NEW CHALLENGES IN HYDROCARBONS EXPLORATION AND EXPLOITATION

DEVELOPMENTS IN SOUTH-EAST MEDITERRANEAN

Solon Kassinis

Managing Director

KASSINIS INTERNATIONAL CONSULTING

19ο Εθνικό Συνέδριο Ενέργειας

Ενέργεια & Ανάπτυξη 2014

11-12 Νοεμβρίου

IENE

12 November 2014, Athens

SOUTH EAST MEDITERRANEAN – AN EMERGING REGION

Advantages

- A promising regional geological background
- Big hydrocarbon discoveries in the region
- Many attractive major "plays" have been identified
- Greater Mediterranean region is a market with large potential for oil and gas trading
- Located at the crossroads of big international energy routes

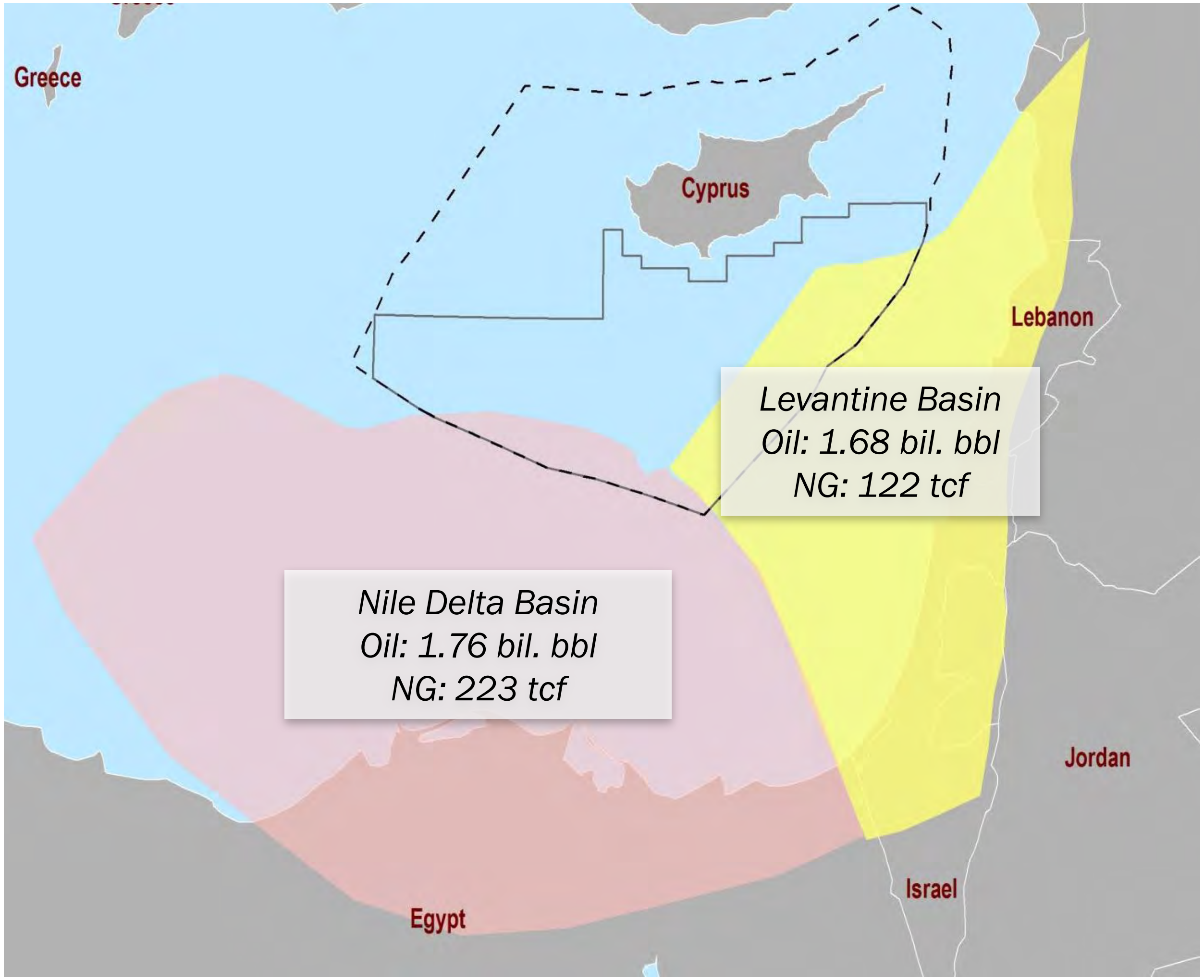
Disadvantages

- A historically tensioned geopolitical setting
- Unstable political scene
- Deep & Ultra Deep Operations

- The hydrocarbon activities can serve as a catalyst towards greater cooperation and stabilization in the region
- New deep water technologies decrease the risk of the oil companies
- High oil prices and increased gas demand secure the commerciality of the hydrocarbon discoveries

HYDROCARBON PROSPECTIVITY IN THE SOUTH EAST MED

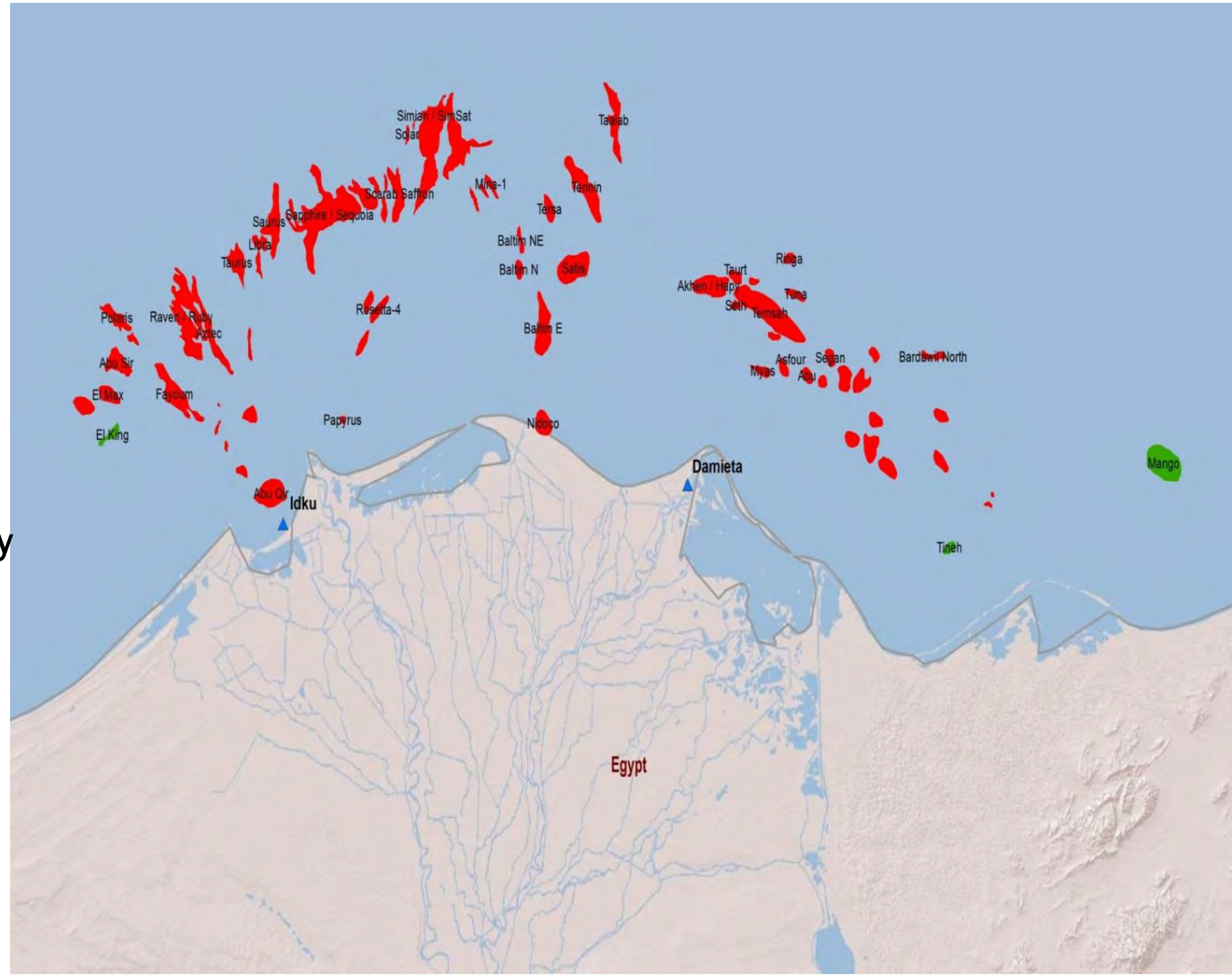
- USGS' Report shows that the Eastern Mediterranean region is a prospective and promising area with estimated significant amounts of undiscovered oil and gas.
- The assessments by USGS put the level of undiscovered oil and gas resources in the Eastern Mediterranean to a total of 3.4 bil. bbl for oil and 345 tcf for natural gas in the Nile Delta and Levantine basins.
- More recent estimates by Noble Energy:
  - Deep Mesozoic play in both Cyprus and Israel
    - 3 bil. bbl (approximation of gross unrisked oil potential)
  - Cyprus
    - 4 tcf (gross natural gas potential)



