



**PRODUCTION ONSHORE
OPPORTUNITIES IN
NORTHWEST PERU
TALARA BASIN**

A bit of context

The Northwest onshore area of Peru began its oil development at the end of the 19th century, with the participation of private and national companies until July 1973, when Petr leos del Peru S.A. (PETROPERU S.A.) was created, carrying out the exploration, exploitation, refining, commercialization and development of the oil and derivatives industry in the country.

Until 1993, more than 10,300 wells were drilled in a surface area of 450,103 Ha in the Northwest onshore zone, registering an oil production of 25,000 bopd. As consequence of the privatization, from 1993 to the present, 2,200 wells were drilled in the Northwest, registering an oil production of 24,805 bopd (lower than 1993) and 5,380 active wells.



Northwest general data

Start of development	End of the XIX century
Drilled wells (Dec, 2019)	13,578
Active wells (Dec, 2019)	5,374
Reservoirs in production (commingled)	Multiple reservoirs: H�lico, Echino, Ostrea, Pari�as, Mogoll�n, Basal Salina
Recovery Mechanism	Solution gas drive
Accumulated oil (MMSTB)	1,500 (57% of the 4 Basins developed)
Recovery factor	9%
Opportunities	Secondary Recovery and EOR

PERUPETRO S.A.
is promoting six blocks of the Talara Basin which contracts will expire in the next years. The purpose is improving the productivity of these mature fields with secondary recovery and the implementation of new technologies.



Geology General data

■ Sedimentary Basin

The 18 principal basins of Peru, of varying tectonic style, are shown in Figure 1. All these basins are related in some degree to plate tectonic activity and to the Andean uplift. The coastal basins, offshore and partially onshore, exhibit parallelism arising from the convergence of the South America and Nazca Plates, whose geomorphic expression is the parallel Peru-Chile submarine trench.

The Talara Basin is a Paleocene-age forearc basin located along the north coast of Peru. The basin was once part of a larger, older basin that included the Progreso Basin to the north and the Sechura Basin to the east. Hydrocarbon-producing formations in the Talara Basin range in age from Pennsylvanian

to Oligocene, and the reservoirs are mainly Upper Cretaceous through Oligocene sandstones of fluvial, deltaic, and nearshore to deep-marine environments. The primary reservoirs are Eocene-age sandstones and some turbidites of the Talara and Salinas Groups; these reservoirs also have great potential for undiscovered resources. There are forty-two oil/gas fields in the Talara Basin Province, producing from as many as a dozen intervals per well from mostly Eocene-age nearshore marine sandstones; all reported production is commingled (Petroconsultants, 1996). Four fields have oil and (or) gas production from fractured quartzites of the Pennsylvanian Amotape Formation.

