



RYSTAD ENERGY

UCUBE COUNTRY FACTSHEET

Angola

SUMMARY

Angola

Country summary

Resources	Resources	Estimated 1P reserves	Estimated 2P reserves	2019 discovered volumes
	Mmboe	Mmboe	Mmboe	Mmboe
Oil	11,991	2,260	3,484	485
NGL	221	41	72	0
Gas	2,953	626	1,300	0
Total	15,165	2,926	4,856	485

Production	2020 production	2020 production change	Production growth last three years	Production growth next three years
	kboe/d	kboe/d		
Oil	1,353	-40	-6%	-5%
NGL	40	-12	13%	-11%
Gas	115	-9	1%	-11%
Total	1,508	-61	-5%	-6%

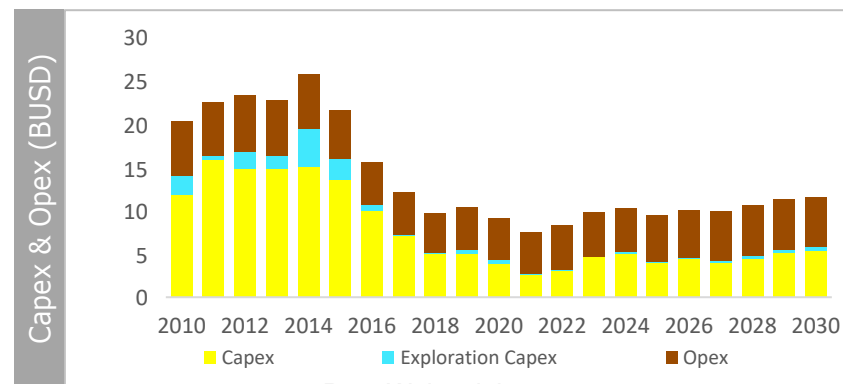
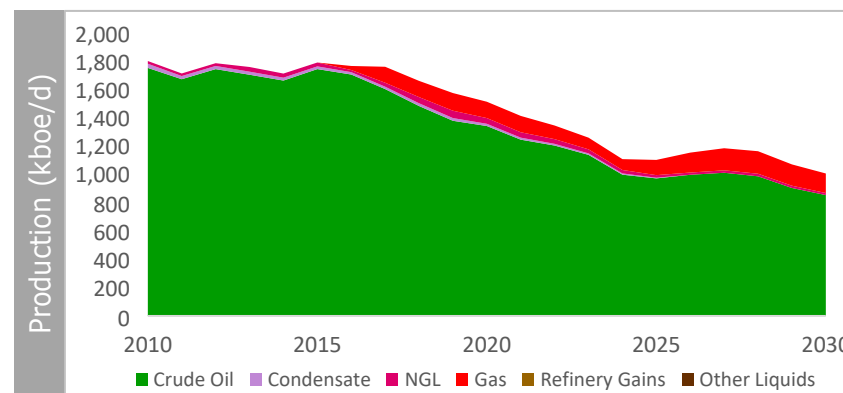
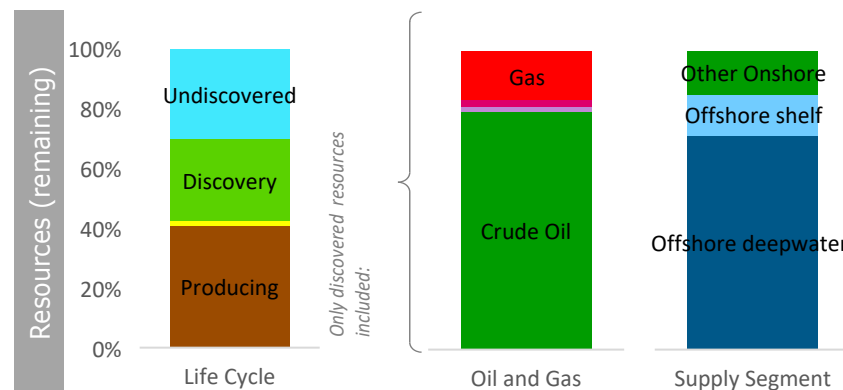
Activity	Investments	Operational costs	Awarded licenses
	MUSD	MUSD	#
2018	5,103	4,610	
2019	5,486	4,861	2
2020	4,317	4,749	3
2021	2,680	4,845	
2022	3,146	5,135	

Fiscal regime

Fiscal Regime	PSC
Average Gross Tax Rate	1.9%
Average Net Tax Rate	59.2%
Average Government Take	45.7%

Economic metrics

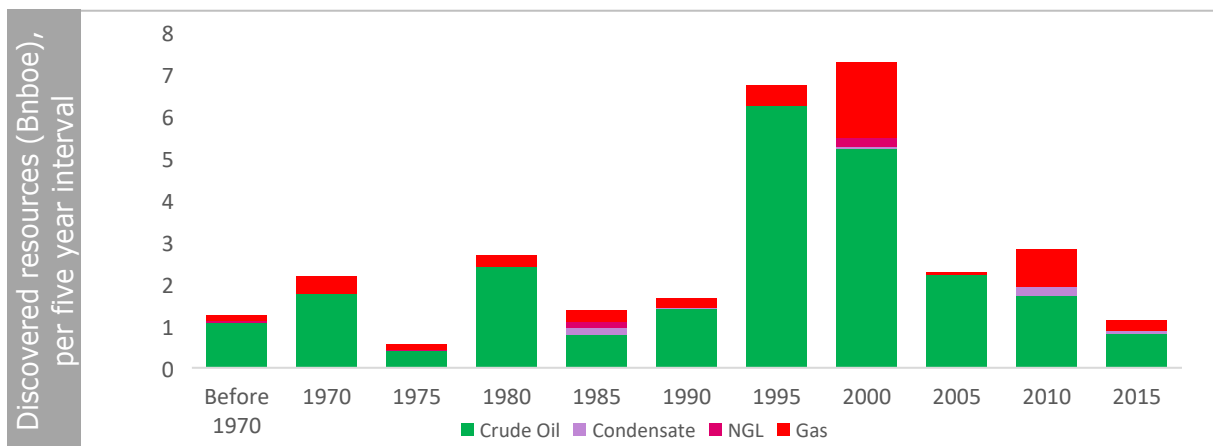
	2015-2019	2020-2024
	USD/boe	USD/boe
Average Offshore Development Capex	11.4	10.4
Average Opex	7.9	8.6
Average discovery cost	3.5	



