

REPSOL Group

2019 Information on oil
and gas exploration
and production
activities

*Translation of a report originally
issued in Spanish.
In the event of a discrepancy,
the Spanish language version
prevails*



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(1) About this report

This document contains information on the Repsol Group's oil and gas exploration and production activities. This unaudited information is published on an annual basis and is prepared in accordance with the criteria contained in Topic 932 of the "Financial Accounting Standards Boards" (FASB), which contains the principles that are generally applied in the oil and gas industry.

This information includes:

- **Information on acreage.**
- **Exploration and development activities.**
- **Net proven reserves**, which represent the volume of proven developed and undeveloped reserves of oil and gas.
- **Future net cash flows**, which represents an estimate of standardized measure of discounted future net cash flows relating to proven oil and gas reserves.
- **Changes in Future net cash flows**, which reflects the changes in standardized measure of discounted future net cash flows relating to proven oil and gas reserves with respect to those presented for the previous year
- **Production of oil and gas of the year.**
- **Results of oil and gas exploration and production activities**, including revenue and expenses directly associated to this activity.
- **Accumulated investment** (capitalized cost), which shows capitalized historical costs.
- **Investments of the year** (cost incurred), which represent the amounts capitalized during the year, including the dismantling obligations.

The financial information included in this document is consistent with that stated in the Group financial statements and management report (accessible at www.repsol.com), but there might be some differences due to the fact that the information included in the current document is presented in accordance with US GAAP (Topic 932 FASB) and the Group's official financial information is presented accordingly to International Financial Reporting Standards endorsed by the European Union (IFRS-UE).

Repsol Group estimates its proven reserves according to the standards established by the SPE-PRMS system. The information here contained refers to the last three years (2019, 2018 and 2017).

(2) Information on acreage

The following tables disclose details of Repsol's acreage and exploration and development activities by geographical region:

- Developed and undeveloped acreage: developed acreage consists of surface area that contains productive wells, while undeveloped acreage encompass surface area that does not contain productive wells or in which these do not allow for extraction of hydrocarbons.

(km ²)	Developed and undeveloped acreage											
	2019				2018				2017			
	Developed		Undeveloped		Developed		Undeveloped		Developed		Undeveloped	
	Gross (1)	Net (2)	Gross (1)	Net (2)	Gross (1)	Net (2)	Gross (1)	Net (2)	Gross (1)	Net (2)	Gross (1)	Net (2)
Europe	1,934	596	44,959	17,913	1,714	533	34,353	12,512	1,816	680	37,775	15,891
Norway	741	177	6,724	2,982	555	114	2,756	913	303	107	4,609	1,660
United Kingdom	1,170	403	439	137	1,137	402	472	141	1,490	555	430	105
Rest of Europe	22	17	37,797	14,793	22	17	31,126	11,457	22	17	32,736	14,126
Latin America	3,219	761	100,046	48,663	3,007	682	158,279	95,105	3,006	688	117,655	51,550
Brazil	838	80	5,065	1,896	838	80	4,737	1,837	838	80	2,236	316
Colombia	525	134	58,715	23,807	369	72	74,143	27,212	369	78	73,382	27,525
Peru	238	48	17,427	16,216	238	48	52,431	51,220	238	48	12,755	10,348
Trinidad & Tobago	153	46	3,652	1,076	151	45	3,653	1,076	151	45	3,653	1,076
Venezuela	806	192	2,185	661	806	192	2,185	661	806	192	2,185	661
Rest of Latin America	660	263	13,002	5,008	606	245	21,131	13,099	606	245	23,443	11,624
North America	3,419	2,505	21,344	9,837	3,459	2,134	25,204	12,562	6,028	2,199	17,213	8,538
Canada	2,453	1,612	6,454	2,067	2,498	1,647	10,246	5,096	2,517	1,580	10,673	5,567
United States	967	892	5,236	2,929	961	487	5,305	2,624	3,511	620	5,947	2,615
Rest of North America	-	-	9,653	4,842	-	-	9,653	4,842	-	-	593	356
Africa	4,245	1,095	26,967	8,355	4,245	1,095	31,980	12,100	4,347	1,234	51,793	23,899
Asia and Oceania	4,342	1,738	129,384	94,749	2,377	1,051	134,258	100,052	2,290	982	136,872	99,721
Indonesia	2,594	979	14,344	8,741	615	219	16,705	12,289	615	219	15,583	12,261
Malaysia	1,293	526	1,004	351	1,307	598	4,023	2,528	1,221	560	4,108	2,566
Russia	47	23	4,898	3,062	47	23	3,384	2,352	46	23	3,386	2,418
Rest of Asia and Oceania	408	210	109,138	82,595	408	210	110,146	82,884	408	180	113,794	82,476
Total	17,159	6,695	322,699	179,516	14,802	5,494	384,074	232,331	17,487	5,783	361,308	199,599

- Acreage under development and exploration: acreage under development consist of surface area occupied by blocks under development and/or production, while acreage under exploration is surface area occupied by assets in the exploration phase.

(km ²)	Acreage in development or exploration											
	2019				2018				2017			
	Development		Exploration		Development		Exploration		Development		Exploration	
	Gross (1)	Net (2)	Gross (1)	Net (2)	Gross (1)	Net (2)	Gross (1)	Net (2)	Gross (1)	Net (2)	Gross (1)	Net (2)
Europe	2,868	1,132	44,024	17,377	2,818	1,122	33,249	11,922	2,743	1,199	36,848	15,373
Norway	1,044	321	6,420	2,838	999	310	2,313	717	851	324	4,062	1,444
United Kingdom	1,424	479	185	61	1,419	480	189	63	1,492	543	428	117
Rest of Europe	400	331	37,419	14,479	400	331	30,748	11,143	400	331	32,358	13,812
Latin America	16,527	4,822	86,738	44,602	16,560	4,827	144,726	90,959	15,236	4,475	105,425	47,763
Brazil	1,691	250	4,212	1,726	1,691	250	3,884	1,667	973	100	2,100	296
Colombia	1,651	264	57,590	23,676	1,684	270	72,828	27,014	1,357	219	72,394	27,383
Peru	1,693	292	15,971	15,971	1,693	292	50,975	50,975	1,413	141	11,580	10,255
Trinidad & Tobago	3,804	1,121	-	-	3,804	1,121	-	-	3,804	1,121	-	-
Venezuela	2,990	853	-	-	2,990	853	-	-	2,990	853	-	-
Rest of Latin America	4,698	2,041	8,965	3,229	4,698	2,041	17,039	11,303	4,698	2,041	19,351	9,828
North America	6,859	5,064	17,904	7,278	6,901	4,698	21,762	9,998	10,252	5,234	12,989	5,503
Canada	4,816	3,419	4,091	261	4,837	3,434	7,907	3,309	5,180	3,779	8,009	3,368
United States	2,043	1,645	4,160	2,176	2,064	1,264	4,202	1,847	5,072	1,455	4,387	1,780
Rest of North America	-	-	9,653	4,842	-	-	9,653	4,842	-	-	593	356
Africa	12,622	2,605	18,589	6,845	12,622	2,605	23,602	10,590	12,725	2,744	43,416	22,389
Asia and Oceania	5,982	2,454	127,744	94,032	7,276	2,951	129,359	98,152	10,060	4,105	129,101	96,598
Indonesia	2,095	754	14,843	8,965	3,124	1,011	14,196	11,496	3,124	1,011	13,074	11,469
Malaysia	2,297	877	-	-	2,324	1,022	3,005	2,104	2,324	1,022	3,005	2,104
Russia	353	172	4,592	2,912	346	169	3,085	2,206	346	169	3,085	2,272
Rest of Asia and Oceania	1,237	651	108,309	82,155	1,482	749	109,071	82,345	4,267	1,902	109,935	80,754
Total	44,859	16,077	294,999	170,134	46,178	16,203	352,698	221,621	51,016	17,757	327,779	187,625

(1) Gross acreage surface area is the area in which Repsol owns an interest.

(2) Net acreage is the total of the fractional interest in the gross acreage position.

