The Southern Gas Corridor: The SGC & Prospective Diversification

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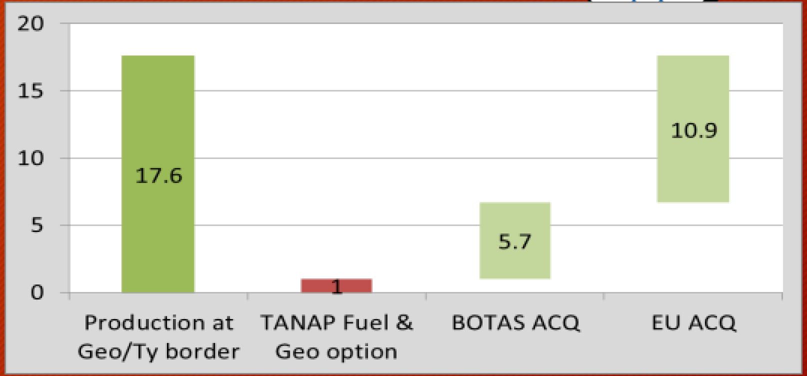
The Southern Gas Corridor: Overview

Gas sales to EU buyers signed in 2013:
Axpo, GDF Suez, Gas Natural, E.ON, Shell
Hera, ENEL, Bulgargaz, DEPA
Gas to Europe to start 1 yr later than 1st gas



- Shah Deniz Field
- South Caucasus Pipeline Expansion (SCPX)
- Trans Anatolian Pipeline (TANAP)
- Trans Adriatic Pipeline (TAP)

Gas sales to BOTAS
Stage 2 sales signed in 2011
(First Gas in 2018)
Complementing current Stage 1 sales

ACQ: Annual Contract Quantity

The Outstanding Issue: The Trans-Adriatic Pipeline

TAP: 90.5% Complete

The TAP Basics – November 2019

- An 878-km system capable of carrying an initial 10 bcm/y and, with added compression, a further 10 bcm/y.
- Overall completion: 90.5% as of November 2019.
- Backfilling completed in both Greece and Albania: 765 kms.
- Completion reported for 105-km offshore section from Fier in Albania to San Foca in Italy. August 2019.
- Completion reported for 1.6 km, 2.4 metre diameter, micro tunnel built to connect offshore line with onshore pipe to carry the gas to the San Foca receiving terminal. August 2019.
- Work starts on the 55-km Melendugno-Brindisi gas pipeline,which will connect TAP to the Snam-Rete gas network. in legal terms, this is not part of TAP, but without this connection, being built SNAM, TAP cannot deliver gas to customers in Italy, and beyond. January 2019.

TAP: What’s Left?

- Gas pipe insertion into the Micro-tunnel. Due for completion by end 2019.
- Completion of the receiving terminal.
- Commissioning of the 55-km Melendugno-Brindisi onward connection to the Snam-Rete system.
- Political problems?????
- TAP will start operations in Italy at the end of 2020. Luca Schieppati, TAP managing director, 23 September 2019.

TAP: What's Next?

- Phase Two. Expansion to 20 bcm/y.
- But when will this take place?
- And what will it carry?

Gas: Regional Breakdown of Demand 2015-2040 The Gas Exporters' View

	2015	2040	Major Increases 2015-40	Lesser Increases 2015-40
OECD Europe	457	569		112
Non-OECD Europe	24	41		17
CIS	611	656		45
Middle East	457	716	259	
OECD Asia-Pacific	214	245		31
Non-OECD Asia	480	1257	777	
North America	958	1302	344	
Latin America	161	228	67	
Africa	132	244	112	
Total	3494	5258	1559	205

Source: GECF Global Gas Outlook 2040

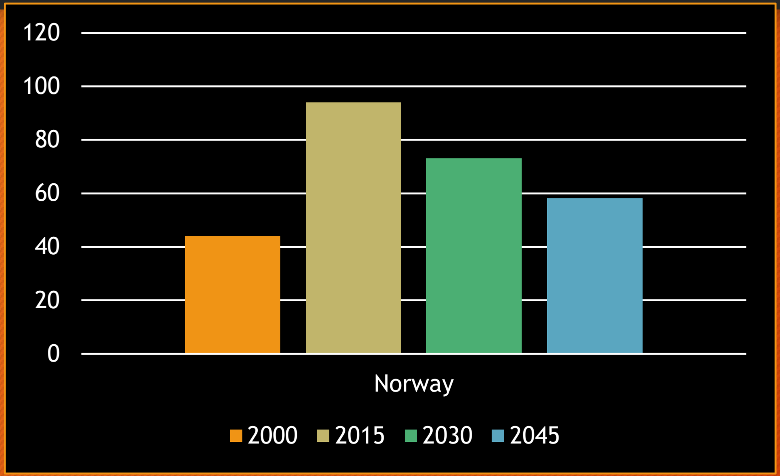
Natural Gas: Pipelines & LNG

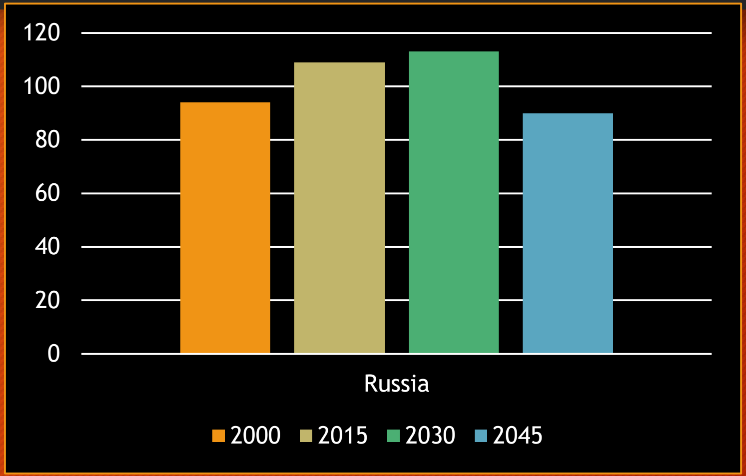
Table: Global Gas Trade by Pipeline and LNG (bcm)

