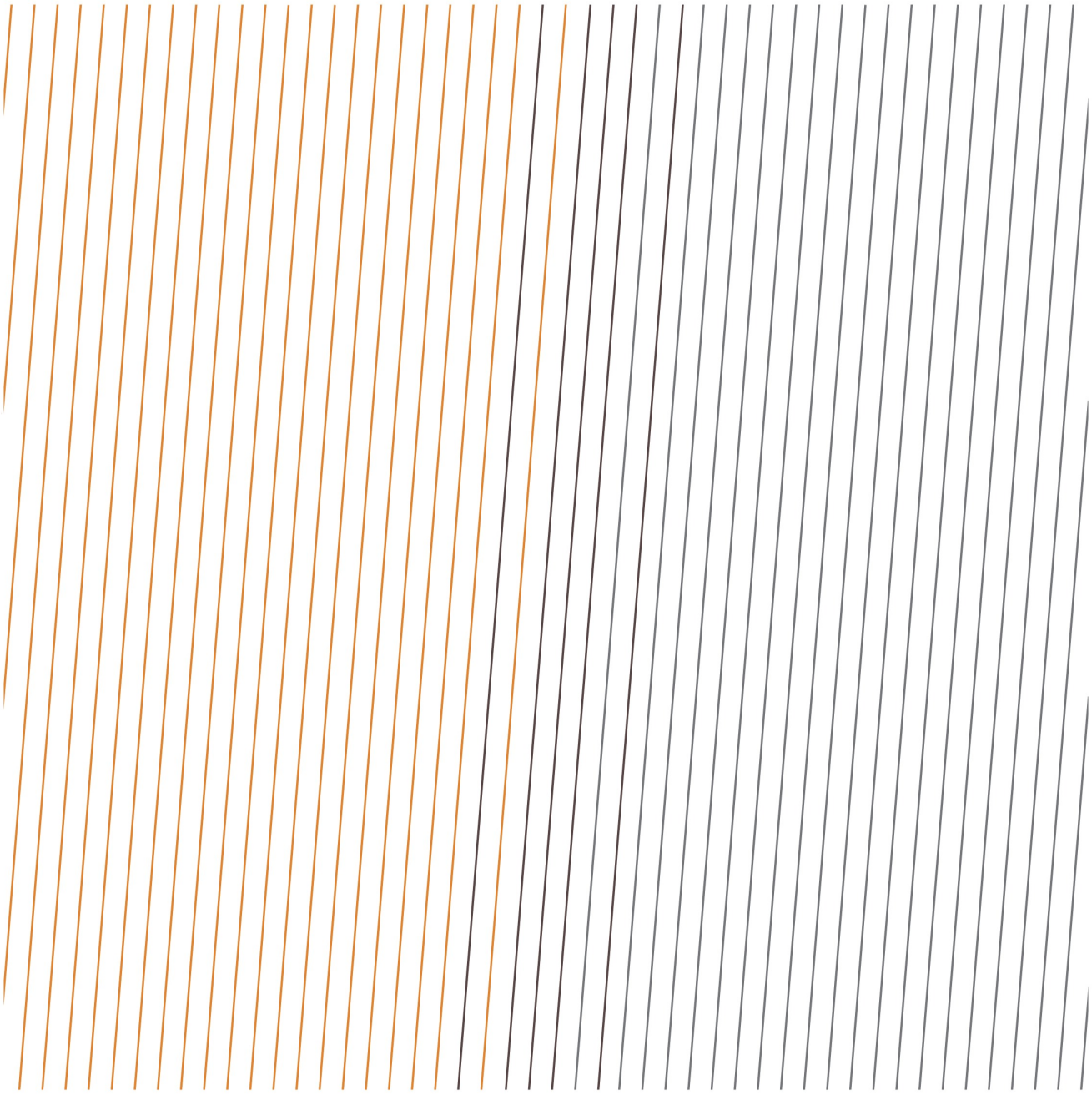
International Association of Oil & Gas Producers

REPORT
2021p

September
2022

DATA SERIES

IOGP Safety performance indicators - Process safety events - 2021 data



Acknowledgements

IOGP thanks those companies that have participated in the data collection programme. This report was produced by the Safety Committee.

Feedback

IOGP welcomes feedback on our reports: publications@iogp.org

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VERSION	DATE	AMENDMENTS
1.00	September 2022	First release

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Contributing companies

The process safety statistics were derived from data provided by the following companies:

2019

ADNOC
Aker BP
Aker Energy
Assala Energy
Beach Energy
BHP
BP
Capricorn Energy PLC.
CEPSA EP
Chevron
Chrysaor
CNOOC
ConocoPhillips
Dragon Oil
ENI
Equinor ASA
ExxonMobil
Gulf Keystone
Hess Corporation
Husky Energy
INPEX Corporation
KMG
Kosmos Energy
Kuwait Oil Company
MOL
Neptune Energy
North Oil Company
Oil Search
OMV
Pan American Energy
Petrobras
Petronas Carigali SDN BHD
PGNiG
Pluspetrol
Premier Oil
PTTEP
QatarGas
Repsol
Sasol
Shell Companies
Sonangol
Suncor
TotalEnergies
Tullow Oil
Wintershall Dea
Woodside
YPF SA

2020

ADNOC
Assala Energy
Beach Energy
BHP
BP
BW Energy
Capricorn Energy PLC.
CCED
CEPSA EP
Chevron
Chrysaor
CNOOC
ConocoPhillips
ENI
Equinor ASA
ExxonMobil
GENEL
Gulf Keystone
Husky Energy
INPEX Corporation
KMG
Kosmos Energy
Kuwait Oil Company
MOL
Neptune Energy
North Oil Company
Oil Search
OMV
Pan American Energy
Petrobras
Petronas Carigali SDN BHD
PGNiG
Pluspetrol
Premier Oil
PTTEP
QatarGas
Repsol
Shell Companies
SOCAR
Suncor
TotalEnergies
Wintershall Dea
Woodside
YPF SA

2021

ADNOC
Aker BP
Assala Energy
Beach Energy
BHP
BP
BW Energy
Capricorn Energy PLC.
CCED
Cenovus
CEPSA EP
Chevron
CNOOC
ConocoPhillips
Dana Gas
ENI
Equinor ASA
ExxonMobil
GENEL
Gulf Keystone
Harbour Energy
INPEX Corporation
Kosmos Energy
Kuwait Oil Company
MOL
Neptune Energy
North Oil Company
Oil Search
OMV
Pan American Energy
Petrobras
Petronas Carigali SDN BHD
Pluspetrol
Premier Oil
PTTEP
QatarGas
Repsol
Shell Companies
SOCAR
Sonangol
Suncor
TotalEnergies
Tullow Oil
Vår Energy
Wintershall Dea
Woodside
YPF SA

Introduction

In response to a number of major incidents, the oil and gas industry has identified opportunities to improve Key Performance Indicators (KPIs) for monitoring and review within management systems in order to more proactively identify and address barrier weaknesses.

IOGP Report 456, Process Safety - *Recommended Practice on Key Performance Indicators* was last revised in November 2018. It provides guidance for companies with upstream activities on Key Performance Indicators (KPI) used in managing process safety for the prevention of unplanned and uncontrolled loss of containment events. It builds on the framework and definitions included in the API Recommended Practice (RP) 754 (revised in April 2016), Process Safety Indicators for the Refining and Petrochemical Industries on process safety indicators, with specific emphasis on their application to upstream oil and gas activities.

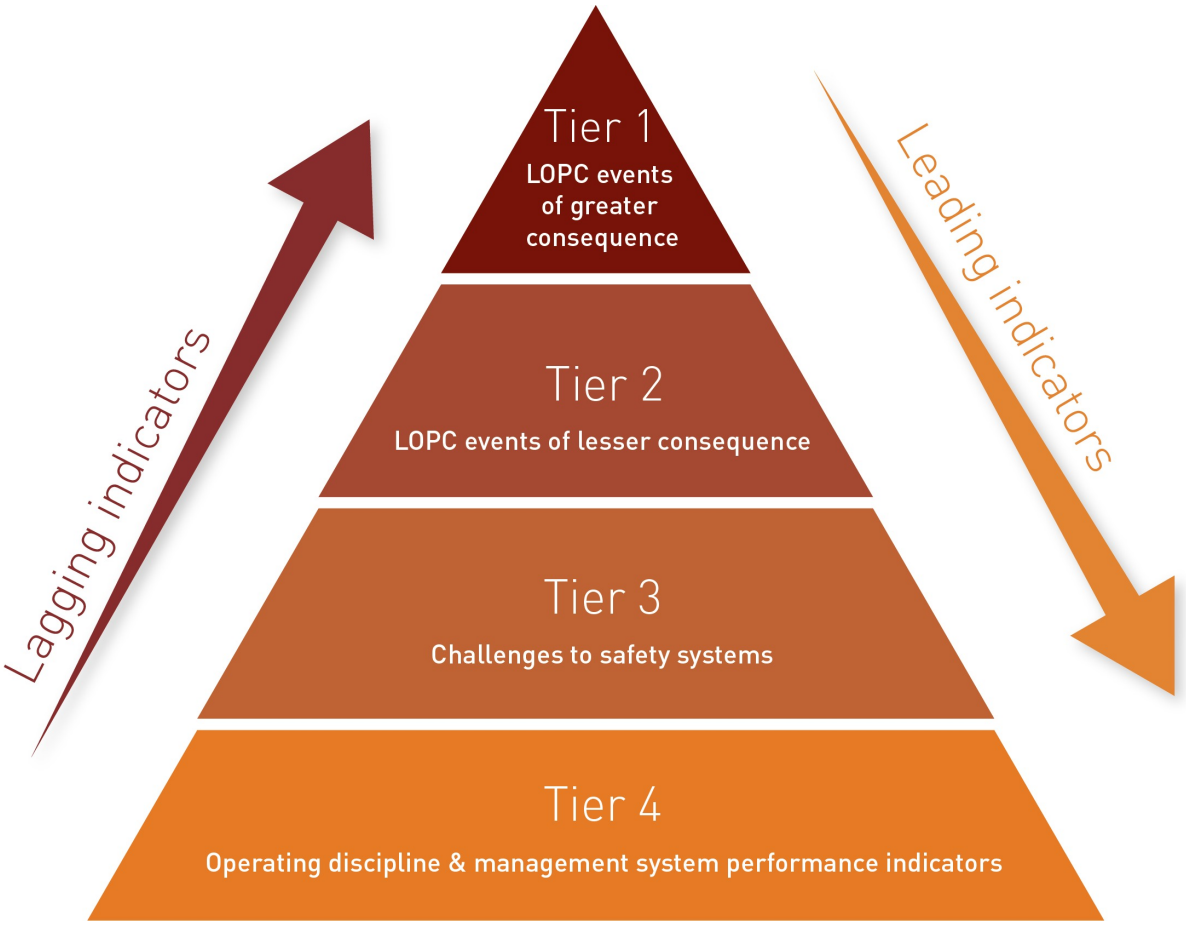
It is noted that the API RP 754 3rd Edition was issued in August 2021, but for this report the reference to API RP 754 2nd Edition has been maintained to be consistent with the 2021 reporting guidance.

IOGP Report 456 and API RP 754 adopt a four-tier framework of KPIs which is illustrated in Figure 2.

Tiers 1 and 2 are predominantly lagging indicators related to Loss of Primary Containment (LOPC) referred to as a Process Safety Event (PSE):

- The Tier 1 KPI records events with greater consequence within the four-tier approach.
- The Tier 2 KPI records incidents with a lesser consequence.

Figure 1: Process Safety Indicator Pyramid (from API RP 754, April 2016)



RP 754 Tier 1 and Tier 2 KPI definitions and thresholds have been adopted by IOGP with the intent that both indicators can be applied across production and drilling operations for the industry worldwide.

Tier 1 and Tier 2 KPIs include LOPC incidents that are reportable as Process Safety Events (PSEs) if the incident results in any of the consequences shown in Figure 3. The definitions refer to material release threshold quantities, which are published in Part E of IOGP Report 456.

Figure 2: Process Safety Event definitions and thresholds (from IOGP Report 456, extract from API RP 754, 2016)



Process safety event definitions, reproduced from API RP 754

Tier 1 Indicator Definition and Consequences

A Tier 1 PSE is an unplanned or uncontrolled release of any material (Loss of Primary Containment, or LOPC), including non-toxic and non-flammable materials (e.g., steam, hot water, nitrogen, compressed CO_2, or compressed air), from a process that results in one or more of the consequences listed below:

- An employee, contractor or subcontractor 'days away from work' injury and/or fatality
- A hospital admission and/or fatality of a third party
- An officially declared community evacuation or community shelter-in-place including precautionary community evacuation or community shelter-in-place
- A fire or explosion damage greater than or equal to $100,000 of direct cost
- An engineered pressure relief (e.g., use of a pressure relief device (PRD), safety instrumented system (SIS), or manually initiated emergency depressure) discharge, of a quantity greater than or equal to the threshold quantities in Part E in any one-hour period, whether directly to the atmosphere, or via a downstream destructive device that results in one or more of the following four consequences:
  - rainout
  - discharge to a potentially unsafe location
  - an onsite shelter-in-place or on-site evacuation, excluding precautionary on-site shelter-in-place or on-site evacuation
  - public protective measures (e.g., road closures) including precautionary public protective measures
- An upset emission from a permitted or regulated source, of a quantity greater than or equal to the threshold quantities in Part E in any one-hour period, that results in one or more of the following four consequences:
  - rainout
  - discharge to a potentially unsafe location
  - an on-site shelter-in-place or on-site evacuation, excluding precautionary on-site shelter-in-place or on-site evacuation
  - public protective measures (e.g., road closures) including precautionary public protective measures
- A release of material greater than or equal to the threshold quantities described in Part E in any one hour period.

Tier 2 Indicator Definition and Consequences

A Tier 2 Process Safety Event (PSE) is an LOPC with lesser consequence. A Tier 2 PSE is an unplanned or uncontrolled release of any material, including non-toxic and non-flammable materials (e.g., steam, hot water, nitrogen, compressed CO2 or compressed air), from a process that results in one or more of the consequences listed below and is not reported as a Tier 1 PSE:

- An employee, contractor or subcontractor recordable injury
- A fire or explosion damage greater than or equal to $2,500 of direct cost to the company
- An engineered pressure relief (PRD, SIS, or manually initiated emergency depressure) device discharge, of a quantity greater than or equal to the threshold quantities in Part E in any one-hour period, whether directly to atmosphere or via a downstream destructive device that results in one or more of the following four consequences:
  - rainout
  - discharge to a potentially unsafe location
  - an on-site shelter-in-place or on-site evacuation, excluding precautionary on-site shelter-in-place or on-site evacuation
  - public protective measures (e.g., road closures) including precautionary public protective measures
- An upset emission from a permitted or regulated source, of a quantity greater than or equal to the threshold quantities in Part E in any one-hour period, that results in one or more of the following four consequences:
  - rainout
  - discharge to a potentially unsafe location
  - an on-site shelter-in-place or on-site evacuation, excluding precautionary on-site shelter-in-place or on-site evacuation
  - public protective measures (e.g., road closures) including precautionary public protective measures
- A release of material greater than or equal to the threshold quantities described in Part E in any one-hour period.

Note: See section 2 for additional guidance on releases from a Pressure Relief Device (PRD), cold vent flaring, shelter-in-place and public protective measures.

Note: Some non-toxic and non-flammable materials (e.g. steam, hot water or compressed air) have no threshold quantities and are only included in this definition as a result of their potential to result in one of the other consequences.

Note: An internal fire or explosion that causes an LOPC from a process triggers an evaluation of the consequences. The LOPC does not have to occur first.

Note: In determining the Threshold Release Category, a company may choose to use either the properties of the released material based upon laboratory analysis at the time of the release, or the properties documented in the safety data sheet. Companies should be consistent in their approach for all LOPCs.

Note: Refer to API RP 754, Annex G (Application of Threshold Release Categories to Multicomponent Releases) for guidance on how to properly determine the threshold quantity for mixtures.

Note: "days away from work" injury should be taken to be the same as the IOGP defined Lost Work Day Case (LWDC).

In this report, 2021 data are published together with 2012-2020 data.

The Process Safety Event (PSE) data presented in this report are based on the numbers of Tier 1 and Tier 2 PSE reported by participating IOGP Member Companies, broken down for:

- onshore and offshore
- drilling and production
- activities
- consequences
- material released

The Tier 1 and Tier 2 data presented have been normalized against reported work hours associated with drilling and production activities to provide PSE rates.

Tier 3 and Tier 4 process safety KPIs are not included in this report as they are primarily intended for use at a company or facility level. Guidance on Tier 3 and Tier 4 indicators is available in IOGP Report 456, Part G.

Definitions

Loss of primary containment (LOPC)

An unplanned or uncontrolled release of any material from primary containment, including non-toxic and non-flammable materials (e.g. steam, hot water, nitrogen, compressed CO2 or compressed air). [From API RP 754 (2nd edition)]

For drilling operations, any unplanned or uncontrolled release to the surface (seabed or ground level) should be included. LOPC is a type of event. An unplanned or uncontrolled release is an LOPC irrespective of whether the material is released into the environment, or into secondary containment, or into other primary containment not intended to contain the material released under normal operating conditions).

Process safety [From API RP 754 (2nd edition)]

A disciplined framework for managing the integrity of hazardous operating systems and processes by applying good design principles, engineering, and operating and maintenance practices. It deals with the prevention and control of events with the potential to release hazardous materials or energy. Such releases can result in toxic effects, fire or explosion, and could ultimately result in serious injuries, property damage, lost production and environmental impact.

Primary containment

A tank, vessel, pipe, truck, rail car, or other equipment designed to keep a material within it, typically for purposes of storage, separation, processing or transfer of gases or liquids. The terms vessel and pipe are taken to include containment of reservoir fluids within the casing and wellhead valving to the surface. Note that primary containment for a specified material may comprise a vessel or pipe that is inside another vessel that is also designed as primary containment for a different material; for example, a heating tube is primary containment for fuel gas or fuel oil, even though the tubes may be inside a firebox which is in turn within an oil-water separator.

Process safety event (PSE) – IOGP reportable

An unplanned or uncontrolled release of any material including non-toxic and non-flammable materials (e.g., steam, hot water, nitrogen, compressed CO2 or compressed air) from a process, or an undesired event or condition, that under slightly different circumstances, could have resulted in a release of material. For more information see IOGP Report 456, *Process safety - Recommended practice on Key Performance Indicators*

Secondary containment [From API RP 754 (2nd edition)]

An impermeable physical barrier specifically designed to mitigate the impact of materials that have breached primary containment (i.e. an LOPC). Secondary containment systems include, but are not limited to: tank dykes, curbing around process equipment, drainage collection systems, the outer wall of open top double walled tanks, etc.

A summary of 2012-2021 data can be found in Appendix B.

A glossary of terms related to Process Safety Events can be found in Appendix D.

Data collection

Participating IOGP Member Companies were asked to report the number of offshore and onshore Tier 1 and Tier 2 PSE for both drilling and production, consequences relating to Tier 1 and Tier 2 PSE and additional information about the material released and the operational activities at the time of the release. Note that a single PSE can result in multiple consequences, so the total number of consequences reported will equal or exceed the total number of PSEs.

Information was also requested on fatalities that resulted from PSE, i.e., the number of PSE that resulted in one or more fatalities, as well as the actual number of fatalities (employees and contractors, or third parties).

Narrative event descriptions

Narrative descriptions of Tier 1 PSE, as well as fatal incidents and high potential events that have been collected as part of the annual safety performance indicators report and that are process safety events or process safety related, are published as 2021pfh, *Tier 1 PSE, Fatal incident and high potential event reports* . Process safety related events are those where there are significant process safety learnings but the criteria for PSE is not met, e.g., equipment not connected to the process. The intention is to enable feedback on learnings from events and to help organizations to categorize process safety events.

The narrative descriptions of fatal incidents and high potential events are submitted separately to the process safety event data published in this report, and Tier 1 PSE narratives were not provided for all reported Tier 1 PSE. Therefore there can be no direct correlation between the narratives and the data published in this report.

Descriptions and lessons learned for Tier 1 PSE are available at https://data.iogp.org/ProcessSafety/Tier1PSE/. Fatal incidents that are also Tier 1 PSE are available at https://data.iogp.org/ProcessSafety/FatalIncidents/. High potential events that are PSE or PSE related are available at https://data.iogp.org/ProcessSafety/HighPotentialEvents/.

Descriptions and lessons learned for all reported events that had fatal consequences for company or contractor employees are available at https://data.iogp.org/Safety/FatalIncidents/. High potential events are available at https://data.iogp.org/Safety/HighPotentialEvents/.

Normalization

Tier 1 and Tier 2 PSE have been normalized against work hours associated with process safety events using the following formula for the PSE Rate. Refer to IOGP Report 456, Part C, for further information.

$$\text{Tier 1 PSER} = \frac{\text{Total Tier 1 PSE Count}}{\text{Total Hours Worked (for drilling and production activities)}} \times 1{,}000{,}000$$

$$\text{Tier 2 PSER} = \frac{\text{Total Tier 2 PSE Count}}{\text{Total Hours Worked (for drilling and production activities)}} \times 1{,}000{,}000$$

Data are only included for normalized results where both work hours and process safety event data are reported for the data set and work function.

Scope of reporting and data validation

The data requested from participating IOGP Member Companies are published in an annual User Guide, IOGP Report , which contains definitions and the scope of the safety data submission. This document is available from the IOGP public website.

The safety data submission process is used for the collection of data relating to safety performance, process safety performance and motor vehicle crashes. The IOGP safety database has built-in data validation requirements and each company data submission is validated by the IOGP Secretariat and the work group (Safety Committee, Subcommittee, Task Force or Network) responsible for the data set in accordance with the IOGP data collection and reporting procedure. Any communication with reporting companies is conducted by the IOGP Secretariat and any data validated by an IOGP workgroup is blind coded to preserve the anonymity of the reporting companies.

A self-assessment questionnaire is included within the data submission process to determine the alignment between the requested data and the company submissions. The information provided in this questionnaire is also used in the validation process. Data that appear to be incorrect and that cannot be confirmed by the submitting company as correct may be excluded from the data set at the discretion of the Secretariat.

The scope of data included within this report is detailed in Appendix A.

Data series

Other IOGP data reports published annually include:

- Aviation Safety Data
- Environmental Performance Indicators
- Health Performance Indicators
- Motor Vehicle Crash Data
- Safety Performance Indicators Data

These are available from the IOGP website http://www.iogp.org/bookstore.

Environmental Performance Indicators, Safety Performance Indicators and the information published in this report are also available in electronic format in IOGP's data website at https://data.iogp.org/.

1. 2021 results

1.1 Tier 1 and Tier 2 PSE

The total number of Tier 1 and Tier 2 process safety events reported for 2012-2021 and the normalized rates are shown in Figure 3, Figure 5 and Table 1. The data include onshore and offshore activities related to production and drilling operations.

47 companies contributed PSE data in 2021 (vs. 44 in 2020, 47 in 2019) (see Table 2 and Appendix A). This is in comparison with 50 companies contributing to the safety performance indicators database in 2021 (48 in 2020, 48 in 2019).

Figure 3:

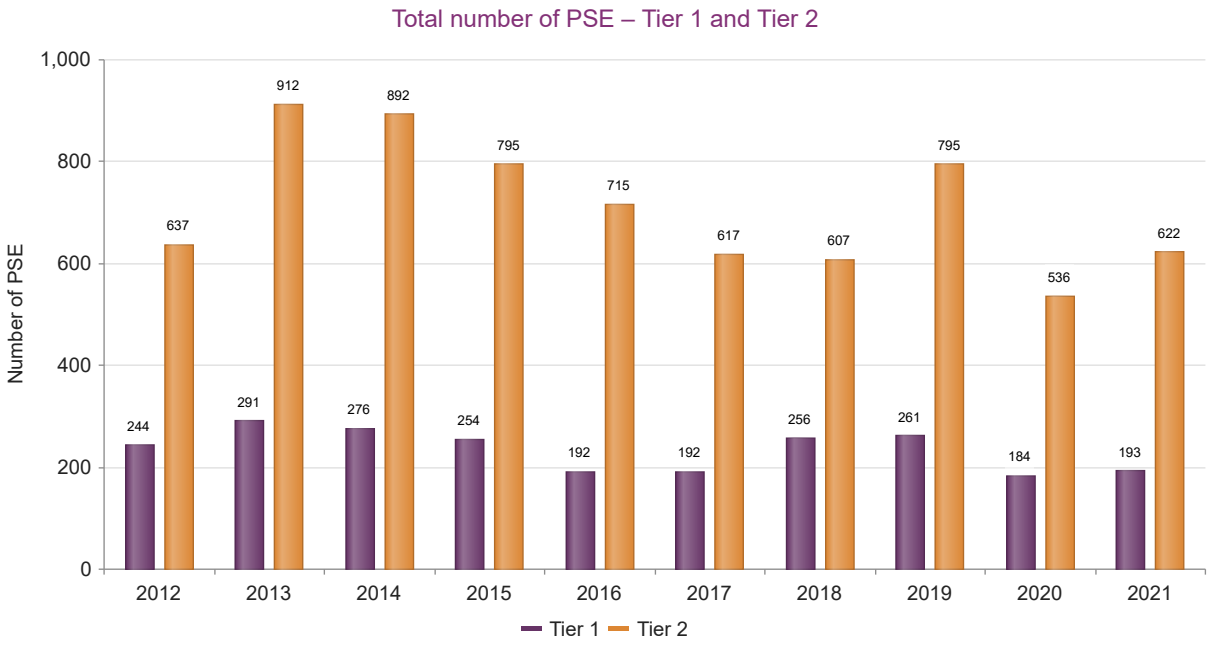
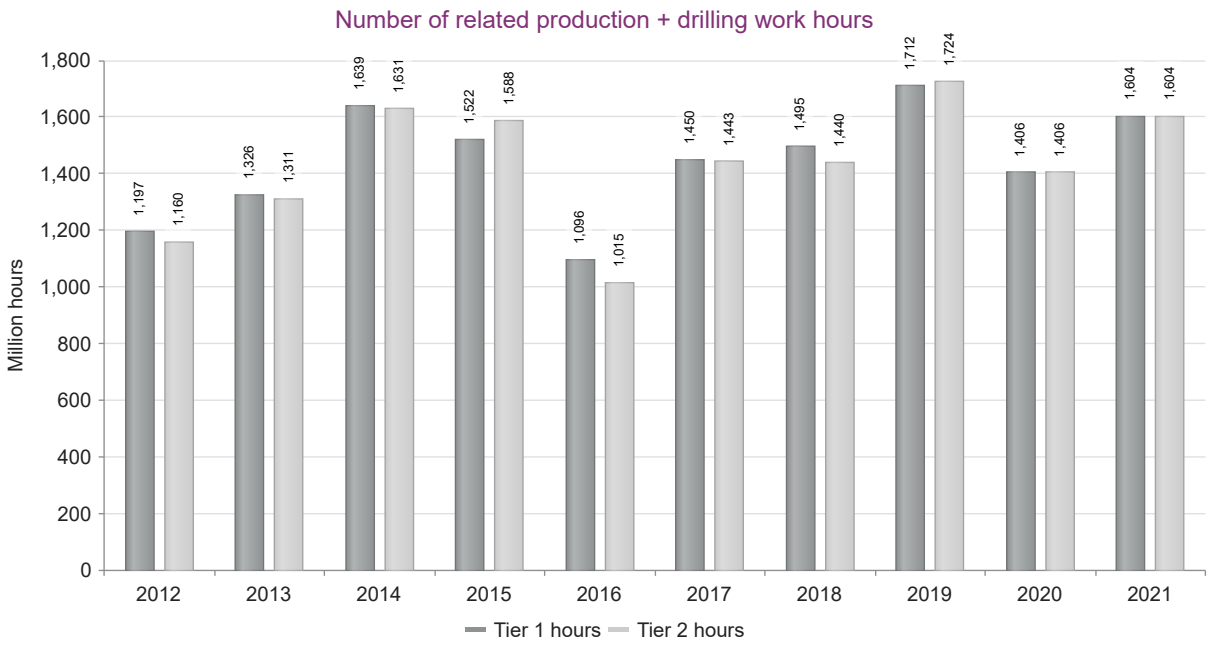


Figure 4:



The data presented in Figure 5 have been normalized using the company-reported work hours associated with drilling and production operations.

Where companies have not provided work hours for the drilling and production functions specifically, their reported PSEs and overall work hours have been excluded from the normalized analysis shown in Figure 5. See Tables B.1 (Tier 1 data) and B.2 (Tier 2 data).

Figure 5:

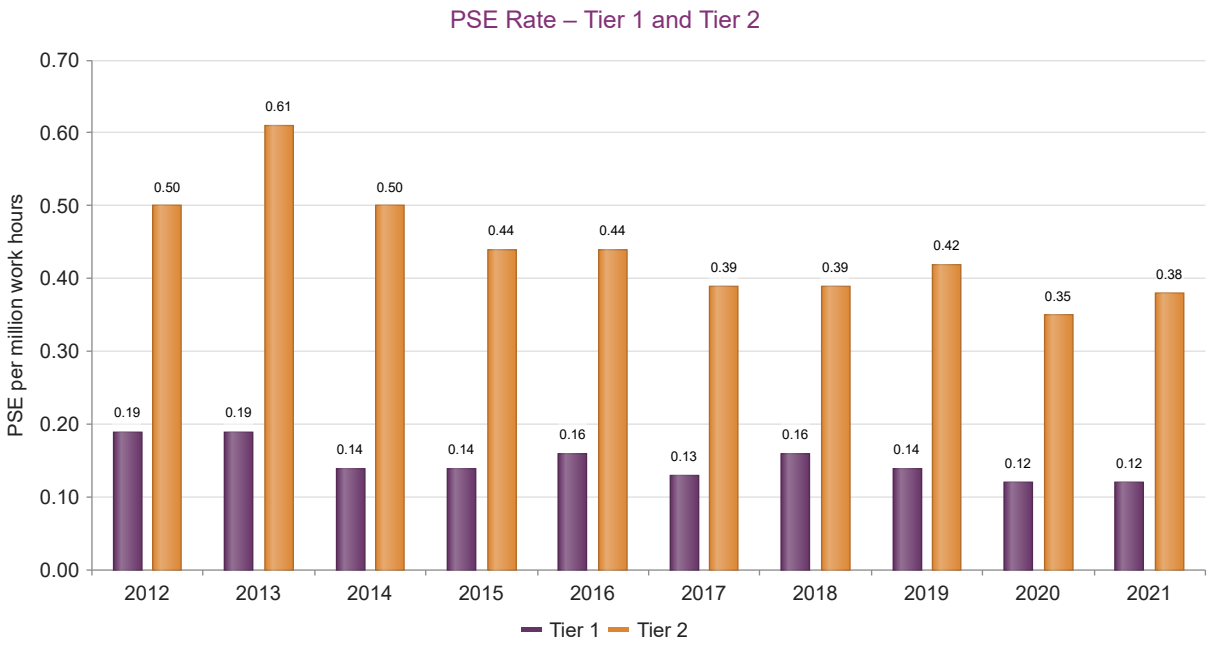


Table 1: Number of reported PSE (2012 - 2021)

	Number of PSE		Number of PSE for normalized results*		PSE rate (PSE per million work hours)*	
Year	Tier 1	Tier 2	Tier 1	Tier 2	Tier 1	Tier 2
2012	244	637	228	582	0.19	0.50
2013	291	912	252	803	0.19	0.61
2014	276	892	227	808	0.14	0.50
2015	254	795	216	700	0.14	0.44
2016	192	715	176	444	0.16	0.44
2017	192	617	187	558	0.13	0.39
2018	256	607	238	555	0.16	0.39
2019	261	795	246	729	0.14	0.42
2020	184	536	173	486	0.12	0.35
2021	193	622	193	614	0.12	0.38

** Excludes PSE where no related drilling or production work hours were reported*

For related work hours for normalized results, see Table 2 (Scope – overall results).

In 2021, reported PSE represented approximately 97% of the drilling and production work hours in the 2021 IOGP safety database, i.e., out of 1,655 million hours (99% in 2020, 99% in 2019, see Table A.1).

Table 2: Scope – overall results (2012 - 2021)

	Number of companies reporting PSE			Number of data sets where PSE data reported		Related work hours (millions)*	
Year	Overall	Tier 1	Tier 2	Tier 1	Tier 2	Tier 1	Tier 2
2011	26	26	20	322	270	971	912
2012	32	32	29	428	426	1,197	1,160
2013	39	39	38	378	375	1,326	1,310
2014	44	44	42	571	547	1,639	1,631
2015	44	44	44	589	586	1,522	1,587
2016	39	39	39	487	481	1,096	1,014
2017	43	43	43	507	513	1,449	1,443
2018	42	42	41	548	533	1,494	1,439
2019	47	47	47	508	507	1,712	1,724
2020	44	44	43	346	346	1,406	1,406
2021	47	47	47	363	363	1,603	1,603

Note: Only includes drilling and production work hours where companies reported these.

PSE Data Set: A set of data with distinct company, country and location (onshore/offshore) where PSE data have been entered (i.e., not blank).

1.2. Sabotage/wilful damage

Process safety events as a result of sabotage or wilful damage were reported for 2012-2021, but were not included in the PSE totals or normalized rates since they are a specific subset of PSE.

Table 3: Sabotage/wilful damage – number of reported PSE (2012 - 2021)

	Number of PSE reated to sabotage or wilful damage	
Year	Tier 1	Tier 2
2012	87	51
2013	113	47
2014	91	49
2015	52	20
2016	18	4
2017	13	0
2018	14	5
2019	20	3
2020	4	4
2021	14	22

14 Tier 1 PSE related to sabotage or wilful damage were reported in 2021. All 14 occurred onshore. All 14 were associated with production operations and resulted in material release.

None of the sabotage/wilful damage PSE reported to date have involved fatalities.

1.3 Onshore and offshore

The Tier 1 and Tier 2 data presented below represent production and drilling PSEs and associated work hours.

