

SEE: KEY ISSUES IN REGIONAL ENERGY TRANSITION



Key Issues in Regional Energy Transition – Power Generation, Decarbonisation, RES, and Energy Efficiency

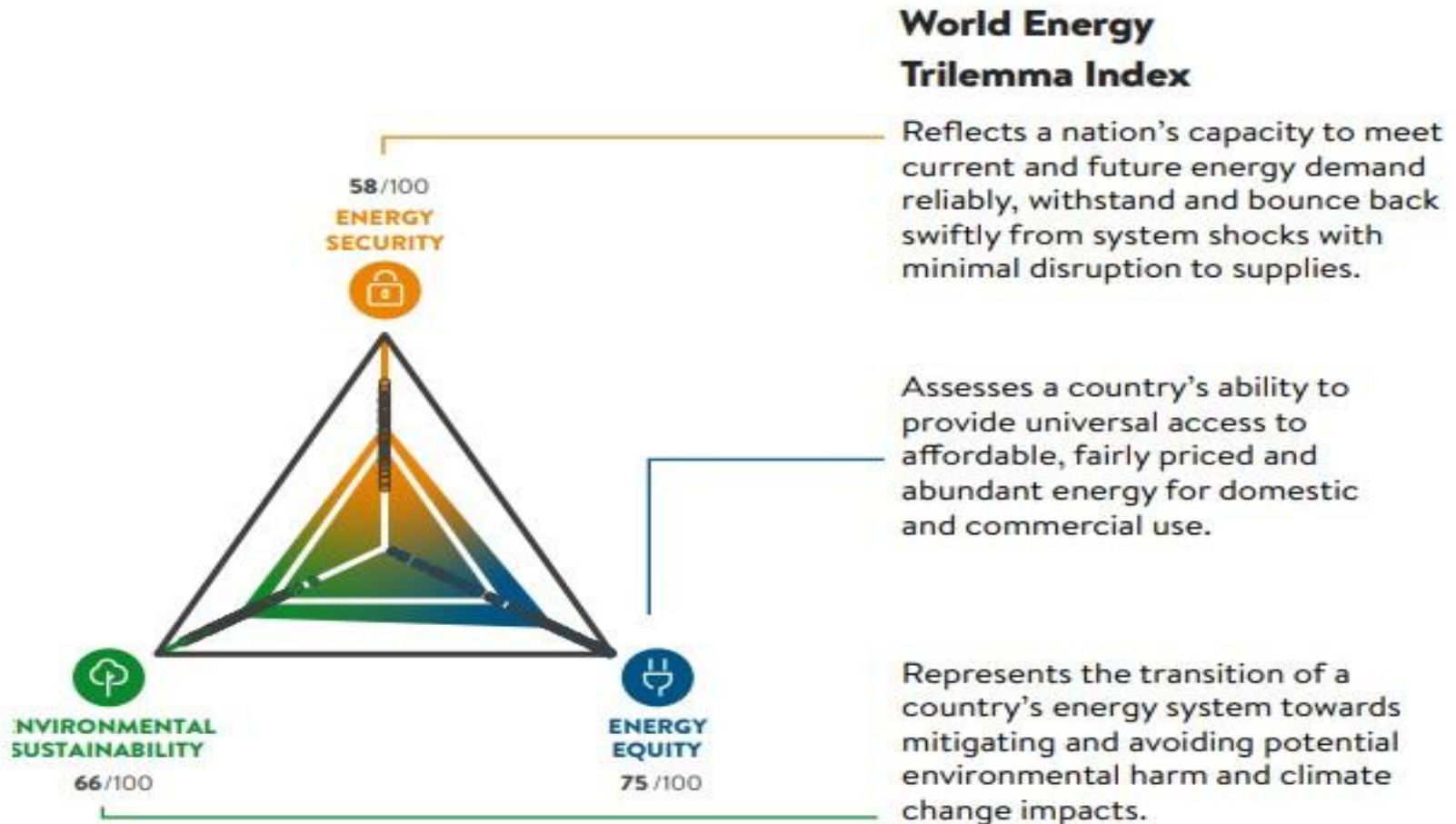
1. World Energy Trilemma
2. Black Sea Region: Security and Vulnerability
3. Recent Events & Challenges
4. The BSTDB and its Activities in Energy

The World Energy Trilemma

The World Energy Trilemma are three competing issues that drive energy competition, namely:

- 1. Energy Security – nation’s capacity to meet current and future needs**
- 2. Energy Equity – country’s ability to provide universal and affordable access**
- 3. Environmental Sustainability – transition of country’s energy system**