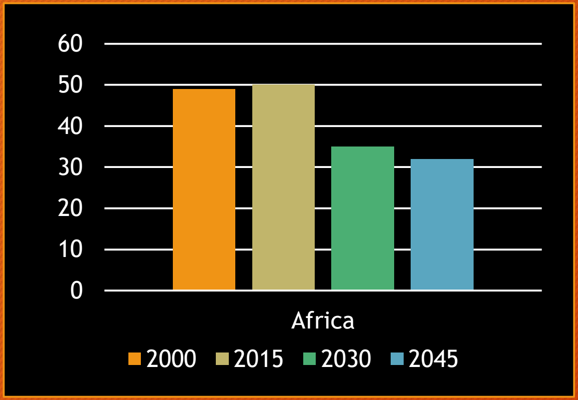
	2000	2005	2010	2015	2020	2030	2040
Pipeline	493	671	693	714	680	745	998
LNG	137	191	296	322	468	599	658
Trade	630	862	989	1,036	1,148	1,344	1,656
LNG Share	26%	26%	31%	31%	41%	45%	40%

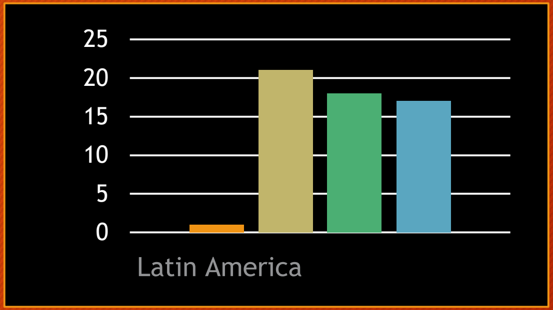
Source: GECF Global Gas Outlook 2040, based on Cedigaz (historic data 2000-2015 and GECF Secretariat (forecasts 2020-2040).

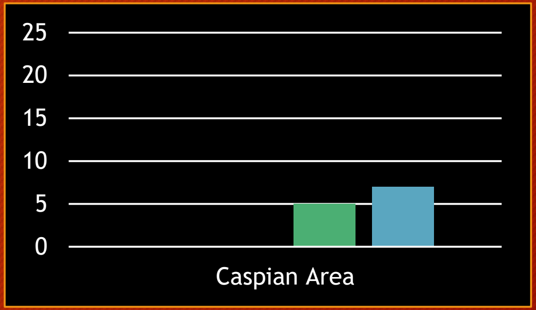
Gas: Forecast for Major Producers (Mtoe)