Figure 6:

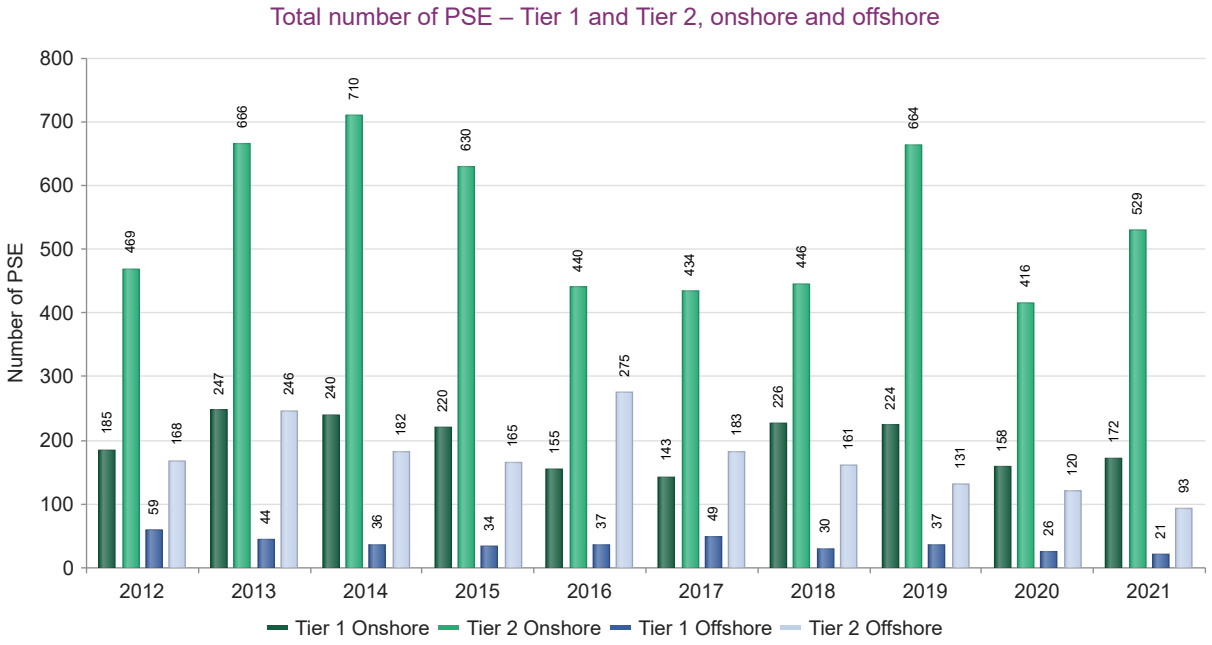
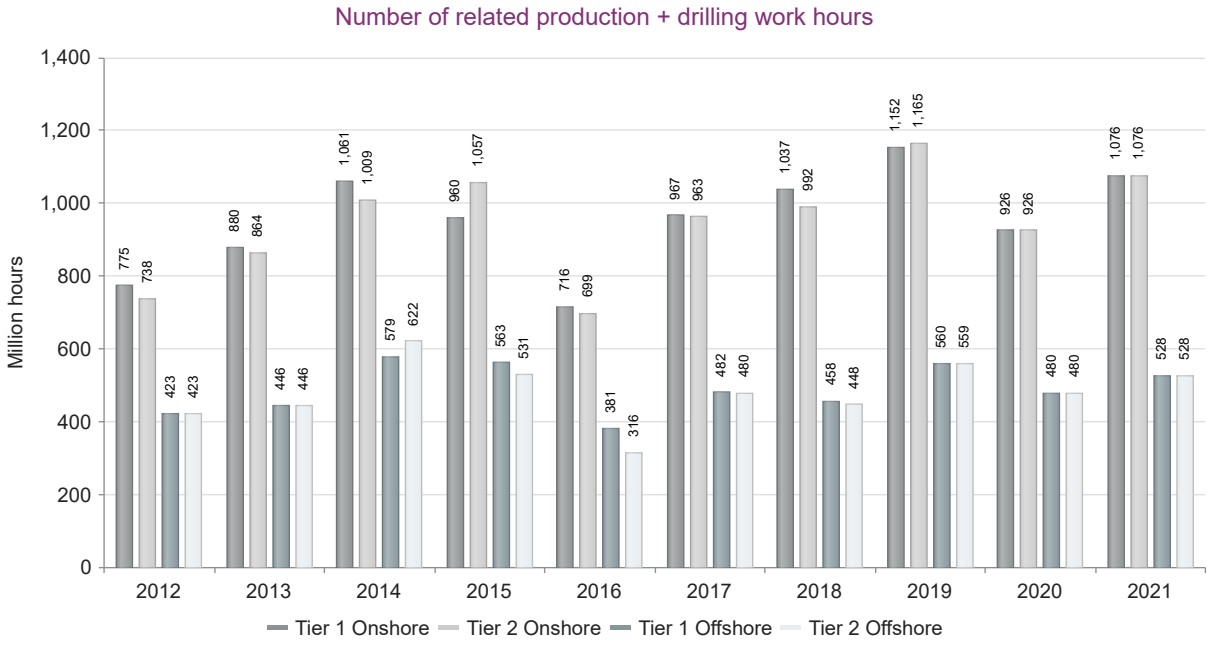
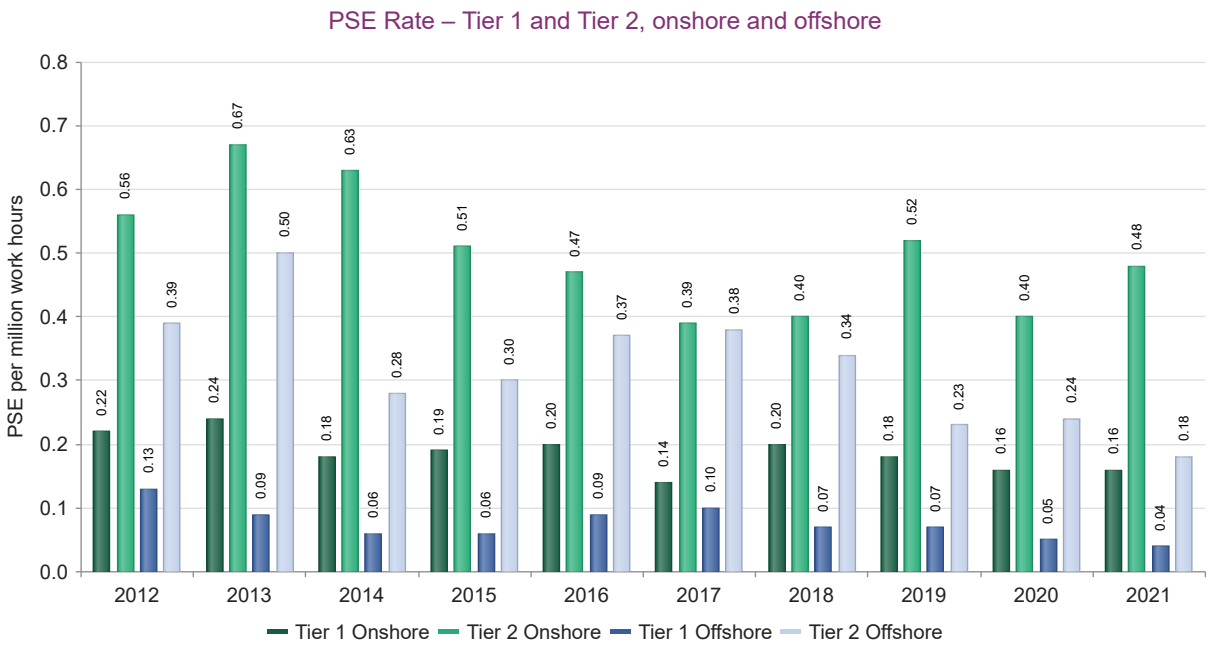


Figure 7:



Note: Excludes work hours where Tier 1 or Tier 2 PSE are not reported. Not all companies report Tier 1 or Tier 2 PSE for all countries onshore/offshore.

Figure 8:


PSE Rate – Tier 1 and Tier 2, onshore and offshore
PSE per million work hours
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
0.22
0.56
0.13
0.39
0.24
0.67
0.09
0.50
0.18
0.63
0.06
0.28
0.19
0.51
0.06
0.30
0.20
0.47
0.09
0.37
0.14
0.39
0.10
0.38
0.20
0.40
0.07
0.34
0.18
0.52
0.07
0.23
0.16
0.40
0.05
0.24
0.16
0.48
0.04
0.18
Tier 1 Onshore
Tier 2 Onshore
Tier 1 Offshore
Tier 2 Offshore

1.4 Tier 1 PSE causal factors

Allocation of 'causal factors' to Tier 1 process safety events was introduced as part of the 2014 data request.

To standardize the response, an IOGP list of causal factors and a glossary was provided to the Member Companies as part of the IOGP User Guide. The causal factors list is divided into two sections:

- People (Acts) classifications usually involve either the actions of a person or actions which were required but not carried out or were incorrectly performed. There are four major categories of actions, with an additional level of detail under each of the major categories.
- Process (Conditions) classifications usually involve some type of physical hazard or organizational aspect out of the control of the individual. There are five major classification categories, with an additional level of detail under each of the major categories.

In 2021:

- 193 of the 207 Tier 1 PSE descriptions reported were assigned causal factors.
- 347 causal factors were assigned for the 193 Tier 1 PSE.
- Between 1 and 11 causal factors were assigned per incident.

'Storms or acts of nature' was in the top 10 causal factors for the first time in 2021.

Table 4: Causal factors assigned to Tier 1 PSE (2014 - 2021)

Causal factor group	2014	2015	2016	2017	2018	2019	2020	2021
PEOPLE (ACTS)	73	115	108	72	66	94	50	59
PROCESS (CONDITIONS)	174	346	341	313	319	370	250	288

The causal factors assigned to Tier 1 PSE are shown below. The highlighted content indicates the top 10 causal factors assigned to Tier 1 PSE in 2021 compared with the previous 7 years. 6 of the causal factors were in the top ten for each of the 8 years shown.

Table 5: Causal factors assigned to Tier 1 PSE

Causal factors assigned to Tier 1 PSE	2014	2015	2016	2017	2018	2019	2020	2021
PROCESS (CONDITIONS) : Tools, Equipment, Materials and Products : Inadequate/defective tools/equipment/materials/products	31	32	30	39	48	44	24	63
PROCESS (CONDITIONS) : Tools, Equipment, Materials and Products : Inadequate maintenance/inspection/testing	30	50	49	60	65	58	68	47
PROCESS (CONDITIONS) : Tools, Equipment, Materials and Products : Inadequate design/specification/management of change	22	55	42	42	42	63	27	34
PROCESS (CONDITIONS) : Organizational : Inadequate hazard identification or risk assessment	11	41	40	47	33	46	22	28
PROCESS (CONDITIONS) : Organizational : Inadequate work standards/procedures	18	37	44	30	32	40	22	25
PROCESS (CONDITIONS) : Work Place Hazards : Storms or acts of nature	1	9	14	3	9	11	3	17
PROCESS (CONDITIONS) : Organizational : Inadequate training/competence	15	16	20	21	15	23	13	15
PEOPLE (ACTS) : Following Procedures : Violation unintentional (by individual or group)	8	29	13	23	8	33	11	15
PROCESS (CONDITIONS) : Protective Systems : Inadequate/defective warning systems/safety devices	10	27	20	10	9	17	18	14
PROCESS (CONDITIONS) : Organizational : Inadequate supervision	6	10	15	17	11	20	10	12
PEOPLE (ACTS) : Inattention/Lack of Awareness : Improper decision making or lack of judgment	16	30	23	13	16	12	8	11
PROCESS (CONDITIONS) : Organizational : Inadequate communication	13	15	17	9	11	15	10	10
PROCESS (CONDITIONS) : Protective Systems : Inadequate/defective guards or protective barriers	9	23	26	13	20	14	16	8
PEOPLE (ACTS) : Inattention/Lack of Awareness : Lack of attention/distracted by other concerns/stress	14	16	7	7	10	7	6	5
PEOPLE (ACTS) : Use of Protective Methods : Inadequate use of safety systems	4	5	10	3	3	7	2	5
PROCESS (CONDITIONS) : Protective Systems : Inadequate/defective Personal Protective Equipment	0	4	4	2	1	4	0	5
PROCESS (CONDITIONS) : Work Place Hazards : Hazardous atmosphere (explosive/toxic/asphyxiant)	3	4	3	3	4	4	9	4
PEOPLE (ACTS) : Use of Tools, Equipment, Materials and Products : Improper use/position of tools/equipment/materials/products	10	9	6	9	5	5	4	4
PEOPLE (ACTS) : Following Procedures : Improper position (in the line of fire)	1	5	5	2	5	1	4	4
PROCESS (CONDITIONS) : Organizational : Failure to report/learn from events	1	13	9	4	10	4	3	4
PEOPLE (ACTS) : Use of Protective Methods : Failure to warn of hazard	3	7	12	3	3	9	7	3
PEOPLE (ACTS) : Following Procedures : Violation intentional (by individual or group)	7	4	6	1	3	3	0	3
PEOPLE (ACTS) : Use of Protective Methods : Disabled or removed guards, warning systems or safety devices	1	4	7	3	4	2	3	2
PEOPLE (ACTS) : Use of Protective Methods : Personal Protective Equipment not used or used improperly	4	1	4	3	1	1	2	2
PEOPLE (ACTS) : Use of Protective Methods : Equipment or materials not secured	2	1	10	2	3	5	1	2
PEOPLE (ACTS) : Following Procedures : Improper lifting or loading	0	0	0	0	0	2	0	2
PEOPLE (ACTS) : Use of Tools, Equipment, Materials and Products : Servicing of energized equipment/inadequate energy isolation	2	3	2	2	4	6	2	1
PROCESS (CONDITIONS) : Organizational : Poor leadership/organizational culture	3	8	4	9	6	2	2	1
PROCESS (CONDITIONS) : Work Place Hazards : Inadequate surfaces, floors, walkways or roads	0	0	0	2	2	2	1	1
PROCESS (CONDITIONS) : Protective Systems : Inadequate security provisions or systems	0	2	3	0	1	2	1	0
PROCESS (CONDITIONS) : Work Place Hazards : Congestion, clutter or restricted motion	1	0	1	2	0	1	1	0
PEOPLE (ACTS) : Inattention/Lack of Awareness : Fatigue	0	0	2	0	1	1	0	0
PEOPLE (ACTS) : Following Procedures : Work or motion at improper speed	0	0	0	1	0	0	0	0
PEOPLE (ACTS) : Inattention/Lack of Awareness : Acts of violence	1	1	1	0	0	0	0	0
PEOPLE (ACTS) : Inattention/Lack of Awareness : Use of drugs or alcohol	0	0	0	0	0	0	0	0
PEOPLE (ACTS) : Following Procedures : Overexertion or improper position/posture for task	0	0	0	0	0	0	0	0

Causal factors are listed in order of frequency for 2021. The top 10 causal factors assigned to Tier 1 PSE for each year are highlighted.

1.5 Fatal Incident causal factors

In 2021 no fatal incidents incidents involving workforce fatalities were identified as 'also Tier 1 PSE'.

No 3rd party fatalities associated with Tier 1 PSE were reported for 2021.

Table 6: Causal factors assigned to fatal incidents

Causal factor group	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
PEOPLE (ACTS)	5	18	6	8	12	2	5	1	1	0
PROCESS (CONDITIONS)	10	19	6	21	6	5	7	1	1	0

A full analysis of the causal factors assigned to fatal incidents in 2021 compared with the previous 10 years is shown in Appendix B.

Additional information on the fatal incidents reported by region can be found at https://data.iogp.org/Safety/FatalIncidents/ . The information provided includes a narrative description of the incident, the corrective actions and recommendations and the causal factors assigned by the reporting company.

1.6 High potential event causal factors

In 2021:

- All of the 15 high potential events that have been identified as 'also PSE' were assigned causal factors.
- 31 causal factors were assigned for the 15 high potential events.
- Between 1 and 7 causal factors were assigned per event.

Table 7: Causal factors assigned to high potential events

Causal factor group	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
PEOPLE (ACTS)	26	11	9	4	21	3	9	15	9	7
PROCESS (CONDITIONS)	54	54	41	12	45	25	33	33	33	24

The causal factors assigned to high potential events in 2021 compared with the previous 10 years are shown in Appendix B.

Additional information on the high potential events reported by region can be found on the IOGP Data website at https://data.iogp.org/Safety/HighPotentialEvents/ . The information provided includes a narrative description of the event, the corrective actions and recommendations and the causal factors assigned by the reporting company.

1.7 Barriers

The allocation of 'barriers' to Tier 1 process safety events was requested for the first time as part of the 2014 data submission.

In 2021:

- 178 of the 207 Tier 1 PSE descriptions reported were assigned barriers.
- 356 barriers were assigned for the 178 Tier 1 PSE.
- Between 1 and 11 barriers were assigned per incident.

Table 8: Barriers assigned to Tier 1 PSE

Barriers assigned to Tier 1 PSE	2014	2015	2016	2017	2018	2019	2020	2021
TIER 1 PSE: Hardware Barrier Failures	53	142	179	135	156	170	125	143
TIER 1 PSE: Human Barrier Failures	42	84	88	74	75	85	57	71
TIER 1 PSE: Management System Element Barrier Failure	120	185	186	213	180	188	136	142

The barriers assigned to Tier 1 PSE are shown below. The highlighted content indicates the top 10 barriers assigned to Tier 1 PSE in 2021 compared with the previous 7 years. 8 of the barriers were in the top ten for each of the 5 years shown.

Table 9: Barriers allocated to Tier 1 PSE

Causal factor	2014	2015	2016	2017	2018	2019	2020	2021
Hardware Barrier Failures: Process Containment	20	47	76	74	86	102	56	72
Management System Element Barrier Failure: Asset design and integrity	31	60	56	61	64	49	23	44
Human Barrier Failures: Operating in accordance with procedures - PTW, Isolation of equipment, Overrides and inhibits of safety systems, Shift handover, etc.	22	48	32	37	37	39	17	35
Management System Element Barrier Failure: Risk assessment and control	27	36	39	42	17	39	32	29
Hardware Barrier Failures: Structural Integrity	14	37	37	34	38	35	31	28
Human Barrier Failures: Surveillance, operator rounds and routine inspection	6	17	31	20	26	22	26	25
Management System Element Barrier Failure: Plans and procedures	15	31	34	39	35	24	22	24
Management System Element Barrier Failure: Execution of activities	23	24	19	29	13	22	19	16
Hardware Barrier Failures: Shutdown Systems – including operational well isolation and drilling well control equipment	3	15	10	9	6	9	7	14
Management System Element Barrier Failure: Monitoring, reporting and learning	5	5	12	11	16	12	20	12
Hardware Barrier Failures: Ignition Control	2	4	13	0	4	3	6	11
Hardware Barrier Failures: Protection Systems - including deluge and fire water systems	5	21	6	4	4	5	7	9
Hardware Barrier Failures: Detection Systems	5	16	27	12	12	11	15	7
Management System Element Barrier Failure: Organization, resources and capability	7	7	11	7	9	13	11	7
Management System Element Barrier Failure: Policies, standards and objectives	3	18	6	10	21	22	8	7
Human Barrier Failures: Response to process alarm and upset conditions (e.g., outside safe envelope)	4	6	11	7	5	8	6	6
Human Barrier Failures: Acceptance of handover or restart of facilities or equipment	6	7	7	10	5	8	4	4
Management System Element Barrier Failure: Commitment and accountability	6	4	4	8	2	0	0	2
Hardware Barrier Failures: Emergency Response Equipment and Systems	2	1	7	2	5	5	3	1
Human Barrier Failures: Authorization of temporary and mobile equipment	0	0	1	0	1	1	1	1
Management System Element Barrier Failure: Stakeholders and customers	1	0	1	2	0	1	0	1
Hardware Barrier Failures: Life-Saving Equipment - including evacuation systems	2	1	3	0	1	0	0	1
Human Barrier Failures: Response to emergencies	4	6	6	0	1	7	3	0
Management System Element Barrier Failure: Assurance, review and improvement	2	0	4	4	3	6	1	0

Barriers are listed in order of frequency for 2021. The top 10 barriers assigned to Tier 1 PSE for each year are highlighted.

2. Results by function

Tier 1 and Tier 2 data presented represent both onshore and offshore combined.

2.1 Drilling

Figure 9:

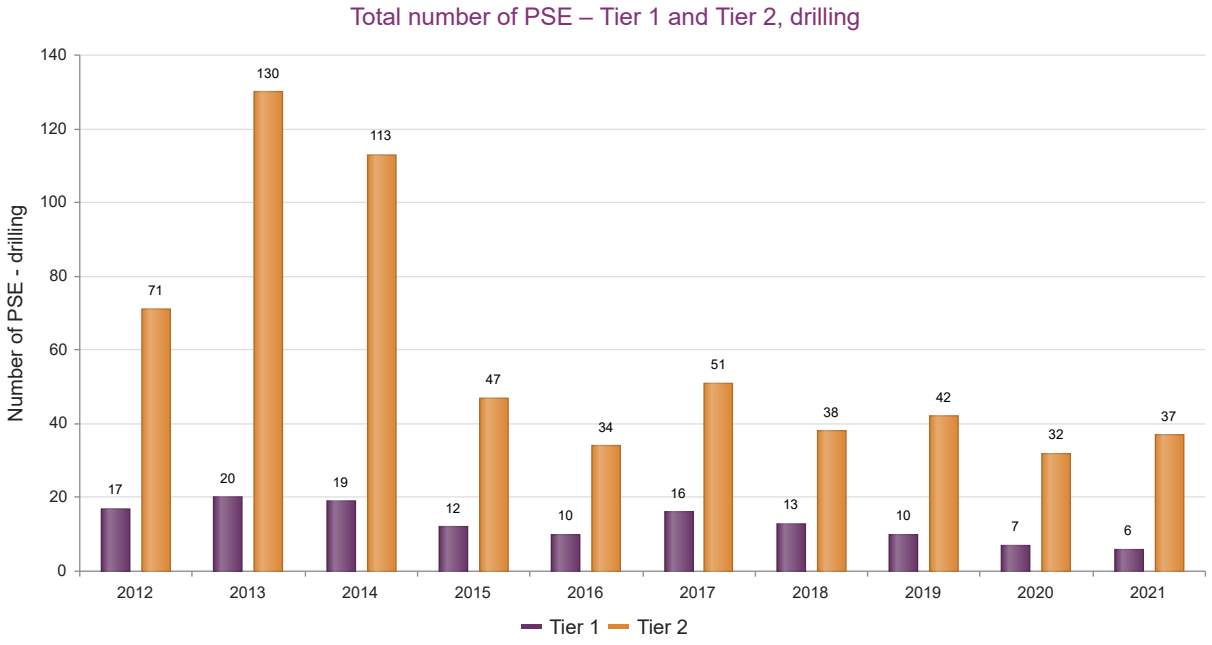


Figure 10:

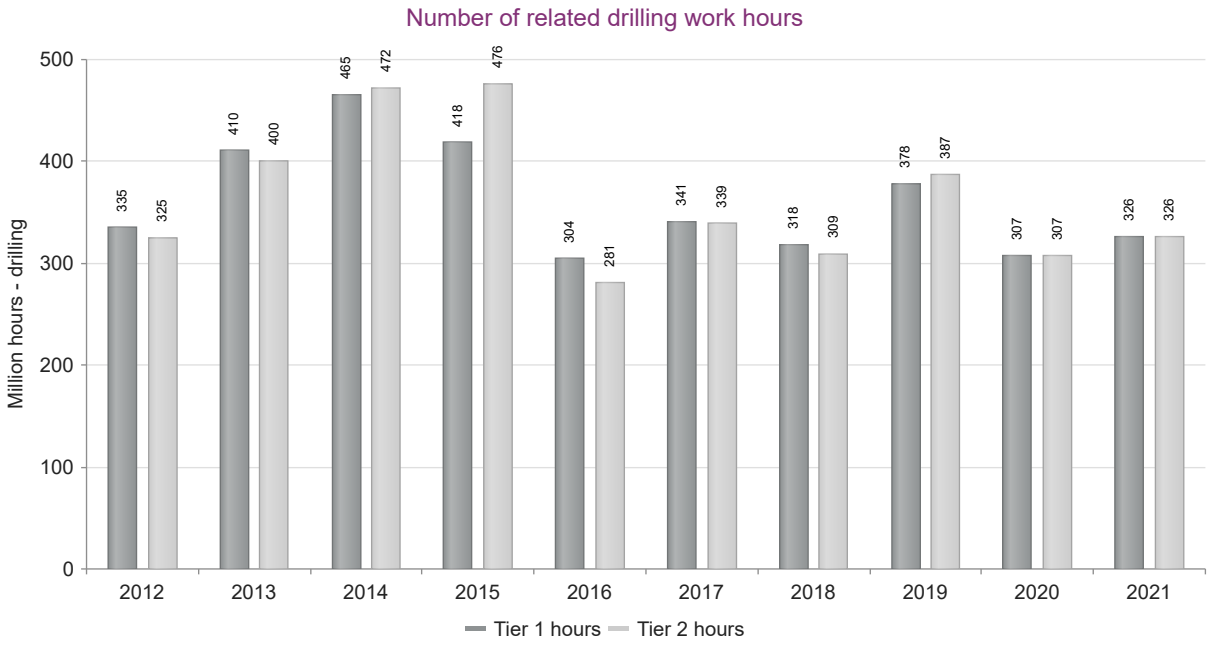


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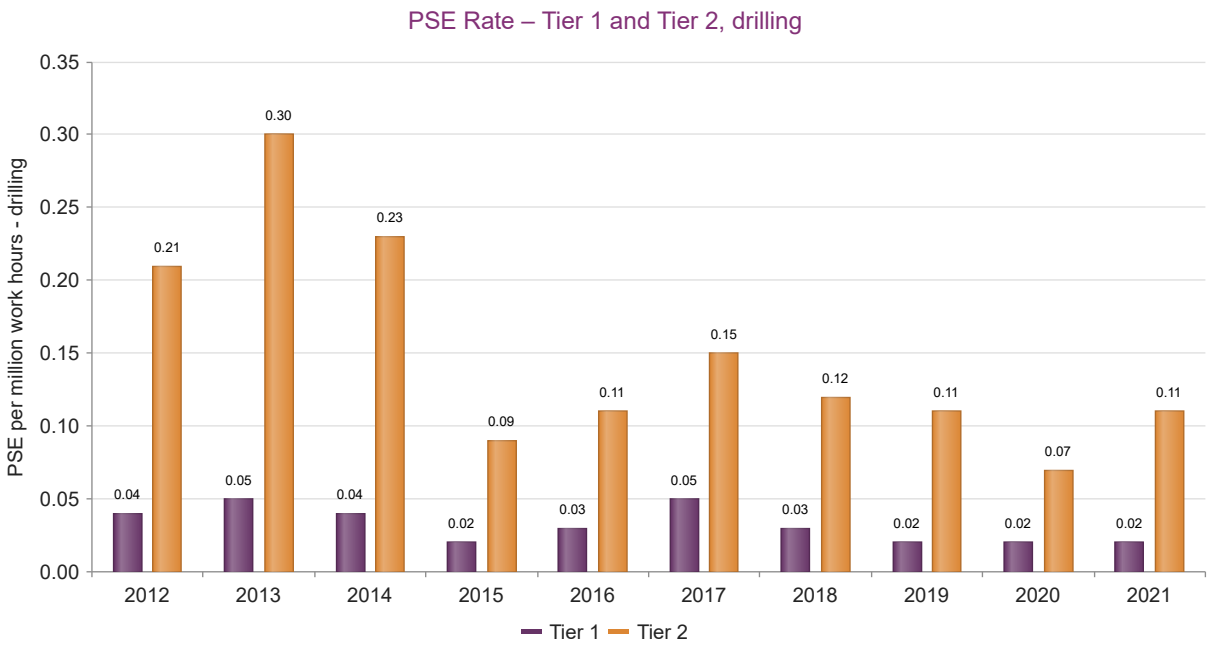


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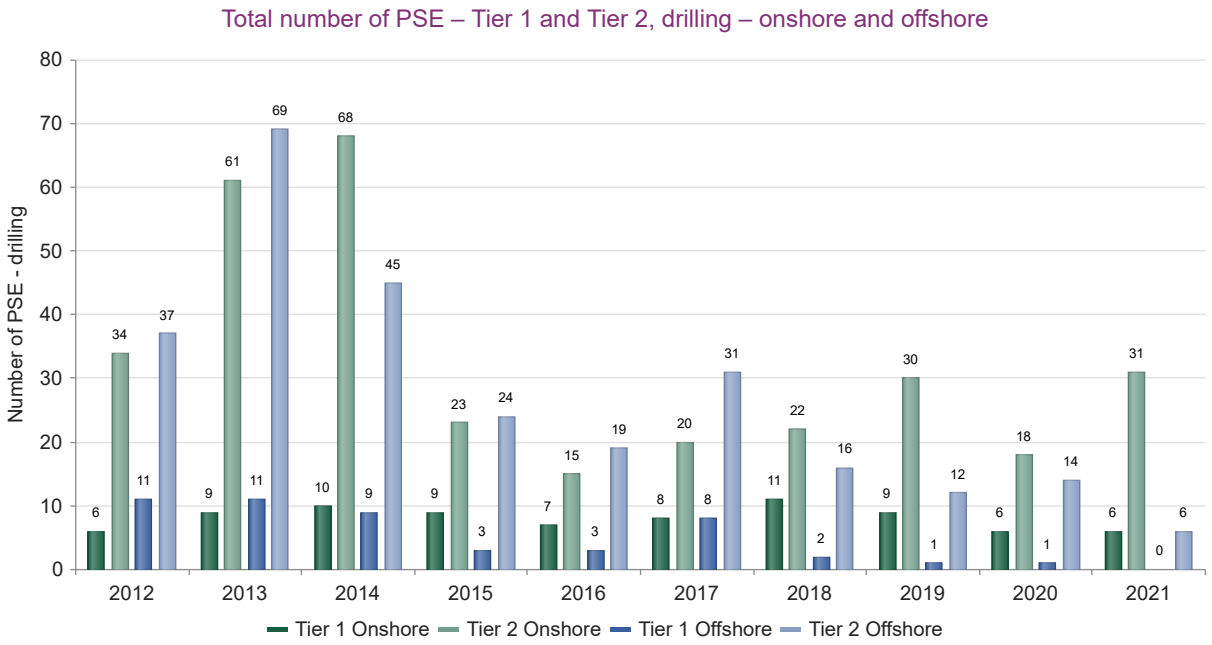


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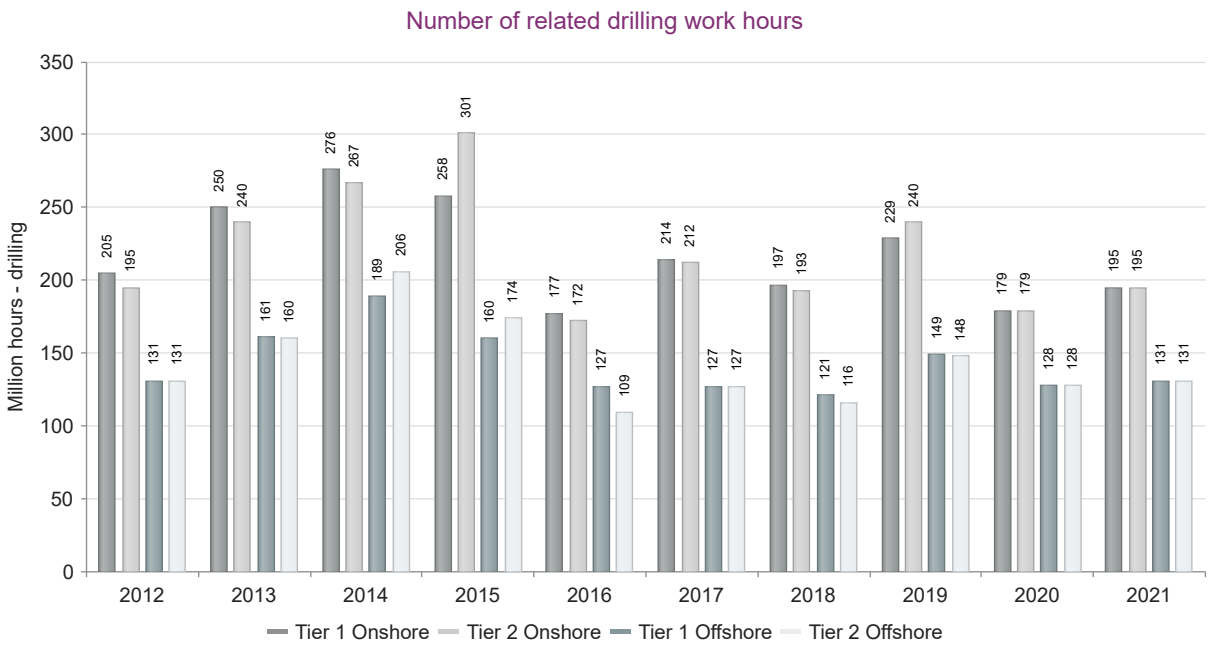
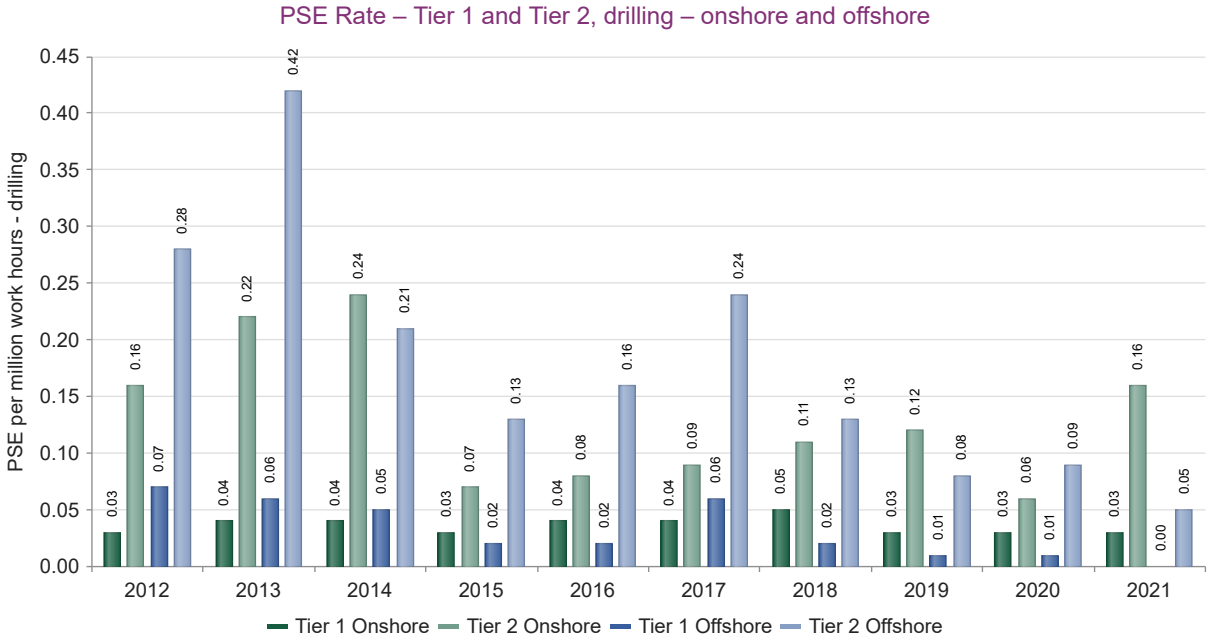


Figure 14:



2.2 Production

Figure 15:

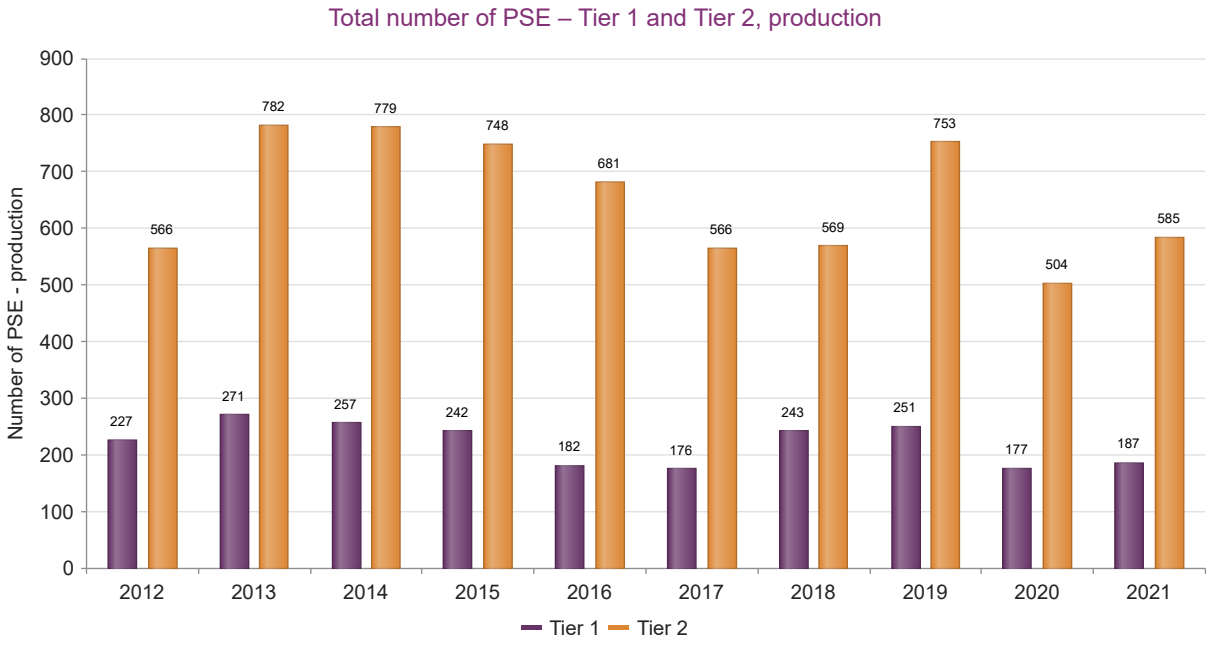


Figure 16:

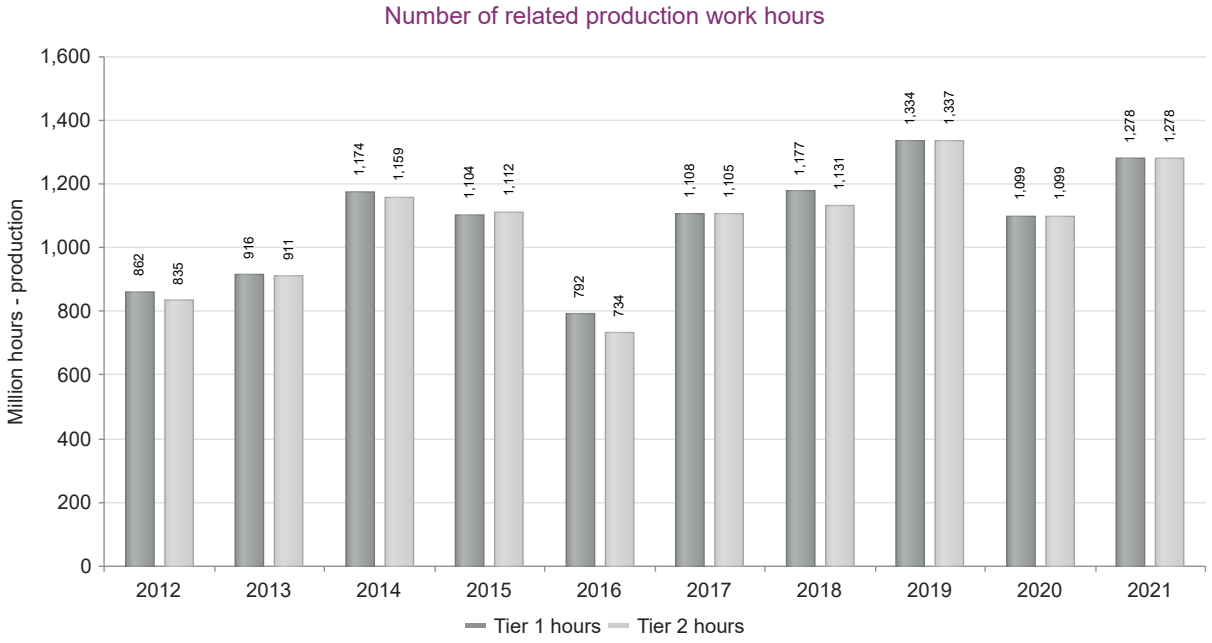


Figure 17:

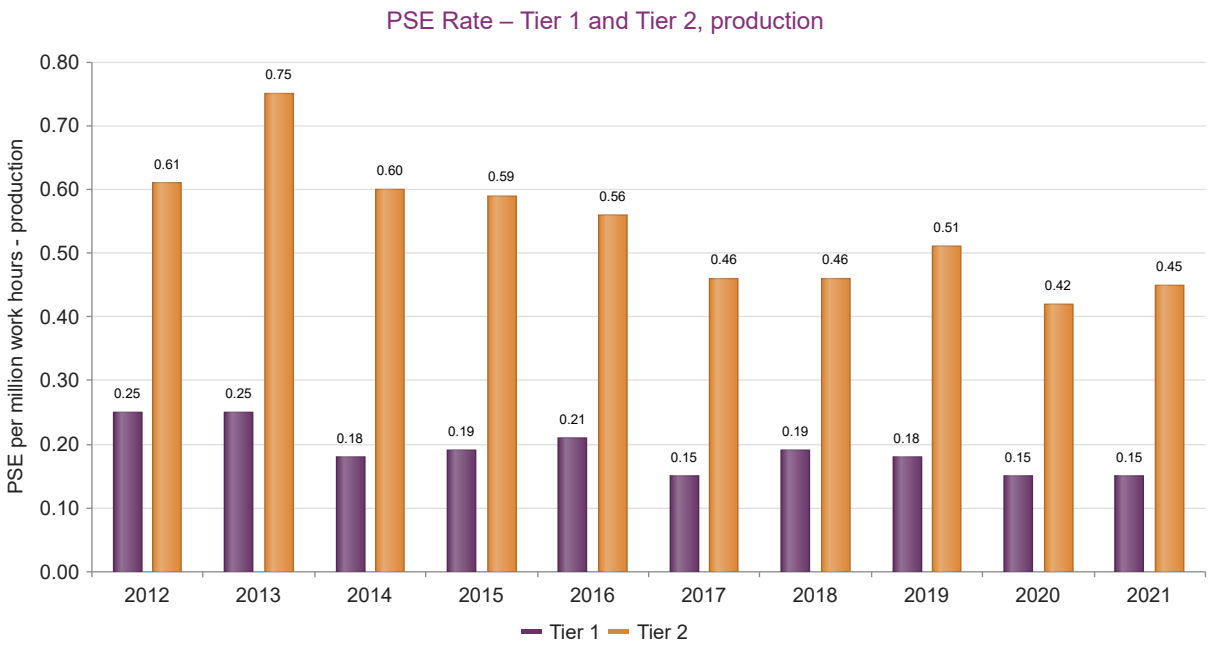


Figure 18:

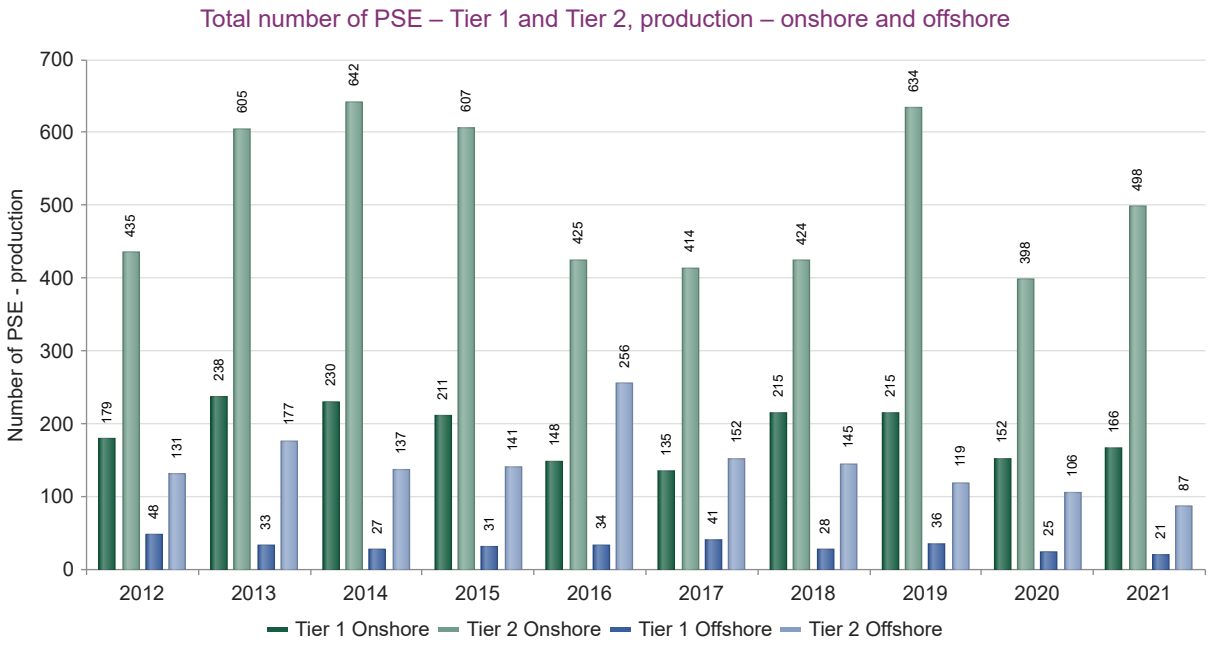


Figure 19:

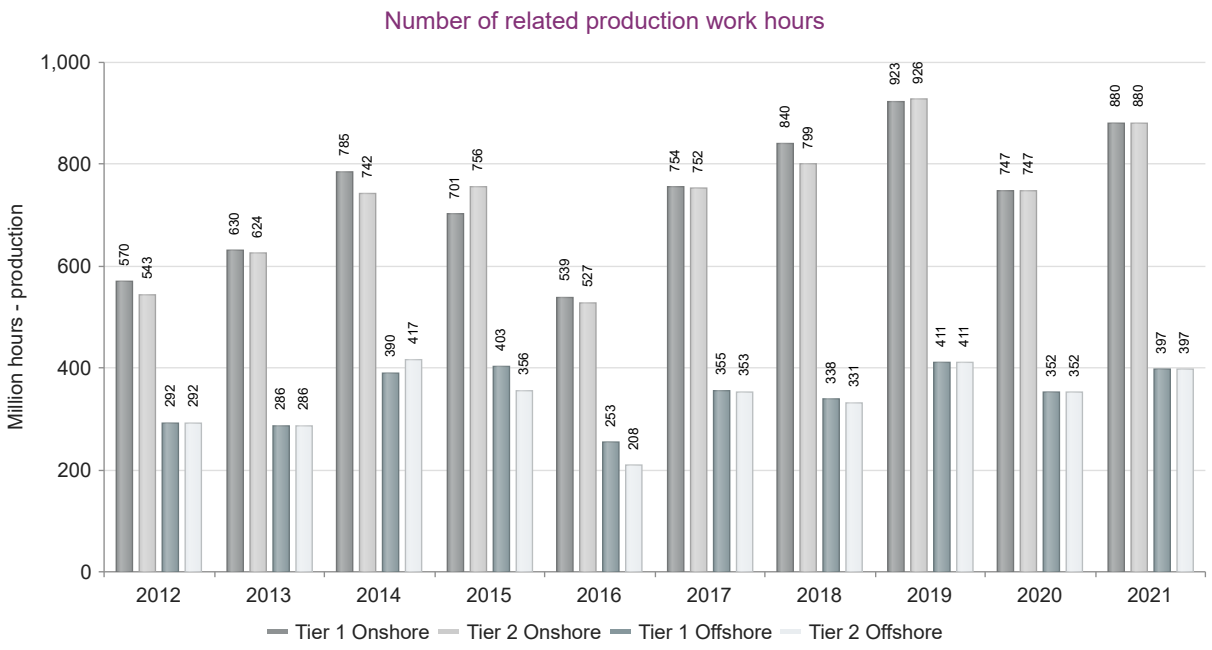
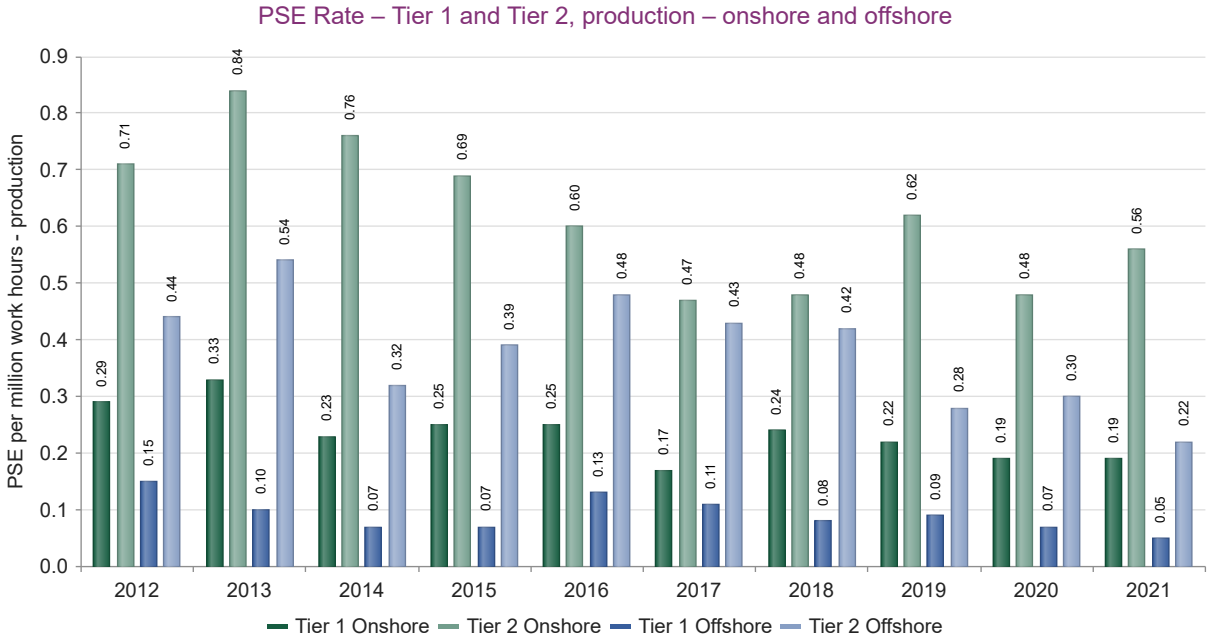


Figure 20:



3. Results by activity

The Tier 1 and Tier 2 data presented in this section represent production operations both onshore and offshore and are broken down by activity, i.e., whether the event occurred during normal operations, start-up or shutdown. Drilling results are not split by activity, since this would not be meaningful.

'Other' is the category used when the event could not be classified under any of the other headings (start-up, normal operations or shutdown).

'Unspecified' is used for PSE where the activity has not been provided.

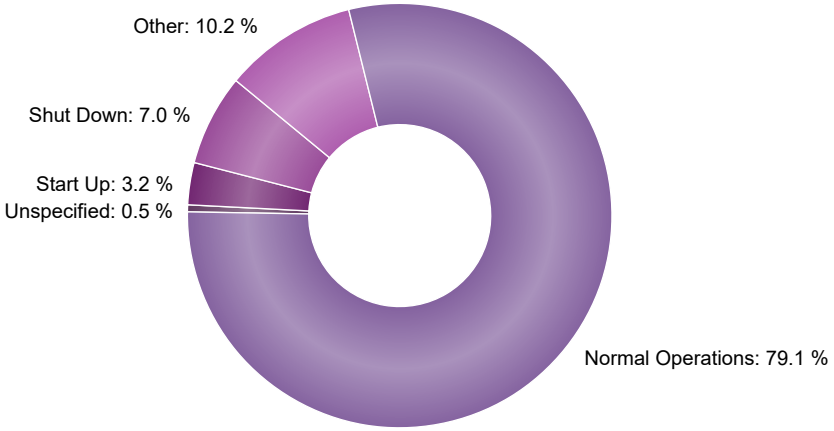
3.1 Tier 1

In 2021, 17 of the companies that reported one or more Tier 1 PSE provided information on the material released.

test 1

Figure 21:

Production PSE by activity (2021) - Tier 1

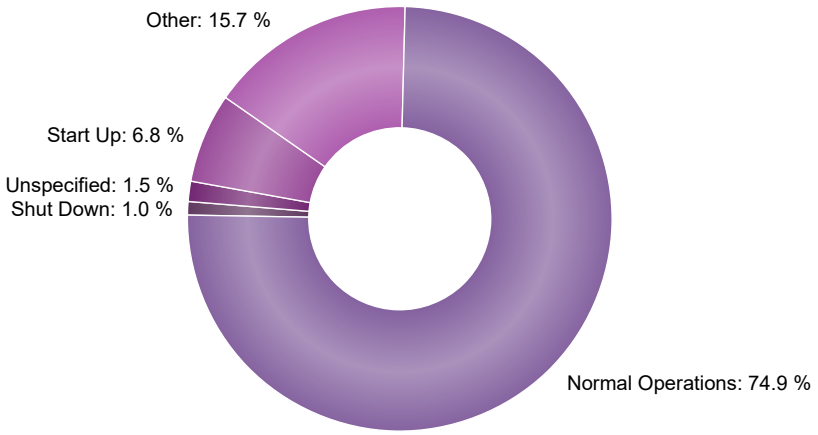


3.2 Tier 2

In 2021, 29 of the companies that reported one or more Tier 2 PSE provided information on the material released.

Figure 22:

Production PSE by activity (2021) - Tier 2



4. Results by consequence

The Tier 1 and Tier 2 data presented represent both onshore and offshore, and production and drilling, combined.

More than one consequence can be associated with each reported process safety event. The consequence classifications, extract from Report 456 - *Process Safety – Recommended Practice on Key Performance Indicators*, are listed in Table 6. Refer to Report 456 Part E for further information and threshold tables. Report 456 Part H contains examples that can be used as an aid to the interpretation of the guidance.

The analysis in this section shows the consequences assigned to Tier 1 and Tier 2 process safety events. A single PSE can result in multiple consequences, so the total number of consequences reported will equal or exceed the total number of PSEs.

Table 10: Consequence classifications (Reference IOGP Report 456 published 2018, Part E)

Table E.1: Thresholds for LOPC resulting in actual harm or damage

An LOPC, including PRD discharge and upset emission from a permitted or regulated source, is a Tier 1 or 2 PSE when it results in one or more of the consequences, irrespective of the amount of material released.

Consequence	PSE Level	
	Tier 1	Tier 2
Injury to employee or contractor	Fatality and/or Lost Workday Case ('days away from work' or 'lost time injury')	Recordable occupational injury (restricted work case or medical treatment case)
Injury to third party	Fatality, or injury/illness that results in a hospital admission	None
Impact to the community [a]	Officially declared community evacuation or community shelter-in-place including precautionary community evacuation or community shelter-in-place	None
Fire or explosion [b]	Fire or Explosion resulting in greater than or equal to $100,000 of direct cost to the Company	Fire or Explosion resulting in greater than or equal to $2,500 of direct cost to the Company

a Community evacuation/shelter-in-place would apply only to onshore facilities with public receptors that could potentially be exposed to impact from the release.

b For a fire or explosion, the classification should be done on the fire or explosion direct cost not the release rate. Fire or Explosion takes precedence over release rate in this case.

Table E.2: Thresholds for LOPC material releases

An LOPC is a Tier 1 or 2 PSE, even when no serious harm or damage results, if the amount of material released exceeds specified thresholds.

	PSE level	
	Tier 1	Tier 2
An LOPC release of a gas or liquid exceeds the material release threshold quantities in any one hour period	See Tables E.4, 5 or 6 for Tier 1 threshold quantities	See Tables E.4, 5 or 6 for Tier 2 threshold quantities
These thresholds for the amount of material released are based on Tier 1 and 2 categories from API RP 754, which are in turn based on the UN Recommendations on the Transportation of Dangerous Goods.		

Table E.3: Thresholds for PRD discharges and upset emissions

An engineered pressure relief (pressure relief device (PRD), safety instrumented system (SIS) or manually initiated emergency depressurization) device discharge event, or an upset emission from a permitted or regulated source, is a Tier 1 or 2 PSE if it results in serious harm or damage per Table E.1, or it exceeds the material release threshold quantities per Tables E.4, 5 or 6 and results in any of the listed criteria in Table E.3.

	PSE level	
	Tier 1	**Tier 2**
An engineered pressure relief (PRD, SIS or manually initiated emergency depressurization) device or an upset emission from a permitted or regulated source discharge, either directly to atmosphere or to a destructive device (e.g., flare, scrubber)	Event is a Tier 1 PSE if it resulted in the consequences listed in Table E.1, regardless of the quantity released, or Event results in a: 1. rainout, or 2. discharge to a potentially hazardous location, or 3. on-site shelter-in-place a or on-site evacuation, excluding precautionary on-site shelter-in-place or on-site evacuation, or 4. public protective measures including precautionary public protective measures **and** the quantity discharged equals or exceeds any Tier 1 threshold in Tables E.4, 5 or 6	Event is a Tier 2 PSE if it resulted in the consequences listed in Table E.1, regardless of the quantity released, or Event results in a: 1. rainout, or 2. discharge to a potentially hazardous location, or 3. on-site shelter-in-place a or on-site evacuation, excluding precautionary on-site shelter-in-place or on-site evacuation, or 4. public protective measures including precautionary public protective measures **and** quantity discharged equals or exceeds any Tier 2 threshold in Tables E.4, 5 or 6

These thresholds for the amount of material released are based on Tier 1 and 2 categories from API RP 754, which are in turn based on international UNDGL Packing Groups.

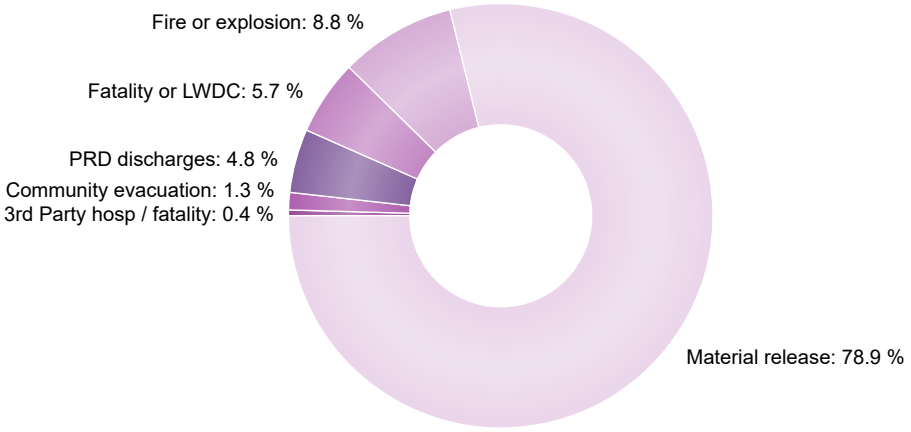
a Mustering offshore would be considered 'shelter-in-place' only if it was undertaken to separate people from a potentially hazardous atmosphere.

4.1 Tier 1

Information was provided on the consequences of individual events for 99% of Tier 1 PSE reported in 2021.

Figure 23:

Consequences assigned to Tier 1 PSE (2021)

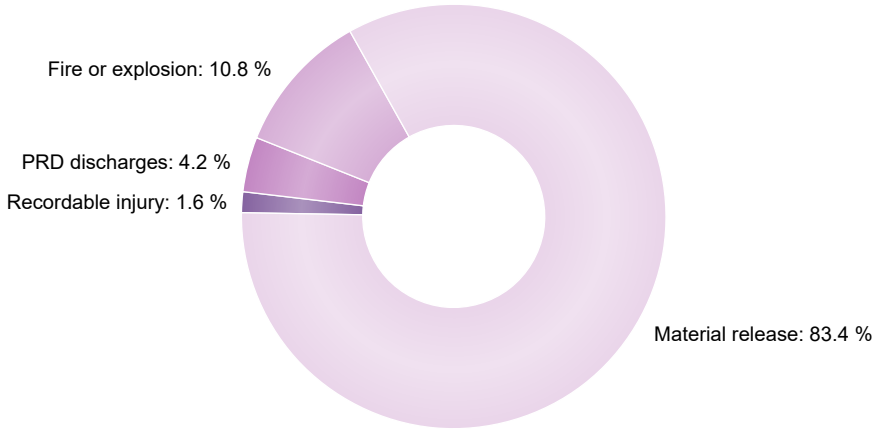


4.2 Tier 2

Information was provided on the consequences of individual events for 99% of Tier 2 PSE reported in 2021.

Figure 24:

Consequences assigned to Tier 2 PSE (2021)



4.3 Injury as consequence

No fatal incidents were reported in 2021.

Figure 25:

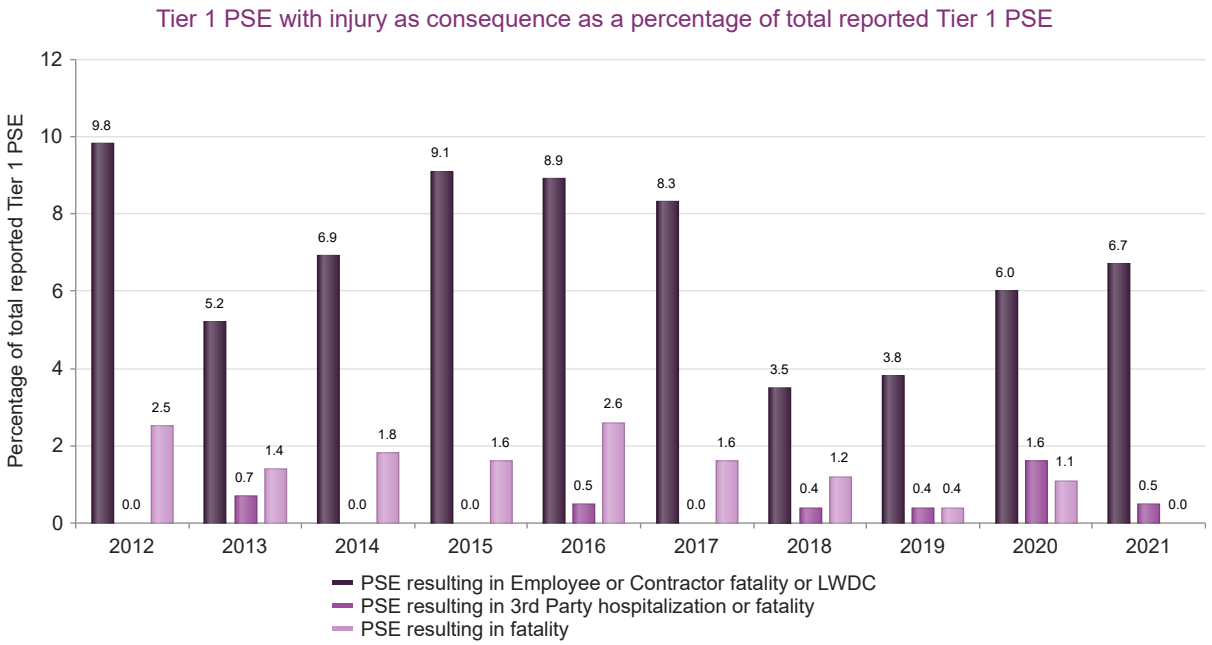
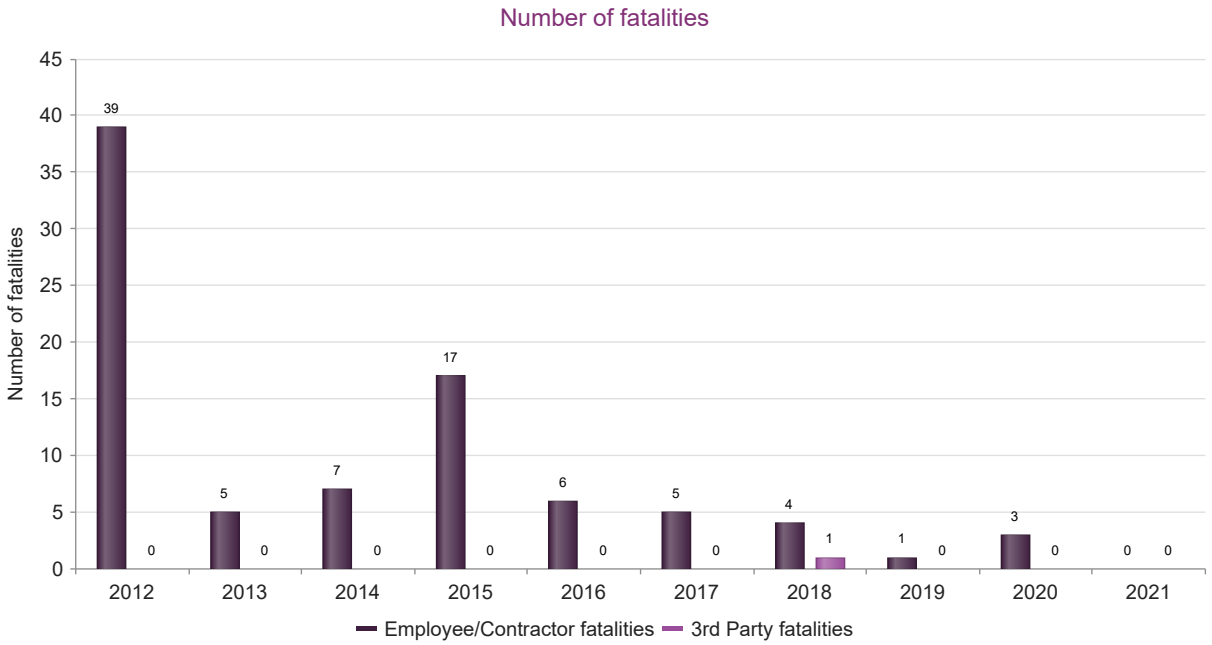


Figure 26:



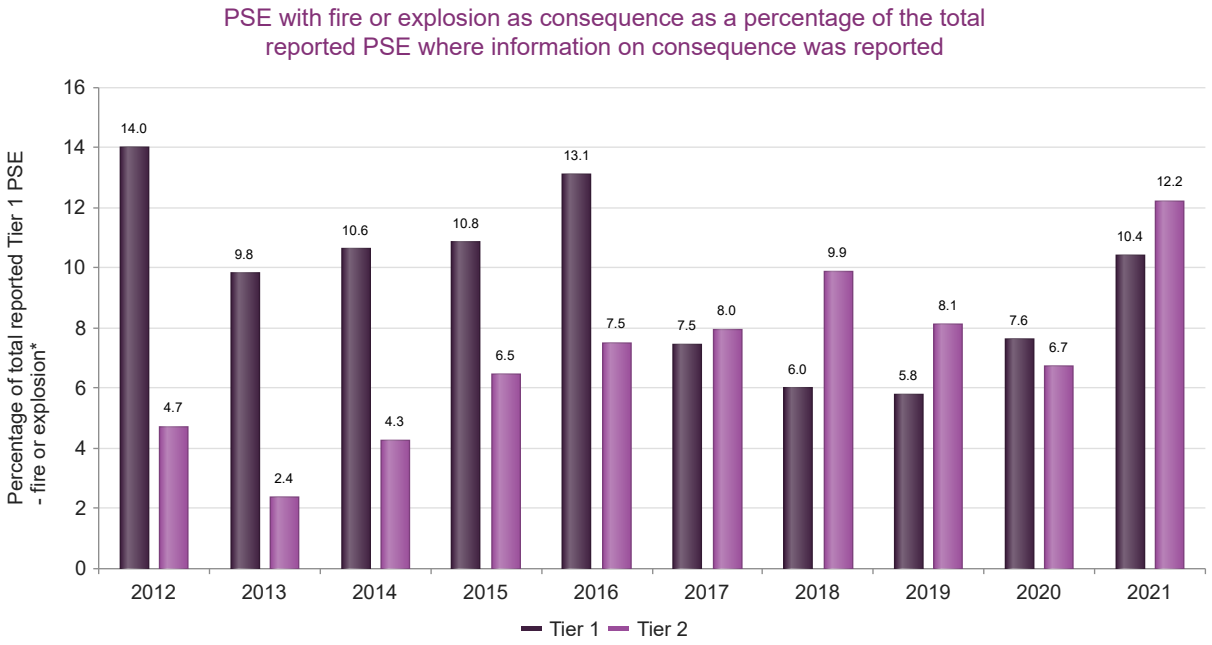
Definitions

Tier 1 injury:

- An employee, contractor or subcontractor 'days away from work' injury and/or fatality
- A hospital admission and/or fatality of a third party

4.4 Fire or explosion as consequence

Figure 27:



** where the consequence was reported.*

Note: The Tier 1 threshold for direct cost changed with 2017 data reporting; for 2011 – 2016 data the threshold was $25,000 of direct cost to the Company. The threshold for Tier 2 is unchanged.

Definitions

Tier 1 fire:

A fire or explosion resulting in greater than or equal to $100,000 of direct cost to the Company.

Tier 2 fire:

Tier 2 fire: A fire or explosion resulting in greater than or equal to $2,500 of direct cost to the Company.

Note: The Tier 1 threshold for direct cost changed with 2017 data reporting; for 2011 – 2016 data the threshold was $25,000 of direct cost to the Company. The threshold for Tier 2 was unchanged.
See Report 456, Part C.

5. Results by material released

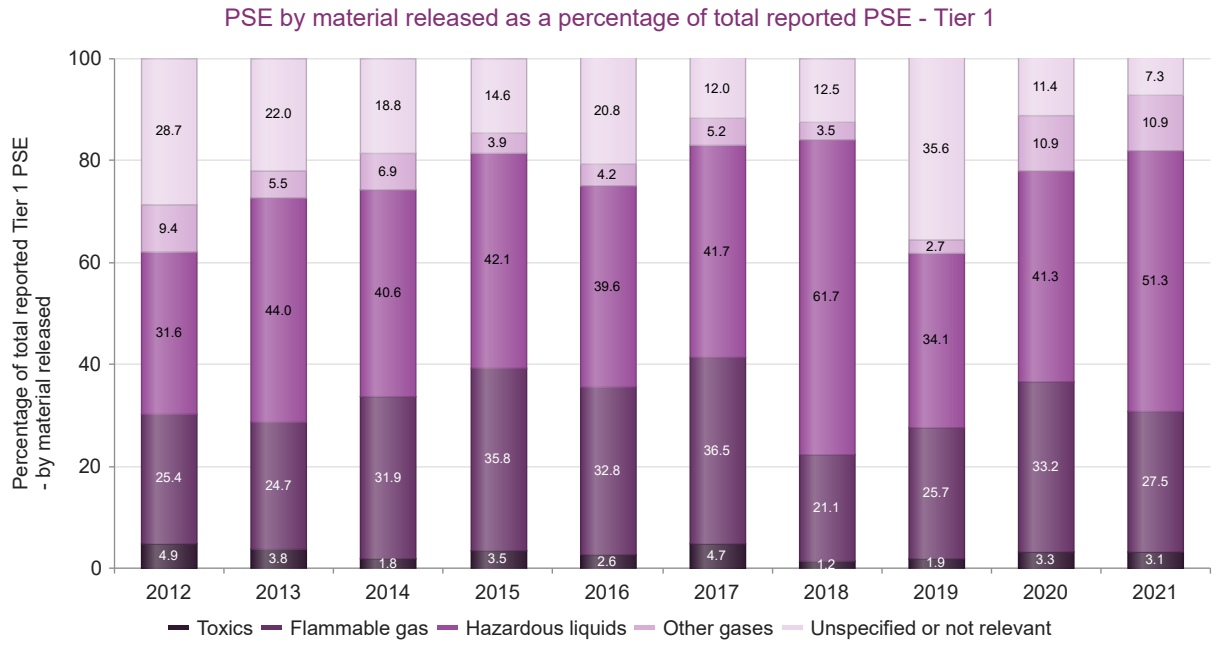
The Tier 1 and Tier 2 data presented represent both onshore and offshore, and production and drilling, combined.

'Unspecified' is used for PSE where the type of material released has not been provided.

5.1 Tier 1

In 2021, 17 of the companies that reported one or more Tier 1 PSE provided information on the material released. Information on the material released was provided for 93% of Tier 1 PSE reported in 2021.

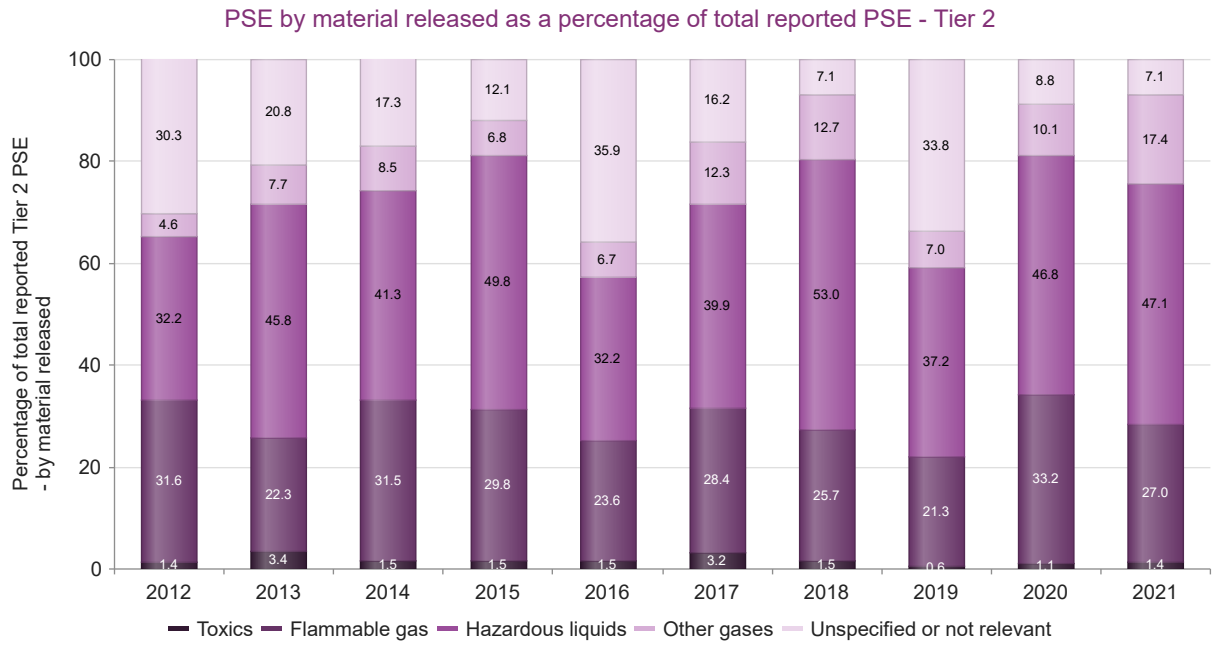
Figure 28:



5.2 Tier 2

In 2021, 29 of the companies that reported one or more Tier 2 PSE provided information on the material released. Information on the material released was provided for 93% of Tier 2 PSE reported in 2021.

Figure 29:



6. Results by region

All data submissions are reported by country and are summarized by region. The Tier 1 and Tier 2 data presented represent both onshore and offshore, and production and overall, combined.