The World Energy Trilemma Index

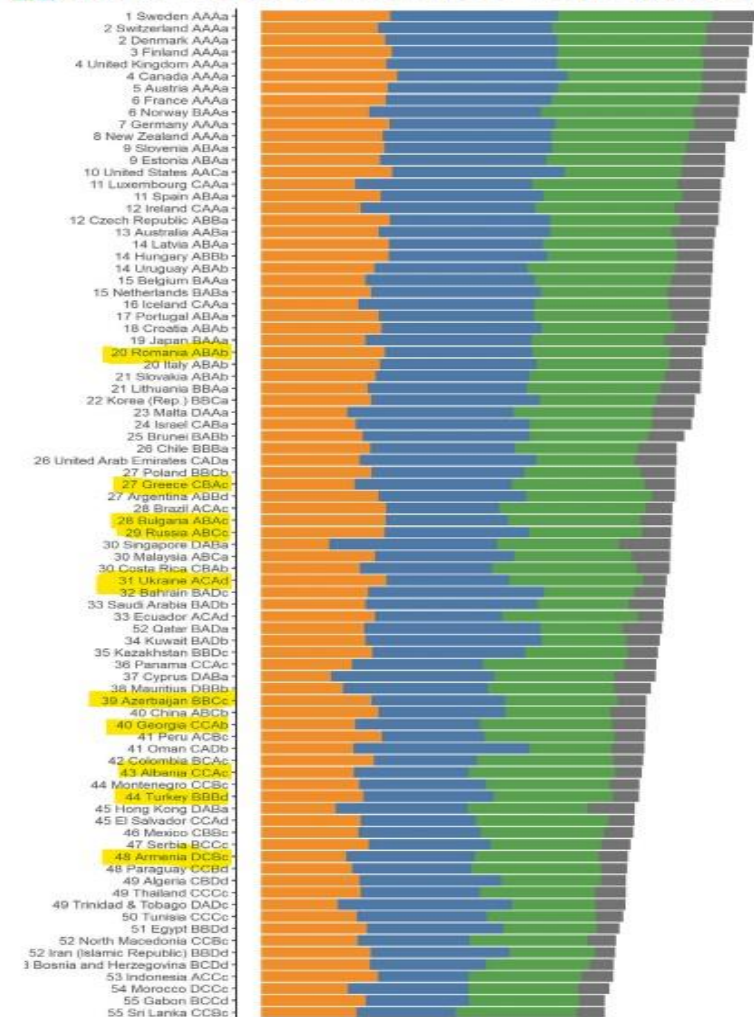


Source: World Energy Council

2022 World Energy Trilemma Index

ANNEX A

2022 WORLD ENERGY TRILEMMA INDEX



Top ranking countries are:
Sweden, Switzerland, Denmark,
Finland, UK and Canada.

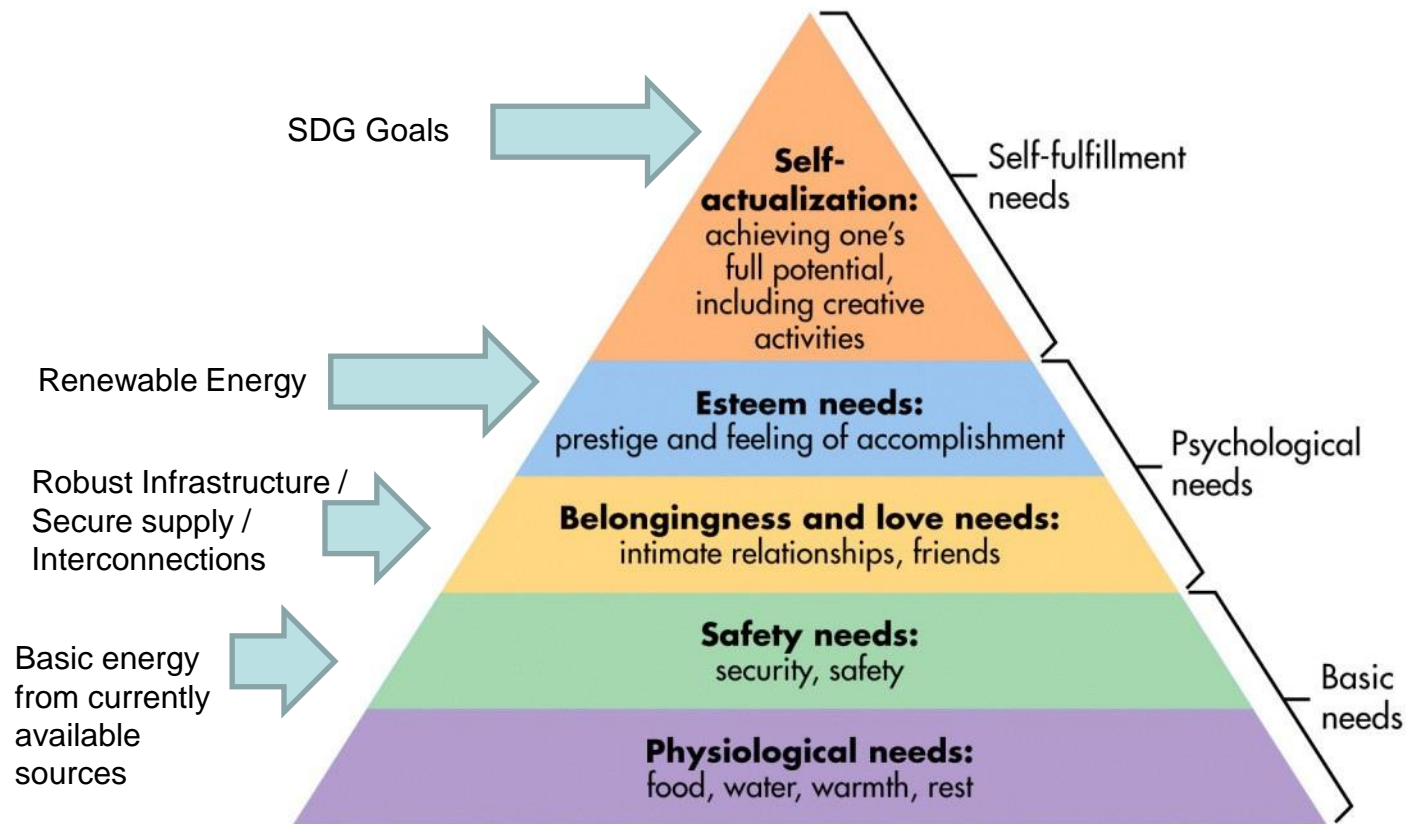
How do BSTDB Countries
compare:

- Romania (20) ranks highest of BSTDB Countries
- Followed by Greece (27), Bulgaria (28), Russia (29), Ukraine (31), Azerbaijan (39), Georgia (40), Albania (43), Turkey (44), Armenia (48), and Moldova (61)

Maslow's Hierarchy applied to Energy

Applying Maslow's Hierarchy to Energy:

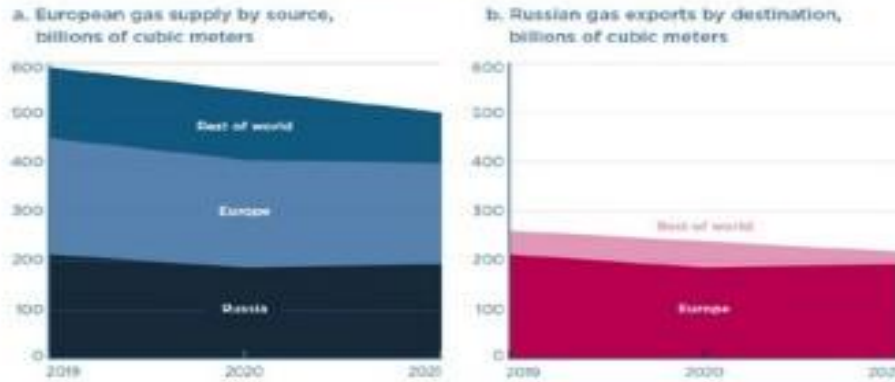
- 1. Developing Countries still fulfilling basic needs*
- 2. As more developed increase focus on Renewables*
- 3. Only most developed can focus on SDGs*



- Europe – was balanced but recent gas & energy shocks changed that. Need for more coordination
- BSEC Countries – primarily focused on Basic Needs & Security of Supply / Connectivity with some Renewables. Affordability is key.
- Not all BSEC Countries at same stage of Maslow's Hierarchy as applied to Energy. But changes are forcing acceleration.

The Black Sea Region: Energy Security and Vulnerability

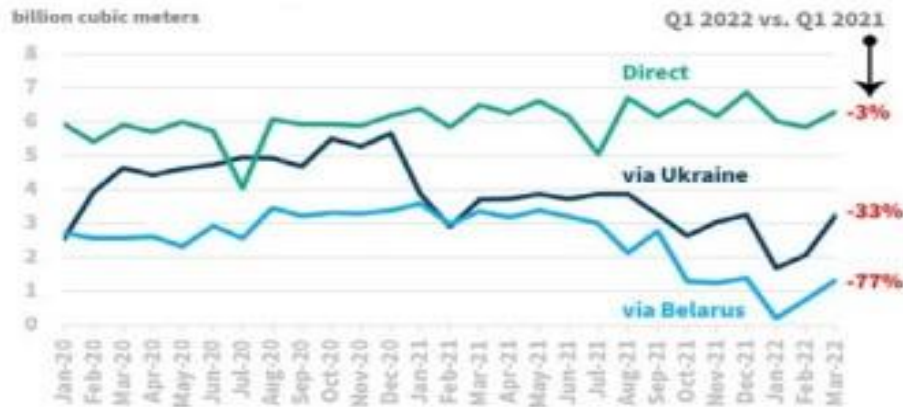
Europe's Gas Market Relies on Russian Supply



