



REGIONAL ASSOCIATION OF
OIL, GAS AND BIOFUELS SECTOR COMPANIES
IN LATIN AMERICA AND THE CARIBBEAN

Manual of environmental performance benchmarking

Oil and gas industry in
Latin America and the Caribbean.

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BENCHMARKING

Environmental Performance Benchmarking in the Oil and Gas Industry in Latin America and the Caribbean 5th Edition – 2017

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1. Executive Summary

Periodically measuring environmental performance is an important management strategy to accomplish continuous improvement. By comparing (benchmarking) their environmental performance, oil and gas companies can:

- Compare company performance to industry trends and to peer companies.
- Identify companies doing particularly well in improving their environmental performance.
- Promote the improvement in environmental management through the exchange of experiences.
- Publicly defend plans for new facilities, on the basis of past performance of similar facilities.

At the industry level, the data can be used to:

- Identify trends or particular problems needing attention.
- Support industry position on legislative and regulatory issues.
- Promote the positive reputation of the industry.
- Support the industry's good practices.

Key environmental performance indicators have been identified, for which an annual environmental benchmarking exercise could be useful for the above mentioned purposes. This manual provides definitions, procedures, and instructions for those in the oil and gas industry who collect and report environmental data to ARPEL. The manual also should be useful to those companies interested in analyzing the data.

ARPEL acknowledges the IPIECA/API "Oil and Gas Industry Guidance on Voluntary Sustainability Reporting" (IPIECA/API¹) in preparation of this manual, and encourages the use of these guidelines for those companies interested in developing their sustainability reports. In order to align this regional information with that of the international petroleum industry, while preparing this manual, the ARPEL Environmental Benchmarking Project Team has –inasmuch as possible– aligned the indicators with those of the IPIECA/API Guidance, and built upon OGP "Environmental Data Collection User's Guide" (OGP², 2005)

The indicators described in this 5th edition of the Manual, indicators of emissions of greenhouse gases are included complementing existing indicators to improve the ability to track environmental performance of companies and of the region as a whole, and thus encourage continuous improvement.

¹ IPIECA – International Petroleum Industry Environmental Conservation Association (<http://www.ipieca.org>) // API – American Petroleum Institute (<http://www.api.org>)

² IOGP - International Association of Oil and Gas Producers (<http://www.iogp.org/>)



2. Introduction

This manual provides definitions, procedures, and instructions for those in the oil and gas industry who collect and report environmental data to ARPEL. The manual also should be useful to those companies interested in analyzing the data.

ARPEL will produce its Annual Reports on environmental data prior to mid-year for the previous calendar year. These reports will be distributed to all ARPEL Member Companies.

2.1. Scope

This manual covers the data collection forms and procedures for its compilation to provide companies information on environmental performance in the oil & gas industry in Latin America and the Caribbean. Samples of the data collection forms are included in this manual.

2.2. Review and Update of this Manual

Comments on ways to improve the manual or the database should be sent to:

Pablo Ferragut
ARPEL Project Manager
E-mail: pferragut@arpel.org.uy
Phone: +598 - 2410 6993 ext 133

2.3. Confidentiality of Company Information

Participating companies should be aware that:

- The electronic files sent with their information will be coded and used for analysis only within ARPEL Executive Secretariat, and not be distributed elsewhere.
- Their data will be published in the annual ARPEL report with consolidated information, using company secret codes. No data will be attributable to individual companies.
- The breadth of circulation of the Final Report and any Summary reports will be with the agreement of all companies participating of the annual data gathering undertaking.

3. Overview of the ARPEL Environmental Database

ARPEL will send the data collection forms to Member Companies in May every year. ARPEL will maintain a master mailing list of the one or two contacts (described below) in each company who are responsible for the company's data are duly entered onto the forms and submitted to ARPEL on time.

3.1. Company Points of Contact for Data Forms and Manuals

A copy of this User's Manual and of the data collection forms will be sent to the company delegate before the ARPEL Environment, Health and Safety Committee, or the corporate environmental director or equivalent, and if desired, one other company-designated individual. Each company shall determine the appropriate internal routing assignments for data collection and notify ARPEL of its designated one or two contacts.

3.2. ARPEL Point of Contact for Forms, Manuals and Annual Reports

Completed sets of data forms should be sent to:

Pablo Ferragut
ARPEL Project Manager
E-mail: pferragut@arpel.org.uy
Phone: +598 - 2410 6993 ext 133

ARPEL Executive Secretariat will be responsible for sending the data collection forms to each Member Company, as well as providing this Environmental Database User's Manual to participating companies as requested. With the support of the members of the ARPEL Environmental Benchmarking Project Team, ARPEL Executive Secretariat will be responsible for developing the Annual Reports.

3.3. Company Responsibilities

In general, the companies participating in ARPEL Environmental Performance Benchmarking Reports are continuously collecting –as well as analyzing- their environmental performance data. Their task in reporting to ARPEL is to accumulate this information from the various sources within their company that corresponds to operations in Latin America and the Caribbean countries and summarize it on the ARPEL forms according to the guidelines and definitions provided in this manual.

3.4. Due Date

The reports of environmental data for the previous calendar year shall be submitted before June 30.

3.5. Report Forms - Processing and Analysis

All report forms received by ARPEL are reviewed for completeness. Also, totals are recalculated as are other arithmetic tasks represented on the forms. ARPEL staff may call the company contacts, if necessary, to complete the forms and correct any anomaly that could be detected. Computerized database and tabulations are prepared from the records from all of the participating companies for each of the report forms submitted.



3.6. Distribution of the Annual Reports

Once the annual report is completed, ARPEL will send it to all member companies. The document will be downloadable from ARPEL web site only for members. Information about how to access to the electronic version of the final reports may be obtained from:

Internal dissemination (i.e., within the company and among the company’s personnel) of the reports or portions of the reports is left to the discretion of the reporting company.

3.7. Guidelines and Data Elements Common to all Forms

The guidelines apply to all of the ARPEL environmental data collection forms. Any questions related to report definitions not addressed in this Manual should be directed to ARPEL Executive Secretariat. The Guidelines are designed to assist oil and gas companies gather environmental data covering the whole value chain of the oil and gas business (i.e., upstream, midstream and downstream) under common criteria, allowing the analysis, comparability and robustness of the information and conclusions.

3.8. Completion and Accuracy

Even though companies may not be able to load the information in ALL the tables, they are requested to submit the information of available indicators (from Table 4 –inclusive- onwards) since individual analyses shall be made for each indicator, and they will support to improve the representativeness of the environmental benchmarking.

No cells should be left blank. All cells corresponding to those functions that will be reported must have an entry. Entries should be:

- a numerical quantity, or
- 0 (zero) to indicate emission/discharge level is zero, or
- NDA to indicate No Data are Available or collected

Data should be reported using the international standard numerical system, and rounded to three significant figures.

ARPEL Executive Secretariat will check all the forms received and contact the companies if there are omissions or other problems discovered. Time and effort for both ARPEL and the company can be saved when the forms are filled out completely and accurately.

3.9. Use of Consistent Definitions

The terms and definitions used in this Manual are not necessarily the same as terms and definitions used in various statutes, rules, codes or other authoritative legal documents. Reporters to ARPEL should be guided by the definitions provided here to the maximum extent possible. If a company cannot follow a definition exactly because of the particular way it keeps its records, its data are still useful and should still be submitted. Any deviations should be described on the form or attached on a separate sheet. **IT IS EXTREMELY IMPORTANT THAT DEVIATIONS FROM ARPEL DEFINITIONS BE NOTED;** otherwise, the annual industry analysis and future studies may be distorted.

As each participating company’s own data system evolves, ARPEL hopes that the company can work toward the definitions referenced in this manual.

3.10. Data Aggregation

Companies report performance data at varying levels of aggregation ranging from individual facilities, to national/regional locations and to global coverage for the entire corporation. **As indicated before, the information to be submitted will be for the operations of the entire corporation, which correspond to Latin America and the Caribbean. Contributors should complete one form for each country where they have operational responsibilities.**

As for the individual data reported, reporters to ARPEL should provide the level of detail requested on each form. If data cannot be subdivided according to ARPEL categories, the requested totals should be provided.

3.11. Yearly Reporting

To help sustain the credibility, the database of the reporting system and to identify trends, it is important to report every year.

3.12. Proper Environmental Reporting – Establishing Boundaries

In order to ensure the accuracy of data to be included in the reporting forms, the boundaries of reported information or indicators represent an important consideration because they often cut across an array of complex operational and organizational relationships as well as direct and indirect impacts. In the oil and gas industry two or more parties are commonly involved in an asset, such as in a joint venture, and work together under a variety of legal forms. Data to be provided by companies participating of the ARPEL benchmarking annual exercise will be those defined under the Operated Boundary.

Under the Operated Boundary, a company reports performance by consolidating 100 percent of the indicator data or information from operations over which it has management control and NO data from operations it does not manage. For the purpose of this manual, oil and gas companies define the operated boundary 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.

Companies will report data on a country-by-country basis for all operations where the company either is the operator or has the majority or controlling interest and has an officer assigned as the senior managing director of the joint venture operation. In the case of Joint Ventures where the operating company is itself not a member of ARPEL, companies in the partnership that are ARPEL members are invited to reach agreement on which company is to take the lead on collection of relevant information. When the Joint Venture company is itself an ARPEL member, then the joint venture company should report. Data from partnership operations (i.e., facilities for which the company owns equity but is not the operator) are excluded.