Figure 30: The seven geographic regions

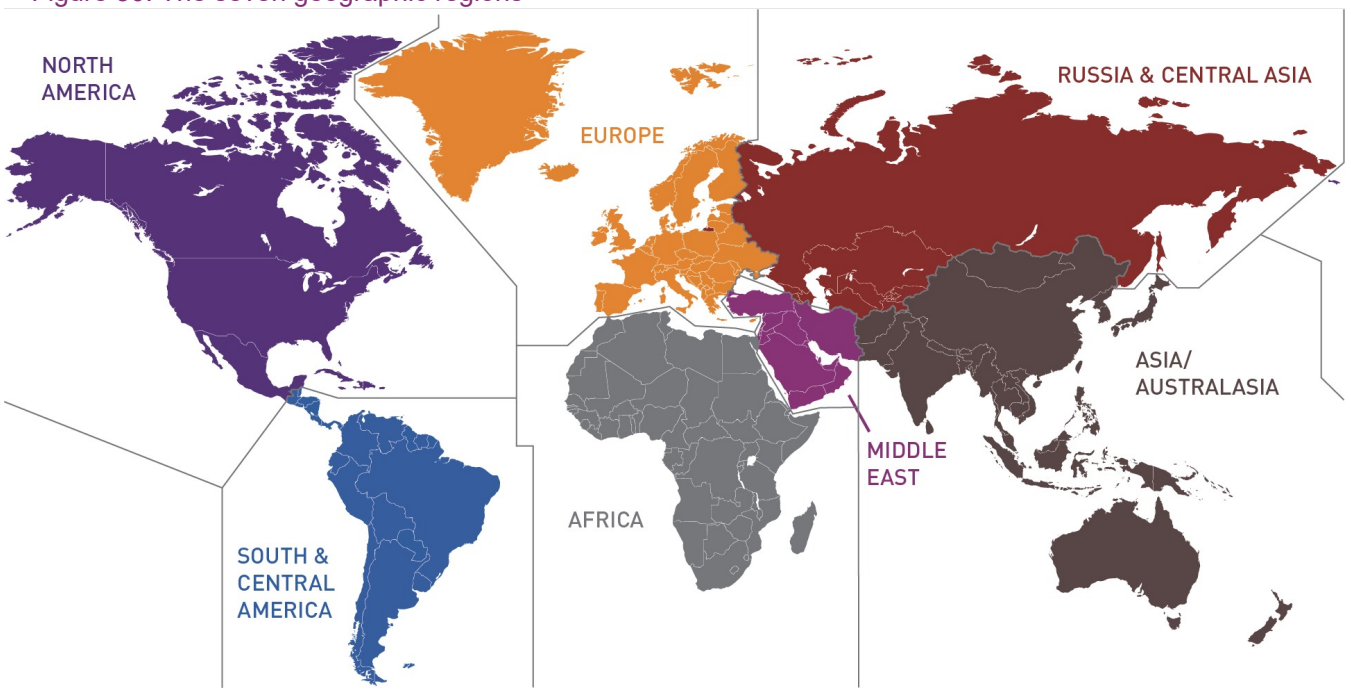


Figure 31:

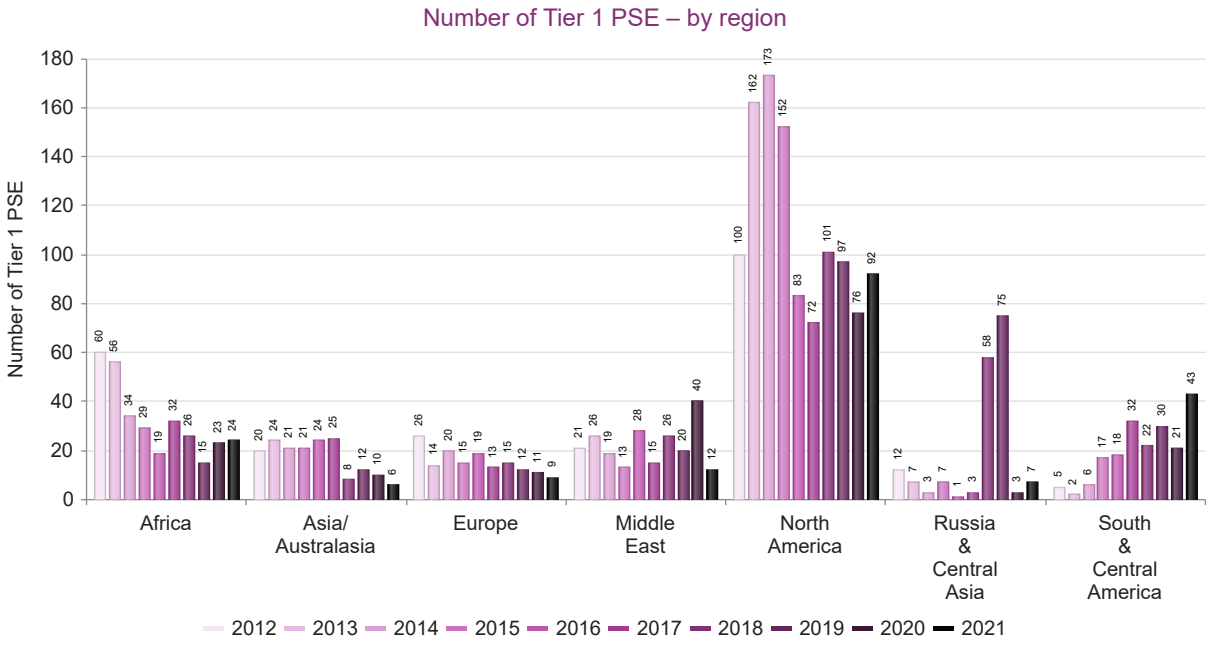
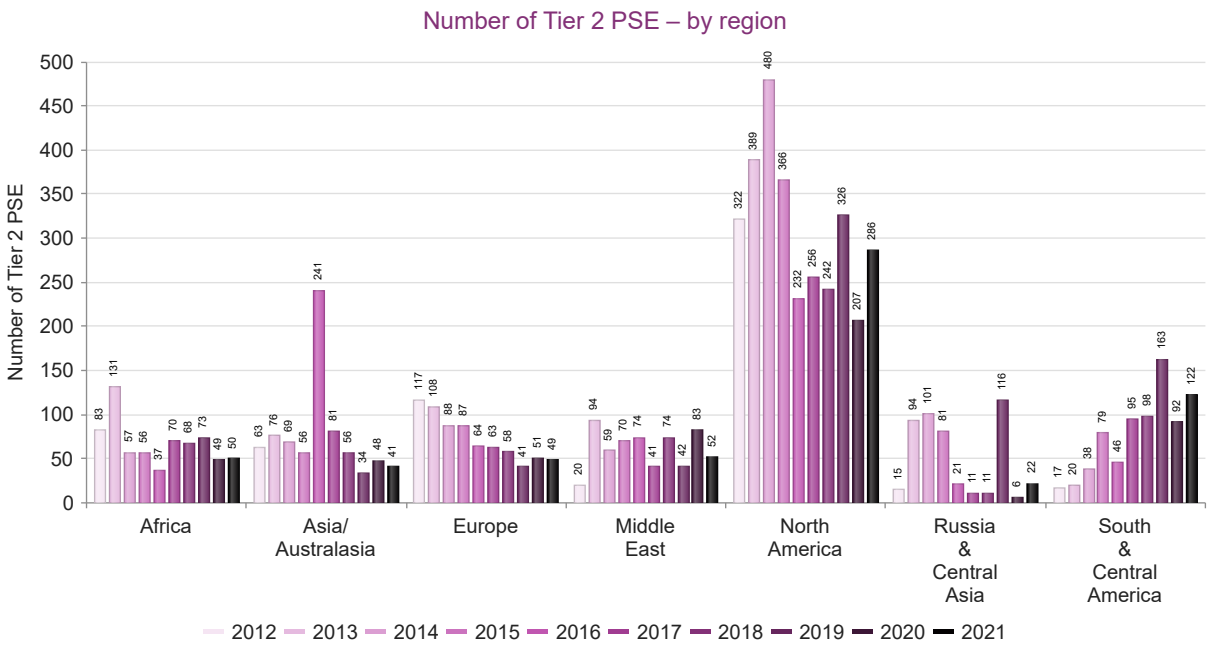


Figure 32:



The normalized data presented only include PSE where drilling or production work hours were reported for the data set in the main safety database, hence some PSE have been excluded. See Tables B.21 – B.30 (Number of PSE used in normalized analysis – by region and function).

Figure 33:

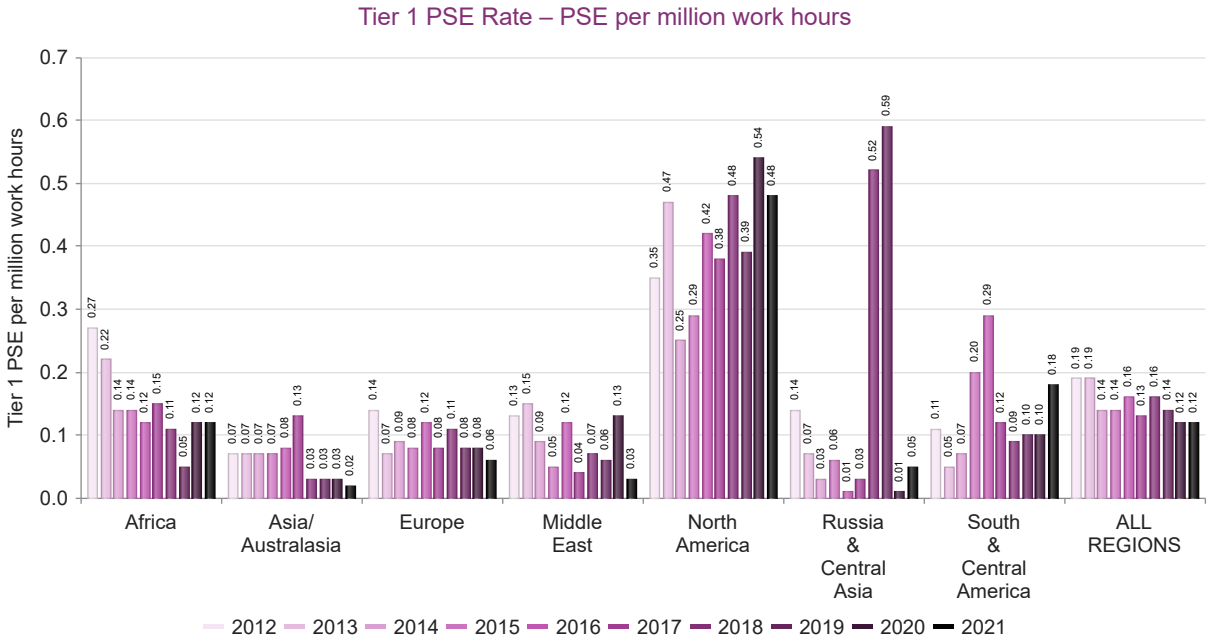


Figure 34:

Tier 2 PSE Rate – PSE per million work hours

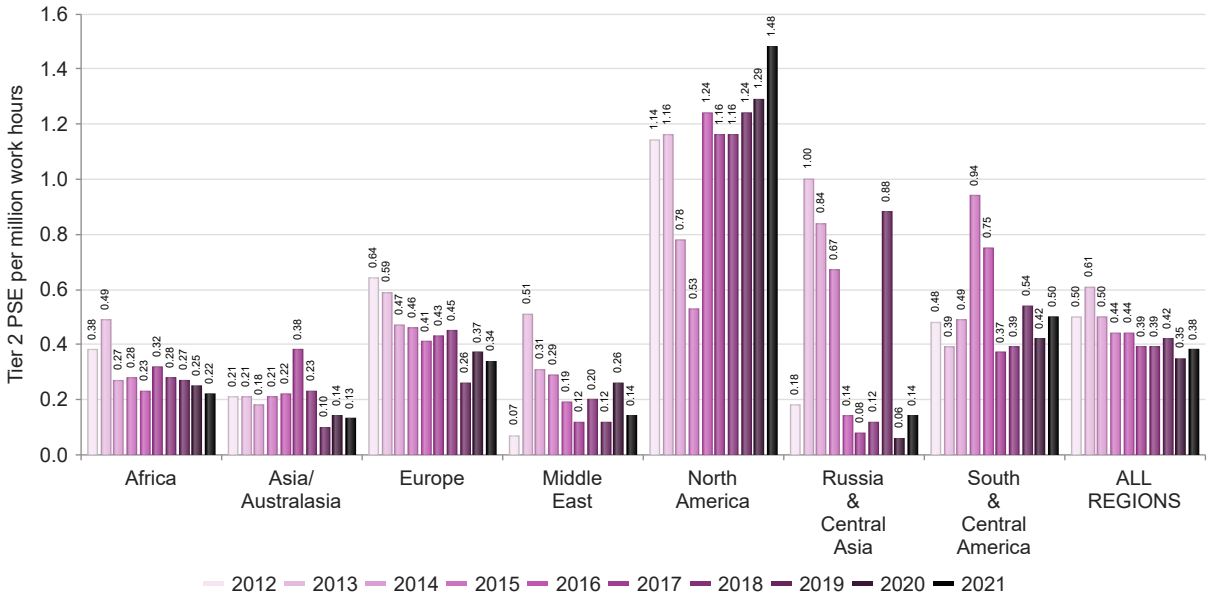


Figure 35:

Related work hours for Tier 1 PSE analyses 2021 - by region, overall

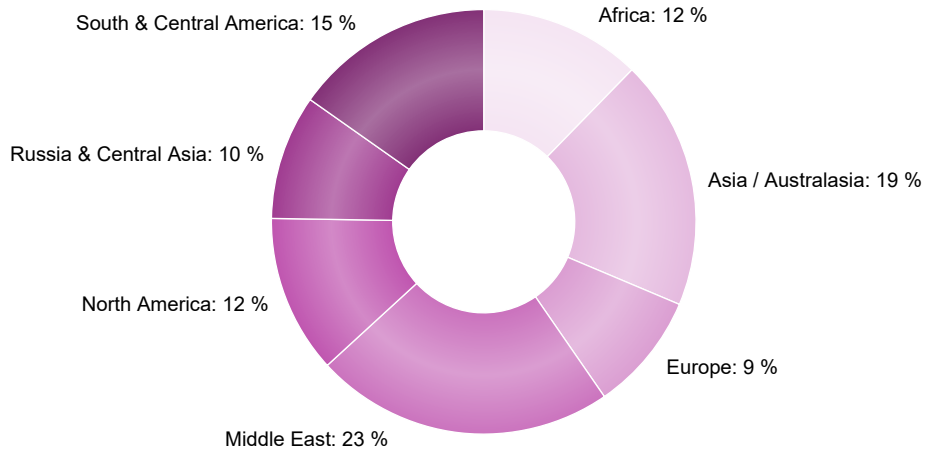


Figure 36:

Related work hours for Tier 1 PSE analyses 2021 - by region, onshore

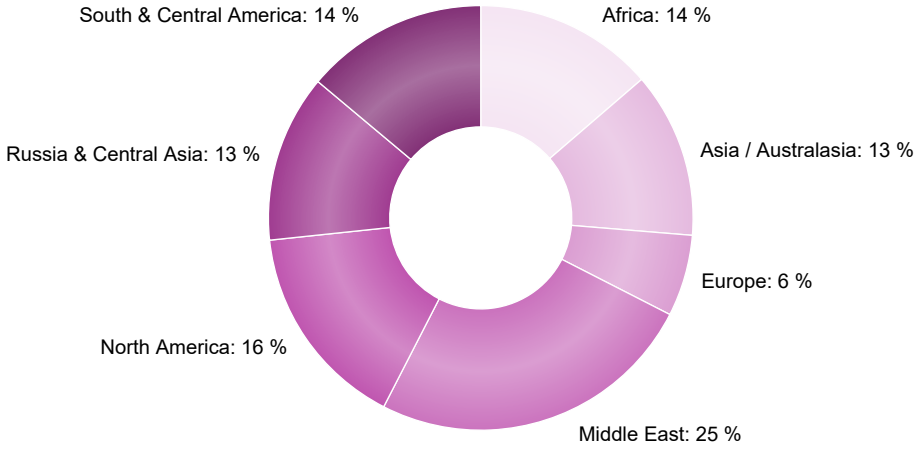
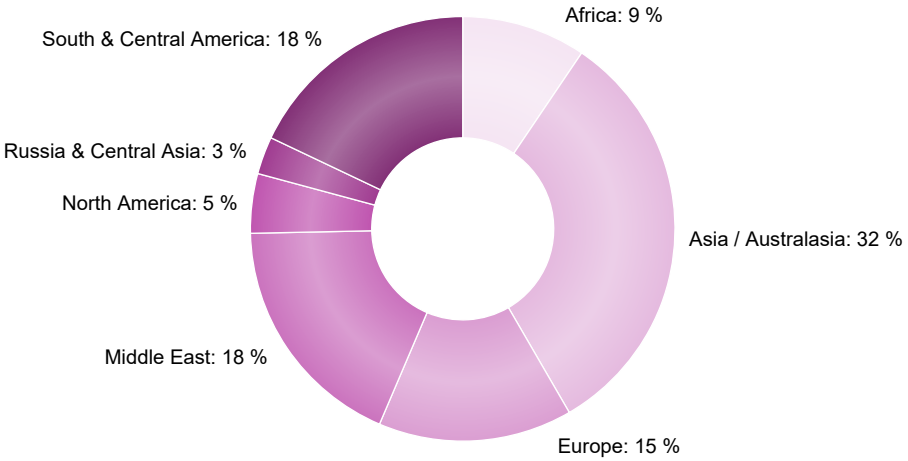


Figure 37:

Related work hours for Tier 1 PSE analyses 2021 - by region, offshore



6.1 Drilling

Figure 38:

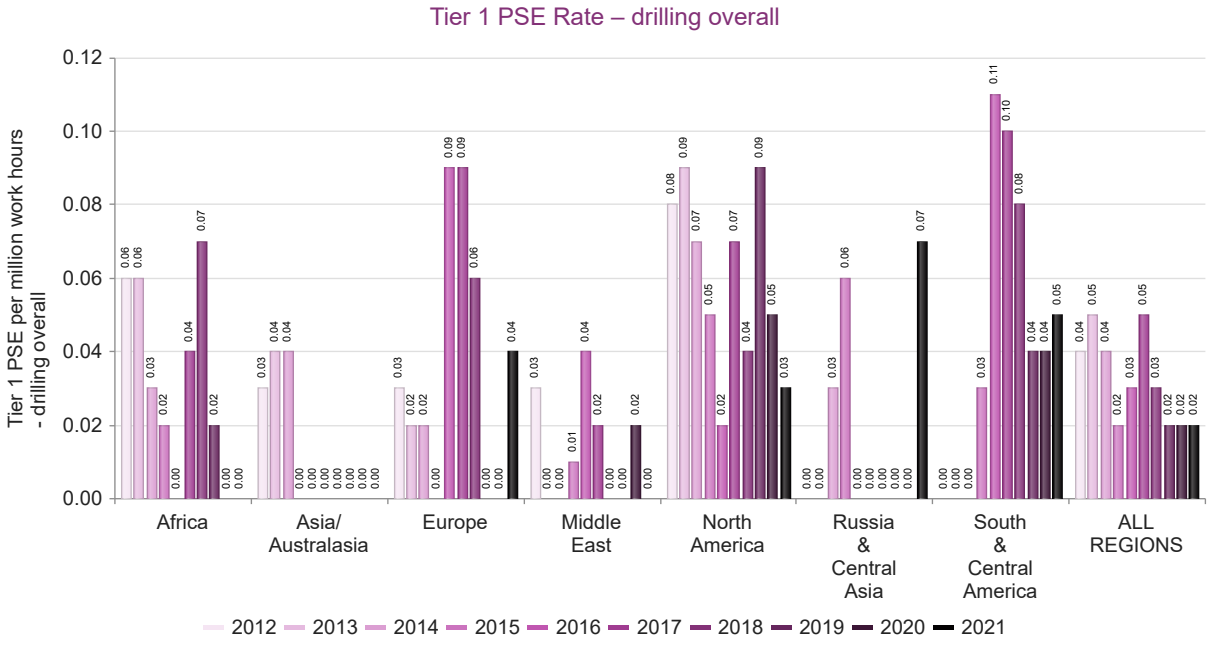


Figure 39:

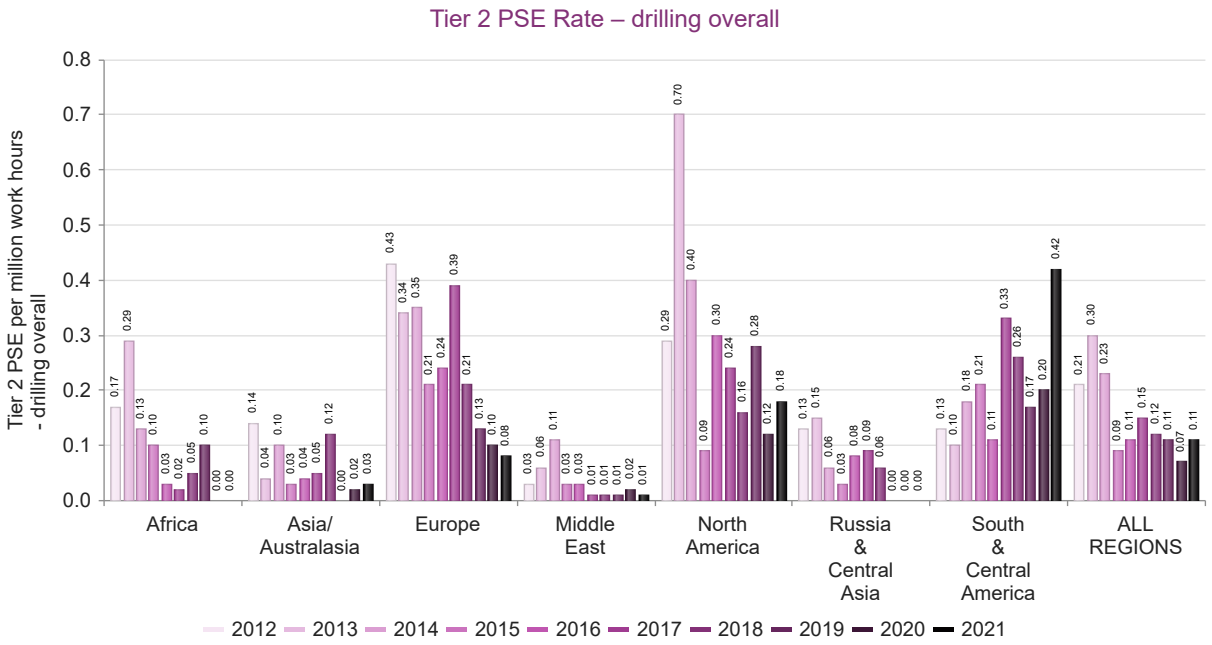


Figure 40:

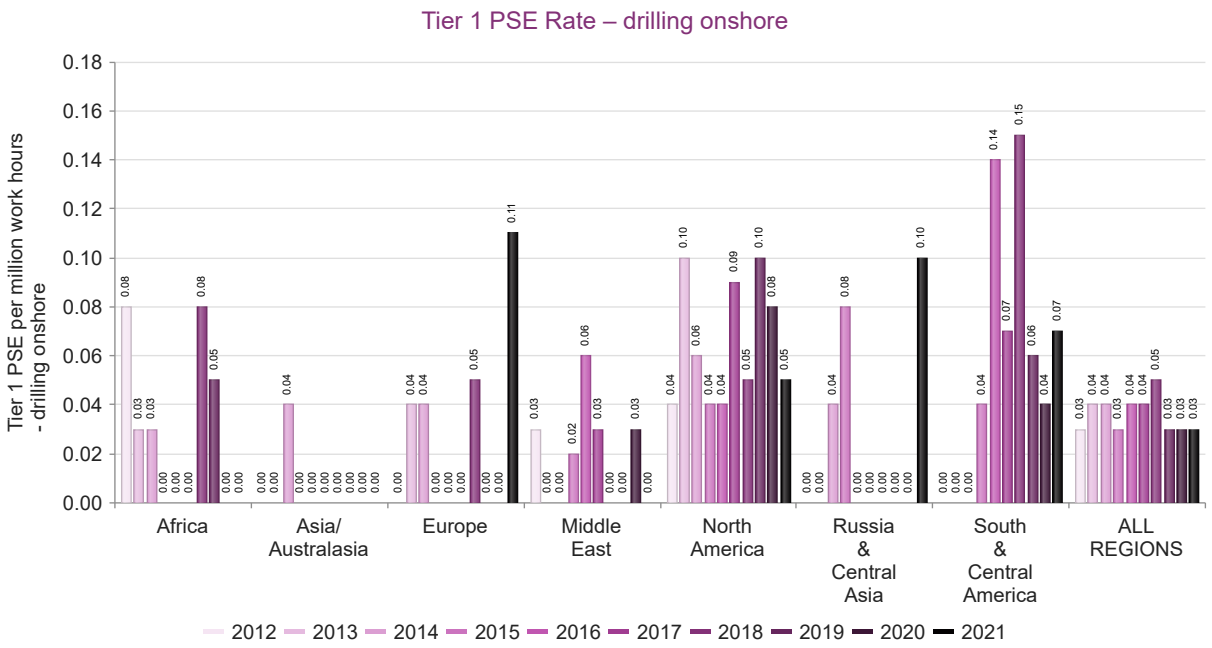


Figure 41:

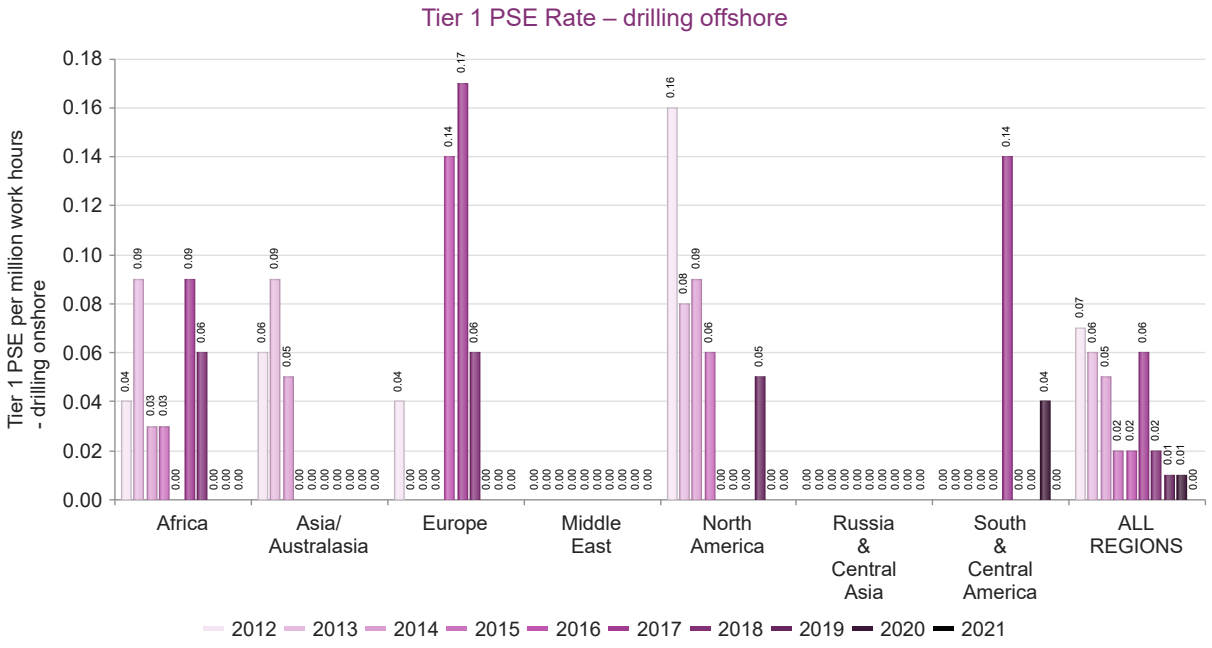


Figure 42:

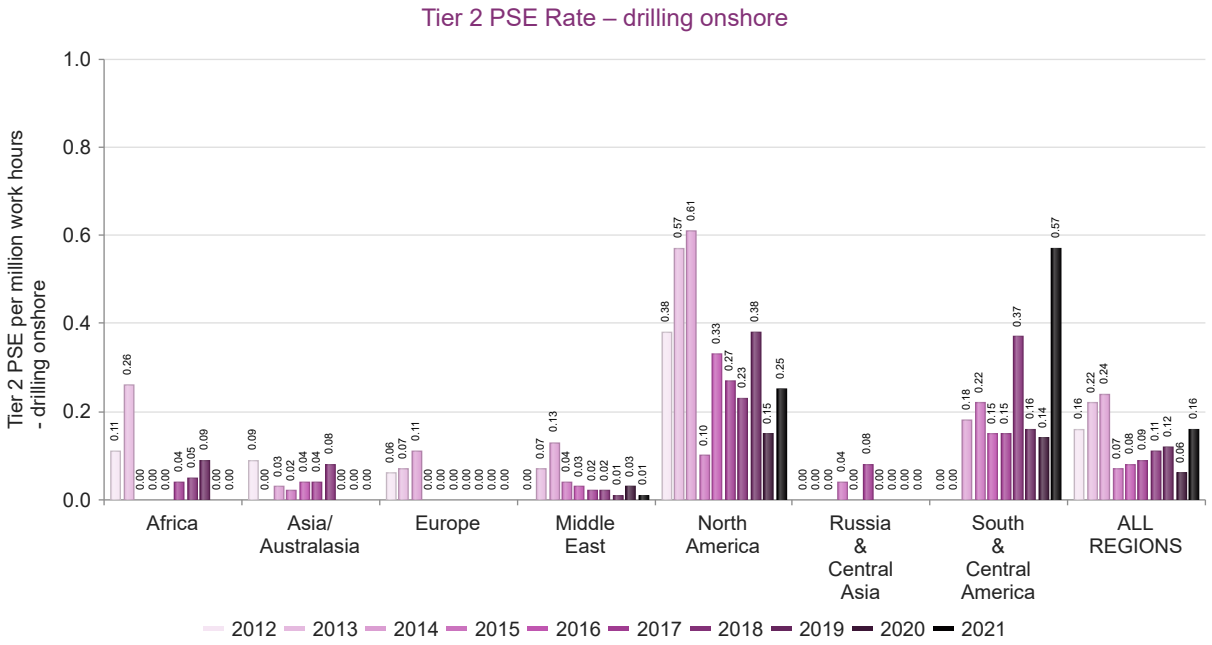
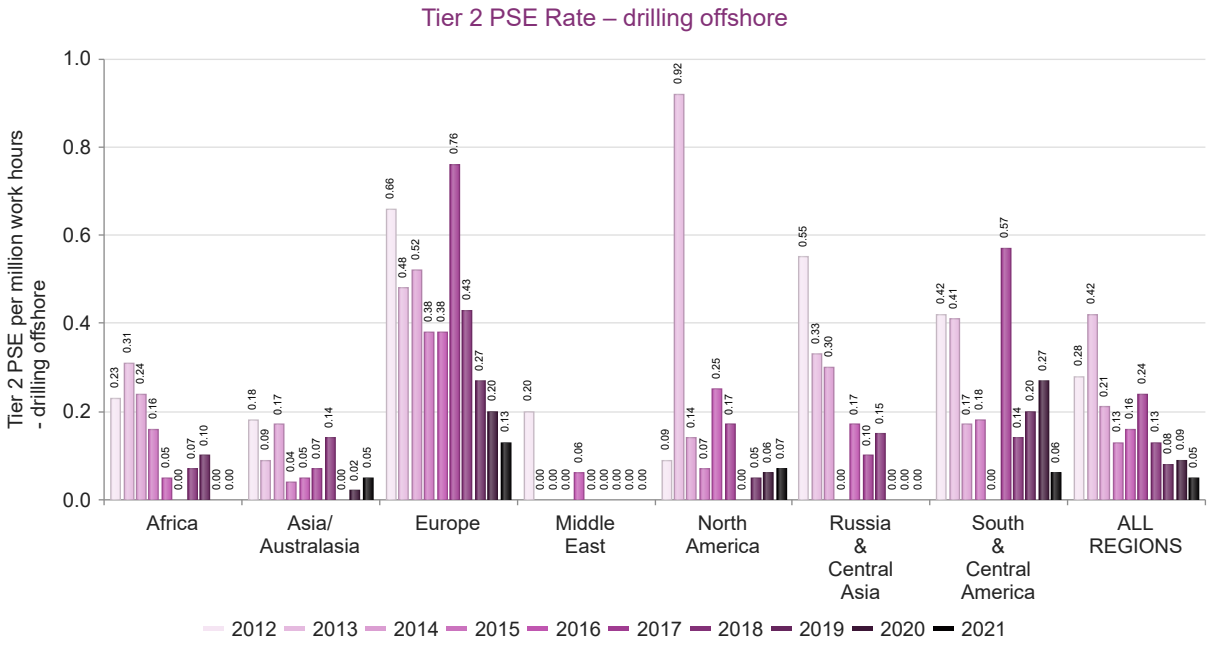


Figure 43:



Note: Drilling PSE Rate excludes PSE where no related drilling work hours were reported.

See Tables B.21 – B.30 (Number of PSE used in normalized analysis – by region and function).

6.2 Production

Figure 44:

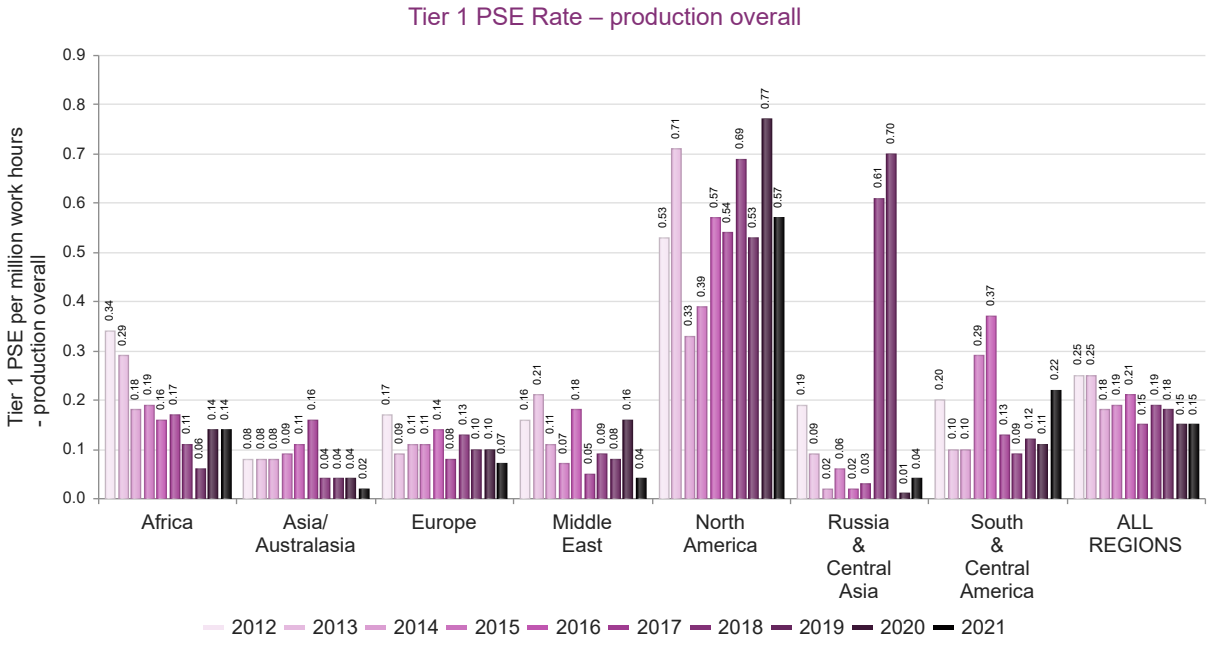


Figure 45:

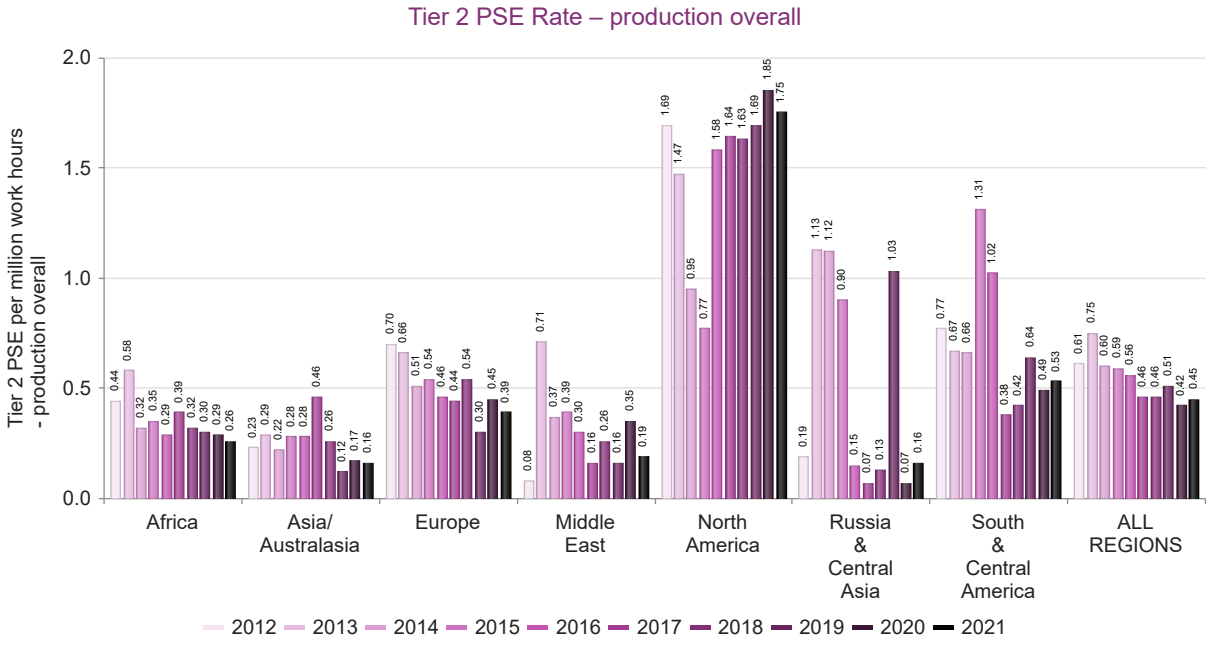


Figure 46:

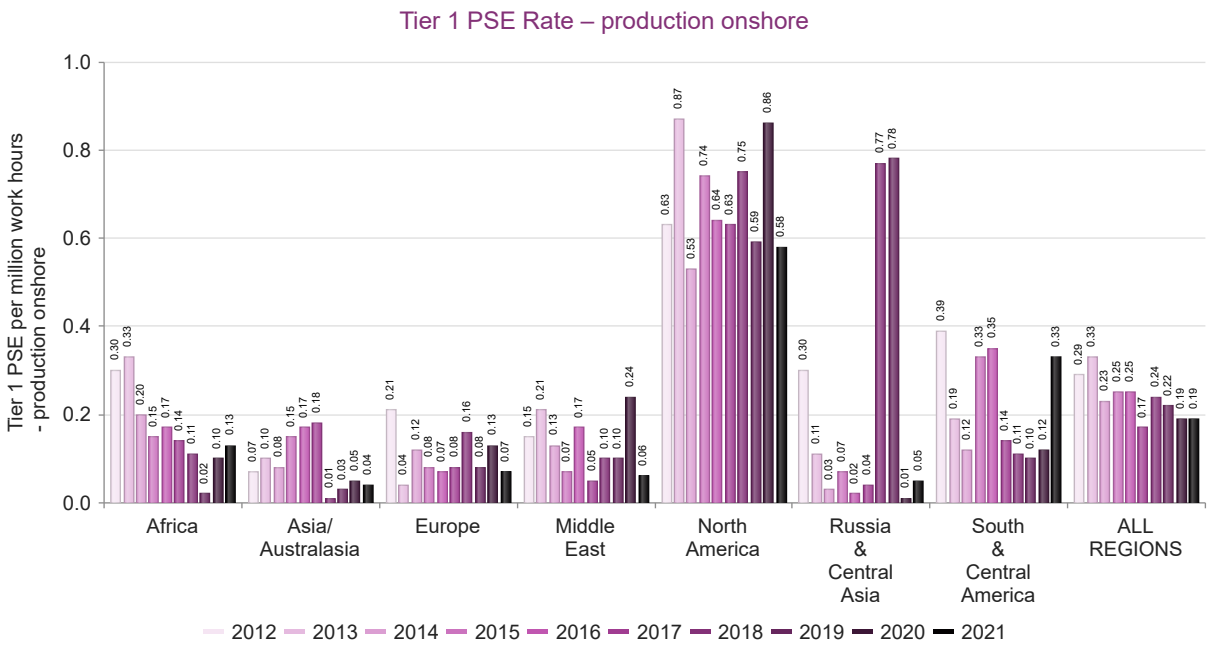


Figure 47:

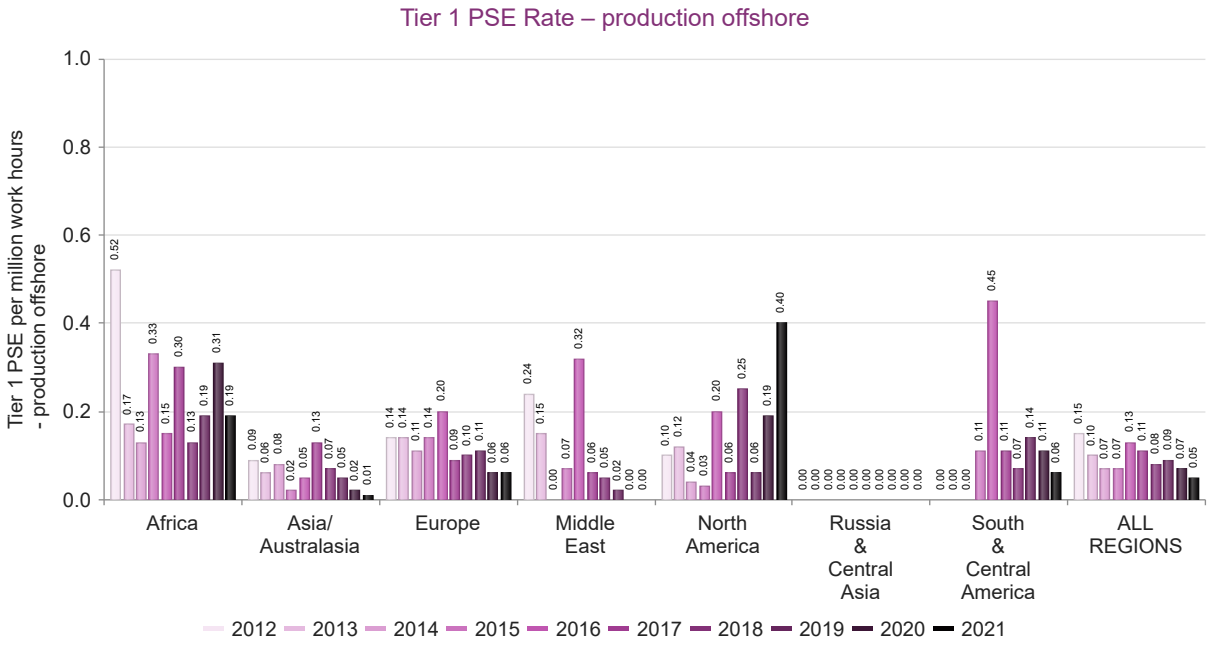


Figure 48:

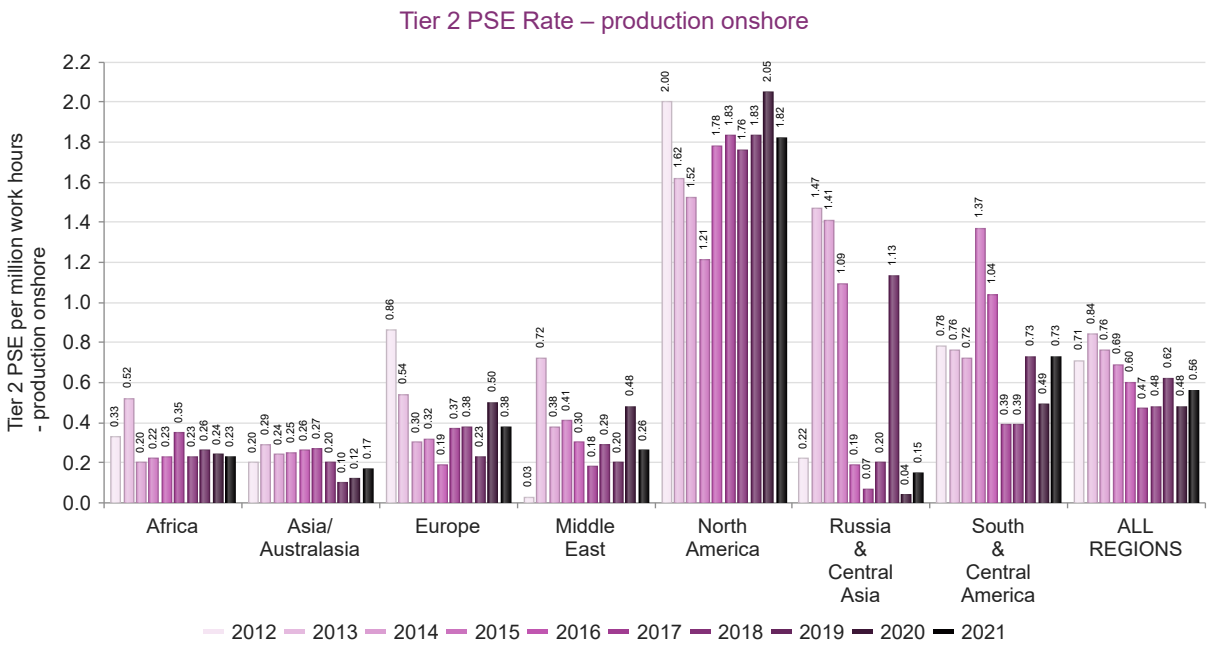
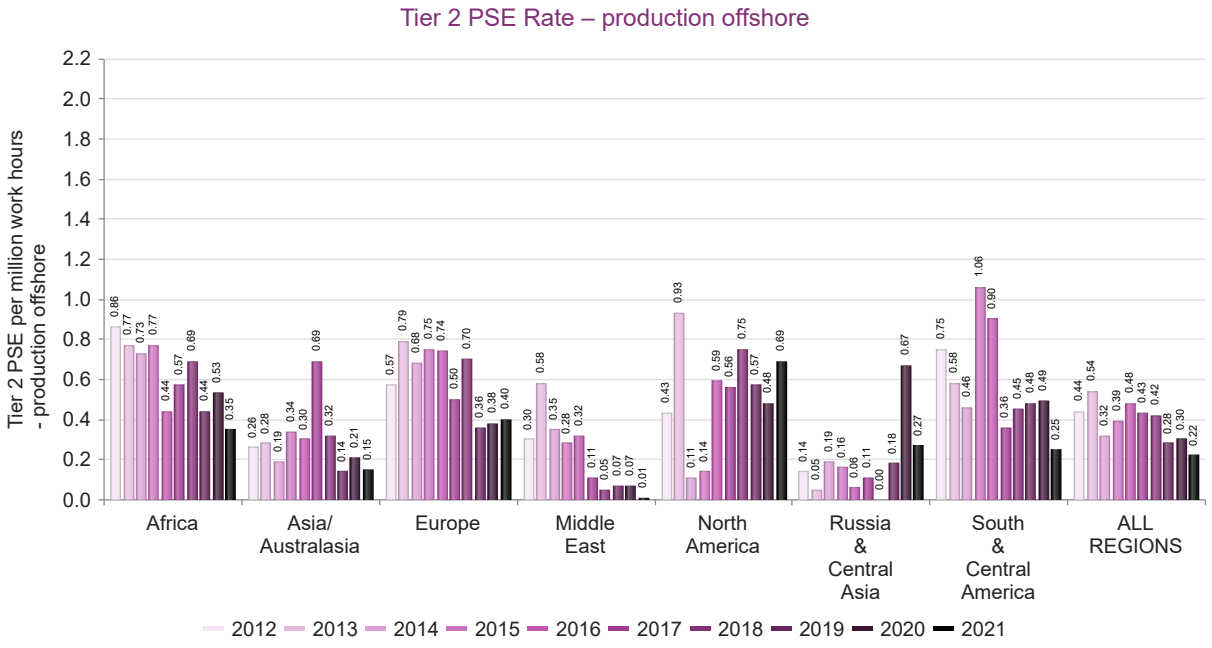


Figure 49:



Note: Production PSE Rate excludes PSE where no related production work hours were reported.

See Tables B.21 – B.30 (Number of PSE used in normalized analysis – by region and function).

7. Company results

Tier 1 and Tier 2 PSE rates are shown by company in rank order of Tier 1 PSE performance. Company names have been replaced with a 2-letter code. A new code is assigned every year.

Data are excluded from PSE rate calculations where either drilling or production work hours are not reported for the data set.

'Overall' refers to the rate for all companies.

Figure 50:

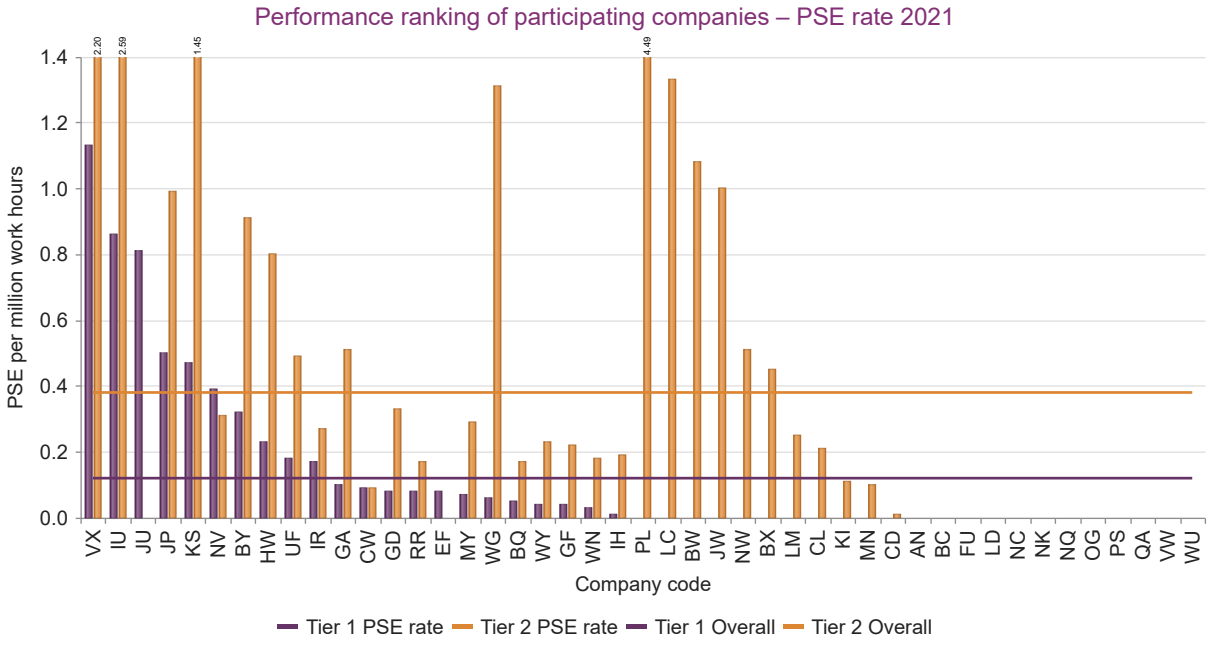


Figure 51:

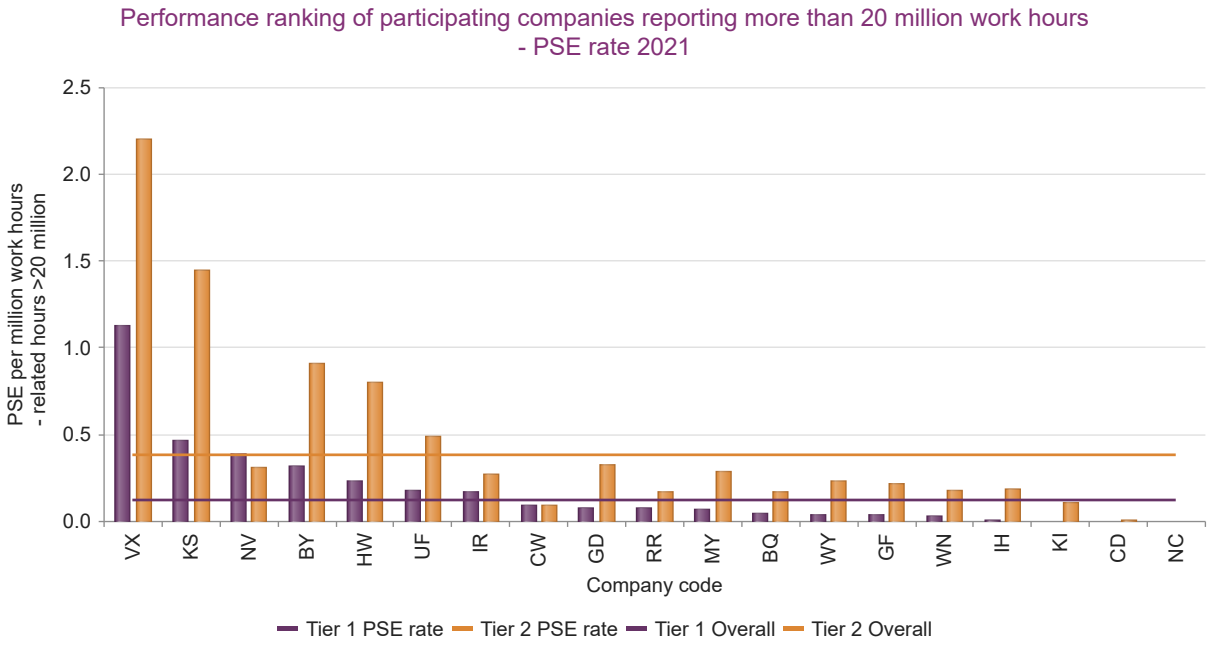
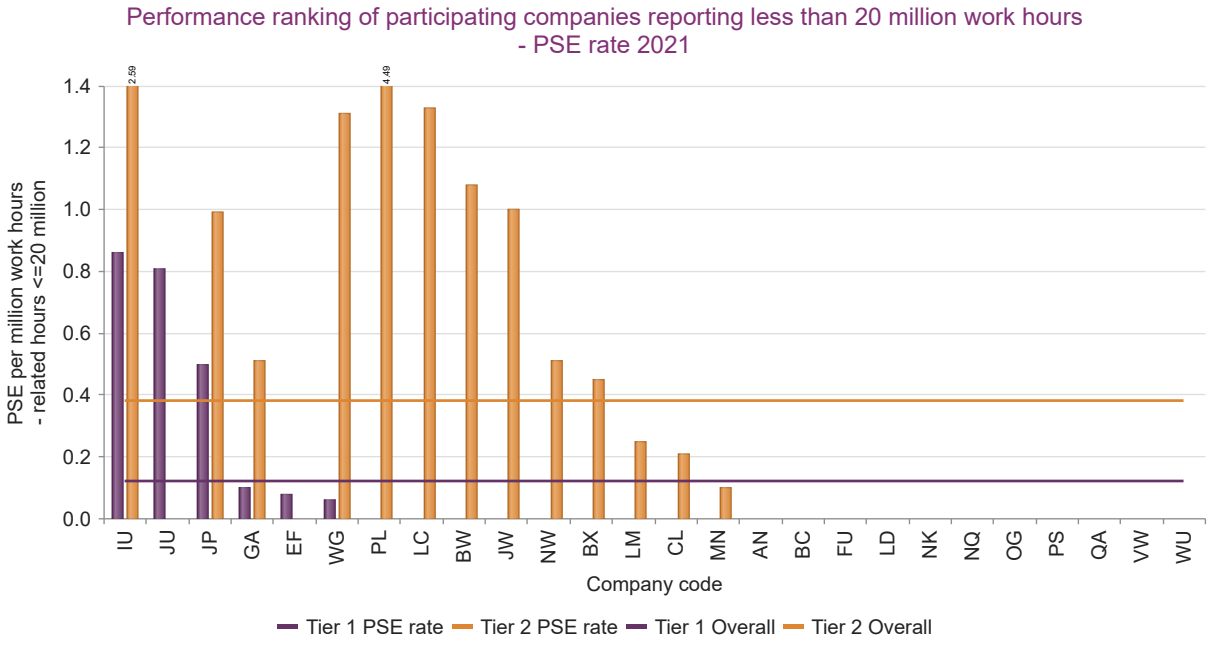


Figure 52:


Performance ranking of participating companies reporting less than 20 million work hours - PSE rate 2021
PSE per million work hours - related hours <=20 million
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
2.59
4.49
IU
JU
JP
GA
EF
WG
PL
LC
BW
JW
NW
BX
LM
CL
MN
AN
BC
FU
LD
NK
NQ
OG
PS
QA
VW
WU
Company code
Tier 1 PSE rate
Tier 2 PSE rate
Tier 1 Overall
Tier 2 Overall

Appendix A - Database dimensions

The PSE data collected by IOGP are based on the numbers of Tier 1 and Tier 2 PSE reported by companies, separately for drilling and production activities and subdivided into offshore and onshore data.

PSE relating to sabotage or wilful damage are reported separately and are presented in section 1.2 of this report. They are not included in the results presented in sections 1–7.

The entire IOGP safety performance database, which is used to produce the annual Safety performance indicators report (IOGP Report 2021s), contains work hours which are split into offshore and onshore work hours and five function categories (defined in the glossary of terms in 2021s - *Safety performance indicators - 2021 data* as work functions):

- exploration
- drilling
- production
- construction
- unspecified

For the purposes of the process safety event database, the only applicable functional categories from the entire IOGP safety performance database are drilling and production, onshore and offshore. The work hours associated with PSEs reported in 2012-2021 for drilling and production, onshore and offshore, are shown in Table A.1, below.

Table A.1: Database

	Number of companies reporting PSE			Data sets where PSE data reported		Related work hours (millions)*	
Year	Overall	Tier 1	Tier 2	Tier 1	Tier 2	Tier 1	Tier 2
2011	26	26	20	322	270	971	912
2012	32	32	29	428	426	1,197	1,160
2013	39	39	38	378	375	1,326	1,310
2014	44	44	42	571	547	1,639	1,631
2015	44	44	44	589	586	1,522	1,587
2016	39	39	39	487	481	1,096	1,014
2017	43	43	43	507	513	1,449	1,443
2018	42	42	41	548	533	1,494	1,439
2019	47	47	47	508	507	1,712	1,724
2020	44	44	43	346	346	1,406	1,406
2021	47	47	47	363	363	1,603	1,603

PSE Data Set: A set of data with distinct company, country and location (onshore/offshore) where PSE data have been entered (i.e., not blank).

Table A.2: Work hours related to datasets where either Tier 1 or Tier 2 PSE were reported

ONSHORE	Work hours in PSE reporting database ('000s)		
Year	Drilling	Production	Total
2012	204,503	581,768	786,271
2013	252,936	630,071	883,007
2014	277,704	784,652	1,062,356
2015	308,974	764,793	1,073,767
2016	176,569	538,959	715,528
2017	213,760	753,564	967,324
2018	197,136	839,533	1,036,669
2019	239,913	926,493	1,166,406
2020	179,284	746,991	926,275
2021	195,393	880,279	1,075,672

OFFSHORE	Work hours in PSE reporting database ('000s)		
Year	Drilling	Production	Total
2012	130,607	292,076	422,683
2013	161,081	288,501	449,582
2014	209,049	431,834	640,883
2015	194,746	402,807	597,553
2016	127,434	253,391	380,825
2017	127,431	354,782	482,213
2018	120,748	337,548	458,296
2019	150,527	410,892	561,419
2020	127,912	352,271	480,183
2021	130,567	397,290	527,857

OVERALL	Work hours in PSE reporting database ('000s)		
Year	Drilling	Production	Total
2012	335,110	873,844	1,208,954
2013	414,017	918,572	1,332,589
2014	486,753	1,216,486	1,703,239
2015	503,720	1,167,600	1,671,320
2016	304,003	792,350	1,096,353
2017	341,191	1,108,346	1,449,537
2018	317,884	1,177,081	1,494,965
2019	390,440	1,337,385	1,727,825
2020	307,196	1,099,262	1,406,458
2021	325,960	1,277,569	1,603,529

The work hours associated with the PSE data reported have been calculated as a subset of the drilling and production function work hours from the safety performance database (see IOGP Report 2021s - *Safety performance indicators – 2021 data*) which have been reported for 2012-2021. Work hours have been used as a reference to provide an indication of scope for the PSE data presented throughout this report.

Work hours have been included where the company has reported associated Tier 1 or Tier 2 PSE (PSE values of zero or greater), for the country and onshore/offshore location (data set). Work hours are excluded for data sets where Tier 1 or Tier 2 PSE figures are not available. The associated work hours differ between Tier 1 and Tier 2 because, although all companies reported both Tier 1 and Tier 2 PSE data, not all companies reported PSE data for all of their global operations.

Some companies that reported PSE data do not split work hours by work function. The reported PSEs and work hours associated with these companies have therefore been excluded from the normalized analysis. Table A.3 shows the number of data sets reported that include Tier 1 or Tier 2 data.

Table A.3: Number of data sets

		Tier 1 PSE data sets				Tier 2 PSE data sets			
Year	Total PSE data sets	Tier 1 Total	By activity	By material	By consequence	Tier 2 Total	By activity	By material	By consequence
2012	429	428	59	55	76	426	78	74	102
2013	381	378	45	52	63	375	76	91	105
2014	574	571	60	59	68	547	109	119	124
2015	594	589	57	58	62	586	113	113	117
2016	491	487	52	51	61	481	88	88	91
2017	517	507	63	63	70	513	100	99	103
2018	548	548	50	51	59	533	87	87	87
2019	510	508	50	55	63	507	88	90	107
2020	347	346	54	48	55	346	100	96	101
2021	363	363	53	46	53	363	91	86	91

Note: a correction was made to the number of data sets reported in 2019 compared with previously published figures.

Appendix B - Data tables

The following data are presented in relation to the sections where they were used.

Section 1 Overall results

Table B.1: Summary of data - Tier 1

Year	Location	Work hours (thousands)	Number of Tier 1 PSE for normalized results*	Number of Tier 1 PSE	Tier 1 PSE rate	Employee / Contractor fatalities (number deaths)	3rd party fatalities (number deaths)	Fatality or LWDC as consequence (number PSE)	3rd party hospitalization or fatality as consequence (number Tier 1 PSE)
2012	Onshore	774,721	174	185	0.22	38	0	19	0
2012	Offshore	422,683	54	59	0.13	1	0	5	0
2012	OVERALL	1,197,404	228	244	0.19	39	0	24	0
2013	Onshore	879,809	214	247	0.24	2	0	10	2
2013	Offshore	446,427	38	44	0.09	3	0	5	0
2013	OVERALL	1,326,236	252	291	0.19	5	0	15	2
2014	Onshore	1,060,825	192	240	0.18	4	0	17	0
2014	Offshore	578,614	35	36	0.06	3	0	2	0
2014	OVERALL	1,639,439	227	276	0.14	7	0	19	0
2015	Onshore	959,741	183	220	0.19	10	0	17	0
2015	Offshore	562,681	33	34	0.06	7	0	6	0
2015	OVERALL	1,522,422	216	254	0.14	17	0	23	0
2016	Onshore	715,528	140	155	0.20	6	0	16	1
2016	Offshore	380,825	36	37	0.09	0	0	1	0
2016	OVERALL	1,096,353	176	192	0.16	6	0	17	1
2017	Onshore	967,324	139	143	0.14	1	0	10	0
2017	Offshore	482,213	48	49	0.10	4	0	6	0
2017	OVERALL	1,449,537	187	192	0.13	5	0	16	0
2018	Onshore	1,036,669	208	226	0.20	4	0	9	0
2018	Offshore	458,296	30	30	0.07	0	1	0	1
2018	OVERALL	1,494,965	238	256	0.16	4	1	9	1
2019	Onshore	1,151,997	209	224	0.18	1	0	7	1
2019	Offshore	560,004	37	37	0.07	0	0	3	0
2019	OVERALL	1,712,001	246	261	0.14	1	0	10	1
2020	Onshore	926,275	147	158	0.16	3	0	9	3
2020	Offshore	480,183	26	26	0.05	0	0	2	0
2020	OVERALL	1,406,458	173	184	0.12	3	0	11	3
2021	Onshore	1,075,672	172	172	0.16	0	0	10	1
2021	Offshore	527,857	21	21	0.04	0	0	3	0
2021	OVERALL	1,603,529	193	193	0.12	0	0	13	1

** Excludes PSE where no related drilling or production work hours were reported*

Table B.2: Summary of data - Tier 2

Year	Onshore / offshore	Work hours (thousands)	Number of Tier 2 PSE for normalized results*	Number of Tier 2 PSE	Tier 2 PSE rate	Recordable injury as consequence fatalities (number Tier 2 PSE)
2012	Onshore	737,627	416	469	0.56	15
2012	Offshore	422,683	166	168	0.39	5
2012	OVERALL	1,160,310	582	637	0.50	20
2013	Onshore	864,392	580	666	0.67	15
2013	Offshore	446,440	223	246	0.50	10
2013	OVERALL	1,310,832	803	912	0.61	25
2014	Onshore	1,008,833	632	710	0.63	11
2014	Offshore	622,493	176	182	0.28	1
2014	OVERALL	1,631,326	808	892	0.50	12
2015	Onshore	1,057,082	540	630	0.51	12
2015	Offshore	530,627	160	165	0.30	2
2015	OVERALL	1,587,709	700	795	0.44	14
2016	Onshore	698,509	327	440	0.47	7
2016	Offshore	316,095	117	275	0.37	1
2016	OVERALL	1,014,604	444	715	0.44	8
2017	Onshore	963,467	376	434	0.39	4
2017	Offshore	479,994	182	183	0.38	2
2017	OVERALL	1,443,461	558	617	0.39	6
2018	Onshore	991,925	401	446	0.40	7
2018	Offshore	447,719	154	161	0.34	2
2018	OVERALL	1,439,644	555	607	0.39	9
2019	Onshore	1,165,376	601	664	0.52	4
2019	Offshore	558,639	128	131	0.23	4
2019	OVERALL	1,724,015	729	795	0.42	8
2020	Onshore	926,275	370	416	0.40	1
2020	Offshore	480,183	116	120	0.24	1
2020	OVERALL	1,406,458	486	536	0.35	2
2021	Onshore	1,075,672	521	529	0.48	7
2021	Offshore	527,857	93	93	0.18	4
2021	OVERALL	1,603,529	614	622	0.38	11

** Excludes PSE where no related drilling or production work hours were reported*

Table B.3: Number of PSE and PSE Rate onshore and offshore

Year	Onshore/offshore	Number of PSE		Number of PSE for normalized results*		PSE rate (PSE per million work hours)*	
		Tier 1	Tier 2	Tier 1	Tier 2	Tier 1	Tier 2
2012	Onshore	185	469	174	416	0.22	0.56
2012	Offshore	59	168	54	166	0.13	0.39
2013	Onshore	247	666	214	580	0.24	0.67
2013	Offshore	44	246	38	223	0.09	0.50
2014	Onshore	240	710	192	632	0.18	0.63
2014	Offshore	36	182	35	176	0.06	0.28
2015	Onshore	220	630	183	540	0.19	0.51
2015	Offshore	34	165	33	160	0.06	0.30
2016	Onshore	155	440	140	327	0.20	0.47
2016	Offshore	37	275	36	117	0.09	0.37
2017	Onshore	143	434	139	376	0.14	0.39
2017	Offshore	49	183	48	182	0.10	0.38
2018	Onshore	226	446	208	401	0.20	0.40
2018	Offshore	30	161	30	154	0.07	0.34
2019	Onshore	224	664	209	601	0.18	0.52
2019	Offshore	37	131	37	128	0.07	0.23
2020	Onshore	158	416	147	370	0.16	0.40
2020	Offshore	26	120	26	116	0.05	0.24
2021	Onshore	172	529	172	521	0.16	0.48
2021	Offshore	21	93	21	93	0.04	0.18

** Excludes PSE where work hours were not categorized as drilling or production (i.e., work hours were not specified by function).*

For related work hours for normalized results, see Table A.4 (Scope – onshore and offshore).

Table B.4: Scope - onshore and offshore

Year	Onshore/offshore	Number of companies reporting PSE		Number of data sets where PSE data reported		Related work hours (millions)*		Work hours for PSE data as percentage of total IOGP safety*	
		Tier 1	Tier 2	Tier 1	Tier 2	Tier 1	Tier 2	Tier 1	Tier 2
2012	Onshore	31	28	296	294	775	738	64	61
2012	Offshore	29	28	132	132	423	423	63	63
2013	Onshore	39	38	248	246	880	864	75	73
2013	Offshore	33	33	130	129	446	446	62	62
2014	Onshore	44	42	404	388	1,061	1,009	75	71
2014	Offshore	41	37	167	159	579	622	63	68
2015	Onshore	43	44	431	430	960	1,057	80	88
2015	Offshore	42	41	158	156	563	531	85	80
2016	Onshore	39	39	360	353	716	699	81	79
2016	Offshore	37	38	127	128	381	316	67	56
2017	Onshore	43	43	350	357	967	963	92	92
2017	Offshore	41	40	157	156	482	480	86	86
2018	Onshore	42	41	374	365	1,037	992	92	88
2018	Offshore	41	38	174	168	458	448	86	84
2019	Onshore	47	47	359	358	1,152	1,165	98	99
2019	Offshore	44	44	149	149	560	559	99	99
2020	Onshore	40	39	217	216	926	926	98	98
2020	Offshore	34	34	129	130	480	480	100	100
2021	Onshore	44	44	227	227	1,076	1,076	96	96
2021	Offshore	36	36	136	136	528	528	100	100

** Work hours for PSE data as percentage of total drilling + production work hours in entire IOGP safety database (complete reporting of PSE data would return 100%)*

Not all of the companies that submitted drilling and production work hours within the IOGP safety performance database submitted process safety event data. A number less than 100% in the table above indicates that process safety events are not reported for all drilling and production work hours in the entire safety database.

PSE Data Set: A set of data with distinct company, country and location (onshore/offshore) where PSE data have been entered (i.e., not blank).

Table B.5: Causal factors assigned to Tier 1 PSE – onshore

Causal factors assigned to Tier 1 PSE – onshore	2014	2015	2016	2017	2018	2019	2020	2021
PROCESS (CONDITIONS) : Tools, Equipment, Materials and Products : Inadequate/defective tools/equipment/materials/products	27	21	18	23	42	33	20	56
PROCESS (CONDITIONS) : Tools, Equipment, Materials and Products : Inadequate maintenance/inspection/testing	24	43	37	41	52	46	58	41
PROCESS (CONDITIONS) : Tools, Equipment, Materials and Products : Inadequate design/specification/management of change	15	50	37	29	30	49	21	24
PROCESS (CONDITIONS) : Organizational : Inadequate hazard identification or risk assessment	10	34	31	28	19	31	18	22
PROCESS (CONDITIONS) : Organizational : Inadequate work standards/procedures	12	29	30	17	23	31	18	21
PROCESS (CONDITIONS) : Work Place Hazards : Storms or acts of nature	1	9	14	1	9	11	3	16
PEOPLE (ACTS) : Following Procedures : Violation unintentional (by individual or group)	6	27	13	12	4	23	9	12
PROCESS (CONDITIONS) : Protective Systems : Inadequate/defective warning systems/safety devices	4	24	17	5	6	10	14	11
PROCESS (CONDITIONS) : Organizational : Inadequate training/competence	11	14	12	11	10	12	10	11
PROCESS (CONDITIONS) : Organizational : Inadequate supervision	6	10	8	10	8	13	7	10
PEOPLE (ACTS) : Inattention/Lack of Awareness : Improper decision making or lack of judgment	10	28	17	6	11	11	8	9
PROCESS (CONDITIONS) : Protective Systems : Inadequate/defective guards or protective barriers	6	22	19	8	15	8	10	8
PROCESS (CONDITIONS) : Organizational : Inadequate communication	9	13	11	7	9	13	6	7
PEOPLE (ACTS) : Following Procedures : Improper position (in the line of fire)	1	4	3	1	5	0	3	4
PEOPLE (ACTS) : Use of Protective Methods : Inadequate use of safety systems	2	5	5	2	3	5	1	4
PROCESS (CONDITIONS) : Work Place Hazards : Hazardous atmosphere (explosive/toxic/asphyxiant)	3	4	3	3	4	4	7	3
PEOPLE (ACTS) : Use of Tools, Equipment, Materials and Products : Improper use/position of tools/equipment/materials/products	9	9	6	5	4	4	3	3
PEOPLE (ACTS) : Following Procedures : Violation intentional (by individual or group)	6	4	6	1	2	3	0	3
PROCESS (CONDITIONS) : Protective Systems : Inadequate/defective Personal Protective Equipment	0	2	2	0	1	3	0	3
PEOPLE (ACTS) : Use of Protective Methods : Failure to warn of hazard	3	6	8	2	3	7	7	2
PROCESS (CONDITIONS) : Organizational : Failure to report/learn from events	1	13	6	2	6	4	1	2
PEOPLE (ACTS) : Use of Protective Methods : Equipment or materials not secured	2	1	9	2	3	4	1	2
PEOPLE (ACTS) : Use of Protective Methods : Personal Protective Equipment not used or used improperly	3	1	3	1	1	1	1	2
PEOPLE (ACTS) : Following Procedures : Improper lifting or loading	0	0	0	0	0	2	0	2
PEOPLE (ACTS) : Inattention/Lack of Awareness : Lack of attention/distracted by other concerns/stress	9	15	4	4	6	5	5	1
PEOPLE (ACTS) : Use of Protective Methods : Disabled or removed guards, warning systems or safety devices	1	3	5	2	3	2	3	1
PROCESS (CONDITIONS) : Work Place Hazards : Inadequate surfaces, floors, walkways or roads	0	0	0	1	2	2	1	1
PROCESS (CONDITIONS) : Organizational : Poor leadership/organizational culture	2	7	4	3	4	1	0	1
PEOPLE (ACTS) : Use of Tools, Equipment, Materials and Products : Servicing of energized equipment/inadequate energy isolation	2	3	2	1	3	4	2	0
PROCESS (CONDITIONS) : Work Place Hazards : Congestion, clutter or restricted motion	1	0	1	2	0	0	1	0
PEOPLE (ACTS) : Inattention/Lack of Awareness : Fatigue	0	0	2	0	0	1	0	0
PROCESS (CONDITIONS) : Protective Systems : Inadequate security provisions or systems	0	2	3	0	1	0	0	0
PEOPLE (ACTS) : Inattention/Lack of Awareness : Acts of violence	1	1	1	0	0	0	0	0
PEOPLE (ACTS) : Inattention/Lack of Awareness : Use of drugs or alcohol	0	0	0	0	0	0	0	0
PEOPLE (ACTS) : Following Procedures : Overexertion or improper position/posture for task	0	0	0	0	0	0	0	0
PEOPLE (ACTS) : Following Procedures : Work or motion at improper speed	0	0	0	0	0	0	0	0