(3) Exploration and development activities

The following tables show Repsol's completed exploratory and developed wells by geographical region:

	Exploration wells completed and in progress ⁽¹⁾														
	Positive			Negative			Under assessment			Total completed			In progress		
	2019	2018	2017	2019	2018	2017	2019	2018	2017	2019	2018	2017	2019	2018	2017
Europe	1	-	-	3	3	2	-	1	-	4	4	2	-	1	-
Norway	1	-	-	2	1	1	-	1	-	3	2	1	-	1	-
United Kingdom	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rest of Europe	-	-	-	1	2	1	-	-	-	1	2	1	-	-	-
Latin America	-	4	3	4	6	4	3	-	-	7	10	7	2	1	5
Brazil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Colombia	-	4	-	3	3	2	-	-	-	3	7	2	1	-	3
Peru	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-
Trinidad & Tobago	-	-	2	-	1	-	2	-	-	2	1	2	-	-	-
Venezuela	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rest of Latin America	-	-	1	1	2	1	1	-	-	2	2	2	1	1	2
North America	1	-	1	-	2	-	-	-	-	1	2	1	2	-	2
Canada	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
United States	1	-	1	-	2	-	-	-	-	1	2	1	2	-	2
Africa	-	-	-	-	3	1	-	-	-	-	3	1	-	-	1
Asia and Oceania	3	-	1	1	2	2	-	-	-	4	2	3	-	1	-
Indonesia	1	-	-	1	-	1	-	-	-	2	-	1	-	1	-
Malaysia	2	-	-	-	2	-	-	-	-	2	2	-	-	-	-
Russia	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-
Rest of Asia and Oceania	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-
Total	5	4	5	8	16	9	3	1	-	16	21	14	4	3	8

(1) Excluding appraisal wells (8 in 2019: 4 positives, 2 negative and 2 in evaluation; 2 in 2018: 1 positive and 1 in evaluation; 2 in 2017: 1 positive y 1 negative).

	Completed development wells											
	Positive			Negative			Under assessment			Total		
	2019	2018	2017	2019	2018	2017	2019	2018	2017	2019	2018	2017
Europe	7	4	4	-	-	-	-	-	-	7	4	4
Norway	6	4	3	-	-	-	-	-	-	6	4	3
United Kingdom	1	-	1	-	-	-	-	-	-	1	-	1
Rest of Europe	-	-	-	-	-	-	-	-	-	-	-	-
Latin America	30	28	69	-	1	2	2	3	3	32	32	74
Brazil	-	2	3	-	-	-	-	-	-	-	2	3
Colombia	24	22	25	-	-	-	-	3	1	24	25	26
Peru	-	-	-	-	-	-	-	-	-	-	-	-
Trinidad & Tobago	5	3	17	-	1	-	-	-	1	5	4	18
Venezuela	-	-	17	-	-	-	-	-	-	-	-	17
Rest of Latin America	1	1	7	-	-	2	2	-	1	3	1	10
North America	103	136	153	1	-	-	-	-	-	104	136	153
Canada	8	48	57	1	-	-	-	-	-	9	48	57
United States	95	88	96	-	-	-	-	-	-	95	88	96
Africa	14	7	12	-	-	1	-	-	-	14	7	13
Asia and Oceania	50	48	31	-	-	1	6	1	3	56	49	35
Indonesia	-	2	-	-	-	-	-	-	-	-	2	-
Malaysia	8	12	-	-	-	-	-	1	3	8	13	3
Russia	40	32	25	-	-	1	6	-	-	46	32	26
Rest of Asia and Oceania	2	2	6	-	-	-	-	-	-	2	2	6
Total	204	223	269	1	1	4	8	4	6	213	228	279

(4) Net proven oil and gas reserves

The tables below reflect the net developed and undeveloped proved reserves of crude oil, condensates, LPG and natural gas, including the volume of reserves equivalent to the financial income obtained under certain production-sharing contracts and service contracts in force as of December 31, 2019, 2018 and 2017, and the variations therein.

In determining net reserves, we exclude from our reported reserves royalties due to others, whether payable in cash or in kind, where the royalty owner has a direct interest in the underlying production and is able to make lifting and sales arrangements independently. By contrast, to the extent that royalty payments required to be made to a third party, whether payable in cash or in kind, are a financial obligation, or are substantially equivalent to a production or severance tax, the related reserves are not excluded from our reported reserves despite the fact that such payments are referred to as “royalties” under local rules. We follow the same methodology in reporting our production amounts.

Repsol applies the criteria established by the Society of Petroleum Engineers’ Petroleum Resource Management System (SPE/WPC/AAPG/SPEE/SEG/SPWLA/EAGE) to estimate its proven and unproven reserves of oil and gas. See Note 3 “Accounting estimates and judgments” of the 2019 Consolidated Financial Statements.

In accordance with these rules, proved oil and gas reserves are those quantities of oil and gas, which, by analysis of geoscience and engineering data, can be estimated with reasonable certainty to be commercially recoverable – from a given date forward, from known reservoirs, and under existing economic conditions, operating methods, and government regulations – prior to the time at which contracts providing the right to operate expire, regardless of whether deterministic or probabilistic methods are used for the estimation. The project to extract the hydrocarbons must have commenced or the operator must be reasonable certain that it will commence the project within a reasonable time.

All of Repsol’s oil and gas reserves have been estimated by the company’s petroleum engineers.

To control the quality of reserves booked, Repsol has established a process that is integrated into Repsol’s internal control system. The process to manage reserves booking is centrally controlled by the Reserve Control Direction which is independent from the upstream activities and it is overseen by the Audit and Control Committee. Furthermore, the volumes booked are submitted to third party engineers for a reserves audit on a periodic basis (at least 95% of the reserves are externally audited on a three years cycle).

For those areas submitted to third party audit, Repsol’s proved reserves figures have to be within 7% of the third party reserves audit figures for Repsol to declare that the reserves information meets the third party reserves audit standards. In the event that the difference is greater than 7% tolerance, Repsol reestimates its proved reserves to achieve this tolerance level or discloses the third party reserves audit figures. In 2019, Repsol commissioned an external audit for various areas of South America and North America.

Estimates of developed and undeveloped proved reserves of crude oil, condensate and natural gas liquids:

Millions of barrels

	Total	Europe	Venezuela	Peru	United States	Rest of America	Africa	Asia and Oceania
Fully-consolidated entities								
Reserves at December 31st, 2016 ⁽¹⁾	380	14	-	96	77	68	107	18
Revisions of previous estimates	42	5	-	-	(6)	10	13	19
Improved recovery	-	-	-	-	-	-	-	-
Extensions and discoveries	19	-	-	-	16	3	-	-
Purchases of minerals in place	2	-	-	-	-	-	-	2
Sales of minerals in place	-	-	-	-	-	-	-	-
Production ⁽¹⁾	(52)	(6)	-	(5)	(10)	(13)	(12)	(5)
Reserves at December 31st, 2017 ⁽¹⁾	391	12	-	92	77	68	108	34
Revisions of previous estimates	46	24	-	(1)	(2)	11	8	5
Improved recovery	1	-	-	-	-	1	-	-
Extensions and discoveries	12	-	-	-	8	4	-	-
Purchases of minerals in place	6	6	-	-	-	-	-	-
Sales of minerals in place	(2)	-	-	-	(2)	-	-	-
Production ⁽¹⁾	(57)	(7)	-	(5)	(10)	(13)	(16)	(7)
Reserves at December 31st, 2018 ⁽¹⁾	397	36	-	86	72	71	100	33
Revisions of previous estimates	(1)	5	-	3	(13)	9	5	(11)
Improved recovery	8	-	-	-	-	8	-	-
Extensions and discoveries	15	-	-	-	13	1	-	-
Purchases of minerals in place	53	1	-	-	52	-	-	-
Sales of minerals in place	-	-	-	-	-	-	-	-
Production ⁽¹⁾	(56)	(6)	-	(5)	(10)	(15)	(15)	(6)
Reserves at December 31st, 2019 ⁽¹⁾	415	35	-	84	114	74	90	17

