

# Safety Benchmarking

in the oil and gas industry  
in Latin America and  
the Caribbean

2016 Data

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October 2017

ARPEL PUBLICATION N° BE03-2017



BENCHMARKING



## **ARPEL REPORT**

# **Safety benchmarking in the oil and gas industry in Latin America and the Caribbean**

## ***2016 Statistics for ARPEL Member Companies***

*ARPEL, October 2017*



**Safety Benchmarking in the oil and gas industry in Latin America and the Caribbean**  
**2016 statistics for ARPEL member companies**  
**Report BE 03-2017**  
**October 2017**

**Authors**

This report was prepared upon request of ARPEL and its Environment, Health and Safety Committee by Pablo Ferragut, Project Manager at ARPEL.

**Review**

This document was reviewed by the ARPEL Safety Benchmarking Project Team the EHS Committee.

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# 1. EXECUTIVE SUMMARY

This report is a compilation of safety statistics of ARPEL Member Companies. It analyzes four reactive indicators (total incidents, gravity, frequency of incidents with lost workdays and fatalities) and two proactive indicators (safety training intensity and task planned observations), broken down by business line (E&P, refining, pipelines, distribution and others) and by category (company and contractors), and also including historical data since 2001.

### Scope:

For 2015, the 22 companies detailed below shared their data, with a total coverage of 676 thousands employees and 1,499 million hours worked. The reported hours fell 22% compared to 2015, which is explained by the contraction of industry activities.

**ANCAP – CHEVRON – COGA – ECOPETROL – ENAP – EP PETROECUADOR – EQUIÓN – OCENSA – OLDELVAL – PCJ – PEMEX – PETROBRAS – PETROPERU – PETROTRIN – PLUSPETROL – RECOPE – REFINOR – REPSOL – STAATSOLIE – TECPETROL – YPF – YPFB Transporte**

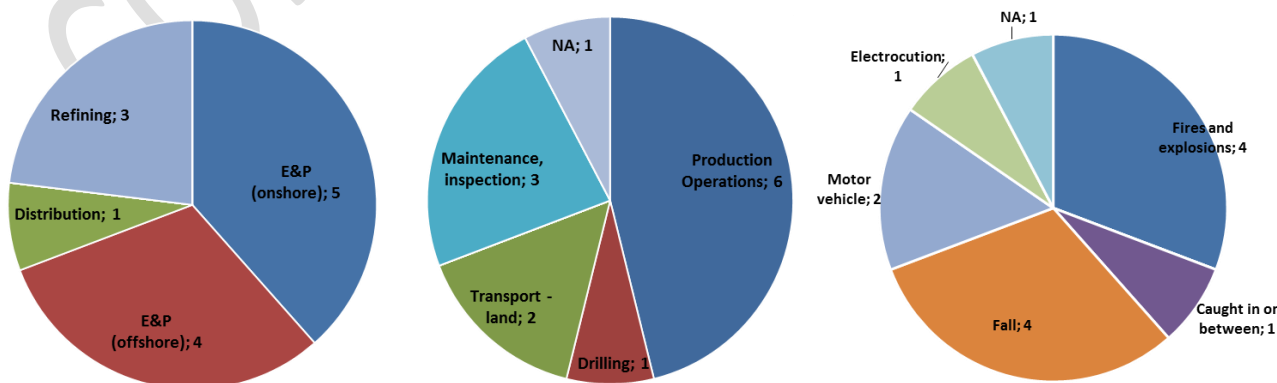
### Reactive indicators:

The total incidents’ rate continues to decline, registering in 2016 the lowest level for the third year in a row, since ARPEL began compiling statistics. The average was 1.24 recordable incidents per million hours worked. Gravity rate and incidents’ with lost work days rate decreased compared to the values registered in 2015, falling from 61.2 to 36.3 and from 0.80 to 0.73 respectively. In 2016, 13 fatalities were registered, which represents a sharp decline compared to 2015 (47 fatalities). This represented a rate of 1 fatality per 115 million hours worked, and it is also de lowest rate registered since ARPEL compiles data.

Indicator	2014	2015	2016	var 16/15
Total incidents rate	1.74	1.49	1.24	● -17%
Gravity rate	89.36	61.16	36.29	● -41%
Incidents w/LWD rate	0.84	0.80	0.73	● -9%
Fatalities rate	0.015	0.024	0.009	● -64%

### Fatalities:

9 out of the 13 fatalities were registered in E&P, 3 in Refining and 1 in Distribution. There were no fatalities registered in pipelines. Falls and fires and explosions were the main causes registered with 4 cases each, and Production Operations the activity that registered the higher number of cases with 6 fatalities.



## 2. INDICATORS (methodological note)

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This report collects four reactive indicators and two proactive indicators, which are detailed below:

### 2.1. Reactive

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1. **Total incidents' rate** = 
$$\frac{\text{Total recordable cases (injuries+illnesses+fatalities)}}{\text{Hours worked (in millions)}}$$
2. **Incidents gravity rate** = 
$$\frac{\text{Number of days away from work}}{\text{Hours worked (in millions)}}$$
3. **Incidents' frequency rate with lost workdays** = 
$$\frac{\text{cases with lost workdays}}{\text{Hours worked (in millions)}}$$
4. **Fatalities' rate** = 
$$\frac{\text{Number of fatalities}}{\text{Hours worked (in millions)}}$$

### 2.2. Proactive

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5. **TPO Indicator** = 
$$\frac{\text{Number of Task Planned Observations (TPO) recorded}}{\text{Average number of workers}}$$
6. **Safety Training Intensity** = 
$$\frac{\text{Total number of safety training hours}}{\text{Hours worked (in millions)}} * 100$$

For further information on the indicators or definitions, please refer to the User's Manual (7th edition 2012) or the glossary provided at the end of this Report.

Not all companies report data for the calculation of all the rates, either because they do not have the information in the required breakdown, or simply because the requested information does not apply to the company in question. The indicators are calculated with the data reported for each particular indicator, so the basis of calculation vary depending on the number of companies that have reported their data correctly for each particular indicator.

Overall data of the companies is shown, broken down by category (company/contractors), for all the controlled operations of the companies in Latin America and the Caribbean. Proactive indicators are calculated only for company employees.

In all cases, an analysis by business line and comparisons between companies is done.

### 3. SCOPE OF THE INFORMATION

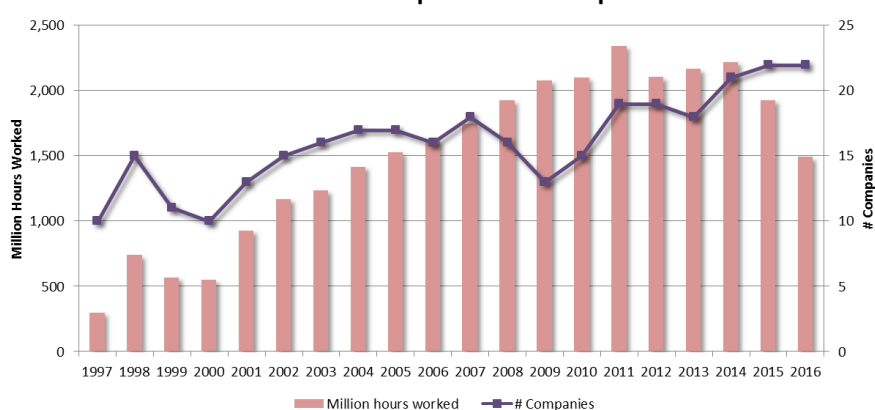
As it is shown in the following table, 22 member companies shared their 2016 safety data for this report.

COMPANIES							
ANCAP	CHEVRON	COGA	ECOPETROL	ENAP	EP PETROECUADOR	EQUIÓN	OCENSA
OLDELVAL	PCJ	PEMEX	PETROBRAS	PETROPERÚ	PETROTRIN	PLUSPETROL	RECOPE
REFINOR	REPSOL	STAATSOLIE	TECPETROL	YPF	YPFB Transporte		

The following table shows the total number of employees and man-hours reported this year for this report. A total of 667 thousands employees and 1,499 million hours were considered in this report, achieving a high representativeness of the oil and gas industry in Latin America and the Caribbean<sup>123</sup>.

Function	# Companies	Company		Contractors		Total	
		# Workers	Hours Worked (thousands)	# Workers	Hours Worked (miles)	# Workers	Hours Worked (thousands)
E&P	12	80,375	190,519	193,020	458,588	273,395	649,106
Refining	14	57,539	133,841	47,143	97,884	104,682	231,725
Pipelines	12	21,861	46,494	41,801	79,973	63,662	126,467
Transport-maritime	3	10,656	9,750	638	1,424	11,294	11,174
Distribution	7	30,386	63,247	13,216	25,867	43,602	89,113
Others	12	80,845	180,161	98,494	210,861	179,340	391,022
<b>Total</b>	<b>22</b>	<b>281,662</b>	<b>624,012</b>	<b>394,312</b>	<b>874,596</b>	<b>675,974</b>	<b>1,498,608</b>

# hours worked reported and companies



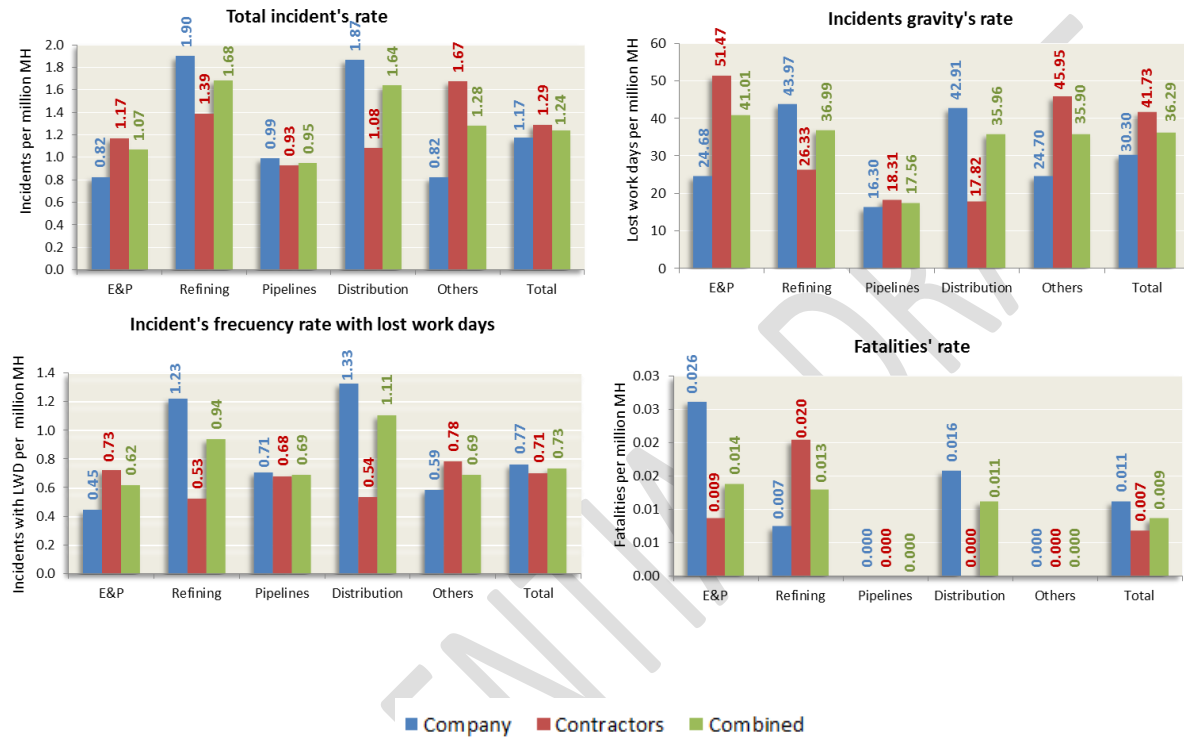
<sup>1</sup> Data on maritime transportation are considered only in the total as there are not enough companies for an adequate benchmarking of this business line. Data on the business line “others” is considered in the global data but a particular analysis is not made due to the heterogeneity of the activities included in that line. Data on pipelines gathers Transport-pipelines for liquids, transport-pipelines for gases, transport pipelines not separated

<sup>2</sup> The hours worked reported fell 22% between 2015 and 2016, falling from 1.9 to 1.5 billion. This significant fall is explained by the contraction of the industry activities, as the reporting companies are almost the same for 2015 and 2106.