The data being gathered will be normalized. Normalized quantities are relative figures representing ratios between two absolute quantities of the same or different kind. Ratios allow comparisons among operations of different size and facilitate comparisons of similar products or processes. They also help relate the performance and achievements of one company, business unit, or organization to those of another.

Given the above, if a company's report covers only selected subsidiaries of a parent corporation, then its report should include the environmental and company data only for those subsidiaries. Some companies individually report data aggregated from their own operations and their contractors,



however they collect the data separately. DATA REPORTED IN THE ARPEL BENCHMARKING FORMS SHALL BE ONLY THOSE FROM THE COMPANY.

3.13. Function Definitions

The ARPEL function (department) categories do not necessarily correspond to Standard Industrial Classification (SIC) codes. The function definitions are given in the next section. For ARPEL reporting purposes, the function categories as defined by ARPEL in Chapter 4 of this Manual should be used.

3.14. Person Submitting Report

On each form, the company name and address section asks for the name of the company delegate before the ARPEL Environment, Health and Safety Committee (CASYSIA), or an equivalent individual responsible for providing data to ARPEL. This person will be considered the main ARPEL environmental data contact for soliciting data in the future and should be the most knowledgeable person to whom inquiries about the data on that form could be directed.

3.15. Functions Reported

Many petroleum companies have operations or subsidiaries dealing with renewable energy, coal, electricity, shale, specialty chemicals or mineral mining or other fields that are not in the mainstream of the oil and gas industry operations. Data on these activities may confuse the picture of the oil and gas industry environmental record and should not be reported.

4. Company Functions

4.1. Summary of Function Categories

More detailed definitions of all the functions follow this table.

Function Categories
Production
Pipelines
Terminals
Refining
Petrochemicals
Distribution / Transport

4.2. Offshore / Onshore / Unconventionals Data

Offshore refers to:

- operations that take place at sea;
- operations in bays or in other inland seas directly connected to the oceans;
- structures or platforms in the water that are used for exploration, production, or drilling. Environmental performance associated with platforms in the process of being operational is included.
- transportation from a shore base to the facility, or from the facility to the shore;
- performance on the water, in the air, or in transferring from a vessel or aircraft associated to the offshore operation.

Offshore does not include sea travel on tankers from distant ports to an offshore facility (which should be reported in the “Distribution/Transport” function).

Onshore refers to operations that take place within a landmass, including those on swamps, rivers and lakes. In some regions, activities taking place at sea may be controlled via an onshore permit. Here, data should be reported as arising from onshore activities.

For the purposes of the report, unconventional are included in the function Production ‘onshore’, so total production will be Production offshore + Production onshore. Anyway, it is requested to report unconventional separately because the environmental impact of this type of production is notoriously different from those generated by conventional production.

Unconventionals are hydrocarbons that are found in nature in conditions that do not allow the fluid movement, either by being trapped in low permeability formations or because of high viscosity, and therefore require special technologies for its extraction such as hydraulic fracturing (fracking), dewatering of coal bed methane, use of steam or solvents to mobilize bitumen or crude and, in some cases, mining activities.



This includes:

- **Extra Heavy oil:** High density liquid oil (<10° API).
- **Tar sands:** Sands highly saturated with natural bitumen, which is a high-density / viscosity hydrocarbon.
- **Shale Oil/Gas:** Petroleum or gas produced directly from the source rock (shale rich in organic matter and very low porosity)
- **Tight Oil/Gas:** Petroleum or gas from reservoirs with low porosity and permeability.
- **Coal bed methane (CBM):** Natural gas extracted from coal beds. Due to its high content of organic matter, coal retains a great quantity of gas adsorbed.
- **Gas Hydrates:** Solid compound similar to ice that contains methane, which is trapped in a crystalline structure of water molecules that is stable in marine sediments higher to 300 meters deep.

4.3. Function definitions

Definitions are given below to remind users of the most common services that are part of each function.

Exploration

Exploration refers to all activities done to discover hydrocarbon deposits beneath the Earth surface (onshore or offshore), such as geophysical activities, seismic, exploratory drilling, etc.

Since it is still not possible to collect homogeneous information for this function with the purpose of benchmarking, data will not be reported yet, but efforts will be made in order to collect the information in the near future.

Production

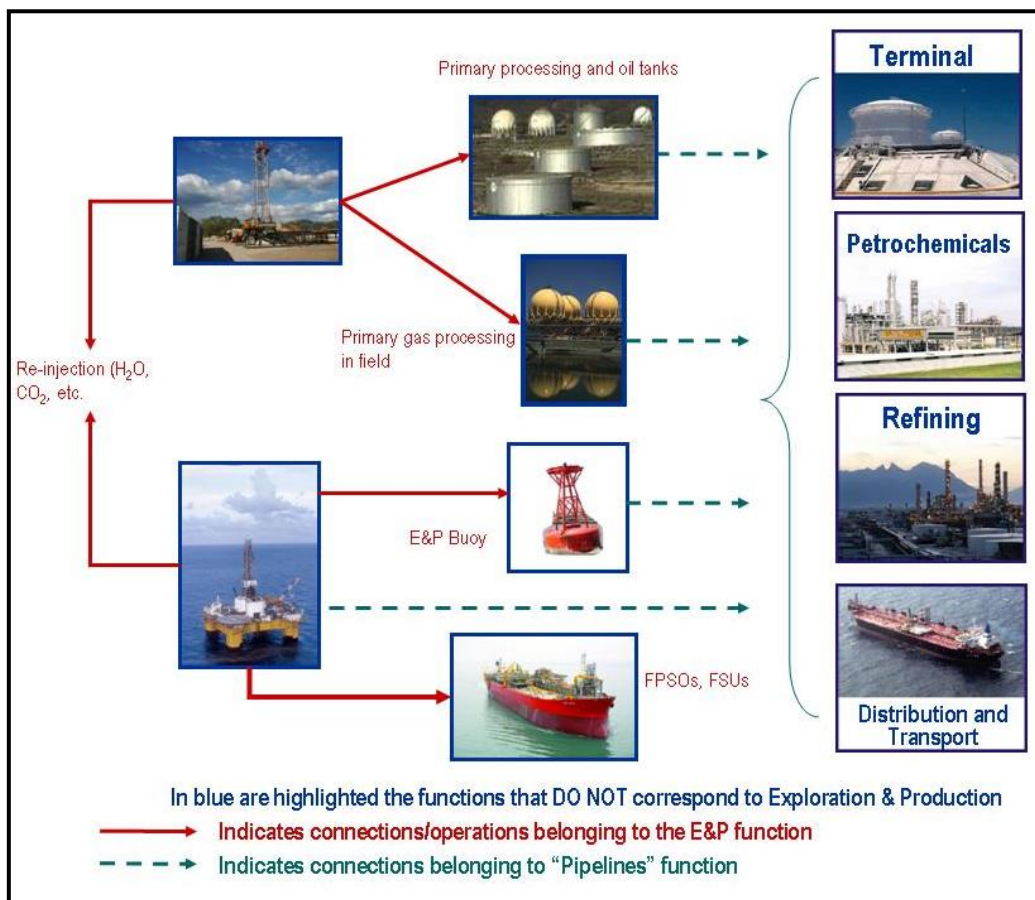
Operations which are included (this list is not exhaustive), are classed as follows:

- Drilling activities, including appraisal wells and well testing/maintenance (workovers, completions);
- On site process and treatment operations, which include:
 - ✓ Oil (including condensates and heavy oil from tar sands) and gas extraction and separation (primary production);
 - ✓ Primary oil processing (water separation, stabilization);
 - ✓ Primary gas processing (dehydration, liquids separation, sweetening, CO2 removal) if developed on the production site (see “Petrochemicals”)
 - ✓ Activities related to re-injection and enhanced oil recovery
 - ✓ Activities related to geologic storage of CO2 from natural gas processing
- Storage tanks and operations

- Floating Production Storage and Offloading Systems (FPSOs), Floating Storage Units (FSUs), buoys and the connections with the associated offshore production structure or platform.

Operations which are **excluded**:

- Support vessels and standby vessels other than those for accidental spills unless data cannot be separated out (this is reported in Distribution/Transport);
- Pipelines connecting Production operations to other functions (i.e., “Pipelines”, “Terminals”, “Refining”, “Petrochemicals” and “Distribution/Transport”). They are reported in the “Pipelines” function.



Pipelines

Pipelines operations include (this list is not exhaustive):

- Transportation via pipeline of crude oil, refined and semi refined products and petrochemicals, within different functions (see below).
- Gathering system and trunk line operations for crude oil.
- Crude gas transportation to processing plant (offshore/onshore);
- Gas gathering and trunk line operations of natural gas transmission lines up to the point of retail distribution.
- Operations of the pipeline pumping stations.



Operations which are excluded:

- Pipelines connecting equipment, processes or tanks WITHIN another function different to “Pipelines” (i.e., “Exploration”, “Production”, “Terminals”, “Refining”, “Petrochemicals” and “Distribution/Transport”).