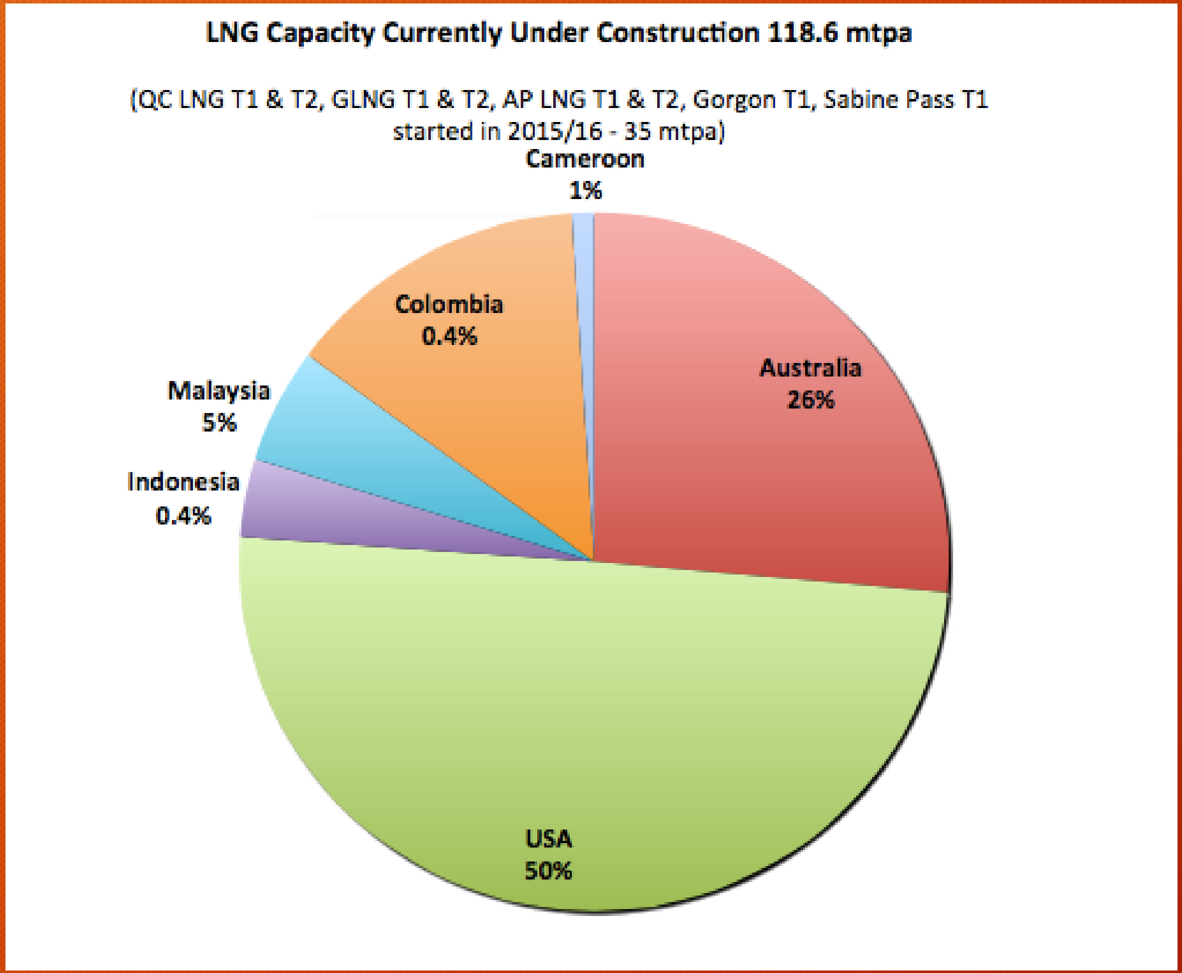






- Source: DG Energy, based on PRIMES model

Europe's Principal Hope: US LNG



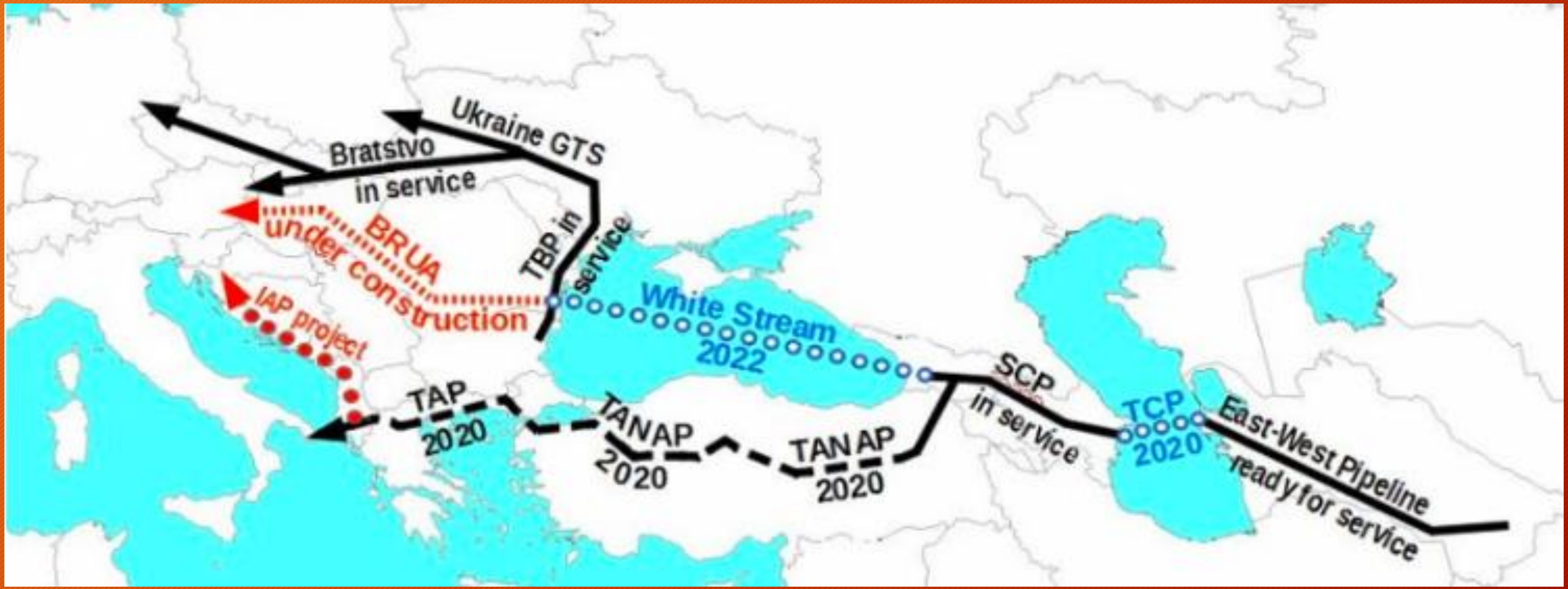
Source:
OIES, Ledesma
South Court

Gas: The Collapse of Demand 2015-2040
The IEA View

Gas Demand in 2018	BP Statistical Review 2019	466.8 bcm
Gas demand in 2040	IEA 2019 WEO Stated Policies scenario	386 bcm
Gas demand in 2040	IEA 2018 WEO Stated Policies scenario	408 bcm
Gas Demand in 2040	IEA 2017 WEO Stated Policies scenario	454 bcm