OFFSHORE HYDROCARBON ACTIVITIES – KEY FACTS

EGYPT

- Proven gas reserves at the end of 2012: 72 tcf*
- Total gas produced from all fields during the year 2012 reached 2.27 tcf
- Damieta & Idku LNG plants idled due to increased internal consumption
- Continuous political instability
- No attractive business environment for oil companies (more investments are needed in oil & gas activities)

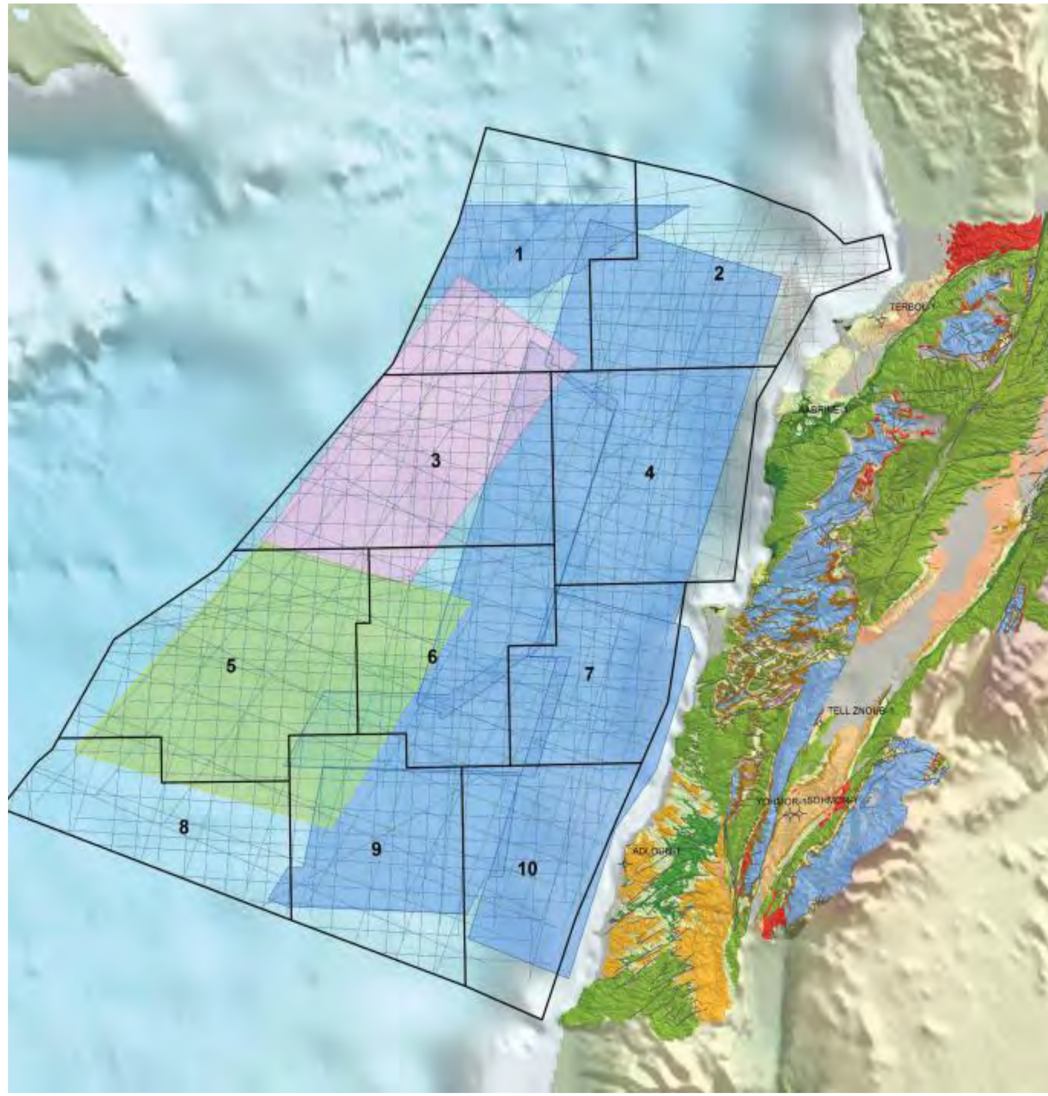


*Source: BP Statistical Review of World Energy

OFFSHORE HYDROCARBON ACTIVITIES – KEY FACTS

LEBANON

- Large volumes of 2D & 3D seismic data
- Minister Bassil in 2013: *"Preliminary surveys of Lebanese offshore fields show reserves of 30 tcf of natural gas and 660 million bbl of oil"*
- 52 companies from 25 countries submitted their pre-qualification applications
- 12 companies were pre-qualified as "Operators" & 34 as "Non-Operators"
- 1st Licensing Round still pending