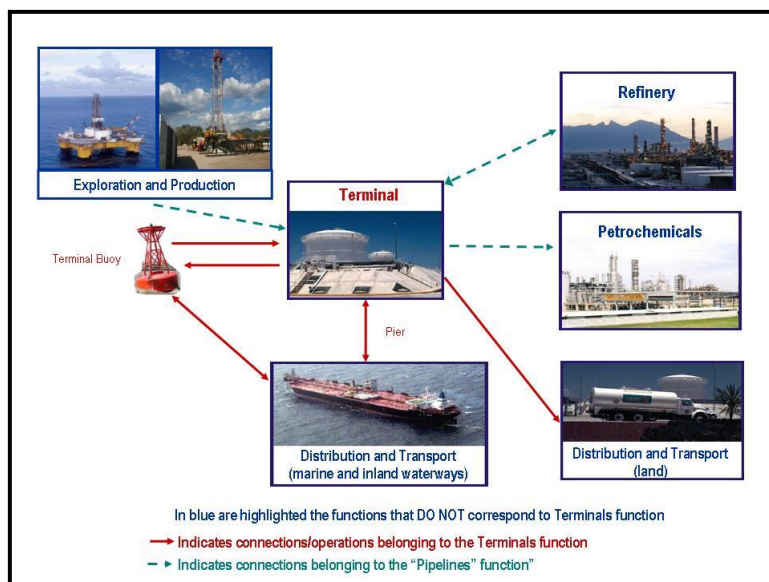
Terminals

Operations which are included are those inside the boundaries of the terminals (this list is not exhaustive):

- Onshore crude oil and products storage:
 - ✓ Connected by pipeline to primary production facilities
 - ✓ Receiving/dispatching crude oil and products by tankers/barges
- Buoy(s) connected to the terminal including its connecting pipeline(s)
- Pipelines that are part of the Terminals operations
- Petroleum products bulk stations and wholesaling establishments

Operations which are excluded:

- Pipelines connecting Terminals to/from other functions (i.e., “Pipelines”, “Exploration”, “Production”, “Refining”, “Petrochemicals” and “Distribution/Transport”). They are reported in the “Pipelines” function.
- Loading/offloading operations from tankers/barges to buoys or piers associated to the terminal. They are reported in the “Distribution/Transport” function.



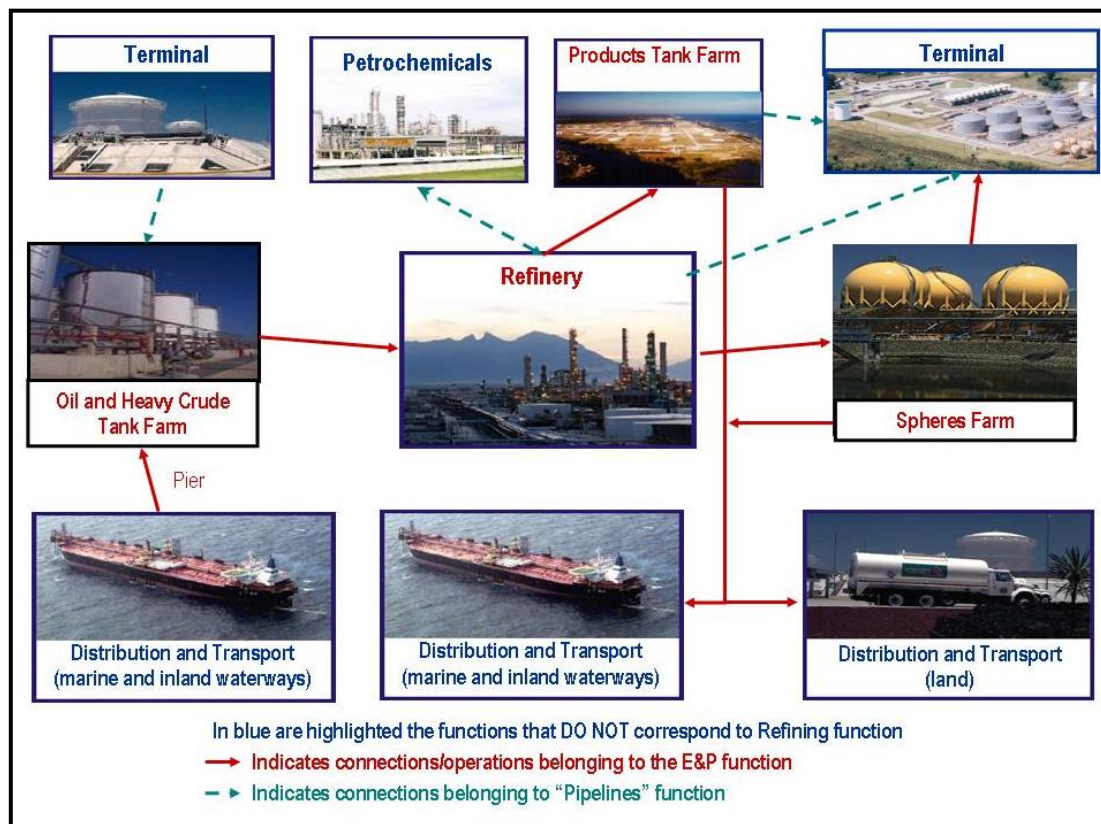
Refining

Operations which are included are those inside the boundaries of the refining facility (this list is not exhaustive):

- Crude oil and derivatives reception tanks
- Pre-treatment processes, feedstock production (e.g., additives) and post-treatment processes (e.g., products' desulfurization)
- Utilities: electricity generation, co-generation, etc.
- Refining of crude oil to produce LPG, gasoline, kerosene, distillate fuel oils, residual fuels oils, lubricants, and other products from crude petroleum.
- Tank farms of liquid derivatives for distribution
- Spheres' farms
- Pipelines that are part of the Refining operations

Operations which are **excluded**:

- Pipelines connecting the Refinery to/from other functions (i.e., "Pipelines", "Exploration", "Production", "Terminals", "Petrochemicals" and "Distribution/Transport"). They are reported in the "Pipelines" function.
- Loading/offloading operations from tankers/barges to piers associated to the Refinery. They are reported in the "Distribution/Transport" function.



Petrochemicals

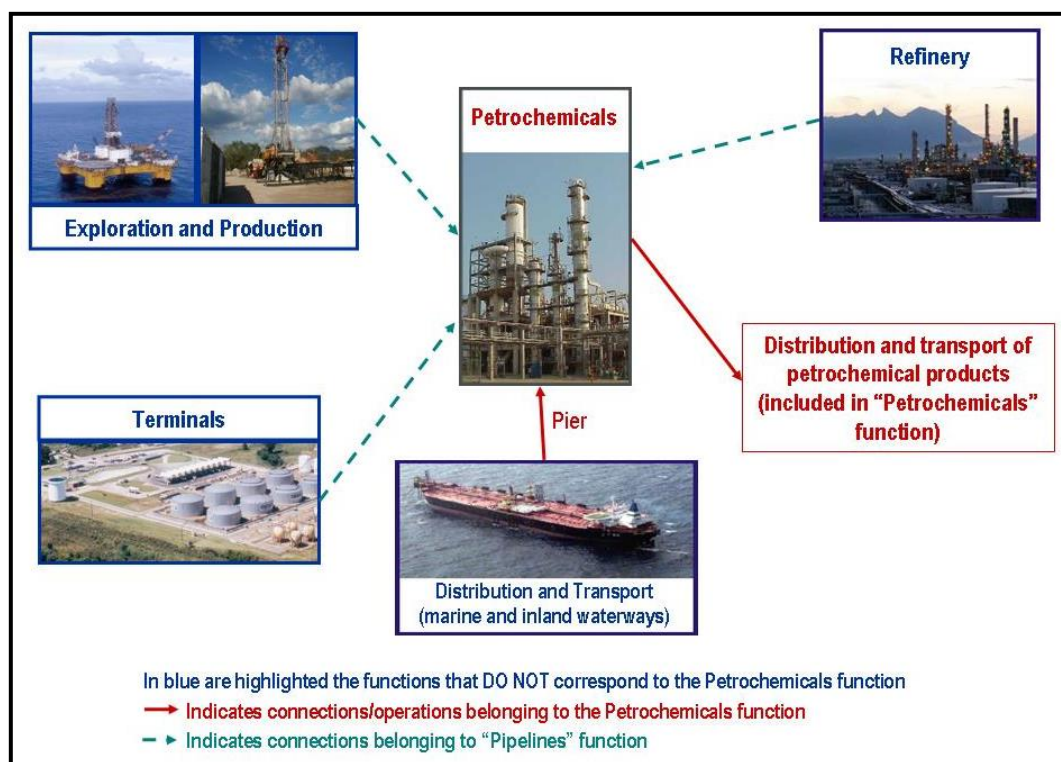


Operations which are included are those inside the boundaries of the petrochemical facility (this list is not exhaustive):

- Production or manufacture of petrochemicals where chemicals are derived from petroleum or petroleum products (List of petrochemicals – see Appendix 2).
- Primary gas processing (dehydration, liquids separation, sweetening, CO₂ removal) **if developed inside the petrochemical facility** (see “Production”)
- Gas processing activities with the primary intent of producing gas liquids for sale:
 - ✓ Secondary liquid separation (i.e., Natural Gas Liquids [NGL] extraction using refrigeration processing)
 - ✓ Ethane, Propane, Butane, Condensate (EPBC) fractionation
 - ✓ Liquefied Natural Gas (LNG) and Gas to Liquids (GTL) operations
- Petrochemicals distribution and transport.

Operations which are **excluded**:

- ✓ The manufacture of other types of chemicals or related products made from petrochemicals, such as plastic containers.
- ✓ Pipelines connecting the Petrochemical facility to/from other functions (i.e., “Pipelines”, “Exploration”, “Production”, “Terminals”, “Refinery” and “Distribution/Transport”). They are reported in the “Pipelines” function.