Millions of barrels

	Total	Europe	Venezuela	Peru	United States	Rest of America	Africa	Asia and Oceania
Equity-accounted investees								
Reserves at December 31st, 2016 ⁽¹⁾	204	40	48	-	-	87	-	29
Revisions of previous estimates	63	9	15	-	-	35	-	4
Improved recovery	-	-	-	-	-	-	-	-
Extensions and discoveries	-	-	-	-	-	-	-	-
Purchases of minerals in place	-	-	-	-	-	-	-	-
Sales of minerals in place	-	-	-	-	-	-	-	-
Production ⁽¹⁾	(41)	(9)	(5)	-	-	(23)	-	(4)
Reserves at December 31st, 2017 ⁽¹⁾	226	40	59	-	-	99	-	29
Revisions of previous estimates	52	15	(5)	-	-	40	-	2
Improved recovery	-	-	-	-	-	-	-	-
Extensions and discoveries	1	-	-	-	-	1	-	1
Purchases of minerals in place	-	-	-	-	-	-	-	-
Sales of minerals in place	-	-	-	-	-	-	-	-
Production ⁽¹⁾	(38)	(10)	(3)	-	-	(22)	-	(3)
Reserves at December 31st, 2018 ⁽¹⁾	241	45	51	-	-	117	-	28
Revisions of previous estimates	(2)	-	(11)	-	-	8	-	1
Improved recovery	-	-	-	-	-	-	-	-
Extensions and discoveries	3	-	-	-	-	2	-	-
Purchases of minerals in place	-	-	-	-	-	-	-	-
Sales of minerals in place	-	-	-	-	-	-	-	-
Production ⁽¹⁾	(37)	(10)	(3)	-	-	(21)	-	(3)
Reserves at December 31st, 2019 ⁽¹⁾	205	35	37	-	-	107	-	26
Total fully-consolidated and equity-accounted entities	620	70	37	84	114	181	90	43

Estimates of developed proved reserves of crude oil, condensate and natural gas liquids:

Millions of barrels

	Total	Europe	Venezuela	Peru	United States	Rest of America	Africa	Asia and Oceania
At December 31st, 2016	407	50	33	48	46	123	68	40
Fully-consolidated entities	250	13	-	48	46	59	68	17
Equity-accounted investees	157	37	33	-	-	64	-	23
At December 31st, 2017	430	47	37	60	38	148	63	37
Fully-consolidated entities	248	11	-	60	38	61	63	16
Equity-accounted investees	182	36	37	-	-	88	-	21
At December 31st, 2018	438	55	33	55	37	164	59	36
Fully-consolidated entities	242	14	-	55	37	63	59	15
Equity-accounted investees	195	41	33	-	-	102	-	20
At December 31st, 2019	436	42	30	56	60	151	66	31
Fully-consolidated entities	264	10	-	56	60	59	66	13
Equity-accounted investees	171	32	30	-	-	92	-	18

Note: The aggregated changes in reserves and total reserves at December 31 may differ from the individual values shown because the calculations use more precise figures than those shown in the table.

- (1) Total net proved developed and undeveloped reserves at December 31, 2019, 2018, 2017 and 2016 include an estimated volume of approximately 47, 47, 47 and 45 million barrels of oil equivalent, respectively, corresponding to royalty payments which, as described above, constitute a financial obligation or are substantially equivalent to a production or equivalent tax. Net production 2019, 2018, 2017 and 2016 includes an estimated volume of 5, 5, 5 and 4 million barrels of oil equivalent, respectively, in connection with such payments.

Estimates of developed and undeveloped proved reserves of natural Gas:

Thousand Millions of Standard Cubic Feet

	<u>Total</u>	<u>Europe</u>	<u>Venezuela</u>	<u>Peru</u>	<u>United States</u>	<u>Rest of America</u>	<u>Africa</u>	<u>Asia and Oceania</u>
Fully-consolidated entities								
Reserves at December 31st, 2016 ⁽¹⁾	5,116	21	44	1,897	1,646	757	98	653
Revisions of previous estimates	59	11	4	-	(87)	39	20	72
Improved recovery	-	-	-	-	-	-	-	-
Extensions and discoveries	387	-	-	-	343	44	-	-
Purchases of minerals in place	13	-	-	-	1	4	-	8
Sales of minerals in place	(17)	-	-	-	(5)	(12)	-	(1)
Production ⁽¹⁾	(494)	(13)	(5)	(67)	(174)	(116)	(8)	(111)
Reserves at December 31st, 2017 ⁽¹⁾	5,064	20	42	1,830	1,724	717	110	620
Revisions of previous estimates	460	15	(7)	(24)	214	176	82	5
Improved recovery	-	-	-	-	-	-	-	-
Extensions and discoveries	248	-	-	-	203	41	-	4
Purchases of minerals in place	124	93	-	-	31	-	-	-
Sales of minerals in place	(41)	-	-	-	(41)	-	-	-
Production ⁽¹⁾	(530)	(23)	(4)	(68)	(179)	(120)	(26)	(108)
Reserves at December 31st, 2018 ⁽¹⁾	5,325	105	31	1,737	1,951	812	166	521
Revisions of previous estimates	(177)	8	(7)	(56)	(140)	(10)	81	(52)
Improved recovery	-	-	-	-	-	-	-	-
Extensions and discoveries	421	-	-	-	409	12	-	-
Purchases of minerals in place	237	5	-	-	232	-	-	-
Sales of minerals in place	-	-	-	-	-	-	-	-
Production ⁽¹⁾	(558)	(28)	(4)	(72)	(200)	(114)	(42)	(98)
Reserves at December 31st, 2019 ⁽¹⁾	5,248	90	20	1,609	2,251	701	206	371
<i>Thousand Millions of Standard Cubic Feet</i>								
	<u>Total</u>	<u>Europe</u>	<u>Venezuela</u>	<u>Peru</u>	<u>United States</u>	<u>Rest of America</u>	<u>Africa</u>	<u>Asia and Oceania</u>
Equity-accounted investees								
Reserves at December 31st, 2016 ⁽¹⁾	4,977	26	3,029	-	-	1,864	-	58
Revisions of previous estimates	177	(1)	(33)	-	-	205	-	6
Improved recovery	-	-	-	-	-	-	-	-
Extensions and discoveries	-	-	-	-	-	-	-	-
Purchases of minerals in place	-	-	-	-	-	-	-	-
Sales of minerals in place	(53)	-	-	-	-	-	-	(53)
Production ⁽¹⁾	(407)	(4)	(125)	-	-	(267)	-	(11)
Reserves at December 31st, 2017 ⁽¹⁾	4,693	20	2,871	-	-	1,802	-	-
Revisions of previous estimates	(167)	3	(195)	-	-	25	-	-
Improved recovery	-	-	-	-	-	-	-	-
Extensions and discoveries	104	-	-	-	-	104	-	-
Purchases of minerals in place	-	-	-	-	-	-	-	-
Sales of minerals in place	-	-	-	-	-	-	-	-
Production ⁽¹⁾	(400)	(8)	(106)	-	-	(287)	-	-
Reserves at December 31st, 2018 ⁽¹⁾	4,230	15	2,570	-	-	1,644	-	-
Revisions of previous estimates	(633)	3	(635)	-	-	(1)	-	-
Improved recovery	-	-	-	-	-	-	-	-
Extensions and discoveries	59	-	-	-	-	59	-	-
Purchases of minerals in place	-	-	-	-	-	-	-	-
Sales of minerals in place	-	-	-	-	-	-	-	-
Production ⁽¹⁾	(373)	(7)	(93)	-	-	(273)	-	-
Reserves at December 31st, 2019 ⁽¹⁾	3,282	11	1,843	-	-	1,428	-	-
Total fully-consolidated and equity-accounted entities	8,530	102	1,863	1,609	2,251	2,129	206	371

Estimates of developed proved reserves of natural gas:

Thousand Millions of Standard Cubic Feet

	Total	Europe	Venezuela	Peru	United States	Rest of America	Africa	Asia and Oceania
At December 31st, 2016	6,054	21	2,014	933	1,112	1,403	18	554
Fully-consolidated entities	3,249	19	44	933	1,112	596	18	528
Equity-accounted investees	2,805	2	1,971	-	-	807	-	26
At December 31st, 2017	6,212	35	1,945	1,163	1,158	1,447	11	452
Fully-consolidated entities	3,486	16	39	1,163	1,158	646	11	452
Equity-accounted investees	2,726	19	1,906	-	-	801	-	-
At December 31st, 2018	6,442	109	1,814	1,093	1,190	1,701	150	385
Fully-consolidated entities	3,658	95	29	1,093	1,190	715	150	385
Equity-accounted investees	2,784	14	1,784	-	-	986	-	-
At December 31st, 2019	6,054	92	1,617	1,012	1,411	1,456	152	315
Fully-consolidated entities	3,615	80	20	1,012	1,411	625	152	315
Equity-accounted investees	2,439	11	1,597	-	-	831	-	-

Notes: The aggregated changes in reserves and total reserves at December 31 may differ from the individual values shown because the calculations use more precise figures than those shown in the table.