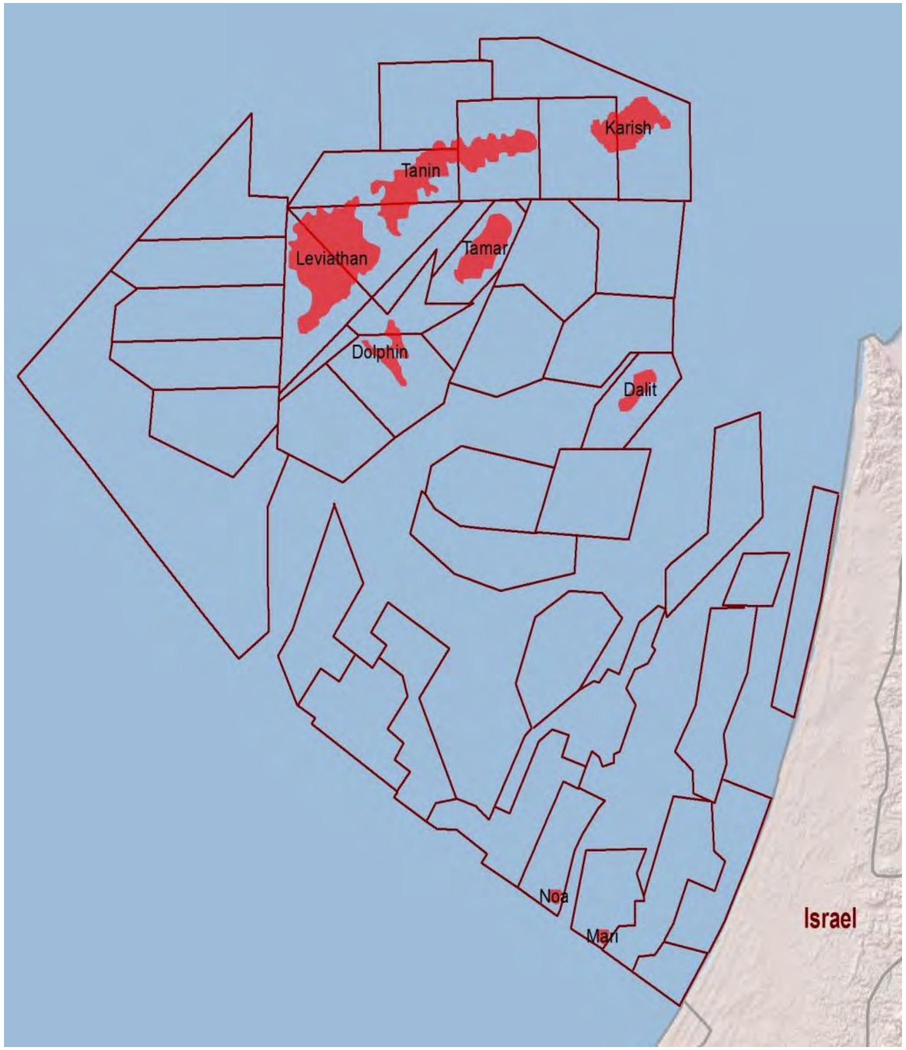


Source: Lebanese Petroleum Administration

OFFSHORE HYDROCARBON ACTIVITIES – KEY FACTS

ISRAEL

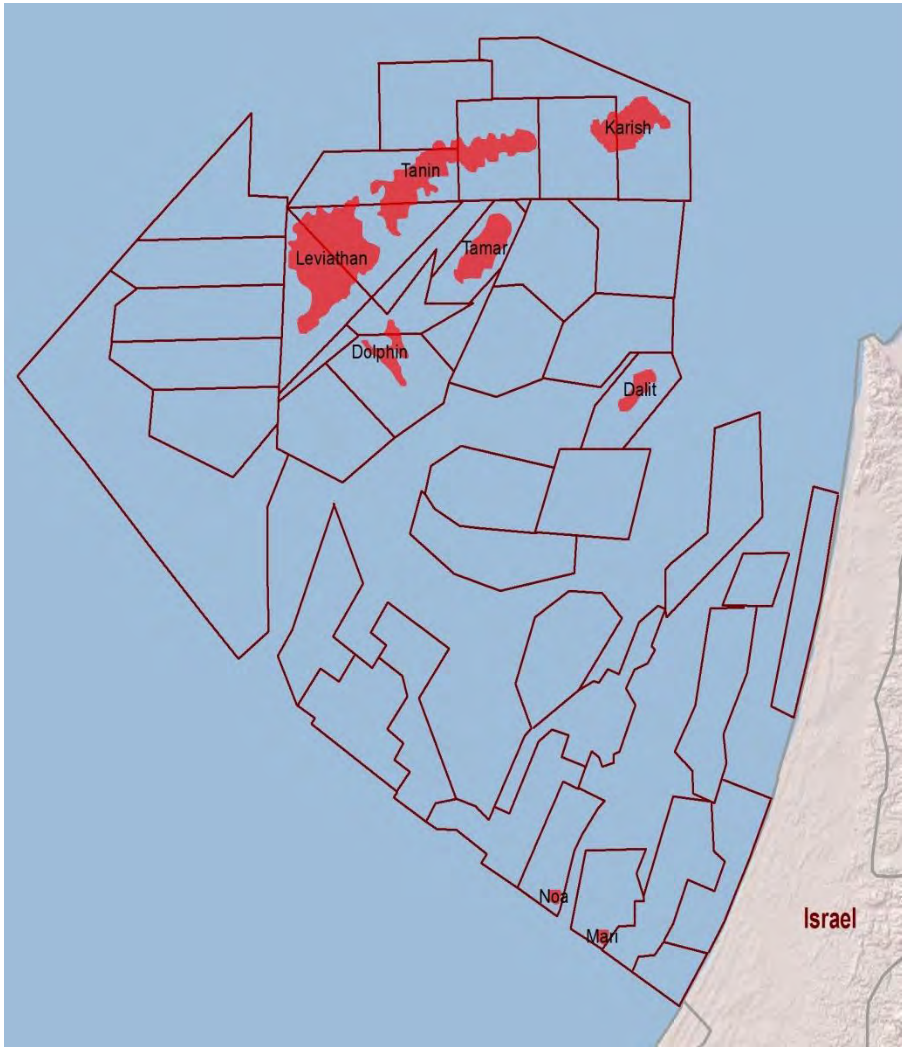
- **In the last six years a series of successful exploration wells offshore Israel has resulted in the discovery of approximately 35 tcf of gas resources**
- **Gas sales from Tamar (10 tcf) began in March 2013, just over four years from discovery.**
  - Israel domestic demand is the main market.
  - Negotiations are underway for:
    - 5 bcma of gas sales for 3 yrs to private customers in Egypt via the East Mediterranean Gas (EMG) pipeline
    - 4.5 bcma of gas sales for 15 yrs to Union Fenosa Gas for the LNG plant in Egypt
    - A total of 1.8 bcm for 15 years to Jordan