Distribution / Transport

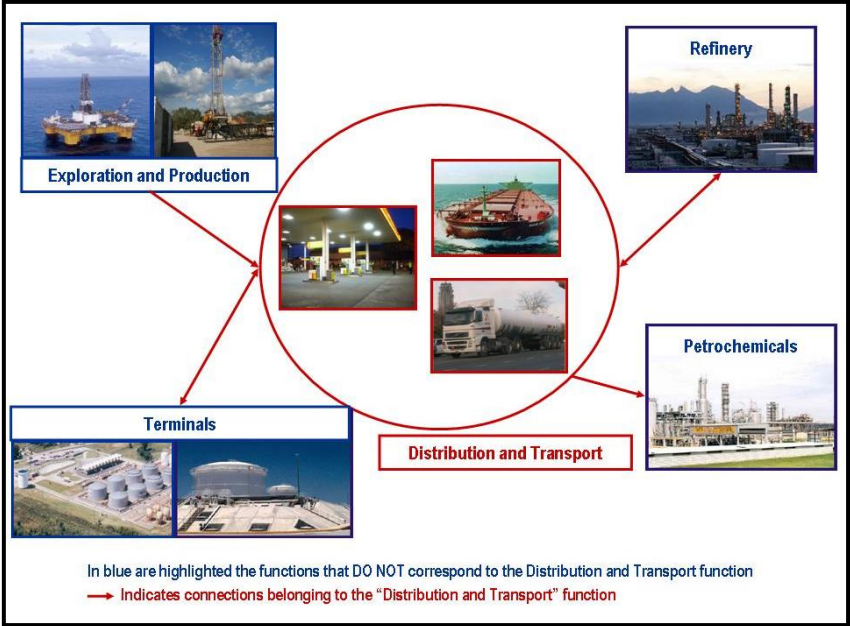
As in all other functions reported, data to be provided by companies participating of the ARPEL benchmarking annual exercise will be those defined under the Operated Boundary. Since many companies outsource many of the distribution/transport activities defined below, companies must be careful to include data of operations over which they have management control and NO data from operations it does not manage.

Distribution/transport operations which are **included** (this list is not exhaustive):

- Operations associated with the use of tankers or barges to transport crude oil and petroleum products between functions.
- Operations associated with the use of trucks or trains to transport petroleum, petroleum products and derivatives between functions
- Marine operations as defined below:
 - ✓ Includes vessels that are owned, operated, and manned under the company supervision. This may include vessels on coastal or transoceanic trips, including international runs. Includes exceptional circumstance of a “bare boat” charter where the vessel is chartered but the petroleum company provides the crew. Does not include “straight charter” vessels where both crew and vessel are hired for specific runs.
- Inland waterway tank ship and barge operations (controlled by the company).
- Bulk distribution of petroleum products to retail or wholesale outlets, including truck and transport deliveries.
- Retail service station and associated convenience store operations. This includes driveway sales, road service operations, car wash services, vehicle repair work, and sales of miscellaneous merchandise.

Operations which are **excluded**:

- Trucks that are an integral part of another function should be covered in that function, not here.
- Petrochemicals distribution and transport. They must be reported in the “Petrochemicals” function.
- The transport of petroleum or petroleum products by pipelines. This must be reported in the “Pipelines” function.



5. Environmental Indicators

Despite the harmonization of data presented by ARPEL Member Companies in this annual benchmarking exercise, companies must understand that there are several factors impacting the comparability of individual indicators such as crude oil utilized, refinery configuration, etc. In light of this, and given the ARPEL Statement of Commitments, companies are encouraged to pursue excellence beyond the analysis of their own performance based on the benchmarking results.

5.1. Hydrocarbon Spills to the Environment

'Hydrocarbon Spills to the Environment' is a core environmental performance indicator because hydrocarbon spills can have negative environmental, reputational and financial impacts.

Definition:

Number and volume (in barrels) of hydrocarbon liquid spills that reach the environment, normalized by the total operated hydrocarbons³

The calculated indicators are:

$$\text{number of spills: } \frac{\text{number of spills}}{10^6 \text{ tonnes of hydrocarbons operated}}$$

$$\text{volume spilled: } \frac{\text{barrels spilled}}{10^6 \text{ tonnes of hydrocarbons operated}}$$

$$\text{Average barrels per spill: } \frac{\text{total barrels spilled}}{\text{total number of barrels}}$$

Two extra adjusted indicators on spills are calculated, considering only the liquid hydrocarbons operated, and not for total hydrocarbons (gas + liquids) as in the above indicators

$$\text{number of spills}_{\text{liquids hydrocarbons}}: \frac{\text{number of spills}}{10^6 \text{ tonnes of liquid hydrocarbons operated}}$$

$$\text{spilled volume}_{\text{liquid HC}}: \frac{\text{barrels spilled}}{10^6 \text{ tonnes of liquid hydrocarbons operated}}$$

Additionally, for the pipelines function, spills indicators normalized by the scope of data for that function will be calculated (pipelines kms)

³ Operated Hydrocarbons are understood as produced, refined, transported by pipeline, charged to refineries, distributed, or transferred in terminals, for the correspondent function



$$\text{number of spills}_{km\ pipelines} = \frac{\text{number of spills}}{km\ of\ pipelines}$$

$$\text{spilled volume}_{km\ pipelines} = \frac{\text{barriles derramados}}{km\ of\ pipelines}$$

Scope:

Hydrocarbon liquids include crude oil, condensate, and petroleum-related products containing hydrocarbons that are used or manufactured, such as: gasoline, residuals, distillates, asphalt, jet fuel, lubricants, naphthas, light ends, bilge oil, kerosene, aromatics, and refinery/petrochemicals petroleum-derivatives.

For the purpose of this Manual, spills include all releases from company operated facilities:

- Company-owned and operated transport.
- Spill occurring from support and standby vessels.
- The estimated hydrocarbon content of spills of oil/water mixtures, NOT the volume of all the mixture spilled (e.g., oil-water emulsions, tank bottoms).

For the purpose of this Manual:

- Primary or secondary containment into the “environment”, including land (permeable materials like soil, sand, silts, shells, gravel, etc.), ice or water
- Water spills are those that reach surface water (fresh, salt or brackish). Offshore spills are always classified as water spills.
- Land spills are those that do not reach surface water.
- Spills to snow or ice should be categorized according to their proximity to a shoreline.

For the purpose of this Manual, spills do NOT include

- Primary and/or secondary containment or other impermeable surfaces if they do not reach the environment
- Workover fluids and synthetic, oil or mineral based drilling fluids
- Chemical spills
- Spills of produced water or process wastewater
- Historical or past leakage that reached the natural environment from tanks, pipes or other vessels, but is not associated with a current release

Reporting Indications:

Table 4 - Hydrocarbon Spills to the Environment in bbl

Refining		Number			Quantity (bbl)		
		Land	Water	Total	Land	Water	Total
1-10 bbl				NDA			NDA
10-100 bbl				NDA			NDA
> 100 bbl				NDA			NDA
Total - Refining		NDA	NDA	NDA	NDA	NDA	NDA

Table 4 covers:

1. Number of hydrocarbon spills
2. Barrels of hydrocarbon spilled
3. Size of the spill (3 categories: 1-10 barrels, 10-100 barrels and more than 100 barrels)

For each function (production, pipelines, terminals, refining, petrochemicals, and Distribution / Transport), enter the number of spills in each size category in the reporting year and the aggregate quantity released in those spills.

For the production function, if the company cannot report or does not record Water Spills or Land Spills separately, it must utilize the "Total" spill columns. If the company does not record separately the spills from 'production offshore', 'production onshore' and 'production of unconventional' functions, it will utilize the cells under 'production Total' (if the company records the spills of those two functions separately, the form will automatically complete the 'production total' cells).

WHEN REPORTING HYDROCARBON SPILLS TO THE ENVIRONMENT (Table 4)

- Spill quantities for the reporting year must be reported volumetrically in barrels; NEITHER in metric tonnes and NOR in cubic meters
- Quantities entered into the table on any line must be the aggregate spillage from all spills in the size group, not the average or maximum spill size

Estimation/Calculation Suggestions:

The volume/mass reported should represent the total estimated amount spilled that reached the environment and should not be reduced by the amount of such hydrocarbon subsequently recovered, evaporated or otherwise lost.



5.2. Produced Water: Controlled Discharges and Re-injection

‘Produced water discharges’ and ‘produced water re-injection’ are key indicators. ‘Produced water discharges’ is an issue that is prevalent industry-wide and can have negative environmental impact. ‘Produced water re-injection’ is central to demonstrate operational environmental excellence.

Definition:

‘Produced water discharges’ is the amount of produced water discharged to a water environment (both inland waterways and to the sea), including inland discharges to drainage structures that connect to waterways, as well as produced water that is treated and discharged on land.

‘Produced Water Re-injection’ refers to the amount of produced water re-injected as a disposal management method, including both water disposed into injection wells, and water re-injected for secondary recovery.

