



# Benchmarking on Environmental Performance in the Oil and Gas Industry in Latin America and the Caribbean

*Information of ARPEL  
Member Companies for 2014*







**Benchmarking on Environmental Performance in the Oil and Gas Industry in Latin America and the Caribbean – Information of ARPEL Member Companies for 2014**  
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## 1. Executive Summary

The Environmental Benchmarking Annual Report is a compilation of environmental statistics of ARPEL member companies that has been performed since 2008.

The report analyzes indicators on:

- Oil spills in water and land.
- Discharges, re-injection and hydrocarbon concentration in water discharge.
- Water and hydrocarbons discharged as process effluents.
- Disposal of hazardous and non-hazardous waste.
- Fresh water extracted and consumed.

### Scope:

In 2014, 26 companies-countries\* from 13 different countries shared their data.

Business line	Operación (10 <sup>3</sup> Tons de HC)	# companies	number of facilities
Offshore production	212,879	7	9,855 prod. wells
Onshore production	181,890	19	21,022 prod. wells
Unconventional production	1,424	3	24 prod. wells
Pipelines	18,739,784	11	49,745 kms pipelines
Terminales	85,546	8	127 terminals
Refineries	227,747	12	35 refineries
Distribution / Transport	55,701	8	NA

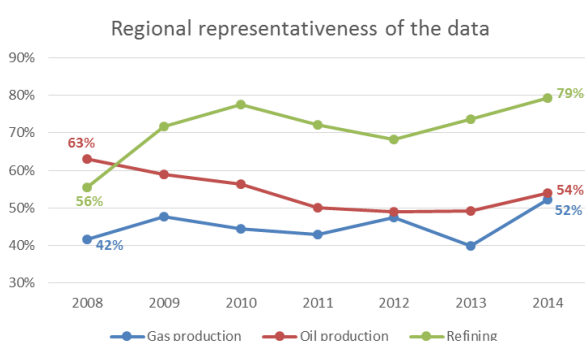
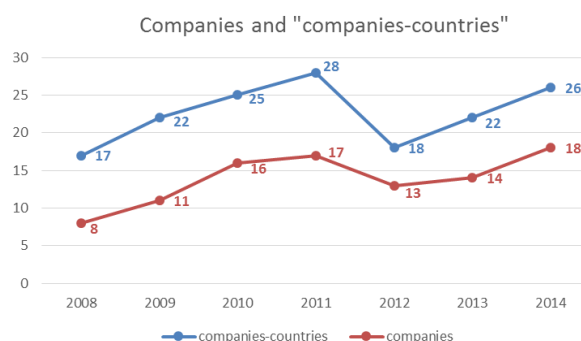
The companies that shared their data were the following:

ANCAP – ECOPEL – ENAP – EP PETROECUADOR – EQUIÓN – OCENSA – PEMEX – PETROAMAZONAS EP – PETROBRAS – PETROPERU – PETROTRIN – PLUSPETROL – RECOPE – REPSOL – STAATSOLIE – TECPETROL – YPF – YPFB

\* For the report the "Company-country" criterion is used, so if a Company has operations in more than one country, the data of each country is considered separately for this report.

The represented countries in this report are the following:

ARGENTINA – BOLIVIA – BRASIL – CHILE – COLOMBIA – COSTA RICA – ECUADOR – MEXICO – PERU – SURINAM – TRINIDAD & TOBAGO – URUGUAY – VENEZUELA





## 2. Introduction and scope of the data reported

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Since 2008, ARPEL compiles environmental information of its member companies with the purpose of allowing the comparison of the environmental performance among companies in the sector in order to achieve a more efficient performance. In addition, through its Environment, Health and Safety Committee (CASYSIA), ARPEL promotes the improvement of environmental management through the exchange of experiences with those companies showing the best environmental performance.

Information in this report is presented based on the "country-company" criterion <sup>1</sup> for the following environmental indicators:

- Oil spills in water and land.
- Discharges and re-injection and hydrocarbon concentration in water discharge.
- Water and hydrocarbons discharged as process effluents.
- Disposal of hazardous and non-hazardous waste.
- Fresh water extracted and consumed.

The indicators are classified into 5 lines of business: Production of oil and gas, transportation by pipelines, movement of terminals, distribution/transportation and refining.

The information presented refers to the operations of the companies in Latin America and the Caribbean. The companies reported the data on their environmental performance by consolidating 100% of the operations over which each company has management control, and NOT data on operations that are not managed. The operating boundary is defined as all of those facilities where the company's management has accountability and authority for sustainability (health, safety, environmental, social and/or economic) policies, systems and performance associated with the facility.

All the definitions and criteria used in the calculation of the indicators may be consulted in the "User Manual – ARPEL Database - Benchmarking on Environmental Performance in the Oil and Gas Industry in Latin America and the Caribbean" (3rd edition, 2013) - available in the web library of ARPEL.

### Participating Companies:

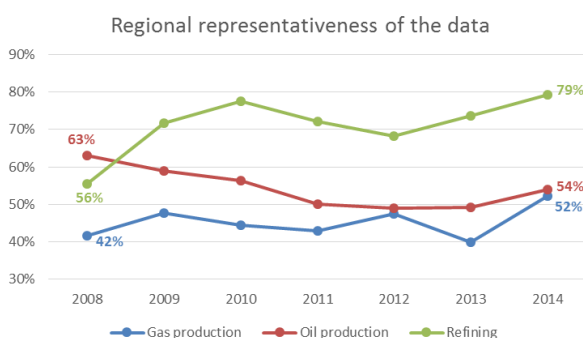
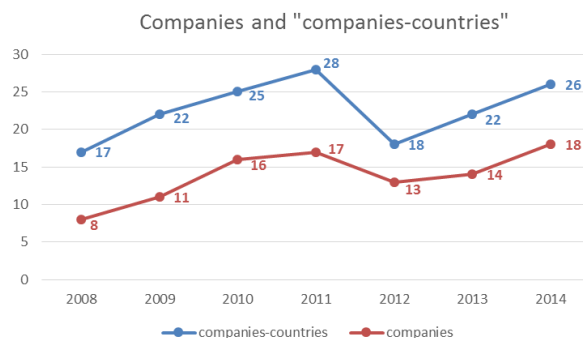
- A total of 26 companies-countries from 13 different countries shared their data for the completion of this report.
- For this report, data were reported on more than 30,877 production wells, 49,745 km of pipelines, 127 terminals and 35 refineries, thus achieving a regional representativeness of approximately 54% of oil production activities, 52% of gas production and 79% of refining activities in Latin America and the Caribbean.<sup>2</sup>

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<sup>1</sup> The company-country criterion implies that if a company operating in more than one country reported information from two different countries, for the purposes of the report this company will be treated as two different companies.

<sup>2</sup> The calculation is based on the BP Annual Statistical Review of World Energy (2015).





**Table 1: Companies participating in the 2015 Report\***

The following tables show companies that shared their data for the Report and the countries from which the information came.

ANCAP	PETROPERÚ
ECOPETROL	PETROTRIN
ENAP	PLUSPETROL
EP PETROECUADOR	RECOPE
EQUIÓN	REPSOL
OCENSA	STAATSOLIE
PEMEX	TECPETROL
PETROAMAZONAS EP	YPF
PETROBRAS	YPFB

\* A total of 26 "country-companies" shared their data for 2014



Table 2 shows the consolidated magnitude of the activities reported for each line of business.

