



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

*Information of ARPEL  
Member Companies for 2013*







**ARPEL Environmental Report Nº 33-2014**  
**Benchmarking on Environmental Performance in the Oil and Gas Industry in Latin America and the Caribbean – Information of ARPEL Member Companies for 2013**  
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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 spills, production water, process effluents, waste disposal and freshwater use.

### Scope:

In 2013, 21 companies\* from 13 different countries share their data.

The companies that share their data were the following:

ANCAP – ECOPEL – ENAP – OCENSA – PEMEX – PETROBRAS – PETROPERU – PETROTRIN – PLUSPETROL – RECOPE – REPSOL – STAATSOLIE – TECPETROL

The represented countries in this report are the following:

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

Business line	Operation (10 <sup>6</sup> tons of HC)	# of facilities
Offshore Prod.	210,455	2,087 prod. wells
Onshore Prod.	128,524	28,239 prod. wells
Pipelines	14,919,375	47,311 km of pipelines
Terminals	53,904	92 terminals
Refineries	208,418	30 refineries
Dist./Transp.	53,384	NA

\* 13 companies, but 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.

### Main results:

❖ E&P onshore is the business line with the largest number of spills per unit of volume operated, with 2.44 spills per million tons produced.

❖ For its part, in E&P offshore business line only 17 incidents and 129 barrels were reported, which represents an average of 0.08 incidents and 0.61 barrels spilled per million tons of oil extracted from subsoil.

❖ In Terminals business line a big incident (7,453 bbl) was reported, so it has a high and exceptional average of spilled volume but not a high incidents average.

❖ Pipelines business line recorded the highest absolute volume spilled (14,830 bbl), but given the large amount of oil and products transported, its average is lower than the other business lines.

Business line	Average # spills	Average vol. spilled (bbl)
Prod offshore	0.08	0.61
Prod onshore	2.44	23.14
Ductos	0.004	0.99
Terminals	0.07	138.5
Refining	0.06	1.57
Dist / Transp	0.28	3.45



## 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.

Successive benchmarking has enabled to compare the environmental performance of companies with the trends of the industry and other companies in the sector, which is a valuable management tool with the purpose of continuous improvement in environmental 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 offshore and onshore production, transportation by pipelines, movement of terminals, refineries and distribution and transportation.
- Discharges and re-injection of production water in Exploration and Production activities
- Water and hydrocarbons discharged as process effluents in refineries.
- Disposal of hazardous solid waste in onshore production and refineries
- Fresh water extracted during onshore production and refineries (incorporated as of this Report)

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.

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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.





### Participating Companies:

- A total of 21 companies from 13 different countries shared their data for the completion of this report.
- For this report, data were reported on more than 30,871 production wells, 47,311 km of pipelines, 92 terminals and 30 refineries, thus achieving a regional representativeness of approximately 67% of the refining and production of liquid hydrocarbons activities.<sup>2</sup>
- The following tables show companies that shared their data for the Report and the countries from which the information came.

**Table 1: Companies participating in the 2013 Report**

Ancap	Petrobras	Recope
Ecopetrol	Petroperu	Refidomsa
EP-Petroecuador	Petrotrin	Repsol
Pemex	Pluspetrol	Staatsolie
Petroamazonas EP		

\* A total of 21 "country-companies" shared their data for 2013



Countries considered in the 2014 report

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	Operation (10 <sup>6</sup> tons of HC)	# of facilities
Offshore Prod.	210,455	2,087 prod. wells
Onshore Prod.	128,524	28,239 prod. wells
Pipelines	14,919,375	47,311 km of pipelines
Terminals	53,904	92 terminals
Refineries	208,418	30 refineries
Dist./Transp.	53,384	NA

\* The "operation" column refers to the amount of hydrocarbons produced in fields, transported by pipelines, moved in terminals, loaded to refineries or distributed, measured in millions of tons per year. The indicators are not necessarily calculated on the basis of these values, because not all the companies report information on all indicators.