OFFSHORE HYDROCARBON ACTIVITIES – KEY FACTS

ISRAEL

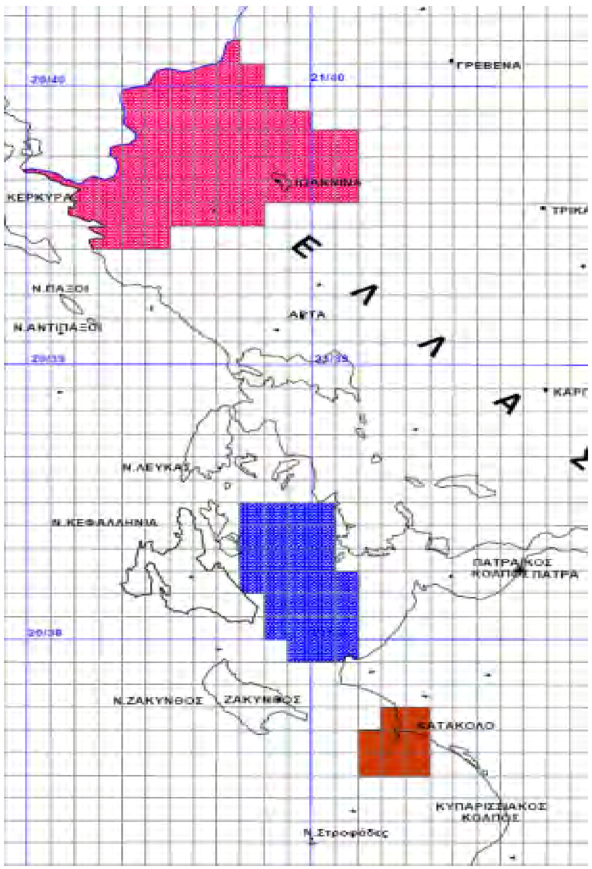
- **The target for initial production from Leviathan (22 tcf) is 2017 / early 2018.**
- **Development plan = $6.5 billion.**
- **Negotiations underway for:**
  - 7 bcma of gas sales for 15 yrs to BG Group for the LNG plant in Egypt
  - A total of 45 bcm of gas sales to Jordan National Electric Power
  - Supply gas to Palestinian Power once Leviathan starts production ($1.2 billion deal)



OFFSHORE HYDROCARBON ACTIVITIES – KEY FACTS

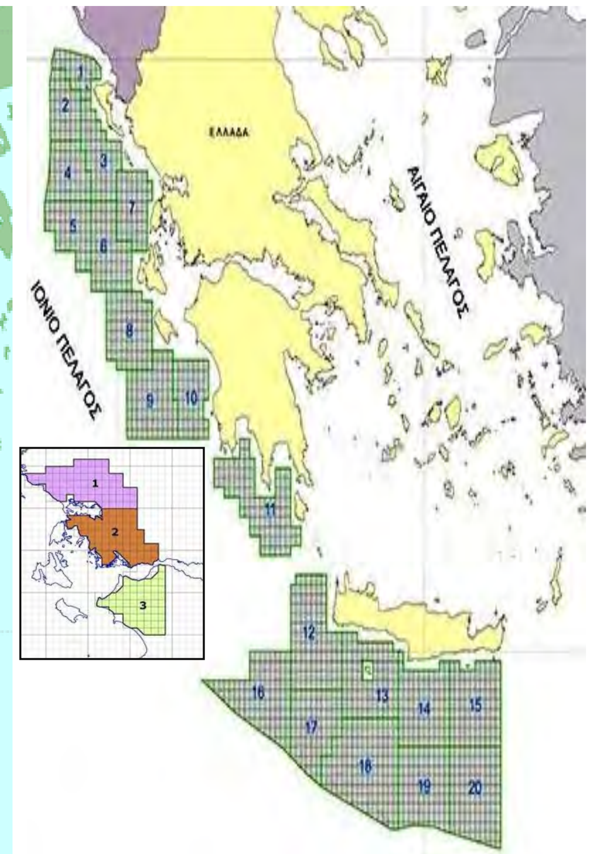
GREECE

- Three concession agreements were signed in 2014 (Katakolo / West Patraikos / Ioannina)
- 12,430 of 2D seismic data were acquired in 2012/2013 in western & southern part
- Next Step: Licensing Round for offshore blocks & Applications for onshore areas



Source: www.ypeka.gr

Source: www.pgs.com



Source: www.ypeka.gr

INITIAL EXPLORATION ACTIVITIES OFFSHORE CYPRUS

2006

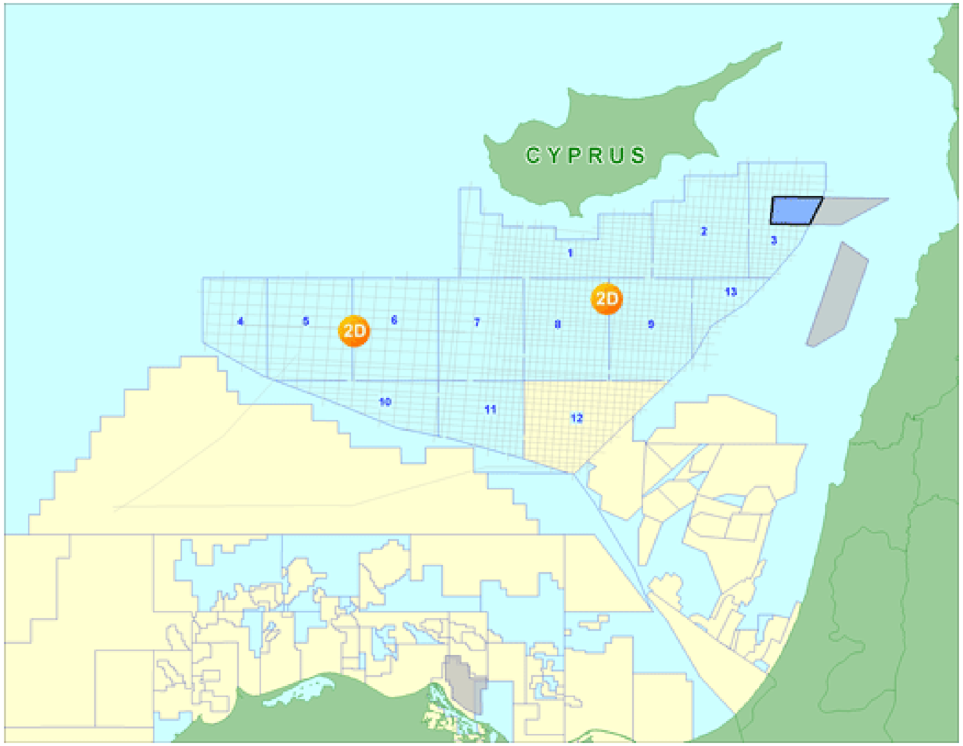
- 2-D seismic survey of 6,770 line-km
- Covered an area of 51,000 sq. km
- 20 x 20 km grid