## 4. RESULTS

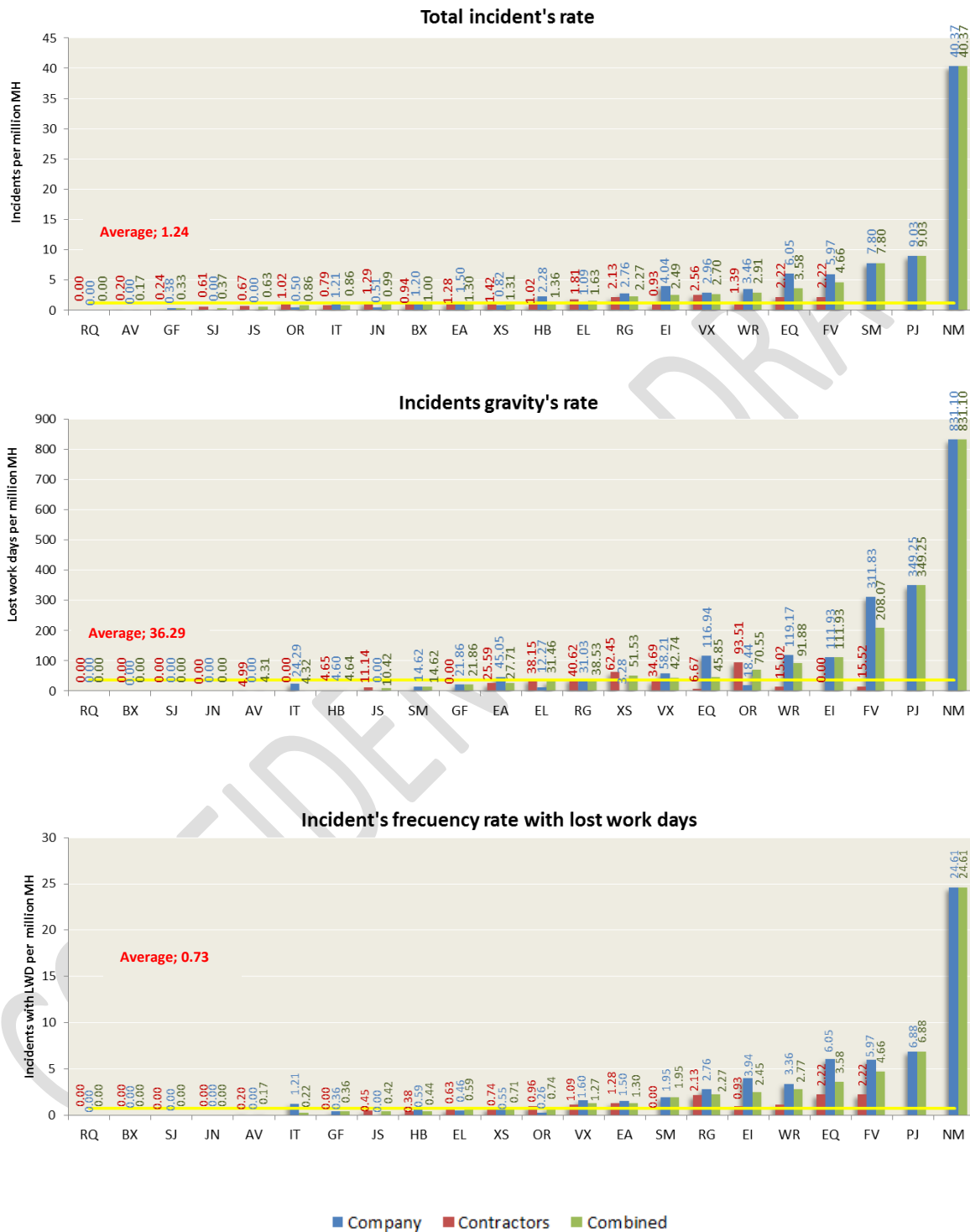
### 4.1. Overall Results

Below are shown the 2016 overall results for the four reactive indicators by business line and then by company.

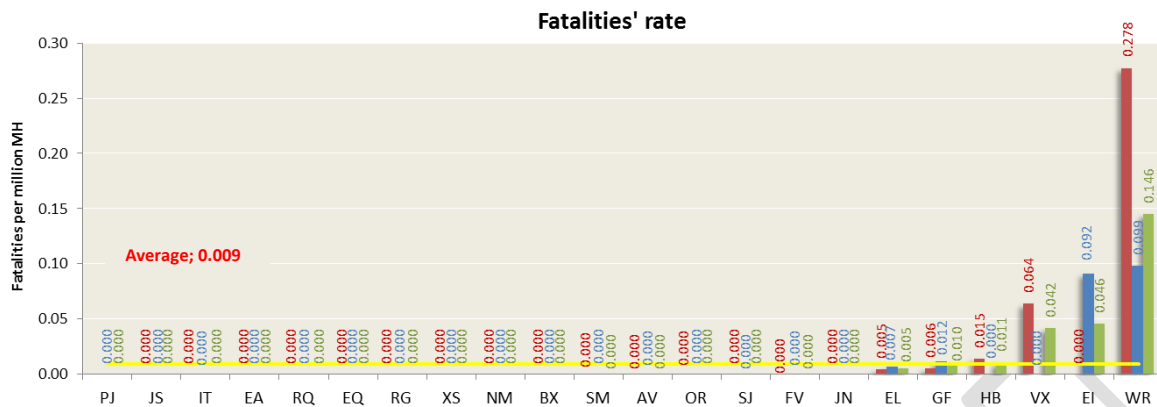


Refining was the business line with more incidents per million hours worked (2.12). However Distribution was the business line with the highest incident's frequency rate with lost workdays (1.11). E&P was the business line with most fatalities per million hours worked (0.014), but Refining (0.013) and Distribution (0.011) showed similar values. E&P showed also the highest incident's gravity rate –lost workdays per million hours worked- (40.54)

Following are shown the reactive indicators broken down by business line, sorted by ascending order according to the combined average of each company (company + contractors)<sup>4</sup>.

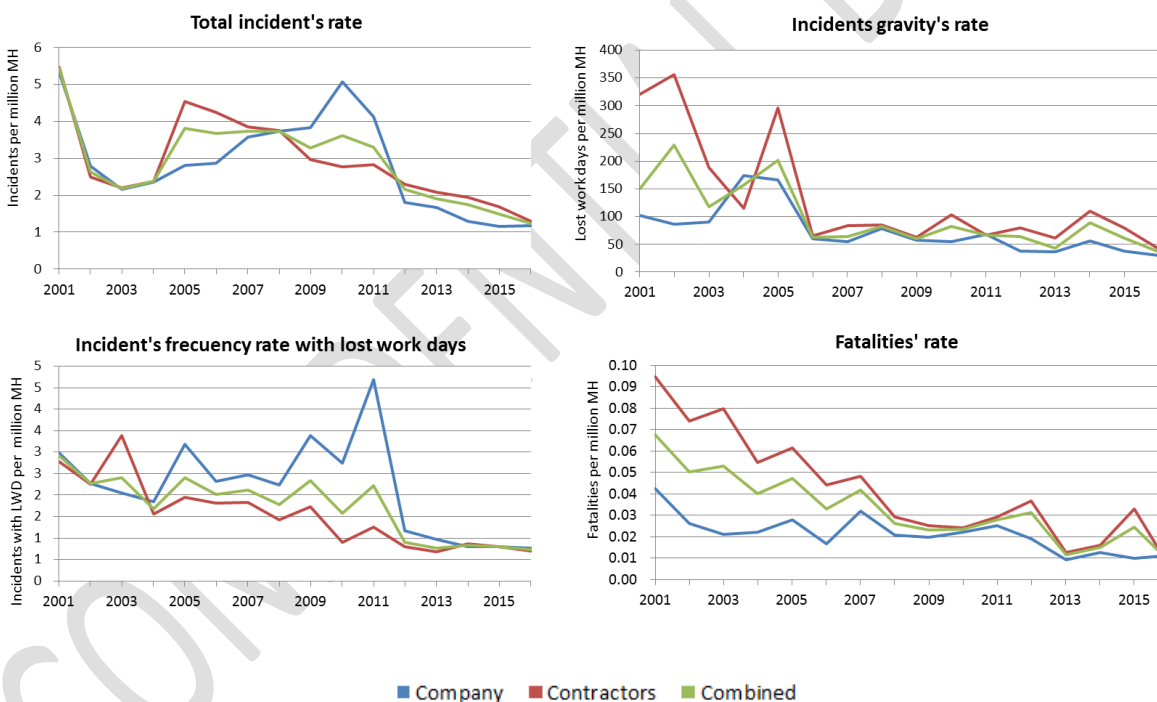


<sup>4</sup> Some companies do not have the red bar in the chart because the reactive indicators for contractors were not submitted. In those cases, combined and company indicators are equal. Since the total number of incidents is calculated as the sum of injuries, diseases and fatalities; and some companies do not report the number of registered occupational diseases, the comparability of the total incident rate is partially affected.



The following four graphs show the evolution of reactive indicators since 2001.

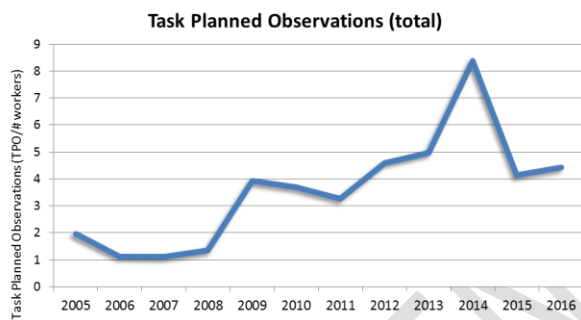
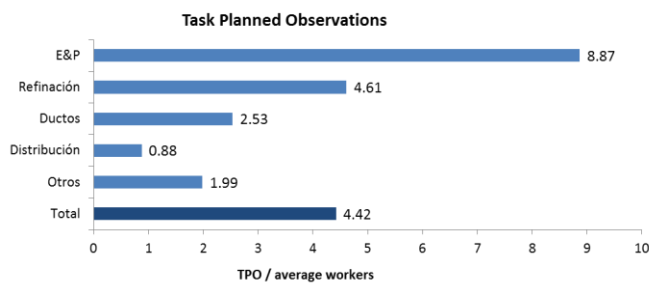
Although there is a clear downward trend in all four indicators, its decreasing pace has slowed or stagnated in the last few years.



### 4.1.1. Proactive indicators

Finally, the proactive indicators are shown by business line and their overall evolution since 2005 (4.1.1) and a comparison between companies for 2016 (4.1.2).

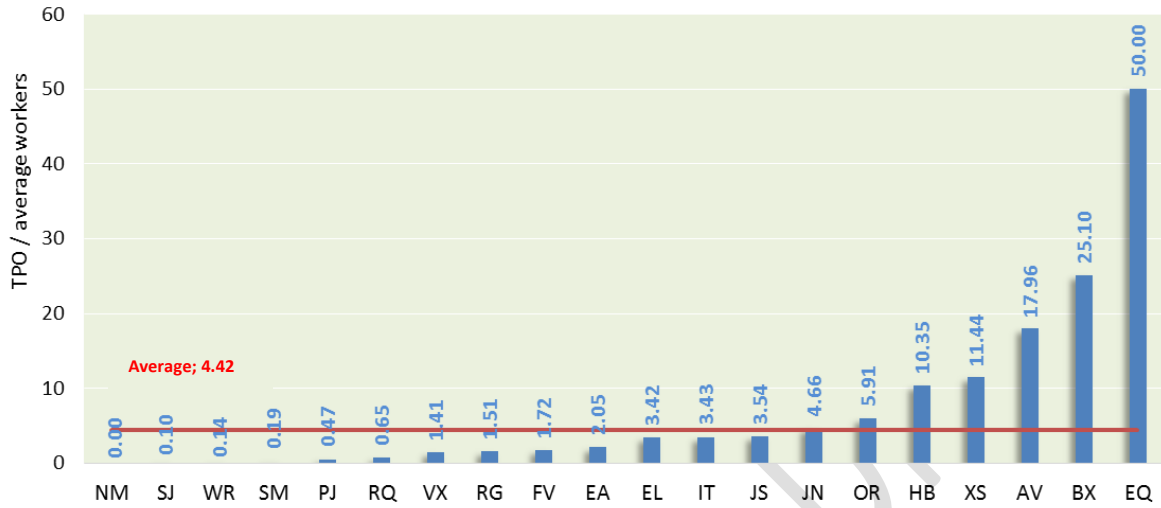
Both indicators recorded an increasing trend, which is desirable since it shows a growth in preventive measures such as training and task observation actions.