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RESOURCES

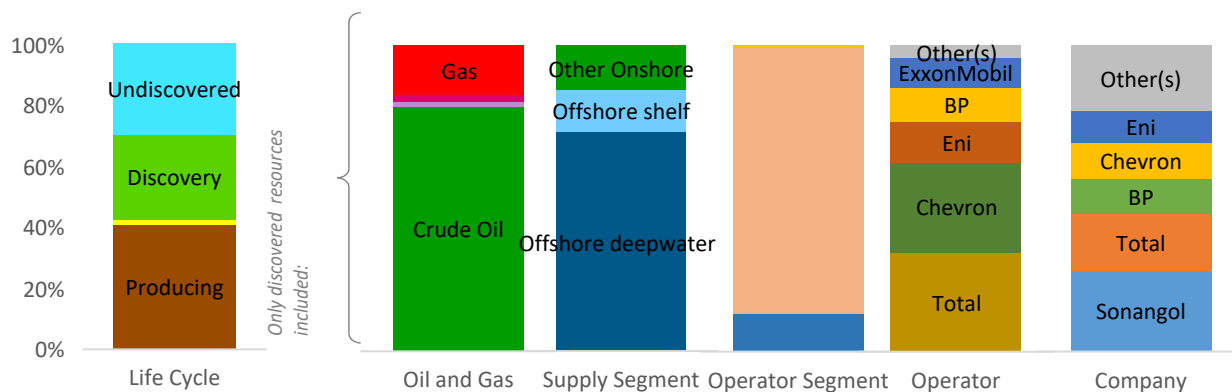
Angola



Discovered resources per five-year interval

Mmboe	Before 1970	1970	1975	1980	1985	1990	1995	2000	2005	2010	2015
Crude Oil	1,074	1,774	407	2,416	780	1,403	6,276	5,242	2,251	1,733	825
Condensate	-	-	3	4	179	41	3	50	-	192	50
NGL	59	4	15	13	147	3	9	221	-	2	14
Gas	124	424	135	271	283	224	484	1,797	24	905	259
Total	1,257	2,202	560	2,703	1,388	1,671	6,772	7,311	2,276	2,831	1,148

Remaining resources as end of 2019, split by different parameters



Key Resources Metrics	
First significant discovery	1966
Share Produced by the end of 2019	58%
Average reserves replacement, 2014-2019	23%

Resources as end of 2019

Bnboe	Original	Produced	Remaining
Crude Oil	22.5	14.1	8.4
Condensate	0.3	0.1	0.2
NGL	0.4	0.2	0.2
Gas	1.9	0.1	1.7
Total	25.1	14.5	10.5

Yet-to find potential

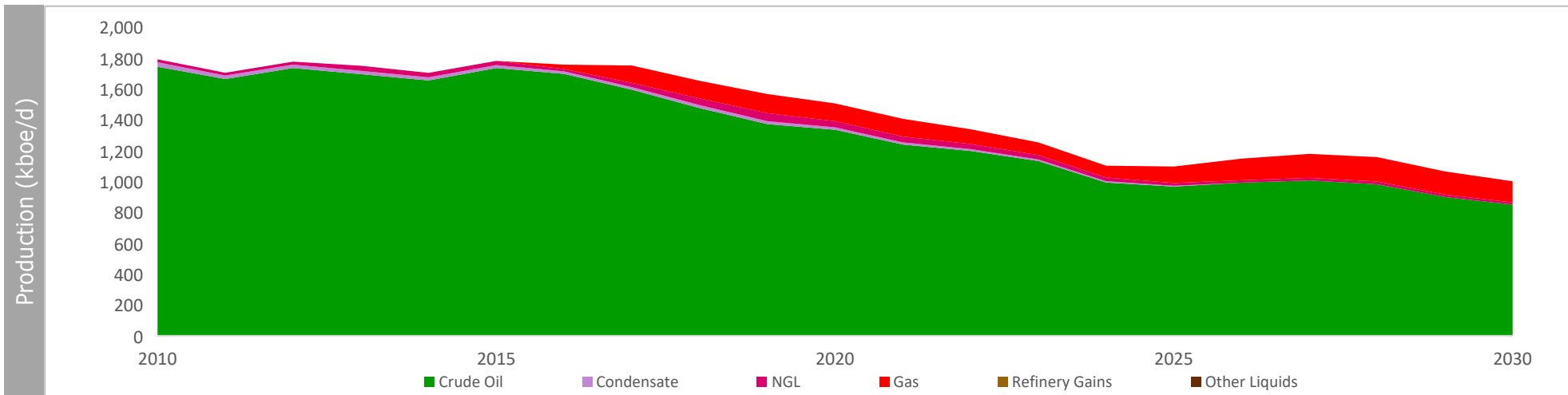
Bnboe	Undiscovered
Crude Oil	3.4
Condensate	0.0
NGL	0.0
Gas	1.2
Total	4.6

Resource Classification Proxy

Bnboe	1P	2P	R. Base
Crude Oil	2.2	3.5	8.4
Condensate	0.0	0.0	0.2
NGL	0.0	0.1	0.2
Gas	0.6	1.3	1.7
Total	2.9	4.9	10.5

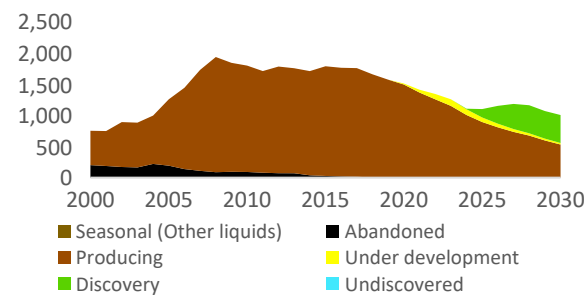
PRODUCTION

Angola

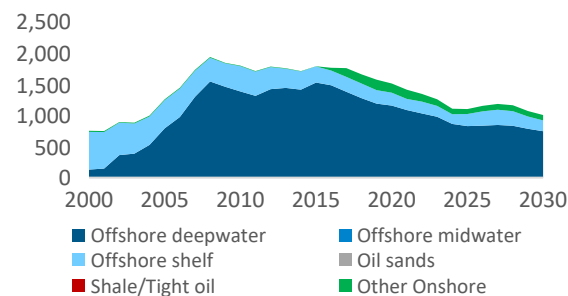


kboe/d	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Crude Oil	1,747	1,667	1,738	1,699	1,658	1,738	1,700	1,598	1,478	1,374	1,337	1,241	1,200	1,134	995	969	994	1,008	983	901	851
Condensate	29	23	22	22	21	19	17	17	20	19	16	14	12	10	9	5	-	-	-	-	0
NGL	19	18	19	33	29	27	15	28	43	52	40	38	33	29	24	18	16	17	18	16	15
Refinery Gains	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Liquids	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gas	-	-	-	-	-	-	28	112	114	124	115	115	96	82	76	107	140	156	158	150	138
Total	1,795	1,708	1,780	1,753	1,707	1,785	1,760	1,755	1,655	1,570	1,508	1,409	1,341	1,255	1,104	1,099	1,150	1,181	1,160	1,067	1,003