Table B.6: Causal factors assigned to Tier 1 PSE – offshore

Causal factors assigned to Tier 1 PSE – offshore	2014	2015	2016	2017	2018	2019	2020	2021
PROCESS (CONDITIONS) : Tools, Equipment, Materials and Products : Inadequate design/specification/management of change	7	5	5	13	12	14	6	10
PROCESS (CONDITIONS) : Tools, Equipment, Materials and Products : Inadequate/defective tools/equipment/materials/products	4	11	12	16	6	11	4	7
PROCESS (CONDITIONS) : Tools, Equipment, Materials and Products : Inadequate maintenance/inspection/testing	6	7	12	19	13	12	10	6
PROCESS (CONDITIONS) : Organizational : Inadequate hazard identification or risk assessment	1	7	9	19	14	15	4	6
PROCESS (CONDITIONS) : Organizational : Inadequate work standards/procedures	6	8	14	13	9	9	4	4
PROCESS (CONDITIONS) : Organizational : Inadequate training/competence	4	2	8	10	5	11	3	4
PEOPLE (ACTS) : Inattention/Lack of Awareness : Lack of attention/distracted by other concerns/stress	5	1	3	3	4	2	1	4
PROCESS (CONDITIONS) : Protective Systems : Inadequate/defective warning systems/safety devices	6	3	3	5	3	7	4	3
PROCESS (CONDITIONS) : Organizational : Inadequate communication	4	2	6	2	2	2	4	3
PEOPLE (ACTS) : Following Procedures : Violation unintentional (by individual or group)	2	2	0	11	4	10	2	3
PROCESS (CONDITIONS) : Organizational : Inadequate supervision	0	0	7	7	3	7	3	2
PROCESS (CONDITIONS) : Organizational : Failure to report/learn from events	0	0	3	2	4	0	2	2
PEOPLE (ACTS) : Inattention/Lack of Awareness : Improper decision making or lack of judgment	6	2	6	7	5	1	0	2
PROCESS (CONDITIONS) : Protective Systems : Inadequate/defective Personal Protective Equipment	0	2	2	2	0	1	0	2
PROCESS (CONDITIONS) : Work Place Hazards : Hazardous atmosphere (explosive/toxic/asphyxiant)	0	0	0	0	0	0	2	1
PEOPLE (ACTS) : Use of Protective Methods : Inadequate use of safety systems	2	0	5	1	0	2	1	1
PEOPLE (ACTS) : Use of Tools, Equipment, Materials and Products : Improper use/position of tools/equipment/materials/products	1	0	0	4	1	1	1	1
PEOPLE (ACTS) : Use of Tools, Equipment, Materials and Products : Servicing of energized equipment/inadequate energy isolation	0	0	0	1	1	2	0	1
PEOPLE (ACTS) : Use of Protective Methods : Failure to warn of hazard	0	1	4	1	0	2	0	1
PEOPLE (ACTS) : Use of Protective Methods : Disabled or removed guards, warning systems or safety devices	0	1	2	1	1	0	0	1
PROCESS (CONDITIONS) : Work Place Hazards : Storms or acts of nature	0	0	0	2	0	0	0	1
PROCESS (CONDITIONS) : Protective Systems : Inadequate/defective guards or protective barriers	3	1	7	5	5	6	6	0
PROCESS (CONDITIONS) : Organizational : Poor leadership/organizational culture	1	1	0	6	2	1	2	0
PROCESS (CONDITIONS) : Protective Systems : Inadequate security provisions or systems	0	0	0	0	0	2	1	0
PEOPLE (ACTS) : Following Procedures : Improper position (in the line of fire)	0	1	2	1	0	1	1	0
PEOPLE (ACTS) : Use of Protective Methods : Personal Protective Equipment not used or used improperly	1	0	1	2	0	0	1	0
PEOPLE (ACTS) : Use of Protective Methods : Equipment or materials not secured	0	0	1	0	0	1	0	0
PROCESS (CONDITIONS) : Work Place Hazards : Congestion, clutter or restricted motion	0	0	0	0	0	1	0	0
PEOPLE (ACTS) : Following Procedures : Violation intentional (by individual or group)	1	0	0	0	1	0	0	0
PEOPLE (ACTS) : Inattention/Lack of Awareness : Fatigue	0	0	0	0	1	0	0	0
PEOPLE (ACTS) : Following Procedures : Work or motion at improper speed	0	0	0	1	0	0	0	0
PROCESS (CONDITIONS) : Work Place Hazards : Inadequate surfaces, floors, walkways or roads	0	0	0	1	0	0	0	0
PEOPLE (ACTS) : Following Procedures : Improper lifting or loading	0	0	0	0	0	0	0	0
PEOPLE (ACTS) : Inattention/Lack of Awareness : Acts of violence	0	0	0	0	0	0	0	0
PEOPLE (ACTS) : Inattention/Lack of Awareness : Use of drugs or alcohol	0	0	0	0	0	0	0	0
PEOPLE (ACTS) : Following Procedures : Overexertion or improper position/posture for task	0	0	0	0	0	0	0	0

Table B.7: Causal factors assigned to Tier 1 PSE – drilling and completion operations

Causal factors assigned to Tier 1 PSE – drilling and completion operations	2014	2015	2016	2017	2018	2019	2020	2021
PROCESS (CONDITIONS) : Organizational : Inadequate work standards/procedures	4	3	2	6	5	3	1	2
PROCESS (CONDITIONS) : Tools, Equipment, Materials and Products : Inadequate/defective tools/equipment/materials/products	3	1	0	5	3	0	1	2
PEOPLE (ACTS) : Inattention/Lack of Awareness : Improper decision making or lack of judgment	4	4	1	3	4	1	0	2
PROCESS (CONDITIONS) : Organizational : Inadequate hazard identification or risk assessment	3	5	4	3	6	6	2	1
PEOPLE (ACTS) : Use of Tools, Equipment, Materials and Products : Improper use/position of tools/equipment/materials/products	1	3	0	0	1	0	1	1
PROCESS (CONDITIONS) : Organizational : Inadequate training/competence	4	3	1	0	3	2	0	1
PEOPLE (ACTS) : Use of Protective Methods : Equipment or materials not secured	1	0	1	0	1	1	0	1
PEOPLE (ACTS) : Use of Protective Methods : Inadequate use of safety systems	1	0	1	2	0	1	0	1
PROCESS (CONDITIONS) : Organizational : Inadequate supervision	2	2	2	1	2	0	0	1
PROCESS (CONDITIONS) : Organizational : Failure to report/learn from events	0	0	0	0	1	0	0	1
PEOPLE (ACTS) : Use of Protective Methods : Personal Protective Equipment not used or used improperly	2	0	0	2	0	0	0	1
PEOPLE (ACTS) : Following Procedures : Improper position (in the line of fire)	1	0	1	0	4	0	2	0
PROCESS (CONDITIONS) : Tools, Equipment, Materials and Products : Inadequate maintenance/inspection/testing	2	1	2	2	2	4	1	0
PEOPLE (ACTS) : Following Procedures : Violation unintentional (by individual or group)	2	4	0	2	0	4	1	0
PEOPLE (ACTS) : Use of Protective Methods : Failure to warn of hazard	1	1	1	1	0	2	1	0
PROCESS (CONDITIONS) : Protective Systems : Inadequate/defective warning systems/safety devices	2	3	1	2	2	1	1	0
PROCESS (CONDITIONS) : Protective Systems : Inadequate/defective guards or protective barriers	1	1	3	2	1	1	1	0
PEOPLE (ACTS) : Use of Protective Methods : Disabled or removed guards, warning systems or safety devices	0	0	2	1	0	0	1	0
PROCESS (CONDITIONS) : Tools, Equipment, Materials and Products : Inadequate design/specification/management of change	4	1	1	2	5	3	0	0
PEOPLE (ACTS) : Use of Tools, Equipment, Materials and Products : Servicing of energized equipment/inadequate energy isolation	1	0	0	0	1	2	0	0
PROCESS (CONDITIONS) : Work Place Hazards : Hazardous atmosphere (explosive/toxic/asphyxiant)	1	1	0	0	2	1	0	0
PROCESS (CONDITIONS) : Work Place Hazards : Inadequate surfaces, floors, walkways or roads	0	0	0	0	1	1	0	0
PROCESS (CONDITIONS) : Protective Systems : Inadequate/defective Personal Protective Equipment	0	1	1	1	0	1	0	0
PROCESS (CONDITIONS) : Organizational : Inadequate communication	3	2	0	1	0	1	0	0
PROCESS (CONDITIONS) : Work Place Hazards : Congestion, clutter or restricted motion	0	0	0	0	0	1	0	0
PEOPLE (ACTS) : Following Procedures : Improper lifting or loading	0	0	0	0	0	1	0	0
PEOPLE (ACTS) : Inattention/Lack of Awareness : Lack of attention/distracted by other concerns/stress	2	1	0	1	2	0	0	0
PROCESS (CONDITIONS) : Organizational : Poor leadership/organizational culture	3	0	0	1	1	0	0	0
PROCESS (CONDITIONS) : Work Place Hazards : Storms or acts of nature	0	1	0	0	0	0	0	0
PEOPLE (ACTS) : Following Procedures : Violation intentional (by individual or group)	3	0	0	0	0	0	0	0
PEOPLE (ACTS) : Following Procedures : Overexertion or improper position/posture for task	0	0	0	0	0	0	0	0
PEOPLE (ACTS) : Following Procedures : Work or motion at improper speed	0	0	0	0	0	0	0	0
PEOPLE (ACTS) : Inattention/Lack of Awareness : Acts of violence	0	0	0	0	0	0	0	0
PEOPLE (ACTS) : Inattention/Lack of Awareness : Use of drugs or alcohol	0	0	0	0	0	0	0	0
PEOPLE (ACTS) : Inattention/Lack of Awareness : Fatigue	0	0	0	0	0	0	0	0
PROCESS (CONDITIONS) : Protective Systems : Inadequate security provisions or systems	0	0	0	0	0	0	0	0

Table B.8: Causal factors assigned to Tier 1 PSE – production

Causal factors assigned to Tier 1 PSE – production	2014	2015	2016	2017	2018	2019	2020	2021
PROCESS (CONDITIONS) : Tools, Equipment, Materials and Products : Inadequate/defective tools/equipment/materials/products	28	31	30	34	45	44	23	61
PROCESS (CONDITIONS) : Tools, Equipment, Materials and Products : Inadequate maintenance/inspection/testing	28	49	47	58	63	54	67	47
PROCESS (CONDITIONS) : Tools, Equipment, Materials and Products : Inadequate design/specification/management of change	18	54	41	40	37	60	27	34
PROCESS (CONDITIONS) : Organizational : Inadequate hazard identification or risk assessment	8	36	36	44	27	40	20	27
PROCESS (CONDITIONS) : Organizational : Inadequate work standards/procedures	14	34	42	24	27	37	21	23
PROCESS (CONDITIONS) : Work Place Hazards : Storms or acts of nature	1	8	14	3	9	11	3	17
PEOPLE (ACTS) : Following Procedures : Violation unintentional (by individual or group)	6	25	13	21	8	29	10	15
PROCESS (CONDITIONS) : Protective Systems : Inadequate/defective warning systems/safety devices	8	24	19	8	7	16	17	14
PROCESS (CONDITIONS) : Organizational : Inadequate training/competence	11	13	19	21	12	21	13	14
PROCESS (CONDITIONS) : Organizational : Inadequate supervision	4	8	13	16	9	20	10	11
PROCESS (CONDITIONS) : Organizational : Inadequate communication	10	13	17	8	11	14	10	10
PEOPLE (ACTS) : Inattention/Lack of Awareness : Improper decision making or lack of judgment	12	26	22	10	12	11	8	9
PROCESS (CONDITIONS) : Protective Systems : Inadequate/defective guards or protective barriers	8	22	23	11	19	13	15	8
PEOPLE (ACTS) : Inattention/Lack of Awareness : Lack of attention/distracted by other concerns/stress	12	15	7	6	8	7	6	5
PROCESS (CONDITIONS) : Protective Systems : Inadequate/defective Personal Protective Equipment	0	3	3	1	1	3	0	5
PROCESS (CONDITIONS) : Work Place Hazards : Hazardous atmosphere (explosive/toxic/asphyxiant)	2	3	3	3	2	3	9	4
PEOPLE (ACTS) : Use of Protective Methods : Inadequate use of safety systems	3	5	9	1	3	6	2	4
PEOPLE (ACTS) : Following Procedures : Improper position (in the line of fire)	0	5	4	2	1	1	2	4
PEOPLE (ACTS) : Use of Protective Methods : Failure to warn of hazard	2	6	11	2	3	7	6	3
PEOPLE (ACTS) : Use of Tools, Equipment, Materials and Products : Improper use/position of tools/equipment/materials/products	9	6	6	9	4	5	3	3
PROCESS (CONDITIONS) : Organizational : Failure to report/learn from events	1	13	9	4	9	4	3	3
PEOPLE (ACTS) : Following Procedures : Violation intentional (by individual or group)	4	4	6	1	3	3	0	3
PEOPLE (ACTS) : Use of Protective Methods : Disabled or removed guards, warning systems or safety devices	1	4	5	2	4	2	2	2
PEOPLE (ACTS) : Following Procedures : Improper lifting or loading	0	0	0	0	0	1	0	2
PEOPLE (ACTS) : Use of Tools, Equipment, Materials and Products : Servicing of energized equipment/inadequate energy isolation	1	3	2	2	3	4	2	1
PROCESS (CONDITIONS) : Organizational : Poor leadership/organizational culture	0	8	4	8	5	2	2	1
PEOPLE (ACTS) : Use of Protective Methods : Personal Protective Equipment not used or used improperly	2	1	4	1	1	1	2	1
PEOPLE (ACTS) : Use of Protective Methods : Equipment or materials not secured	1	1	9	2	2	4	1	1
PROCESS (CONDITIONS) : Work Place Hazards : Inadequate surfaces, floors, walkways or roads	0	0	0	2	1	1	1	1
PROCESS (CONDITIONS) : Protective Systems : Inadequate security provisions or systems	0	2	3	0	1	2	1	0
PROCESS (CONDITIONS) : Work Place Hazards : Congestion, clutter or restricted motion	1	0	1	2	0	0	1	0
PEOPLE (ACTS) : Inattention/Lack of Awareness : Fatigue	0	0	2	0	1	1	0	0
PEOPLE (ACTS) : Following Procedures : Work or motion at improper speed	0	0	0	1	0	0	0	0
PEOPLE (ACTS) : Inattention/Lack of Awareness : Acts of violence	1	1	1	0	0	0	0	0
PEOPLE (ACTS) : Inattention/Lack of Awareness : Use of drugs or alcohol	0	0	0	0	0	0	0	0
PEOPLE (ACTS) : Following Procedures : Overexertion or improper position/posture for task	0	0	0	0	0	0	0	0

Table B.9: Causal factors assigned to fatal incidents

Causal factors assigned to fatal incidents	2014	2015	2016	2017	2018	2019	2020	2021
PROCESS (CONDITIONS) : Organizational : Inadequate hazard identification or risk assessment	0	2	0	0	2	1	1	0
PEOPLE (ACTS) : Following Procedures : Improper position (in the line of fire)	0	0	2	0	1	0	1	0
PEOPLE (ACTS) : Use of Protective Methods : Equipment or materials not secured	0	0	0	0	0	1	0	0
PEOPLE (ACTS) : Inattention/Lack of Awareness : Improper decision making or lack of judgment	1	1	2	1	1	0	0	0
PROCESS (CONDITIONS) : Organizational : Inadequate supervision	1	2	1	1	1	0	0	0
PROCESS (CONDITIONS) : Organizational : Inadequate training/competence	2	3	2	0	1	0	0	0
PEOPLE (ACTS) : Use of Protective Methods : Failure to warn of hazard	0	1	2	0	1	0	0	0
PEOPLE (ACTS) : Following Procedures : Violation unintentional (by individual or group)	2	3	1	0	1	0	0	0
PEOPLE (ACTS) : Use of Tools, Equipment, Materials and Products : Servicing of energized equipment/inadequate energy isolation	0	0	1	0	1	0	0	0
PROCESS (CONDITIONS) : Tools, Equipment, Materials and Products : Inadequate design/specification/management of change	0	1	0	0	1	0	0	0
PROCESS (CONDITIONS) : Organizational : Failure to report/learn from events	0	0	0	0	1	0	0	0
PROCESS (CONDITIONS) : Work Place Hazards : Storms or acts of nature	0	0	0	0	1	0	0	0
PEOPLE (ACTS) : Use of Protective Methods : Inadequate use of safety systems	1	0	1	1	0	0	0	0
PROCESS (CONDITIONS) : Tools, Equipment, Materials and Products : Inadequate maintenance/inspection/testing	0	0	1	1	0	0	0	0
PROCESS (CONDITIONS) : Organizational : Inadequate work standards/procedures	1	2	0	1	0	0	0	0
PROCESS (CONDITIONS) : Protective Systems : Inadequate/defective guards or protective barriers	1	1	0	1	0	0	0	0
PROCESS (CONDITIONS) : Tools, Equipment, Materials and Products : Inadequate/defective tools/equipment/materials/products	0	1	0	1	0	0	0	0
PROCESS (CONDITIONS) : Protective Systems : Inadequate/defective warning systems/safety devices	1	2	1	0	0	0	0	0
PEOPLE (ACTS) : Following Procedures : Violation intentional (by individual or group)	0	0	1	0	0	0	0	0
PEOPLE (ACTS) : Use of Protective Methods : Disabled or removed guards, warning systems or safety devices	0	0	1	0	0	0	0	0
PEOPLE (ACTS) : Inattention/Lack of Awareness : Fatigue	0	0	1	0	0	0	0	0
PROCESS (CONDITIONS) : Work Place Hazards : Inadequate surfaces, floors, walkways or roads	0	0	1	0	0	0	0	0
PROCESS (CONDITIONS) : Protective Systems : Inadequate/defective Personal Protective Equipment	0	3	0	0	0	0	0	0
PROCESS (CONDITIONS) : Organizational : Inadequate communication	0	2	0	0	0	0	0	0
PEOPLE (ACTS) : Use of Protective Methods : Personal Protective Equipment not used or used improperly	1	1	0	0	0	0	0	0
PEOPLE (ACTS) : Inattention/Lack of Awareness : Lack of attention/distracted by other concerns/stress	1	1	0	0	0	0	0	0
PEOPLE (ACTS) : Use of Tools, Equipment, Materials and Products : Improper use/position of tools/equipment/materials/products	0	1	0	0	0	0	0	0
PROCESS (CONDITIONS) : Work Place Hazards : Hazardous atmosphere (explosive/toxic/asphyxiant)	0	1	0	0	0	0	0	0
PROCESS (CONDITIONS) : Protective Systems : Inadequate security provisions or systems	0	1	0	0	0	0	0	0
PROCESS (CONDITIONS) : Organizational : Poor leadership/organizational culture	0	0	0	0	0	0	0	0
PEOPLE (ACTS) : Following Procedures : Overexertion or improper position/posture for task	0	0	0	0	0	0	0	0
PEOPLE (ACTS) : Following Procedures : Work or motion at improper speed	0	0	0	0	0	0	0	0
PEOPLE (ACTS) : Following Procedures : Improper lifting or loading	0	0	0	0	0	0	0	0
PROCESS (CONDITIONS) : Work Place Hazards : Congestion, clutter or restricted motion	0	0	0	0	0	0	0	0
PEOPLE (ACTS) : Inattention/Lack of Awareness : Acts of violence	0	0	0	0	0	0	0	0
PEOPLE (ACTS) : Inattention/Lack of Awareness : Use of drugs or alcohol	0	0	0	0	0	0	0	0

Table B.10: Causal factors assigned to high potential events

Causal factors assigned to high potential events	2014	2015	2016	2017	2018	2019	2020	2021
PROCESS (CONDITIONS) : Tools, Equipment, Materials and Products : Inadequate design/specification/management of change	6	1	9	2	4	4	4	4
PROCESS (CONDITIONS) : Organizational : Inadequate work standards/procedures	7	2	6	2	4	4	4	4
PEOPLE (ACTS) : Use of Tools, Equipment, Materials and Products : Improper use/position of tools/equipment/materials/products	0	0	3	0	1	0	1	3
PROCESS (CONDITIONS) : Tools, Equipment, Materials and Products : Inadequate maintenance/inspection/testing	6	1	2	5	6	3	4	2
PROCESS (CONDITIONS) : Organizational : Inadequate hazard identification or risk assessment	6	2	6	5	2	4	3	2
PROCESS (CONDITIONS) : Organizational : Inadequate training/competence	3	0	2	2	4	3	3	2
PROCESS (CONDITIONS) : Protective Systems : Inadequate/defective warning systems/safety devices	2	2	1	2	2	2	3	2
PROCESS (CONDITIONS) : Organizational : Inadequate supervision	1	1	1	1	0	4	2	2
PROCESS (CONDITIONS) : Organizational : Failure to report/learn from events	2	0	2	0	1	0	1	2
PEOPLE (ACTS) : Following Procedures : Violation intentional (by individual or group)	2	1	2	0	0	2	0	2
PROCESS (CONDITIONS) : Protective Systems : Inadequate/defective guards or protective barriers	0	0	4	2	1	1	0	2
PEOPLE (ACTS) : Inattention/Lack of Awareness : Improper decision making or lack of judgment	2	1	5	1	1	4	3	1
PROCESS (CONDITIONS) : Tools, Equipment, Materials and Products : Inadequate/defective tools/equipment/materials/products	2	1	2	1	3	2	2	1
PEOPLE (ACTS) : Use of Protective Methods : Failure to warn of hazard	0	0	3	0	1	1	2	1
PROCESS (CONDITIONS) : Protective Systems : Inadequate/defective Personal Protective Equipment	0	0	1	0	0	1	0	1
PROCESS (CONDITIONS) : Organizational : Inadequate communication	3	1	4	2	2	3	5	0
PROCESS (CONDITIONS) : Work Place Hazards : Hazardous atmosphere (explosive/toxic/asphyxiant)	1	1	4	1	2	1	2	0
PEOPLE (ACTS) : Use of Protective Methods : Inadequate use of safety systems	1	0	1	0	2	0	2	0
PEOPLE (ACTS) : Following Procedures : Overexertion or improper position/posture for task	0	0	0	0	0	0	1	0
PEOPLE (ACTS) : Use of Tools, Equipment, Materials and Products : Servicing of energized equipment/inadequate energy isolation	0	0	0	0	1	3	0	0
PEOPLE (ACTS) : Following Procedures : Violation unintentional (by individual or group)	0	1	4	1	1	2	0	0
PEOPLE (ACTS) : Use of Protective Methods : Equipment or materials not secured	1	0	0	0	0	2	0	0
PEOPLE (ACTS) : Use of Protective Methods : Personal Protective Equipment not used or used improperly	1	0	1	0	0	1	0	0
PROCESS (CONDITIONS) : Work Place Hazards : Congestion, clutter or restricted motion	0	0	0	0	0	1	0	0
PEOPLE (ACTS) : Inattention/Lack of Awareness : Lack of attention/distracted by other concerns/stress	0	0	0	1	1	0	0	0
PEOPLE (ACTS) : Following Procedures : Improper position (in the line of fire)	0	1	1	0	1	0	0	0
PROCESS (CONDITIONS) : Organizational : Poor leadership/organizational culture	2	0	0	0	1	0	0	0
PROCESS (CONDITIONS) : Protective Systems : Inadequate security provisions or systems	0	0	0	0	1	0	0	0
PEOPLE (ACTS) : Use of Protective Methods : Disabled or removed guards, warning systems or safety devices	0	0	1	0	0	0	0	0
PROCESS (CONDITIONS) : Work Place Hazards : Storms or acts of nature	0	0	1	0	0	0	0	0
PEOPLE (ACTS) : Following Procedures : Work or motion at improper speed	1	0	0	0	0	0	0	0
PEOPLE (ACTS) : Inattention/Lack of Awareness : Fatigue	1	0	0	0	0	0	0	0
PROCESS (CONDITIONS) : Work Place Hazards : Inadequate surfaces, floors, walkways or roads	0	0	0	0	0	0	0	0
PEOPLE (ACTS) : Following Procedures : Improper lifting or loading	0	0	0	0	0	0	0	0
PEOPLE (ACTS) : Inattention/Lack of Awareness : Acts of violence	0	0	0	0	0	0	0	0
PEOPLE (ACTS) : Inattention/Lack of Awareness : Use of drugs or alcohol	0	0	0	0	0	0	0	0

Note: In 2017, Member Companies were asked to submit additional high potential events for 2010-2016. In 2018 some changes were made to causal factors assigned to 2017 high potential events. Therefore, the figures in the table above are different to those previously published.

Section 2 Results by function

Table B.11: Total number of PSE and PSE Rate – drilling

Year	Location	Number of drilling PSE		Number of drilling PSE for normalized results*		PSE rate (PSE per million work hours)* - drilling	
		Tier 1	Tier 2	Tier 1	Tier 2	Tier 1	Tier 2
2012	Onshore	6	34	6	32	0.03	0.16
2012	Offshore	11	37	9	37	0.07	0.28
2012	OVERALL	17	71	15	69	0.04	0.21
2013	Onshore	9	61	9	54	0.04	0.22
2013	Offshore	11	69	10	67	0.06	0.42
2013	OVERALL	20	130	19	121	0.05	0.30
2014	Onshore	10	68	10	65	0.04	0.24
2014	Offshore	9	45	9	44	0.05	0.21
2014	OVERALL	19	113	19	109	0.04	0.23
2015	Onshore	9	23	7	21	0.03	0.07
2015	Offshore	3	24	3	22	0.02	0.13
2015	OVERALL	12	47	10	43	0.02	0.09
2016	Onshore	7	15	7	13	0.04	0.08
2016	Offshore	3	19	3	17	0.02	0.16
2016	OVERALL	10	34	10	30	0.03	0.11
2017	Onshore	8	20	8	20	0.04	0.09
2017	Offshore	8	31	8	30	0.06	0.24
2017	OVERALL	16	51	16	50	0.05	0.15
2018	Onshore	11	22	9	21	0.05	0.11
2018	Offshore	2	16	2	15	0.02	0.13
2018	OVERALL	13	38	11	36	0.03	0.12
2019	Onshore	9	30	8	29	0.03	0.12
2019	Offshore	1	12	1	12	0.01	0.08
2019	OVERALL	10	42	9	41	0.02	0.11
2020	Onshore	6	18	5	10	0.03	0.06
2020	Offshore	1	14	1	11	0.01	0.09
2020	OVERALL	7	32	6	21	0.02	0.07
2021	Onshore	6	31	6	31	0.03	0.16
2021	Offshore	0	6	0	6	0.00	0.05
2021	OVERALL	6	37	6	37	0.02	0.11

** Excludes PSE where related drilling work hours were not reported.*

For related work hours for normalized results see Scope table below.

Table B.12: Scope – drilling

Year	Location	Companies reporting PSE data – drilling		Related work hours (millions)* – drilling		Data sets – drilling	
		Tier 1	Tier 2	Tier 1	Tier 2	Tier 1	Tier 2
2012	Onshore	29	27	205	195	285.00	282.00
2012	Offshore	29	28	131	131	130.00	130.00
2012	OVERALL	30	28	335	325	415.00	412.00
2013	Onshore	37	35	250	240	206.00	208.00
2013	Offshore	33	32	161	160	118.00	120.00
2013	OVERALL	37	35	410	400	324.00	328.00
2014	Onshore	41	38	276	267	387.00	369.00
2014	Offshore	39	36	189	206	159.00	155.00
2014	OVERALL	42	39	465	472	546.00	524.00
2015	Onshore	42	43	258	301	406.00	406.00
2015	Offshore	40	41	160	174	155.00	153.00
2015	OVERALL	42	43	418	476	561.00	559.00
2016	Onshore	38	38	177	172	328.00	321.00
2016	Offshore	36	38	127	109	123.00	122.00
2016	OVERALL	39	39	304	281	451.00	443.00
2017	Onshore	41	40	214	212	335.00	346.00
2017	Offshore	39	38	127	127	150.00	149.00
2017	OVERALL	41	40	341	339	485.00	495.00
2018	Onshore	41	39	197	193	367.00	359.00
2018	Offshore	40	38	121	116	168.00	161.00
2018	OVERALL	41	39	318	309	535.00	520.00
2019	Onshore	46	46	229	240	327.00	323.00
2019	Offshore	44	44	149	148	143.00	143.00
2019	OVERALL	46	46	378	387	470.00	466.00
2020	Onshore	33	33	179	179	154.00	154.00
2020	Offshore	29	29	128	128	102.00	103.00
2020	OVERALL	38	38	307	307	256.00	257.00
2021	Onshore	30	30	195	195	150.00	150.00
2021	Offshore	26	26	131	131	98.00	98.00
2021	OVERALL	37	37	326	326	248.00	248.00

** Related work hours have not been provided for all reported PSE*

Table B.13: Total number of PSE and PSE Rate – production

Year	Location	Number of production PSE		Number of production PSE for normalized results*		PSE rate (PSE per million work hours)* - production	
		Tier 1	Tier 2	Tier 1	Tier 2	Tier 1	Tier 2
2012	Onshore	179	435	168	384	0.29	0.71
2012	Offshore	48	131	45	129	0.15	0.44
2012	OVERALL	227	566	213	513	0.25	0.61
2013	Onshore	238	605	205	526	0.33	0.84
2013	Offshore	33	177	28	156	0.10	0.54
2013	OVERALL	271	782	233	682	0.25	0.75
2014	Onshore	230	642	182	567	0.23	0.76
2014	Offshore	27	137	26	132	0.07	0.32
2014	OVERALL	257	779	208	699	0.18	0.60
2015	Onshore	211	607	176	519	0.25	0.69
2015	Offshore	31	141	30	138	0.07	0.39
2015	OVERALL	242	748	206	657	0.19	0.59
2016	Onshore	148	425	133	314	0.25	0.60
2016	Offshore	34	256	33	100	0.13	0.48
2016	OVERALL	182	681	166	414	0.21	0.56
2017	Onshore	135	414	131	356	0.17	0.47
2017	Offshore	41	152	40	152	0.11	0.43
2017	OVERALL	176	566	171	508	0.15	0.46
2018	Onshore	215	424	199	380	0.24	0.48
2018	Offshore	28	145	28	139	0.08	0.42
2018	OVERALL	243	569	227	519	0.19	0.46
2019	Onshore	215	634	201	572	0.22	0.62
2019	Offshore	36	119	36	116	0.09	0.28
2019	OVERALL	251	753	237	688	0.18	0.51
2020	Onshore	152	398	142	360	0.19	0.48
2020	Offshore	25	106	25	105	0.07	0.30
2020	OVERALL	177	504	167	465	0.15	0.42
2021	Onshore	166	498	166	490	0.19	0.56
2021	Offshore	21	87	21	87	0.05	0.22
2021	OVERALL	187	585	187	577	0.15	0.45

** Excludes PSE where related production work hours were not reported*

For related work hours for normalized results see Scope table below

Table B.14: Scope – production

Year	Location	Companies reporting PSE data – production		Related work hours (millions)* – production		Data sets – production	
		Tier 1	Tier 2	Tier 1	Tier 2	Tier 1	Tier 2
2012	Onshore	31	28	570	543	288.00	287.00
2012	Offshore	29	28	292	292	126.00	126.00
2012	OVERALL	32	29	862	835	414.00	413.00
2013	Onshore	37	36	630	624	212.00	211.00
2013	Offshore	30	30	286	286	111.00	112.00
2013	OVERALL	37	36	916	911	323.00	323.00
2014	Onshore	44	42	785	742	394.00	378.00
2014	Offshore	41	37	390	417	154.00	147.00
2014	OVERALL	44	42	1,174	1,159	548.00	525.00
2015	Onshore	43	44	701	756	425.00	425.00
2015	Offshore	42	41	403	356	152.00	150.00
2015	OVERALL	44	44	1,104	1,112	577.00	575.00
2016	Onshore	39	39	539	527	353.00	339.00
2016	Offshore	37	38	253	208	120.00	116.00
2016	OVERALL	39	39	792	734	473.00	455.00
2017	Onshore	43	43	754	752	350.00	357.00
2017	Offshore	41	40	355	353	154.00	153.00
2017	OVERALL	43	43	1,108	1,105	504.00	510.00
2018	Onshore	42	41	840	799	373.00	364.00
2018	Offshore	40	37	338	331	173.00	166.00
2018	OVERALL	42	41	1,177	1,131	546.00	530.00
2019	Onshore	47	47	923	926	350.00	345.00
2019	Offshore	44	44	411	411	143.00	138.00
2019	OVERALL	47	47	1,334	1,337	493.00	483.00
2020	Onshore	38	37	747	747	187.00	186.00
2020	Offshore	31	31	352	352	105.00	105.00
2020	OVERALL	41	40	1,099	1,099	292.00	291.00
2021	Onshore	41	41	880	880	195.00	196.00
2021	Offshore	33	33	397	397	115.00	115.00
2021	OVERALL	44	44	1,278	1,278	310.00	311.00

** Related work hours have not been provided for all reported PSE*

Section 3 Results by activity

Table B.15: Number of production PSE by activity

TIER 1	Normal operations	Start up	Shut down	Other	Unspecified
2012	159	10	3	4	51
2013	165	6	2	10	88
2014	181	18	5	8	45
2015	164	11	5	29	33
2016	101	10	12	22	37
2017	119	8	7	28	14
2018	181	10	4	24	24
2019	132	8	1	7	103
2020	143	6	3	24	1
2021	148	6	13	19	1

TIER 2	Normal operations	Start up	Shut down	Other	Unspecified
2012	398	15	12	6	135
2013	459	11	4	30	278
2014	556	19	12	31	161
2015	556	34	11	67	80
2016	349	18	6	60	248
2017	423	11	10	48	74
2018	447	11	7	62	42
2019	425	14	4	16	294
2020	417	14	3	61	9
2021	438	40	6	92	9

Section 4 Results by consequence

Table B.16: Number of consequences assigned to PSE – Tier 1

Year	Number of consequences assigned to Tier 1 PSE					
	Fatality or LWDC	Third party hospitalization	Community evacuation	Fire or explosion	PRD discharges	Material release
2012	24	0	2	34	32	180
2013	15	2	7	28	24	230
2014	19	0	10	29	13	217
2015	23	0	1	27	13	195
2016	17	1	2	25	16	144
2017	16	0	2	14	8	151
2018	9	1	2	15	5	221
2019	10	1	1	15	15	225
2020	11	3	0	14	6	168
2021	13	1	3	20	11	179

Table B.17: Number of consequences assigned to PSE – Tier 2

Year	Number of consequences assigned to Tier 2 PSE			
	Recordable injury	Fire or explosion	PRD discharges	Material release
2012	20	30	49	545
2013	25	21	44	813
2014	12	37	44	797
2015	14	49	35	660
2016	8	53	19	635
2017	6	48	17	534
2018	9	56	14	497
2019	8	64	78	645
2020	2	36	21	504
2021	11	75	29	578

Table B.18: Number of fatalities

Year	Number of Employee/Contractor fatalities	Number of 3rd Party fatalities
2012	39	0
2013	5	0
2014	7	0
2015	17	0
2016	6	0
2017	5	0
2018	4	1
2019	1	0
2020	3	0
2021	0	0

Table B.19: PSE by consequence – scope

TIER 1	Percentage of total reported PSE where information on consequence was provided	Number of Companies reporting PSE data by consequence	Number of related work hours (millions) where PSE reported by consequence	Number of data sets where PSE reported by consequence
2012	100%	26	632	76
2013	98%	24	613	63
2014	99%	28	811	68
2015	98%	28	660	62
2016	99%	22	510	61
2017	98%	26	863	70
2018	98%	28	794	59
2019	99%	27	813	63
2020	100%	27	619	55
2021	99%	21	655	53

TIER 2	Percentage of total reported PSE where information on consequence was provided	Number of Companies reporting PSE data by consequence	Number of related work hours (millions) where PSE reported by consequence	Number of data sets where PSE reported by consequence
2012	100%	23	728	102
2013	96%	27	789	105
2014	97%	33	1064	124
2015	95%	32	838	117
2016	99%	26	565	91
2017	98%	27	900	103
2018	93%	32	827	87
2019	99%	34	1069	107
2020	100%	30	860	101
2021	99%	30	920	91

Note 1: Consequence is only specified where 1 or more PSE are reported.

Note 2: Related work hours were not provided for all reported PSE.

Section 5 Results by material

Table B.20: Number of PSE by material released

TIER 1	Toxics	Flammable gas	Hazardous liquid	Other gases or liquids	Unspecified
2012	12	62	77	23	70
2013	11	72	128	16	64
2014	5	88	112	19	52
2015	9	91	107	10	37
2016	5	63	76	8	40
2017	9	70	80	10	23
2018	3	54	158	9	32
2019	5	67	89	7	93
2020	6	61	76	20	21
2021	6	53	99	21	14

TIER 2	Toxics	Flammable gas	Hazardous liquid	Other gases or liquids	Unspecified
2012	9	201	205	29	193
2013	31	203	418	70	190
2014	13	281	368	76	154
2015	12	237	396	54	96
2016	11	169	230	48	257
2017	20	175	246	76	100
2018	9	156	322	77	43
2019	5	169	296	56	269
2020	6	178	251	54	47
2021	9	168	293	108	44

Note: Material is only specified where 1 or more PSE are reported.

Table B.21: PSE by material – scope

TIER 1	Number of Companies reporting PSE data by material released	Number of related work hours (millions) where PSE reported by material released	Number of data sets where PSE reported by material released
2012	18	437	55
2013	19	443	52
2014	25	487	59
2015	25	503	58
2016	20	457	51
2017	22	786	63
2018	26	583	51
2019	24	714	55
2020	25	544	48
2021	17	536	46

TIER 2	Number of Companies reporting PSE data by material released	Number of related work hours (millions) where PSE reported by material released	Number of data sets where PSE reported by material released
2012	18	490	74
2013	23	584	91
2014	31	726	119
2015	31	808	113
2016	24	534	88
2017	26	838	99
2018	31	810	87
2019	28	934	90
2020	29	795	96
2021	29	902	86

Note 1: Material is only specified where 1 or more PSE are reported.

Note 2: Related work hours were not provided for all reported PSE.