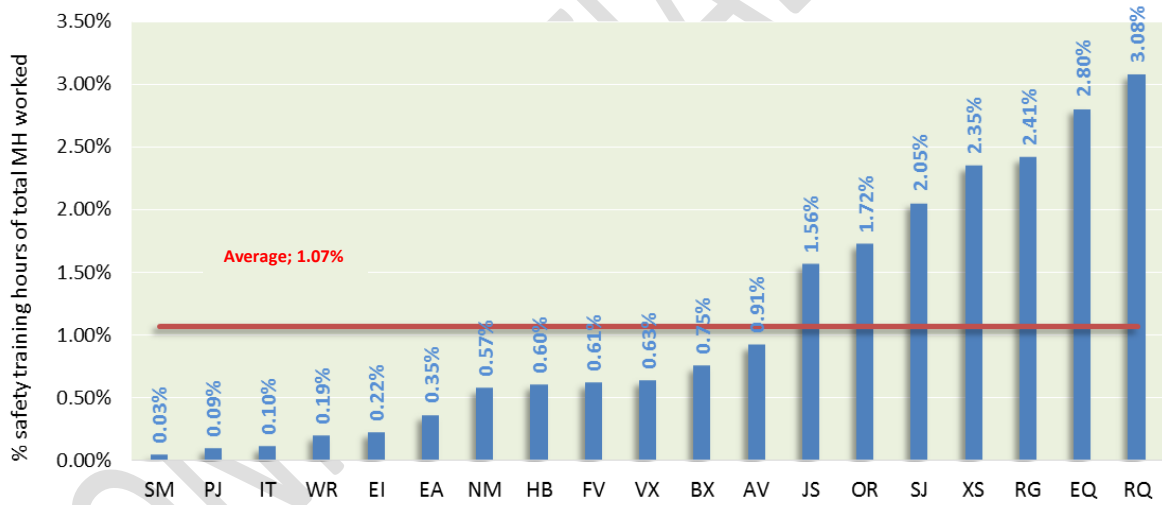
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#### 4.1.2. Proactive indicators by company

**Task Planned Observations**



**Safety training intensity**



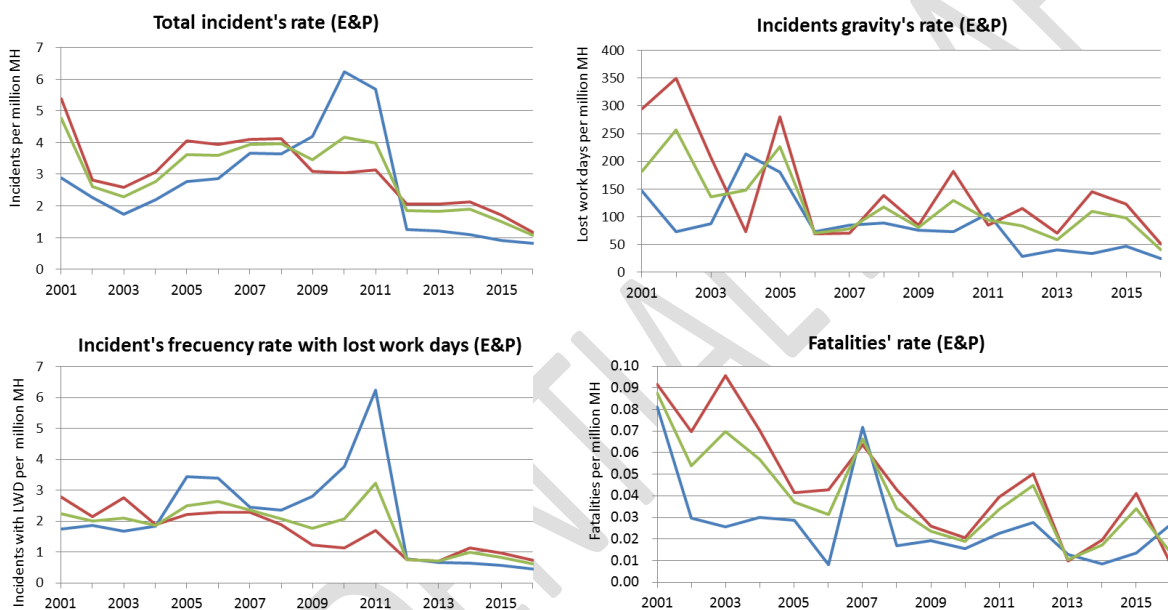


## 4.2. Exploration and Production

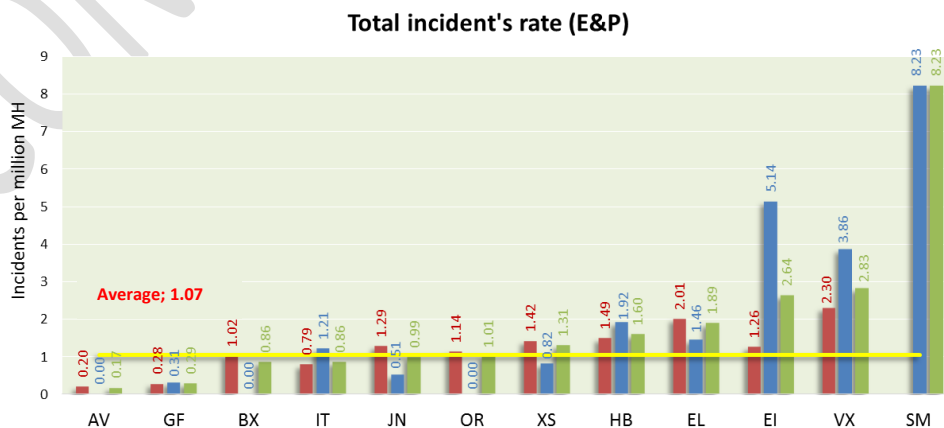
Below is shown the evolution of the reactive indicators (4.2.1), a comparison between companies for the year 2016 (4.2.2), and the historical evolution of proactive indicators for E&P (4.2.3)

E&P total data includes onshore and offshore operations, in sections 4.2.4 and 4.2.5 there is an analysis of the historical evolution and comparisons between companies of the reactive indicators only for E&P offshore. Section 4.2.6 shows a comparison between ARPEL group of companies and IOGP group of companies for E&P.

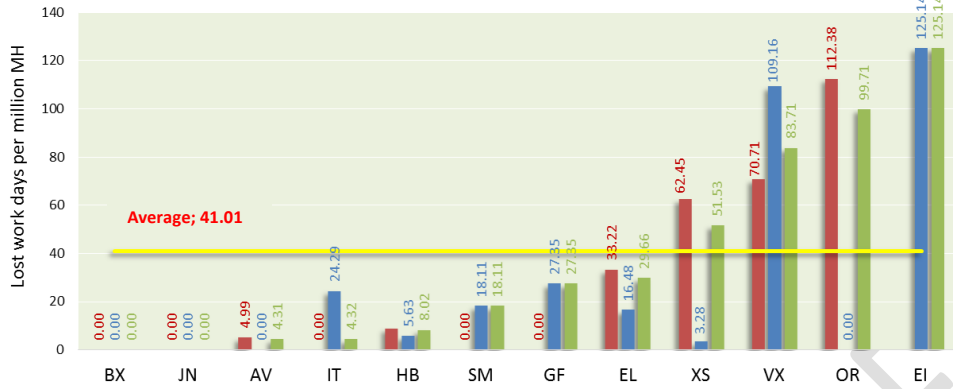
### 4.2.1. Evolution of reactive indicators (E&P total)



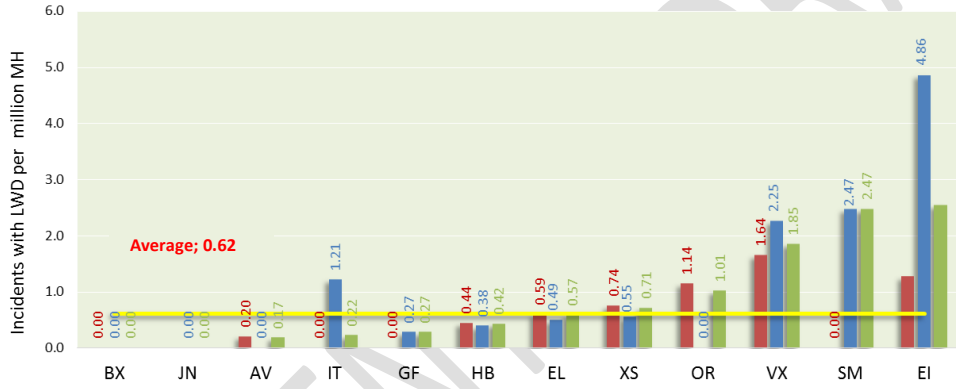
### 4.2.2. Indicadores reactivos por compañía (E&P total)



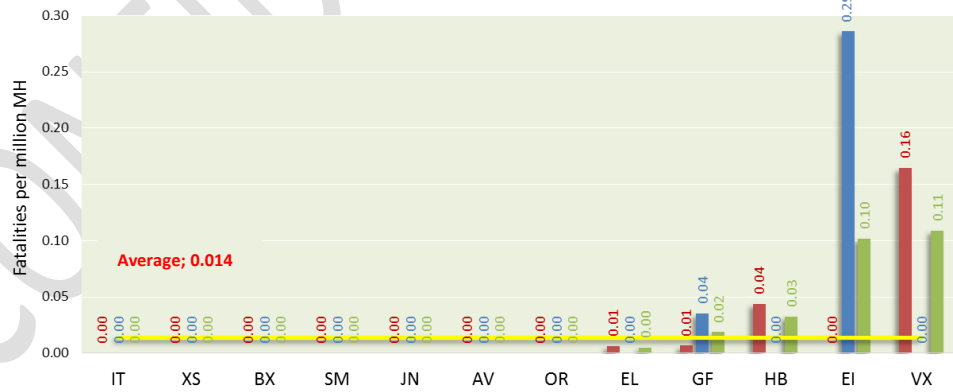
**Incidents gravity's rate (E&P)**



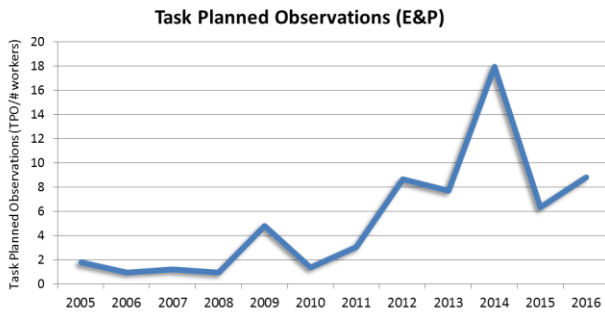
**Incident's frequency rate with lost work days (E&P)**



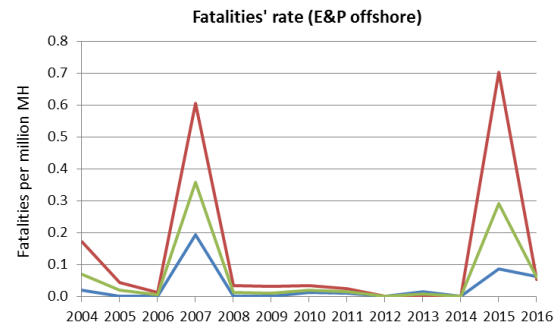
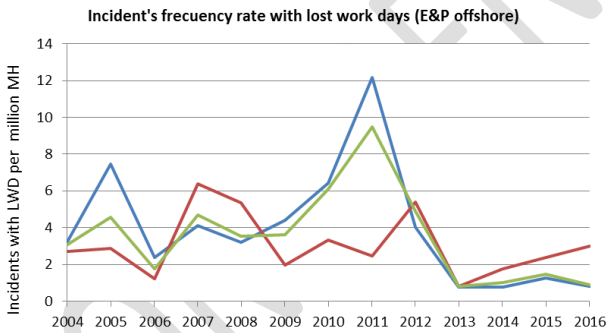
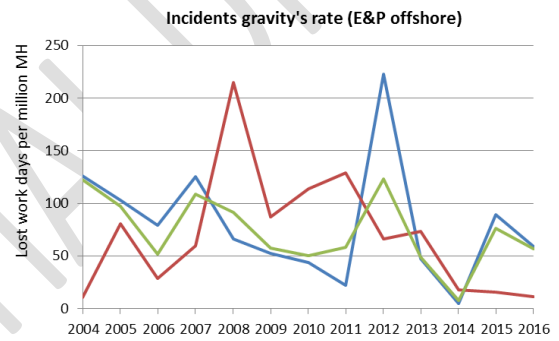
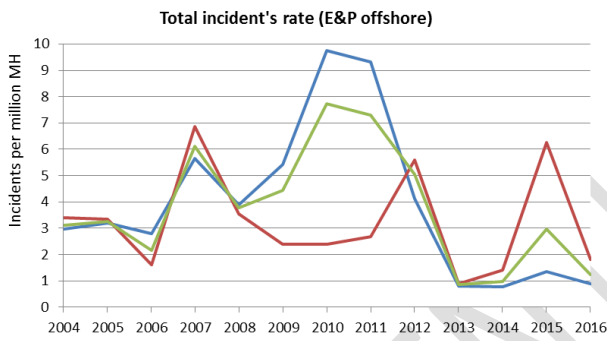
**Fatalities' rate (E&P)**