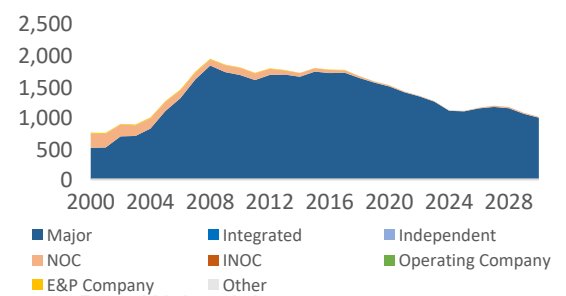
Production split by life cycle



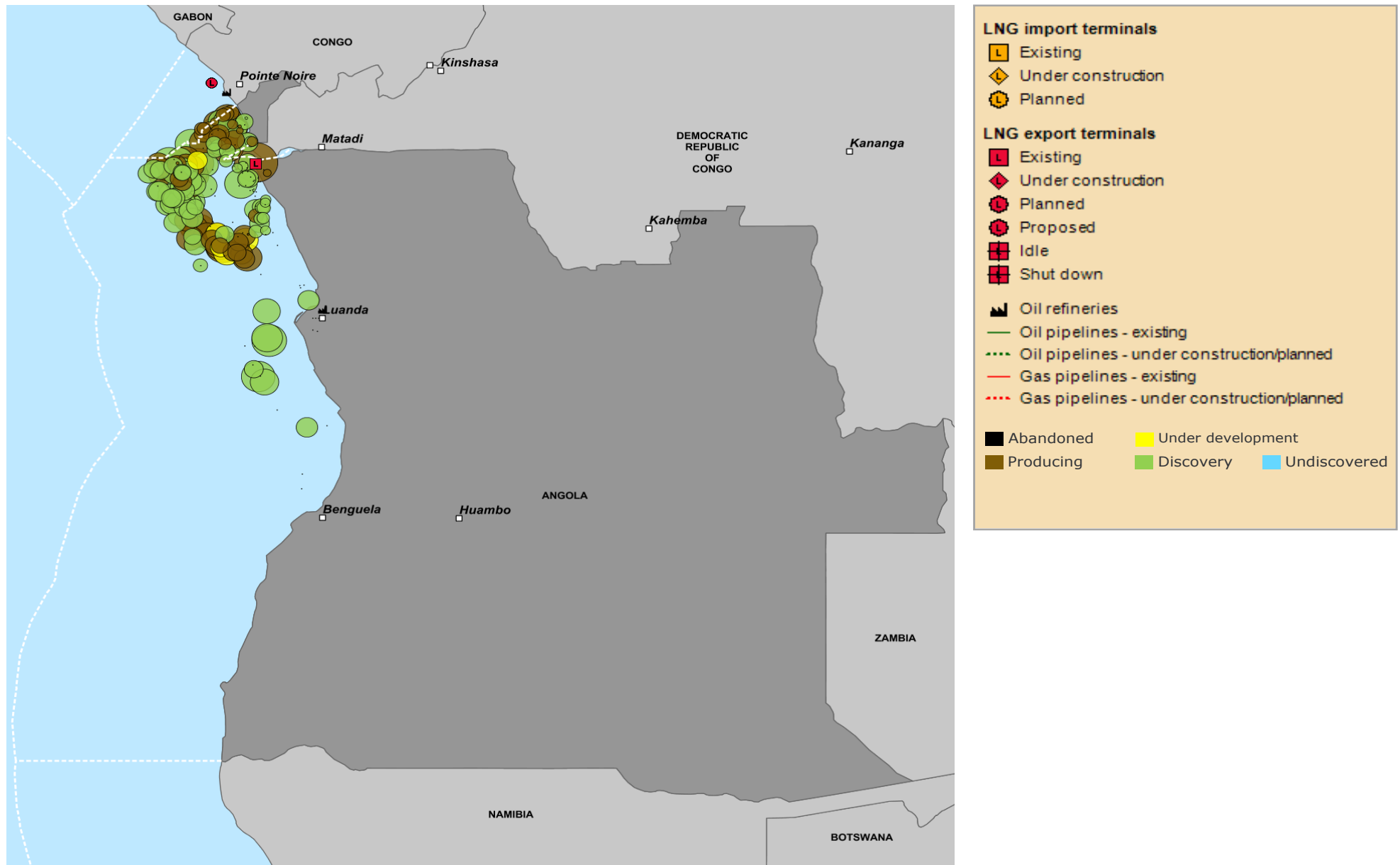
Supply segment



Operator segment

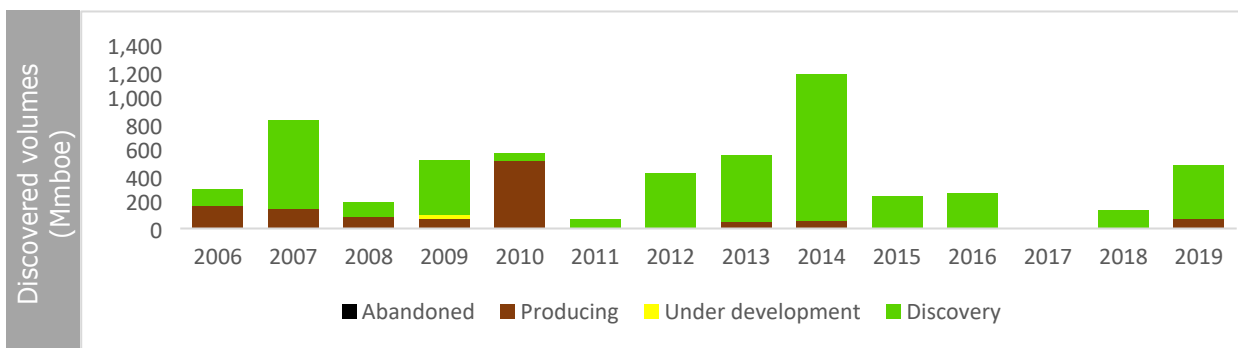


COUNTRY MAP Angola

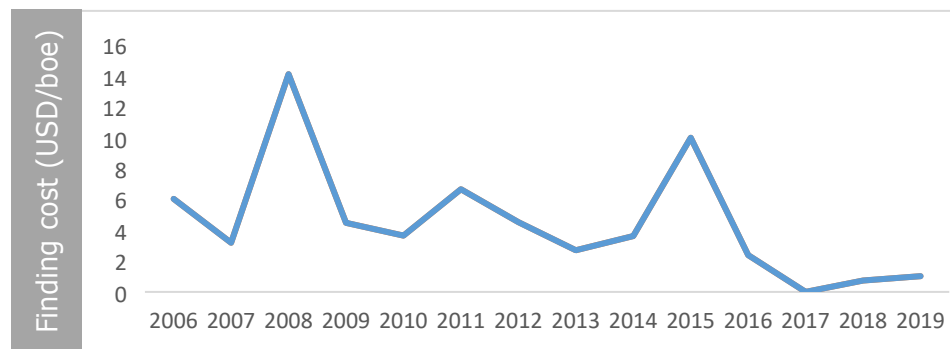
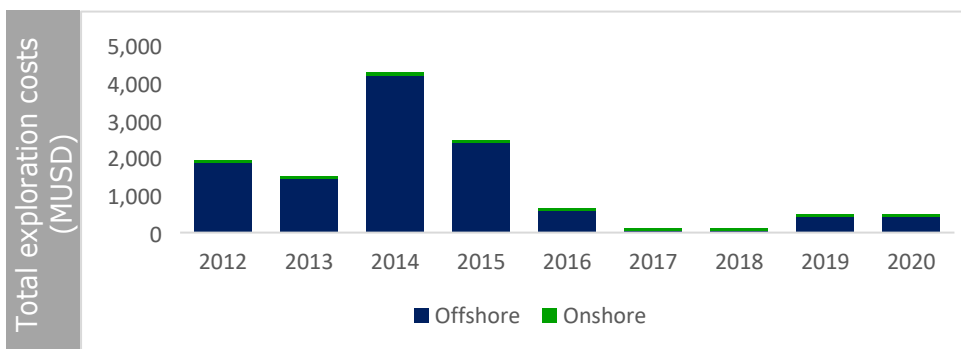


EXPLORATION ACTIVITY

Angola



Key Exploration Metrics		
Average volumes discovered 2013-2016	568	Mmboe
Average volumes discovered 2017-2019	208	Mmboe
Average exploration cost 2013-2016	2,246	MUSD
Average exploration cost 2017-2019	200	MUSD
Average finding cost 2013-2016	3.95	USD/boe
Average finding cost 2017-2019	0.96	USD/boe



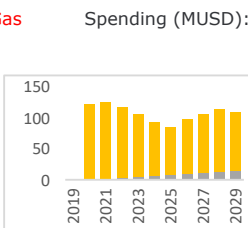
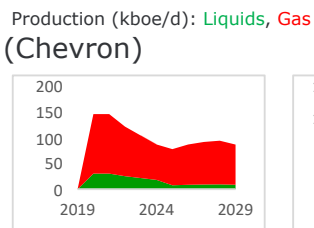
Top 10 discoveries last two years

Asset	Discovery Year	Operator	Province	Field type	Estimated start-up	Resources (Mmboe)	Estimated NPV (MUSD)
Agogo	2019	Eni	Atlantic Ocean	Oil	2025	244	1,464
Agidigbo	2019	Eni	Atlantic Ocean	Oil	2027	87	381
Ndungu	2019	Eni	Atlantic Ocean	Oil	2024	70	481

TOP 10 PRODUCING ASSETS (2020) Angola

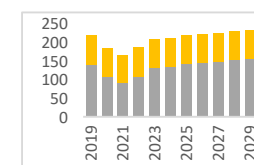
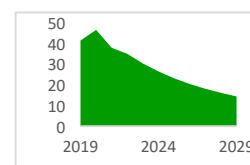
Angola LNG T1 (Upstream) (Chevron)

Field Type	Gas-Condensate
Start-up year	2016
Facility	Onshore
Original resources	1,735
Remaining resources	1,561



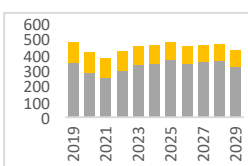
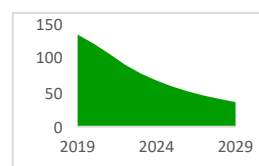
Rosa (Total)

Field Type	Oil
Start-up year	2007