The indicators calculated are:

$$\text{Produced Water Discharged: } \frac{m^3 \text{ produced water}}{10^3 \text{ tonnes of hydrocarbons produced}}$$

$$\text{Hydrocarbons discharged in produced water: } \frac{\text{tonnes of hydrocarbons discharged}}{10^6 \text{ tonnes of hydrocarbons produced}}$$

$$\text{Produced Water re – injection: } \frac{m^3 \text{ produced water re – injected}}{10^3 \text{ tonnes of hydrocarbons produced}}$$

Scope:

These indicators include:

- the quantity of produced water discharged,
- the quantity of produced water that is treated and discharged on land
- the quantity of hydrocarbon discharged to water through produced water discharges,
- the quantity of water re-injected as a disposal management method; and

These indicators do NOT include:

- Spills, upsets or accidental discharges (included in chapter 5.1)
- Spills of oil-based drilling fluids and cuttings
- Spills of drilling and production chemicals
- Quantities discharged to third-party treatment facilities
- Discharges of drilling fluids or drilling mud

Reporting Indications:

Table 5 – Produced Water: Discharges and Re-injection

Activity	Produced water discharged (m3)	Oil discharged in produced water (t)	Water re-injected (m3)
Production (offshore)			
Production (onshore)			
Production (unconventionals)			
Production (Total)	NDA	NDA	NDA
Indicator (1) (offshore)	NDA	NDA	NDA
Indicator (2) (onshore)	NDA	NDA	NDA
Indicator (3) (unconventionals)	NDA	NDA	NDA
Indicator (4) (total)	NDA	NDA	NDA

Table 5 refers to the Production function (onshore, offshore and unconventionals) and is to be used for entering discharges and re-injection associated to produced water in the reporting year. There are three elements:

- The quantity of produced water discharged to the surface environment (in m³). Water that is sent to lined evaporation ponds (and therefore its oil content) shall not be included;
- The quantity of oil discharged to the surface environment through produced water discharges (in tonnes);
- The quantity of water re-injected as a disposal management method (in m³);

The ratio between the second and first element is the concentration of oil in the produced water discharged.

Table 5 allows for recording aqueous/hydrocarbons discharges and water re-injection during production, separating the production information on onshore and offshore. Where no split is possible for a mixed onshore and offshore operation, it must be recorded in the 'Production (total)' row. If the company does not record separately the discharges of produced water and oil and/or of the produced water re-injection from the functions "production offshore", "production onshore", it will utilize the "Production Total" row (if the company records information in those two functions separately, the form will automatically complete the cells of "Production (total)"). Enter water quantities in m³ and oil discharge quantities in tonnes for the reporting year.

WHEN REPORTING PRODUCED WATER DISCHARGES/RE-INJECTION (Table 5)

- Quantities of water must be reported in cubic meters, NOT tonnes and NOT thousands of cubic meters
- Quantities of oil discharged in produced water must be recorded in tonnes

Estimation/Calculation Suggestions:

Measures should be those resulting from the use of test methods required or approved by local regulatory authorities (or equivalent applicable standards).



5.3. Controlled Hydrocarbons Discharges as Process Effluent

Use of water in industry processes determines the potential environmental impact, both for freshwater consumption, and the amount of hydrocarbons dissolved or suspended associated with the effluents.

The process effluents indicator refers to the Production, Pipelines, Terminals, Refining, Petrochemical and Distribution/Transport functions and is used for determining the quantity of hydrocarbons discharged as process effluent from facilities –including inland discharges to drainage structures that connect to waterways- in the reporting year.

The indicators calculated are:

$$\text{Water discharged: } \frac{m^3 \text{ water discharged}}{10^3 \text{ tonnes of hydrocarbons operated}}$$

$$\text{oil discharged as process effluent: } \frac{\text{tonnes of hydrocarbons in process effluents}}{10^9 \text{ tonnes of hydrocarbons operated}}$$

The ratio between the second and first element is the concentration of oil in the water discharged. The reporting forms calculate this ratio automatically.

Scope:

These indicators include

- The quantity of hydrocarbons contained in discharges of process effluents from facilities. Inland discharges to drainage structures that connect to waterways are considered.

These indicators do NOT include:

- Oil spills or accidental discharges
- Spills of drill cuts or hydrocarbon-based drilling fluids
- Spills of chemical products coming from production and drilling activities
- Amounts discharged to third parties treatment facilities
- Discharges of drilling fluids and mud
- For the Production function, production water discharges should NOT be included because they are already considered on table 5

Table 6 – Controlled Hydrocarbon Discharges as Process Effluent

			Normalized indicators			
Activity		Water discharged (m3)	Oil discharged in water (t)	Water discharged indicator (m3/10 ³ Ton)	Oil discharged in water indicator (t/10 ⁹ Ton)	HC concentration in water (mg/L)
Production	offshore			NDA	NDA	NDA
	onshore			NDA	NDA	NDA
	unconventionals			NDA	NDA	NDA
	Total	NDA	NDA	NDA	NDA	NDA
Pipelines				NDA	NDA	NDA
Terminals				NDA	NDA	NDA
Distribution / Transportation				NDA	NDA	NDA
Refining				NDA	NDA	NDA
Petrochemicals				NDA	NDA	NDA

Table 6 refers to production, pipelines, terminals, refining, petrochemical and distribution/transport functions. It is used for entering the quantity of discharged hydrocarbons as a process effluent from facilities, and to calculate the mentioned indicators.

If in the Table 3 production was reported in more than one cell ('Offshore', 'Onshore' or 'Unconventionals'), and the company cannot split the data of the source of discharged process water to report in Table 6, then it must record NDA in the corresponding cells and report the discharged process water in the totals row.

WHEN REPORTING CONTROLLED HYDROCARBONS DISCHARGES AS PROCESS EFFLUENT (Table 6)

- Quantities of water discharged must be reported in cubic meters, NOT tonnes and NOT thousands of cubic meters
- Quantities of oil discharged must be recorded in tonnes
- For the Production function, produced water shall NOT be included.

Estimation/Calculation Suggestions:

The quantity of oil discharged may generally be estimated by multiplying the volume of water discharged by the concentration of hydrocarbons (oil and grease).

5.4. Waste and Residual Materials

Effective waste management is an indicator of operational efficiency. Some hazardous wastes, when not properly managed, can have significant environmental, social and economic impacts. It is an issue that is prevalent industry-wide though it is not managed or defined consistently worldwide and is often an issue of a local nature.

Two different indicators are utilized in this chapter:

$$\text{Generation of hazardous waste: } \frac{\text{tonnes of hazardous waste generated}}{10^6 \text{ tonnes of hydrocarbons operated}}$$



$$\text{Generation of non – hazardous waste: } \frac{\text{tonnes of non – hazardous waste generated}}{10^6 \text{ tonnes of hydrocarbons operated}}$$

For the purpose of this Manual, ‘waste and residual materials’ includes (this list is not exhaustive):

- non-recycled products, catalysts and by-products from industrial processes and utilities;
- waste from wastewater treatment;
- trash and other office, commercial or packaging related wastes;
- waste sent for treatment to third parties;
- waste from reclaimed used oil solvents and lubricants treatment;
- other residual materials.

Table 7 – Waste and Residual Materials (N.A.: For the Production function, wastes from offshore operations, although disposed of onshore, must be recorded as offshore)

Activity			Normalized indicators			
			Regulated Hazardous Waste Generated (metric tons)	Non-Hazardous Waste Generated (metric tons)	Indicator of regulated Hazardous Waste (TM waste/10 ⁶ Ton of HC)	Indicator of regulated Non-Hazardous Waste (TM waste/10 ⁶ Ton of HC)
Production	<i>offshore</i>			NDA	NDA	
	<i>onshore</i>			NDA	NDA	
	<i>unconventionals</i>			NDA	NDA	
	Total	NDA	NDA	NDA	NDA	
Pipelines					NDA	NDA
Terminals					NDA	NDA
Distribution / Transportation					NDA	NDA
Refining					NDA	NDA
Petrochemicals					NDA	NDA

Estimation/Calculation Suggestions and References for Measuring the Amount of Waste Disposed:

Measures should be those resulting from the use of test methods required or recommended by regulatory agencies or authorities. The hierarchy below gives guidance on some recommended methods of measurement and estimation.

- Direct measurement of mass on site using a calibrated gauge such as weigh bridge or a suspended balance.
- Direct measurement of mass by waste disposal contractor at the point of waste disposal or by transporters, at the point of shipping or loading.
- Periodic measurement of waste mass to facilitate estimation in relation to volumes. Periodic measurement should be based on a wide range of waste types over a representative time period.

WHEN REPORTING REGULATED HAZARDOUS AND NON-HAZARDOUS WASTE DISPOSED (Table 7)

- Quantities for the reporting year must be reported in metric tons
- For the production function, wastes from offshore operations, although disposed of onshore, must be recorded as offshore
- Wastes generated for major shutdowns and periodic maintenance activities, large, one-time construction projects, remediation activities and drilling operations must NOT be recorded for this benchmarking exercise.

Quantity of Regulated Hazardous Waste Generated

Scope:

For the purpose of this Manual, 'hazardous waste' includes all waste that is defined as hazardous, toxic, dangerous, listed, priority, special, or some other similar term as defined by an appropriate local regulatory agency or authority (see Note 1 at the end of this sub-chapter). 'Local' refers to the point of waste generation. This metric includes both on-site and off-site disposal.

Hazardous waste does not include:

- Hazardous wastes treated on-site and rendered non-hazardous
- Non-hazardous waste (listed in the next section)
- Hazardous wastes that by legitimate reuse, reclamation, or recycling cease to be regulated as hazardous wastes

For the purposes of this Manual, 'disposal' is considered any waste management option classified as 'disposal' by an appropriate local regulatory agency or authority (see Note 2 at the end of this sub-chapter). 'Local' refers to the point of disposal. This could include: land filling or burning without energy recovery of waste; and/or management of waste other than reuse, recycling, reclamation or other beneficial use.

Reporting Indications:

The first column of Table 7 records the quantity of **regulated hazardous waste generated** (in metric tons). For each function (production, pipelines, terminals, refining, petrochemicals, and distribution/transport), enter the amount of hazardous waste generated in the reporting year. For the production function, separate onshore and offshore disposal (please consider the source of the waste –i.e., offshore or onshore- to make this classification).