<sup>2</sup> The calculation is based on the BP Annual Statistical Review of World Energy (2013)



### 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:

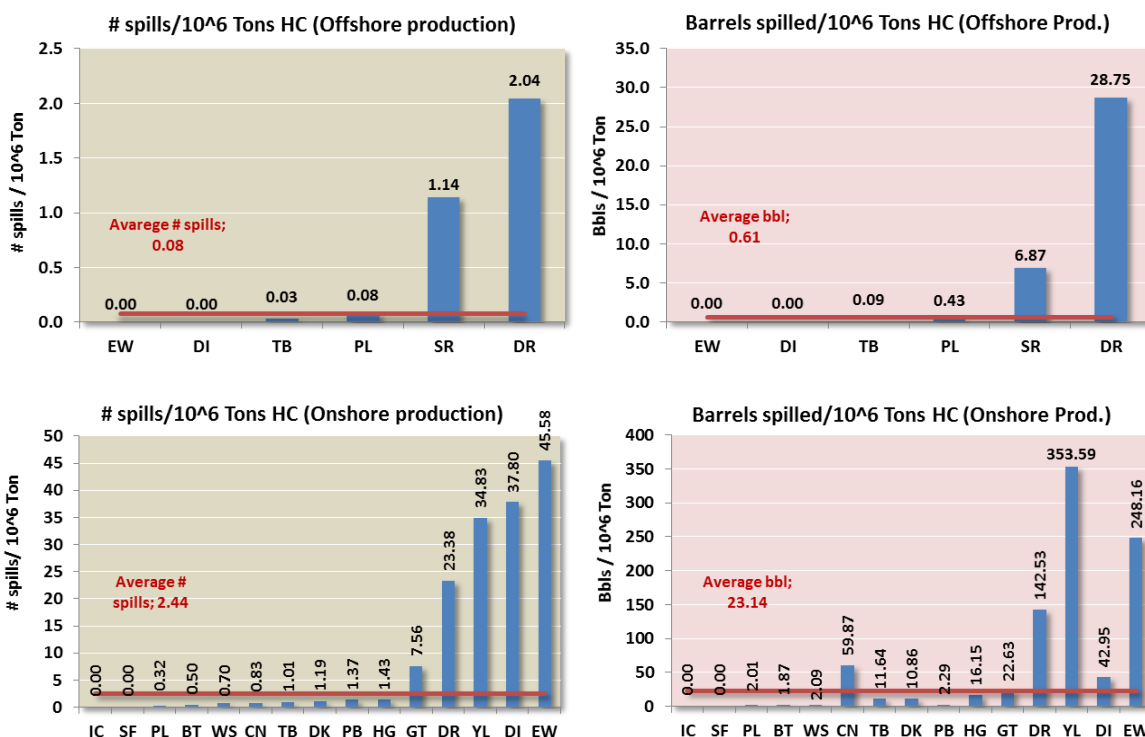
**Number of spills:** # spills / 10<sup>6</sup> tons of oil operated<sup>3</sup>