**Table 2: Consolidation of data (in 10<sup>3</sup> tons)**

Business line	Operación (10 <sup>3</sup> Tons de HC)	# companies	number of facilities
Offshore production	212,879	7	9,855 prod. wells
Onshore production	181,890	19	21,022 prod. wells
Unconventional production	1,424	3	24 prod. wells
Pipelines	18,739,784	11	49,745 kms pipelines
Terminales	85,546	8	127 terminals
Refineries	227,747	12	35 refineries
Distribution / Transport	55,701	8	NA

\* The "operation" column refers to the amount of hydrocarbons produced in fields, transported by pipelines, moved in terminals, loaded to refineries or distributed/transported by different system (excluding pipelines). The indicators are not necessarily calculated on the basis of these values, because not all the companies report information on all indicators.



### 3. Environmental Indicators

#### 3.1 Oil Spills

Spills are a very important indicator of environmental performance for the oil and natural gas industry because they have a visible impact on the environment. The environmental impact degree is highly dependent on the nature of the spill, where it occurred and how it was managed later.

For the purpose of this Report, spills include all releases from company operated facilities, but DO NOT include the primary and/or secondary containment, or other impermeable surfaces, if they do not reach the environment.

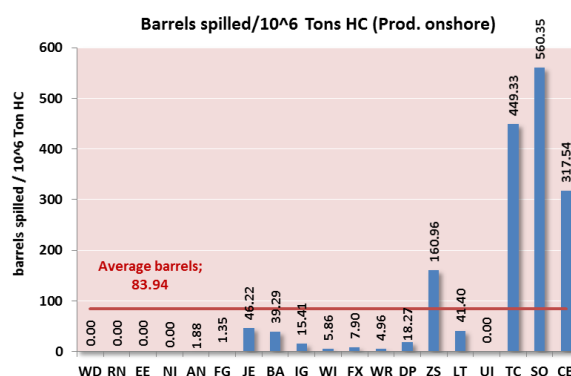
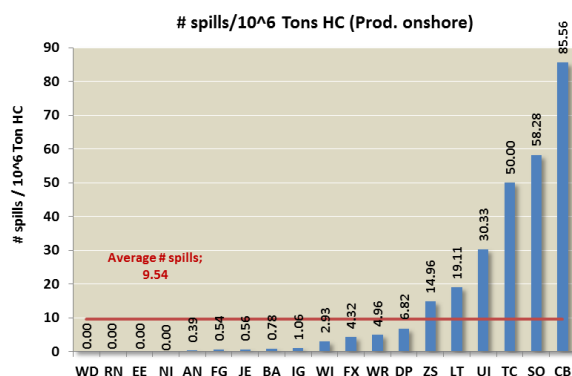
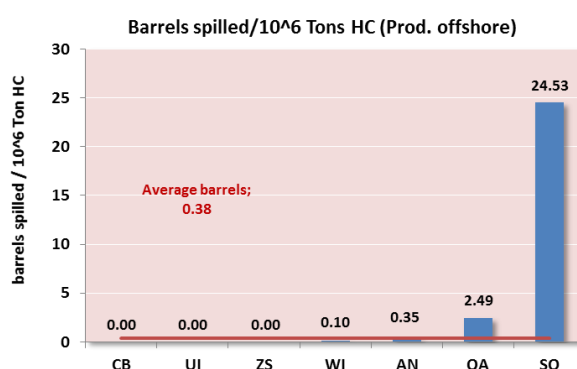
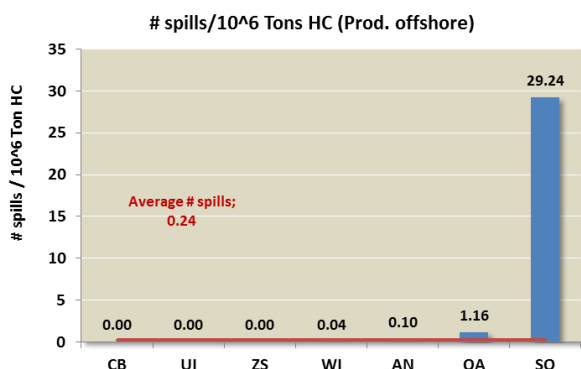
The indicators presented in this chapter are:

**Number of spills:** # spills /  $10^6$  tons of oil operated<sup>3</sup>

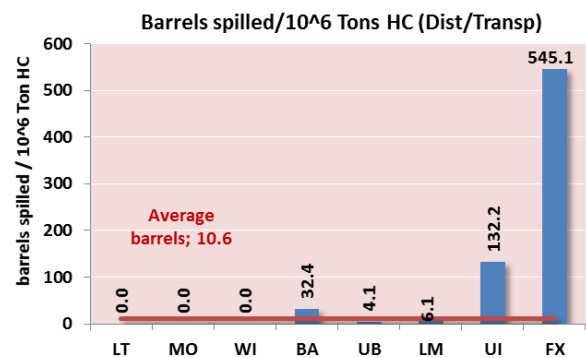
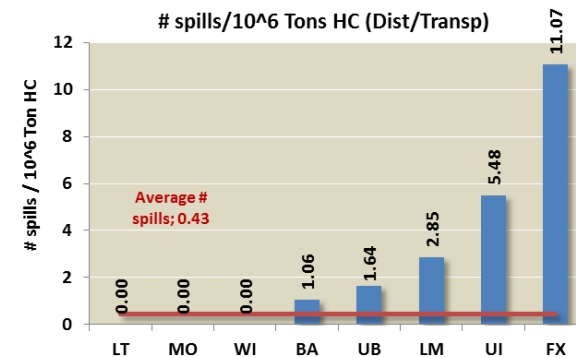
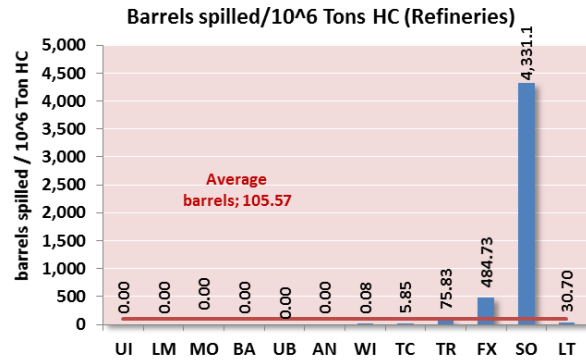
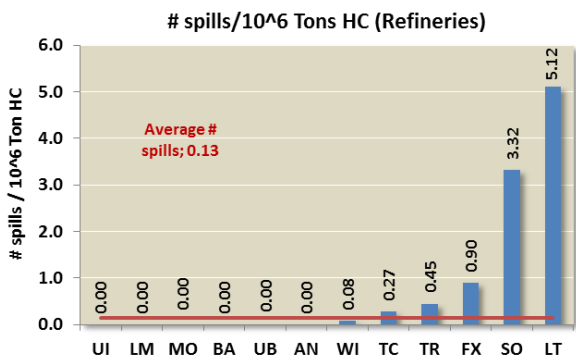
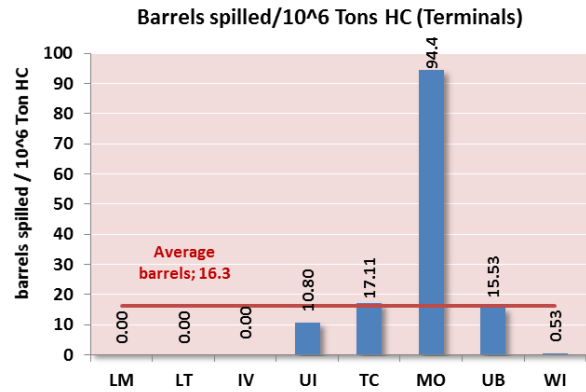
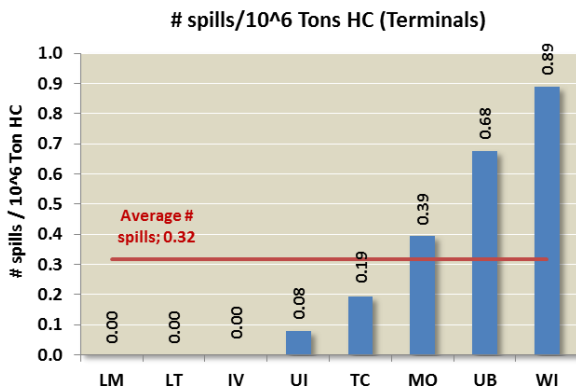
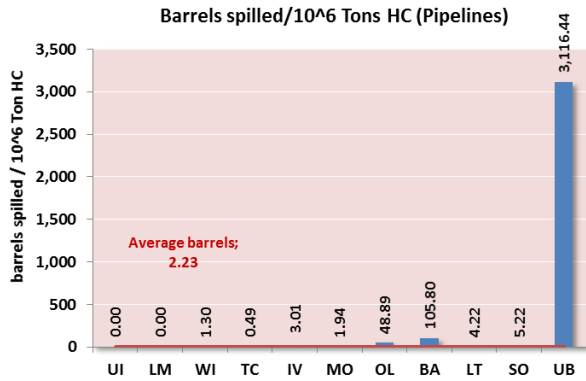
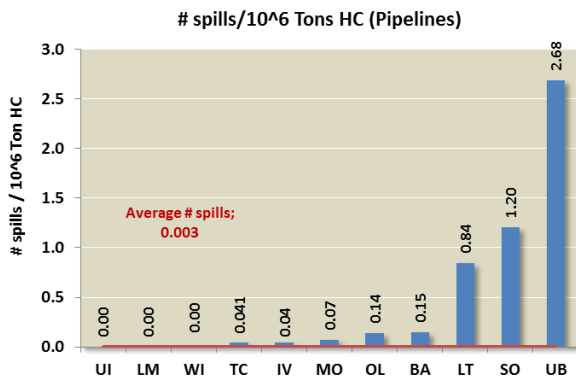
**Spill volume:** Barrels spilled /  $10^6$  tons of oil operated