2007

- 3-D seismic survey of 659 sq. km
- Covered a small area within Block 3

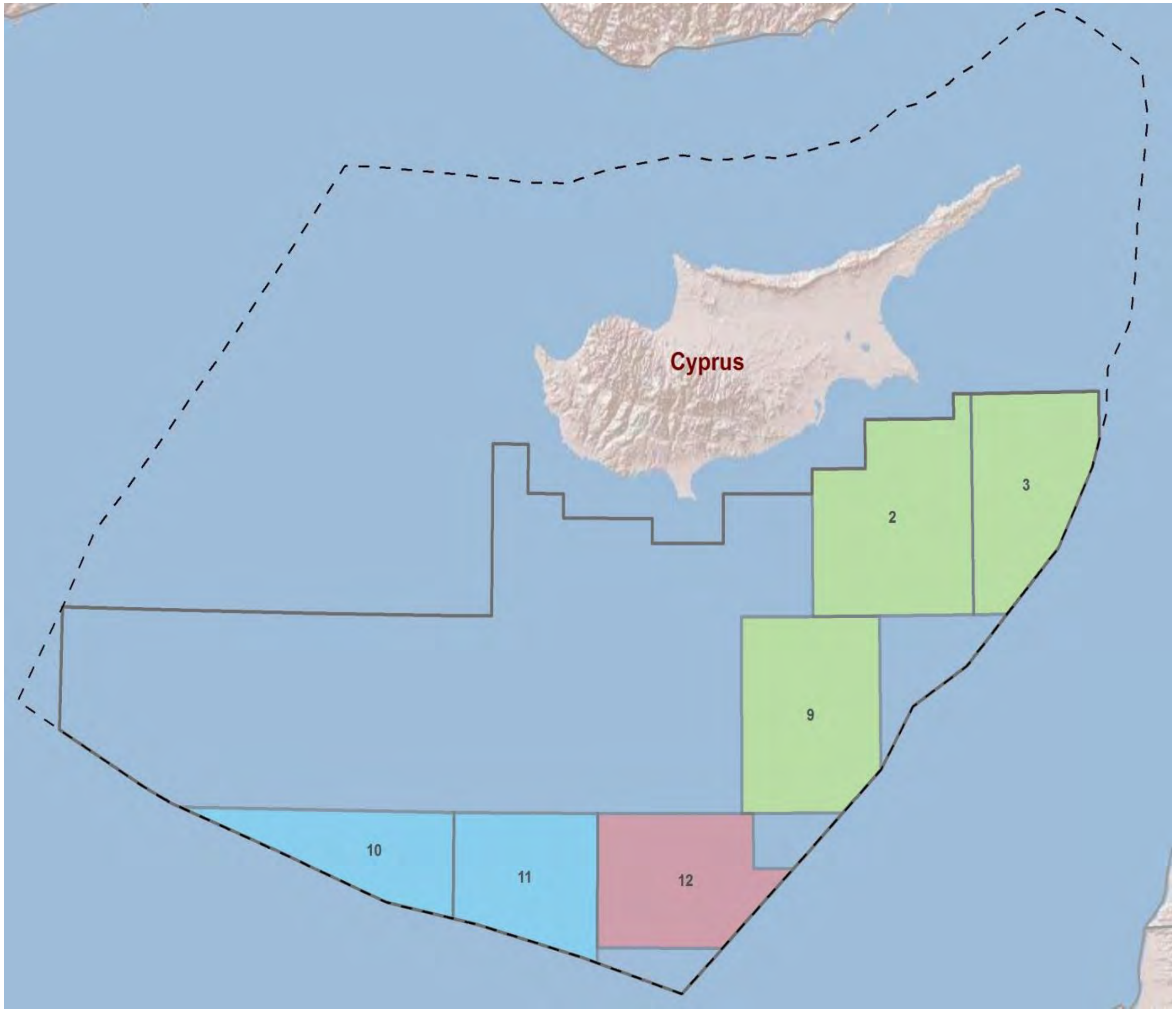
2008

- 2-D seismic survey of 12,000 line-km
- Covered an area of 51,000 sq. km
- 10 x 10 km grid on the western side
- 5 x 5 km grid on the eastern side
- First and biggest seismic survey to be carried out using PGS' GeoStreamer® technology