- (1) Total net proved developed and undeveloped reserves at December 31, 2019, 2018, 2017 and 2016 include an estimated volume of approximately 907, 1,127, 1,248 and 1,273 billion cubic feet of gas, respectively, corresponding to royalty payments which, as described above, constitute a financial obligation or are substantially equivalent to a production or equivalent tax. Net production in 2019, 2018, 2017 and 2016 includes an estimated volume of 70, 73, 50 and 64 billion cubic feet of gas, respectively, in connection with such payments.

Estimates of developed and undeveloped proved reserves of crude oil, condensate, natural gas liquids and natural gas:

Millions of Barrels of Oil Equivalent

	Total	Europe	Venezuela	Peru	United States	Rest of America	Africa	Asia and Oceania
Fully-consolidated entities								
Reserves at December 31st, 2016 ⁽¹⁾	1,291	17	8	434	370	203	125	135
Revisions of previous estimates	52	7	1	-	(21)	17	17	32
Improved recovery	-	-	-	-	-	-	-	-
Extensions and discoveries	88	-	-	-	77	11	-	-
Purchases of minerals in place	5	-	-	-	-	1	-	3
Sales of minerals in place	(3)	-	-	-	(1)	(2)	-	-
Production ⁽¹⁾	(140)	(9)	(1)	(17)	(41)	(34)	(14)	(25)
Reserves at December 31st, 2017 ⁽¹⁾	1,293	15	8	417	384	196	128	145
Revisions of previous estimates	128	27	(1)	(5)	36	43	22	6
Improved recovery	1	-	-	-	-	1	-	-
Extensions and discoveries	56	-	-	-	45	11	-	1
Purchases of minerals in place	28	23	-	-	5	-	-	-
Sales of minerals in place	(9)	-	-	-	(9)	-	-	-
Production ⁽¹⁾	(151)	(11)	(1)	(17)	(41)	(35)	(21)	(26)
Reserves at December 31st, 2018 ⁽¹⁾	1,345	54	6	395	419	216	129	126
Revisions of previous estimates	(33)	6	(1)	(7)	(38)	7	20	(20)
Improved recovery	8	-	-	-	-	8	-	-
Extensions and discoveries	90	-	-	-	86	3	-	-
Purchases of minerals in place	95	2	-	-	93	-	-	-
Sales of minerals in place	-	-	-	-	-	-	-	-
Production ⁽¹⁾	(155)	(11)	(1)	(18)	(45)	(35)	(22)	(23)
Reserves at December 31st, 2019 ⁽¹⁾	1,350	51	4	371	515	199	127	83
Equity-accounted investees								
Reserves at December 31st, 2016 ⁽¹⁾	1,090	45	588	-	-	419	-	39
Revisions of previous estimates	95	9	9	-	-	71	-	5
Improved recovery	-	-	-	-	-	-	-	-
Extensions and discoveries	-	-	-	-	-	-	-	-
Purchases of minerals in place	-	-	-	-	-	-	-	-
Sales of minerals in place	(9)	-	-	-	-	-	-	(9)
Production ⁽¹⁾	(114)	(10)	(27)	-	-	(71)	-	(6)
Reserves at December 31st, 2017 ⁽¹⁾	1,062	43	570	-	-	420	-	29
Revisions of previous estimates	22	15	(39)	-	-	44	-	2
Improved recovery	-	-	-	-	-	-	-	-
Extensions and discoveries	20	-	-	-	-	19	-	1
Purchases of minerals in place	-	-	-	-	-	-	-	-
Sales of minerals in place	-	-	-	-	-	-	-	-
Production ⁽¹⁾	(110)	(11)	(22)	-	-	(73)	-	(3)
Reserves at December 31st, 2018 ⁽¹⁾	994	48	509	-	-	410	-	28
Revisions of previous estimates	(114)	-	(124)	-	-	8	-	1
Improved recovery	-	-	-	-	-	-	-	-
Extensions and discoveries	13	-	-	-	-	13	-	-
Purchases of minerals in place	-	-	-	-	-	-	-	-
Sales of minerals in place	-	-	-	-	-	-	-	-
Production ⁽¹⁾	(104)	(11)	(19)	-	-	(70)	-	(3)
Reserves at December 31st, 2019 ⁽¹⁾	789	37	366	-	-	361	-	26
Total fully-consolidated and equity-accounted entities	2,139	88	369	371	515	560	127	109

Estimates of developed proved reserves of crude oil, condensate, natural gas liquids and natural gas

Millions of Barrels of Oil Equivalent

	Total	Europe	Venezuela	Peru	United States	Rest of America	Africa	Asia and Oceania
At December 31st, 2016	1,485	53	392	214	244	373	71	139
Fully-consolidated entities	829	16	8	214	244	165	71	111
Equity-accounted investees	656	37	384	-	-	208	-	28
At December 31st, 2017	1,536	53	383	267	244	406	65	118
Fully-consolidated entities	869	13	7	267	244	176	65	97
Equity-accounted investees	667	40	376	-	-	230	-	21
At December 31st, 2018	1,585	75	356	249	249	467	85	104
Fully-consolidated entities	894	31	5	249	249	190	85	84
Equity-accounted investees	691	43	350	-	-	277	-	20
At December 31st, 2019	1,514	58	318	236	312	410	93	87
Fully-consolidated entities	908	24	4	236	312	170	93	69
Equity-accounted investees	606	34	315	-	-	240	-	18

Notes: The aggregated changes in reserves and total reserves at December 31 may differ from the individual values shown because the calculations use more precise figures than those shown in the table.

- (1) Total net proved developed and undeveloped reserves at December 31, 2019, 2018, 2017 and 2016 include an estimated volume of approximately 208, 247, 269 and 272 million barrels of oil equivalent, respectively, corresponding to royalty payments which, as described above, constitute a financial obligation or are substantially equivalent to a production or equivalent tax. Net production in 2019, 2018, 2017 and 2016 includes an estimated volume of 17, 18, 14 and 15 million barrels of oil equivalent, respectively, in connection with such payments.

(5) Standardized future cash flows

Standardized measure of discounted future net cash flows and changes therein relating to proved oil and gas reserves

Projected net cash flows were estimated in accordance with the criteria established by the "SPE/WPC/AAPG/SPEE/SEG/SPWLA/EAGE Petroleum Resources Management System, commonly referred to by its acronym, SPE-PRMS (SPE standing for the Society of Petroleum Engineers)". Oil and gas prices and other financial assumptions regarding the outlook for costs reflect the Company's best estimates for the purposes of valuing its assets. These assumptions are applied to estimated future production in respect of its proved oil and gas reserves as of the most recent reporting date, less estimated future development and production costs (based on current costs) in respect of these same proved reserves, all of which assuming that prevailing economic conditions are sustained.

Future production costs were estimated on based on the cost structure at the end of the year and are projected on the basis of the above-mentioned assumptions. Future development costs were calculated on the basis of technical studies conducted by Repsol and by the operators holding joint title with Repsol. The taxes projected for each of the future years were determined under the contractual and tax regime prevailing at the end of the year. The rate used to discount the future net revenues was 10%.

The present value of the future net cash flows estimated on the basis of the aforementioned assumptions is not intended to be interpreted, and should not be interpreted, as the fair value of the Group's oil and gas reserves. An estimation of the fair value of these reserves should also include the future exploitation of reserves not yet classified as proved reserves and costs and a discount rate which represents the time value of money at the calculation date and the uncertainties inherent to estimating the reserves.