Sources: BP Statistical Review of World Energy 2020 and 2021, Bloomberg, ENTSOG, European Commission, Eurostat, Gazprom, IEA

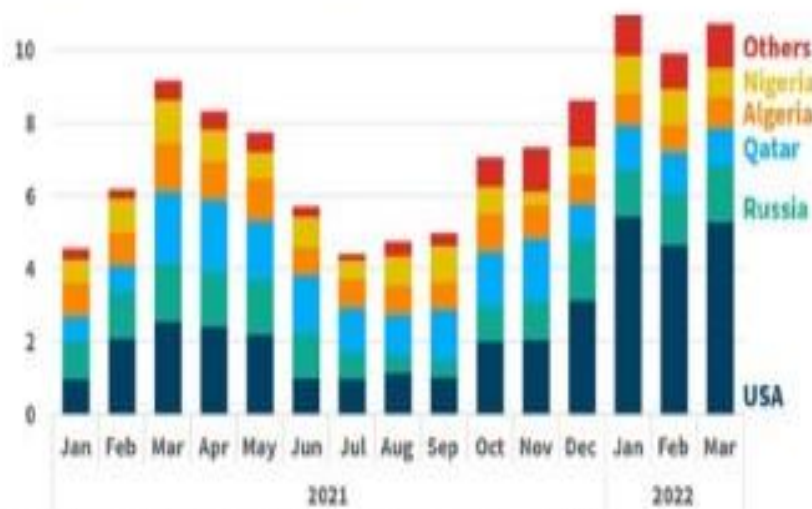
- Recent energy crisis is forcing changes
- Reducing reliance on Russian gas
- Actively seeking alternative sources of supply

Russian pipeline gas exports to the European Union



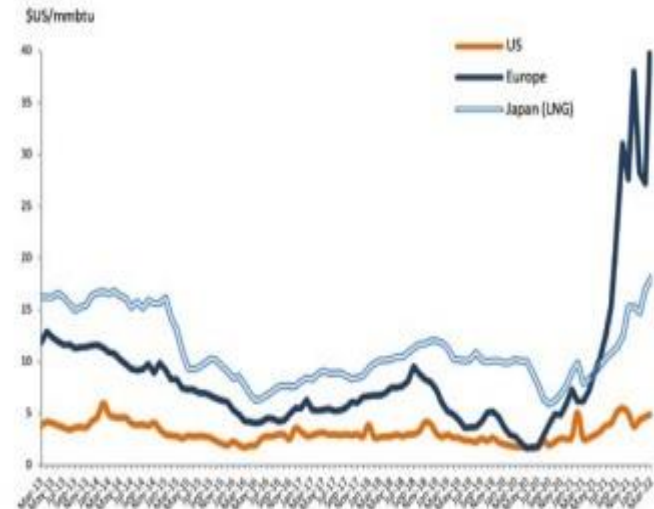
Source: Gazprom, Actual Supplies to the European Union

European LNG imports by source



Source: Kpler LNG Service (data downloaded on April 1, 2022)