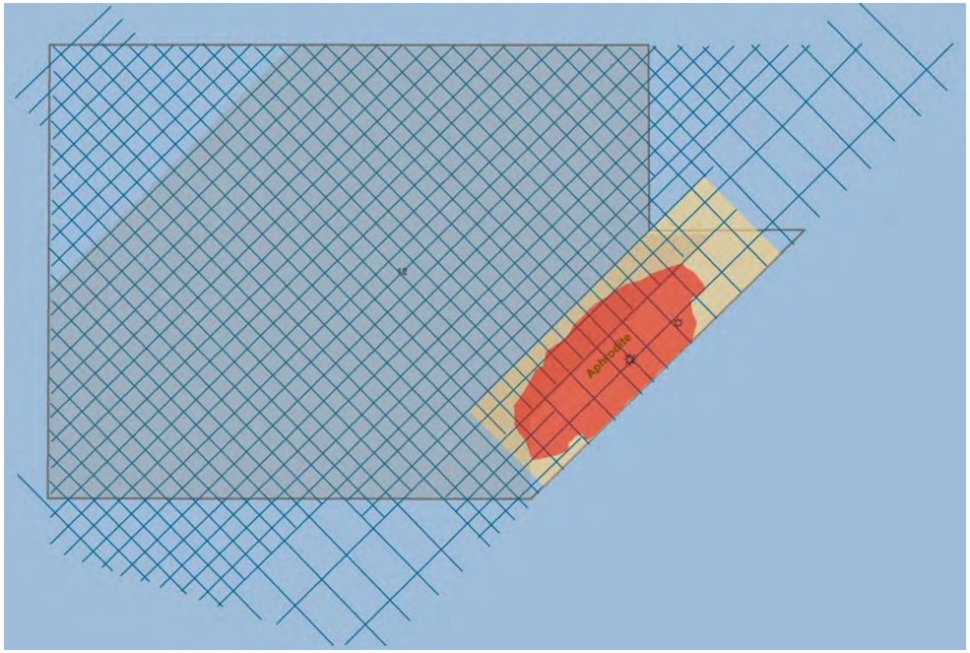


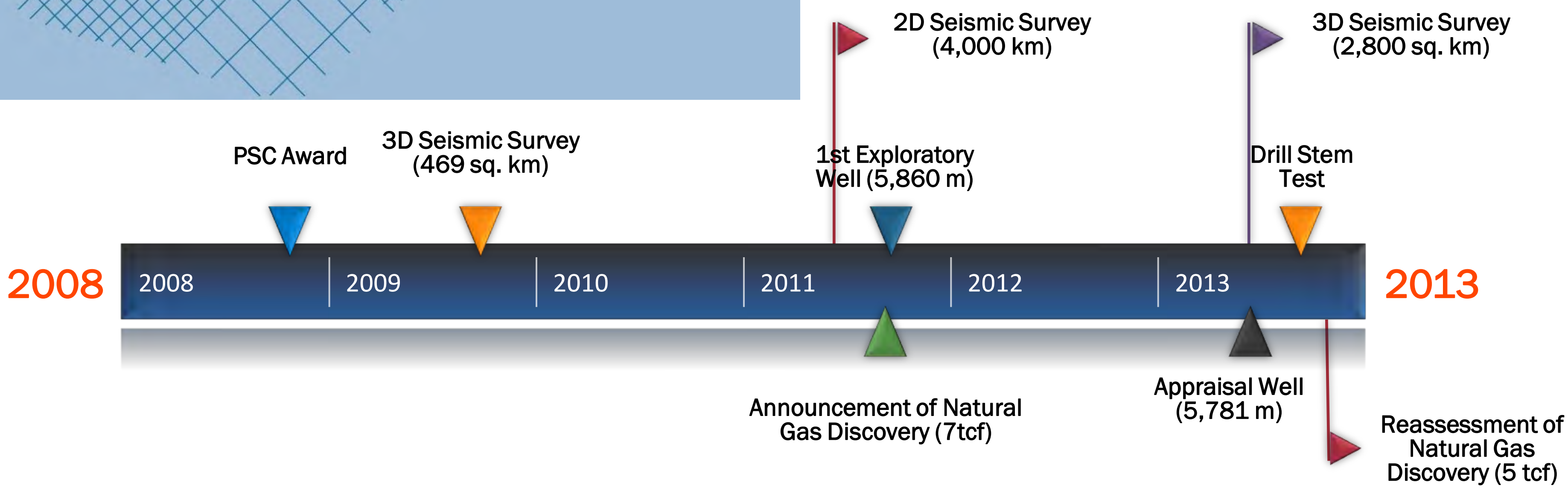
HYDROCARBON ACTIVITIES OFFSHORE CYPRUS

- **Two Hydrocarbon Licensing Rounds: 2007 & 2012**
- **Six Hydrocarbon Exploration Licences were awarded:**
  - Blocks 2,3,9: Eni (80%) / Kogas (20%)
  - Blocks 10,11: Total (100%)
  - Block 12: Noble Energy (70%) / Delek Drilling (15%) / Avner Oil Exploration (15%)



HYDROCARBON ACTIVITIES OFFSHORE CYPRUS – BLOCK 12





HYDROCARBON ACTIVITIES OFFSHORE CYPRUS – BLOCK 12

- **An agreement on the exchange of data (seismic & well data, studies) was signed between Cyprus and Israel – Noble Energy will utilize and evaluate the well data from "Ishai" block (offshore Israel)**
- **Future Plans:**
  - One Exploration Well 12 by end 2015 – New Geological Structure
  - Second Appraisal Well for the "Aphrodite" gas discovery subject to the results of the evaluation of the data acquired in "Ishai"
  - Data gathering for assessing the commerciality of the gas discovery – Various options under evaluation: onshore LNG, FLNG, pipeline to LNG plants in Egypt

Drill Stem Test – Aphrodite Discovery
Source: www.mcit.gov.cy

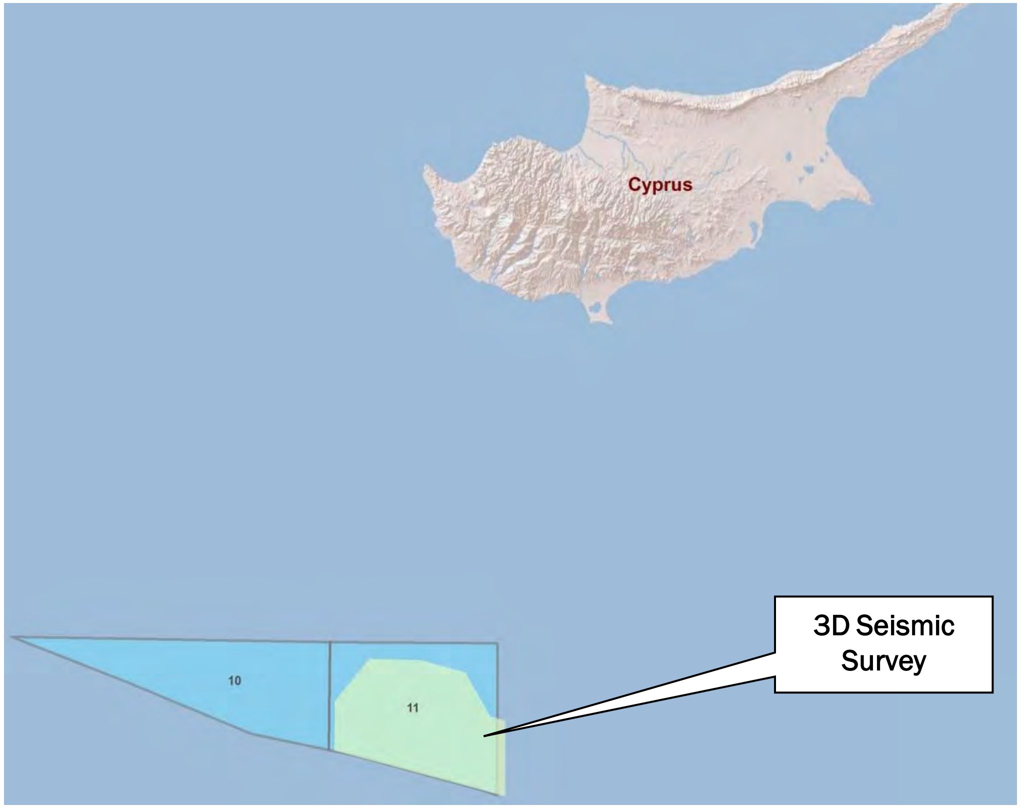
HYDROCARBON ACTIVITIES OFFSHORE CYPRUS – BLOCKS 2,3,9

- Large volumes of 2D & 3D seismic data
- Four firm Exploration Wells + any Appraisal Well(s) by end 2015
- 1st Exploration Well in Block 9 ("Onasagoras") spudded end September by the drillship "Saipem 10000"

- Maximum depth of the exploration wells > 6,000 m – Water depth around 2,000 m

HYDROCARBON ACTIVITIES OFFSHORE CYPRUS – BLOCKS 10,11

- 3D Seismic survey in Block 11 – 2,200 sq. km.
- Coring and geochemical analysis of the seabed in Block 11
- 2D Seismic survey in Block 10 – 1,500 km
- Two firm Exploration Wells / second half of 2015 – early 2016