**Average barrels per spill:** Total barrels spilled / # spills.

The following graphs show the indicators of number of spills and volume spilled by line of business, broken down by company.



<sup>3</sup>"Operated" means produced, transported in pipelines, loaded to refineries, distributed or moved in terminals, according to the corresponding line of business.





**Table 3: Oil Spills**

Table 3 details -for each business line- all the reported spills classified according to volume spilled and final destination of the spill, i.e, if it occurred in water or land.

	# spills in land	# spills in water	# total spills	Vol spilled in land (bbl)	Vol spilled in water	Total spilled (bbl)
<b>Offshore production</b>	<b>0</b>	<b>52</b>	<b>52</b>	<b>0</b>	<b>64</b>	<b>64</b>
1-10	0	52	52	0	64	64
10-100	0	0	0	0	0	0
+ 100	0	0	0	0	0	0
# spills or bbls / 10 <sup>6</sup> Ton HC operated	<b>0.00</b>	<b>0.24</b>	<b>0.24</b>	<b>0.00</b>	<b>0.30</b>	<b>0.38</b>
bbl/spill	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>1.23</b>	<b>1.23</b>
<b>Onshore production</b>	<b>1,729</b>	<b>20</b>	<b>1,749</b>	<b>15,547</b>	<b>82</b>	<b>15,630</b>
1-10	1,528	19	1,547	3,760	56	3,816
10-100	178	1	179	4,012	26	4,038
+ 100	23	0	23	7,775	0	7,775
# spills or bbls / 10 <sup>6</sup> Ton HC operated	<b>9.42</b>	<b>0.12</b>	<b>9.54</b>	<b>83.54</b>	<b>0.41</b>	<b>83.94</b>
bbl/spill	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>8.99</b>	<b>4.11</b>	<b>8.94</b>
<b>Pipelines</b>	<b>57</b>	<b>5</b>	<b>62</b>	<b>25,841</b>	<b>15,857</b>	<b>41,698</b>
1-10	44	1	45	66	3	69
10-100	7	1	8	244	64	308
+ 100	6	3	9	25,531	15,790	41,321
# spills or bbls / 10 <sup>6</sup> Ton HC operated	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>1.38</b>	<b>0.85</b>	<b>2.23</b>
bbl/spill	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>453.35</b>	<b>3,171.40</b>	<b>672.55</b>
<b>Terminals</b>	<b>23</b>	<b>5</b>	<b>28</b>	<b>611</b>	<b>855</b>	<b>1,466</b>
1-10	20	1	21	26	1	27
10-100	1	2	3	23	83	106
+ 100	2	2	4	562	771	1,333
# spills or bbls / 10 <sup>6</sup> Ton HC operated	<b>0.27</b>	<b>0.05</b>	<b>0.32</b>	<b>7.15</b>	<b>9.19</b>	<b>16.33</b>
bbl/spill	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>26.58</b>	<b>170.95</b>	<b>52.36</b>
<b>Distribution/Transport</b>	<b>20</b>	<b>5</b>	<b>25</b>	<b>584</b>	<b>27</b>	<b>611</b>
1-10	11	4	15	39	12	51
10-100	7	1	8	210	15	225
+ 100	2	0	2	335	0	335
# spills or bbls / 10 <sup>6</sup> Ton HC operated	<b>0.34</b>	<b>0.09</b>	<b>0.43</b>	<b>10.11</b>	<b>0.48</b>	<b>10.59</b>
bbl/spill	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>29.20</b>	<b>5.40</b>	<b>24.44</b>
<b>Refining</b>	<b>34</b>	<b>0</b>	<b>34</b>	<b>24,081</b>	<b>0</b>	<b>24,081</b>
1-10	22	0	22	62	0	62
10-100	9	0	9	254	0	254
+ 100	3	0	3	23,765	0	23,765
# spills or bbls / 10 <sup>6</sup> Ton HC operated	<b>0.13</b>	<b>0.00</b>	<b>0.13</b>	<b>105.57</b>	<b>0.00</b>	<b>105.57</b>
bbl/spill	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>708.27</b>	<b>-</b>	<b>708.27</b>

- ❖ A total of 2010 spills were registered, 1923 of them (96%) had land as final destination and 87 (4%) ended in water.
- ❖ In terms of volume spilled, 85,266 bbls were reported, 68,380 of them (80%) ended in land and 16,885 (20%) in water.
- ❖ The business line showing more spills was Production, with 1861 spills (1749 onshore, 52 offshore, 60 unconventional, in land).
- ❖ “Pipelines” was the business line with the largest volume spilled with 41,698 barrels with an average of 672.6 barrels per spill.
- ❖ The largest spill was registered in refining, where only 1 spill totaled 22,000 bbls.