The following table shows the present value of the future net revenues relating to proved oil and gas reserves, calculated on the basis of the aforementioned assumptions.

Millions of euros
At December 31st 2017

	Total	Europe	Venezuela	Peru	United States	Rest of America	Africa	Asia and Oceania
Fully-consolidated entities								
Future cash inflows	40,133	796	91	9,185	11,091	5,141	7,674	6,155
Future production costs	(12,634)	(510)	(33)	(4,278)	(3,126)	(2,014)	(956)	(1,717)
Future development and abandonment costs	(7,408)	(1,209)	(10)	(428)	(1,918)	(2,220)	(565)	(1,058)
Future income tax expenses	(5,627)	1,144	(19)	(1,343)	(275)	(194)	(3,694)	(1,246)
Future net cash flows after taxes	14,464	221	29	3,136	5,772	713	2,459	2,134
10% annual discount for estimated timing of cash flows	(6,494)	(451)	(16)	(2,056)	(2,895)	351	(852)	(575)
Discounted future net cash flows	7,970	(230)	13	1,080	2,877	1,064	1,607	1,559
Equity-accounted investees								
Future cash inflows	30,323	2,658	15,157	-	-	11,006	-	1,502
Future production costs	(12,713)	(2,247)	(4,616)	-	-	(4,912)	-	(938)
Future development and abandonment costs	(6,284)	(3,349)	(902)	-	-	(1,926)	-	(107)
Future income tax expenses	(3,954)	1,038	(3,780)	-	-	(1,130)	-	(82)
Future net cash flows after taxes	7,372	(1,900)	5,859	-	-	3,038	-	375
10% annual discount for estimated timing of cash flows	(2,789)	1,278	(3,257)	-	-	(617)	-	(193)
Discounted future net cash flows	4,583	(622)	2,602	-	-	2,421	-	182
Total discounted future net cash flows	12,553	(852)	2,615	1,080	2,877	3,485	1,607	1,741

Millions of euros
At December 31st 2018

	Total	Europe	Venezuela	Peru	United States	Rest of America	Africa	Asia and Oceania
Fully-consolidated entities								
Future cash inflows	45,648	3,146	88	11,465	12,079	5,277	7,709	5,884
Future production costs	(16,013)	(1,543)	(33)	(4,964)	(4,127)	(2,370)	(1,221)	(1,755)
Future development and abandonment costs	(8,202)	(1,811)	(9)	(449)	(1,978)	(2,292)	(625)	(1,038)
Future income tax expenses	(7,135)	302	(18)	(1,910)	(568)	(185)	(3,673)	(1,083)
Future net cash flows after taxes	14,298	94	28	4,142	5,406	430	2,190	2,008
10% annual discount for estimated timing of cash flows	(5,731)	(2)	(10)	(2,639)	(2,405)	571	(670)	(576)
Discounted future net cash flows	8,567	92	18	1,503	3,001	1,001	1,520	1,432
Equity-accounted investees								
Future cash inflows	32,495	3,270	14,813	-	-	12,889	-	1,523
Future production costs	(13,839)	(2,653)	(4,370)	-	-	(5,930)	-	(886)
Future development and abandonment costs	(5,729)	(2,542)	(1,031)	-	-	(2,047)	-	(109)
Future income tax expenses	(4,334)	881	(3,807)	-	-	(1,316)	-	(92)
Future net cash flows after taxes	8,593	(1,044)	5,605	-	-	3,596	-	436
10% annual discount for estimated timing of cash flows	(3,251)	943	(3,135)	-	-	(866)	-	(193)
Discounted future net cash flows	5,342	(101)	2,470	-	-	2,730	-	243
Total discounted future net cash flows	13,909	(9)	2,488	1,503	3,001	3,731	1,520	1,675

Millions of euros
At December 31st 2019

	<u>Total</u>	<u>Europe</u>	<u>Venezuela</u>	<u>Peru</u>	<u>United States</u>	<u>Rest of America</u>	<u>Africa</u>	<u>Asia and Oceania</u>
Fully-consolidated entities								
Future cash inflows	36,832	2,613	58	7,280	12,318	4,663	6,579	3,321
Future production costs	(15,657)	(1,417)	(25)	(3,574)	(6,013)	(2,682)	(1,006)	(940)
Future development and abandonment costs	(6,785)	(1,204)	(9)	(712)	(2,366)	(1,426)	(785)	(283)
Future income tax expenses	(4,729)	264	(11)	(891)	(303)	(168)	(2,891)	(729)
Future net cash flows after taxes	9,661	256	13	2,103	3,636	387	1,897	1,369
10% annual discount for estimated timing of cash flows	(3,121)	(10)	(4)	(1,276)	(1,331)	303	(569)	(234)
Discounted future net cash flows	6,540	246	9	827	2,305	690	1,328	1,135
Equity-accounted investees								
Future cash inflows	23,897	2,220	10,257	-	-	9,884	-	1,536
Future production costs	(10,070)	(1,324)	(3,114)	-	-	(4,598)	-	(1,034)
Future development and abandonment costs	(3,973)	(1,960)	(410)	-	-	(1,498)	-	(105)
Future income tax expenses	(2,791)	544	(2,583)	-	-	(669)	-	(83)
Future net cash flows after taxes	7,063	(520)	4,150	-	-	3,119	-	314
10% annual discount for estimated timing of cash flows	(2,464)	620	(2,148)	-	-	(810)	-	(126)
Discounted future net cash flows	4,599	100	2,002	-	-	2,309	-	188
Total discounted future net cash flows	11,139	346	2,011	827	2,305	2,999	1,328	1,323

Changes in Standardized measure of discounted future net cash flows relating to proved oil and gas reserves

The detail of the changes in the standardized measure of discounted future net cash flows for 2017, 2018 and 2019 as follows:

Millions of euros

	Total	Europe	Venezuela	Peru	United States	Rest of America	Africa	Asia and Oceania
Fully-consolidated entities								
Balance at December 31st, 2016	9,963	(179)	28	1,330	3,472	1,926	1,716	1,670
Changes due to sale or transfer prices of future production costs	(2,528)	50	(20)	(368)	(791)	(438)	(463)	(498)
Changes in future development costs	424	532	(2)	(2)	45	(191)	(19)	61
Oil and gas sales and transfers in the period	(1,807)	(133)	-	(116)	(528)	(289)	(215)	(526)
Net changes due to extensions, discoveries and improvements in the recovery of reserves	619	-	-	-	574	45	-	-
Net changes due to purchases/sales of assets	33	-	-	-	(5)	(6)	-	44
Net changes due to revisions in quantity estimates	237	(208)	4	(47)	(238)	37	200	489
Previously estimated development costs incurred in the year	773	65	-	106	232	36	134	200
Effect of discounting to a different date and exchange rate effect	(336)	1	-	(30)	(114)	(73)	(51)	(69)
Other non-specific changes	-	-	-	-	-	-	-	-
Changes in income tax	592	(358)	3	207	230	17	305	188
Net change	(1,993)	(51)	(15)	(250)	(595)	(862)	(109)	(111)
Balance at December 31st, 2017	7,970	(230)	13	1,080	2,877	1,064	1,607	1,559
Changes due to sale or transfer prices of future production costs	(468)	69	6	655	(591)	(374)	(122)	(111)
Changes in future development costs	304	496	(1)	(18)	(60)	(5)	(12)	(96)
Oil and gas sales and transfers in the period	(2,266)	(124)	1	(119)	(494)	(308)	(639)	(583)
Net changes due to extensions, discoveries and improvements in the recovery of reserves	325	-	-	-	256	63	-	6
Net changes due to purchases/sales of assets	66	70	-	-	(4)	-	-	-
Net changes due to revisions in quantity estimates	707	52	(3)	(62)	386	293	199	(158)
Previously estimated development costs incurred in the year	933	82	1	32	257	115	73	373
Effect of discounting to a different date and exchange rate effect	1,104	(33)	1	162	405	137	211	221
Other non-specific changes	-	-	-	-	-	-	-	-
Changes in income tax	(108)	(290)	-	(227)	(31)	16	203	221
Net change	597	322	5	423	124	(63)	(87)	(127)
Balance at December 31st, 2018	8,567	92	18	1,503	3,001	1,001	1,520	1,432
Changes due to sale or transfer prices of future production costs	(3,861)	(284)	(4)	(1,015)	(1,384)	(493)	(520)	(161)
Changes in future development costs	87	198	(2)	(124)	(139)	123	(33)	64
Oil and gas sales and transfers in the period	(2,818)	(201)	(6)	(184)	(610)	(323)	(816)	(678)
Net changes due to extensions, discoveries and improvements in the recovery of reserves	369	-	-	-	319	50	-	-
Net changes due to purchases/sales of assets	432	14	-	-	418	-	-	-
Net changes due to revisions in quantity estimates	290	142	(4)	25	(228)	105	269	(19)
Previously estimated development costs incurred in the year	1,045	315	1	32	398	96	83	120
Effect of discounting to a different date and exchange rate effect	954	22	1	175	352	104	159	141
Other non-specific changes	-	-	-	-	-	-	-	-
Changes in income tax	1,475	(52)	5	415	178	27	666	236
Net change	(2,027)	154	(9)	(676)	(696)	(311)	(192)	(297)
Balance at December 31st, 2019	6,540	246	9	827	2,305	690	1,328	1,135