If in the Table 3 production was reported in more than one cell ('Offshore', 'Onshore' or 'Unconventionals'), and the company cannot split the data of the source of discharged process water to report in Table 6, then it must record NDA in the corresponding cells and report the discharged process water in the totals row.

Notes:



1. The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal is an international treaty that provides for cooperative and controlled management of hazardous wastes (Adopted in 1989 and entered into force on May 5, 1992). This treaty provides an international definition of hazardous wastes (Articles 1, 2 and 3) and can be used as a resource for the purpose of identifying and reporting this metric. See www.basel.int
2. Operating sectors will have significantly different regulated hazardous waste streams with different treatment and management options available. In downstream operations, major shutdowns and periodic maintenance activities can result in short term increases in hazardous waste generated. Large, one-time construction projects, remediation activities, and high-volume aqueous wastes should be tracked separately. For upstream operations, drilling operations, large one-time construction projects, remediation activities, and high-volume aqueous wastes can result in large variations in hazardous waste generated. **Although individual (and separate) reporting of these waste streams may enable companies to better understand and explain year-to-year fluctuations of aggregated hazardous waste data, they shall NOT be included in Table 7.**

Quantity of Non-Hazardous Waste Generated

Scope:

‘Non-hazardous waste’ includes industrial wastes resulting from company operations that are not designated or listed as ‘hazardous’ by the appropriate local regulatory agency. ‘Local’ refers to the point of waste generation. This category consists of materials disposed of both on-site and off-site, including trash and other office, commercial or packaging related wastes.

For the purposes of this Manual, ‘disposal’ is considered any waste management option classified as ‘disposal’ by the appropriate local regulating authority (see Note below). ‘Local’ refers to the point of disposal. This could include: land filling or burning without energy recovery of waste and/or management of waste other than reuse, recycling, reclamation or other beneficial use.

Reporting Indications:

The second column of Table 7 records the quantity of **non-hazardous waste generated** (in metric tons). For each function (production, pipelines, terminals, refining, petrochemicals and distribution/transport), enter the amount of non-hazardous waste generated in the reporting year.

For the production function, separate onshore and offshore generation (please consider the source of the waste –i.e., offshore or onshore- to make this classification).

If in the Table 3 production was reported in more than one cell (‘Offshore’, ‘Onshore’ or ‘Unconventionals’), and the company cannot split the data of the source of discharged process water to report in Table 6, then it must record NDA in the corresponding cells and report the discharged process water in the totals row.

Note: Operating sectors will typically generate different non-hazardous waste streams. In downstream operations, major shutdowns and periodic maintenance activities can result in short term increases in waste generated. For upstream operations, it is recommended that drilling wastes and wastes disposed by deep-well disposal and one-time wastes not related to production operations are reported separately. Large one-time construction projects, remediation activities, and

high-volume aqueous wastes can also be reported separately. **Although individual (and separate) reporting of these waste streams may enable companies to better understand and explain year-to-year fluctuations of aggregated hazardous waste data, they shall NOT be included in Table 7.**

5.5. Fresh Water

Water is a scarce and essential resource both for industrial activities as for life in general and its use in the oil and gas industry competes with other uses like human consumption or agriculture. This conflict of interests and the fact that water is essential for life makes absolutely necessary to perform an optimal management of water in the oil and gas industry.

Furthermore, these indicators are 'input indicators' because they measure the inputs used in the production activities and not only the effluents of it (disposal, discharges, emissions and spills), allowing the assessment of the efficiency of the oil and gas industry.

$$\text{Freshwater withdrawn: } \frac{\text{freshwater withdrawn (m}^3\text{)}}{10^3 \text{ tonnes of hydrocarbons operated}}$$

$$\% \text{ water reused: } \frac{\text{water reused or recycled}}{\text{freshwater withdrawn}} * 100$$

% indirect and direct sources on the total water withdrawn: Is the % of fresh water withdrawn from direct sources (or indirect) of the total fresh water withdrawn, being desirable a high and increasing percentage of fresh water withdrawn from indirect sources.

				Normalized indicators		
Activity		Freshwater withdrawn (m3/year)	% freshwater withdrawn from indirect sources	Water reused / recycled (m3/year)	Freshwater withdrawn indicator (m3/10 ³ ton)	% Reuse / recycling
Production	<i>offshore</i>				NDA	NDA
	<i>onshore</i>				NDA	NDA
	<i>unconventionals</i>				NDA	NDA
	Total	NDA	NDA	NDA	NDA	NDA
Pipelines					NDA	NDA
Terminals					NDA	NDA
Distribution/Transport					NDA	NDA
Refining					NDA	NDA
Petrochemicals					NDA	NDA

Reporting Indications, definitions and scope:

Fresh Water: Non-brackish water, this includes drinking water, water used in agriculture, water used for domestic or industrial uses, etc. The total dissolved solids (TDS) concentration of this water type is up to 2000 mg/l.

Fresh water withdrawn: the volume of fresh water used within the boundaries of the company (including service water) that was removed both from **direct sources** such as surface water or groundwater or **indirect sources** such as, harvested rainwater and municipal water supplies.



Water reuse/recycle: The volume of water used in more than one process (recycle), or reused more than one time in a single process (reuse), excluding cooling water, and that reduces the total amount of fresh water withdrawal required at the site (note: Water used for washing demineralizer units, for example, should be included)

5.6. Greenhouse gases emissions (GHG emissions)

Emissions generated by the oil and gas industry activities come from the normal activities of production, processing, transport, use of hydrocarbons and flaring. These emissions contribute with a negative impact to the increase and disequilibrium of the planet’s natural greenhouse effect. This generates an increase in the average temperature of the Earth’s surface, accelerating the climate change. This is the reason why the management of GHG emissions by the oil and gas companies is crucial for the international cooperation in the fight against Climate Change.

Scope

The Intergovernmental Panel on Climate Change (IPCC) considers 7 GHG, for the oil and gas industry operations the emissions of carbon dioxide (CO₂) and methane (CH₄) are generally the most relevant, followed by the nitrous oxide (N₂O) that appears in little amounts as a consequence of fossil fuels combustion. Therefore, this report considers only the three mentioned gases CO₂, CH₄ y N₂O

GHG emissions from the following sources shall be included:

- Combustion (e.g. fuel used for gas compression, power generation, heat, coke burning, etc.)
- Flaring (mainly CO₂) and venting (mainly CH₄)
- Processes (e.g. ship loading, storage tanks, glycol dehydration, sulfur recovery units, hydrogen production)
- Fugitive emissions (including pipelines and leak units)
- Non-routine events (e.g. pipelines maintenance, gas releases, equipment maintenance)

Emissions estimations shall include both mobile sources as ships carrying products, tanker trucks, mobile rigs and mobile production facilities, and stationary as production facilities, refineries, chemical plants, terminals, rigs and offices.

GHG Protocol defines 2 types of emissions:

- **Direct:** emissions from sources that belongs (partial or totally) and/or are operated by the reporting entity
- **Indirect:** emissions that are a consequence of the activities of the reporting entity, but that are generated by sources that belong or are controlled by another entity (e.g. electricity used)

Additionally, the mentioned protocol classifies the emissions in 3 different scopes. This manual will consider only scopes 1 and 2 which are defined below:

- **Scope 1:** All GHG emissions (mobile or stationary sources)
- **Scope 2:** Indirect GHG emissions coming from the consumption or purchase of electricity, steam, heat or cooling.

Note: CO₂ that is sold as a product, used for enhanced oil recovery or sequestered (e.g. through CCS), generally is not considered by companies as part of their own GHG emissions. It should be removed from GHG emissions inventory as carbon sink.

Activity	Carbon dioxide - CO ₂ (10 ³ tons/year)						Methane - CH ₄ (10 ³ tons/year)						Nitrous oxide - N ₂ O (10 ³ tons/year)						Normalized indicators								
	Direct		Indirect		Total emissions - CO ₂ equiv (10 ³ tons/year)		Indicator CO ₂ (10 ³ Ton CO ₂ /10 ³ Ton HC)			Indicator CH ₄ (10 ³ Ton CH ₄ /10 ³ Ton HC)			Indicator N ₂ O (10 ³ Ton N ₂ O/10 ³ Ton HC)			Total emissions indicator - (10 ³ Ton CO ₂ equiv/10 ³ Ton HC)											
	Direct	Indirect	Direct	Indirect	Direct	Indirect	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total									
Production																											
offshore																											
onshore																											
unconventionals																											
Total																											
Pipelines																											
Terminals																											
Distribution/Transport																											
Refining																											
Petrochemicals																											

Data referred to gaseous emissions must be reported in Table 9. For each business line, enter the volume of emissions of each gas in thousand tonnes.

For each business line, the table automatically calculates the column “Total emissions – CO₂ equivalent (10³ Ton/año) using the global warming potentials referred in the 5th IPCC assessment report. The values are shown in the table below.

Normalized emissions indicators are calculated for each one of the mentioned gases, and also for total emissions.

Compound	Chemical formula	Lifetime (years)	Global Warming Potential (GWP) for 100 years
Carbon dioxide	CO ₂	variable	1
Methane	CH ₄	12	28
Nitrous oxide	N ₂ O	114	265

Indicators

$$Emissions = \frac{10^3 \text{ GHG tonnes}}{10^3 \text{ tonnes of hydrocarbons operated}}$$

Where the GHG can be CO₂, CH₄ or N₂O expressed as CO₂ equivalent.