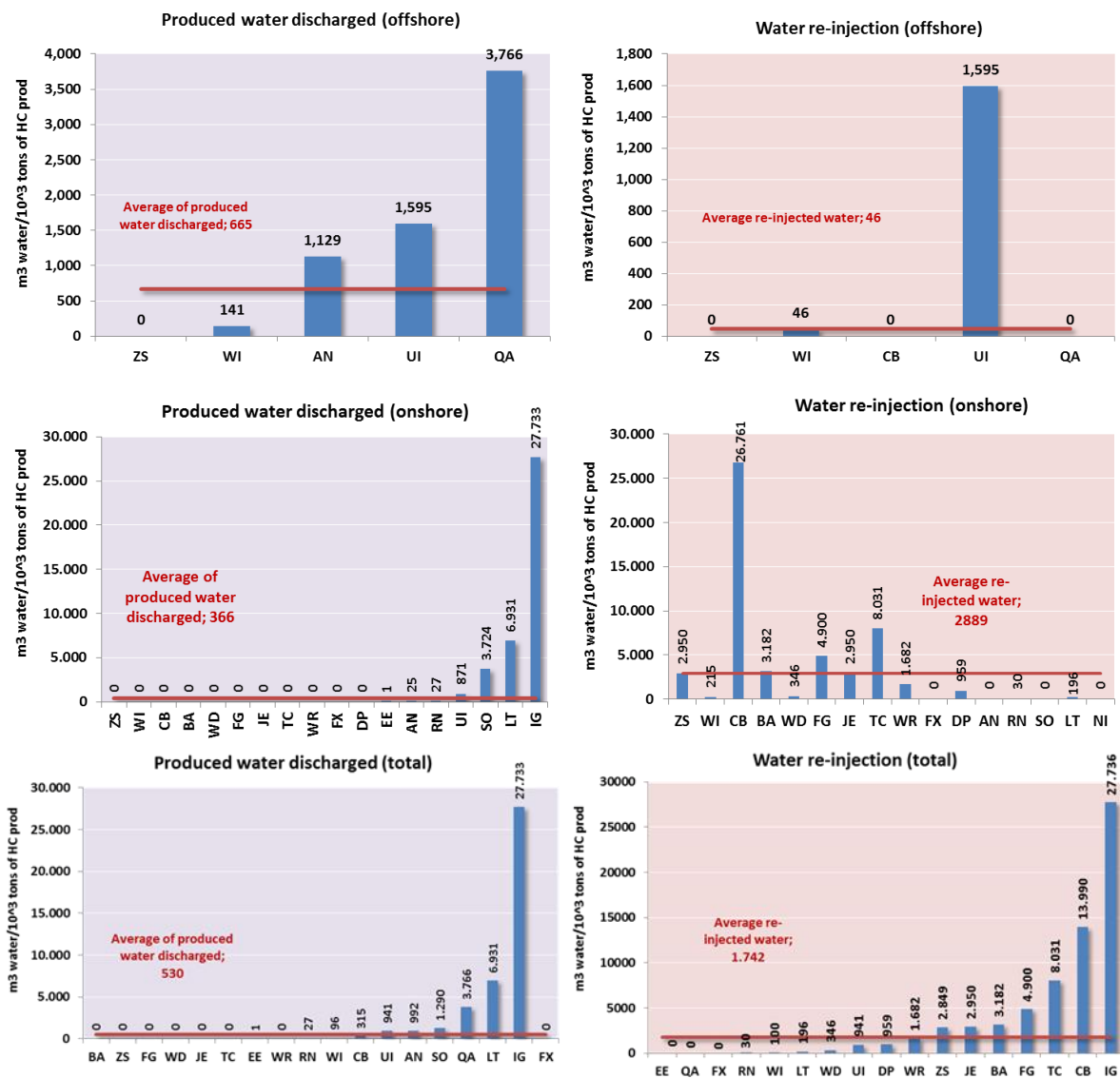


### 3.2 Discharges and re-injection of production water

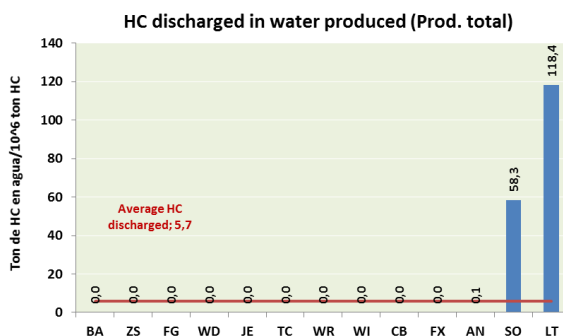
The production of hydrocarbons involves the extraction of water, usually called "production water." Production water may be discharged to the environment as it is extracted, or upon treatment, but whatever the treatment, there is always an amount of hydrocarbon dissolved in the production water. The discharge of production water into the surrounding environment may have a negative impact on it. Production water may also be re-injected into the production well. This is a fundamental practice that shows environmental and operational excellence in the production of hydrocarbons.

The indicators presented in this chapter are<sup>4</sup>:

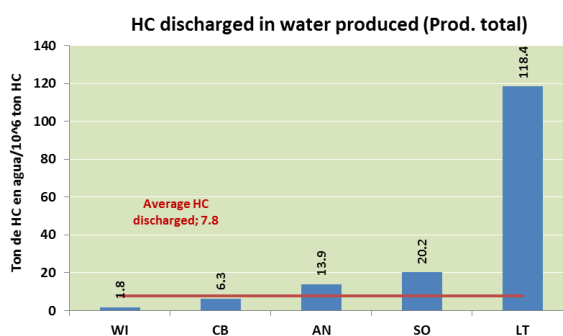
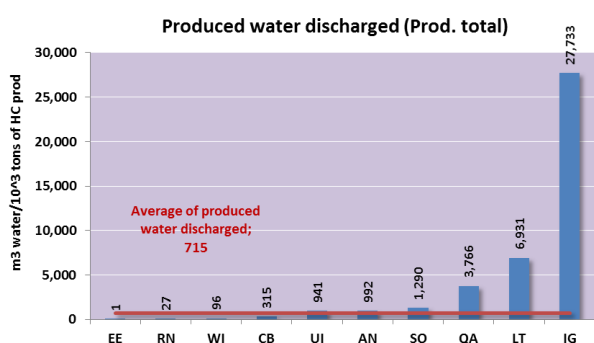
- The amount of production water discharged for each thousand tons operated.
- The amount of water re-injected for each thousand tons operated.
- The amount of hydrocarbons discharged associated with water production discharged for each thousand operated.



<sup>4</sup>When analyzing the information from indicators associated with production water, other aspects not included in this report must be considered. For example: a mature production field generally increase the amount of water associated to the production of the field.



Water and hydrocarbon discharged are presented below taking into account only the data from those companies whose production water discharge is not null.