### 4.2.3. Proactive Indicators (E&P total)

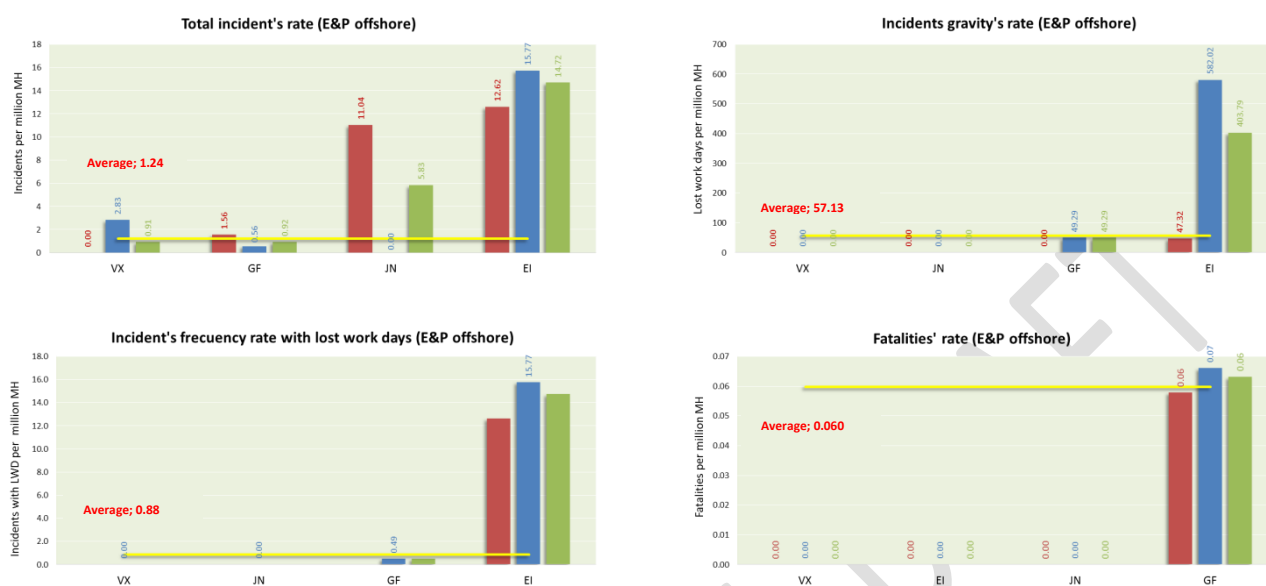


### 4.2.4. Reactive Indicators E&P (offshore)



■ Company ■ Contractors ■ Combined

#### 4.2.5. Reactive indicators by company E&P (offshore)



#### 4.2.6. Comparison with international references

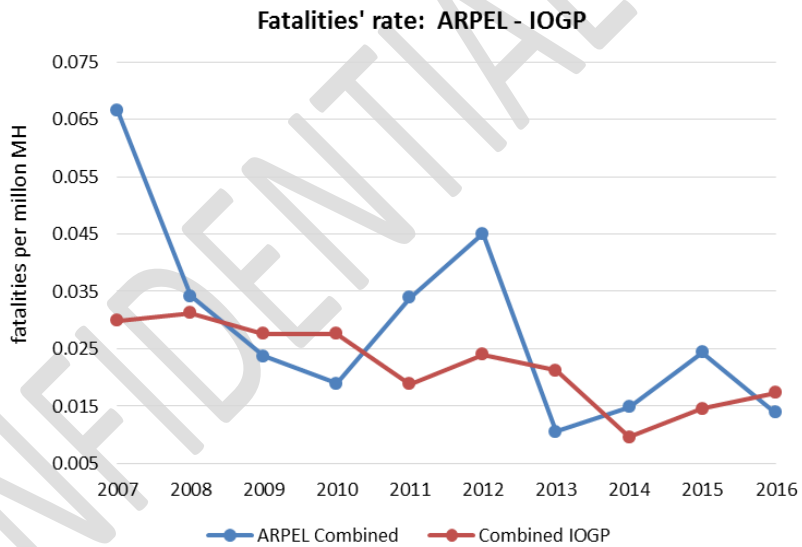
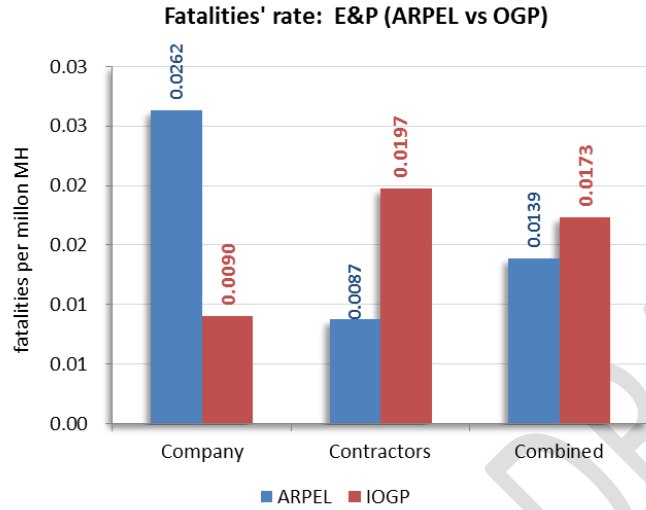
Following is a comparison between the data of fatalities in E&P for ARPEL and IOGP (International Oil and Gas Producers Association) member companies.

The overall rate of fatalities in E&P for ARPEL companies in 2016 was 0.0139 fatalities per million hours worked, which is lower to the average fatalities per million hours worked registered by IOGP companies for the same period (0.0173).

Breaking down the data in company and contractors, it is observed that ARPEL member companies group shows a higher value in company category (0.0262 ARPEL vs 0.0090 IOGP) and a lower value in contractors category (0.0087 ARPEL vs 0.0197 IOGP).

The three main causes of fatality presented by IOGP were "transport - air" (38%), "struck by" (20%) and "fires and burns" (18%). Only one of these causes is similar to the main fatalities causes of ARPEL member companies group

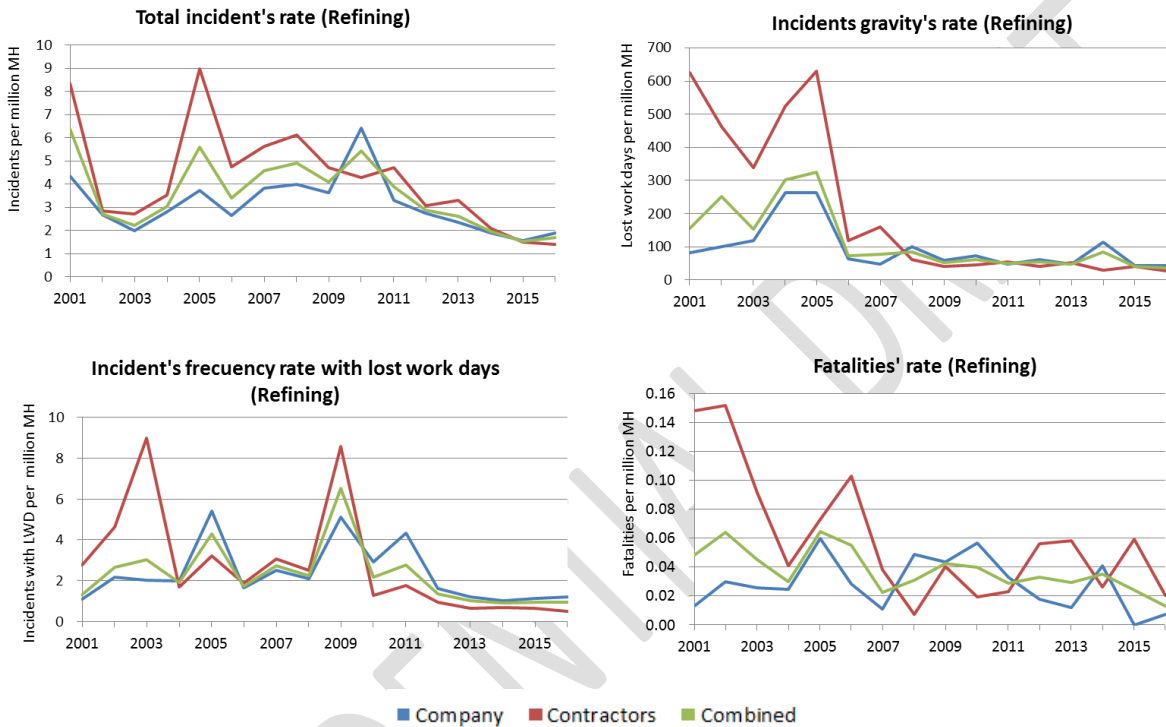
Below are shown the results for 2016 and the historical evolution of the fatalities rate (combined) for IOGP and ARPEL since 2007.



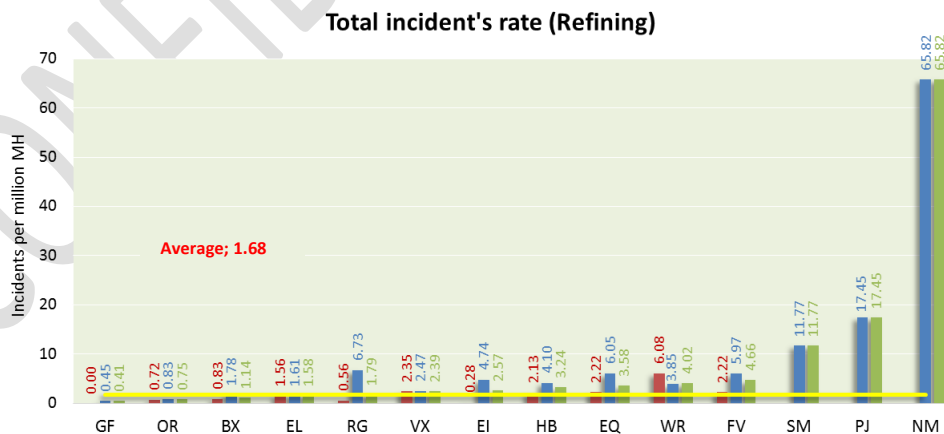
### 4.3. Refining

Below is the historical evolution of the reactive indicators (4.3.1), a comparison between companies for the year 2016 (4.3.2) and a historical evolution of proactive indicators (4.3.3) for the business line Refining.

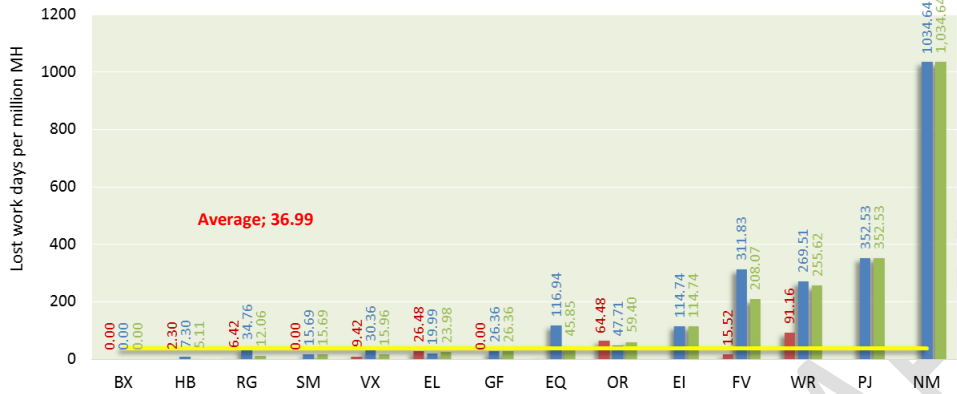
#### 4.3.1. Evolution of reactive indicators



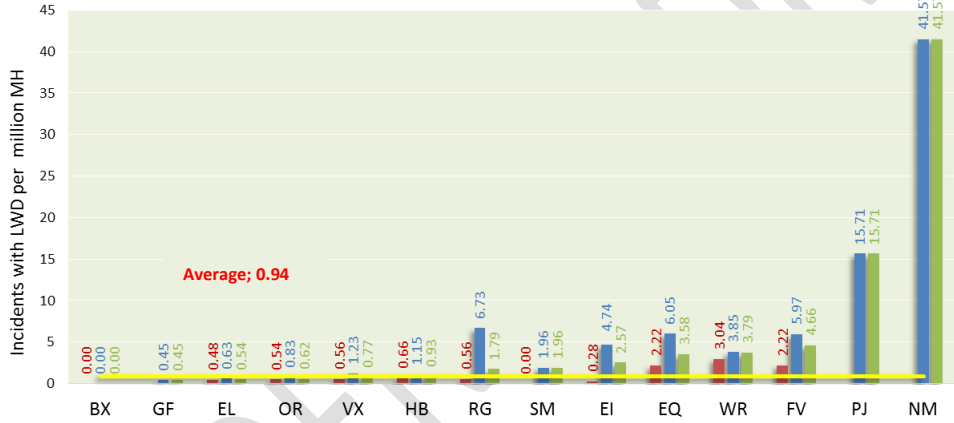
#### 4.3.2. Reactive indicators by company