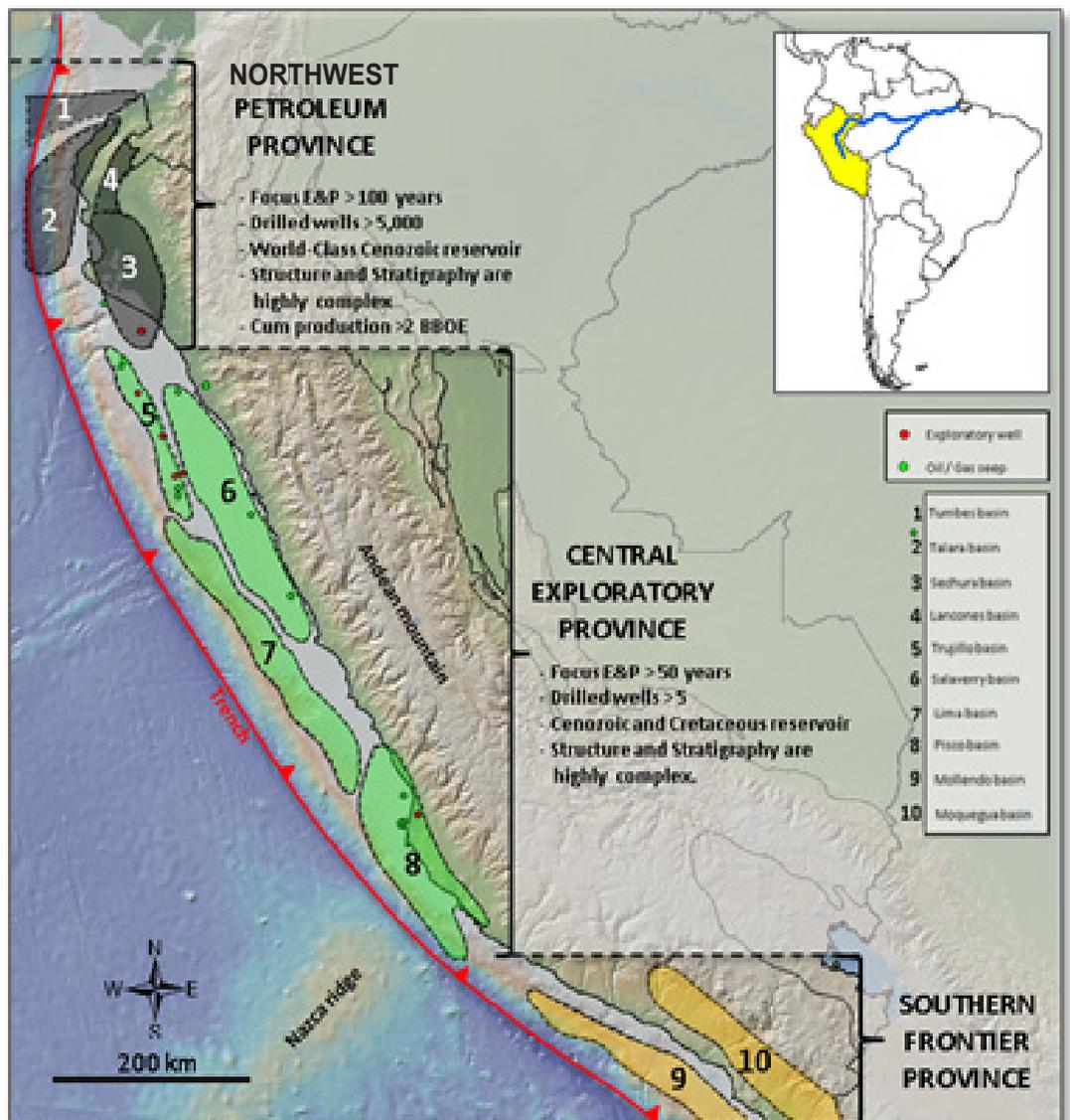


Figure 1.
Peru's coastal basins
(Source: A. Quispe, 2020)

Location

The Talara Basin province is located on the continental shelf along the northern coast of Peru. Its eastern limit is delineated by the La Brea–Amotape Mountains of the Coastal Range, and the associated uplift that separates the basin from the Lancones & Sechura Basins (Figure 2).

The southeast boundary is east of the La Casita fault and the Paita High uplift, between Talara and Sechura Basins. The west boundary of the province is the approximate location of the Nazca Plate subduction zone under the South American

Plate. The Pillar of Zorritos is a basement uplift and associated fault zone that is the northern limit of the Talara Basin province. This boundary coincides with the southern edge of the Dolores-Guayaquil megashear zone and has a complex structural setting that includes transcurrent (wrench) faulting as well as high- and low-angle faults of various ages (American International Petroleum Corporation (AIPC), no date; Marocco and others, 1995; Pindell and Tabbutt, 1995; Zúñiga-Rivero and others, 1998, 1999).