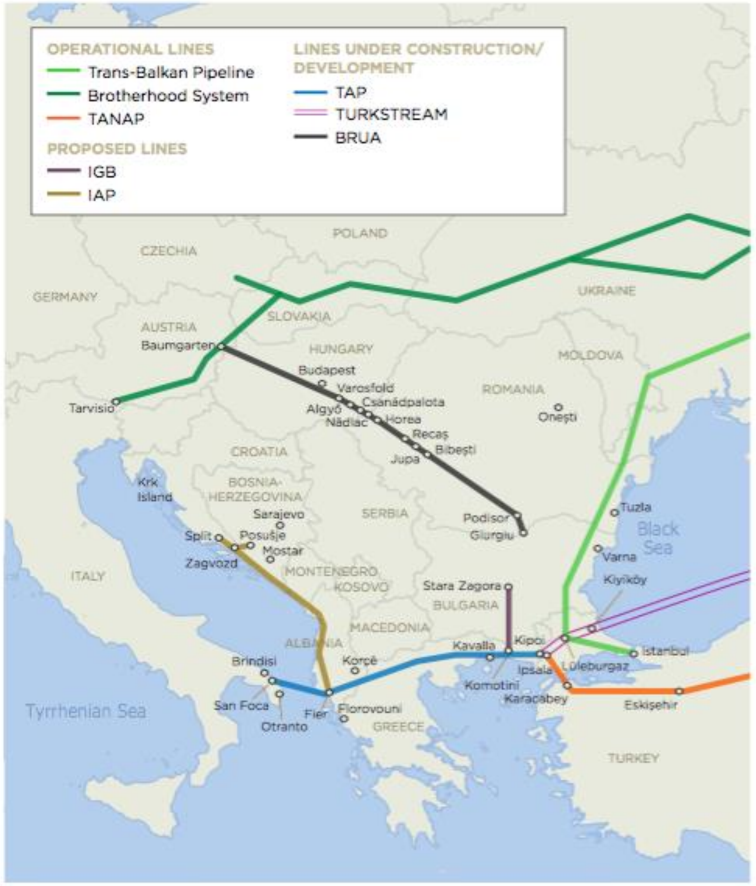
SGC Phase Two: Optimism & Reality

Source: Robert M. Cutler: How Central Asian energy complements the Southern Gas Corridor. EurActiv 24 Jan 2018.



SGC Phase 2: Pipelines in Southeast Europe: BRUA & IAP

Existing, Planned, or Proposed Long-distance Pipelines in Southeast Europe



Source: Atlantic Council.

Source:
Atlantic Council

Europe: Potential Political Concerns

Supply Issues for the Southern Gas Corridor.

The Turkish-Russian rapprochement and the revival of Turkish Stream:

- The challenge to Ukraine and gas transit across Ukraine

Insurance mechanisms:

- Diversified Infrastructure in Europe
- LNG from Atlantic & Gulf suppliers
- Marine-based development of East Med gas.

Southern Gas Corridor Source Fields (Theoretical)

Field	Country	Estimated Reserves	Output & Production Timing
Shah Deniz Phases I and II	Azerbaijan	1.2-2.0 tcm	25 bcm/y during 2018-2022
Shah Deniz Phase III	Azerbaijan	c. 500 bcm	?
ACG Deep Level	Azerbaijan	300-500 bcm	5-10 bcm/y by 2025-7???
Apsheron	Azerbaijan	350 bcm	Startup in 2021. 5 bcm /y by 2024?
Umid, Babek, Nakhchivan,			
Zafer-Meshel, Araz-Alov-Sharq,			
Shafaq-Asiman	Azerbaijan	2.7 tcm	Post-2025.
Kurdistan	Iraq	?	5-10 bcm/y c. 2022; 10-20 later?
Akkas	Iraq	59.4 bcm (GOI)	5-10 bcm/y long-term
Galkynysh	Turkmenistan	Up to 26.2 tcm (GIP)	10-30 bcm/y but when ????
Dauletabad	Turkmenistan	1 tcm	30 bcm/y with E-W pipeline
Offshore Block 1	Turkmenistan	180 bcm	10 bcm/y in 12-18 months?????

- Source: Methinks

Azerbaijan: Offshore Fields, Active and ProspectIve

SGC: Caspian offshore prospects Azerbaijan – and Turkmenistan?


Gas pipeline
Planned gas pipeline
RUSSIA
KAZAKHSTAN
UZBEKISTAN
Caspian Sea
Black Sea
GEORGIA
Tbilisi
AZERBAIJAN
Baku
ARMENIA
TURKEY
Erzurum
Turkmenbasy
TURKMENISTAN
SYRIA
IRAQ
IRAN
200 km

Prospective Suppliers: Challenging or Complementing Russian Supplies to Europe?

- Shah Deniz/Azerbaijan: 6bcm/y to Turkey in 2019; 10 bcm/y to EU in 2021. Subsequent – but delayed – throughput expansion.
- Turkmenistan: Potential for 10 bcm/y to Azerbaijan/Turkey/EU via SGC; But when?
- Iran: The great unknown.
- Iraq. Potential 10 bcm/y to Turkey within three years, but will this actually happen?
- East Med: Will impact Europe, but most likely as LNG from Egypt.

Questions?

- John Roberts
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- Member of the UN Economic Commission for Europe's (UNECE) Group of Experts on Gas;
- Senior Fellow with the Global Energy Centre, Atlantic Council, Washington DC.