Facility	Subsea tie back
Original resources	493
Remaining resources	157



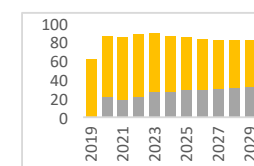
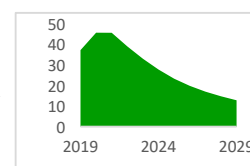
Dalia/Camelia (Total)

Field Type	Oil
Start-up year	2006
Facility	FPSO
Original resources	1,331
Remaining resources	358



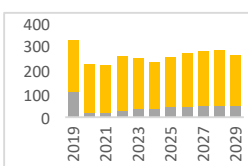
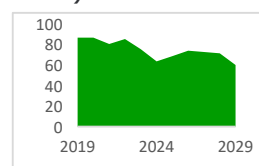
Mpungi (Eni)

Field Type	Oil
Start-up year	2016
Facility	Subsea tie back
Original resources	204
Remaining resources	140



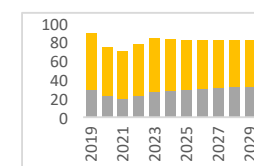
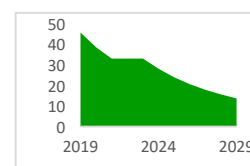
Mafumeira Sul (South) (Chevron)

Field Type	Oil
Start-up year	2016
Facility	Steel platform
Original resources	433
Remaining resources	372



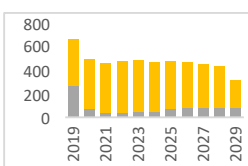
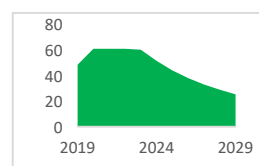
Cravo (Total)

Field Type	Oil
Start-up year	2014
Facility	Subsea tie back
Original resources	255
Remaining resources	128



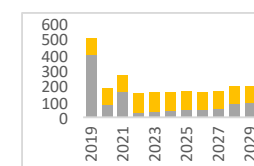
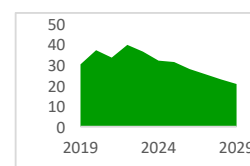
Cabaca South East (Eni)

Field Type	Oil
Start-up year	2017
Facility	FPSO
Original resources	293
Remaining resources	244



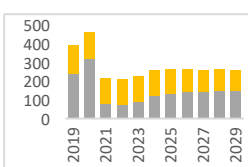
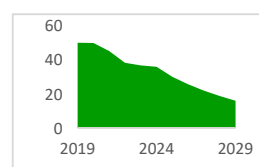
Mostarda (Total)

Field Type	Oil
Start-up year	2019
Facility	FPSO
Original resources	186
Remaining resources	175



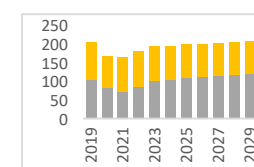
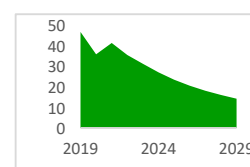
Gindungo (Total)