Millions of euros

	Total	Europe	Venezuela	Peru	United States	Rest of America	Africa	Asia and Oceania
Equity-accounted investees								
Balance at December 31st, 2016	4,227	(1,387)	2,608	-	-	2,692	-	314
Changes due to sale or transfer prices of future production costs	(603)	230	16	-	-	(722)	-	(127)
Changes in future development costs	861	599	51	-	-	237	-	(26)
Oil and gas sales and transfers in the period	(1,201)	(144)	(302)	-	-	(699)	-	(56)
Net changes due to extensions, discoveries and improvements in the recovery of reserves	-	-	-	-	-	-	-	-
Net changes due to purchases/sales of assets	(1)	-	-	-	-	-	-	(1)
Net changes due to revisions in quantity estimates	791	(150)	119	-	-	777	-	45
Previously estimated development costs incurred in the year	615	201	89	-	-	307	-	18
Effect of discounting to a different date and exchange rate effect	(213)	6	(101)	-	-	(112)	-	(6)
Other non-specific changes	-	-	-	-	-	-	-	-
Changes in income tax	107	23	122	-	-	(59)	-	21
Net change	356	765	(6)	-	-	(271)	-	(132)
Balance at December 31st, 2017	4,584	(622)	2,602	-	-	2,422	-	182
Changes due to sale or transfer prices of future production costs	369	75	220	-	-	45	-	29
Changes in future development costs	662	805	(56)	-	-	(95)	-	8
Oil and gas sales and transfers in the period	(1,382)	(136)	(332)	-	-	(877)	-	(37)
Net changes due to extensions, discoveries and improvements in the recovery of reserves	117	-	-	-	-	112	-	5
Net changes due to purchases/sales of assets	-	-	-	-	-	-	-	-
Net changes due to revisions in quantity estimates	(122)	(108)	(579)	-	-	542	-	23
Previously estimated development costs incurred in the year	499	125	62	-	-	300	-	12
Effect of discounting to a different date and exchange rate effect	621	(79)	360	-	-	313	-	27
Other non-specific changes	-	-	-	-	-	-	-	-
Changes in income tax	(5)	(161)	193	-	-	(31)	-	(6)
Net change	759	521	(132)	-	-	309	-	61
Balance at December 31st, 2018	5,342	(101)	2,470	-	-	2,730	-	243
Changes due to sale or transfer prices of future production costs	(965)	265	(381)	-	-	(781)	-	(68)
Changes in future development costs	799	181	405	-	-	222	-	(9)
Oil and gas sales and transfers in the period	(1,609)	(236)	(242)	-	-	(1,077)	-	(54)
Net changes due to extensions, discoveries and improvements in the recovery of reserves	57	-	-	-	-	53	-	4
Net changes due to purchases/sales of assets	-	-	-	-	-	-	-	-
Net changes due to revisions in quantity estimates	(1,199)	96	(1,332)	-	-	6	-	31
Previously estimated development costs incurred in the year	528	134	27	-	-	353	-	14
Effect of discounting to a different date and exchange rate effect	564	(31)	291	-	-	279	-	25
Other non-specific changes	-	-	-	-	-	-	-	-
Changes in income tax	1,082	(208)	764	-	-	524	-	2
Net change	(743)	201	(468)	-	-	(421)	-	(55)
Balance at December 31st, 2019	4,599	100	2,002	-	-	2,309	-	188
Total fully-consolidated and equity-accounted entities	11,139	346	2,011	827	2,305	2,999	1,328	1,323

(6) Production of oil and gas

The next table shows the productions in volume and the number of Repsol's productive wells by geographic area:

	Net Production of liquids and natural gas by area									Productive wells by area					
	Liquids (Mbbbl)			Natural gas (bcf)			Total (Mbep)			Oil			Gas		
	2019	2018	2017	2019	2018	2017	2019	2018	2017	2019	2018	2017	2019	2018	2017
Europe	16	16	16	35	31	17	22	22	19	241	231	222	11	12	6
Norway	6	6	6	28	23	13	11	10	8	66	61	55	8	9	3
United Kingdom	10	10	9	7	8	4	11	11	10	168	161	157	2	2	2
Rest of Europe	-	-	1	-	-	-	-	1	1	7	9	10	1	1	1
Latin America	35	36	38	483	504	498	121	125	127	792	771	873	241	227	241
Brazil	15	16	17	9	7	9	17	18	18	27	29	30	-	-	-
Colombia	7	5	5	8	8	7	8	7	6	479	440	398	-	-	-
Peru	5	5	5	72	68	67	18	17	17	-	-	-	29	28	27
Trinidad & Tobago	1	1	1	221	238	217	40	43	40	1	1	1	78	66	73
Venezuela	3	3	5	97	110	130	20	23	28	97	106	247	31	32	32
Rest of Latin America	5	6	5	75	73	68	18	17	17	188	195	197	103	101	109
North America	18	17	18	274	261	256	66	64	63	1,434	1,439	2,657	2,918	2,795	2,219
Canada	8	8	8	74	82	82	21	22	22	1,158	1,163	1,098	1,611	1,564	1,055
United States	10	9	10	200	178	174	45	42	41	276	276	1,559	1,307	1,231	1,164
Africa	15	16	12	42	26	8	22	21	14	385	94	248	92	93	84
Asia and Oceania	9	10	9	98	108	122	27	29	31	668	625	606	70	82	78
Indonesia	-	1	-	78	82	80	14	15	15	7	6	6	35	44	42
Malaysia	4	4	3	18	25	30	7	8	8	79	75	75	35	38	33
Russia	3	3	4	-	-	11	3	3	6	542	505	472	-	-	-
Rest of Asia and Oceania	2	2	2	1	1	1	2	3	2	40	39	53	-	-	3
Total	93	95	93	931	930	901	259	261	254	3,520	3,160	4,606	3,332	3,209	2,628

(7) Results of oil and gas exploration and production activities

The following table shows the revenues and expenses associated directly with the Group's oil and gas exploration and production activities. It does not include any allocation of the finance costs or general expenses, except for the accretion expense, and, therefore, is not necessarily indicative of the contribution to consolidated net profit of the oil and gas activities.