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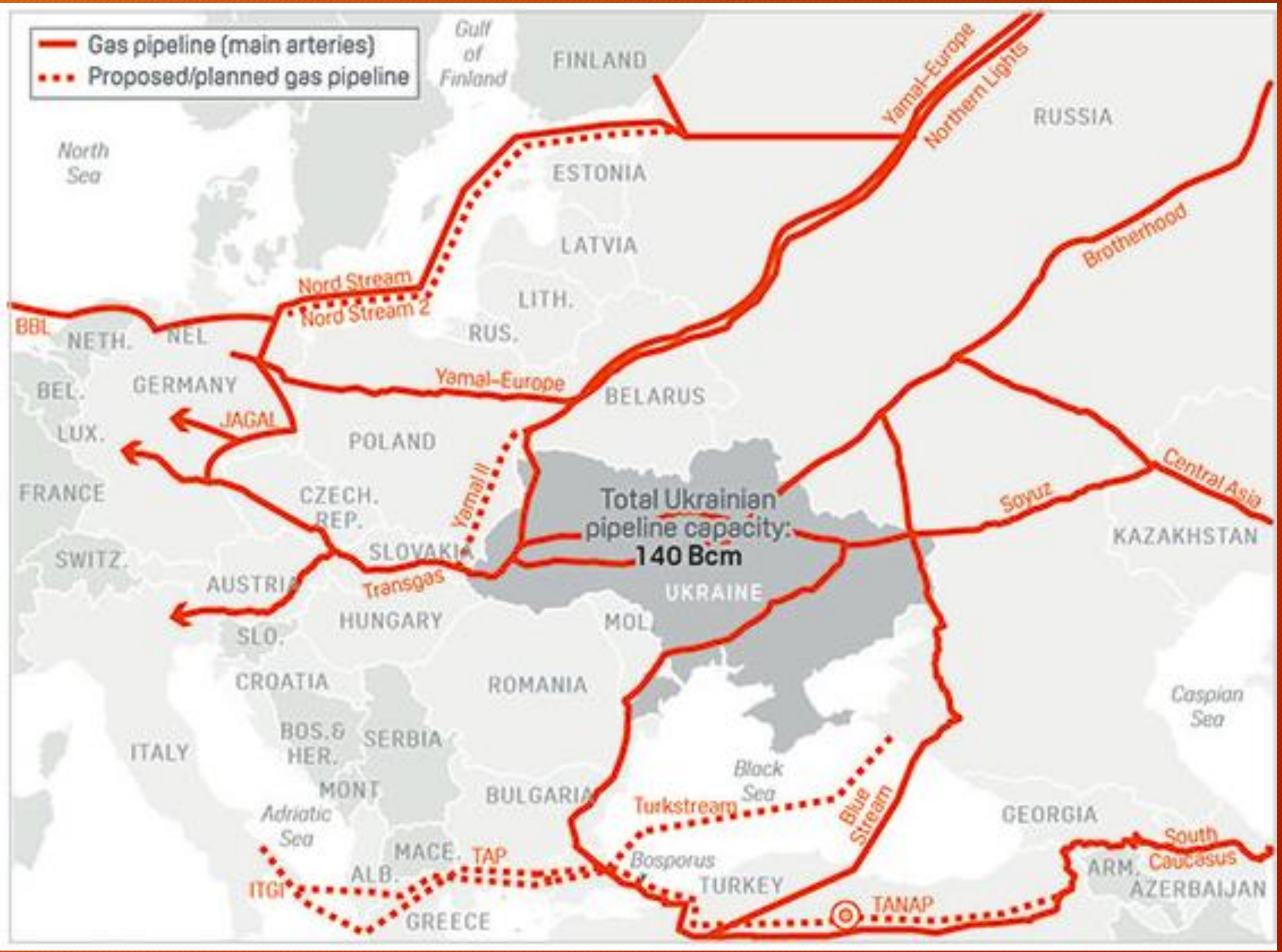
Russia: Gas Pipelines to Europe



Source: S & P Platts
24 July 2018

Turkish Stream in 2015 – and 2019

Source: Gazprom

In December 2016, Gazprom's South Stream Transport hired the Swiss-Dutch Allseas and its massive pipelaying vessel, the *Pioneering Spirit*, to lay the first string of TurkStream and in February 2017 the *Pioneering Spirit* was hired to lay the second string as well.

As the *Pieter Schelte*, the very same vessel was contracted by South Stream Transport in April 2014 to lay one 'string' of the planned South Stream gas pipeline under the Black Sea, a project that failed to materialise.

NOTE (with reference to Crimea): The author is not responsible for the colours in this map.