Field Type	Oil
Start-up year	2018
Facility	FPSO
Original resources	164
Remaining resources	137



Plutonio (BP)

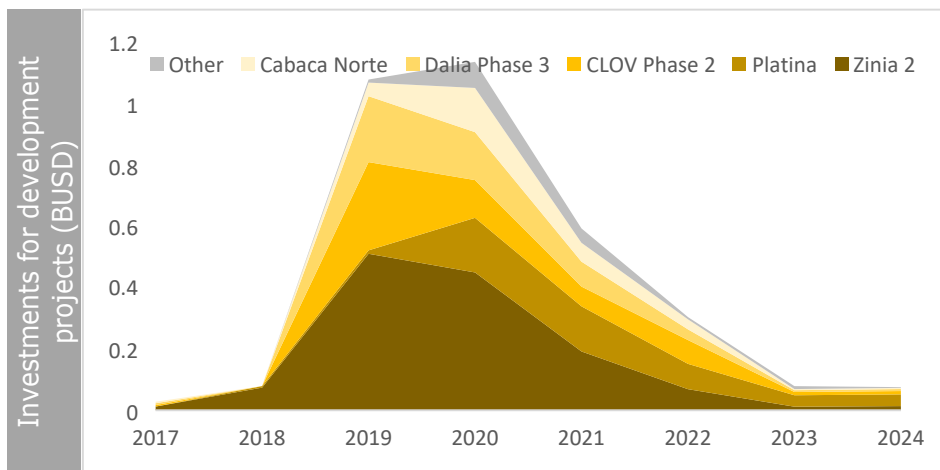
Field Type	Oil
Start-up year	2007
Facility	FPSO
Original resources	417
Remaining resources	145



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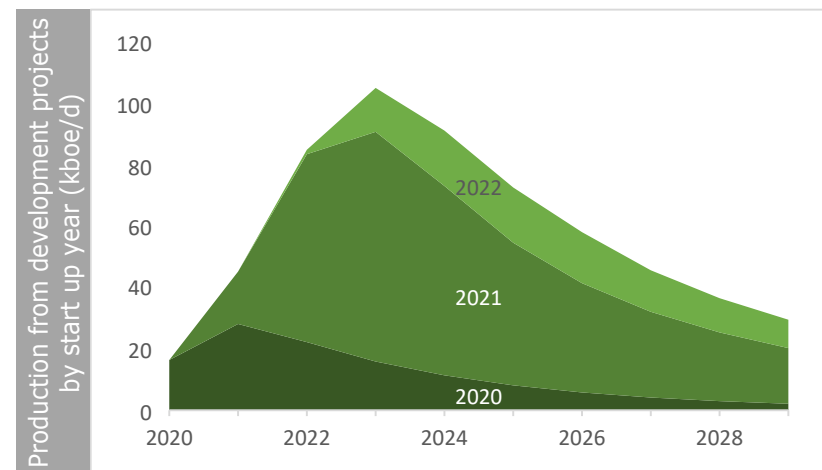
FIELD DEVELOPMENT

Angola



Investments for under development projects

MUSD	2017	2018	2019	2020	2021	2022	2023	2024
Facility capex	28	79	749	839	386	53	22	24
Well capex	-	-	333	301	209	252	57	52
Total	28	79	1,082	1,140	595	305	79	76



Production for under development projects

kboe/d	2020	2021	2022	2023	2024	2025
Liquids	16	45	85	105	92	73
Gas	-	-	-	-	-	-
Total	16	45	85	105	92	73

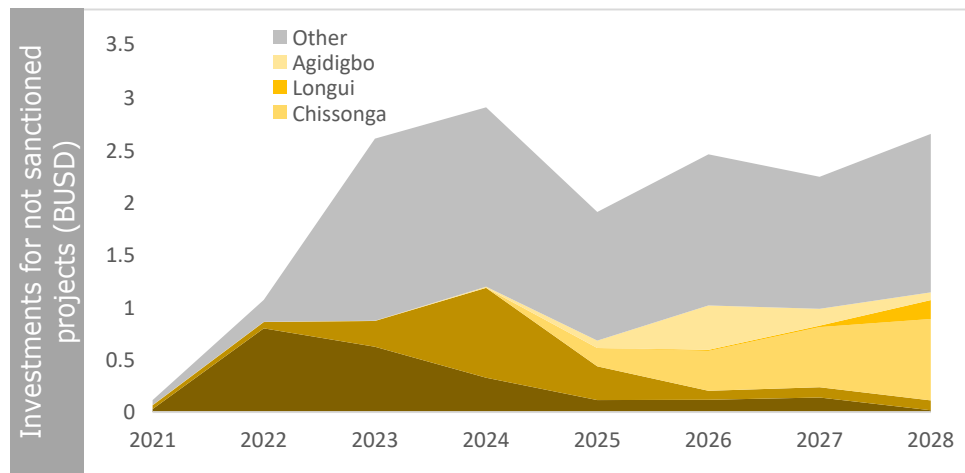
Top 10 development projects with start-up towards 2025

Asset	Operator	Province	Facility solution	On-offshore	Field type	Approval year	Start-up year*	Breakeven category, USD/bbl	Resources (Mmboe)
Zinia 2	Total	Atlantic Ocean	Subsea tie back	Offshore	Oil	2018	2021	30-35	74
Platina	BP	Atlantic Ocean	Subsea tie back	Offshore	Oil	2019	2022	35-40	56
CLOV Phase 2	Total	Atlantic Ocean	Subsea tie back	Offshore	Oil	2018	2020	20-25	44
Dalia Phase 3	Total	Atlantic Ocean	Subsea tie back	Offshore	Oil	2018	2021	25-30	34
Cabaca Norte	Eni	Atlantic Ocean	Subsea tie back	Offshore	Oil	2018	2021	35-40	28
Lifua	Chevron	Atlantic Ocean	Steel platform	Offshore	Oil	2020	2021	25-30	27