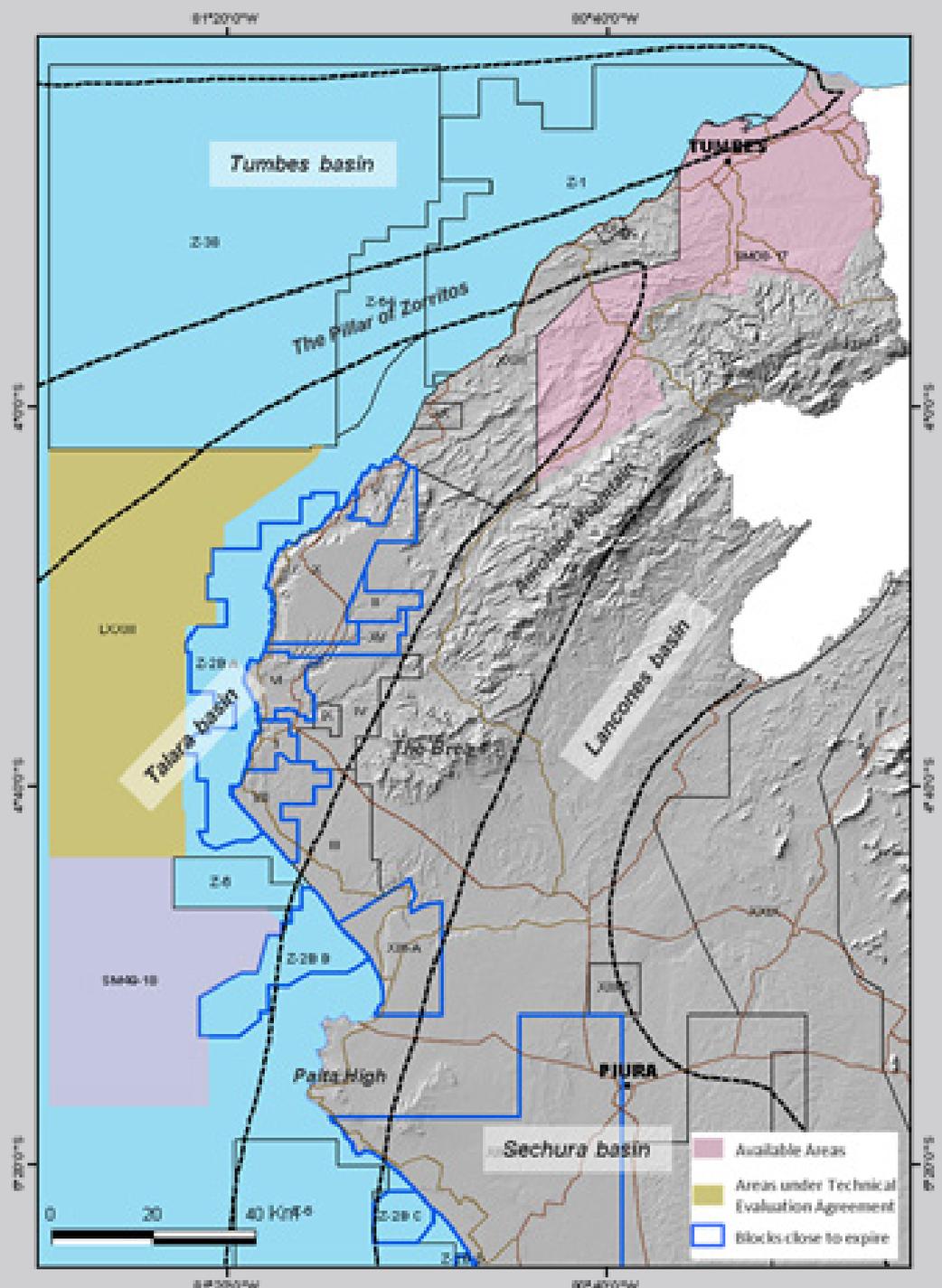