TurkStream: Onward options from Ipsala/Kipoi

"We have installed available capacity ready to produce more than 100 bcm of gas today, so we don't need any additional investment to produce more than 100 bcm. But in order to bring this gas to Europe we need additional infrastructure which we are working on with our European partners – NordStream 2 and Turkish Stream. This capacity will not be sufficient to bring all this to Europe. **So this is why we are talking to use available capacity on Poseidon project, (the studies for which) that will be ready soon -- or maybe TAP." Alexander Medvedev, Gazprom Deputy Chairman, Vienna 24 January 2017.**

TurkStream – On to Baumgarten

Source:
Kommersant
22 Nov 2018

Balkan Stream:
Turkstream in a regional context

Interconnection point
1 Strandzha-Malkoclar
2 Kirevo/Zajecar
10 Baumgarten

Compression station
3 Provadia compressor station

LNG import terminal
4 Krk LNG*
14 Revithoussa LNG
15 Alexandroupolis FSRU*
20 Aliaga Izmir LNG/ Aliaga Etki Neptune
21 Maramara Ereglisi LNG

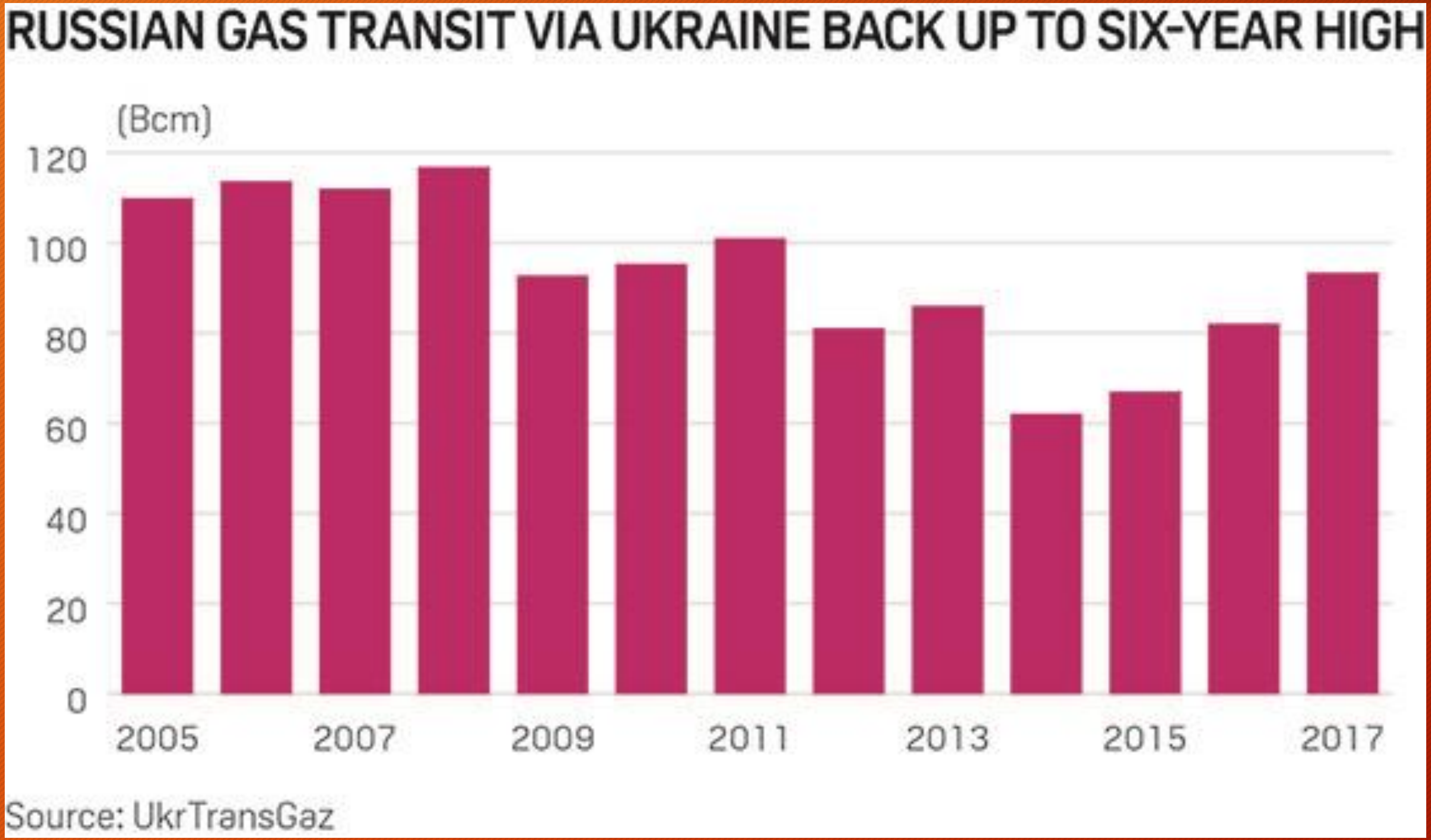
Gas field
17 Neptune gas discovery

Existing pipelines
5 Strandzha-Provadia pipeline (reverse flow conversion)
11 Onshore continuation of first TurkStream leg
12 TANAP

Planned pipelines
6 403km pipeline within Serbia
7 484km pipeline from Provadia-Serbian border
8 TurkStream
9 Link to existing pipeline, plus new 11km pipeline to Strandzha
13 TAP
16 Interconnector Greece-Bulgaria
18 BRUA pipeline
19 Bulgaria-Serbia interconnector

Source: S&P Global Platts

Russian Gas Transit Via Ukraine 2005-2017



Source: S & P Platts
24 July 2018

Russia: Putative Black Sea Boundaries in the Wake of Russia’s Annexation of Crimea