CO₂ equivalent is calculated as follows:

$$ton \text{ CO}_2eq = \sum_{i=0}^n ton \text{ GHG}_n * GWP_n$$

Definitions

- **GHG direct emissions:** total GHG emissions coming from sources that belong (partial or totally) and/or are operated by the reporting entity. These emissions correspond to Scope 1 of stationary and mobile sources.



- **GHG indirect emissions coming from imported energy:** they occur in the place where the energy is generated (which is property, or is operated by a third party) for power, heating or steam that is imported (purchased) to be used in a facility of the entity that is reporting data. It corresponds to Scope 2.
- **Direct GHG emissions coming from energy exports:** GHG emissions related to energy production in the form of electricity, heat or steam that is exported (sold) by the entity that is reporting data to a facility that belong or is operated by a third party. This is a subset of direct emissions.
- **Direct emissions coming from co-generation:** GHG emissions related to electricity generation and steam co-generation (simultaneous production of both useful energy and heat). This is a subset of GHG direct emissions that generally results in the reduction of GHG emissions.

6. Environmental Data⁴

ARPEL Member Companies should send the Report Forms of the Benchmarking on Environmental Performance in the Oil & Gas Industry in Latin America and the Caribbean to ARPEL Executive Secretariat, before the date agreed for each edition. Electronic files of the Report Forms will be forwarded together with the request of data. The electronic files of this Manual and of the Reporting Forms can be downloaded from ARPEL web site (www.arpel.org).

6.1. Normalizing Factors

For benchmarking purposes, environmental data have to be normalized; i.e., divided by the magnitude of operations of the different functions (“normalizing factors”). The definitions of the normalizing factors are described in this sub-chapter and should be strictly followed by reporting companies.

Reporting normalizing factors is essential. This information is used to calculate the indicators in the functions in which the reporting company has activity and –thus- if this information is not provided, the data provided by the company in the other tables is completely useless. It is also important that the quantities provided be related with operations in countries of Latin America and the Caribbean (for which environmental data is reported).

The following definitions and considerations apply for the normalizing factors that will have to be reported in Table 3:

- **Gross Hydrocarbon Production: Thousands of tonnes (for the reporting year) at the wellhead.** Please note that there is an extra cell in which you must inform if production data relating to support and standby vessels are included or not.
 - The production quantity **includes**:
 - hydrocarbon transferred (i.e. sold, Royalties, take)
 - fuel used on site
 - flared and vented hydrocarbons
 - hydrocarbon gas produced and deposited in geological structures other than the producing reservoir
 - The production quantity **excludes**:
 - quantities returned to the producing reservoir (recycling/re-injection)
 - third party operated production
 - If gross figures are not available, the basis on which the reports are made should be indicated (e.g. net production).

⁴ This chapter describes the guidelines and data elements unique to the Benchmarking on Environmental Performance in the Oil & Gas Industry in Latin America and the Caribbean report form. The reader also should refer to Chapter 3, Guidelines and Data Elements Common to All Forms, and Section 4, Company Functions.



- **Pipelines’ Transportation:** Thousands of tonnes (for the reporting year) of products transported via pipeline, within different functions (see Chapter 4.3.2). Pipeline distribution of products inside the facilities (e.g., production field, refinery, terminal) is excluded.
- **Terminals’ Movement:** Thousands of tonnes (for the reporting year) of products transferred from the Terminals to other functions (see Chapter 4.3.3). Please note that there is an extra cell in which you must inform the amount of ballast water discharged (in m³).
- **Products Distribution:** Thousand of tonnes (for the reporting year) of products transferred to, from and within the company’s facilities, excluding pipelines, but including tankers, barges, trucks, trains and retail service stations (see Chapter 4.3.6).
- **Refining Activity:** Thousands of tonnes fed (for the reporting year) to produce LPG, gasoline, kerosene, distillate fuel oils, residual fuels oils, lubricants, and other products (see Chapter 4.3.4).
- **Petrochemicals’ Activity:** Thousands of tonnes (for the reporting year) of petrochemicals produced or manufactured where chemicals are derived from petroleum or petroleum products (see chapter 4.3.5).

For a better evaluation of the environmental data, it is important to know the magnitude of the operations –in the different functions- that relate to gas and liquid products. For the purpose of this Manual, and in order to complete the information requested in Table 3, liquids and gas are defined as:

- **Liquids:** Include crude oil, condensate, refined and semi refined products and liquid petrochemicals. If these data are only available in volumetric units, convert the values using the conversion factors given in Appendix 1.
- **Gas:** Include all gaseous products and exclude condensates

6.2. General Instructions

Please note:

- Data should be provided on a country-by-country basis **and corresponding only to company operations in Latin America and the Caribbean countries (NOT contractors)** as this is the denominator for compiling and analyzing the information. Globally aggregated data cannot be used for analysis. If companies are unable to provide country-by-country data or have reservations about supplying information in this form, they should contact ARPEL Executive Secretariat.
- Where the parent company has two or more **subsidiaries** operating in the same country, the data should be aggregated and entered onto a single data input form. **Only one form per country should be submitted.**
- Companies will report data on a country-by-country basis for all operations where the company either is the operator or has the majority or controlling interest and has an officer assigned as the senior managing director of the joint venture operation. In the case of Joint Ventures where the operating company is itself not a member of ARPEL, companies in the partnership that are ARPEL members are invited to reach agreement on which company is to take the lead on collection of relevant information. When the Joint Venture operating company is itself an ARPEL member, then the joint venture company should report.

Data from partnership operations (i.e., facilities for which the company owns equity but is not the operator) are excluded. In short, companies will report performance by consolidating 100 percent of the data or information from operations over which they have management control and NO data from operations they do not manage.

- In table 1 (contact) you will be asked to report for which functions are you going to provide data. You should do that by checking the box in the left of the corresponding function in the Excel sheet. Those cells of the other tables corresponding to functions that were not selected in Table 1 will be shadowed and no information could be reported on it.
- No cells should be left blank. All cells corresponding to those functions that will be reported must have an entry. Entries should be:
 - ✓ a numerical quantity, or
 - ✓ **0** (zero) to indicate emission/discharge level is zero, or
 - ✓ **NDA** to indicate No Data are Available or collected, or
- The total figures and the normalized figures are computed from other items on the form. These portions of the form are the grey-shaded boxes. The computed quantities will be recomputed by ARPEL and checked against the totals reported. The reporting company does not have to fill in the gray-shaded areas because they are automatically fulfilled once the corresponding data is entered. If data cannot be provided at the level of detail requested on the form, the total should be provided.

6.3. Specific Details to Complete the Environmental Data Collection Forms

This chapter provides selected details on how to complete the environmental data collection forms described in Chapter 7 and referred to in Chapters 1 through 5. In particular, this sub-chapter emphasizes details to take into consideration in the first 3 tables, which are common to the other tables (which refer to the specific indicators described in Chapter 5)

Table 1

Enter the **year** corresponding to the data, NOT the year of submitting the data.

Table 2

Enter the name of the reporting parent **company**, not the name of the local subsidiary. In case of joint ventures, enter the name of the reporting company - member of ARPEL - and also enter the name of the joint venture (in order to avoid duplication). **Company anonymity will be preserved in the final report.**

Table 3

Reporting quantities must be in thousand tonnes, not in barrels and not in units of tonnes, and for the whole reporting year in Latin America and the Caribbean. See sub-chapter 6.1 for definitions.

Table 3.1

In Table 3.1 information about the scope of the report is requested (# wells, kms of pipelines, # terminals, # refineries, # petrochemical facilities). This information is complementary to the benchmarking and no indicators will be calculated from it. Its reporting is optional.

Checklist, historical data and controls.



A checklist was added to the forms. It must be verified and all its items should have “OK” status before submitting the information to the Secretariat. The list checks the most common mistakes of the reporting process and it is completed automatically with exception of ‘historical data’ and ‘reporting units’ controls. In these cases the control should be made by the user in the ‘historical data’ sheet.

In all Excel sheets, a red message will pop-up if you make one of the following common mistakes:

All tables – If you leave blank cells

Table 4 – If the average quantity spilled is outside the reporting range. For example, if in the row where spills greater than 100 barrels must be reported, you report 2 spills and a total of 150 barrels (an average of 75 barrels by spill) a message will be shown because $75 < 100$.

Table 5 and Table 6 – If the same values are reported for produced water discharged (T5) and effluent water discharged (T6) or oil discharged in produced water (T5) and oil discharged in effluent water (T6).

Also a ‘historical data’ sheet was added with the information reported by the company in previous years. The information of the current year of report will be completed automatically (importing the information from the other tables)

If you have any questions concerning the definitions of functions or any other information requested on all of these forms, please refer to previous chapters of this manual or contact Pablo Ferragut at ARPEL Executive Secretariat (pferragut@arpel.org.uy – Tel: +598-24106993)

7. Environmental Data Collection Forms

Table 1 and 2 – Contact Information

Year	
Name of contact person	
Phone number of contact person	
E-mail of contact person	

Table 2 - Reporting Company and Country

Company	
Country	

Please state which functions / business lines you will report

<input type="checkbox"/> Production (offshore)	Y/N/SO
<input type="checkbox"/> Production (onshore)	Y/N/SO
<input type="checkbox"/> Production (unconventionals)	Y/N/SO
<input type="checkbox"/> Pipelines	Y/N/SO
<input type="checkbox"/> Terminals	Y/N/SO
<input type="checkbox"/> Distribution / Transport	Y/N/SO
<input type="checkbox"/> Refining	Y/N/SO
<input type="checkbox"/> Petrochemicals	Y/N/SO

Please aggregate data of all company subsidiaries from one country into each form, and complete one form for each country. Use one electronic file per country.