NG EXPLOITATION: LNG PLANT

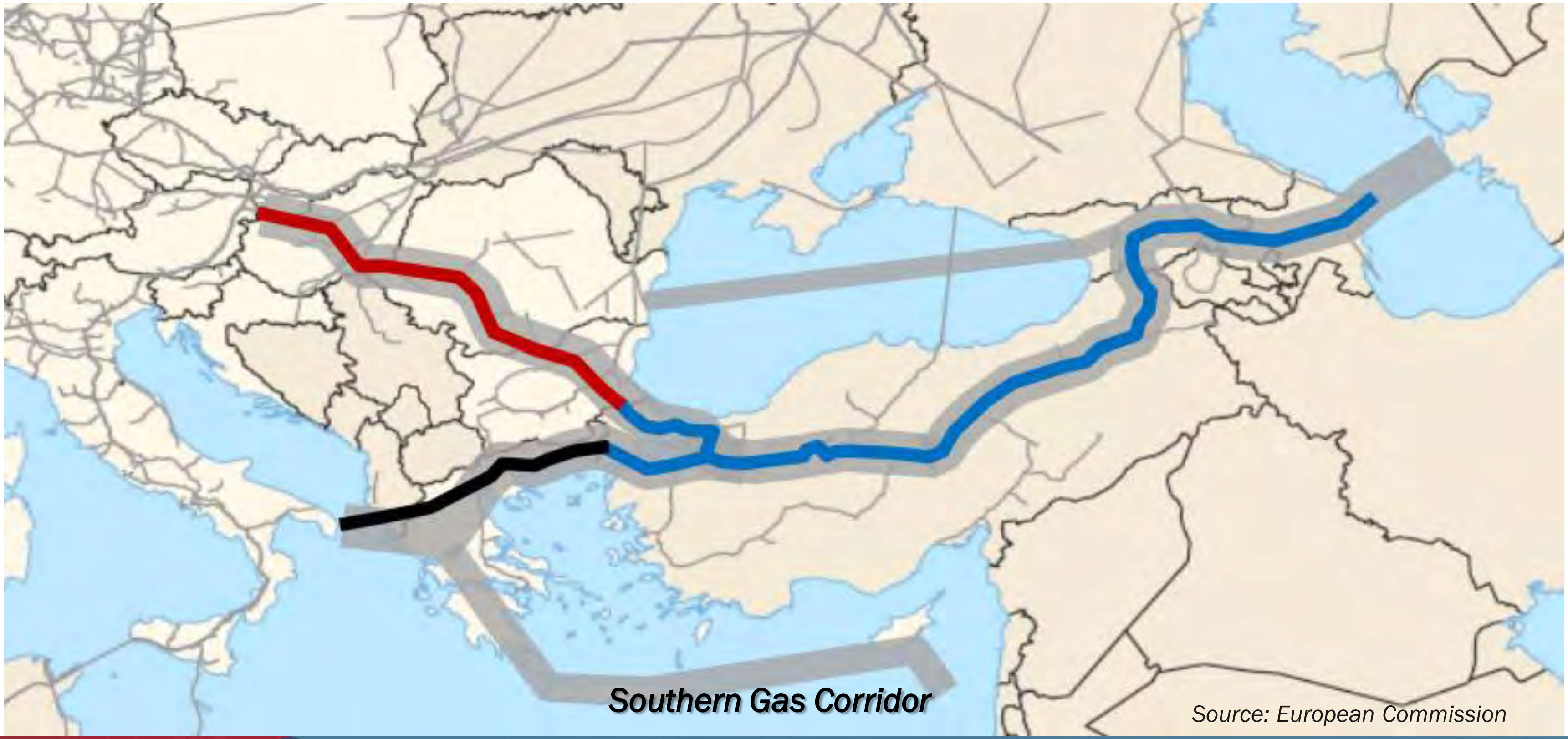
- The establishment of an onshore LNG plant was until recently the first option for gas monetization
- More gas quantities are needed in order to become commercially viable – Results from Eni's exploration activities are anticipated → Statement by the Government
- It will be the largest investment in the island's history
- Offers export market flexibility
- Agreement with Israel for handling additional gas volumes mainly from "Leviathan" will be beneficial for project's viability
- Decisions must be taken soon – Many LNG projects under development around the world (especially in Australia and US)

Source: Noble Energy

CAN SOUTH EAST MEDITERRANEAN REGION PLAY AN IMPORTANT ROLE TO EU'S ENERGY SUPPLY?

- Speech by President of the European Commission on the preparations of the European Council of 22 May 2013:

"We must continue to strengthen the internal and external diversification of our supplies. This includes tapping new international sources, for instance through the Southern Gas Corridor ."



PROJECTS OF COMMON INTEREST – ELECTRICITY

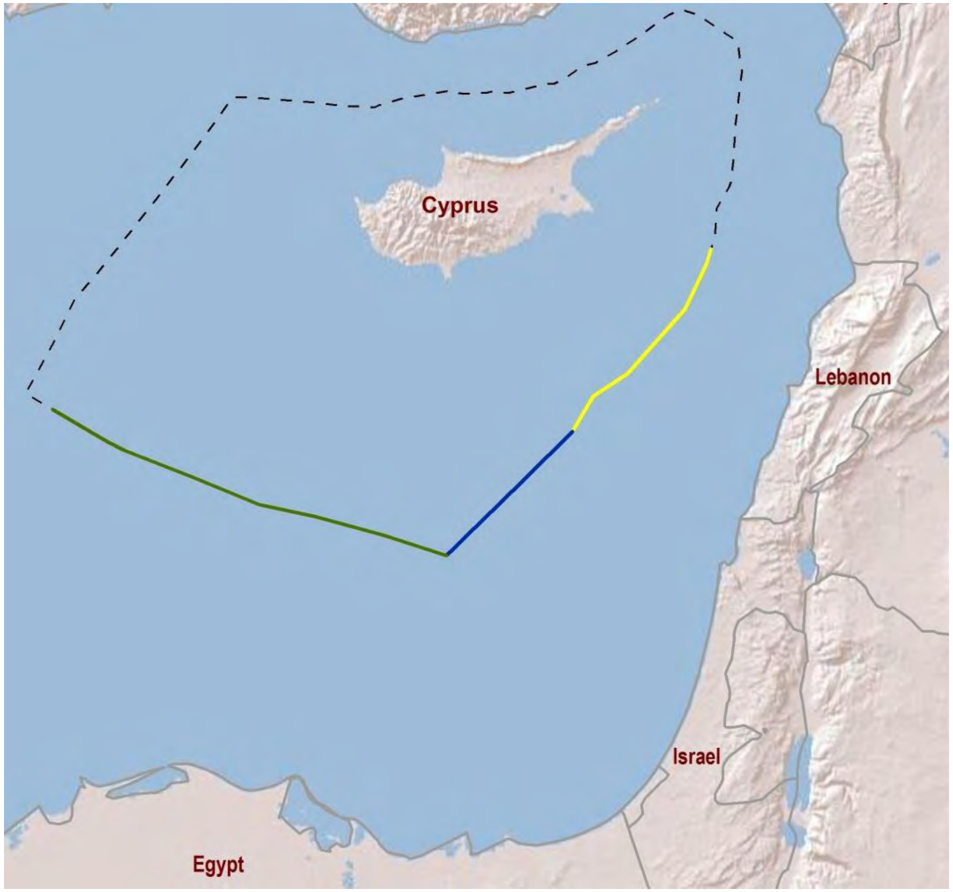
- The project (when implemented) can provide diversification and additional means for hydrocarbon exploitation (and also RES generation transfer).
- Phase 1 of the EuroAsia Interconnector (which is the connection between Cyprus and Israel) could provide an 'interim solution' and security of energy supply to Cyprus
  - can achieve lower electricity costs through energy supplies from Israel

HYDROCARBON ACTIVITIES OFFSHORE CYPRUS – TURKEY'S INTERFERENCES / CLAIMS

EEZ AGREEMENTS

The Republic of Cyprus has signed Agreements on the delimitation of its EEZ, on the basis of the median-line principle, with:

- 2003 – The Arab Republic of Egypt (in force)
- 2007 – The Republic of Lebanon (ratification pending)
- 2010 – The State of Israel (in force)