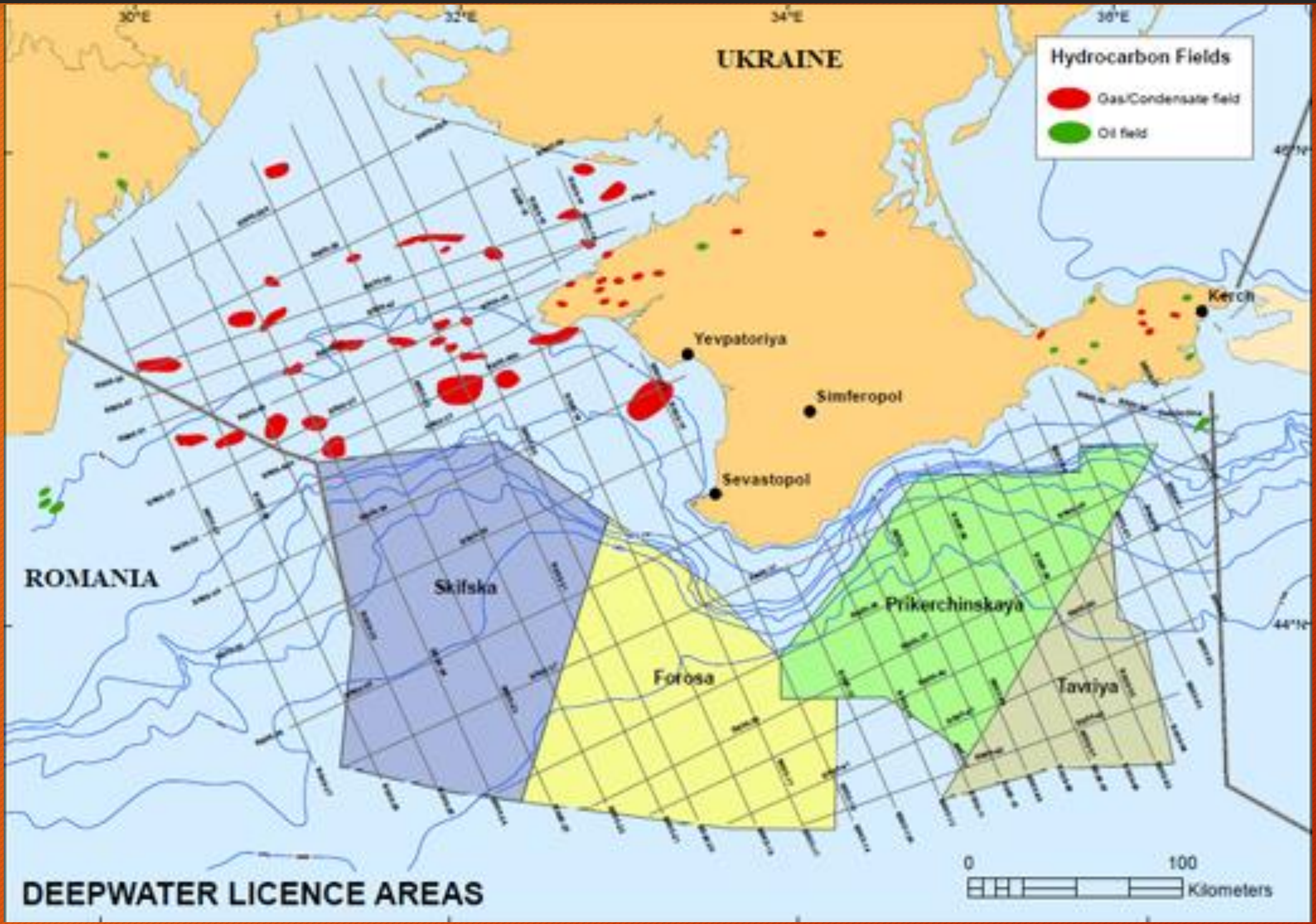
- Officially recognised EEZs

- Source: Defence24.pl

If the Annexation were to be recognised

Source: Defence24.pl

Offshore Ukraine:
Consequences of the Crimean takeover

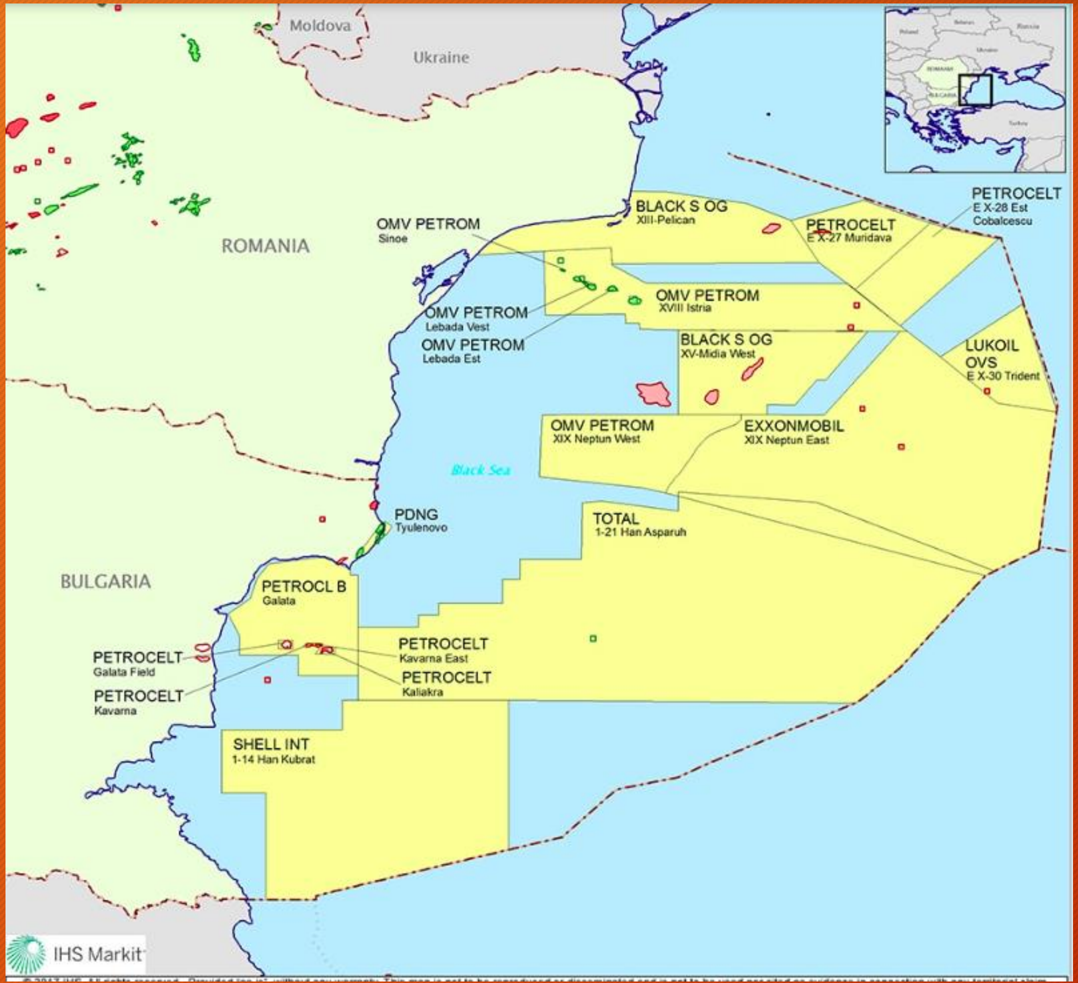


Four blocks impacted:
<u>Skifska:</u> Shell signs agreement to develop PSA in 2012. Abandoned March 2014.
<u>Prykerchenska:</u> Vanco signs agreements in 2006 and 2013.
<u>Forinska:</u> No bidding interest.
<u>Tavriya:</u> No bidding interest.

Ukraine: Prykerche

Vanco's Prykerchenska licence of 2006 and 2013: a 3.2 million-acre block off SE Crimea. Some parts of the field located at depths of more than 6,500 feet.