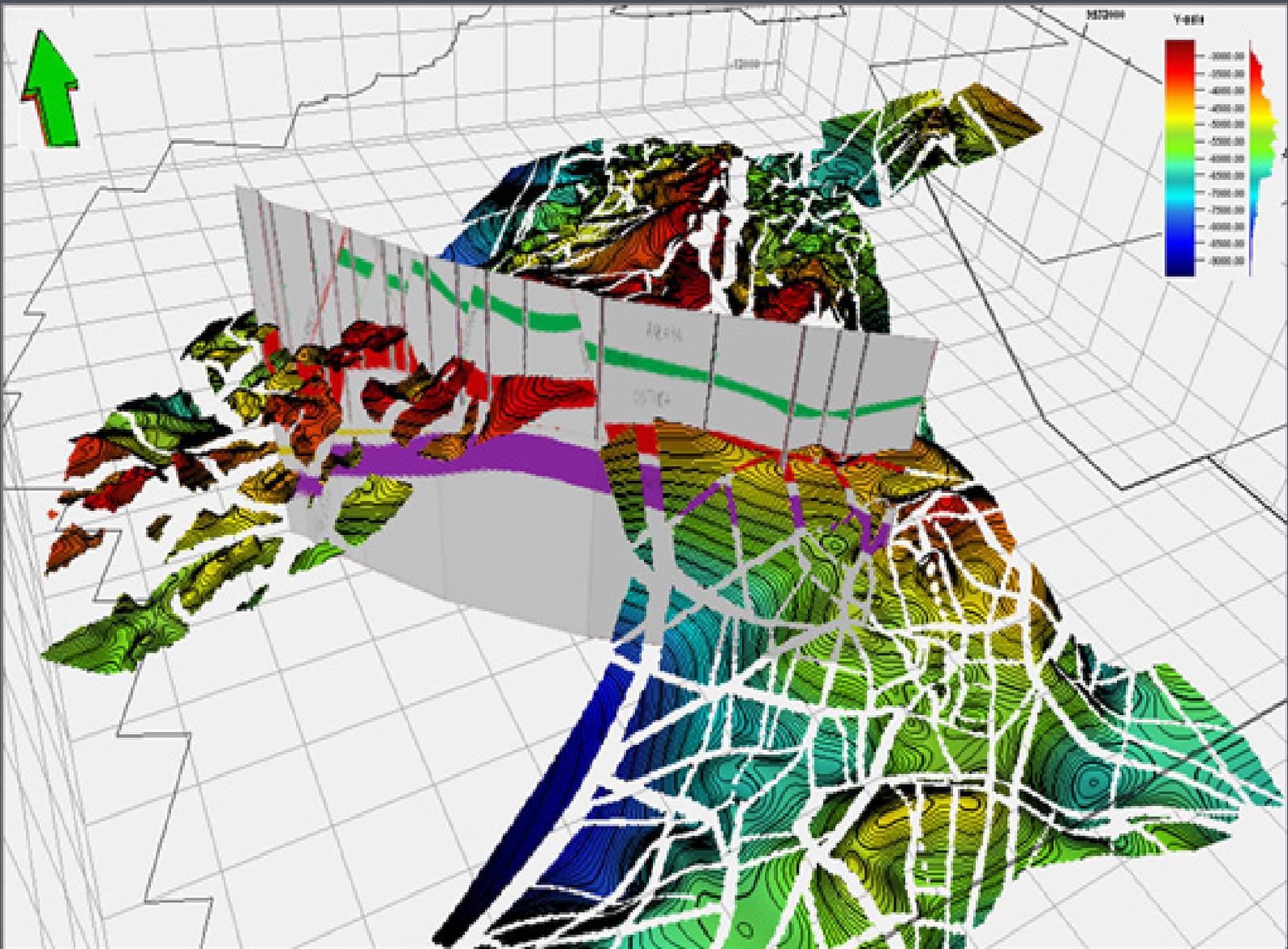