Table 3 – Normalizing factors / Table 3.1 – Scope of the report

		Liquids (10 ³ Ton)	Gases (10 ³ Ton)	Total (10 ³ Ton)
Gross Hydrocarbon Production	Offshore			NR
	Onshore			NR
	Unconventionals			NR
	Total	NR	NR	NR
Pipelines' Transportation			NR	
Terminals' Movement			NR	
Distribution / Transport			NR	
Refining Activity			NR	
Petrochemicals' Activity			NR	

* Onshore Production must include Unconventionals Production.

IT IS EXTREMELY IMPORTANT THAT DEVIATIONS FROM ARPEL DEFINITIONS BE NOTED

Are production data relating to support and standby vessels included (Y/N)?

Quantity of ballast water discharged in m3:

Table 3.1 - Scope of the report

SCOPE OF THE REPORT	
# wells (offshore production)	
# wells (onshore production)	
# wells (unconventionals production)	
Kms of pipelines	
Number of Terminals	
Number of Refineries	
Number of Petrochemicals facilities	

Table 4 - Hydrocarbon Spills to the Environment in bbl

Production (offshore)		Number			Quantity (bbl)		
		Land	Water	Total	Land	Water	Total
	1-10 bbl			NDA			NDA
	10-100 bbl			NDA			NDA
	> 100 bbl			NDA			NDA
Total - Production (offshore)			NDA	NDA		NDA	NDA

Production (onshore)		Number			Quantity (bbl)		
		Land	Water	Total	Land	Water	Total
	1-10 bbl			NDA			NDA
	10-100 bbl			NDA			NDA
	> 100 bbl			NDA			NDA
Total - Production (onshore)		NDA	NDA	NDA	NDA	NDA	NDA

Production (unconventionals)		Number			Quantity (bbl)		
		Land	Water	Total	Land	Water	Total
	1-10 bbl			NDA			NDA
	10-100 bbl			NDA			NDA
	> 100 bbl			NDA			NDA
Total - Production (unconventionals)		NDA	NDA	NDA	NDA	NDA	NDA

Production Total		Number			Quantity (bbl)		
		Land	Water	Total	Land	Water	Total
	1-10 bbl	NDA	NDA	NDA	NDA	NDA	NDA
	10-100 bbl	NDA	NDA	NDA	NDA	NDA	NDA
	> 100 bbl	NDA	NDA	NDA	NDA	NDA	NDA
Total Producción		NDA	NDA	NDA	NDA	NDA	NDA

Pipelines		Number			Quantity (bbl)		
		Land	Water	Total	Land	Water	Total
	1-10 bbl			NDA			NDA
	10-100 bbl			NDA			NDA
	> 100 bbl			NDA			NDA
Total - Pipelines		NDA	NDA	NDA	NDA	NDA	NDA

Terminals		Number			Quantity (bbl)		
		Land	Water	Total	Land	Water	Total
	1-10 bbl			NDA			NDA
	10-100 bbl			NDA			NDA
	> 100 bbl			NDA			NDA
Total - Terminals		NDA	NDA	NDA	NDA	NDA	NDA

Distribution / Transport		Number			Quantity (bbl)		
		Land	Water	Total	Land	Water	Total
	1-10 bbl			NDA			NDA
	10-100 bbl			NDA			NDA
	> 100 bbl			NDA			NDA
Total - Distribution / Transport		NDA	NDA	NDA	NDA	NDA	NDA

Table 4 - Hydrocarbon Spills to the Environment in bbl (Cont.)

Refining		Number			Quantity (bbl)		
		Land	Water	Total	Land	Water	Total
	1-10 bbl			NDA			NDA
	10-100 bbl			NDA			NDA
	> 100 bbl			NDA			NDA
	Total - Refining	NDA	NDA	NDA	NDA	NDA	NDA

Petrochemicals		Number			Quantity (bbl)		
		Land	Water	Total	Land	Water	Total
	1-10 bbl			NDA			NDA
	10-100 bbl			NDA			NDA
	> 100 bbl			NDA			NDA
	Total - Petrochemicals	NDA	NDA	NDA	NDA	NDA	NDA

Summary

Activity	Number of spills			Quantity (bbl)			# Spills Indicator			# Quantity (bbl) Indicator			Spills Average		
	Land	Water	Total	Land	Water	Total	Land	Water	Total	Land	Water	Total	Land	Water	Total
Production (offshore)		NDA	NDA		NDA	NDA		NDA	NDA		NDA	NDA		NDA	NDA
Production (onshore)	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA
Production (unconventionals)	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA
Production (total)	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA
Pipelines	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA
Terminals	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA
Distribution / Transport	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA
Refining	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA
Petrochemicals	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA	NDA

Table 5 – Produced Water: Discharges and Re-injection

Activity	Produced water discharged (m3)	Oil discharged in produced water (t)	Water re-injected (m3)
Production (offshore)			
Production (onshore)			
Production (unconventionals)			
Production (Total)	NDA	NDA	NDA
Indicator (1) (offshore)	NDA	NDA	NDA
Indicator (2) (onshore)	NDA	NDA	NDA
Indicator (3) (unconventionals)	NDA	NDA	NDA
Indicator (4) (total)	NDA	NDA	NDA

IT IS EXTREMELY IMPORTANT THAT DEVIATIONS FROM ARPEL DEFINITIONS BE NOTED

Table 6 – Controlled Hydrocarbon Discharges as Process Effluent

Table 6 – Controlled Hydrocarbon Discharges as Process Effluent

Activity		Water discharged (m3)	Oil discharged in water (t)	Normalized indicators		
				Water discharged indicator (m3/10 ³ Ton)	Oil discharged in water indicator (t/10 ⁹ Ton)	HC concentration in water (mg/L)
Production	<i>offshore</i>			NDA	NDA	NDA
	<i>onshore</i>			NDA	NDA	NDA
	<i>unconventionals</i>			NDA	NDA	NDA
	Total	NDA	NDA	NDA	NDA	NDA
Pipelines				NDA	NDA	NDA
Terminals				NDA	NDA	NDA
Distribution / Transportation				NDA	NDA	NDA
Refining				NDA	NDA	NDA
Petrochemicals				NDA	NDA	NDA

Table 7 – Waste and Residual Materials (N.A.: For the PRODUCTION function, wastes from offshore operations, although disposed of onshore, must be recorded as offshore)

Activity		Regulated Hazardous Waste Generated (metric tons)	Non-Hazardous Waste Generated (metric tons)	Normalized indicators	
				Indicator of regulated Hazardous Waste (TM waste/10 ⁶ Ton of HC)	Indicator of regulated Non-Hazardous Waste (TM waste/10 ⁶ Ton of HC)
Production	<i>offshore</i>			NDA	NDA
	<i>onshore</i>			NDA	NDA
	<i>unconventionals</i>			NDA	NDA
	Total	NDA	NDA	NDA	NDA
Pipelines				NDA	NDA
Terminals				NDA	NDA
Distribution / Transportation				NDA	NDA
Refining				NDA	NDA
Petrochemicals				NDA	NDA

8. Appendix 1 – Conversion Factors

These conversion factors should be used only when the data are available with a standard which differs from the required one, and when the ad hoc conversion factor is not known (for example, when data related to the quantity of oil produced are expressed in barrels of oil equivalent (BOE) and when the mean density of the production is not known).

The assumptions underlying the conversion factors are:

density of oil	0.84 t m ⁻³
density of condensate	0.75 t m ⁻³
density of associated gas	1 kg m ⁻³
density of non-associated gas	0.80 kg m ⁻³
density of chemicals, solvents, and all other products spilled	1.0 t m ⁻³

Conversion Factors for Table 3. Hydrocarbon production:

1 bbl of oil \approx 0.159 m ³	\approx 0.134 t (metric tonne)
1 bbl of condensate	\approx 0.119 t
1000 m ³ of associated gas	\approx 1.00 t
1000 m ³ of non-associated gas	\approx 0.80 t
1000 ft ³ of associated gas \approx 28.3 m ³	\approx 0.0283 t
1000 ft ³ of non-associated gas \approx 28.3 m ³	\approx 0.0226 t
1000 bbl per day	\approx 48910 t per year

Conversion Factors for Table 4. Oil Spills:

1 bbl of oil	\approx 0.159 m ³ or \approx 0.134 t
1 bbl of condensate	\approx 0.119 t
1 bbl of chemicals and others	\approx 0.159 t

Conversion Factors for Table 5. Produced Water discharges/reinjection:

1 bbl \approx 0.159 m³

1 bbl per day \approx 58.0 m³ per annum

9. Appendix 2 – List of Petrochemicals

METHANE DERIVATES	
Ammonia	Carbone dioxide
Methanol	Methy-tert-butyl-eter

ETHANE DERIVATES		
Acetaldehyde	Vynil chloride	Dichlorethane
Ethylene	Ethylenic glycols	Ethylene oxide
High density polyethilene	Low density polyethilene	

AROMATICS AND DERIVATES		
Heavy aromatics	Aromina 100™	Benzene
Styrene	Ethylbenzene	Fluxoil
Orto-Xylene	Para-Xylene	Toluene
Xylenes		

PROPYLENE AND DERIVATES		
Acetonitrile	Hydrogen cyanide	Acrylonitrile
Propylene	Polypropylene	

OTHERS		
Hydrochloric acid	Muriatic acid	Crude butane
Petrochemical specialties	Heptane	Hexane
Hydrogen	Oxygen	Pentanes



BENCHMARKING

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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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