*Expected

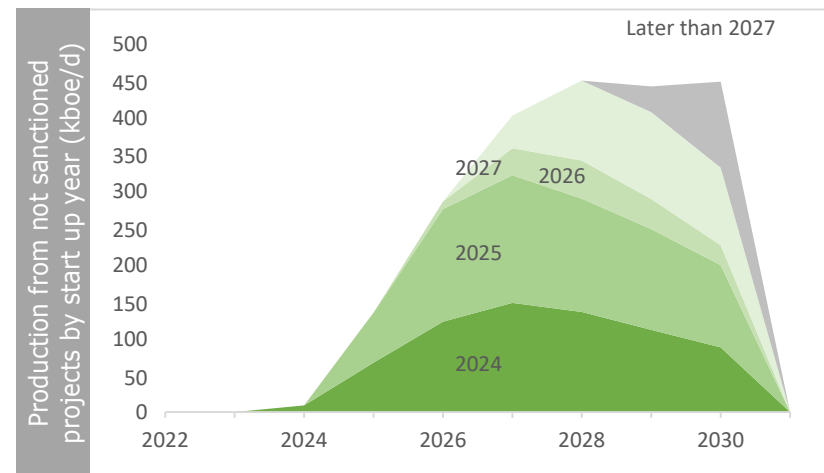
NOT YET SANCTIONED PROJECTS

Angola



Investments for not yet sanctioned projects

MUSD	2020	2021	2022	2023	2024	2025	2026	2027
Facility capex	28	114	815	2,134	2,318	1,211	1,728	1,583
Well capex	-	-	250	463	576	689	720	651
Total	28	114	1,065	2,596	2,893	1,900	2,447	2,234



Production for not yet sanctioned projects

kboe/d	2022	2023	2024	2025	2026	2027
Liquids	-	-	1	98	223	329
Gas	-	-	8	37	62	73
Total	-	-	9	135	286	402

Top 10 not sanctioned projects with start-up towards 2030

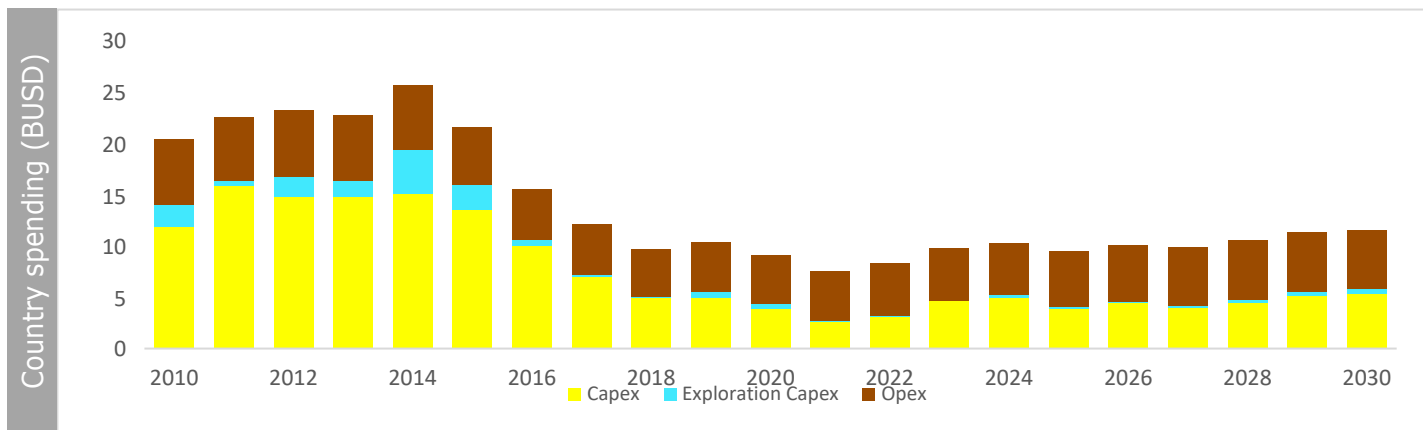
Asset	Operator	Province	Facility solution	On-offshore	Field type	Approval year*	Start-up year*	Breakeven category, USD/bbl	Resources (Mmboe)
Quiluma/ Maboqueiro (Northern Gas Con	Eni	Atlantic Ocean	Steel platform	Offshore	Gas-Condensate	2021	2024	135-140	248
Agogo	Eni	Atlantic Ocean	FPSO	Offshore	Oil	2022	2025	30-35	244
Chissonga	Total	Atlantic Ocean	Subsea tie back	Offshore	Oil	2024	2029	55-60	199
Longui	Chevron	Atlantic Ocean	Steel platform	Offshore	Oil	2027	2030	30-35	122
Agidigbo	Eni	Atlantic Ocean	Subsea tie back	Offshore	Oil	2025	2027	30-35	87
Ndungu	Eni	Atlantic Ocean	Subsea tie back	Offshore	Oil	2023	2024	20-25	70
Astraea	BP	Atlantic Ocean	Subsea tie back	Offshore	Oil	2022	2025	25-30	58
N`Dola South	Chevron	Atlantic Ocean	Steel platform	Offshore	Oil	2023	2025	35-40	51
Reco-Reco	ExxonMobil	Atlantic Ocean	Subsea tie back	Offshore	Oil	2027	2029	25-30	48
Palas	BP	Atlantic Ocean	FPSO	Offshore	Oil	2022	2025	45-50	47

*Expected

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CAPEX AND OPEX

Angola



Key Economic Metrics (BUSD)

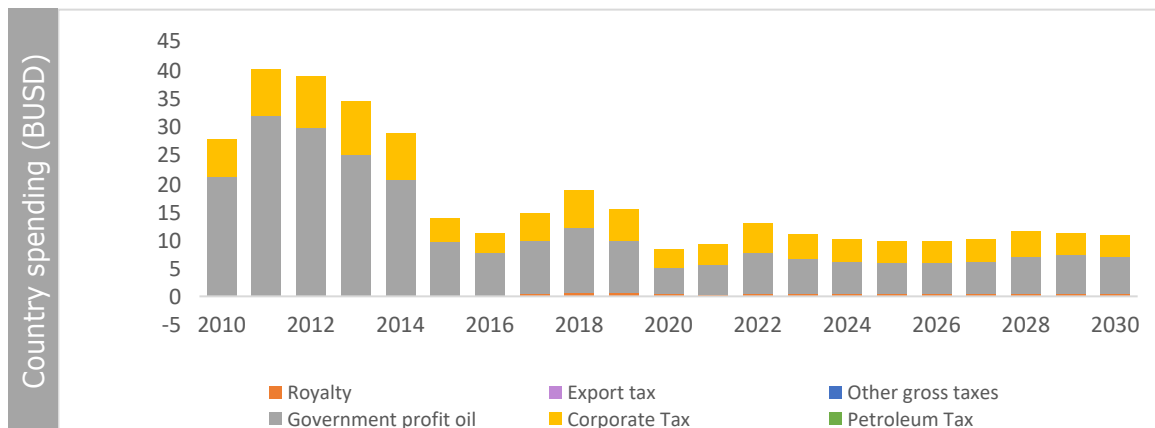
Average Expex 2013-2017	1.8
Average Expex 2018-2022	0.2
Average Capex 2013-2017	12.1
Average Capex 2018-2022	3.9
Average Opex 2013-2017	5.6
Average Opex 2018-2022	4.8

