

## Onshore Turkey – Western Pontides

### Bartın Licence AR/AME/K/E28-C & AR/AME/K/F28-b1, b2

- > High impact exploration gas block with successful nearby analogue
- > Low cost with an ability to easily commercialise any discovery
- > Favourable fiscal terms and gas price in Turkey lead to robust field economics
- > Experienced operator with long history in Turkey

### Introduction

Aladdin Middle East Ltd. (“AME”) is an independent Exploration & Production company which has operated in Turkey for 60 years. AME was awarded a 100% interest in the Bartın exploration licences in February 2020. The licences cover an area of 830 km<sup>2</sup> and the term is five years. The licence commitment requires partners to drill an exploration well by February 2022, and a second well by February 2023.

The Bartın exploration licences are situated in the Western Pontides region in Northern Turkey. The licences cover part of the Devrek sub-basin, which lies to the southern margin of the Western Black Sea basin.



Turkey has a relatively small, but mature, upstream oil and gas sector. It is heavily reliant on imports of both oil and gas. Domestic gas production currently represents less than 1% of Turkey’s demands. Strong economic growth since 2000 has created a demand for energy, with natural gas consumption increasing at a faster rate than GDP growth. As a result, the Government is looking to increase domestic gas production. This represents an excellent opportunity for international investors to partner with established Turkey-based E&P companies like AME.

### Exploration History

Eight exploration wells and side-tracks have been drilled on the licence between 1987 and 2009, although no commercial discoveries have been made. The closest producing gas fields are in the SASB (South Akcakoca Sub-Basin) located offshore in the shallow water Western Black Sea, ~ 100km west of the Bartın licence area.

The SASB fields were originally put into production in 2007. Recent additional discoveries on SASB mean the estimated ultimately recoverable gas is in excess of 100 Bcf. The SASB gas fields are a close geological analogue for Bartın. The Akcakoca and Devrek sub-basins are the same age and have undergone the same tectonic processes resulting in similar structures. The main reservoirs in both are the Early-Middle Eocene turbiditic sandstones of the Kusuri Formation.

The recent Sakarya discovery by TPAO in August 2020 is Turkey’s biggest ever find and lies ~150km North of SASB, in the deeper water part of the Western Black Sea sedimentary basin. Turkey’s President, Recep Tayyip Erdoğan, recently stated that the Tuna-1 well may have established contingent resources of 14.3 Tcf.

The Bartın block is covered by 2D seismic data of varying vintages that were acquired between 1983 and 1987. 550km of 2D lines were reprocessed by Veritas DGC Ltd in 2006. The reprocessing resulted in improved structural imaging of the reservoir section and facilitated the data to be used for future AVO processing in order to highlight gas deposits.

### Petroleum System

The Western Pontides contains a rock succession of Devonian to recent ages. The Early-Middle Eocene Kusuri Formation acts as the source, seal and reservoir for the play.

The formation is a thick upward coarsening unit of turbiditic sandstones, conglomerates, shales, marls, volcanoclastics and limestones.

The gas source is biogenic in origin and there have been several shows in the wells drilled on the licence to date.

Mesozoic		Cenozoic			Petroleum System Element		
Cretaceous		Paleogene		Neogene			
Early	Late	Paleocene	Eocene	Oligocene	Miocene	Pliocene	
							Source
							Reservoir
							Seal
							Trap Formation
							Generation & Migration
							Critical Point

Reservoir development is associated with slope channel sand deposits and fractured limestones. Matrix porosity in the sandstones can be as high as 16-22%, with permeabilities ranging from 0.06-1.71mD.

The reservoirs within the licence are charged with the same biogenic gas as recovered from the SASB gas fields. These gas-charged reservoirs provide a DHI response.

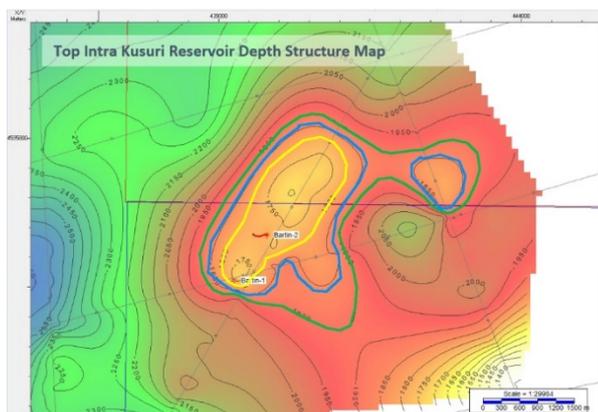
Reservoirs are sealed by inter-turbidite shales, marls and volcanics within the formation.