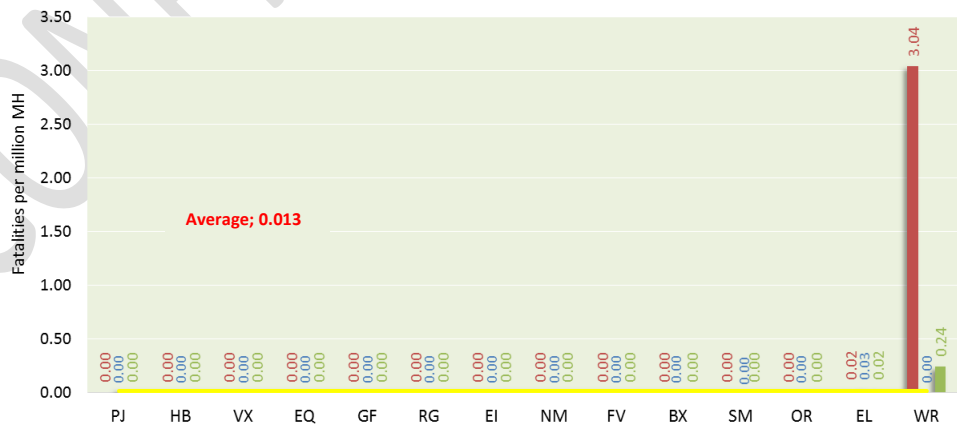
Incidents gravity's rate (Refining)



Incident's frequency rate with lost work days (Refining)



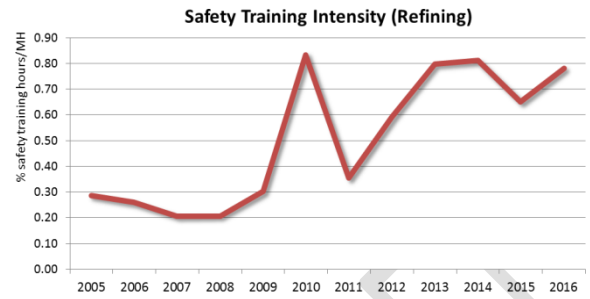
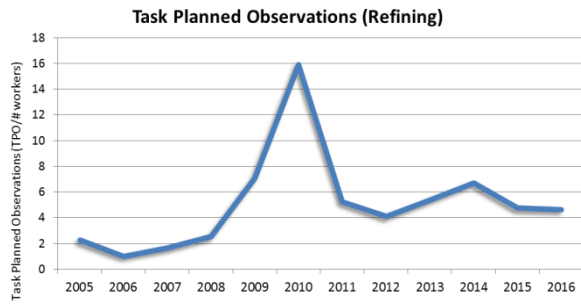
Fatalities' rate (Refining)



■ Company ■ Contractors ■ Combined

### 4.3.3. Proactive indicators

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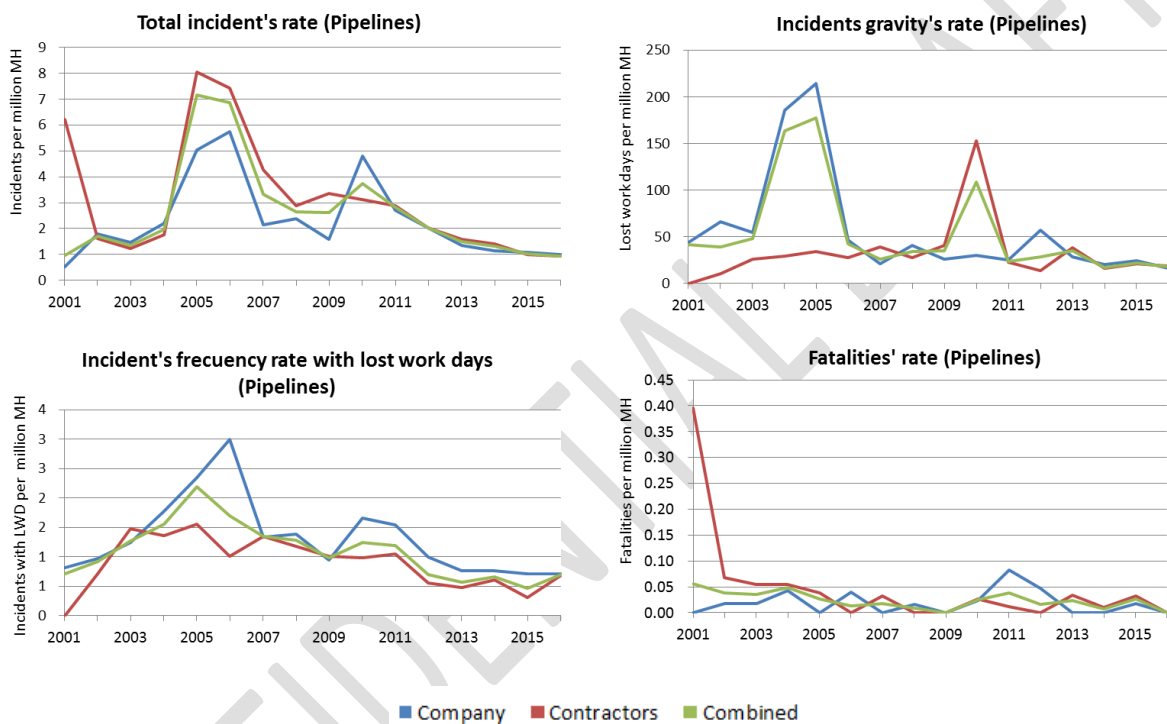


## 4.4. Pipelines

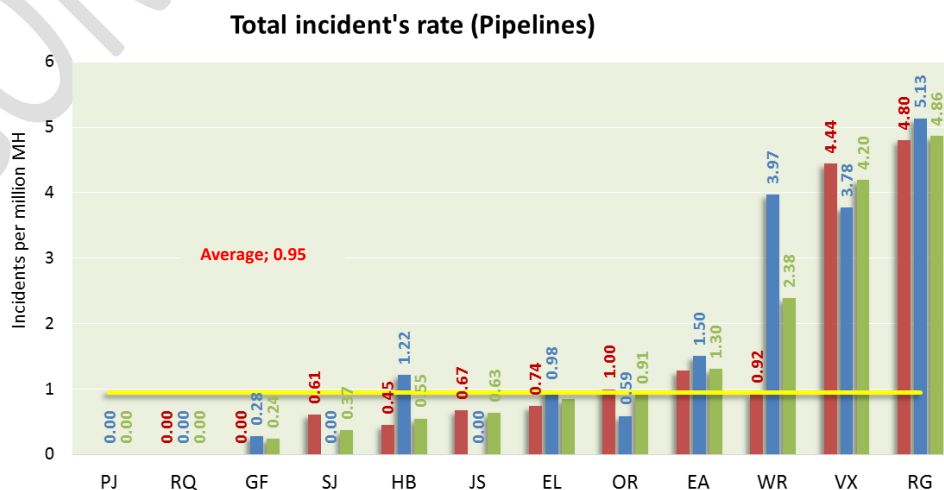
Below is the historical evolution of the reactive indicators (4.4.1), a comparison between companies for the year 2016 (4.4.2) and the historical evolution of proactive indicators (4.4.3) for the business line Pipelines.

The data includes the information reported in "transport – pipelines for liquids", "transport – pipelines for gases" and "transport – pipelines not separated". Data prior to 2009 corresponds only to "transport - pipelines for liquids".

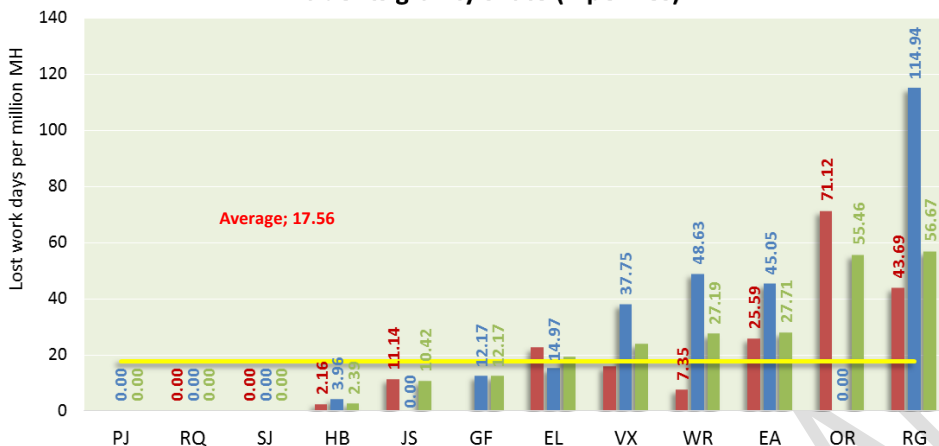
### 4.4.1. Evolution of reactive indicators



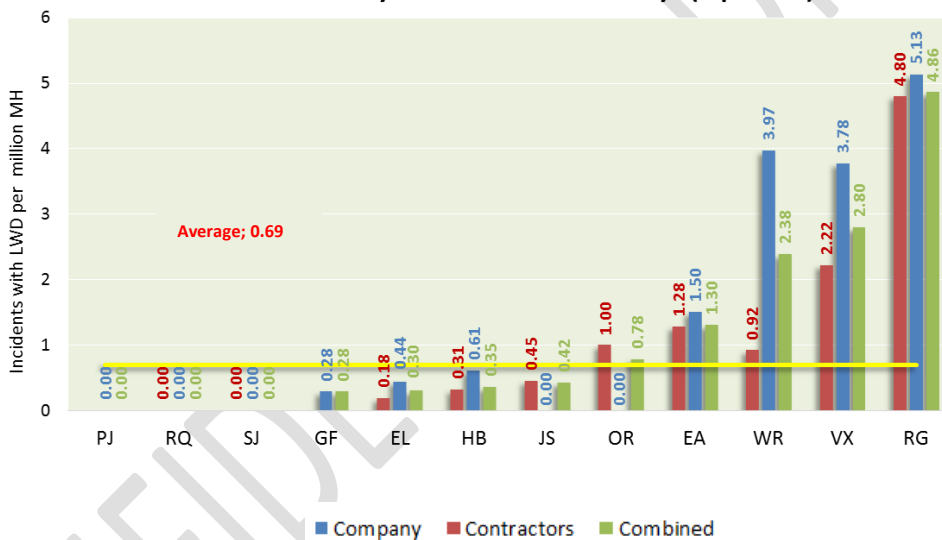
### 4.4.2. Reactive indicators by company



**Incidents gravity's rate (Pipelines)**

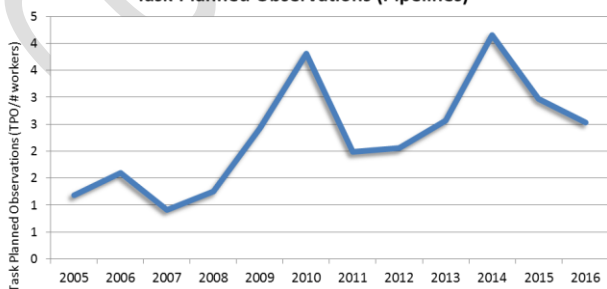


**Incident's frequency rate with lost work days (Pipelines)**

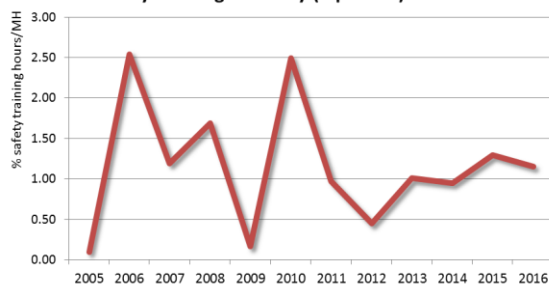


### 4.4.3. Proactive indicators

**Task Planned Observations (Pipelines)**



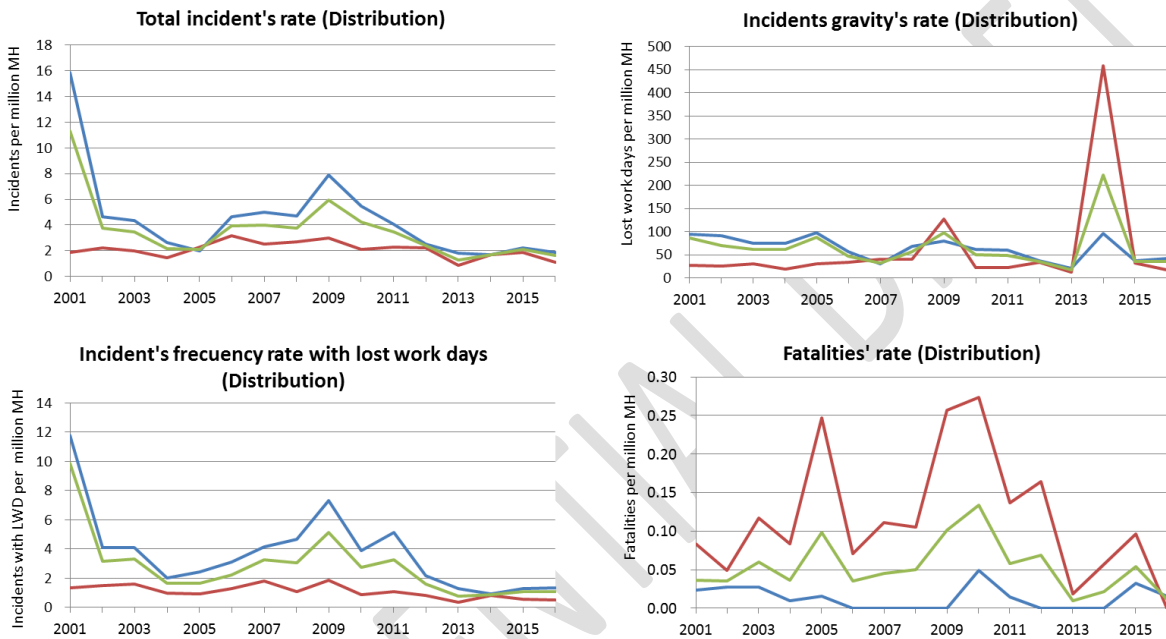
**Safety Training Intensity (Pipelines)**