Figure 2. Location of blocks in Talara basin (Source: A. Quispe, 2020)

■ Structural Framework

The tectonic movements during the Paleozoic established the structural and depositional framework for subsequent periods. Some major faults originally became active during the Paleozoic; since then they have been reactivated several times,

occasionally with movement opposite to the original direction of offset. Normal faulting is an important aspect of the structural style of this basin, as are low-angle gravitational slide faults and large, essentially vertical transcurrent faults.

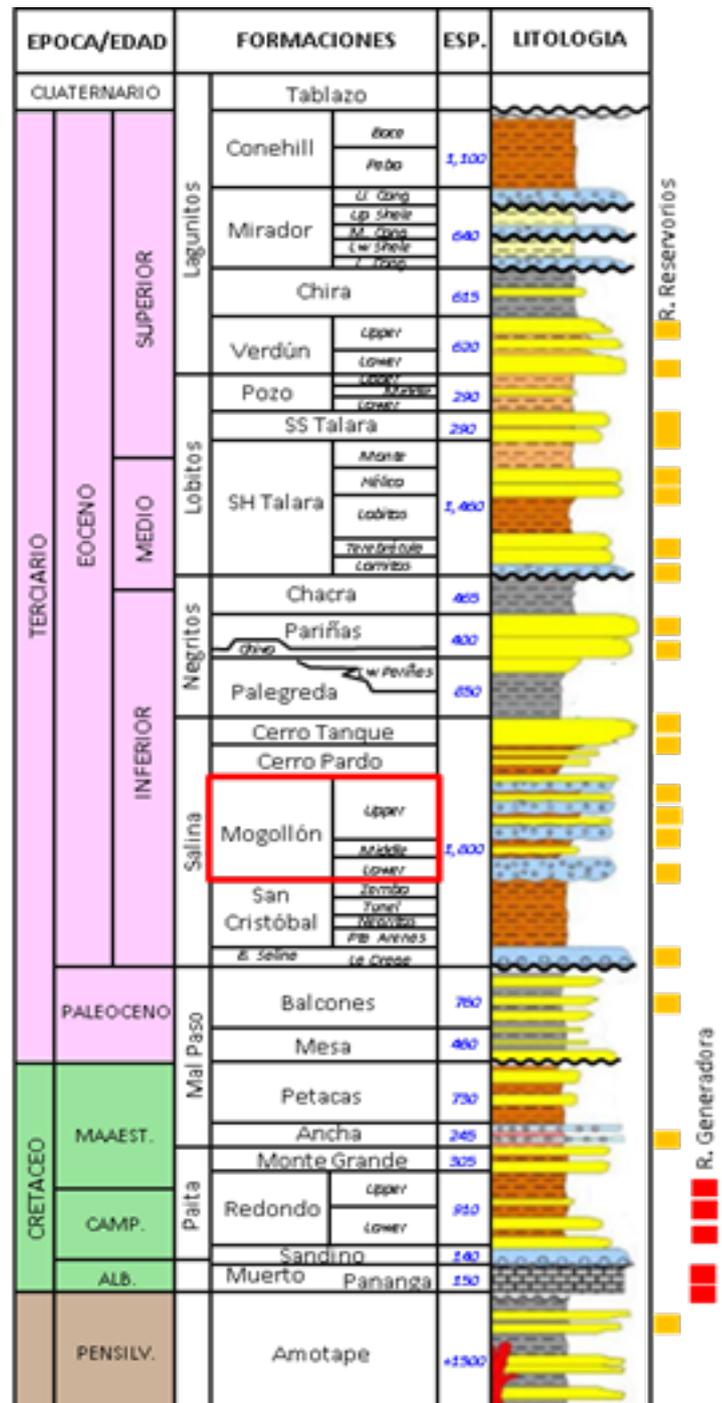
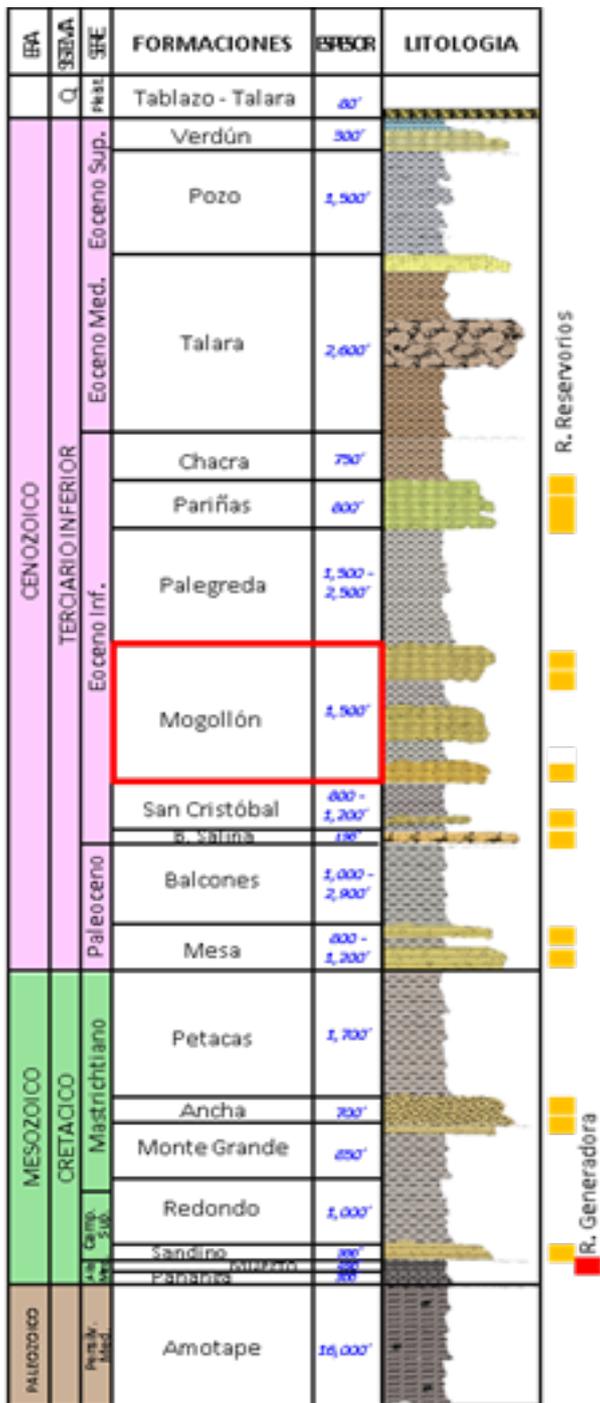