### 3.3 Controlled discharges of water and hydrocarbons into process effluents

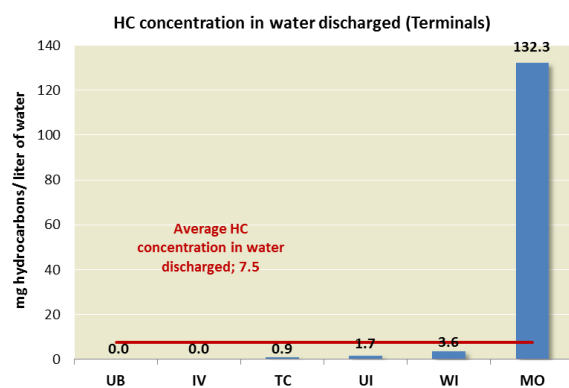
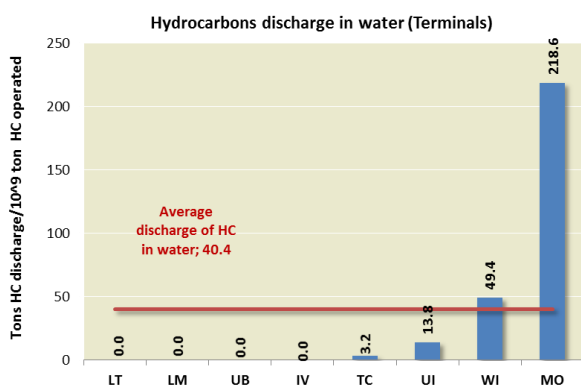
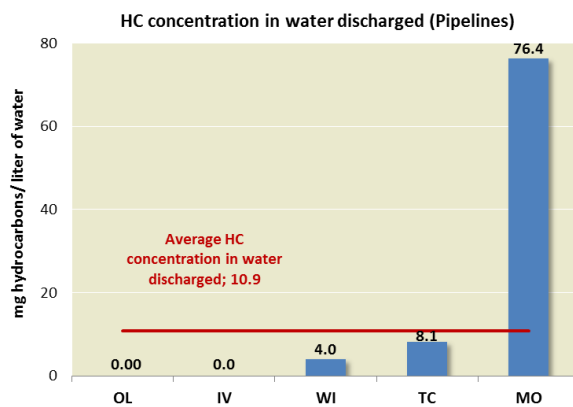
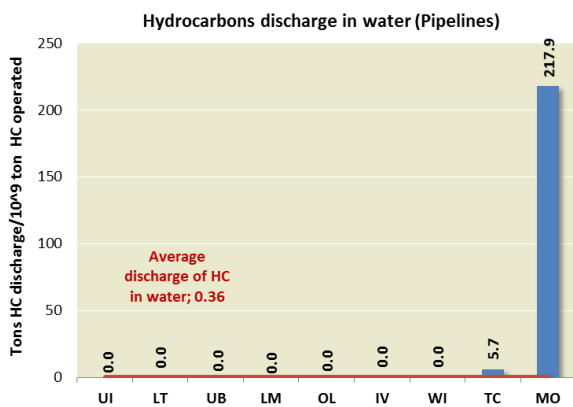
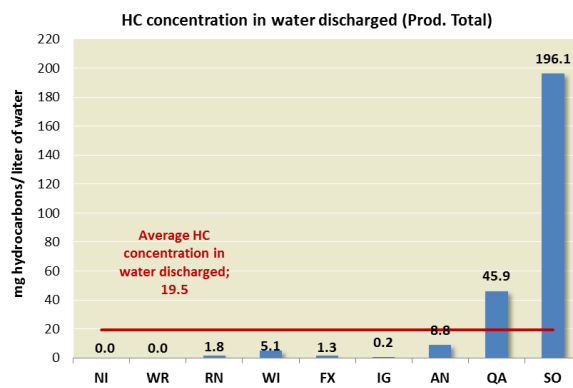
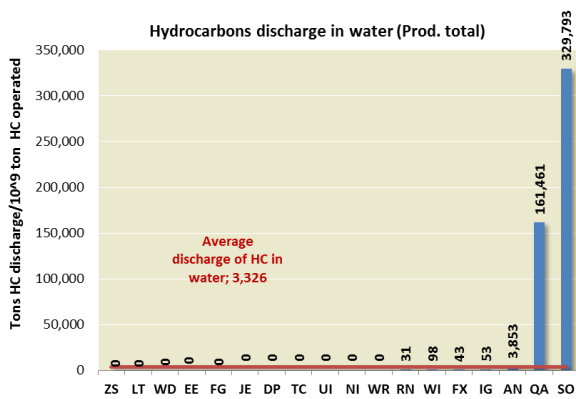
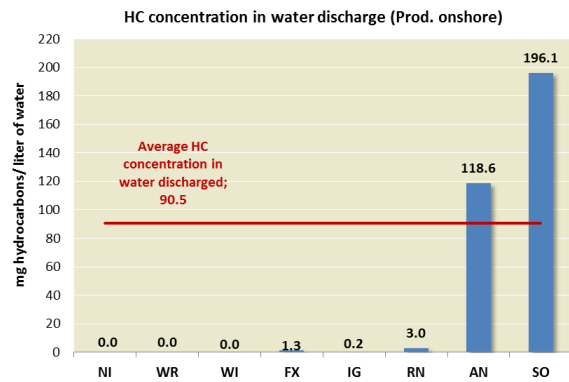
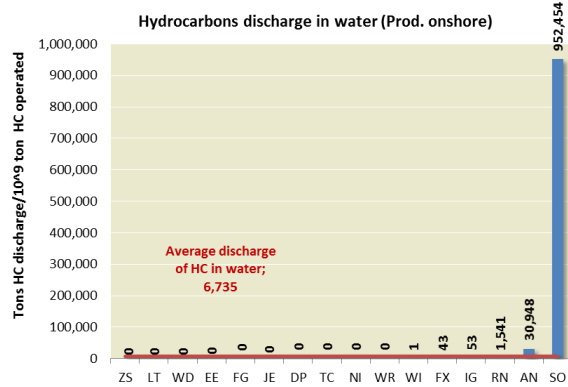
The use of water in the processes of the industry determines the potential environmental impact, both from the consumption of fresh water and from the amount of hydrocarbons dissolved or dispersed that are associated with the effluents.

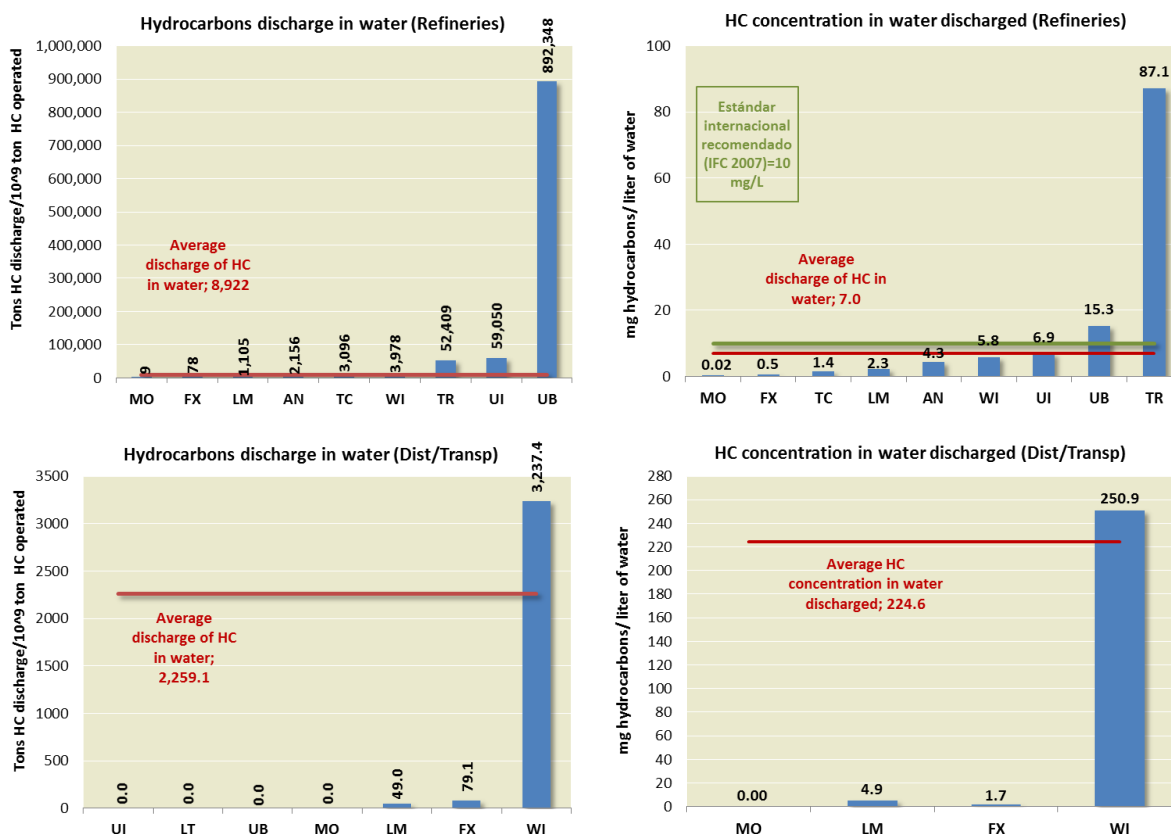
The indicators presented in this chapter are<sup>5</sup>:

- Concentration of hydrocarbons in water discharged as process effluent: Ratio between the amount of hydrocarbons discharged and the amount of water discharged.
- Discharged tons of hydrocarbons per million tons operated.
- m<sup>3</sup> of water discharged per million tons operated.

Below is the concentration of hydrocarbons in the water discharged as process effluent and the hydrocarbons discharged for the different business line.

<sup>5</sup>When analyzing the information from indicators associated with water and hydrocarbons in process effluents, it is important to take into account that this Report does not consider the complexity of refineries.





- ❖ In the case of refineries, the red line represents the regional average and the green one, the international standard recommended by IFC 2007 for the concentration of hydrocarbons in water discharged as process effluent: lower than 10 mg/l.
- ❖ In average, 731 tons of hydrocarbons were discharged for each million tons produced offshore. The average concentration of hydrocarbons in water discharged for this business line was 2.84 mg/L.

### 3.4 Disposal of hazardous and non-hazardous solid waste

Effective waste management is an indicator of operational efficiency. Some waste, when not properly managed, can have significant environmental, social and economic impacts.

For the purpose of this Report, ‘hazardous waste’ includes all waste that is defined as hazardous, toxic, dangerous, listed, priority, special, or some other similar term as defined by a local regulatory agency or authority. ‘Local’ refers to the point of waste generation. Disposal may thus include: land filling or burning without energy recovery of waste; and/or management of waste other than reuse, recycling, reclamation or other beneficial use.

**The following ARE NOT included in the results reported by the companies for this Report:**

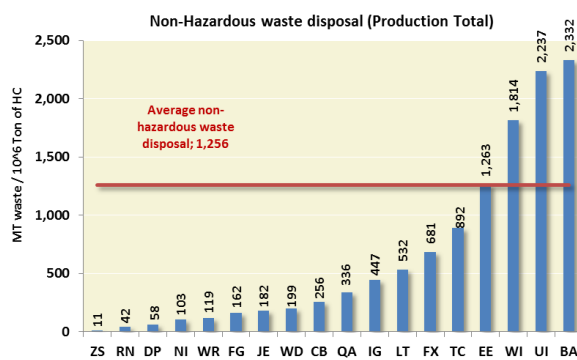
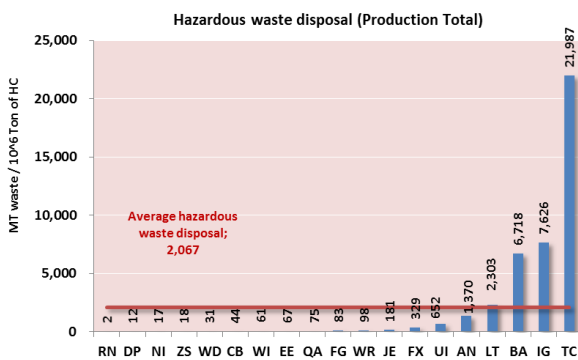
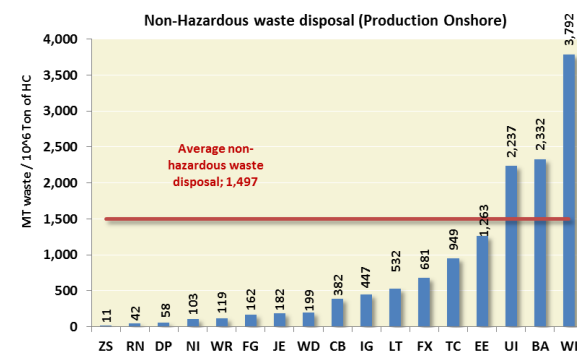
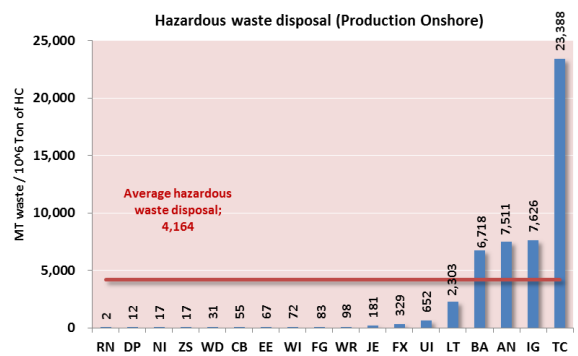
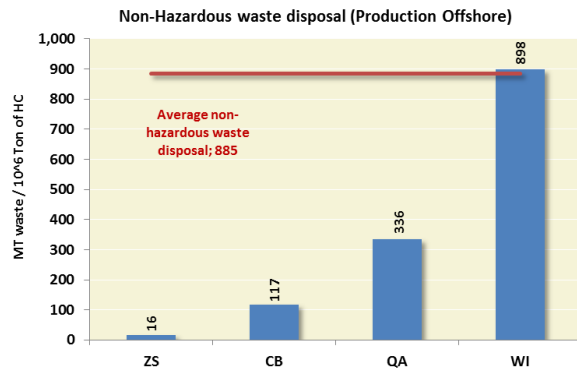
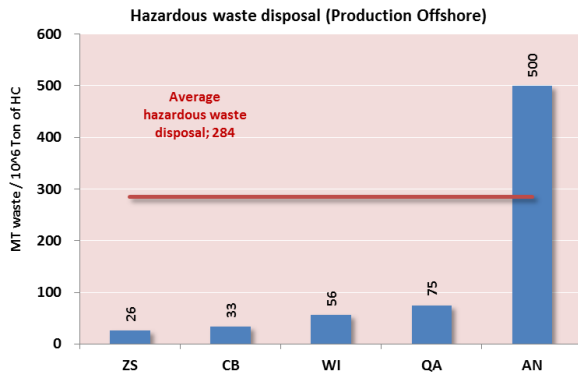
- In downstream operations, major shutdowns and periodic maintenance activities that can result in short term increases in hazardous waste generated.
- Large, one-time construction projects, remediation activities, and high-volume aqueous waste.
- For upstream operations, drilling operations, large one-time construction projects, remediation activities, and high-volume aqueous waste can result in large variations in hazardous waste generated.