**Spill volume:** Barrels spilled / 10<sup>6</sup> tons of oil operated

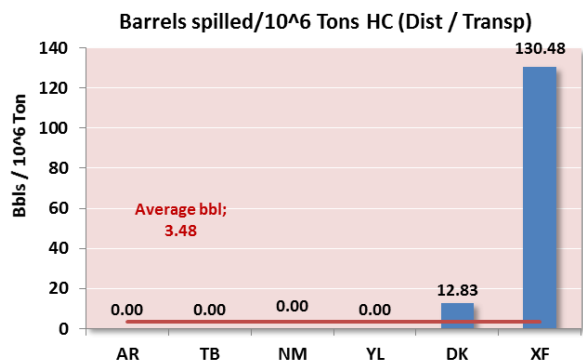
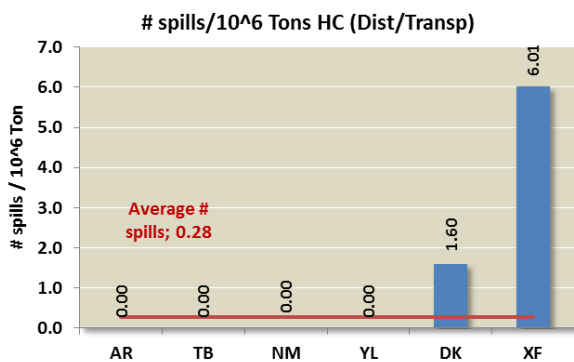
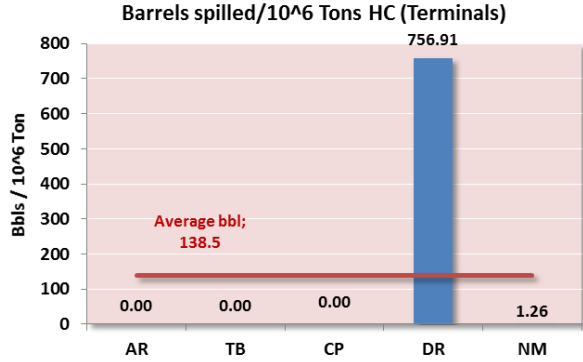
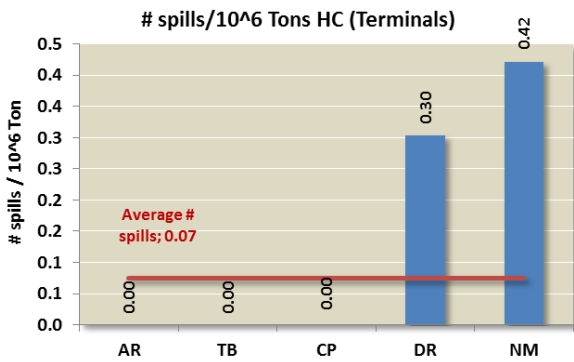
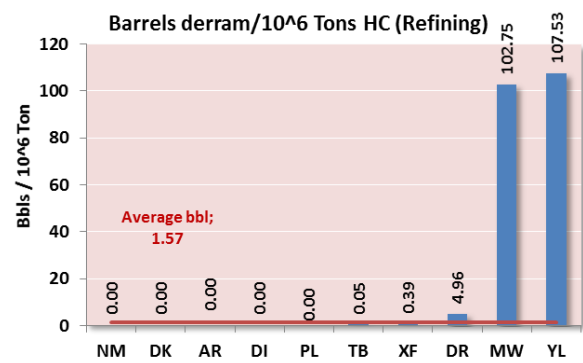
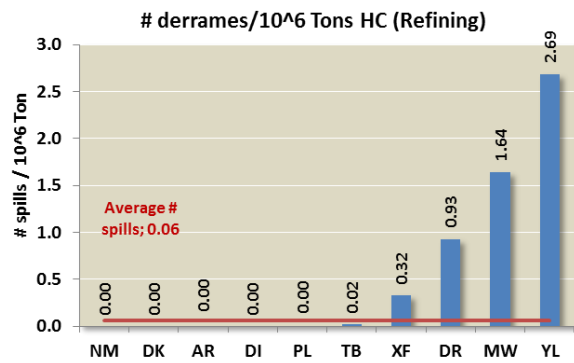
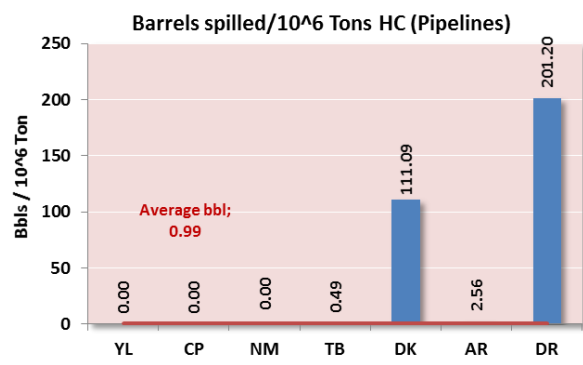
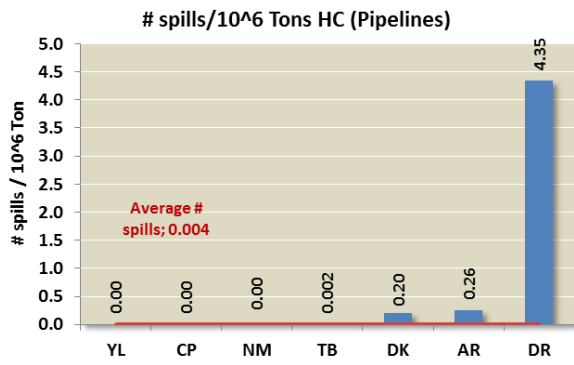
**Average barrels per spill:** Total barrels spilled / # spills.