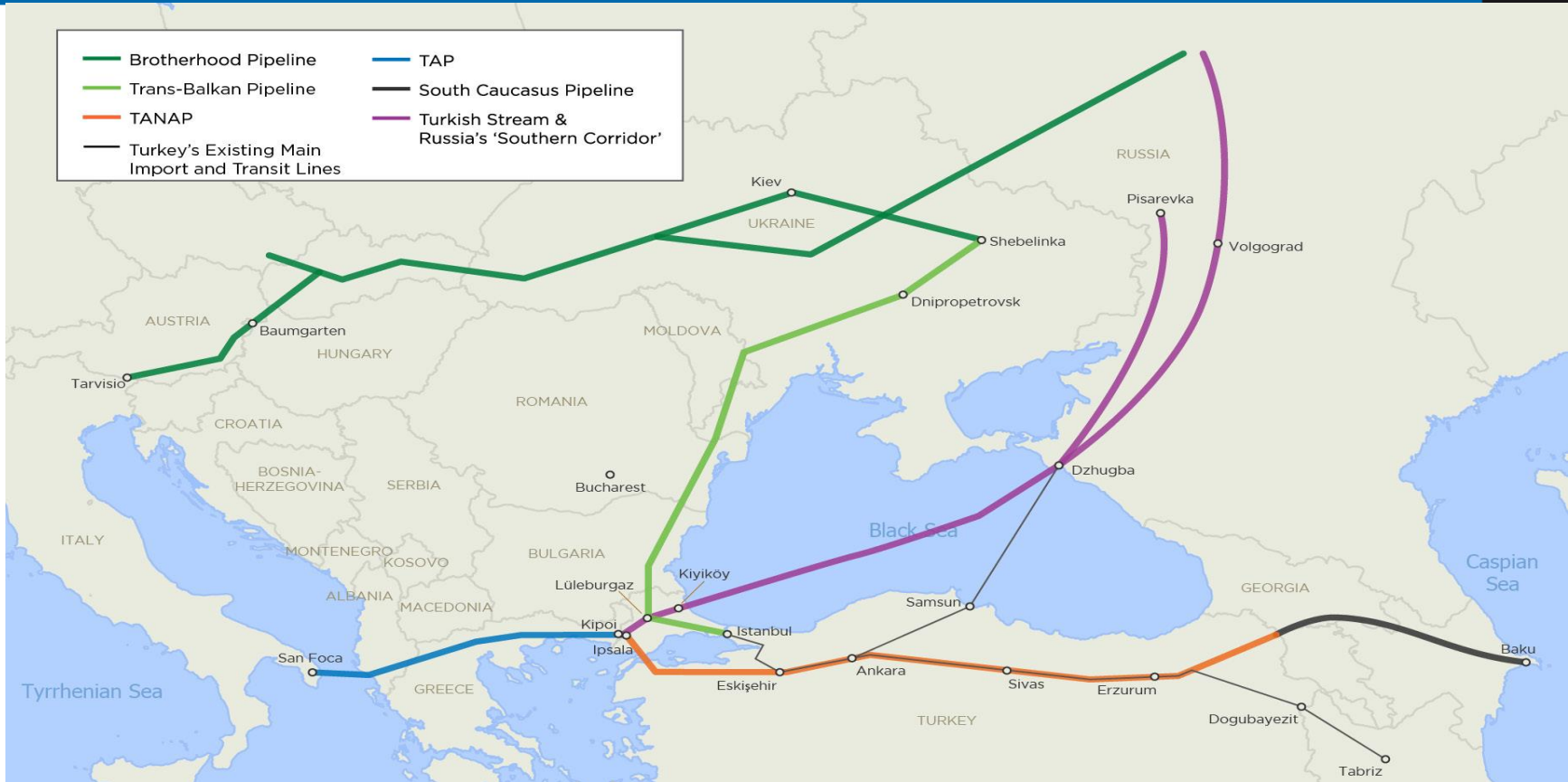
Natural Gas Prices



Source: World Bank

- Increase of LNG imports
- Natural Gas price shocks are unbalanced

Black Sea Region: Piped Gas Supply



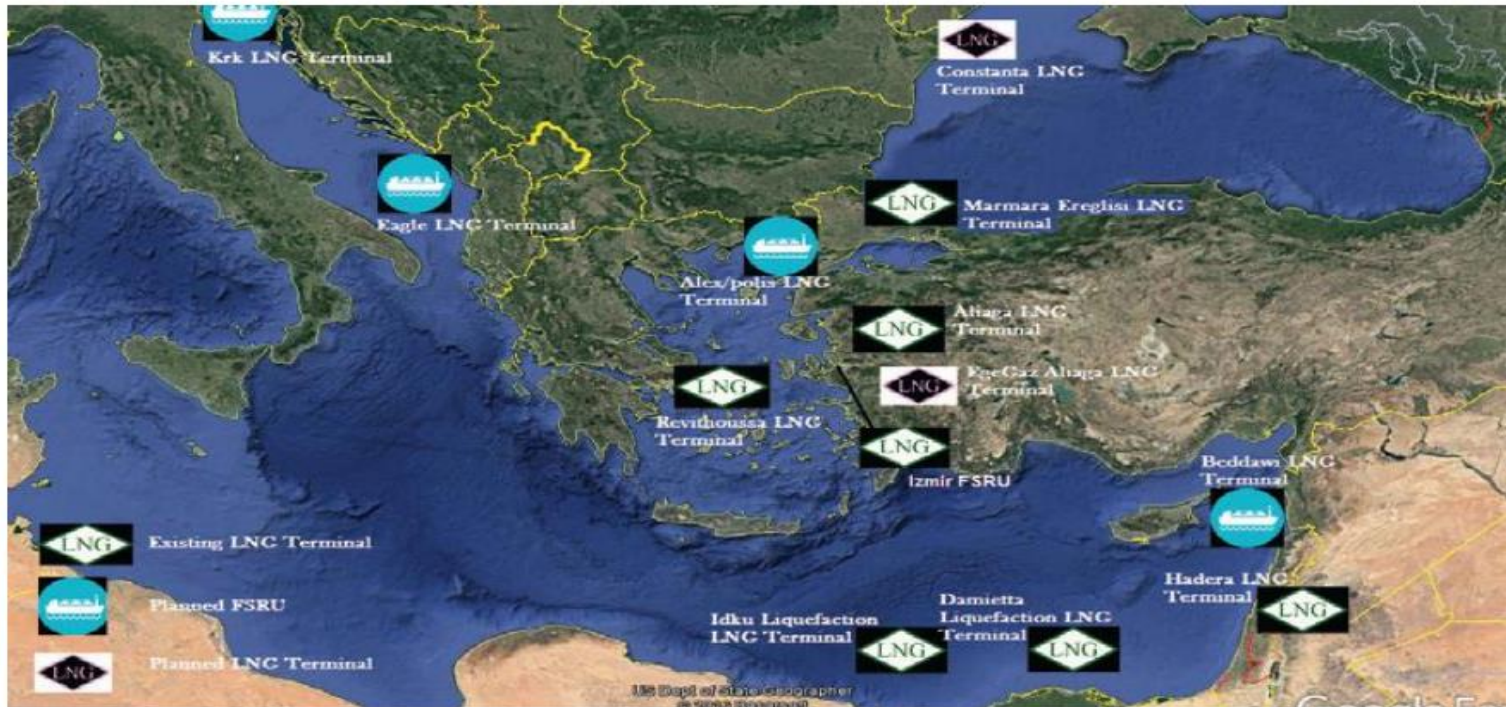
- The SGC and the Turkish Stream were to diversify supply routes.