BUSD nominal	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Country spend	20.3	22.5	23.2	22.7	25.7	21.6	15.6	12.1	9.7	10.3	9.1	7.5	8.3	9.8	10.3	9.5	10.0	9.9	10.6	11.3	11.5
Capex	11.9	15.8	14.8	14.8	15.1	13.5	10.0	7.0	5.0	5.0	3.8	2.6	3.1	4.6	5.0	3.9	4.4	4.0	4.5	5.1	5.4
Well Capex	3.3	5.0	5.0	5.4	3.8	4.0	3.1	3.6	1.7	2.5	1.8	1.2	1.0	1.1	1.2	1.3	1.3	1.2	1.3	1.6	1.6
Facility Capex	8.5	10.8	9.8	9.4	11.3	9.5	6.8	3.5	3.3	2.5	2.0	1.5	2.1	3.5	3.8	2.6	3.1	2.7	3.2	3.6	3.8
Exploration Capex	2.1	0.5	1.9	1.5	4.3	2.5	0.7	0.1	0.1	0.5	0.5	0.0	0.0	0.0	0.3	0.1	0.1	0.2	0.3	0.4	0.4
Opex	6.3	6.2	6.5	6.4	6.3	5.6	4.9	4.9	4.6	4.9	4.7	4.8	5.1	5.1	5.0	5.4	5.5	5.7	5.8	5.8	5.7
SG&A Opex	0.7	0.7	0.7	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.7	0.7	0.6	0.6	0.7	0.7	0.7	0.7	0.7
Transportation Opex	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.6	0.7	0.7	0.7	0.7	0.7
Production Opex	5.4	5.2	5.4	5.3	5.1	4.5	3.8	3.4	3.3	3.6	3.4	3.6	3.9	3.9	3.8	4.0	4.0	4.2	4.4	4.2	4.2
Abandonment cost	-	-	0.0	0.1	0.1	0.1	0.1	0.2	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.2	0.1

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GOVERNMENT TAKE AND FCF

Angola



2019 Key Economic Metrics

Total Government take	MUSD	18,684
Cash Flow from operations	MUSD	17,262
Royalties	MUSD	576
Government profit oil	MUSD	11,576
Corporate taxes	MUSD	6,533
Petroleum and other taxes	MUSD	-2
Average Gross Tax Rate	%	1.4%
Average Cash profit 2013-2017	%	55%

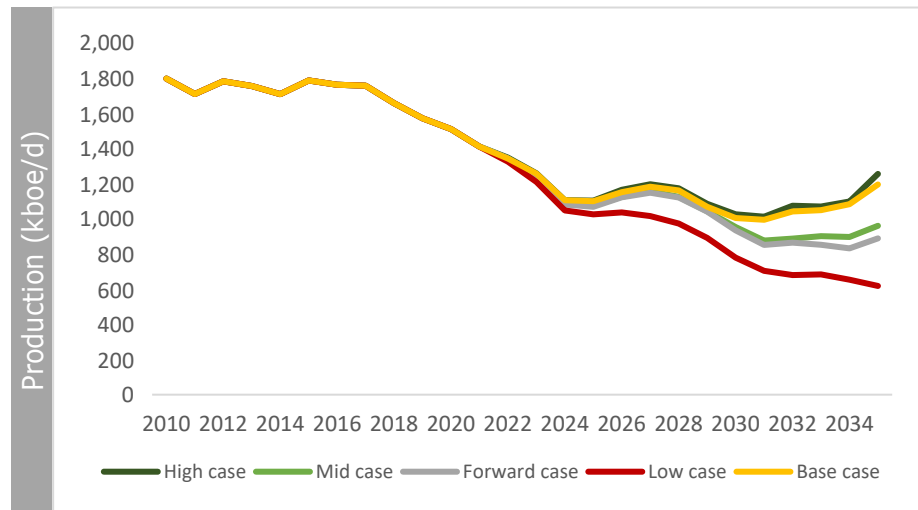
BUSD nominal	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Revenue	50.3	66.3	69.4	66.4	59.6	33.4	26.7	33.3	40.9	34.6	21.1	23.5	32.2	28.8	25.3	25.6	26.9	28.1	28.3	26.8	26.0
Total government take	27.7	40.0	38.7	34.2	28.6	13.7	11.0	14.6	18.7	15.3	8.3	9.1	13.0	11.0	10.1	9.7	9.6	10.1	11.4	11.2	10.8
Royalty	-	-	-	0.0	0.0	0.0	0.1	0.4	0.6	0.6	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5
Export tax	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other gross taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Government profit oil	21.1	31.9	29.6	24.9	20.5	9.6	7.6	9.4	11.6	9.2	4.7	5.1	7.2	6.2	5.7	5.5	5.4	5.7	6.4	6.9	6.6
Corporate Tax	6.6	8.2	9.1	9.3	8.2	4.1	3.4	4.8	6.5	5.5	3.2	3.6	5.3	4.4	4.0	3.8	3.8	4.0	4.5	3.8	3.7
Petroleum Tax	-0.0	-0.0	-0.1	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0
Other net taxes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Free Cash Flow	2.3	0.8	6.3	9.4	5.3	-1.9	0.2	6.6	12.5	9.0	3.7	6.9	10.9	8.0	5.0	6.5	7.3	8.1	6.3	4.3	3.8
Country NOC	1.0	1.1	0.4	1.3	0.1	-1.7	-1.1	0.6	2.3	2.3	0.9	1.7	3.0	1.8	1.0	1.9	2.5	2.6	1.9	1.1	0.9
Other companies	1.3	-0.3	5.9	8.2	5.2	-0.2	1.3	6.0	10.2	6.7	2.8	5.2	7.9	6.2	4.0	4.6	4.8	5.5	4.5	3.2	2.9

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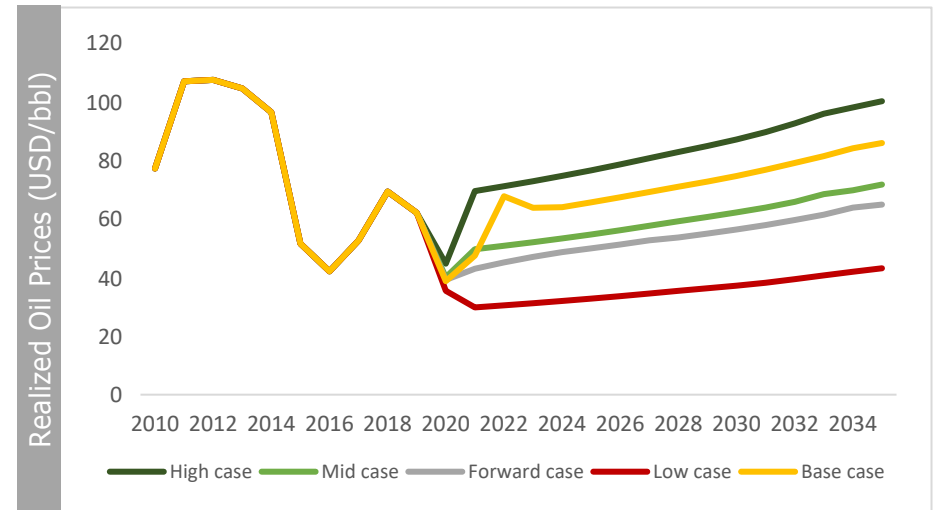
PRODUCTION SCENARIO