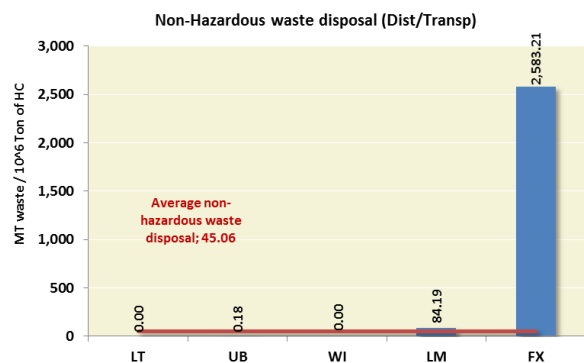
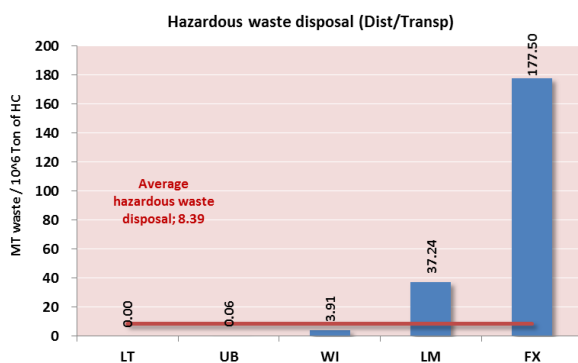
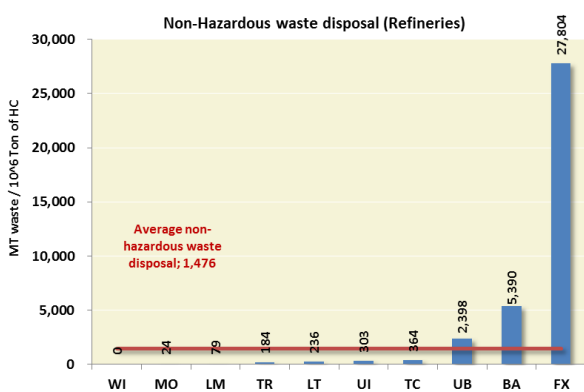
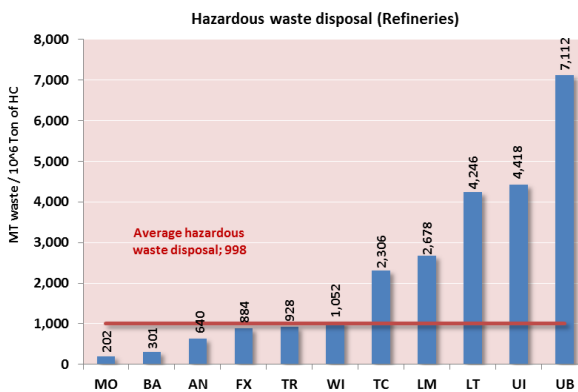
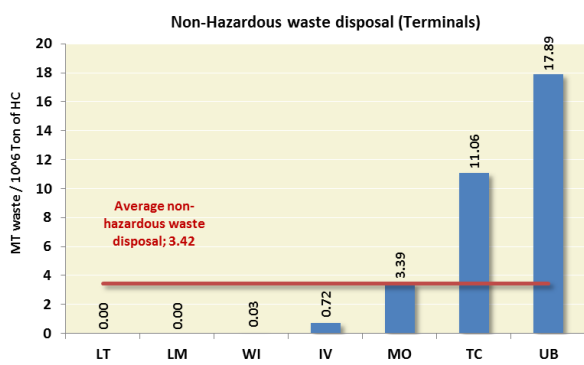
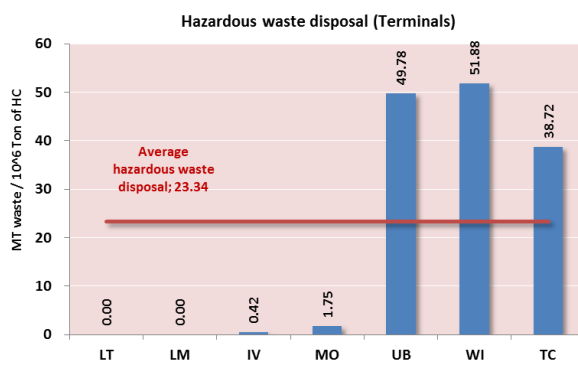
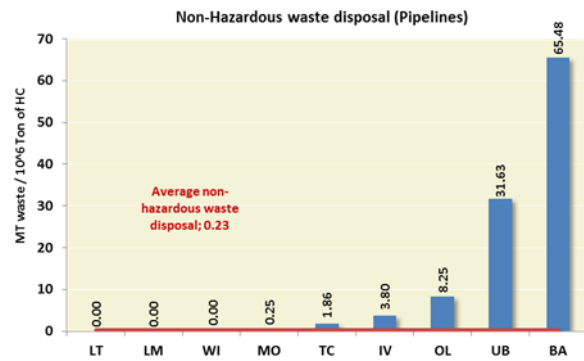
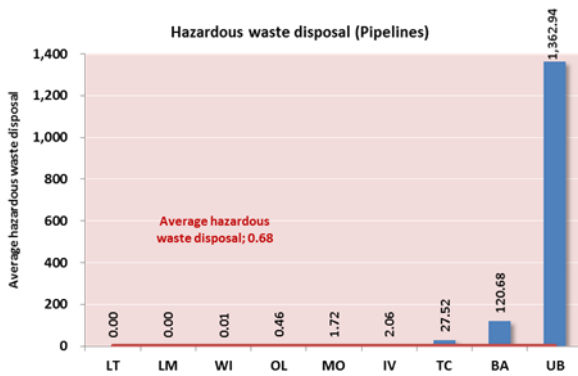




The indicators presented are **tons of hazardous/non-hazardous waste** disposed of per million tons operated in the corresponding line of business.

Below are the waste disposal indicators for the different business line.







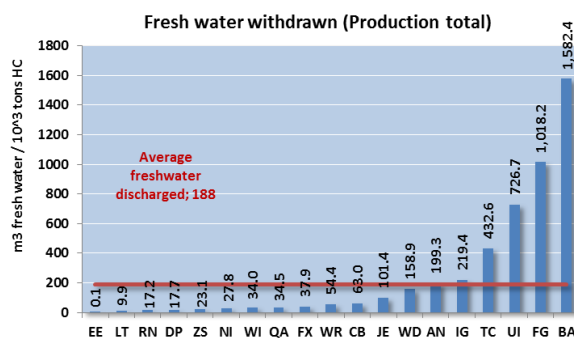
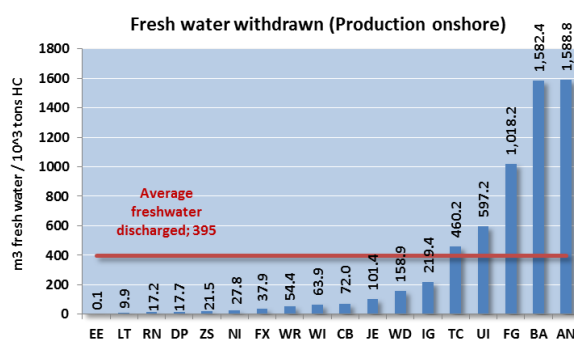
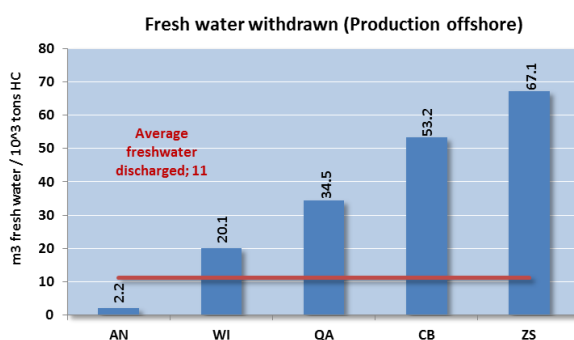
### 3.5 Freshwater