Black Sea Region - Gas Interconnectors



- Connectivity is paramount as it allows for diversity of supply routes.
- In SEE & Black Sea region, the development of ancillary gas infrastructure and regional market integration are of particular importance. Gas will be further diversified into the Balkans and Central Europe.

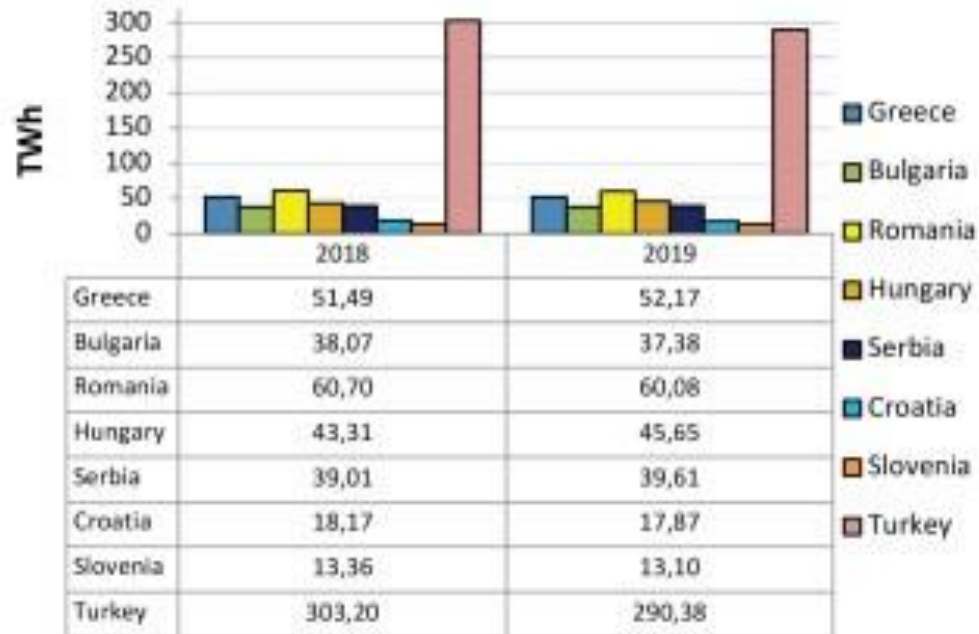
LNG Terminals in SE Europe



Source: IENE study "South East Europe Energy Outlook 2016/2017", Athens, 2017

LNG as an alternative to pipe gas has become more important

Electricity Demand in SEE Markets (2018 – 2019)