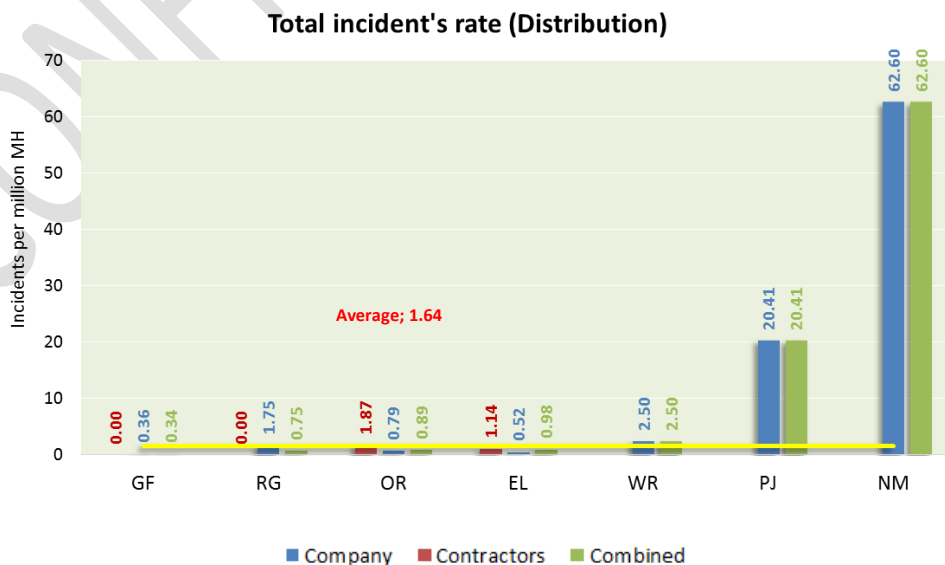
## 4.5. Distribution

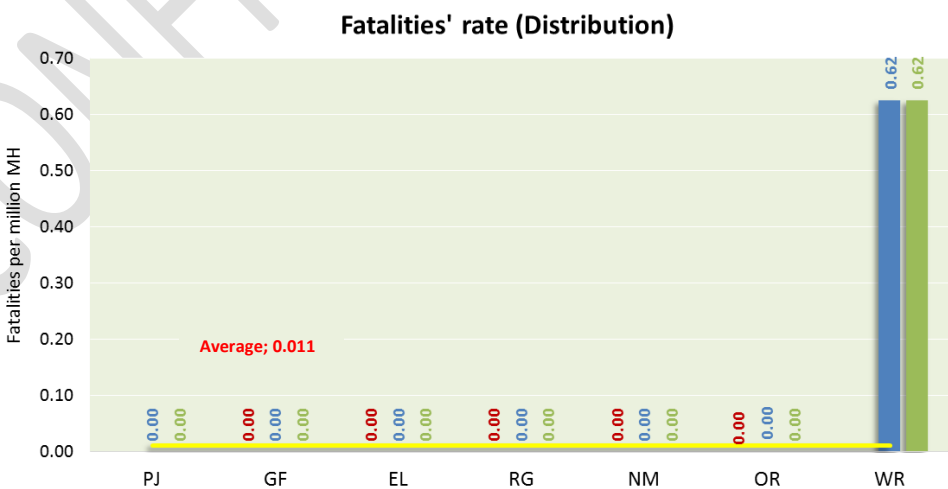
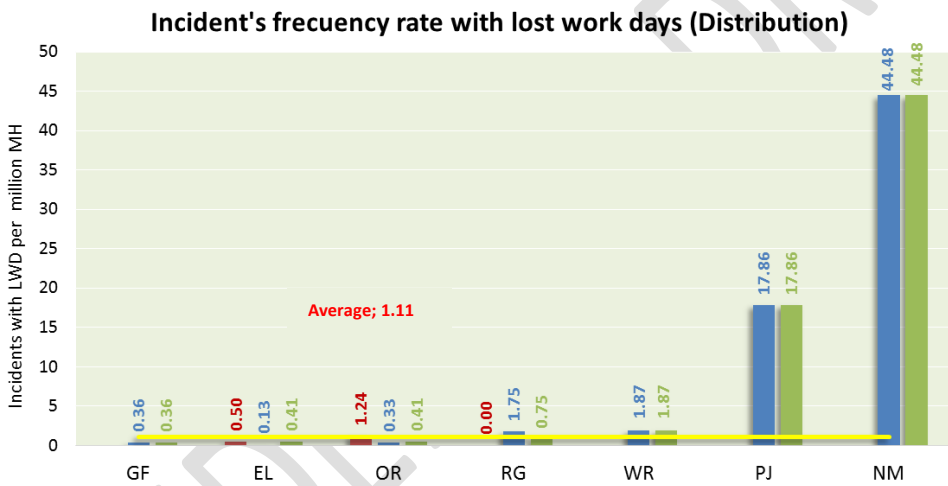
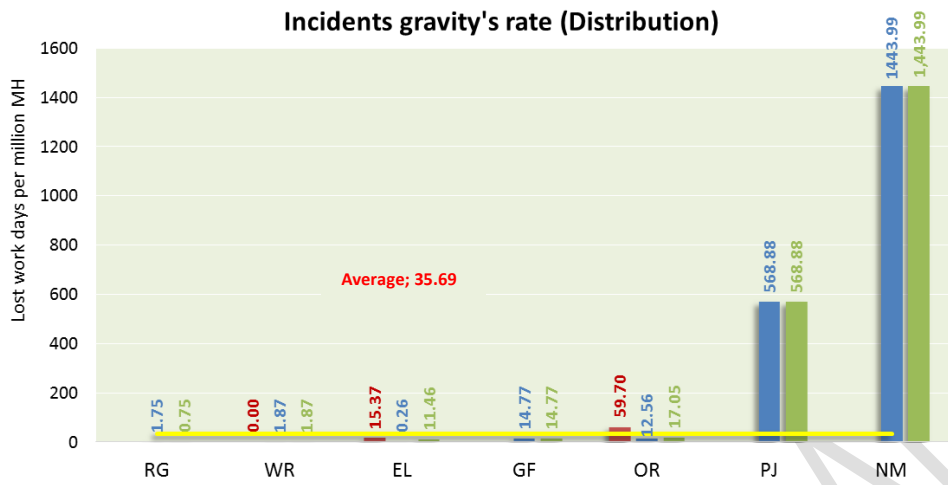
Below is shown the historical evolution of the reactive indicators (4.5.1), a comparison between companies for the year 2016 (4.5.2) and a historical evolution of proactive indicators (4.5.3) for the business line Distribution.

### 4.5.1. Reactive indicators



### 4.5.2. Reactive indicators by company

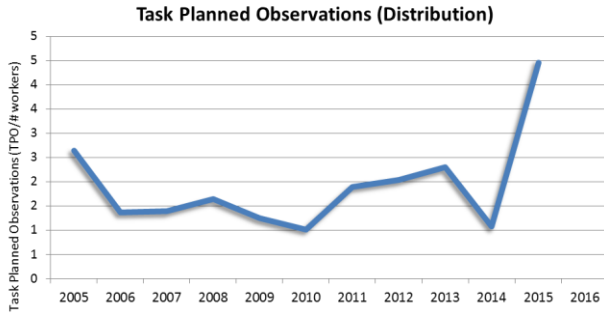




■ Company ■ Contractors ■ Combined

### 4.5.3. Proactive indicators

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## 5. CAUSES OF FATALITIES

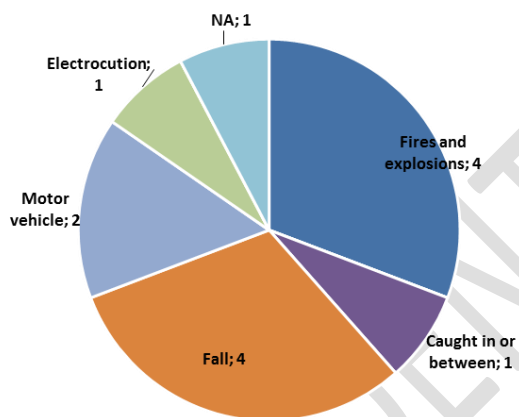
This chapter presents an analysis of the fatalities reported in 2016 by companies and contractors broken down by cause, type of activity and function. Additionally, it presents a historical comparative analysis of the causes of fatalities reported from 2001 to date.

In 2016, a total of 13 fatalities were reported, corresponding to 0.009 fatalities per million hours worked, representing a decrease of 64% compared to 2015. Fatalities cases decreased from 47 to 13.

The main causes of fatalities in 2016 were Fires and Explosions and falls with 4 cases each. Fires and explosions is also the main historical cause of fatalities since data has been collected (2001) with 23% of the total cases.

### 5.1. Fatalities by cause

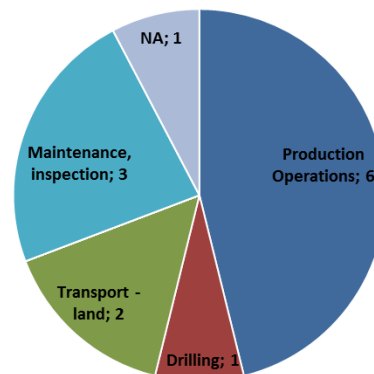
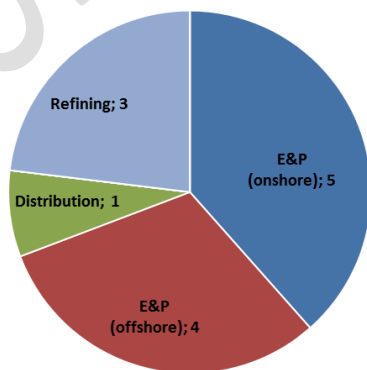
The pie chart shows the causes of fatalities reported for 2016. Fires and explosions (4 cases), falls (4), motor vehicle accident (2), caught in or between (1), electrocution (1) were the causes reported. The table below in the right shows the causes of fatalities registered from 2001 to 2016.



Cause	# fat	%
<b>Fires and explosions</b>	<b>182</b>	<b>23%</b>
<b>Struck by equipment</b>	<b>117</b>	<b>15%</b>
<b>Motor Vehicle</b>	<b>115</b>	<b>14%</b>
Fall	83	10%
Caught in or between	65	8%
Drowning	61	8%
Electrocution	54	7%
Toxic gas or liquid	43	5%
Other transportation	38	5%
Other	37	5%
NA	2	0%
<b>Total</b>	<b>797</b>	<b>100%</b>

### 5.2. Fatalities by activity and function

In 2016, production operations was the activity that recorded the highest number of fatalities (6 cases), while E&P was the most affected business line with 9 cases, 5 of them onshore and 4 offshore.



## 6. GLOSSARY

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### **Case involving lost workdays**

All non-fatal cases that result in the worker being away from work at least one business day after the day of the injury or disease. The day on which the worker goes home before the end of his workday is not considered in this item. Fatalities, as well as restricted labor activity days are excluded, since they are recorded separately.