*Example of Block X; structural map of Mogollon formation
(Source CNPC 2019, modified/adapted by A. Quispe, 2020)*

Stratigraphy and Petroleum Systems

The stratigraphic sequence is primarily Eocene (up to 28000 ft aggregate thickness), which in turn lies on up to 6,700 ft of Cretaceous. The uppermost Paleozoic units, known both from outcrop and drilling, are also sedimentary; in fact, commercial oil production occurs from the Pennsylvanian Amotape quartzite in two onshore fields. The Paleocene-Eocene sedimentary sequence is entirely clastic, characterized by shallow marine, deltaic, and fluvial sandstones, marine shales, and turbidites.

The underlying Cretaceous is about 75% clastic rocks, but it does include some thick and widespread oolitic, reefy, and micritic limestones that are considered to be the most important hydrocarbon source rocks. The Eocene sequence includes littoral and beach sands, fluviodeltaic sands, and (in places) coarse conglomerates, as well as turbidite channel sands. The sandy units are separated and sealed by marine shales, both shallow- and deep-water deposits.



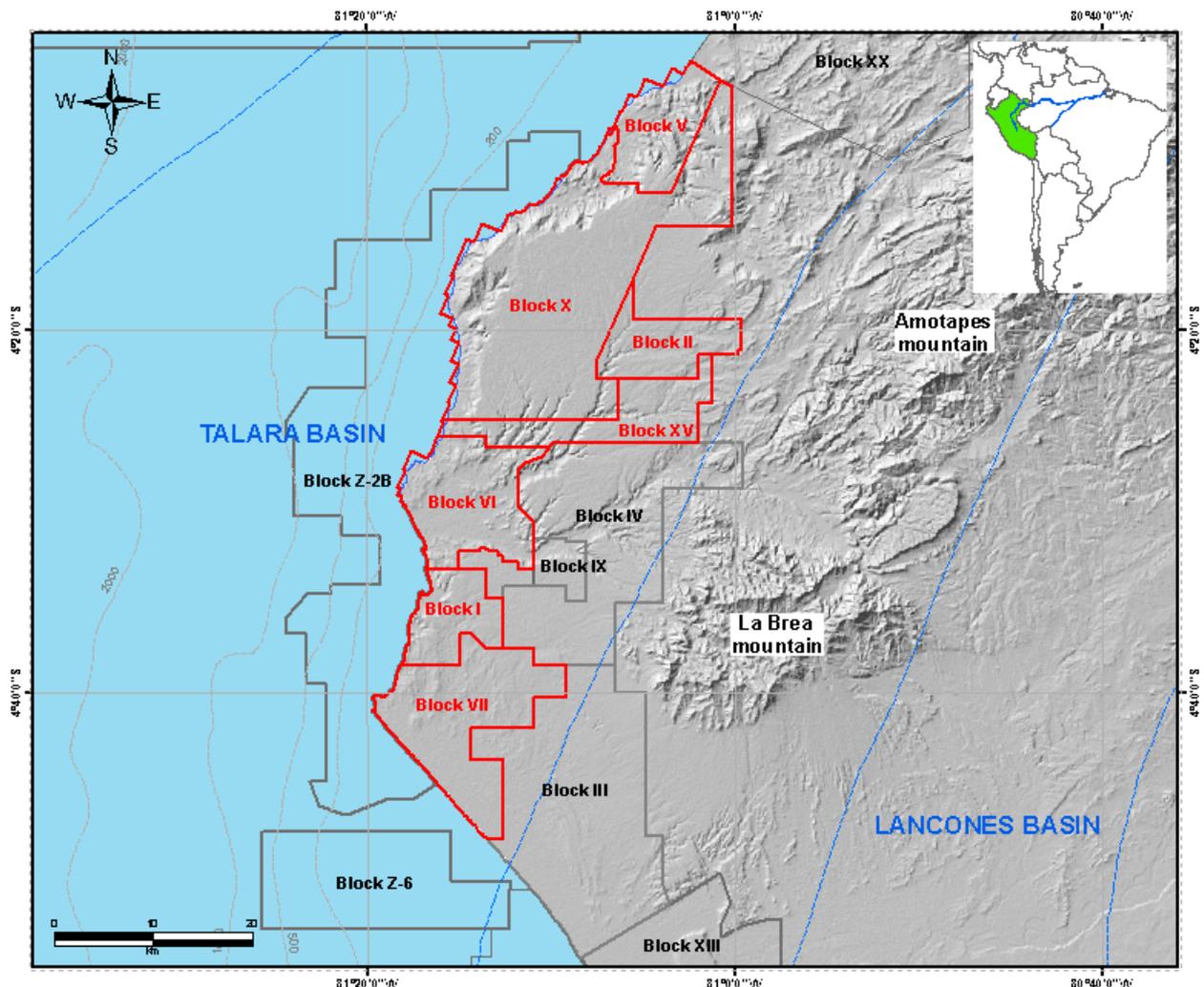
Generalized stratigraphy of the southern (Block I) and northern (Block X) areas of the Talara basin (Source: GMP, 2020 and CNPC, 2020)

Blocks in Talara Basin

PERUPETRO is promoting the following 06 blocks of the Talara Basin which contracts will expire in the next years:

	Area (ha)	Total Wells	Active wells	OOIP (MMSTB)	Daily Oil Production (BOPD)	Recovery Factor (%)
Block I	8,943	775	217	974	597	19.5
Block II	7,691	261	146	383	432	7.1
Block V	9,026	95	41	38	88	14.8
Block VI-VII	32,434	5,200	953	1,605	3,548	12.3
Block X	46,962	5,633	3,223	6,018	12,784	9.3
Block XV	9,498	33	11	10	33	10.7
TOTAL	176,585	13,105	5,166	10,206	20,488	

Summaries of blocks in Northwest
(Source: DGH, 2018 and PERUPETRO, 2020)



Northwest blocks location
(Source: PERUPETRO, 2020)



History of Talara producing Blocks

Block I

Started production in 1800, however the production information is available since December 1914, having 19 oil-producing fields of multiple reservoirs throughout its extension, which are: Aeropuerto, Bellavista, Calzada, El Pato, Huaco, Manta, Medano, Milla 6, Milla 7, Monte, Negritos, Pampa, Pozo, Pozo Viejo, Sección 16, Tunel, Verdun Alto and Tablazo. As of December 2019, the Block has a cumulative production of 112,256 MSTB of oil and 169,506 BCF of gas, from 775 drilled wells. The main productive formations are Pariñas, Mogollon, Basal Salina, Mesa, and Ancha.

Block II

Started production in 1953, has 04 oil-producing fields of multiple reservoirs throughout its extension, which are: Coyonitas, Golondrina, Ronchudo and Hualtaca. As of December 2019, the Block has a cumulative production of 27,326 MSTB of oil and 43.2 BCF of gas, from 261 wells drilled. The main productive formations are Mogollon, and Ostrea.