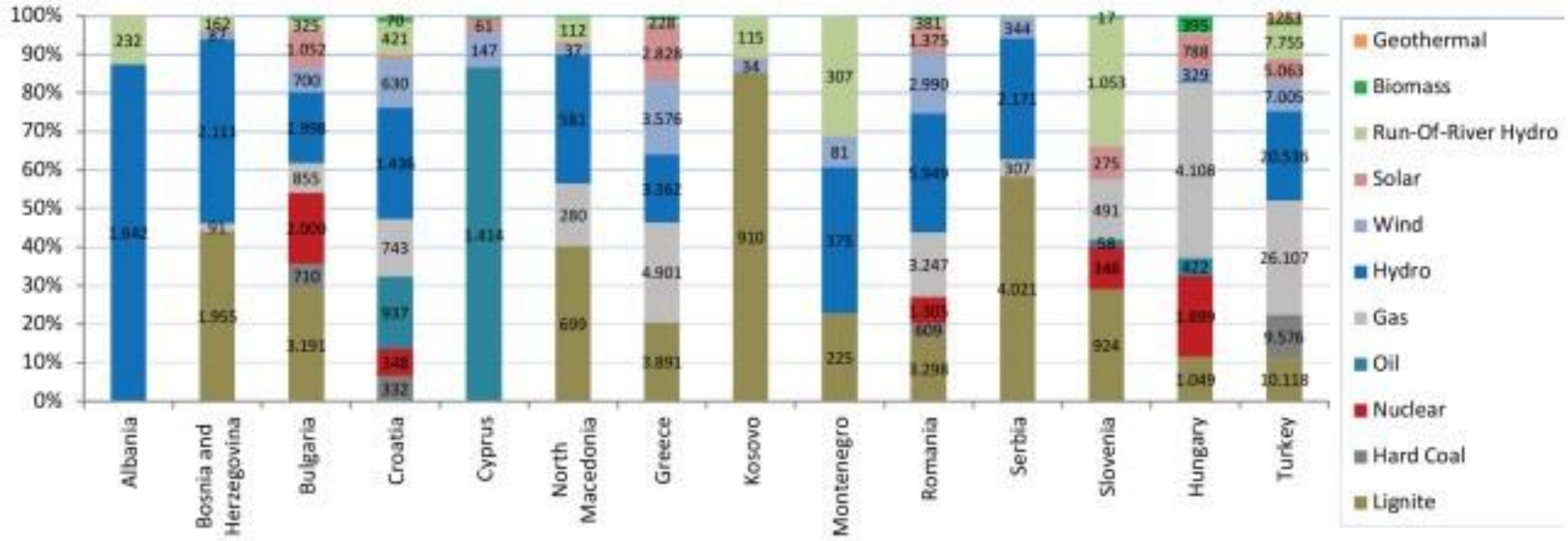


- Electricity Demand is growing
- Turkey by far greatest Demand

* Greece's Electricity Demand does not include demand in the non-interconnected islands

Sources: ENTSOE, YTBS

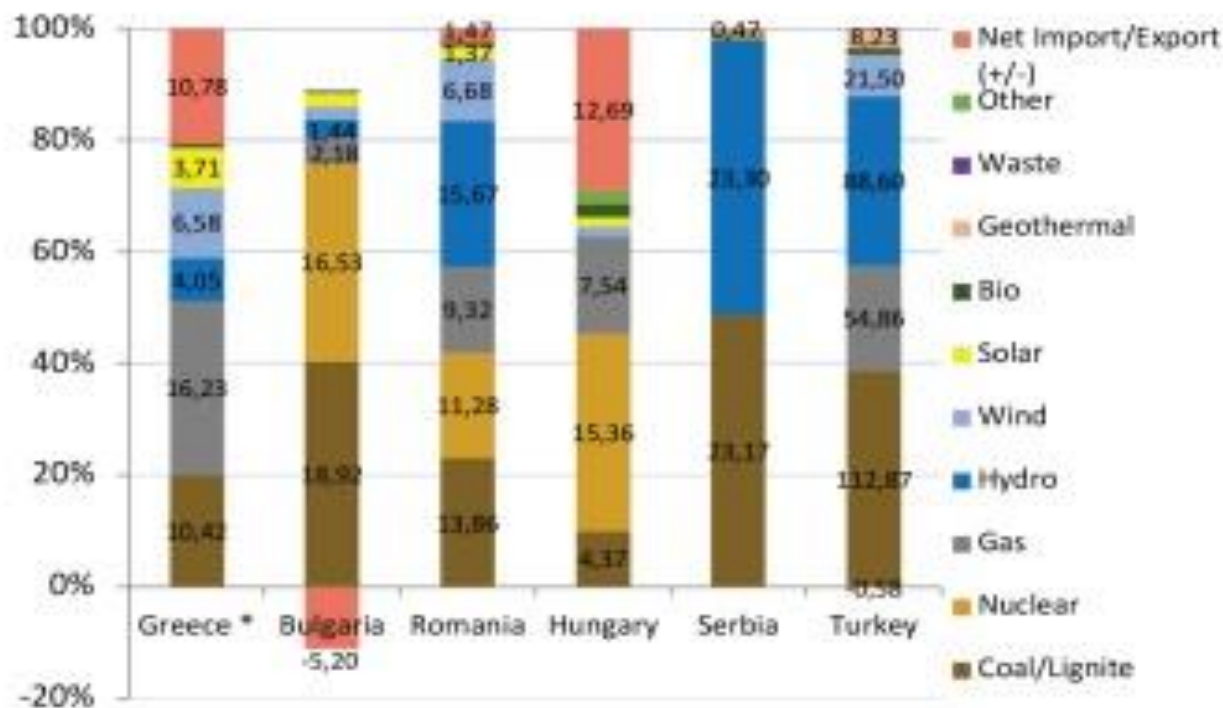
Installed Capacity per Country and Production Type in SE Europe (MW) (2019)