Section 6 Results by region

Table B.22: Number of PSE

Number of PSE		Africa	Asia/Australasia	Europe	Middle East	North America	Russia & Central Asia	South America
2012	Tier 1	60	20	26	21	100	12	5
2012	Tier 2	83	63	117	20	322	15	17
2013	Tier 1	56	24	14	26	162	7	2
2013	Tier 2	131	76	108	94	389	94	20
2014	Tier 1	34	21	20	19	173	3	6
2014	Tier 2	57	69	88	59	480	101	38
2015	Tier 1	29	21	15	13	152	7	17
2015	Tier 2	56	56	87	70	366	81	79
2016	Tier 1	19	24	19	28	83	1	18
2016	Tier 2	37	241	64	74	232	21	46
2017	Tier 1	32	25	13	15	72	3	32
2017	Tier 2	70	81	63	41	256	11	95
2018	Tier 1	26	8	15	26	101	58	22
2018	Tier 2	68	56	58	74	242	11	98
2019	Tier 1	15	12	12	20	97	75	30
2019	Tier 2	73	34	41	42	326	116	163
2020	Tier 1	23	10	11	40	76	3	21
2020	Tier 2	49	48	51	83	207	6	92
2021	Tier 1	24	6	9	12	92	7	43
2021	Tier 2	50	41	49	52	286	22	122

Table B.23: Number of PSE for normalized results*

Number of PSE for normalized results*		Africa	Asia/Australasia	Europe	Middle East	North America	Russia & Central Asia	South America
2012	Tier 1	59	18	25	21	89	12	4
2012	Tier 2	81	57	116	8	288	15	17
2013	Tier 1	51	22	14	26	130	7	2
2013	Tier 2	113	68	105	90	317	94	16
2014	Tier 1	33	20	19	15	131	3	6
2014	Tier 2	57	63	88	52	409	101	38
2015	Tier 1	28	20	15	13	116	7	17
2015	Tier 2	55	49	85	69	283	81	78
2016	Tier 1	19	22	19	27	70	1	18
2016	Tier 2	35	42	63	42	206	10	46
2017	Tier 1	32	25	12	15	68	3	32
2017	Tier 2	69	75	61	41	208	9	95
2018	Tier 1	26	7	15	26	85	57	22
2018	Tier 2	65	48	58	74	204	9	97
2019	Tier 1	14	10	12	20	85	75	30
2019	Tier 2	71	30	41	42	272	111	162
2020	Tier 1	23	10	10	40	68	1	21
2020	Tier 2	49	44	49	83	163	6	92
2021	Tier 1	24	6	9	12	92	7	43
2021	Tier 2	43	40	49	52	286	22	122

**Excludes PSE where no related drilling or production work hours were reported. See Tables B.30 – B.39 (Number of PSE used in normalized analysis – by region and function).*

Table B.24: PSE Rate

Year	Tier	PSE per million work hours*							
		Africa	Asia/Australasia	Europe	Middle East	North America	Russia & Central Asia	South America	OVERALL
2012	Tier 1	0.27	0.07	0.14	0.13	0.35	0.14	0.11	0.19
2012	Tier 2	0.38	0.21	0.64	0.07	1.14	0.18	0.48	0.50
2013	Tier 1	0.22	0.07	0.07	0.15	0.47	0.07	0.05	0.19
2013	Tier 2	0.49	0.21	0.59	0.51	1.16	1.00	0.39	0.61
2014	Tier 1	0.14	0.07	0.09	0.09	0.25	0.03	0.07	0.14
2014	Tier 2	0.27	0.18	0.47	0.31	0.78	0.84	0.49	0.50
2015	Tier 1	0.14	0.07	0.08	0.05	0.29	0.06	0.20	0.14
2015	Tier 2	0.28	0.21	0.46	0.29	0.53	0.67	0.94	0.44
2016	Tier 1	0.12	0.08	0.12	0.12	0.42	0.01	0.29	0.16
2016	Tier 2	0.23	0.22	0.41	0.19	1.24	0.14	0.75	0.44
2017	Tier 1	0.15	0.13	0.08	0.04	0.38	0.03	0.12	0.13
2017	Tier 2	0.32	0.38	0.43	0.12	1.16	0.08	0.37	0.39
2018	Tier 1	0.11	0.03	0.11	0.07	0.48	0.52	0.09	0.16
2018	Tier 2	0.28	0.23	0.45	0.20	1.16	0.12	0.39	0.39
2019	Tier 1	0.05	0.03	0.08	0.06	0.39	0.59	0.10	0.14
2019	Tier 2	0.27	0.10	0.26	0.12	1.24	0.88	0.54	0.42
2020	Tier 1	0.12	0.03	0.08	0.13	0.54	0.01	0.10	0.12
2020	Tier 2	0.25	0.14	0.37	0.26	1.29	0.06	0.42	0.35
2021	Tier 1	0.12	0.02	0.06	0.03	0.48	0.05	0.18	0.12
2021	Tier 2	0.22	0.13	0.34	0.14	1.48	0.14	0.50	0.38

**Excludes PSE where no related drilling or production work hours were reported. See Tables B.27 and B.29 (Number of PSE used in normalized analysis – by region and function).*

Table B.25: Number of related work hours

Year	Tier	Number of work hours (000's) used in normalized analysis							
		Africa	Asia/Australasia	Europe	Middle East	North America	Russia & Central Asia	South America	OVERALL
2012	Tier 1	215,383	262,770	181,799	162,372	253,988	85,633	35,459	1,197,404
2012	Tier 2	215,383	274,320	181,799	116,090	251,626	85,633	35,459	1,160,310
2013	Tier 1	229,918	316,861	190,335	175,885	277,489	94,464	41,284	1,326,236
2013	Tier 2	229,918	320,099	177,205	174,842	273,475	94,338	40,955	1,310,832
2014	Tier 1	236,275	291,065	208,466	172,950	521,335	119,699	89,649	1,639,439
2014	Tier 2	213,756	345,322	186,572	166,673	521,335	119,699	77,969	1,631,326
2015	Tier 1	193,327	306,097	184,785	240,688	393,785	120,371	83,369	1,522,422
2015	Tier 2	193,327	235,369	186,483	238,979	529,811	120,371	83,369	1,587,709
2016	Tier 1	155,553	271,552	152,320	218,137	165,683	71,254	61,854	1,096,353
2016	Tier 2	155,553	190,350	152,320	218,137	165,683	71,254	61,307	1,014,604
2017	Tier 1	217,765	197,636	142,314	337,908	179,417	116,348	258,149	1,449,537
2017	Tier 2	217,765	195,285	142,314	334,183	179,417	116,348	258,149	1,443,461
2018	Tier 1	242,448	207,795	136,603	368,292	177,301	108,877	253,649	1,494,965
2018	Tier 2	234,808	206,583	128,812	368,292	176,014	75,500	249,635	1,439,644
2019	Tier 1	263,090	314,203	158,772	341,054	219,433	126,064	289,385	1,712,001
2019	Tier 2	263,666	315,363	158,360	341,054	219,401	126,445	299,726	1,724,015
2020	Tier 1	192,576	320,640	133,272	319,150	126,749	96,309	217,762	1,406,458
2020	Tier 2	192,576	320,640	133,272	319,150	126,749	96,309	217,762	1,406,458
2021	Tier 1	197,141	305,640	144,811	365,617	193,593	152,467	244,260	1,603,529
2021	Tier 2	197,141	305,640	144,811	365,617	193,593	152,467	244,260	1,603,529

Table B.26: Number of PSE - drilling

Number of PSE		Africa	Asia/Australasia	Europe	Middle East	North America	Russia & Central Asia	South America	OVERALL
2012	Tier 1	4	3	1	1	8	0	0	17
2012	Tier 2	9	9	17	2	29	3	2	71
2013	Tier 1	4	5	1	0	10	0	0	20
2013	Tier 2	22	4	15	5	80	2	2	130
2014	Tier 1	2	4	1	0	11	1	0	19
2014	Tier 2	8	12	15	5	66	2	5	113
2015	Tier 1	1	1	0	1	6	2	1	12
2015	Tier 2	6	3	10	3	18	1	6	47
2016	Tier 1	0	0	3	4	1	0	2	10
2016	Tier 2	3	2	8	3	15	1	2	34
2017	Tier 1	2	0	3	2	4	0	5	16
2017	Tier 2	2	2	13	1	15	2	16	51
2018	Tier 1	3	0	2	0	3	1	4	13
2018	Tier 2	3	4	7	1	10	1	12	38
2019	Tier 1	1	0	0	0	7	0	2	10
2019	Tier 2	4	0	5	1	21	0	11	42
2020	Tier 1	0	0	1	2	2	0	2	7
2020	Tier 2	0	5	4	2	11	0	10	32
2021	Tier 1	0	0	1	0	1	1	3	6
2021	Tier 2	0	2	2	1	6	0	26	37

Table B.27: Number of PSE for normalized results* - drilling

Number of PSE for normalized results*		Africa	Asia/Australasia	Europe	Middle East	North America	Russia & Central Asia	South America	OVERALL
2012	Tier 1	3	2	1	1	8	0	0	15
2012	Tier 2	9	9	17	1	28	3	2	69
2013	Tier 1	4	4	1	0	10	0	0	19
2013	Tier 2	20	4	13	3	77	2	2	121
2014	Tier 1	2	4	1	0	11	1	0	19
2014	Tier 2	8	12	15	4	63	2	5	109
2015	Tier 1	1	0	0	1	5	2	1	10
2015	Tier 2	5	2	10	2	17	1	6	43
2016	Tier 1	0	0	3	4	1	0	2	10
2016	Tier 2	1	2	8	3	13	1	2	30
2017	Tier 1	2	0	3	2	4	0	5	16
2017	Tier 2	1	2	13	1	15	2	16	50
2018	Tier 1	3	0	2	0	2	0	4	11
2018	Tier 2	2	4	7	1	9	1	12	36
2019	Tier 1	1	0	0	0	6	0	2	9
2019	Tier 2	4	0	5	1	20	0	11	41
2020	Tier 1	0	0	0	2	2	0	2	6
2020	Tier 2	0	1	3	2	5	0	10	21
2021	Tier 1	0	0	1	0	1	1	3	6
2021	Tier 2	0	2	2	1	6	0	26	37

**Excludes PSE where no related drilling work hours were reported.*

See Tables B.30 – B.39 (Number of PSE used in normalized analysis – by region and function).

Table B.28: Number of PSE - production

Number of PSE		Africa	Asia/Australasia	Europe	Middle East	North America	Russia & Central Asia	South America	OVERALL
2012	Tier 1	56	17	25	20	92	12	5	227
2012	Tier 2	74	54	100	18	293	12	15	566
2013	Tier 1	52	19	13	26	152	7	2	271
2013	Tier 2	109	72	93	89	309	92	18	782
2014	Tier 1	32	17	19	19	162	2	6	257
2014	Tier 2	49	57	73	54	414	99	33	779
2015	Tier 1	28	20	15	12	146	5	16	242
2015	Tier 2	50	53	77	67	348	80	73	748
2016	Tier 1	19	24	16	24	82	1	16	182
2016	Tier 2	34	239	56	71	217	20	44	681
2017	Tier 1	30	25	10	13	68	3	27	176
2017	Tier 2	68	79	50	40	241	9	79	566
2018	Tier 1	23	8	13	26	98	57	18	243
2018	Tier 2	65	52	51	73	232	10	86	569
2019	Tier 1	14	12	12	20	90	75	28	251
2019	Tier 2	69	34	36	41	305	116	152	753
2020	Tier 1	23	10	10	38	74	3	19	177
2020	Tier 2	49	43	47	81	196	6	82	504
2021	Tier 1	24	6	8	12	91	6	40	187
2021	Tier 2	50	39	47	51	280	22	96	585

Table B.29: Number of PSE for normalized results* - production

Number of PSE for normalized results*		Africa	Asia/Australasia	Europe	Middle East	North America	Russia & Central Asia	South America	OVERALL
2012	Tier 1	56	16	24	20	81	12	4	213
2012	Tier 2	72	48	99	7	260	12	15	513
2013	Tier 1	47	18	13	26	120	7	2	233
2013	Tier 2	93	64	92	87	240	92	14	682
2014	Tier 1	31	16	18	15	120	2	6	208
2014	Tier 2	49	51	73	48	346	99	33	699
2015	Tier 1	27	20	15	12	111	5	16	206
2015	Tier 2	50	47	75	67	266	80	72	657
2016	Tier 1	19	22	16	23	69	1	16	166
2016	Tier 2	34	40	55	39	193	9	44	414
2017	Tier 1	30	25	9	13	64	3	27	171
2017	Tier 2	68	73	48	40	193	7	79	508
2018	Tier 1	23	7	13	26	83	57	18	227
2018	Tier 2	63	44	51	73	195	8	85	519
2019	Tier 1	13	10	12	20	79	75	28	237
2019	Tier 2	67	30	36	41	252	111	151	688
2020	Tier 1	23	10	10	38	66	1	19	167
2020	Tier 2	49	43	46	81	158	6	82	465
2021	Tier 1	24	6	8	12	91	6	40	187
2021	Tier 2	43	38	47	51	280	22	96	577

**Excludes PSE where no related production work hours were reported.*

See Tables B.30 – B.39 (Number of PSE used in normalized analysis – by region and function).

Table B.30: Number of PSE used in normalized analysis – by region and function – 2012

Region	Function	Tier 1			Tier 2		
		Onshore	Offshore	OVERALL	Onshore	Offshore	OVERALL
Africa	Drilling	2	1	3	3	6	9
Africa	Production	38	18	56	42	30	72
Africa	OVERALL	40	19	59	45	36	81
Asia / Australasia	Drilling	0	2	2	3	6	9
Asia / Australasia	Production	7	9	16	22	26	48
Asia / Australasia	OVERALL	7	11	18	25	32	57
Europe	Drilling	0	1	1	1	16	17
Europe	Production	13	11	24	54	45	99
Europe	OVERALL	13	12	25	55	61	116
Middle East	Drilling	1	0	1	0	1	1
Middle East	Production	16	4	20	2	5	7
Middle East	OVERALL	17	4	21	2	6	8
North America	Drilling	3	5	8	25	3	28
North America	Production	78	3	81	247	13	260
North America	OVERALL	81	8	89	272	16	288
Russia & Central Asia	Drilling	0	0	0	0	3	3
Russia & Central Asia	Production	12	0	12	9	3	12
Russia & Central Asia	OVERALL	12	0	12	9	6	15
South & Central America	Drilling	0	0	0	0	2	2
South & Central America	Production	4	0	4	8	7	15
South & Central America	OVERALL	4	0	4	8	9	17
OVERALL	Drilling	6	9	15	32	37	69
OVERALL	Production	168	45	213	384	129	513
OVERALL	OVERALL	174	54	228	416	166	582

Table B.31: Number of PSE used in normalized analysis – by region and function – 2013

Region	Function	Tier 1			Tier 2		
		Onshore	Offshore	OVERALL	Onshore	Offshore	OVERALL
Africa	Drilling	1	3	4	9	11	20
Africa	Production	41	6	47	65	28	93
Africa	OVERALL	42	9	51	74	39	113
Asia / Australasia	Drilling	0	4	4	0	4	4
Asia / Australasia	Production	11	7	18	33	31	64
Asia / Australasia	OVERALL	11	11	22	33	35	68
Europe	Drilling	1	0	1	1	12	13
Europe	Production	3	10	13	38	54	92
Europe	OVERALL	4	10	14	39	66	105
Middle East	Drilling	0	0	0	3	0	3
Middle East	Production	25	1	26	83	4	87
Middle East	OVERALL	25	1	26	86	4	90
North America	Drilling	7	3	10	41	36	77
North America	Production	116	4	120	208	32	240
North America	OVERALL	123	7	130	249	68	317
Russia & Central Asia	Drilling	0	0	0	0	2	2
Russia & Central Asia	Production	7	0	7	91	1	92
Russia & Central Asia	OVERALL	7	0	7	91	3	94
South & Central America	Drilling	0	0	0	0	2	2
South & Central America	Production	2	0	2	8	6	14
South & Central America	OVERALL	2	0	2	8	8	16
OVERALL	Drilling	9	10	19	54	67	121
OVERALL	Production	205	28	233	526	156	682
OVERALL	OVERALL	214	38	252	580	223	803

Table B.32: Number of PSE used in normalized analysis – by region and function – 2014

Region	Function	Tier 1			Tier 2		
		Onshore	Offshore	OVERALL	Onshore	Offshore	OVERALL
Africa	Drilling	1	1	2	0	8	8
Africa	Production	25	6	31	23	26	49
Africa	OVERALL	26	7	33	23	34	57
Asia / Australasia	Drilling	2	2	4	2	10	12
Asia / Australasia	Production	11	5	16	31	20	51
Asia / Australasia	OVERALL	13	7	20	33	30	63
Europe	Drilling	1	0	1	2	13	15
Europe	Production	9	9	18	19	54	73
Europe	OVERALL	10	9	19	21	67	88
Middle East	Drilling	0	0	0	4	0	4
Middle East	Production	15	0	15	42	6	48
Middle East	OVERALL	15	0	15	46	6	52
North America	Drilling	5	6	11	53	10	63
North America	Production	114	6	120	329	17	346
North America	OVERALL	119	12	131	382	27	409
Russia & Central Asia	Drilling	1	0	1	0	2	2
Russia & Central Asia	Production	2	0	2	95	4	99
Russia & Central Asia	OVERALL	3	0	3	95	6	101
South & Central America	Drilling	0	0	0	4	1	5
South & Central America	Production	6	0	6	28	5	33
South & Central America	OVERALL	6	0	6	32	6	38
OVERALL	Drilling	10	9	19	65	44	109
OVERALL	Production	182	26	208	567	132	699
OVERALL	OVERALL	192	35	227	632	176	808

Table B.33: Number of PSE used in normalized analysis – by region and function – 2015

Region	Function	Tier 1			Tier 2		
		Onshore	Offshore	OVERALL	Onshore	Offshore	OVERALL
Africa	Drilling	0	1	1	0	5	5
Africa	Production	16	11	27	24	26	50
Africa	OVERALL	16	12	28	24	31	55
Asia / Australasia	Drilling	0	0	0	1	1	2
Asia / Australasia	Production	18	2	20	29	18	47
Asia / Australasia	OVERALL	18	2	20	30	19	49
Europe	Drilling	0	0	0	0	10	10
Europe	Production	5	10	15	21	54	75
Europe	OVERALL	5	10	15	21	64	85
Middle East	Drilling	1	0	1	2	0	2
Middle East	Production	10	2	12	59	8	67
Middle East	OVERALL	11	2	13	61	8	69
North America	Drilling	3	2	5	12	5	17
North America	Production	107	4	111	247	19	266
North America	OVERALL	110	6	116	259	24	283
Russia & Central Asia	Drilling	2	0	2	1	0	1
Russia & Central Asia	Production	5	0	5	77	3	80
Russia & Central Asia	OVERALL	7	0	7	78	3	81
South & Central America	Drilling	1	0	1	5	1	6
South & Central America	Production	15	1	16	62	10	72
South & Central America	OVERALL	16	1	17	67	11	78
OVERALL	Drilling	7	3	10	21	22	43
OVERALL	Production	176	30	206	519	138	657
OVERALL	OVERALL	183	33	216	540	160	700

Table B.34: Number of PSE used in normalized analysis – by region and function – 2016

Region	Function	Tier 1			Tier 2		
		Onshore	Offshore	OVERALL	Onshore	Offshore	OVERALL
Africa	Drilling	0	0	0	0	1	1
Africa	Production	14	5	19	19	15	34
Africa	OVERALL	14	5	19	19	16	35
Asia / Australasia	Drilling	0	0	0	1	1	2
Asia / Australasia	Production	17	5	22	23	17	40
Asia / Australasia	OVERALL	17	5	22	24	18	42
Europe	Drilling	0	3	3	0	8	8
Europe	Production	4	12	16	11	44	55
Europe	OVERALL	4	15	19	11	52	63
Middle East	Drilling	4	0	4	2	1	3
Middle East	Production	20	3	23	36	3	39
Middle East	OVERALL	24	3	27	38	4	42
North America	Drilling	1	0	1	8	5	13
North America	Production	65	4	69	181	12	193
North America	OVERALL	66	4	70	189	17	206
Russia & Central Asia	Drilling	0	0	0	0	1	1
Russia & Central Asia	Production	1	0	1	8	1	9
Russia & Central Asia	OVERALL	1	0	1	8	2	10
South & Central America	Drilling	2	0	2	2	0	2
South & Central America	Production	12	4	16	36	8	44
South & Central America	OVERALL	14	4	18	38	8	46
OVERALL	Drilling	7	3	10	13	17	30
OVERALL	Production	133	33	166	314	100	414
OVERALL	OVERALL	140	36	176	327	117	444

Table B.35: Number of PSE used in normalized analysis – by region and function – 2017

Region	Function	Tier 1			Tier 2		
		Onshore	Offshore	OVERALL	Onshore	Offshore	OVERALL
Africa	Drilling	0	2	2	1	0	1
Africa	Production	20	10	30	49	19	68
Africa	OVERALL	20	12	32	50	19	69
Asia / Australasia	Drilling	0	0	0	1	1	2
Asia / Australasia	Production	15	10	25	22	51	73
Asia / Australasia	OVERALL	15	10	25	23	52	75
Europe	Drilling	0	3	3	0	13	13
Europe	Production	4	5	9	19	29	48
Europe	OVERALL	4	8	12	19	42	61
Middle East	Drilling	2	0	2	1	0	1
Middle East	Production	10	3	13	34	6	40
Middle East	OVERALL	12	3	15	35	6	41
North America	Drilling	4	0	4	12	3	15
North America	Production	63	1	64	183	10	193
North America	OVERALL	67	1	68	195	13	208
Russia & Central Asia	Drilling	0	0	0	1	1	2
Russia & Central Asia	Production	3	0	3	5	2	7
Russia & Central Asia	OVERALL	3	0	3	6	3	9
South & Central America	Drilling	2	3	5	4	12	16
South & Central America	Production	16	11	27	44	35	79
South & Central America	OVERALL	18	14	32	48	47	95
OVERALL	Drilling	8	8	16	20	30	50
OVERALL	Production	131	40	171	356	152	508
OVERALL	OVERALL	139	48	187	376	182	558

Table B.36: Number of PSE used in normalized analysis – by region and function – 2018

Region	Function	Tier 1			Tier 2		
		Onshore	Offshore	OVERALL	Onshore	Offshore	OVERALL
Africa	Drilling	2	1	3	1	1	2
Africa	Production	18	5	23	37	26	63
Africa	OVERALL	20	6	26	38	27	65
Asia / Australasia	Drilling	0	0	0	1	3	4
Asia / Australasia	Production	1	6	7	18	26	44
Asia / Australasia	OVERALL	1	6	7	19	29	48
Europe	Drilling	1	1	2	0	7	7
Europe	Production	8	5	13	18	33	51
Europe	OVERALL	9	6	15	18	40	58
Middle East	Drilling	0	0	0	1	0	1
Middle East	Production	24	2	26	71	2	73
Middle East	OVERALL	24	2	26	72	2	74
North America	Drilling	2	0	2	9	0	9
North America	Production	79	4	83	184	11	195
North America	OVERALL	81	4	85	193	11	204
Russia & Central Asia	Drilling	0	0	0	0	1	1
Russia & Central Asia	Production	57	0	57	8	0	8
Russia & Central Asia	OVERALL	57	0	57	8	1	9
South & Central America	Drilling	4	0	4	9	3	12
South & Central America	Production	12	6	18	44	41	85
South & Central America	OVERALL	16	6	22	53	44	97
OVERALL	Drilling	9	2	11	21	15	36
OVERALL	Production	199	28	227	380	139	519
OVERALL	OVERALL	208	30	238	401	154	555

Table B.37: Number of PSE used in normalized analysis – by region and function – 2019

Region	Function	Tier 1			Tier 2		
		Onshore	Offshore	OVERALL	Onshore	Offshore	OVERALL
Africa	Drilling	1	0	1	2	2	4
Africa	Production	4	9	13	46	21	67
Africa	OVERALL	5	9	14	48	23	71
Asia / Australasia	Drilling	0	0	0	0	0	0
Asia / Australasia	Production	4	6	10	12	18	30
Asia / Australasia	OVERALL	4	6	10	12	18	30
Europe	Drilling	0	0	0	0	5	5
Europe	Production	5	7	12	14	22	36
Europe	OVERALL	5	7	12	14	27	41
Middle East	Drilling	0	0	0	1	0	1
Middle East	Production	19	1	20	37	4	41
Middle East	OVERALL	19	1	20	38	4	42
North America	Drilling	5	1	6	19	1	20
North America	Production	78	1	79	243	9	252
North America	OVERALL	83	2	85	262	10	272
Russia & Central Asia	Drilling	0	0	0	0	0	0
Russia & Central Asia	Production	75	0	75	109	2	111
Russia & Central Asia	OVERALL	75	0	75	109	2	111
South & Central America	Drilling	2	0	2	7	4	11
South & Central America	Production	16	12	28	111	40	151
South & Central America	OVERALL	18	12	30	118	44	162
OVERALL	Drilling	8	1	9	29	12	41
OVERALL	Production	201	36	237	572	116	688
OVERALL	OVERALL	209	37	246	601	128	729

Table B.38: Number of PSE used in normalized analysis – by region and function – 2020

Region	Function	Tier 1			Tier 2		
		Onshore	Offshore	OVERALL	Onshore	Offshore	OVERALL
Africa	Drilling	0	0	0	0	0	0
Africa	Production	13	10	23	32	17	49
Africa	OVERALL	13	10	23	32	17	49
Asia / Australasia	Drilling	0	0	0	0	1	1
Asia / Australasia	Production	7	3	10	17	26	43
Asia / Australasia	OVERALL	7	3	10	17	27	44
Europe	Drilling	0	0	0	0	3	3
Europe	Production	7	3	10	28	18	46
Europe	OVERALL	7	3	10	28	21	49
Middle East	Drilling	2	0	2	2	0	2
Middle East	Production	38	0	38	76	5	81
Middle East	OVERALL	40	0	40	78	5	83
North America	Drilling	2	0	2	4	1	5
North America	Production	64	2	66	153	5	158
North America	OVERALL	66	2	68	157	6	163
Russia & Central Asia	Drilling	0	0	0	0	0	0
Russia & Central Asia	Production	1	0	1	3	3	6
Russia & Central Asia	OVERALL	1	0	1	3	3	6
South & Central America	Drilling	1	1	2	4	6	10
South & Central America	Production	12	7	19	51	31	82
South & Central America	OVERALL	13	8	21	55	37	92
OVERALL	Drilling	5	1	6	10	11	21
OVERALL	Production	142	25	167	360	105	465
OVERALL	OVERALL	147	26	173	370	116	486

Table B.39: Number of PSE used in normalized analysis – by region and function – 2021

Region	Function	Tier 1			Tier 2		
		Onshore	Offshore	OVERALL	Onshore	Offshore	OVERALL
Africa	Drilling	0	0	0	0	0	0
Africa	Production	17	7	24	30	13	43
Africa	OVERALL	17	7	24	30	13	43
Asia / Australasia	Drilling	0	0	0	0	2	2
Asia / Australasia	Production	5	1	6	19	19	38
Asia / Australasia	OVERALL	5	1	6	19	21	40
Europe	Drilling	1	0	1	0	2	2
Europe	Production	4	4	8	22	25	47
Europe	OVERALL	5	4	9	22	27	49
Middle East	Drilling	0	0	0	1	0	1
Middle East	Production	12	0	12	50	1	51
Middle East	OVERALL	12	0	12	51	1	52
North America	Drilling	1	0	1	5	1	6
North America	Production	87	4	91	273	7	280
North America	OVERALL	88	4	92	278	8	286
Russia & Central Asia	Drilling	1	0	1	0	0	0
Russia & Central Asia	Production	6	0	6	19	3	22
Russia & Central Asia	OVERALL	7	0	7	19	3	22
South & Central America	Drilling	3	0	3	25	1	26
South & Central America	Production	35	5	40	77	19	96
South & Central America	OVERALL	38	5	43	102	20	122
OVERALL	Drilling	6	0	6	31	6	37
OVERALL	Production	166	21	187	490	87	577
OVERALL	OVERALL	172	21	193	521	93	614

Tables B.40–49 show the number of work hours in the main safety database for which there were related PSE data (even if zero), i.e., those that were included in the calculation of PSE per million work hours in this report.

Table B.40: Number of work hours (000's) used in normalized analysis – by region and function – 2012

Region	Function	Tier 1			Tier 2		
		Onshore	Offshore	OVERALL	Onshore	Offshore	OVERALL
Africa	Drilling	26,549	25,672	52,221	26,549	25,672	52,221
Africa	Production	128,218	34,944	163,162	128,218	34,944	163,162
Africa	OVERALL	154,767	60,616	215,383	154,767	60,616	215,383
Asia / Australasia	Drilling	31,629	33,943	65,572	31,629	33,943	65,572
Asia / Australasia	Production	97,879	99,319	197,198	109,429	99,319	208,748
Asia / Australasia	OVERALL	129,508	133,262	262,770	141,058	133,262	274,320
Europe	Drilling	15,763	24,095	39,858	15,763	24,095	39,858
Europe	Production	62,552	79,389	141,941	62,552	79,389	141,941
Europe	OVERALL	78,315	103,484	181,799	78,315	103,484	181,799
Middle East	Drilling	33,016	4,928	37,944	25,553	4,928	30,481
Middle East	Production	107,570	16,858	124,428	68,751	16,858	85,609
Middle East	OVERALL	140,586	21,786	162,372	94,304	21,786	116,090
North America	Drilling	68,357	31,781	100,138	65,995	31,781	97,776
North America	Production	123,751	30,099	153,850	123,751	30,099	153,850
North America	OVERALL	192,108	61,880	253,988	189,746	61,880	251,626
Russia & Central Asia	Drilling	17,969	5,478	23,447	17,969	5,478	23,447
Russia & Central Asia	Production	40,024	22,162	62,186	40,024	22,162	62,186
Russia & Central Asia	OVERALL	57,993	27,640	85,633	57,993	27,640	85,633
South & Central America	Drilling	11,220	4,710	15,930	11,220	4,710	15,930
South & Central America	Production	10,224	9,305	19,529	10,224	9,305	19,529
South & Central America	OVERALL	21,444	14,015	35,459	21,444	14,015	35,459
OVERALL	Drilling	204,503	130,607	335,110	194,678	130,607	325,285
OVERALL	Production	570,218	292,076	862,294	542,949	292,076	835,025
OVERALL	OVERALL	774,721	422,683	1,197,404	737,627	422,683	1,160,310

Table B.41: Number of work hours (000's) used in normalized analysis – by region and function – 2013

Region	Function	Tier 1			Tier 2		
		Onshore	Offshore	OVERALL	Onshore	Offshore	OVERALL
Africa	Drilling	34,717	34,928	69,645	34,717	34,928	69,645
Africa	Production	124,035	36,238	160,273	124,035	36,238	160,273
Africa	OVERALL	158,752	71,166	229,918	158,752	71,166	229,918
Asia / Australasia	Drilling	52,608	42,873	95,481	52,718	43,302	96,020
Asia / Australasia	Production	113,156	108,224	221,380	113,156	110,923	224,079
Asia / Australasia	OVERALL	165,764	151,097	316,861	165,874	154,225	320,099
Europe	Drilling	23,949	25,829	49,778	13,613	24,795	38,408
Europe	Production	70,547	70,010	140,557	70,547	68,250	138,797
Europe	OVERALL	94,496	95,839	190,335	84,160	93,045	177,205
Middle East	Drilling	45,284	6,896	52,180	45,372	6,896	52,268
Middle East	Production	116,814	6,891	123,705	115,683	6,891	122,574
Middle East	OVERALL	162,098	13,787	175,885	161,055	13,787	174,842
North America	Drilling	70,447	39,089	109,536	71,507	39,060	110,567
North America	Production	133,233	34,720	167,953	128,480	34,428	162,908
North America	OVERALL	203,680	73,809	277,489	199,987	73,488	273,475
Russia & Central Asia	Drilling	7,207	6,081	13,288	7,081	6,081	13,162
Russia & Central Asia	Production	61,811	19,365	81,176	61,811	19,365	81,176
Russia & Central Asia	OVERALL	69,018	25,446	94,464	68,892	25,446	94,338
South & Central America	Drilling	15,526	4,929	20,455	15,197	4,929	20,126
South & Central America	Production	10,475	10,354	20,829	10,475	10,354	20,829
South & Central America	OVERALL	26,001	15,283	41,284	25,672	15,283	40,955
OVERALL	Drilling	249,738	160,625	410,363	240,205	159,991	400,196
OVERALL	Production	630,071	285,802	915,873	624,187	286,449	910,636
OVERALL	OVERALL	879,809	446,427	1,326,236	864,392	446,440	1,310,832

Table B.42: Number of work hours (000's) used in normalized analysis – by region and function – 2014

Region	Function	Tier 1			Tier 2		
		Onshore	Offshore	OVERALL	Onshore	Offshore	OVERALL
Africa	Drilling	30,118	36,245	66,363	27,962	33,907	61,869
Africa	Production	122,482	47,430	169,912	116,134	35,753	151,887
Africa	OVERALL	152,600	83,675	236,275	144,096	69,660	213,756
Asia / Australasia	Drilling	55,859	38,442	94,301	57,319	57,242	114,561
Asia / Australasia	Production	134,979	61,785	196,764	126,970	103,791	230,761
Asia / Australasia	OVERALL	190,838	100,227	291,065	184,289	161,033	345,322
Europe	Drilling	24,517	24,896	49,413	18,141	24,868	43,009
Europe	Production	77,284	81,769	159,053	64,245	79,318	143,563
Europe	OVERALL	101,801	106,665	208,466	82,386	104,186	186,572
Middle East	Drilling	30,545	7,279	37,824	30,185	7,279	37,464
Middle East	Production	117,050	18,076	135,126	111,965	17,244	129,209
Middle East	OVERALL	147,595	25,355	172,950	142,150	24,523	166,673
North America	Drilling	86,253	69,634	155,887	86,253	69,634	155,887
North America	Production	216,565	148,883	365,448	216,565	148,883	365,448
North America	OVERALL	302,818	218,517	521,335	302,818	218,517	521,335
Russia & Central Asia	Drilling	24,640	6,739	31,379	24,640	6,739	31,379
Russia & Central Asia	Production	67,386	20,934	88,320	67,386	20,934	88,320
Russia & Central Asia	OVERALL	92,026	27,673	119,699	92,026	27,673	119,699
South & Central America	Drilling	24,241	5,551	29,792	22,102	5,950	28,052
South & Central America	Production	48,906	10,951	59,857	38,966	10,951	49,917
South & Central America	OVERALL	73,147	16,502	89,649	61,068	16,901	77,969
OVERALL	Drilling	276,173	188,786	464,959	266,602	205,619	472,221
OVERALL	Production	784,652	389,828	1,174,480	742,231	416,874	1,159,105
OVERALL	OVERALL	1,060,825	578,614	1,639,439	1,008,833	622,493	1,631,326

Table B.43: Number of work hours (000's) used in normalized analysis – by region and function – 2015

Region	Function	Tier 1			Tier 2		
		Onshore	Offshore	OVERALL	Onshore	Offshore	OVERALL
Africa	Drilling	18,780	31,711	50,491	18,780	31,711	50,491
Africa	Production	109,242	33,594	142,836	109,242	33,594	142,836
Africa	OVERALL	128,022	65,305	193,327	128,022	65,305	193,327
Asia / Australasia	Drilling	44,874	42,865	87,739	42,531	24,921	67,452
Asia / Australasia	Production	118,825	99,533	218,358	114,429	53,488	167,917
Asia / Australasia	OVERALL	163,699	142,398	306,097	156,960	78,409	235,369
Europe	Drilling	19,917	26,266	46,183	21,469	26,412	47,881
Europe	Production	66,642	71,960	138,602	66,642	71,960	138,602
Europe	OVERALL	86,559	98,226	184,785	88,111	98,372	186,483
Middle East	Drilling	54,175	12,622	66,797	54,175	10,779	64,954
Middle East	Production	145,474	28,417	173,891	145,608	28,417	174,025
Middle East	OVERALL	199,649	41,039	240,688	199,783	39,196	238,979
North America	Drilling	73,584	33,642	107,226	117,399	67,615	185,014
North America	Production	145,555	141,004	286,559	204,134	140,663	344,797
North America	OVERALL	219,139	174,646	393,785	321,533	208,278	529,811
Russia & Central Asia	Drilling	23,988	7,145	31,133	23,988	7,145	31,133
Russia & Central Asia	Production	70,413	18,825	89,238	70,413	18,825	89,238
Russia & Central Asia	OVERALL	94,401	25,970	120,371	94,401	25,970	120,371
South & Central America	Drilling	22,955	5,623	28,578	22,955	5,623	28,578
South & Central America	Production	45,317	9,474	54,791	45,317	9,474	54,791
South & Central America	OVERALL	68,272	15,097	83,369	68,272	15,097	83,369
OVERALL	Drilling	258,273	159,874	418,147	301,297	174,206	475,503
OVERALL	Production	701,468	402,807	1,104,275	755,785	356,421	1,112,206
OVERALL	OVERALL	959,741	562,681	1,522,422	1,057,082	530,627	1,587,709

Table B.44: Number of work hours (000's) used in normalized analysis – by region and function – 2016

Region	Function	Tier 1			Tier 2		
		Onshore	Offshore	OVERALL	Onshore	Offshore	OVERALL
Africa	Drilling	16,489	21,349	37,838	16,489	21,349	37,838
Africa	Production	83,611	34,104	117,715	83,611	34,104	117,715
Africa	OVERALL	100,100	55,453	155,553	100,100	55,453	155,553
Asia / Australasia	Drilling	31,508	37,445	68,953	27,472	18,583	46,055
Asia / Australasia	Production	99,237	103,362	202,599	86,801	57,494	144,295
Asia / Australasia	OVERALL	130,745	140,807	271,552	114,273	76,077	190,350
Europe	Drilling	13,206	20,801	34,007	13,206	20,801	34,007
Europe	Production	58,998	59,315	118,313	58,998	59,315	118,313
Europe	OVERALL	72,204	80,116	152,320	72,204	80,116	152,320
Middle East	Drilling	71,527	17,531	89,058	71,527	17,531	89,058
Middle East	Production	119,679	9,400	129,079	119,679	9,400	129,079
Middle East	OVERALL	191,206	26,931	218,137	191,206	26,931	218,137
North America	Drilling	24,063	19,688	43,751	24,063	19,688	43,751
North America	Production	101,712	20,220	121,932	101,712	20,220	121,932
North America	OVERALL	125,775	39,908	165,683	125,775	39,908	165,683
Russia & Central Asia	Drilling	5,883	5,996	11,879	5,883	5,996	11,879
Russia & Central Asia	Production	41,264	18,111	59,375	41,264	18,111	59,375
Russia & Central Asia	OVERALL	47,147	24,107	71,254	47,147	24,107	71,254
South & Central America	Drilling	13,893	4,624	18,517	13,346	4,624	17,970
South & Central America	Production	34,458	8,879	43,337	34,458	8,879	43,337
South & Central America	OVERALL	48,351	13,503	61,854	47,804	13,503	61,307
OVERALL	Drilling	176,569	127,434	304,003	171,986	108,572	280,558
OVERALL	Production	538,959	253,391	792,350	526,523	207,523	734,046
OVERALL	OVERALL	715,528	380,825	1,096,353	698,509	316,095	1,014,604