Indicators of oil spills are classified according to the final destination of the spill, i.e., if it occurred offshore or onshore.

The following graphs show the indicators of number of spills and volume spilled by line of business, broken down by company. Table 3 shows the detail of the spills classified according to the volume spilled.



<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**

	# spills in land	# spills in water	# total spills	Vol spilled in land (bbl)	Vol spilled in water (bbl)	Total spilled (bbl)
<b>Offshore production</b>	<b>0</b>	<b>17</b>	<b>17</b>	<b>0</b>	<b>129</b>	<b>129</b>
1-10		13	13		40	40
10-100		4	4		89	89
+ 100		0	0		0	0
<b># spills or bbls/10<sup>6</sup> Tons HC prod</b>		<b>0.08</b>	<b>0.08</b>		<b>0.61</b>	<b>0.61</b>
<b>bbl/spill</b>					<b>7.59</b>	<b>7.59</b>
<b>Onshore production</b>	<b>300</b>	<b>13</b>	<b>313</b>	<b>2,923</b>	<b>52</b>	<b>2,974</b>
1-10	259	13	272	703	52	755
10-100	37	0	37	1,070	0	1,070
+ 100	4	0	4	1,149	0	1,149
<b># spills or bbls/10<sup>6</sup> Tons HC prod</b>	<b>2.33</b>	<b>0.10</b>	<b>2.44</b>	<b>22.74</b>	<b>0.40</b>	<b>23.14</b>
<b>bbl/spill</b>				<b>9.74</b>	<b>3.97</b>	<b>9.50</b>
<b>Pipelines</b>	<b>54</b>	<b>7</b>	<b>61</b>	<b>10,320</b>	<b>4,510</b>	<b>14,830</b>
1-10	38	1	39	136	7	143
10-100	9	0	9	305	0	305
+ 100	7	6	13	9,880	4,503	14,383
<b># spills or bbls/10<sup>6</sup> Tons HC prod</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.69</b>	<b>0.30</b>	<b>0.99</b>
<b>bbl/spill</b>				<b>191.11</b>	<b>644.31</b>	<b>243.12</b>
<b>Terminals</b>	<b>0</b>	<b>4</b>	<b>4</b>	<b>0</b>	<b>7,466</b>	<b>7,466</b>
1-10	0	3	3	0	13	13
10-100	0	0	0	0	0	0
+ 100	0	1	1	0	7,453	7,453
<b># spills or bbls/10<sup>6</sup> Tons HC prod</b>	<b>0.00</b>	<b>0.07</b>	<b>0.07</b>	<b>0.00</b>	<b>138.51</b>	<b>138.51</b>
<b>bbl/spill</b>				<b>NA</b>	<b>1,866.50</b>	<b>1,866.50</b>
<b>Dist/Transp</b>	<b>12</b>	<b>0</b>	<b>12</b>	<b>151</b>	<b>0</b>	<b>151</b>
1-10	7	0	7	28	0	28
10-100	5	0	5	123	0	123
+ 100	0	0	0	0	0	0
<b># spills or bbls/10<sup>6</sup> Tons HC prod</b>	<b>0.28</b>	<b>0.00</b>	<b>0.28</b>	<b>3.48</b>	<b>0.00</b>	<b>3.48</b>
<b>bbl/spill</b>				<b>12.57</b>	<b>NA</b>	<b>12.57</b>
<b>Refining</b>	<b>12</b>	<b>1</b>	<b>13</b>	<b>325</b>	<b>1</b>	<b>326</b>
1-10	7	1	8	35	1	36
10-100	4	0	4	130	0	130
+ 100	1	0	1	160	0	160
<b># spills or bbls/10<sup>6</sup> Tons HC prod</b>	<b>0.06</b>	<b>0.00</b>	<b>0.06</b>	<b>1.56</b>	<b>0.01</b>	<b>1.57</b>
<b>bbl/spill</b>				<b>27.10</b>	<b>1.20</b>	<b>25.10</b>