Block V

Started production in 1957, has 05 oil-producing fields of multiple reservoirs throughout its extension, which are: Organos Norte, Calamar, Patria, Condor and Laguna. The first discovery of oil was in well 1314 of the Calamar field in the Verdun formation, where a production peak of 536 BPD was subsequently achieved. In 1965, the discovery of oil in the Patria field with the PB-274 well began, with which the development of the Mogollon formation in the Patria and Condor fields began. Also, in 1967 the development of the intermediate Ostrea-Echino formations, with which Block V reached a maximum production peak of 1090 BPD. Finally, in 1984, the development of the Mogollon formation began in the Organos Norte field. As of December 2019, the Block has a cumulative production of 5,630 MSTB of oil and 9.4 BCF of gas, from 95 wells drilled. The main productive formations are Verdún, Mogollon, and Ostrea.

Block VI-VII

Started production in 1889, with the drilling of well 7 in Negritos field in the block VI, reaching a depth of 500 feet. Likewise, block VII started its development in 1903 with the drilling of well 3, reaching a depth of 630 feet. This block has 51 oil-producing fields of multiple reservoirs throughout its extension, which are: Alvarez Oveja, Bonanza, Bronco, Folche, Honda, Jabonillal, Leones, Lindero, Lobitos, Lobo, Malacas, Siete Vientos, Silla, Verdun Alto, Vichayo, Yeso and others. The production information is available as of December 1910. As of December 2019, the Block has a cumulative production of 497,150 MSTB of oil and 519.6 BCF of gas, of 5,200 drilled wells. The main productive formations are Pariñas, Mogollon, and Basal Salina.

Block X

Started production in 1910, with the drilling of the Restin 1 well, it has 17 oil-producing fields of multiple reservoirs throughout its extension, which are: Organos Norte, Patria, Organos Sur, Somatito, Laguna, Tunal, Ballena, Verde, Zapotal, Peña Negra, Taiman, Central, Merina, Reventones, La Tuna y Carrizo. The block had a production peak of 35.6 MBPD of oil. Between 2004 and 2014 PETROBRAS, through a massive drilling campaign, managed to drill more than 1000 wells, increasing production from 11 MBPD to 14.3 MBPD. As of 2016, CNPC Peru S.A. It continued with the drilling of producing wells, reaching 3,100 active wells and thus having an oil and gas production.

As of December 2019, the Block has accumulative production of 494,728 MSTB of oil from 5.633 wells drilled. The main productive formations are Mogollon, Ostrea and Echinocyamus.

Block XV

Started production in 1920, has 04 oil-producing fields of multiple reservoirs throughout its extension, which are: Lobitos, Paloma, Golondrina and Hualtaca. The Lobitos field in Block XV began production with well 333-A. Then, in the 1950s the Paloma field was also started through the AX-32 and AX-30 wells. As of 12/31/2019, the Block has a cumulative production of 901.7 MBLS of oil and 705 MBLS of gas. The main producing formations are Pariñas, Hélico, and on a smaller scale Ostrea and Mogollon. In November of 2012, the Block XV had a production peak of 23 BOPD x 35 BWPD x 90 MPCD.

To date, the Block produces just under 37 BOPD with 15% water cut and 130 scf/tb of GOR from 11 wells. The mechanism of production that controls is solution gas drive. Not existing projects for gas or production water injection. As of December 2019, the Block has a cumulative production of 888 MSTB of oil and 0.70 BCF of gas, from 33 wells drilled. The main productive formations are Mogollon, Ostrea and Echinocyamus.

Reserves and Resources

According to the reserve book reported by MINEM as of December 2018, the total of proven, probable and possible recoverable reserves has been estimated to be 172.81 MMSTB, 86.62 MMSTB of Contingent resources and 60.69 MMSTB of Prospective resources.

	Proven	Probable	Possible	Total	Contingent-2C	Prospectives-2U
Block I	6.01	1.22	1.33	8.56	7.67	19.05
Block II	2.75	0.22	-	2.97	6.53	-
Block V	1.75	0.21	0.20	2.16	2.24	3.11
Block VI-VII	13.44	-	-	13.44	13.08	-
Block X	69.36	4.22	-	73.58	36.27	9.40
Block XV	0.48	0.06	-	0.54	4.09	-
TOTAL	128.86	23.56	20.39		86.62	60.69