Table B.45: Number of work hours (000's) used in normalized analysis – by region and function – 2017

Region	Function	Tier 1			Tier 2		
		Onshore	Offshore	OVERALL	Onshore	Offshore	OVERALL
Africa	Drilling	22,924	21,547	44,471	22,924	21,547	44,471
Africa	Production	139,683	33,611	173,294	139,683	33,611	173,294
Africa	OVERALL	162,607	55,158	217,765	162,607	55,158	217,765
Asia / Australasia	Drilling	23,307	15,574	38,881	23,228	14,946	38,174
Asia / Australasia	Production	83,064	75,691	158,755	83,011	74,100	157,111
Asia / Australasia	OVERALL	106,371	91,265	197,636	106,239	89,046	195,285
Europe	Drilling	16,110	17,169	33,279	16,110	17,169	33,279
Europe	Production	50,698	58,337	109,035	50,698	58,337	109,035
Europe	OVERALL	66,808	75,506	142,314	66,808	75,506	142,314
Middle East	Drilling	67,094	25,246	92,340	65,267	25,246	90,513
Middle East	Production	191,880	53,688	245,568	189,982	53,688	243,670
Middle East	OVERALL	258,974	78,934	337,908	255,249	78,934	334,183
North America	Drilling	44,137	17,320	61,457	44,137	17,320	61,457
North America	Production	100,009	17,951	117,960	100,009	17,951	117,960
North America	OVERALL	144,146	35,271	179,417	144,146	35,271	179,417
Russia & Central Asia	Drilling	12,941	9,562	22,503	12,941	9,562	22,503
Russia & Central Asia	Production	75,104	18,741	93,845	75,104	18,741	93,845
Russia & Central Asia	OVERALL	88,045	28,303	116,348	88,045	28,303	116,348
South & Central America	Drilling	27,247	21,013	48,260	27,247	21,013	48,260
South & Central America	Production	113,126	96,763	209,889	113,126	96,763	209,889
South & Central America	OVERALL	140,373	117,776	258,149	140,373	117,776	258,149
OVERALL	Drilling	213,760	127,431	341,191	211,854	126,803	338,657
OVERALL	Production	753,564	354,782	1,108,346	751,613	353,191	1,104,804
OVERALL	OVERALL	967,324	482,213	1,449,537	963,467	479,994	1,443,461

Table B.46: Number of work hours (000's) used in normalized analysis – by region and function – 2018

Region	Function	Tier 1			Tier 2		
		Onshore	Offshore	OVERALL	Onshore	Offshore	OVERALL
Africa	Drilling	24,684	17,178	41,862	22,200	15,019	37,219
Africa	Production	162,651	37,935	200,586	159,654	37,935	197,589
Africa	OVERALL	187,335	55,113	242,448	181,854	52,954	234,808
Asia / Australasia	Drilling	12,459	22,266	34,725	12,459	21,746	34,205
Asia / Australasia	Production	90,993	82,077	173,070	90,301	82,077	172,378
Asia / Australasia	OVERALL	103,452	104,343	207,795	102,760	103,823	206,583
Europe	Drilling	18,481	16,794	35,275	17,833	16,131	33,964
Europe	Production	50,194	51,134	101,328	47,507	47,341	94,848
Europe	OVERALL	68,675	67,928	136,603	65,340	63,472	128,812
Middle East	Drilling	66,581	18,379	84,960	66,581	18,379	84,960
Middle East	Production	243,134	40,198	283,332	243,134	40,198	283,332
Middle East	OVERALL	309,715	58,577	368,292	309,715	58,577	368,292
North America	Drilling	39,795	16,825	56,620	39,795	16,815	56,610
North America	Production	104,810	15,871	120,681	104,810	14,594	119,404
North America	OVERALL	144,605	32,696	177,301	144,605	31,409	176,014
Russia & Central Asia	Drilling	9,095	6,663	15,758	9,095	6,663	15,758
Russia & Central Asia	Production	74,121	18,998	93,119	40,744	18,998	59,742
Russia & Central Asia	OVERALL	83,216	25,661	108,877	49,839	25,661	75,500
South & Central America	Drilling	26,041	22,643	48,684	24,574	21,709	46,283
South & Central America	Production	113,630	91,335	204,965	113,238	90,114	203,352
South & Central America	OVERALL	139,671	113,978	253,649	137,812	111,823	249,635
OVERALL	Drilling	197,136	120,748	317,884	192,537	116,462	308,999
OVERALL	Production	839,533	337,548	1,177,081	799,388	331,257	1,130,645
OVERALL	OVERALL	1,036,669	458,296	1,494,965	991,925	447,719	1,439,644

Table B.47: Number of work hours (000's) used in normalized analysis – by region and function – 2019

Region	Function	Tier 1			Tier 2		
		Onshore	Offshore	OVERALL	Onshore	Offshore	OVERALL
Africa	Drilling	20,792	20,548	41,340	21,127	19,094	40,221
Africa	Production	174,420	47,330	221,750	176,115	47,330	223,445
Africa	OVERALL	195,212	67,878	263,090	197,242	66,424	263,666
Asia / Australasia	Drilling	22,114	42,620	64,734	22,114	42,772	64,886
Asia / Australasia	Production	118,525	130,944	249,469	119,533	130,944	250,477
Asia / Australasia	OVERALL	140,639	173,564	314,203	141,647	173,716	315,363
Europe	Drilling	19,079	18,479	37,558	19,026	18,416	37,442
Europe	Production	59,875	61,339	121,214	59,579	61,339	120,918
Europe	OVERALL	78,954	79,818	158,772	78,605	79,755	158,360
Middle East	Drilling	70,283	21,414	91,697	70,283	21,414	91,697
Middle East	Production	187,993	61,364	249,357	187,993	61,364	249,357
Middle East	OVERALL	258,276	82,778	341,054	258,276	82,778	341,054
North America	Drilling	50,100	20,463	70,563	50,068	20,463	70,531
North America	Production	133,103	15,767	148,870	133,103	15,767	148,870
North America	OVERALL	183,203	36,230	219,433	183,171	36,230	219,401
Russia & Central Asia	Drilling	12,325	5,995	18,320	12,706	5,995	18,701
Russia & Central Asia	Production	96,674	11,070	107,744	96,674	11,070	107,744
Russia & Central Asia	OVERALL	108,999	17,065	126,064	109,380	17,065	126,445
South & Central America	Drilling	33,987	19,593	53,580	44,328	19,593	63,921
South & Central America	Production	152,727	83,078	235,805	152,727	83,078	235,805
South & Central America	OVERALL	186,714	102,671	289,385	197,055	102,671	299,726
OVERALL	Drilling	228,680	149,112	377,792	239,652	147,747	387,399
OVERALL	Production	923,317	410,892	1,334,209	925,724	410,892	1,336,616
OVERALL	OVERALL	1,151,997	560,004	1,712,001	1,165,376	558,639	1,724,015

Table B.48: Number of work hours (000's) used in normalized analysis – by region and function – 2020

Region	Function	Tier 1			Tier 2		
		Onshore	Offshore	OVERALL	Onshore	Offshore	OVERALL
Africa	Drilling	15,810	8,880	24,690	15,810	8,880	24,690
Africa	Production	135,737	32,149	167,886	135,737	32,149	167,886
Africa	OVERALL	151,547	41,029	192,576	151,547	41,029	192,576
Asia / Australasia	Drilling	19,938	40,588	60,526	19,938	40,588	60,526
Asia / Australasia	Production	138,246	121,868	260,114	138,246	121,868	260,114
Asia / Australasia	OVERALL	158,184	162,456	320,640	158,184	162,456	320,640
Europe	Drilling	15,268	14,751	30,019	15,268	14,751	30,019
Europe	Production	55,587	47,666	103,253	55,587	47,666	103,253
Europe	OVERALL	70,855	62,417	133,272	70,855	62,417	133,272
Middle East	Drilling	66,111	21,173	87,284	66,111	21,173	87,284
Middle East	Production	159,572	72,294	231,866	159,572	72,294	231,866
Middle East	OVERALL	225,683	93,467	319,150	225,683	93,467	319,150
North America	Drilling	25,876	15,674	41,550	25,876	15,674	41,550
North America	Production	74,799	10,400	85,199	74,799	10,400	85,199
North America	OVERALL	100,675	26,074	126,749	100,675	26,074	126,749
Russia & Central Asia	Drilling	8,183	4,411	12,594	8,183	4,411	12,594
Russia & Central Asia	Production	79,220	4,495	83,715	79,220	4,495	83,715
Russia & Central Asia	OVERALL	87,403	8,906	96,309	87,403	8,906	96,309
South & Central America	Drilling	28,098	22,435	50,533	28,098	22,435	50,533
South & Central America	Production	103,830	63,399	167,229	103,830	63,399	167,229
South & Central America	OVERALL	131,928	85,834	217,762	131,928	85,834	217,762
OVERALL	Drilling	179,284	127,912	307,196	179,284	127,912	307,196
OVERALL	Production	746,991	352,271	1,099,262	746,991	352,271	1,099,262
OVERALL	OVERALL	926,275	480,183	1,406,458	926,275	480,183	1,406,458

Table B.49: Number of work hours (000's) used in normalized analysis – by region and function – 2021

Region	Function	Tier 1			Tier 2		
		Onshore	Offshore	OVERALL	Onshore	Offshore	OVERALL
Africa	Drilling	16,762	13,253	30,015	16,762	13,253	30,015
Africa	Production	130,438	36,688	167,126	130,438	36,688	167,126
Africa	OVERALL	147,200	49,941	197,141	147,200	49,941	197,141
Asia / Australasia	Drilling	21,527	43,702	65,229	21,527	43,702	65,229
Asia / Australasia	Production	114,293	126,118	240,411	114,293	126,118	240,411
Asia / Australasia	OVERALL	135,820	169,820	305,640	135,820	169,820	305,640
Europe	Drilling	9,521	15,597	25,118	9,521	15,597	25,118
Europe	Production	57,266	62,427	119,693	57,266	62,427	119,693
Europe	OVERALL	66,787	78,024	144,811	66,787	78,024	144,811
Middle East	Drilling	73,407	23,020	96,427	73,407	23,020	96,427
Middle East	Production	195,866	73,324	269,190	195,866	73,324	269,190
Middle East	OVERALL	269,273	96,344	365,617	269,273	96,344	365,617
North America	Drilling	19,711	13,818	33,529	19,711	13,818	33,529
North America	Production	149,964	10,100	160,064	149,964	10,100	160,064
North America	OVERALL	169,675	23,918	193,593	169,675	23,918	193,593
Russia & Central Asia	Drilling	10,287	3,791	14,078	10,287	3,791	14,078
Russia & Central Asia	Production	127,083	11,306	138,389	127,083	11,306	138,389
Russia & Central Asia	OVERALL	137,370	15,097	152,467	137,370	15,097	152,467
South & Central America	Drilling	44,178	17,386	61,564	44,178	17,386	61,564
South & Central America	Production	105,369	77,327	182,696	105,369	77,327	182,696
South & Central America	OVERALL	149,547	94,713	244,260	149,547	94,713	244,260
OVERALL	Drilling	195,393	130,567	325,960	195,393	130,567	325,960
OVERALL	Production	880,279	397,290	1,277,569	880,279	397,290	1,277,569
OVERALL	OVERALL	1,075,672	527,857	1,603,529	1,075,672	527,857	1,603,529

Section 7 Company results

Table B.50: PSE rate by company 2021

Company code	Tier 1 PSE rate	Tier 2 PSE rate
VX	1.13	2.20
IU	0.86	2.59
JU	0.81	0.00
JP	0.50	0.99
KS	0.47	1.45
NV	0.39	0.31
BY	0.32	0.91
HW	0.23	0.80
UF	0.18	0.49
IR	0.17	0.27
GA	0.10	0.51
CW	0.09	0.09
GD	0.08	0.33
RR	0.08	0.17
EF	0.08	0.00
MY	0.07	0.29
WG	0.06	1.31
BQ	0.05	0.17
WY	0.04	0.23
GF	0.04	0.22
WN	0.03	0.18
IH	0.01	0.19
PL	0.00	4.49
LC	0.00	1.33
BW	0.00	1.08
JW	0.00	1.00
NW	0.00	0.51
BX	0.00	0.45
LM	0.00	0.25
CL	0.00	0.21
KI	0.00	0.11
MN	0.00	0.10
CD	0.00	0.01
AN	0.00	0.00
BC	0.00	0.00
FU	0.00	0.00
LD	0.00	0.00
NC	0.00	0.00
NK	0.00	0.00
NQ	0.00	0.00
OG	0.00	0.00
PS	0.00	0.00
QA	0.00	0.00
VW	0.00	0.00
WU	0.00	0.00

Appendix C - Countries represented

The table below shows the 87 countries for which PSE data were reported in 2012.

Table C.1: Countries represented – 2012 PSE database

Region	Country
Africa	Algeria
	Angola
	Cameroun
	Chad
	Congo
	Egypt
	Equatorial Guinea
	Gabon
	Ghana
	Ivory Coast
	Liberia
	Libya
	Madagascar
	Mauritania
	Mozambique
	Nigeria
	Sudan
	Tanzania
	Tunisia
	Uganda
Asia / Australasia	Australia
	Bangladesh
	Brunei
	Cambodia
	China
	India
	Indonesia
	Japan
	Malaysia
	Myanmar
	New Zealand
	Pakistan
	Papua New Guinea
	Philippines
	Singapore
	South Korea
	Thailand
	Timor Leste
	Vietnam
Europe	Austria
	Denmark
	Faroe Islands
	France
	Germany
	Greenland
	Ireland
	Italy
	Monaco
	Netherlands
	Norway
	Poland
	Romania
	Switzerland
	UK
	Ukraine

Region	Country
Russia & Central Asia	Azerbaijan
	Kazakhstan
	Russia
	Turkmenistan
	Uzbekistan
Middle East	Bahrain
	Iran
	Iraq
	Israel
	Jordan
	Kuwait
	Oman
	Qatar
	Saudi Arabia
	Syria
	Turkey
	UAE
	Yemen
North America	Canada
	Cuba
	Mexico
	USA
South & Central America	Argentina
	Bolivia
	Brazil
	Chile
	Colombia
	French Guiana
	Peru
	Trinidad & Tobago
	Uruguay
	Venezuela

The table below shows the 83 countries for which PSE data were reported in 2013.

Table C.2: Countries represented – 2013 PSE database

Region	Country
Africa	Algeria
	Angola
	Benin
	Cameroun
	Chad
	Congo
	Egypt
	Equatorial Guinea
	Ethiopia
	Gabon
	Ghana
	Ivory Coast
	Kenya
	Libya
	Madagascar
	Mauritania
	Morocco
	Mozambique
	Namibia
	Nigeria
	Senegal
	South Africa
	Tanzania
	Tunisia
	Uganda
Asia / Australasia	Australia
	Bangladesh
	Brunei
	China
	India
	Indonesia
	Japan
	Malaysia
	Myanmar
	New Zealand
	Pakistan
	Papua New Guinea
	Philippines
	Singapore
	South Korea
	Thailand
	Vietnam
Europe	Austria
	Croatia
	Denmark
	France
	Germany
	Hungary
	Ireland
	Italy
	Netherlands
	Norway
	Poland
	Romania
	Switzerland
	UK
	Ukraine

Region	Country
Russia & Central Asia	Azerbaijan
	Kazakhstan
	Russia
Middle East	Iran
	Iraq
	Jordan
	Kuwait
	Oman
	Qatar
	Turkey
	UAE
	Yemen
North America	Canada
	Mexico
	USA
South & Central America	Argentina
	Bolivia
	Brazil
	Chile
	Colombia
	Falkland Islands
	French Guiana
	Suriname
	Trinidad & Tobago
	Uruguay
	Venezuela

The table below shows the 107 countries for which PSE data were reported in 2014.

Table C.3: Countries represented – 2014 PSE database

Region	Country
Africa	Algeria
	Angola
	Benin
	Cameroun
	Chad
	Congo
	Drc - Democratic Republic of the Congo (formerly Zaire)
	Egypt
	Equatorial Guinea
	Ethiopia
	Gabon
	Ghana
	Guinea
	Ivory Coast
	Kenya
	Liberia
	Libya
	Madagascar
	Mauritania
	Morocco
	Mozambique
	Namibia
	Nigeria
	Senegal
	Sierra Leone
	South Africa
	Sudan
	Tanzania
	Tunisia
	Uganda
Asia / Australasia	Australia
	Bangladesh
	Brunei
	Cambodia
	China
	India
	Indonesia
	Japan
	Malaysia
	Myanmar
	New Zealand
	Pakistan
	Papua New Guinea
	Philippines
	Singapore
	South Korea
	Taiwan
	Thailand
	Timor Leste
	Vietnam
Europe	Austria
	Bulgaria
	Croatia
	Cyprus
	Denmark
	France
	Germany
	Greenland
	Hungary
	Ireland
	Italy
	Lithuania
	Malta
	Monaco
	Netherlands
	Norway
	Poland
	Portugal
	Romania
	Spain
	UK
	Ukraine

Region	Country
Russia & Central Asia	Azerbaijan
	Kazakhstan
	Russia
	Turkmenistan
Middle East	Iran
	Iraq
	Jordan
	Kuwait
	Oman
	Palestine
	Qatar
	Saudi Arabia
	Syria
	Turkey
	UAE
	Yemen
North America	Canada
	Mexico
	USA
South & Central America	Argentina
	Aruba
	Bolivia
	Brazil
	Chile
	Colombia
	Ecuador
	Falkland Islands
	French Guiana
	Guatemala
	Guyana
	Peru
	Suriname
	Trinidad & Tobago
	Uruguay
	Venezuela

The table below shows the 100 countries for which PSE data were reported in 2015.

Table C.4: Countries represented – 2015 PSE database

Region	Country
Africa	Algeria
	Angola
	Chad
	Congo
	Egypt
	Equatorial Guinea
	Ethiopia
	Gabon
	Ghana
	Guinea
	Ivory Coast
	Kenya
	Liberia
	Libya
	Madagascar
	Mauritania
	Morocco
	Mozambique
	Namibia
	Nigeria
	Senegal
	Sierra Leone
	South Africa
	Sudan
	Tanzania
	Tunisia
	Uganda
Asia / Australasia	Australia
	Bangladesh
	Brunei
	China
	India
	Indonesia
	Japan
	Malaysia
	Myanmar
	New Zealand
	Pakistan
	Papua New Guinea
	Philippines
	Singapore
	South Korea
	Tadjikistan
	Taiwan
	Thailand
	Timor Leste
	Vietnam
Europe	Austria
	Bulgaria
	Croatia
	Cyprus
	Denmark
	France
	Germany
	Hungary
	Ireland
	Italy
	Monaco
	Netherlands
	Norway
	Poland
	Romania
	Spain
	UK
	Ukraine

Region	Country
Russia & Central Asia	Azerbaijan
	Kazakhstan
	Russia
	Turkmenistan
Middle East	Iran
	Iraq
	Jordan
	Kurdistan Region Of Iraq
	Kuwait
	Oman
	Palestine
	Qatar
	Saudi Arabia
	Syria
	Turkey
	UAE
	Yemen
North America	Canada
	Jamaica
	Mexico
	USA
South & Central America	Argentina
	Aruba
	Bolivia
	Brazil
	Chile
	Colombia
	Ecuador
	Falkland Islands
	Guyana
	Peru
	Suriname
	Trinidad & Tobago
	Uruguay
	Venezuela

The table below shows the 95 countries for which PSE data were reported in 2016.

Table C.5: Countries represented – 2016 PSE database

Region	Country
Africa	Algeria
	Angola
	Chad
	Congo
	Drc - Democratic Republic of the Congo (formerly Zaire)
	Egypt
	Equatorial Guinea
	Gabon
	Ghana
	Ivory Coast
	Kenya
	Liberia
	Libya
	Madagascar
	Mauritania
	Morocco
	Mozambique
	Namibia
	Nigeria
	Senegal
	South Africa
	Sudan
	Tanzania
	Tunisia
	Uganda
Asia / Australasia	Australia
	Bangladesh
	Brunei
	China
	East Timor
	India
	Indonesia
	Japan
	Malaysia
	Myanmar
	New Zealand
	Pakistan
	Papua New Guinea
	Philippines
	Singapore
	South Korea
	Taiwan
	Tajikistan
	Thailand
	Vietnam
Europe	Albania
	Austria
	Bulgaria
	Croatia
	Cyprus
	Denmark
	France
	Germany
	Hungary
	Ireland
	Italy
	Monaco
	Netherlands
	Norway
	Poland
	Romania
	Spain
	UK
	Ukraine

Region	Country
Russia & Central Asia	Azerbaijan
	Kazakhstan
	Russia
	Turkmenistan
Middle East	Iran
	Iraq
	Jordan
	Kurdistan Region Of Iraq
	Kuwait
	Oman
	Qatar
	Saudi Arabia
	UAE
	Yemen
North America	Canada
	Jamaica
	Mexico
	USA
South & Central America	Argentina
	Aruba
	Bolivia
	Brazil
	Colombia
	Ecuador
	Falkland Islands
	Guyana
	Peru
	Suriname
	Trinidad & Tobago
	Uruguay
	Venezuela

The table below shows the 96 countries for which PSE data were reported in 2017.

Table C.6: Countries represented – 2017 PSE database

Region	Country
Africa	Algeria
	Angola
	Chad
	Congo
	Egypt
	Equatorial Guinea
	Ethiopia
	Gabon
	Ghana
	Ivory Coast
	Kenya
	Liberia
	Libya
	Mauritania
	Morocco
	Mozambique
	Namibia
	Nigeria
	São Tomé And Príncipe
	Senegal
	South Africa
	Sudan
	Tanzania
	Tunisia
	Uganda
Asia / Australasia	Australia
	Bangladesh
	Brunei
	China
	India
	Indonesia
	Japan
	Malaysia
	Myanmar
	New Zealand
	Pakistan
	Papua New Guinea
	Philippines
	Singapore
	South Korea
	Tadjikistan
	Thailand
	Timor Leste
	Vietnam
Europe	Albania
	Austria
	Belgium
	Bulgaria
	Croatia
	Cyprus
	Denmark
	France
	Germany
	Greece
	Hungary
	Ireland
	Italy
	Netherlands
	Norway
	Portugal
	Romania
	Spain
	UK
	Ukraine

Region	Country
Russia & Central Asia	Azerbaijan
	Georgia
	Kazakhstan
	Russia
	Turkmenistan
Middle East	Iran
	Iraq
	Kurdistan Region Of Iraq
	Kuwait
	Oman
	Qatar
	Saudi Arabia
	Turkey
	UAE
	Yemen
North America	Canada
	Jamaica
	Mexico
	USA
South & Central America	Argentina
	Aruba
	Bolivia
	Brazil
	Colombia
	Ecuador
	Falkland Islands
	Guyana
	Peru
	Suriname
	Trinidad & Tobago
	Uruguay
	Venezuela

The table below shows the 94 countries for which PSE data were reported in 2018.

Table C.7: Countries represented – 2018 PSE database

Region	Country
Africa	Algeria
	Angola
	Chad
	Congo
	Egypt
	Equatorial Guinea
	Ethiopia
	Gabon
	Ghana
	Ivory Coast
	Kenya
	Liberia
	Libya
	Mauritania
	Morocco
	Mozambique
	Namibia
	Nigeria
	São Tomé And Príncipe
	Senegal
	South Africa
	Tanzania
	Tunisia
	Uganda
Asia / Australasia	Australia
	Bangladesh
	Brunei
	China
	India
	Indonesia
	Japan
	Malaysia
	Myanmar
	New Zealand
	Pakistan
	Papua New Guinea
	Philippines
	Singapore
	South Korea
	Taiwan
	Thailand
	Vietnam
Europe	Albania
	Austria
	Bulgaria
	Croatia
	Cyprus
	Denmark
	France
	Germany
	Hungary
	Ireland
	Italy
	Netherlands
	Norway
	Poland
	Portugal
	Romania
	Spain
	UK
	Ukraine

Region	Country
Russia & Central Asia	Azerbaijan
	Georgia
	Kazakhstan
	Russia
	Turkmenistan
Middle East	Iran
	Iraq
	Kurdistan Region Of Iraq
	Kuwait
	Oman
	Qatar
	Saudi Arabia
	Turkey
	UAE
	Yemen
North America	Canada
	Jamaica
	Mexico
	USA
South & Central America	Argentina
	Aruba
	Bolivia
	Brazil
	Colombia
	Ecuador
	Falkland Islands
	French Guiana
	Guyana
	Peru
	Suriname
	Trinidad & Tobago
	Uruguay
	Venezuela

The table below shows the 87 countries for which PSE data were reported in 2019.

Table C.8: Countries represented – 2019 PSE database

Region	Country
Africa	Algeria
	Angola
	Chad
	Congo
	Egypt
	Equatorial Guinea
	Gabon
	Ghana
	Ivory Coast
	Kenya
	Libya
	Mauritania
	Morocco
	Mozambique
	Namibia
	Nigeria
	São Tomé And Príncipe
	Senegal
	South Africa
	Tunisia
	Uganda
Asia / Australasia	Australia
	Bangladesh
	Brunei
	China
	India
	Indonesia
	Japan
	Malaysia
	Myanmar
	New Zealand
	Pakistan
	Papua New Guinea
	Philippines
	Singapore
	South Korea
	Taiwan
	Thailand
	Vietnam
Europe	Albania
	Austria
	Bulgaria
	Croatia
	Cyprus
	Denmark
	France
	Germany
	Hungary
	Ireland
	Italy
	Netherlands
	Norway
	Poland
	Romania
	Spain
	UK
	Ukraine

Region	Country
Russia & Central Asia	Azerbaijan
	Georgia
	Kazakhstan
	Russia
	Turkmenistan
Middle East	Iran
	Iraq
	Kurdistan Region Of Iraq
	Kuwait
	Lebanon
	Oman
	Qatar
	Turkey
	UAE
	Yemen
North America	Canada
	Mexico
	USA
South & Central America	Argentina
	Bolivia
	Brazil
	Colombia
	Ecuador
	Falkland Islands
	French Guiana
	Guyana
	Peru
	Suriname
	Trinidad & Tobago
	Venezuela

The table below shows the 71 countries for which PSE data were reported in 2020.

Table C.9: Countries represented – 2020 PSE database

Region	Country
Africa	Algeria
	Angola
	Chad
	Congo
	Egypt
	Equatorial Guinea
	Gabon
	Ghana
	Ivory Coast
	Libya
	Mauritania
	Mozambique
	Nigeria
	Senegal
	South Africa
	Tunisia
	Uganda
Asia / Australasia	Australia
	Brunei
	China
	India
	Indonesia
	Japan
	Malaysia
	Myanmar
	New Zealand
	Pakistan
	Papua New Guinea
	Philippines
	Thailand
	Vietnam
Europe	Albania
	Austria
	Croatia
	Cyprus
	Denmark
	Germany
	Hungary
	Italy
	Netherlands
	Norway
	Poland
	Romania
	Spain
	UK
	Ukraine

Region	Country
Russia & Central Asia	Azerbaijan
	Georgia
	Kazakhstan
	Russia
	Turkmenistan
Middle East	Iraq
	Kurdistan Region Of Iraq
	Kuwait
	Lebanon
	Oman
	Qatar
	Turkey
	UAE
North America	Canada
	Mexico
	USA
South & Central America	Argentina
	Bolivia
	Brazil
	Colombia
	Ecuador
	Guyana
	Peru
	Trinidad & Tobago
	Venezuela

Table C.10: Countries represented – 2021 PSE database

Region	Country
Africa	Algeria
	Angola
	Chad
	Congo
	Egypt
	Equatorial Guinea
	Gabon
	Ghana
	Ivory Coast
	Kenya
	Liberia
	Libya
	Mauritania
	Mozambique
	Namibia
	Nigeria
	Senegal
	South Africa
	Tunisia
	Uganda
Asia / Australasia	Australia
	Bangladesh
	Brunei
	China
	India
	Indonesia
	Japan
	Malaysia
	Myanmar
	New Zealand
	Pakistan
	Papua New Guinea
	Philippines
	Singapore
	Thailand
	Vietnam
Europe	Albania
	Austria
	Bulgaria
	Croatia
	Cyprus
	Denmark
	France
	Germany
	Hungary
	Italy
	Montenegro
	Netherlands
	Norway
	Romania
	Spain
	UK

Region	Country
Russia & Central Asia	Azerbaijan
	Georgia
	Kazakhstan
	Russia
	Turkmenistan
Middle East	Bahrain
	Iraq
	Israel
	Kurdistan Region Of Iraq
	Kuwait
	Lebanon
	Oman
	Qatar
	Turkey
	UAE
	Yemen
North America	Canada
	Mexico
	USA
South & Central America	Argentina
	Bolivia
	Brazil
	Colombia
	Ecuador
	Falkland Islands
	Guyana
	Peru
	Suriname
	Trinidad & Tobago
	Venezuela

Appendix D - Glossary of terms

A glossary of terms related to PSE and Safety performance indicators can be found in *2021s – Safety performance indicators – 2021 data* or online at https://data.iogp.org/Safety/Glossary/.

Asset integrity

Asset integrity is related to the prevention of major incidents. It is an outcome of good design, construction and operating practice. It is achieved when facilities are structurally and mechanically sound and perform the processes and produce the products for which they were designed.

Barrier

A risk control that seeks to prevent unintended events from occurring, or prevent escalation of events into incidents with harmful consequences.

Explosion [From API RP 754 (2nd edition)]

A release of energy that causes a pressure discontinuity or blast wave (e.g. detonations, deflagrations, and rapid releases of high pressure caused by rupture of equipment or piping).

Fatality

Involves one person who died as a result of a work-related incident.

Fire [From API RP 754 (2nd edition)]

Any combustion resulting from an LOPC, regardless of the presence of flame. This includes smouldering, charring, smoking, singeing, scorching, carbonizing, or the evidence that any of these have occurred.

First aid

A consequence of an event that required medical attention, often consisting of one-time, short-term treatment and requiring little technology or training to administer. First aid can include cleaning minor cuts, scrapes, or scratches; treating a minor burn; applying bandages and dressings; the use of non-prescription medicine; draining blisters; removing debris from the eyes; massage; and drinking fluids to relieve heat stress. A full list of 14 first aid treatments is provided in the IOGP Safety Performance Indicators User Guide. First aid cases are not classified as recordable incidents for the purpose of reporting to IOGP but may be used by companies as a criterion for reporting of events as Tier 3 KPIs.

Hospital admission [From API RP 754 (2nd edition)]

Formal acceptance by a hospital or other inpatient health care facility of a patient who is to be provided with room, board, and medical service in an area of the hospital or facility where patients generally reside at least overnight. Treatment in the hospital emergency room or an overnight stay in the emergency room would not by itself qualify as a 'hospital admission'.

Loss of primary containment (LOPC)

An unplanned or uncontrolled release of any material from primary containment, including non-toxic and non-flammable materials (e.g. steam, hot water, nitrogen, compressed CO2 or compressed air). [From API RP 754 (2nd edition)]

For drilling operations, any unplanned or uncontrolled release to the surface (seabed or ground level) should be included. LOPC is a type of event. An unplanned or uncontrolled release is an LOPC irrespective of whether the material is released into the environment, or into secondary containment, or into other primary containment not intended to contain the material released under normal operating conditions).

Lost Work Day Case (LWDC)

Any work-related injury, other than a fatal injury, which results in a person being unfit for work on any day after the day of occurrence of the occupational injury. "Any day" includes rest days, weekend days, leave days, public holidays or days after ceasing employment.

Major incident

Hazardous event that results in:

- multiple fatalities or severe injuries, or
- extensive damage to structure, installation or plant, or
- large-scale impact on the environment (e.g. persistent and severe environmental damage that can lead to loss of commercial or recreational use, loss of natural resources over a wide area or severe environmental damage that will require extensive measures to restore beneficial uses of the environment).

NOTE 1: This definition is adapted from ISO 17776 [4].
NOTE 2: This definition is intended to incorporate terms such as 'major accident'.

Material release threshold quantity

The weight of gas, liquid, or solid material released from an LOPC which, if exceeded, results in the event being recordable as either a Tier 1 or 2 PSE. The threshold quantities are described more fully in API RP 754 (2nd edition) and follow the UNDG classification system.

Planned shutdown (as a PSE mode of operation)

A planned shutdown is the activity of shutting down a process unit normally for planned maintenance or a turnaround.

Precautionary (evacuation, public protective measure, shelter-in-place) [From API RP 754 (2nd edition)]

A measure taken from an abundance of caution.

For example, a Company may require all workers to shelter-in-place in response to an LOPC independent of or prior to any assessment (e.g. wind direction, distance from the LOPC, etc.) of the potential hazard to those workers.

For example, a recognized community official (e.g. fire, police, civil defence, emergency management) may order a community shelter-in-place, evacuation, or public protective measure (e.g. road closure) in the absence of information from a Company experiencing a process safety event, or just in case the wind direction changes, or due to the sensitive nature of the potentially affected population (e.g. school children, the elderly).

Pressure relief device (PRD) [From API RP 754 (2nd edition)]

A device designed to open and relieve excess pressure (e.g. safety valve, thermal relief, rupture disk, rupture pin, deflagration vent, pressure/vacuum vents).

NOTE: A PRD discharge is a LOPC due to the nature of the unplanned release. The PRD discharge is evaluated against the consequence criteria to determine if it is a Tier 1 or 2 PSE.

Primary containment

A tank, vessel, pipe, truck, rail car, or other equipment designed to keep a material within it, typically for purposes of storage, separation, processing or transfer of gases or liquids. The terms vessel and pipe are taken to include containment of reservoir fluids within the casing and wellhead valving to the surface. Note that primary containment for a specified material may comprise a vessel or pipe that is inside another vessel that is also designed as primary containment for a different material; for example, a heating tube is primary containment for fuel gas or fuel oil, even though the tubes may be inside a firebox which is in turn within an oil-water separator.

Process

Facilities used in drilling and production operations in the oil and gas industry. This includes rigs and process equipment (e.g. vessels, piping, valves, boilers, generators, pumps, compressors, exchangers, refrigeration systems) and includes storage tanks, ancillary support areas (e.g. boiler houses and waste water treatment plants), on-site remediation facilities, and distribution piping under control of the Company.

Process safety [From API RP 754 (2nd edition)]

A disciplined framework for managing the integrity of hazardous operating systems and processes by applying good design principles, engineering, and operating and maintenance practices. It deals with the prevention and control of events with the potential to release hazardous materials or energy. Such releases can result in toxic effects, fire or explosion, and could ultimately result in serious injuries, property damage, lost production and environmental impact.

Process Safety Event (PSE) [From API RP 754 (2nd edition)]

An unplanned or uncontrolled release of any material including non-toxic and non-flammable materials (e.g., steam, hot water, nitrogen, compressed CO2 or compressed air) from a process, or an undesired event or condition, that under slightly different circumstances, could have resulted in a release of material. For more information see IOGP Report 456, *Process safety - Recommended practice on Key Performance Indicators*

Process Safety Event Rate

The number of process safety events per 1,000,000 (1 million) work hours (production and drilling work hours only).

Process safety related

Process safety related events are those which do not meet the specific criteria to be classified as Tier 1 or 2 process safety events but which have learning potential in the prevention of process safety events.

Sabotage

Deliberately destroy, damage, or obstruct (something).

Secondary containment [From API RP 754 (2nd edition)]

An impermeable physical barrier specifically designed to mitigate the impact of materials that have breached primary containment (i.e. an LOPC). Secondary containment systems include, but are not limited to: tank dykes, curbing around process equipment, drainage collection systems, the outer wall of open top double walled tanks, etc.

Shelter-in-place [From API RP 754 (2nd edition)]

The use of a structure and its indoor atmosphere to temporarily separate individuals from a potentially hazardous outdoor atmosphere.

Threshold: Material release threshold quantity

The weight of gas, liquid, or solid material released from an LOPC which, if exceeded, results in the event being recordable as either a Tier 1 or 2 PSE. The threshold quantities are described more fully in API RP 754 (2nd edition) and follow the UNDG classification system.

Tier

One of the four levels of the IOGP framework for process safety KPIs as described in IOGP Report 456, which is in turn based on the API RP 754 (2nd edition).

Turnaround (as a PSE mode of operation)

A planned, periodic shut down (total or partial) of a process unit or plant to perform maintenance, overhaul and repair operations and to inspect, test and replace process materials and equipment. This is after a planned shutdown.

Wilful damage

Wilful or malicious damage or destruction of the property of another.

International Association of Oil & Gas Producers

The Process Safety Event data presented in this report are based on voluntary submissions from participating IOGP Member Companies and are not necessarily representative of the entire upstream oil and gas industry.

The Process Safety Events (PSE) data presented are based on the numbers of Tier 1 and Tier 2 PSE reported by participating IOGP Member companies, and are categorised by:

- onshore and offshore
- drilling and production
- activities
- consequences
- material released

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