Angola

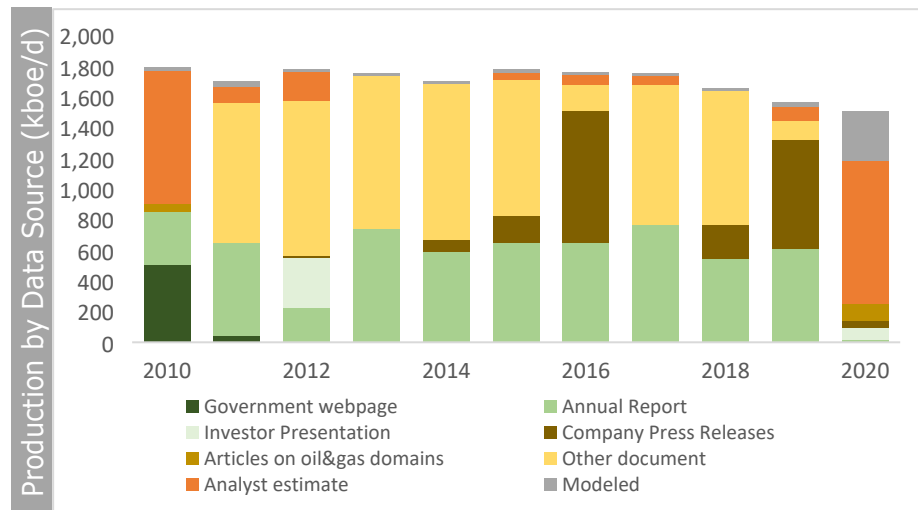
Production



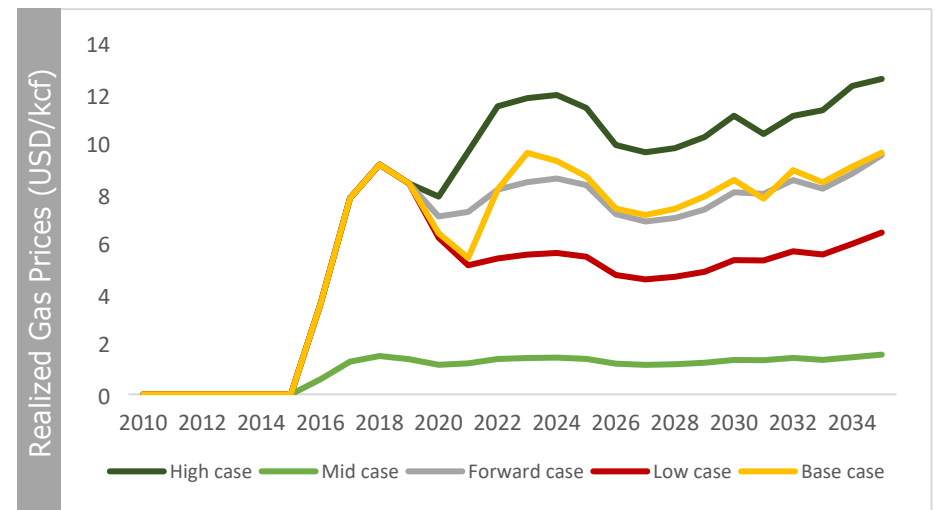
Average Realized Oil Price Scenarios*



Data Origin



Average Realized Gas Price Scenarios*



*Prices are Economics (revenue) per boe. No production gives price=0

<i>Metric</i>	<i>Definition</i>
Average discovery cost	Discovery cost is calculated by dividing Exploration costs by Discovered resources. Discovered Resources value item is available in UCube only for ECube users. Expressed in nominal terms
Average Gross Tax Rate	The sum of Royalty, Export tax and other gross taxes divided by Revenue in the current year
Average Offshore Development Capex	Development Capex is defined as the total investment costs (well and facility capex) from start of development to two years after start-up. Development Capex pr boe corresponds to the total development cost divided by the total initial resources. Expressed in nominal terms
Average Opex	Total opex (including transportation, production, SG&A, abandonment) divided by annual production
Average Realized Oil Price Scenarios	Realized oil price is defined as an average realized crude oil and condensate price. In UCube base case realized condensate price is equal to realized crude oil price
Average reserves replacement	Discovered resources (available in UCube only for ECube users) divided by annual production
Cash Flow from operations	Cash Flow from operations (OCF) is defined as Revenue reduced by Opex and total Government take
Finding cost	Annual Discovered Resources divided by annual Exploration Expenditure. Expressed in nominal terms
First significant discovery	First discovery with the total resource base above 400 MMboe
Fiscal Regime	Fiscal Regime dominating in the country in the current year. May include several tax regimes. Tax regime is included if the share of taxes paid within the regime exceed 5% in the total country gov. take
Investments	Capex and expex. Expressed in nominal terms
Investments for development projects	Expressed in nominal terms
Investment for not sanctioned projects	Expressed in nominal terms
Oil	Includes Crude oil and Condensate
Operational costs	Expressed in nominal terms
Production growth last three years	Compound Annual Growth Rate (CAGR) = $(\text{Ending Value}/\text{Beginning Value})^{(1/\text{N}^{\circ} \text{ of years})} - 1$
Resources as end of 2019	Excluding undiscovered resources
Share Produced by the end of 2019	The share of produced resources divided by the total initial resources (excluding Undiscovered resources)
Spending	Expressed in nominal terms
Top 10 development projects with start-up towards 2025	Top 10 under development assets are based on remaining resources
Top 10 not sanctioned projects with start-up towards 2030	Top 10 unsanctioned discoveries are based on remaining resources
Top 10 discoveries last two years	Top 10 non-sanctioned discoveries are based on initial resources. Uncommercial discoveries are also included
Top 10 producing assets (2019)	Top 10 producing assets are based on annual production
Total exploration costs	Expressed in nominal terms



RYSTAD ENERGY

Rystad Energy is an independent energy consulting services and business intelligence data firm offering global databases, strategy advisory and research products for energy companies and suppliers, investors, investment banks, organizations, and governments. Rystad Energy's headquarters are located in Oslo, Norway.

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