- ❖ A total of 420 spills were registered, 378 of them (90%) had land as final destination and 42 (10%) ended in water.
- ❖ In terms of volume spilled, 25,876 bbls were reported, 13,719 of them (53%) ended in land and 12,158 (47%) in water.
- ❖ The line of business showing more spills was E&P, with 330 spills (313 onshore and 17 offshore).
- ❖ E&P onshore is also the business line with the largest number of spills per unit of volume operated, with 2.44 spills per million tons produced.
- ❖ In terms of volume spilled, "Pipelines" was the line of business recording the greatest volume, with a total of 14,830 barrels and an average of 243 barrels per spill.
- ❖ The largest spill was registered in terminals, where only 1 spill totaled 7,453 bbls.
- ❖ "Pipelines" was the business line with the largest number of spills of more than 100 barrels with 13 spills, 7 of them in land and 6 in water.

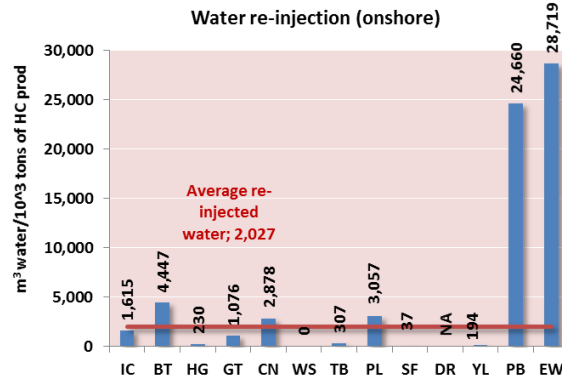
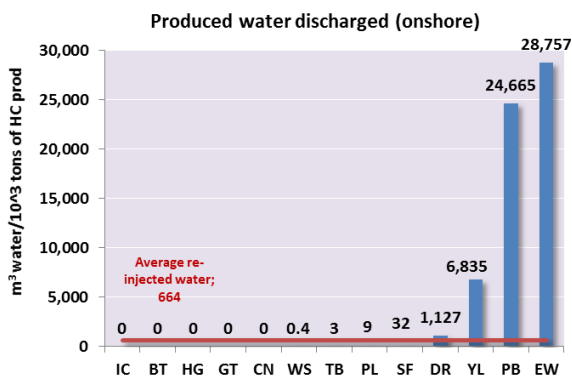
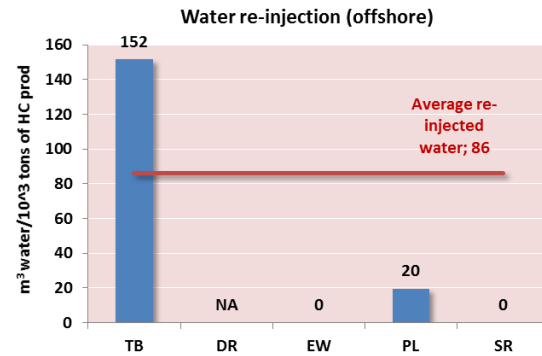
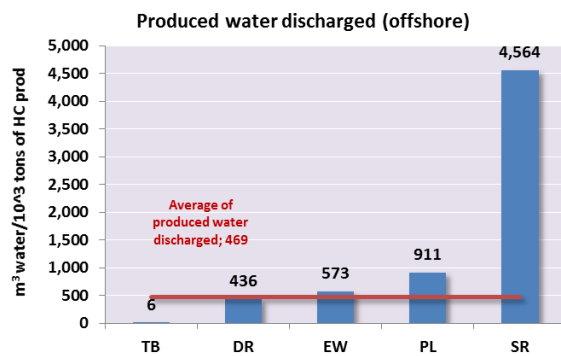