Millions of euros

At December 31st
2017

	Total	Europe	Venezuela	Peru	United States	Rest of America	Africa	Asia and Oceania
Fully-consolidated entities								
Income								
Sales to non-Group companies	2,577	347	2	283	560	528	6	851
Sales between business segments and to Group Companies	688	32	-	8	312	61	275	-
Total income	3,265	379	2	291	872	589	281	851
Production costs ⁽¹⁾	(1,024)	(148)	(9)	(75)	(222)	(260)	(54)	(256)
Production taxes ⁽¹⁾	(104)	-	-	(62)	(5)	-	(29)	(8)
Exploration expenses ⁽²⁾	(547)	(136)	-	43	(145)	(135)	(54)	(120)
Other operating expenses ⁽¹⁾	73	(29)	(8)	(1)	(152)	(30)	293	-
Depreciation and amortisation charge ⁽³⁾	(1,163)	(83)	(67)	(43)	(563)	56	(102)	(361)
Profit (Loss) before taxes and charges	500	(17)	(82)	153	(215)	220	335	106
Taxes and charges	(880)	(57)	22	(7)	(236)	(292)	(239)	(71)
Results of oil and gas production activities	(380)	(74)	(60)	146	(451)	(72)	96	35
Equity-accounted investees								
Income								
Sales to non-Group companies	2,226	431	525	-	-	1,106	-	164
Sales between business segments and to Group Companies	494	-	-	-	-	494	-	-
Total income	2,720	431	525	-	-	1,600	-	164
Production costs ⁽¹⁾	(895)	(311)	(71)	-	-	(496)	-	(17)
Production taxes ⁽¹⁾	(322)	-	(71)	-	-	(209)	-	(42)
Exploration expenses ⁽²⁾	(27)	-	-	-	-	(17)	-	(10)
Other operating expenses ⁽¹⁾	553	888	(291)	-	-	(10)	-	(34)
Depreciation and amortisation charge ⁽³⁾	(1,359)	(103)	(634)	-	-	(607)	-	(15)
Profit (Loss) before taxes and charges	670	905	(542)	-	-	261	-	46
Taxes and charges	56	-	146	-	-	(74)	-	(16)
Results of oil and gas production activities	726	905	(396)	-	-	187	-	30
Total results of oil and gas activities ⁽⁴⁾	346	831	(456)	146	(451)	115	96	65

Millions of euros

At December 31st
2018

	Total	Europe	Venezuela	Peru	United States	Rest of America	Africa	Asia and Oceania
Fully-consolidated entities								
Income								
Sales to non-Group companies	3,643	531	4	381	590	481	666	990
Sales between business segments and to Group Companies	907	28	-	12	339	97	393	38
Total income	4,550	559	4	393	929	578	1,059	1,028
Production costs ⁽¹⁾	(1,106)	(163)	(14)	(105)	(223)	(319)	(76)	(206)
Production taxes ⁽¹⁾	(159)	-	(1)	(77)	(9)	-	(53)	(19)
Exploration expenses ⁽²⁾	(627)	(213)	-	1	(64)	(80)	(146)	(125)
Other operating expenses ⁽¹⁾	(421)	8	(291)	6	(149)	65	(6)	(54)
Depreciation and amortisation charge ⁽³⁾	(1,466)	(11)	(1)	(38)	(606)	(273)	(134)	(403)
Profit (Loss) before taxes and charges	771	180	(303)	180	(122)	(29)	644	221
Taxes and charges	(909)	(259)	(21)	(138)	32	(84)	(701)	262
Results of oil and gas production activities	(138)	(79)	(324)	42	(90)	(113)	(57)	483
Equity-accounted investees								
Income								
Sales to non-Group companies	2,488	619	424	-	-	1,280	-	165
Sales between business segments and to Group Companies	663	20	-	-	-	643	-	-
Total income	3,151	639	424	-	-	1,923	-	165
Production costs ⁽¹⁾	(796)	(308)	(28)	-	-	(456)	-	(4)
Production taxes ⁽¹⁾	(448)	-	(62)	-	-	(332)	-	(54)
Exploration expenses ⁽²⁾	(43)	(1)	-	-	-	(37)	1	(6)
Other operating expenses ⁽¹⁾	107	36	126	-	-	(23)	-	(32)
Depreciation and amortisation charge ⁽³⁾	(869)	121	(394)	-	-	(585)	-	(11)
Profit (Loss) before taxes and charges	1,102	487	66	-	-	490	1	58
Taxes and charges	(95)	208	(50)	-	-	(240)	-	(13)
Results of oil and gas production activities	1,007	695	16	-	-	250	1	45
Total results of oil and gas activities ⁽⁴⁾	869	616	(308)	42	(90)	137	(56)	528

Millions of euros

At December 31st
2019

	Total	Europe	Venezuela	Peru	United States	Rest of America	Africa	Asia and Oceania
Fully-consolidated entities								
Income								
Sales to non-Group companies	3,289	407	6	267	572	496	636	905
Sales between business segments and to Group Companies	825	11	-	11	321	154	327	1
Total income	4,114	418	6	278	893	650	963	906
Production costs ⁽¹⁾	(986)	(113)	(5)	(72)	(256)	(292)	(82)	(166)
Production taxes ⁽¹⁾	(159)	-	(1)	(60)	(6)	-	(62)	(30)
Exploration expenses ⁽²⁾	(916)	(134)	-	(1)	3	(145)	(111)	(528)
Other operating expenses ⁽¹⁾	(402)	(51)	(117)	(14)	(131)	(68)	33	(54)
Depreciation and amortisation charge ⁽³⁾	(5,912)	(178)	(1)	(49)	(2,383)	(2,768)	(190)	(343)
Profit (Loss) before taxes and charges	(4,261)	(58)	(118)	82	(1,880)	(2,623)	551	(215)
Taxes and charges ⁽⁵⁾	(92)	(87)	7	(25)	50	497	(418)	(116)
Results of oil and gas production activities	(4,353)	(145)	(111)	57	(1,830)	(2,126)	133	(331)
Equity-accounted investees								
Income								
Sales to non-Group companies	2,208	570	383	-	-	1,099	-	156
Sales between business segments and to Group Companies	561	20	-	-	-	541	-	-
Total income	2,769	590	383	-	-	1,640	-	156
Production costs ⁽¹⁾	(592)	(227)	(32)	-	-	(317)	-	(16)
Production taxes ⁽¹⁾	(409)	-	(55)	-	-	(291)	-	(63)
Exploration expenses ⁽²⁾	(121)	(1)	-	-	-	(65)	-	(55)
Other operating expenses ⁽¹⁾	(90)	19	(86)	-	-	(10)	-	(13)
Depreciation and amortisation charge ⁽³⁾	(1,218)	(242)	(39)	-	-	(926)	-	(11)
Profit (Loss) before taxes and charges	339	139	171	-	-	31	-	(2)
Taxes and charges ⁽⁵⁾	(63)	(38)	(90)	-	-	75	-	(10)
Results of oil and gas production activities	276	101	81	-	-	106	-	(12)
Total results of oil and gas activities ⁽⁴⁾	(4,077)	(44)	(30)	57	(1,830)	(2,020)	133	(343)

(1) In order to facilitate the understanding and comparability with companies in the sector of the results of oil and gas exploration and production activities, the structure of the results table has been modified to differentiate "Taxes on production", reclassifying the amounts previously included under "Production costs" to this heading. In addition, transportation costs were reclassified to "Other income and other expenses" in the amount of €333 million and €317 million in 2018 and 2017, respectively, and the results of abandonment provisions were included together with "Depreciation and amortization charge and provisions" amounting to €265 million in income and €17 million in expenses in 2018 and 2017, respectively.

(2) Exploration expenses include charges for the impairment of exploration assets of €713, €312 and €339 million in 2019, 2018 and 2017, respectively.

(3) Depreciation and amortization charge and provisions" includes the net impairment of production assets and development and provisions for onerous charges, as well as impairment of goodwill amounting to €4,981 million, €717 million and €335 million in 2019, 2018 and 2017, respectively (see Note 21 to the Financial Statements and section 4.1. of the Management Report).

(4) Results generated for divestments are not included. In addition, it does not include the provision recognized in 2019, amounting to €837 million, as a result of the second award issued by the Arbitration Court in relation to the proceedings initiated by Addax Petroleum UK Limited and Sinopec International Petroleum Exploration and Production Corporation.

(5) The income tax expense includes the impairment of tax assets recognized in 2019 amounting to €470 million (see Note 21 to the Financial Statements and section 4.1. of the Management Report).

(8) Investments

Investments of the year (cost incurred)

The costs incurred represent amounts capitalised during the year relating to acquisitions of properties and for exploration and development activities, including dismantling costs.