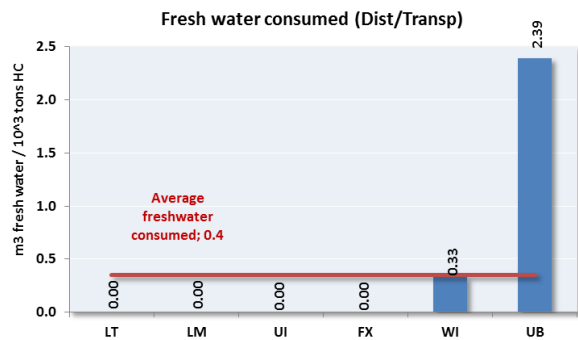
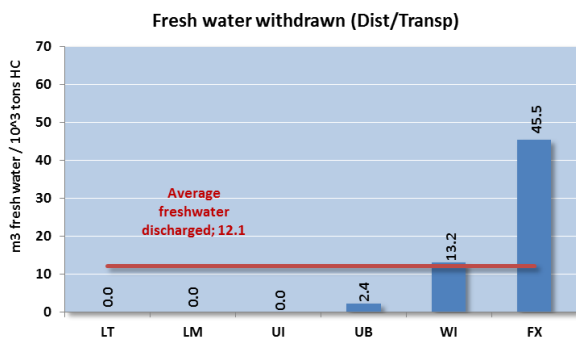
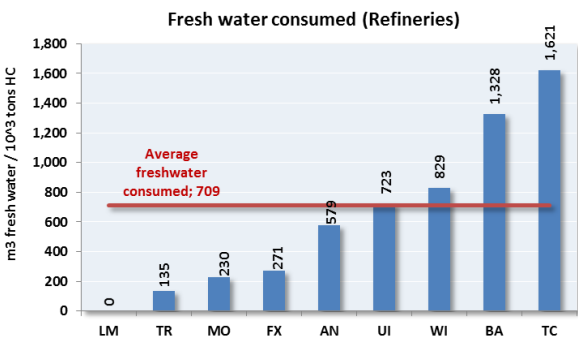
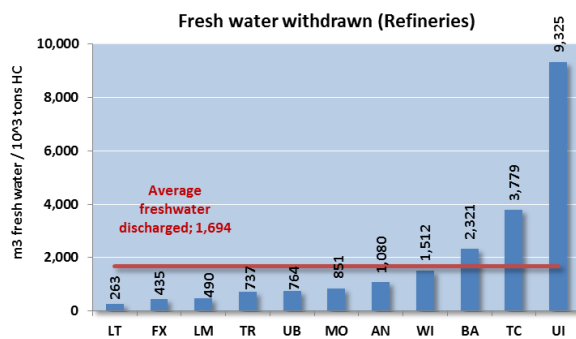
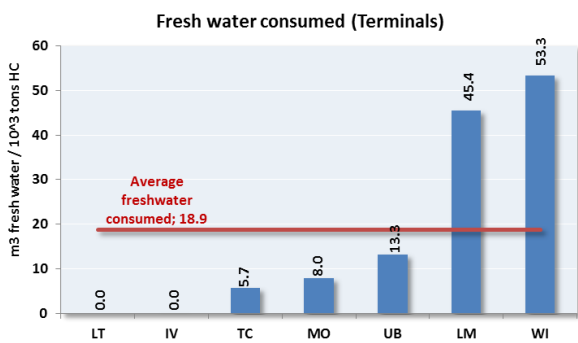
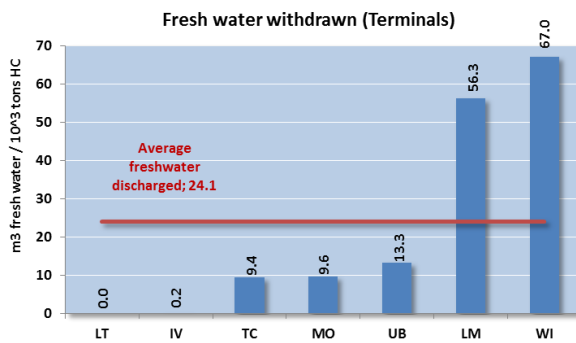
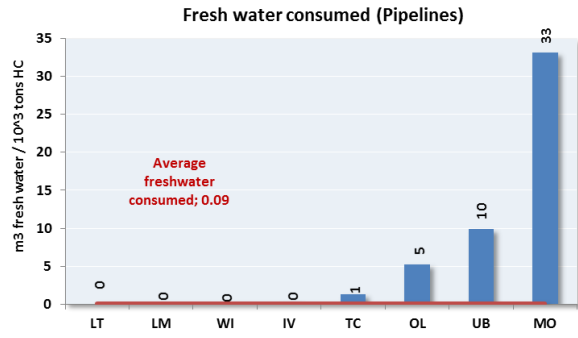
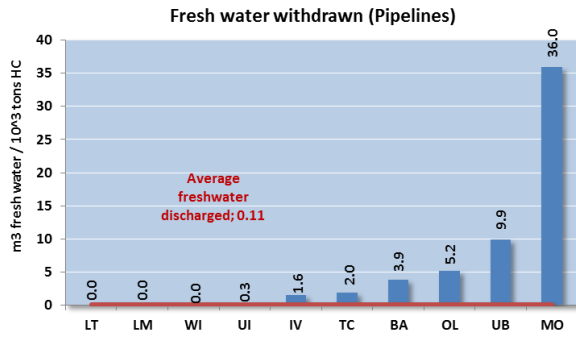
Fresh water is essential for the operations of the industry as well as for human development and agriculture. The industry competes with other uses of fresh water. It is vital to have an adequate management throughout its value chain, both in terms of freshwater withdrawn or consumed and the protection of existing water resources. These factors represent a particularly significant risk in companies whose operations occur where water scarcity is recognized and that companies must manage.

A start was made with collecting information about the use of freshwater in 2013.

For different business line the following indicators are shown:

- Extracted Freshwater: is calculated as cubic meters of fresh water extracted per thousand tons of hydrocarbons operated.
- Freshwater consumption: is the volume of water consumed during the year / total volume of hydrocarbons operated during this year.





## Regional Association of Oil, Gas and Biofuels Sector Companies in Latin America and the Caribbean

**ARPEL** is a non-profit association gathering companies and institutions of the oil, gas and biofuels sector in Latin America and the Caribbean. It was founded in 1965 as a vehicle for cooperation and mutual assistance between companies in the sector, with the primary purpose of actively promoting industry integration and competitive growth and the sustainable energy development in the region. Its membership represents over 90% of the upstream and downstream activities in the region, and includes national, international and independent oil companies, providers of technology, goods and services to the industry value chain, and other national and international institutions in the industry.

### Mission

To promote the integration, growth, operational excellence and effective socio-environmental performance of the industry in the region, facilitating the dialogue, cooperation, development of synergies among players as well as the shared creation of value among members through the exchange and expansion of collective knowledge.

### Vision

To be an institution of reference in the consolidation of the oil and gas industry, furthering the provision of reliable and safe energy that meets the growing regional energy demand in a sustainable manner.

## MEMBER COMPANIES



## MEMBER INSTITUTIONS



## ALLIANCES