### **Case involving restricted workdays**

All non-fatal cases implying days of restricted activity of the usual tasks after the day of the injury or disease. Fatalities must be excluded.

### **Case involving medical treatment**

All treatment cases of injuries / diseases administered by doctors, registered professionals or non-medical personnel. The medical treatment does not include first aids (one single treatment and the following observation of scratches, cuts, burns, splinters, and other episodes without gravity that generally do not require medical attention) even if a doctor or a registered professional provides them.

### **Company worker**

Any person employed by the reporting company or included in its payroll.

### **Contractor**

Any person directly involved in the execution of an assigned work for the reporting company, according to a contract.

### **Number of days away from work**

The total number of days (consecutive or not) after the day when the injury or disease occurred, on which the workers involved (according to the definition of case involving lost workdays) should have worked but did not, as a result of the occupational injury or disease, until the day they get back to work. The day the person starts to work is excluded. Weekends and holidays are included, even if the employee was not scheduled to work.

This definition has to be distinguished from 'cases with lost work days' which include those incidents that generated lost work days –the number of incidents, not the number of days- and which is used to calculate the 'frequency of incidents with lost work days'

### **Recordable case - disease**

Any occupational incident resulting from a disease (according to the provided classification by the legislation/regulation [if applicable] of the country where the company reports its activities). Occupational diseases resulting in fatalities are included.

### **Recordable case - fatality**

A fatality resulting from an occupational injury or disease. The fatality should be loaded to the year in which the injury occurred or the occupational disease was recorded.

### **Recordable case - injury**

Any occupational incident resulting in an injury (according to the provided classification by the legislation/regulation [if applicable] of the country where the company reports its activities). Occupational injuries resulting in fatalities are included.

### **Recordable cases - total**

The sum of Recordable cases – Injury, Recordable cases – Disease and Recordable cases – Fatalities.

**Tasks planned observations (TPO)**

"Tasks planned observations" (TPO) are safety observations performed according to a systematic method. They constitute a recorded visual analysis in which the sequence of tasks, maneuvers and operations required to obtain a certain result of the service which is pre-established within the company, is studied by well trained and qualified personnel. The referred study includes hazard identification and risk management during normal task performance and comprises observations of immediate and basic aspects as well as systematic ones. Observations are recorded in a pre-established form according to a given procedure to determine all deviations that result in an increased probability of any human resources or material loss.

**Worked hours**

Hours worked by both the company workers and contractors' workers (separately recorded).

**Work relatedness**

An injury or disease is to be considered to be work-related if an event or exposure in the work environment caused or contributed to the resulting condition or significantly aggravated a pre-existing injury or disease. Work-relatedness is defined for injuries and diseases resulting from events or exposures occurred in the work environment, defining the work environment as the physical place where one or more employees work or are present due to work reasons. The work environment includes not only physical locations, but also the equipment or materials used by the employee during the course of his/her work.

CONFIDENTIAL DRAFT



## 7. ANNEXES

### 7.1. 2016 data (reactive indicators)

Form	Category	Function	# incidents (TIR)	HW (TIR)	# days away from work (TGR)	HW (TGR)	# incidents (TILWDR)	WH (TILWDR)	# incidents (TFR)	WH (TFR)	TIR	TGR	TILWDR	TFR
OIC/PI	Company	E&P	157	190,519	4,702	190,519	85	190,519	5	190,519	0.82	24.68	0.45	0.026
OIC/PI	Company	Refining	254	133,841	5,885	133,841	164	133,841	1	133,841	1.90	43.97	1.23	0.007
OIC/PI	Company	Pipelines	46	46,494	758	46,494	33	46,494	0	46,494	0.99	16.30	0.71	0.000
OIC/PI	Company	Transport-maritime	9	9,750	399	9,750	6	9,750	0	9,750	0.92	40.92	0.62	0.000
OIC/PI	Company	Distribution	118	63,247	2,714	63,247	84	63,247	1	63,247	1.87	42.91	1.33	0.016
OIC/PI	Company	Others	148	180,161	4,450	180,161	106	180,161	0	180,161	0.82	24.70	0.59	0.000
OIC/PI	Company	Total	<b>732</b>	<b>624,012</b>	<b>18,908</b>	<b>624,012</b>	<b>478</b>	<b>624,012</b>	<b>7</b>	<b>624,012</b>	<b>1.17</b>	<b>30.30</b>	<b>0.77</b>	<b>0.011</b>

Form	Category	Function	# incidents (TIR)	HW (TIR)	# days away from work (TGR)	HW (TGR)	# incidents (TILWDR)	WH (TILWDR)	# incidents (TFR)	WH (TFR)	TIR	TGR	TILWDR	TFR
OIC/PI	Contractors	E&P	537	458,588	15,318	297,636	221	303,972	4	458,588	1.17	51.47	0.73	0.009
OIC/PI	Contractors	Refining	136	97,884	2,307	87,602	48	91,192	2	97,884	1.39	26.33	0.53	0.020
OIC/PI	Contractors	Pipelines	74	79,973	1,420	77,566	53	77,566	0	79,973	0.93	18.31	0.68	0.000
OIC/PI	Contractors	Transport-maritime	0	1,424	0	0	0	0	0	1,424	0.00	NA	NA	0.000
OIC/PI	Contractors	Distribution	28	25,867	432	24,242	13	24,242	0	25,867	1.08	17.82	0.54	0.000
OIC/PI	Contractors	Others	353	210,861	9,220	200,644	158	201,488	0	210,861	1.67	45.95	0.78	0.000
OIC/PI	Contractors	Total	<b>1128</b>	<b>874,596</b>	<b>28,697</b>	<b>687,689</b>	<b>493</b>	<b>698,459</b>	<b>6</b>	<b>874,596</b>	<b>1.29</b>	<b>41.73</b>	<b>0.71</b>	<b>0.007</b>

Form	Category	Function	# incidents (TIR)	HW (TIR)	# days away from work (TGR)	HW (TGR)	# incidents (TILWDR)	WH (TILWDR)	# incidents (TFR)	WH (TFR)	TIR	TGR	TILWDR	TFR
OIC/PI	Combined	E&P	694	649,106	20,020	488,154	306	494,490	9	649,106	1.07	41.01	0.62	0.014
OIC/PI	Combined	Refining	390	231,725	8,192	221,443	212	225,033	3	231,725	1.68	36.99	0.94	0.013
OIC/PI	Combined	Pipelines	120	126,467	2,178	124,060	86	124,060	0	126,467	0.95	17.56	0.69	0.000
OIC/PI	Combined	Transport-maritime	9	11,174	399	9,750	6	9,750	0	11,174	0.81	40.92	0.62	0.000
OIC/PI	Combined	Distribution	146	89,113	3,146	87,488	97	87,488	1	89,113	1.64	35.96	1.11	0.011
OIC/PI	Combined	Others	501	391,022	13,670	380,805	264	381,649	0	391,022	1.28	35.90	0.69	0.000
OIC/PI	Combined	Total	<b>1860</b>	<b>1,498,608</b>	<b>47,605</b>	<b>1,311,701</b>	<b>971</b>	<b>1,322,471</b>	<b>13</b>	<b>1,498,608</b>	<b>1.24</b>	<b>36.29</b>	<b>0.73</b>	<b>0.009</b>

#### E&P Offshore

Form	Category	Function	# incidents (TIR)	HW (TIR)	# days away from work (TGR)	HW (TGR)	# incidents (TILWDR)	WH (TILWDR)	# incidents (TFR)	WH (TFR)	TIR	TGR	TILWDR	TFR
OIO	Company	E&P	28	31,540	1,863	31,540	25	31,540	2	31,540	0.89	59.07	0.79	0.063
OIO	Contractors	E&P	34	18,622	15	1,330	4	1,330	1	18,622	1.83	11.28	3.01	0.054
OIO	Combined	E&P	62	50,162	1,878	32,870	29	32,870	3	50,162	1.24	57.13	0.88	0.060

### 7.2. 2016 data (proactive indicators)

Form	Category	Function	# TPO	# workers TPO	# Safety training hours	# WH STI	TPO	STI
OIC/PI	Company	E&P	303,904	34,268	672,313	29,724	8.87	2.3%
OIC/PI	Company	Refining	131,268	28,454	231,387	29,690	4.61	0.8%
OIC/PI	Company	Pipelines	38,710	15,281	161,500	14,072	2.53	1.1%
OIC/PI	Company	Transport-maritime	13	55	128	115	0.24	0.1%
OIC/PI	Company	Distribution	10,570	12,029	86,364	19,059	0.88	0.5%
OIC/PI	Company	Others	70,274	35,362	237,999	36,878	1.99	0.6%
OIC/PI	Company	Total	<b>554,739</b>	<b>125,448</b>	<b>1,389,690</b>	<b>129,539</b>	<b>4.42</b>	<b>1.1%</b>