Millions of euros

At December 31st 2017

	<u>Total</u>	<u>Europe</u>	<u>Venezuela</u>	<u>Peru</u>	<u>United States</u>	<u>Rest of America</u>	<u>Africa</u>	<u>Asia and Oceania</u>
Fully-consolidated entities								
Acquisition of proved properties	5	-	-	-	-	-	-	5
Acquisition of unproved properties	-	-	-	-	-	-	-	-
Exploration costs	528	104	-	1	74	186	48	115
Development costs	968	56	1	32	376	194	168	141
Costs incurred	1,501	160	1	33	450	380	216	261
Equity-accounted investees								
Acquisition of proved properties	-	-	-	-	-	-	-	-
Acquisition of unproved properties	-	-	-	-	-	-	-	-
Exploration costs	48	(1)	-	-	-	35	-	14
Development costs	534	(27)	26	-	-	522	-	13
Costs incurred	582	(28)	26	-	-	557	-	27
Total costs incurred	2,083	132	27	33	450	937	216	288

Millions of euros

At December 31st 2018

	<u>Total</u>	<u>Europe</u>	<u>Venezuela</u>	<u>Peru</u>	<u>United States</u>	<u>Rest of America</u>	<u>Africa</u>	<u>Asia and Oceania</u>
Fully-consolidated entities								
Acquisition of proved properties	174	158	-	-	13	3	-	-
Acquisition of unproved properties	-	-	-	-	-	-	-	-
Exploration costs	531	110	-	(1)	47	279	31	65
Development costs	926	124	-	97	437	38	142	88
Costs incurred	1,631	392	-	96	497	320	173	153
Equity-accounted investees								
Acquisition of proved properties	-	-	-	-	-	-	-	-
Acquisition of unproved properties	-	-	-	-	-	-	-	-
Exploration costs	70	-	-	-	-	53	-	17
Development costs	120	(44)	3	-	-	149	-	12
Costs incurred	190	(44)	3	-	-	202	-	29
Total costs incurred	1,821	348	3	96	497	522	173	182

Millions of euros
At December 31st 2019

	Total	Europe	Venezuela	Peru	United States	Rest of America	Africa	Asia and Oceania
Fully-consolidated entities								
Acquisition of proved properties	512	37	-	-	475	-	-	-
Acquisition of unproved properties	-	-	-	-	-	-	-	-
Exploration costs	479	96	-	-	220	111	14	38
Development costs	1,138	315	-	7	589	34	63	130
Costs incurred	2,129	448	-	7	1,284	145	77	168
Equity-accounted investees								
Acquisition of proved properties	-	-	-	-	-	-	-	-
Acquisition of unproved properties	-	-	-	-	-	-	-	-
Exploration costs	55	-	-	-	-	42	-	13
Development costs	546	130	-	-	-	401	-	15
Costs incurred	601	130	-	-	-	443	-	28
Total costs incurred	2,730	578	-	7	1,284	588	77	196

Accumulated investments (capitalised costs)

Capitalised costs represent the historical costs capitalised related to oil and gas exploration and production activities, including auxiliary equipment and facilities, and the related accumulated depreciation and accumulated impairment losses.

Millions of euros
At December 31st 2017

	<u>Total</u>	<u>Europe</u>	<u>Venezuela</u>	<u>Peru</u>	<u>United States</u>	<u>Rest of America</u>	<u>Africa</u>	<u>Asia and Oceania</u>
Fully-consolidated entities								
Capitalised costs of proved oil and gas properties	14,525	776	67	521	6,374	2,679	1,520	2,588
Capitalised costs of unproved oil and gas properties	8,282	174	-	20	3,534	2,551	278	1,725
	22,807	950	67	541	9,908	5,230	1,798	4,313
Auxiliary equipment and facilities	3,784	303	36	526	1,025	754	955	185
Total capitalised costs	26,591	1,253	103	1,067	10,933	5,984	2,753	4,498
Accumulated depreciation and impairment losses	(10,547)	(919)	(99)	(265)	(4,706)	(1,836)	(1,525)	(1,197)
Net amount	16,044	334	4	802	6,227	4,148	1,228	3,301
Equity-accounted investees								
Capitalised costs of proved oil and gas properties	8,665	829	1,561	-	-	6,096	-	179
Capitalised costs of unproved oil and gas properties	2,136	1,154	-	-	-	866	-	116
	10,801	1,983	1,561	-	-	6,962	-	295
Auxiliary equipment and facilities	3,156	351	757	-	-	2,047	-	1
Total capitalised costs	13,957	2,334	2,318	-	-	9,009	-	296
Accumulated depreciation and impairment losses	(6,909)	(795)	(1,389)	-	-	(4,652)	-	(73)
Net amount	7,048	1,539	929	-	-	4,357	-	223
Total Net amounts	23,092	1,873	933	802	6,227	8,505	1,228	3,524

Millions of euros
At December 31st 2018

	Total	Europe	Venezuela	Peru	United States	Rest of America	Africa	Asia and Oceania
Fully-consolidated entities								
Capitalised costs of proved oil and gas properties	20,727	938	71	556	8,539	5,362	1,722	3,539
Capitalised costs of unproved oil and gas properties	2,152	92	-	0	837	368	112	743
	22,879	1,030	71	556	9,376	5,730	1,834	4,282
Auxiliary equipment and facilities	4,576	465	33	662	1,065	830	1,108	413
Total capitalised costs	27,455	1,495	104	1,218	10,441	6,560	2,942	4,695
Accumulated depreciation and impairment losses	(11,093)	(1,001)	(100)	(315)	(4,100)	(2,199)	(1,745)	(1,633)
Net amount	16,362	494	4	903	6,341	4,361	1,197	3,062
Equity-accounted investees								
Capitalised costs of proved oil and gas properties	10,736	2,036	1,559	-	-	6,959	-	182
Capitalised costs of unproved oil and gas properties	802	-	(1)	-	-	708	-	95
	11,538	2,036	1,558	-	-	7,667	-	277
Auxiliary equipment and facilities	3,094	357	833	-	-	1,902	-	2
Total capitalised costs	14,632	2,393	2,391	-	-	9,569	-	279
Accumulated depreciation and impairment losses	(8,311)	(991)	(1,827)	-	-	(5,420)	-	(73)
Net amount	6,321	1,402	564	-	-	4,149	-	206
Total Net amounts	22,683	1,896	568	903	6,341	8,510	1,197	3,268

Millions of euros
At December 31st 2019

	Total	Europe	Venezuela	Peru	United States	Rest of America	Africa	Asia and Oceania
Fully-consolidated entities								
Capitalised costs of proved oil and gas properties	21,724	1,036	72	505	9,630	5,424	1,762	3,295
Capitalised costs of unproved oil and gas properties	1,837	89	-	0	1,198	370	20	160
	23,561	1,125	72	505	10,828	5,794	1,782	3,455
Auxiliary equipment and facilities	5,299	733	32	748	1,236	927	1,187	436
Total capitalised costs	28,860	1,858	104	1,253	12,064	6,721	2,969	3,891
Accumulated depreciation and impairment losses	(16,322)	(1,208)	(102)	(368)	(6,570)	(4,187)	(1,963)	(1,924)
Net amount	12,538	650	2	885	5,494	2,534	1,006	1,967
Equity-accounted investees								
Capitalised costs of proved oil and gas properties	11,326	2,116	1,587	-	-	7,399	-	224
Capitalised costs of unproved oil and gas properties	706	-	-	-	-	640	-	66
	12,032	2,116	1,587	-	-	8,039	-	290
Auxiliary equipment and facilities	4,022	462	870	-	-	2,688	-	2
Total capitalised costs	16,054	2,578	2,457	-	-	10,727	-	292
Accumulated depreciation and impairment losses	(9,584)	(1,214)	(1,895)	-	-	(6,381)	-	(94)
Net amount	6,470	1,364	562	-	-	4,346	-	198
Total Net amounts ⁽¹⁾	19,008	2,014	564	885	5,494	6,880	1,006	2,165

(1) In 2019, the European Union adopted IFRS 16 (for further details on its application in Repsol, see Note 2 on Bases of Presentation in the Consolidated Financial Statements). Consequently, total cumulative investments at December 31, 2019 increased by €835 million, mainly affecting "Ancillary equipment and facilities" of investees and consolidated companies, amounting to €685 million and €134 million, respectively.