The play has the potential for both stratigraphic and structural traps, with lateral seals provided by transition to non-reservoir facies. Compressional fault and fold traps formed as a result of the closure of the Intra Pontide suture, from the Maastrichtian through to the Late Eocene.

Fold anticlines are roughly symmetrical and run NE-SW, parallel with the Black Sea coast. The axes range in length between 8 and 42km.

## Bartın Prospect and Leads

The Bartın prospect is defined on a prominent inversion structure imaged by 2D seismic. Two side-tracked wells on Bartın found gas in the Eocene Kusuri Formation clastics and carbonates. Further prospectivity has subsequently been interpreted in the same play in the sub-basin.



Bartın-1 was drilled in 1987 by TPAO, finding gas in a Kusuri sandstone reservoir at a depth of 2,085m MDRT. The well was re-entered in 2006 by Zeta Petroleum and Lotus Petrol with the objective of perforating prospective zones but this failed due to well integrity issues.

Bartın-2 well was drilled in 2007, after Stratum Energy joined the licence, and the well encountered gas shows at a similar depth to Bartın-1. Both Bartın-1 and Bartın-2 were side-tracked in 2009 and Bartın-2S successfully tested gas but with significant water cut. Bartın-1S did not reach the target zone and both wells therefore leave Bartın relatively untested and a remaining opportunity.

The Bartın prospect is a significant tertiary inversion structure that maps a four-way dip closure at Top Bartın reservoir level on 2D seismic data. The key risks are reservoir quality and structural delineation from 2D seismic coverage.

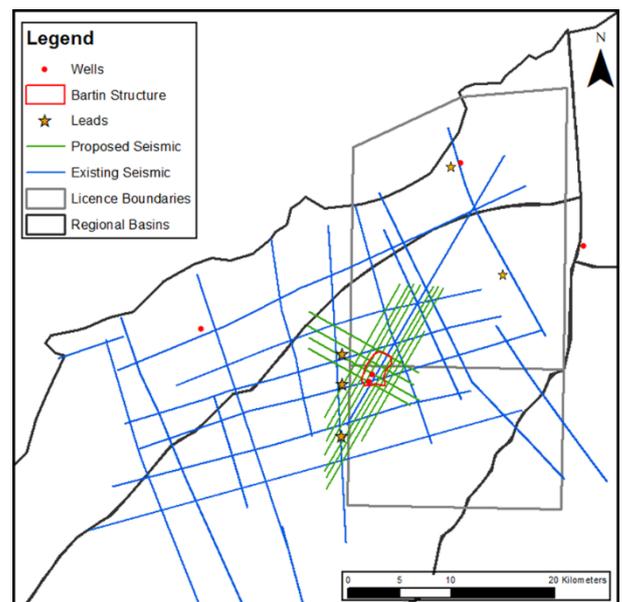
Xodus has calculated the Pmean Gas Initially In Place (GIIP) for the Bartın prospect to be 79 Bcf.

Additional Eocene exploration leads have been identified but these are constrained by definition on single 2D seismic lines only. They are mainly structural traps in similarly aged but smaller compressional features to Bartın. There is also evidence for

stratigraphic trapping. Seismic facies indicate potential for the leads to be in Eocene turbiditic sequences.

Northeast of the Bartın prospect, additional oil and gas leads have been identified in fault blocks containing Devonian and Carboniferous reservoirs. AME has proposed two well locations along a single seismic line in Amasra and Yanaz, targeting the Zonguldak, Alacaagzi and Yılanlı Formations. The source/reservoir couples observed in the penetrated sections in the region, are deemed analogous to the petroleum systems seen in the Thrace Basin, north-western Turkey. These leads are in the early stages of maturation but represent upside on the licence.

AME plans to improve definition of the Bartın prospect and evaluate the leads further by acquiring up to 200km of new 2D seismic at an expected cost of \$25k per km.



## Future Activities

Seismic acquisition and processing will be conducted during 2021 to enable drilling of a well by February 2022. The cost of the well will be approximately \$2.5mm. Following this, low cost development wells would be drilled with access to the existing national pipeline network.

Given the attractive fiscal regime in Turkey, low CAPEX and OPEX, and robust gas prices (\$6/mcf), the prospect will be economically attractive for relatively small discovered volumes.

## The Opportunity

AME seeks a partner to carry the costs of the seismic acquisition programme in return for a non-operated stake in the licence, subject to negotiation.

## Further Information

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