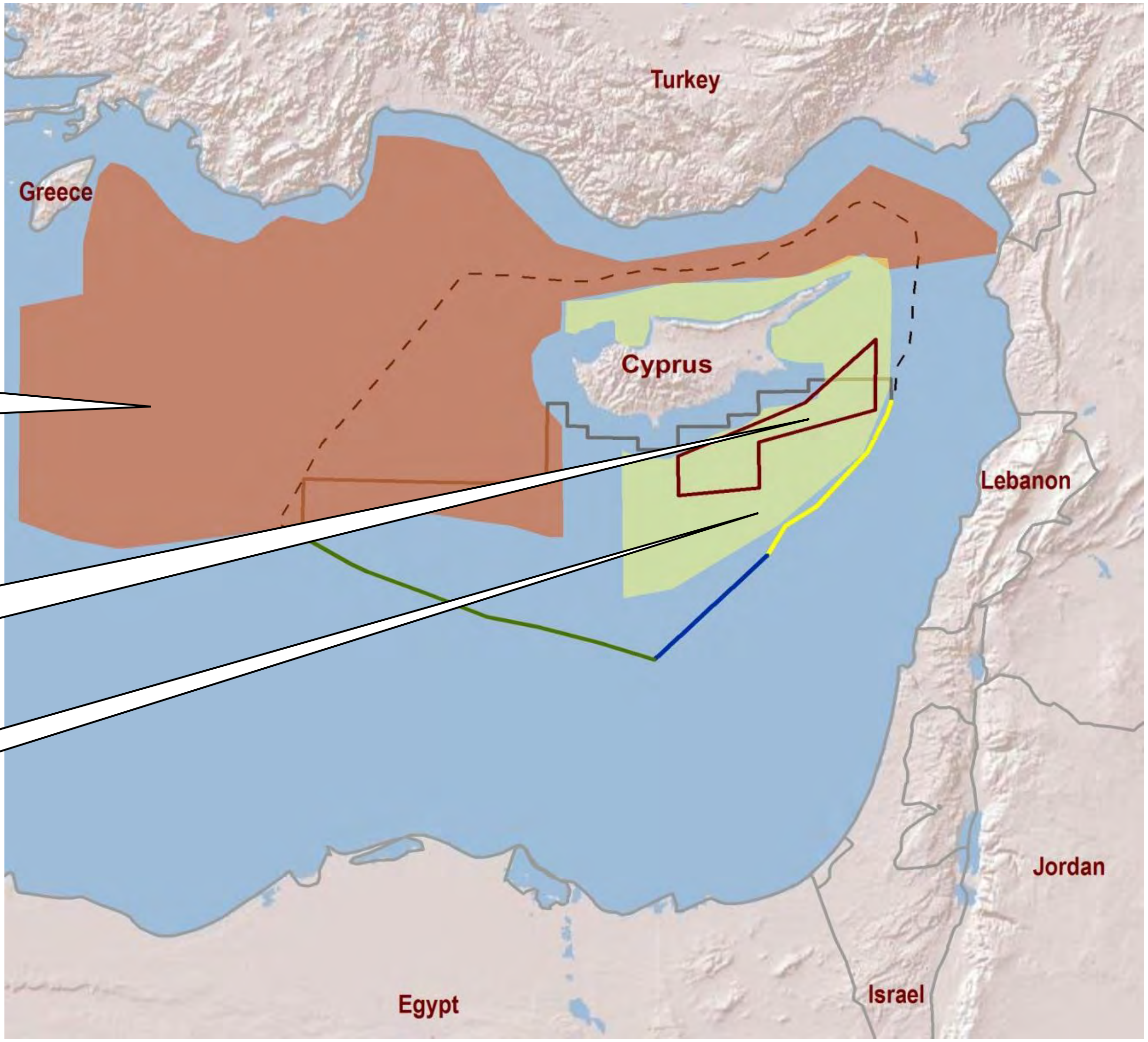


HYDROCARBON ACTIVITIES OFFSHORE CYPRUS – TURKEY'S INTERFERENCES / CLAIMS

Turkish Claims: "The maritime areas west of meridian 32º16'18"E, is part of the Turkish continental shelf"

Illegal NAVTEX issued by Turkey (20 Oct. 2014) for "Barbaros" seismic exploration activity

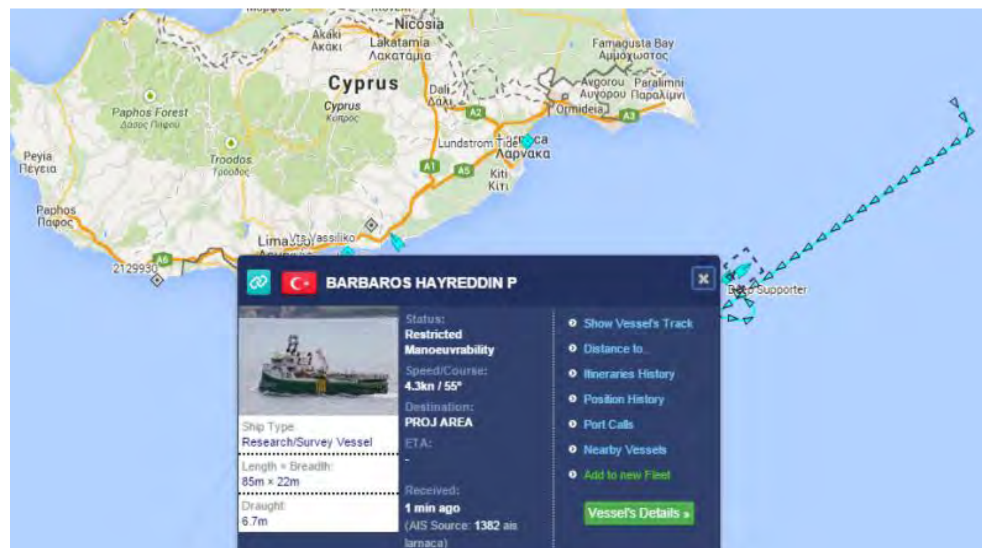
Exploration Area declared illegally by "TRNC"



HYDROCARBON ACTIVITIES OFFSHORE CYPRUS – TURKEY'S INTERFERENCES / CLAIMS

Turkish Interventions:

- 2008 – Fighter plane & Warship during PGS seismic survey
- 2013 – Warship during Total's exploration activities
- 2014 – Warships during Eni's exploration activities + Barbaros exploration activity



Source: www.marinetraffic.com

CONCLUSIONS

- Substantial natural gas deposits have been discovered in the broader South East Mediterranean the last years
- Further exploration and production opportunities will follow in offshore areas between Egypt, Israel, Lebanon, Cyprus and Greece
- The Eastern Mediterranean is attracting international interest in hydrocarbon exploration and production investments
- Studies performed by various organizations, indicate that by 2020, EU natural gas demand will outgrow supply, leading to a substantial gap between demand and supply
- Gas from the South Eastern Mediterranean region can substantially contribute to EU's energy security
- EU's support for establishing the "South Gas Corridor" is of paramount importance – It should set as a priority and mediate to ensure that an appropriate framework and solid plan are in place in order to complete the hydrocarbon exploration/exploitation activities as efficiently and as quickly as possible
- Big investments are needed
- Decisions have to be taken immediately – Competition for supply from North America (shale gas) and Oceania (LNG)

THANK YOU!