### 3.2 Discharges and re-injection of production water

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 (including treated water discharged onshore) for every million tons operated
- The amount of water re-injected as a disposal management method.



<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 may have a large amount of water associated to the production of the field.



### 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.

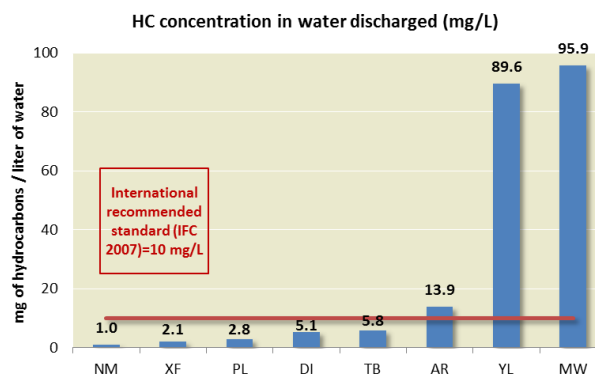
The indicators presented in this chapter are<sup>5</sup>:

**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 in the "Refineries" line of business.



- ❖ In this case, the red line does not represent the regional average but the international standard recommended by IFC 2007 for the concentration of hydrocarbons in water discharged as process effluent: lower than 10 mg/l.
- ❖ In this Report, three of the eight companies that reported data for this indicator showed values higher than the standard of 10mg/l.

<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.