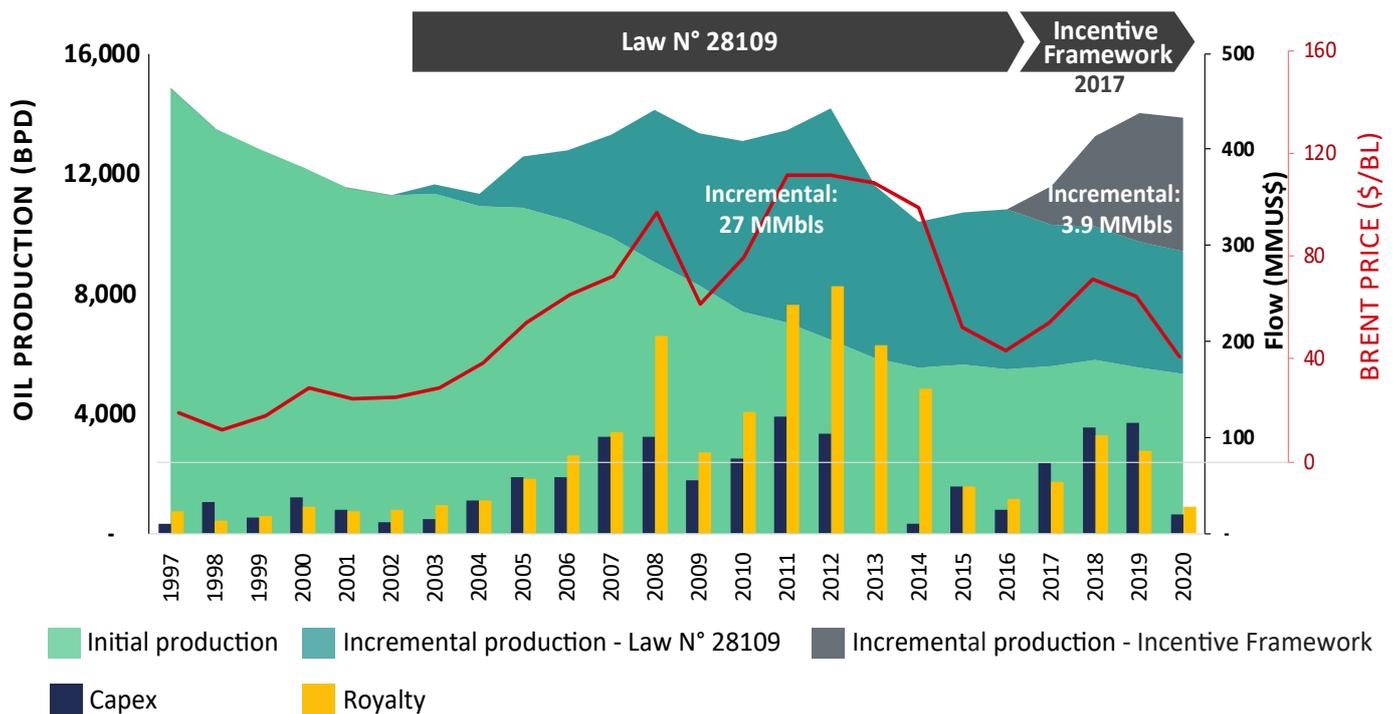
Oil Reserves and Resources (MMSTB)

Block X: Incremental Production after New Investment

Northwest Peru fields have solution gas drive reservoirs whose production declines constantly. Block X is no exception and had been declining until 2002 (with royalties between 23% and 25%) with a production of 11,000 bbl/d that year. The block operating company applied Law N° 28109, proposing an investment plan that led to increase its production, reaching almost 14,000 bbl/d in 2012.

Nevertheless, in 2017 oil prices were falling and a new incentive framework was presented, proposing lower royalties to investments that generate new production. This incentive caused production to increase from 12,000 bbl/d to 14,000 bbl/d.

In the following bar graphs it is clear that maintaining high royalties, between 23% and 25%, does not guarantee a higher income for the State; on the contrary, it can be inferred that lower royalties boost greater investment, and consequently, greater production and income to the country.



Our FUTURE PLANS

Promotion Blocks

- Hydrocarbon production in the basin comes from shallow and intermediate reservoirs, great potential in Deep reservoirs that have proven the existence of hydrocarbons.
- Secondary Recovery, EOR and Deepwater Exploration opportunities.
- Cashflow from day 1: Areas already producing oil and some of them associated gas.
- Potential partnerships with current operators: Current operators are small or medium size companies.
- Unconventional resources to be unlocked.
- New refinery in Talara city with a demand of 95 000 mbd.
- Existing oil infrastructure
- Demand for natural gas, lack of infrastructure to reach the market.
- Potential for energy renewable projects (Energy companies)
- No signing bonuses.
- All our information is totally free.
- Reinforcement of Social Engagement Strategy.



Geoportal

General, technical, infrastructure
and cultural information

GENERAL INFORMATION:

- Blocks, Sedimentary Basins, fields, outcrops, "oil seeps", mineral collection, undrilled prospects.

TECHNICAL INFORMATION:

- Location of all the 2D and 3D seismic campaigns. Gravimetric and magnetometric campaigns.
- Well locations.

INFRASTRUCTURE INFORMATION:

- North Peruvian pipeline, multi-product pipelines, gas pipelines, southern gas pipeline, platforms, batteries and other facilities.

CULTURAL INFORMATION:

- Native Communities (IBC).
- Protected Natural Areas (SERNANP).