Romania & Bulgaria: Offshore Blocks



Source: https://ihsmarkit.com/research-analysis/ep-activity-in-the-romanian-and-bulgarian-waters-of-the-black-sea-where-do-we-go-from-here.html

East Med: Theoretical Export Options

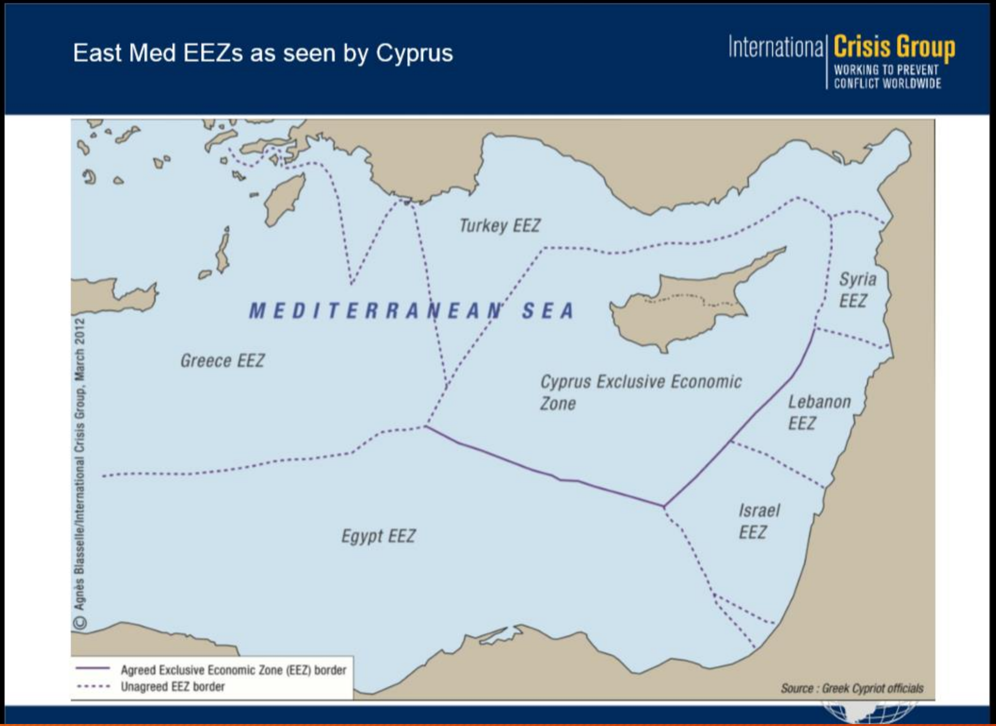
Sources: DEPA, IENE

Source for map:
DEPA SA.

East Med Pipeline (water depths)

- **Source:** ‘Southeastern Mediterranean Hydrocarbons: A new energy corridor for the EU’, 25-4-2012, available at http://www.defencegreece.com/index.php/2012/04/southeastern-mediterranean-hydrocarbons-a-new-energy-corridor-for-the-eu/

Eastern Mediterranean EEZs: Different Perceptions



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