### 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.

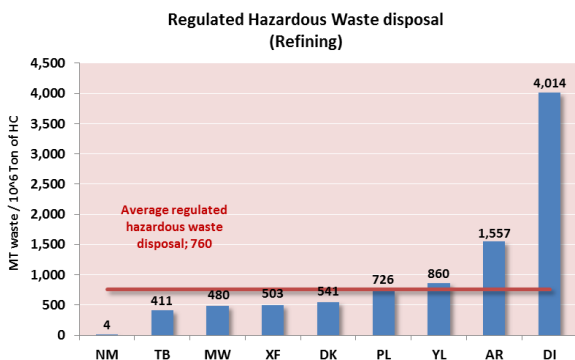
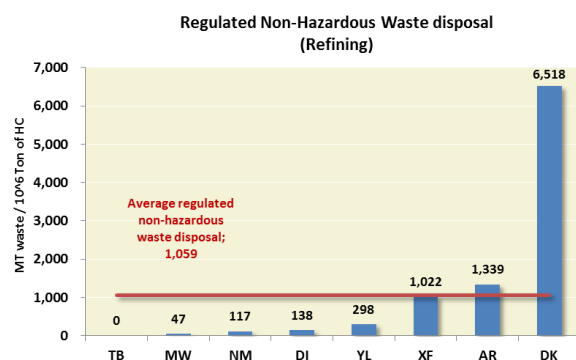
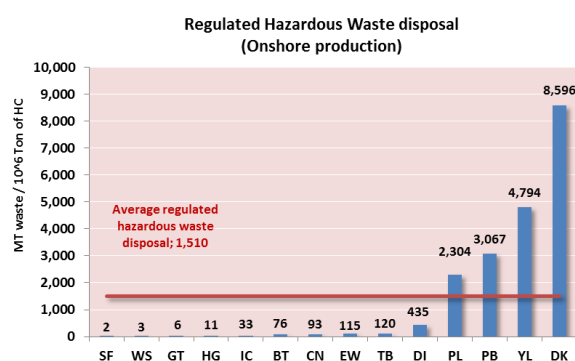
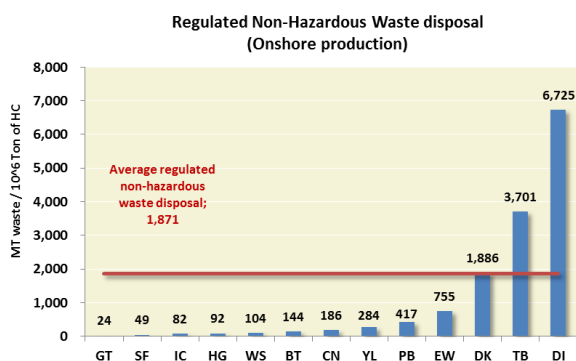
For the purpose of this Report, ‘hazardous waste’ includes all waste that is defined as hazardous, toxic, dangerous, listed, priority, special, or some other similar term as defined by a local regulatory agency or authority. ‘Local’ refers to the point of waste generation. Disposal may thus include: 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 lines of business "Onshore Production" and "Refining."



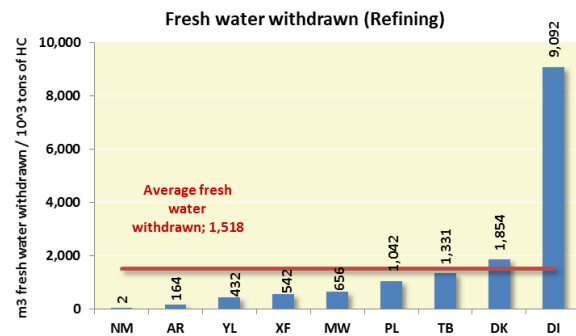
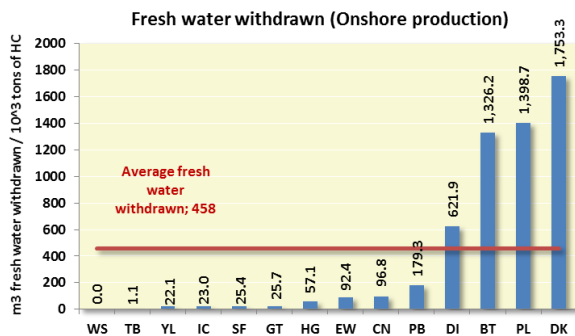


### 3.5 Freshwater

As of 2013 Report, information began to be collected on the use of freshwater, given the sensitivity of water management for the industry and life itself.

Below are the results for the indicator of fresh water extracted in onshore production and refining operations since these are the business line for which more companies share their data.

The indicator is calculated as cubic meters of freshwater extracted for thousand tons of hydrocarbons.





**ARPEL** is a non-profit association gathering oil, gas and biofuels sector companies and institutions in Latin America and the Caribbean. It was founded in 1965 as a vehicle of cooperation and reciprocal assistance between sector companies, with the main purpose of actively contribute to industry integration and competitive growth, and to sustainable energy development in the region.

### ***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 extension of collective knowledge.

### ***Vision***

To be a referent in the consolidation of the industry as a provider of reliable and safe energy, meeting the growing energy demand in a sustainable manner.

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