### 7.3. Historical data 2001-2016 (reactive indicators)

Function	Category	Indicator	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
<b>E&amp;P</b>																			
E&P	Company	Total	1.167	2.875	2.266	1.742	2.202	2.779	2.865	3.663	3.648	4.184	6.234	5.680	1.254	1.220	1.086	0.905	<b>0.82</b>
E&P	Contractors	Total	3.989	5.379	2.818	2.597	3.070	4.060	3.946	4.092	4.134	3.083	3.038	3.127	2.050	2.051	2.136	1.707	<b>1.17</b>
E&P	Combined	Total	2.231	4.770	2.602	2.281	2.780	3.626	3.592	3.947	3.467	4.179	3.978	1.860	1.842	1.888	1.504	<b>1.07</b>	
E&P	Company	Gravity	208.443	146.415	73.670	87.668	212.756	180.887	72.838	85.257	88.789	76.137	73.580	105.415	29.288	39.774	34.441	47.257	<b>24.68</b>
E&P	Contractors	Gravity	61.042	293.985	349.365	206.421	73.007	280.109	69.254	70.599	138.690	84.558	181.485	84.949	114.791	70.629	145.110	123.458	<b>51.47</b>
E&P	Combined	Gravity	152.856	182.395	256.546	135.954	147.310	226.574	70.764	78.978	117.956	80.649	129.142	94.096	83.200	59.193	110.298	97.943	<b>41.01</b>
E&P	Company	Lost Workdays	1.937	1.754	1.858	1.674	1.829	3.447	3.385	2.446	2.355	2.813	3.775	6.234	0.776	0.675	0.635	0.558	<b>0.45</b>
E&P	Contractors	Lost Workdays	3.654	2.779	2.133	2.746	1.893	2.210	2.289	2.289	1.878	1.224	1.131	1.705	0.760	0.720	1.143	0.958	<b>0.73</b>
E&P	Combined	Lost Workdays	2.585	2.238	2.009	2.094	1.872	2.497	2.650	2.354	2.076	1.777	2.082	3.217	0.764	0.709	0.983	0.826	<b>0.62</b>
E&P	Company	Fatalities	0.073	0.081	0.030	0.026	0.030	0.029	0.008	0.072	0.017	0.019	0.016	0.023	0.028	0.013	0.009	0.014	<b>0.026</b>
E&P	Contractors	Fatalities	0.067	0.092	0.070	0.096	0.070	0.041	0.043	0.064	0.043	0.026	0.021	0.040	0.050	0.010	0.020	0.041	<b>0.009</b>
E&P	Combined	Fatalities	0.071	0.088	0.054	0.070	0.057	0.037	0.031	0.067	0.034	0.024	0.019	0.034	0.045	0.010	0.017	0.034	<b>0.014</b>
<b>Refining</b>																			
Refining	Company	Total	10.543	4.337	2.667	1.999	2.815	3.719	2.660	3.822	4.000	3.642	6.398	3.294	2.752	2.368	1.895	1.560	<b>1.90</b>
Refining	Contractors	Total	4.872	8.356	2.832	2.699	3.523	8.967	4.741	5.613	6.118	4.706	4.272	4.699	3.080	3.294	2.097	1.486	<b>1.39</b>
Refining	Combined	Total	9.748	6.368	2.713	2.209	3.036	5.585	3.402	4.568	4.904	4.080	5.434	3.876	2.879	2.627	1.976	1.530	<b>1.68</b>
Refining	Company	Gravity	87.293	81.486	99.711	118.139	262.201	263.005	64.077	47.367	101.506	60.388	73.248	48.707	61.117	47.402	113.196	42.314	<b>43.97</b>
Refining	Contractors	Gravity	31.669	626.472	463.375	339.274	525.086	630.935	118.871	160.858	60.941	40.412	46.484	55.182	41.469	52.112	28.868	41.386	<b>26.33</b>
Refining	Combined	Gravity	79.491	156.027	252.275	153.953	301.468	325.390	72.034	78.747	85.394	52.660	61.542	51.075	54.945	48.872	84.822	42.004	<b>36.99</b>
Refining	Company	Lost Workdays	2.447	1.092	1.186	2.029	2.001	5.394	1.654	2.518	2.095	5.110	2.909	4.345	1.623	1.234	1.050	1.137	<b>1.23</b>
Refining	Contractors	Lost Workdays	3.057	2.788	4.638	8.981	1.707	3.206	1.897	3.085	2.497	8.543	1.299	1.789	0.967	0.676	0.706	0.648	<b>0.53</b>
Refining	Combined	Lost Workdays	2.532	1.333	2.682	3.038	1.906	4.292	1.738	2.743	2.255	6.523	2.170	2.786	1.369	1.023	0.934	0.974	<b>0.94</b>
Refining	Company	Fatalities	0.016	0.013	0.030	0.026	0.025	0.060	0.028	0.011	0.049	0.044	0.057	0.033	0.018	0.012	0.041	0.000	<b>0.007</b>
Refining	Contractors	Fatalities	0.096	0.148	0.151	0.091	0.041	0.073	0.103	0.038	0.007	0.040	0.020	0.023	0.056	0.058	0.026	0.059	<b>0.020</b>
Refining	Combined	Fatalities	0.027	0.048	0.064	0.045	0.030	0.064	0.055	0.022	0.031	0.042	0.040	0.029	0.033	0.029	0.035	0.024	<b>0.013</b>
<b>Pipelines</b>																			
Pipelines	Company	Total	1.319	0.529	1.786	1.475	2.192	5.042	5.744	2.143	2.380	1.590	4.811	2.716	2.036	1.346	1.150	1.074	<b>0.99</b>
Pipelines	Contractors	Total	1.093	6.215	1.631	1.225	1.754	8.042	7.431	4.261	2.893	3.351	3.123	2.891	2.043	1.574	1.411	0.984	<b>0.93</b>
Pipelines	Combined	Total	1.265	0.975	1.719	1.353	1.956	7.169	6.787	3.321	2.635	2.632	3.730	2.827	2.041	1.500	1.333	1.018	<b>0.95</b>
Pipelines	Company	Gravity	92.626	44.051	66.453	54.432	185.335	214.104	46.918	21.505	41.120	25.910	29.977	25.393	57.342	28.740	20.410	24.103	<b>16.30</b>
Pipelines	Contractors	Gravity	8.153	0.000	10.192	26.136	29.478	33.931	27.681	38.982	27.730	40.909	152.685	22.808	14.090	38.364	15.882	21.074	<b>18.31</b>
Pipelines	Combined	Gravity	72.450	41.816	39.440	48.044	163.410	177.237	42.433	26.016	34.572	34.787	108.580	23.778	28.623	35.186	17.283	22.262	<b>17.56</b>
Pipelines	Company	Lost Workdays	1.451	0.815	0.967	1.239	1.782	2.348	3.000	1.330	1.381	0.941	1.656	1.541	0.994	0.769	0.767	0.710	<b>0.71</b>
Pipelines	Contractors	Lost Workdays	1.093	0.000	0.718	1.480	1.356	1.550	1.008	1.353	1.182	1.004	0.978	1.051	0.552	0.483	0.606	0.313	<b>0.68</b>
Pipelines	Combined	Lost Workdays	1.365	0.707	0.920	1.276	1.549	2.185	1.694	1.343	1.284	0.978	1.237	1.191	0.699	0.575	0.656	0.469	<b>0.69</b>
Pipelines	Company	Fatalities	0.026	0.000	0.017	0.018	0.042	0.000	0.039	0.000	0.017	0.000	0.024	0.082	0.047	0.000	0.000	0.017	<b>0.000</b>
Pipelines	Contractors	Fatalities	0.336	0.396	0.067	0.055	0.054	0.038	0.000	0.032	0.000	0.000	0.026	0.012	0.000	0.034	0.010	0.032	<b>0.000</b>
Pipelines	Combined	Fatalities	0.100	0.056	0.038	0.036	0.049	0.027	0.013	0.018	0.008	0.000	0.025	0.038	0.016	0.023	0.007	0.026	<b>0.000</b>
<b>Distribution</b>																			
Distribution	Company	Total	10.013	15.857	4.642	4.364	2.617	2.024	4.662	4.985	4.700	7.881	5.485	4.081	2.540	1.806	1.684	2.242	<b>1.87</b>
Distribution	Contractors	Total	2.483	1.867	2.203	1.991	1.439	2.266	3.162	2.530	2.691	2.970	2.104	2.289	2.234	0.850	1.727	1.891	<b>1.08</b>
Distribution	Combined	Total	7.268	11.296	3.773	3.467	2.189	2.110	3.917	3.987	3.771	5.934	4.211	3.446	2.412	1.297	1.700	2.125	<b>1.64</b>
Distribution	Company	Gravity	78.701	95.350	92.071	74.798	74.511	98.448	56.815	30.489	69.055	79.820	62.334	60.666	37.623	21.143	96.943	37.791	<b>42.91</b>
Distribution	Contractors	Gravity	33.557	28.241	26.401	31.468	19.532	30.793	34.618	40.859	40.878	127.176	22.337	23.255	34.973	12.347	458.961	32.731	<b>17.82</b>
Distribution	Combined	Gravity	62.248	85.829	70.102	61.742	62.087	87.951	47.456	33.278	57.873	97.948	49.745	48.087	36.606	17.987	223.265	36.228	<b>35.96</b>
Distribution	Company	Lost Workdays	7.640	11.789	4.089	4.117	2.006	2.420	3.119	4.149	4.664	7.287	3.882	5.115	2.287	1.043	0.943	1.274	<b>1.33</b>
Distribution	Contractors	Lost Workdays	1.572	1.339	1.497	1.601	1.004	0.946	1.314	1.811	1.093	1.880	0.881	1.092	0.821	0.333	0.817	0.577	<b>0.54</b>
Distribution	Combined	Lost Workdays	5.429	9.830	3.184	3.292	1.642	1.634	2.223	3.246	3.066	5.143	2.750	3.252	1.617	0.786	0.899	1.159	<b>1.11</b>
Distribution	Company	Fatalities	0.024	0.024	0.027	0.027	0.010	0.016	0.000	0.000	0.000	0.000	0.050	0.015	0.000	0.000	0.000	0.032	<b>0.016</b>
Distribution	Contractors	Fatalities	0.000	0.084	0.049	0.117	0.084	0.247	0.071	0.111	0.105	0.257	0.273	0.136	0.164	0.018	0.057	0.096	<b>0.000</b>
Distribution	Combined	Fatalities	0.015	0.037	0.035	0.060	0.036	0.098	0.035	0.045	0.050	0.101	0.134	0.058	0.069	0.010	0.021	0.054	<b>0.011</b>
<b>Others</b>																			
Others	Company	Total	1.030	6.879	3.441	2.011	1.784	1.880	2.235	2.903	3.701	2.403	2.350	2.180	1.402	1.669	0.993	0.840	<b>0.82</b>
Others	Contractors	Total	0.046	2.775	1.877	1.573	1.050	3.425	3.959	2.767	2.530	2.323	2.217	2.033	2.501	2.176	1.763	1.933	<b>1.61</b>
Others	Combined	Total	0.559	4.318	2.441	1.718	1.320	2.933	3.368	2.807	2.846	2.340	2.253	2.066	2.277	2.039	1.554	1.523	<b>1.28</b>
Others	Company	Gravity	30.757	59.755	80.054	62.328	70.119	58.436	28.131	29.100	48.379	17.594	16.696	26.965	21.655	28.111	27.450	27.760	<b>24.70</b>
Others	Contractors	Gravity	0.000	40.308	749.648	206.377	13.799	83.378	84.504	19.148	42.262	48.340	57.390	62.079	73.495	63.372	81.113	43.779	<b>45.95</b>
Others	Combined	Gravity	16.039	84.015															

## 7.4. Historical data 2003-2016 (reactive indicators –offshore-)

Indicator	Category	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Total (TIR)	Company	2.03	2.98	3.20	2.79	5.64	3.90	5.43	9.75	9.31	4.123	0.810	0.769	1.347	0.89
Total (TIR)	Contractors	1.46	3.40	3.35	1.62	6.86	3.55	2.39	2.38	2.68	5.586	0.893	1.421	6.250	1.83
Total (TIR)	Combined	1.73	3.11	3.27	2.17	6.13	3.77	4.43	7.72	7.29	5.053	0.849	0.990	2.967	1.24
Gravity (TGR)	Company	114.22	126.48	103.24	79.26	125.55	66.57	52.69	43.74	22.06	223.027	47.365	5.059	89.068	59.07
Gravity (TGR)	Contractors	11.29	10.58	81.04	28.58	59.84	215.16	87.12	113.89	129.24	65.938	73.474	17.915	15.861	11.28
Gravity (TGR)	Combined	110.27	122.46	97.37	52.12	108.88	91.38	57.73	50.36	58.06	123.142	49.240	8.029	76.730	57.13
Lost Workdays (TILWDR)	Company	1.97	3.25	7.44	2.36	4.10	3.18	4.41	6.41	12.19	4.022	0.767	0.769	1.260	0.79
Lost Workdays (TILWDR)	Contractors	1.03	2.71	2.85	1.20	6.39	5.36	1.95	3.32	2.44	5.413	0.813	1.751	2.358	3.01
Lost Workdays (TILWDR)	Combined	1.93	3.07	4.58	1.74	4.68	3.55	3.60	6.12	9.49	4.907	0.789	0.996	1.445	0.88
Fatalities (TFR)	Company	0.06	0.02	0.00	0.00	0.19	0.00	0.00	0.01	0.01	0.000	0.014	0.000	0.087	0.063
Fatalities (TFR)	Contractors	0.09	0.17	0.04	0.01	0.61	0.03	0.03	0.04	0.03	0.000	0.000	0.000	0.704	0.054
Fatalities (TFR)	Combined	0.08	0.07	0.02	0.01	0.36	0.01	0.01	0.02	0.02	0.000	0.008	0.000	0.291	0.060

## 7.1. Historical data 2005-2016 (proactive indicators)

Task Planned Observations (company)												
Function	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
E&P	1.83	1.07	1.28	1.01	4.87	1.45	3.12	8.69	7.76	17.98	6.39	8.87
Refining	2.21	0.99	1.60	2.51	7.05	15.93	5.22	4.06	5.36	6.69	4.71	4.61
Pipelines	1.18	1.59	0.92	1.25	2.42	3.81	1.98	2.05	2.56	4.16	2.97	2.53
Distribution	2.63	1.36	1.38	1.64	1.24	1.01	1.88	2.02	2.29	1.07	4.45	0.88
Others	0.28	1.44	0.57	1.41	3.23	1.29	2.19	2.56	2.98	2.64	2.16	1.99
<b>Total</b>	<b>1.96</b>	<b>1.15</b>	<b>1.12</b>	<b>1.35</b>	<b>3.93</b>	<b>3.70</b>	<b>3.27</b>	<b>4.59</b>	<b>4.98</b>	<b>8.39</b>	<b>4.14</b>	<b>4.42</b>

Safety Training Intensity (company)												
Function	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
E&P	0.62	0.21	0.22	0.14	0.10	0.32	0.30	0.29	0.51	0.63	0.40	2.26
Refining	0.29	0.26	0.21	0.21	0.30	0.83	0.35	0.59	0.80	0.81	0.65	0.78
Pipelines	0.10	2.54	1.19	1.68	0.16	2.49	0.97	0.45	1.00	0.94	1.29	1.15
Distribution	0.08	0.15	0.10	1.13	0.10	0.19	0.19	0.28	0.58	0.58	0.39	0.45
Others	0.19	0.11	0.02	0.10	0.26	0.32	0.18	0.44	0.62	0.21	0.33	0.65
<b>Total</b>	<b>0.36</b>	<b>0.24</b>	<b>0.18</b>	<b>0.20</b>	<b>0.17</b>	<b>0.45</b>	<b>0.30</b>	<b>0.42</b>	<b>0.57</b>	<b>0.59</b>	<b>0.55</b>	<b>1.07</b>

## 8. REFERENCES

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1. ARPEL (2017) User's Manual –ARPEL Database- Safety benchmarking in the oil and gas industry in Latin America and the Caribbean – 7th edition, 2017.
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BENCHMARKING

# Safety Benchmarking

in the oil and gas industry in Latin America and  
the Caribbean

2016 Data



ARPEL is a non-profit association gathering oil, gas and biofuels sector companies and institutions in Latin America and the Caribbean. Founded in 1965 as a vehicle of cooperation and reciprocal assistance among sector companies, its main purpose is to actively contribute to industry integration and competitive growth, and to sustainable energy development in the region. Its membership currently represents over 90% of the upstream and downstream activities in the region and includes national, international and independent operating companies, providers of technology, goods and services for the value chain, and national and international sector institutions.



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