Sources: IENE, ENTSOE, Republic of Cyprus, Ministry of Innovation and Technology of Hungary

Though many moving towards Renewable sources, many still rely on fossil fuels

Electricity Mix in SEE Markets (TWh) (2019)



* Electricity mix of Greece does not include power generation in non-interconnected islands

Sources: ENTSOE, IPTO, YTBS

Power Exchanges in SE Europe and PX Products Offered

Sources: IBEX, CROPEX, HENEX, HUPX, OPCOM, SEEPEX, BSP South Pool, EXIST, Shah D. et al. (2020)

Country	Power Exchanges	Year of Establishment	DAM	IDM	REC	Additional exchange product
Bulgaria	IBEX 	2014	✓	✓	-	Centralized market for bilateral contracts
Croatia	CROPEX 	2014	✓	✓	-	-
Greece	HENEX 	2018	✓	-	-	Forward Market
Hungary	HUPX 	2007	✓	✓	-	-
Romania	OPCOM 	2000	✓	✓	✓	Universal service market and green certificates market
Serbia	SEEPEX 	2015	✓	-	-	Forward market
Slovenia	BSP South Pool 	2008	✓	✓	-	Long term auction
Turkey	EXIST (EPIAS) 	2015	✓	✓	-	Balancing power market and ancillary services market



Recent Events and Challenges

RECENT EVENTS (1)

- Move toward decarbonization has encouraged a shift to Renewable Energy Sources, or RES, (photovoltaics, wind, hydro, biomass, biogas) in their energy mix in replacement of other energy sources (coal, oil, gas, lignite etc.).
- However, such a process poses a series of challenges in terms of economic, financial, technical and regulatory obstacles; and it is not realistically expected to take place overnight, but over 10-20 years depending on a multiplicity of factors

RECENT EVENTS (2)

- Conflict in Ukraine has dramatically changed the dynamic. It exposed the vulnerabilities in Europe and sparked a global energy crisis.
- Increased unpredictability and volatility in energy commodity and regulatory markets
- Focus on alternative sources of supply, restarting closed power plants, Renewables and possibly Nuclear.

Economic / Financial:

- Increased construction costs due to higher inflation
- Increased financing costs due to recent steep increases in underlying interest rates
- Uncertainty in terms of availability of debt financing from banks, given the uncertainty of the end buyer / purchaser of the energy produced from RES units
- Uncertainty in terms of remuneration and return rates on the side of the investor

Technical:

- Renewables that come onstream have a high geographical dispersion across larger geographic areas
- Unlike other energy sources, renewable plants are not interruptible power producing units
- Thus, the introduction of more renewables in the energy mix requires improved management, upgrade, and expansion of the electricity network, both in terms of capacity and geographical dispersion

Regulatory / Political:

- The regulatory framework for the licensing process of newly developed RES projects keeps on changing abruptly in many cases, thus creating market uncertainty for both investors and lenders.

The BSTDB and Activities in Energy

BSTDB Members Countries

Overview of Greater Black Sea Region

Romania



Capital: Bucharest
Population: 21.4m
GDP: \$169bn
GDP per cap.: \$7,905

Moldova



Capital: Chisinau
Population: 3.6m
GDP: \$7.3bn
GDP per cap.: \$2,038

Ukraine



Capital: Kiev
Population: 45.6m
GDP: \$176bn
GDP per cap.: \$3,864

Black Sea Region

Population: 327m
GDP: \$3,594bn
Weighted av. GDP per cap.: \$10,979

Bulgaria



Capital: Sofia
Population: 7.3m
GDP: \$54.3bn
GDP per cap.: \$7,243

Albania



Capital: Tirana
Population: 3.2m
GDP: \$12.4bn
GDP per cap.: \$3,845

Russia



Capital: Moscow
Population: 143.1m
GDP: \$2,007bn
GDP per cap.: \$14,027

Georgia



Capital: Tbilisi
Population: 4.5m
GDP: \$15.8bn
GDP per cap.: \$3,520

Greece



Capital: Athens
Population: 11.4m
GDP: \$249bn
GDP per cap.: \$21,799

Turkey



Capital: Ankara
Population: 74.7m
GDP: \$789bn
GDP per cap.: \$10,561

Armenia



Capital: Yerevan
Population: 3.3m
GDP: \$9.9bn
GDP per cap.: \$3,027

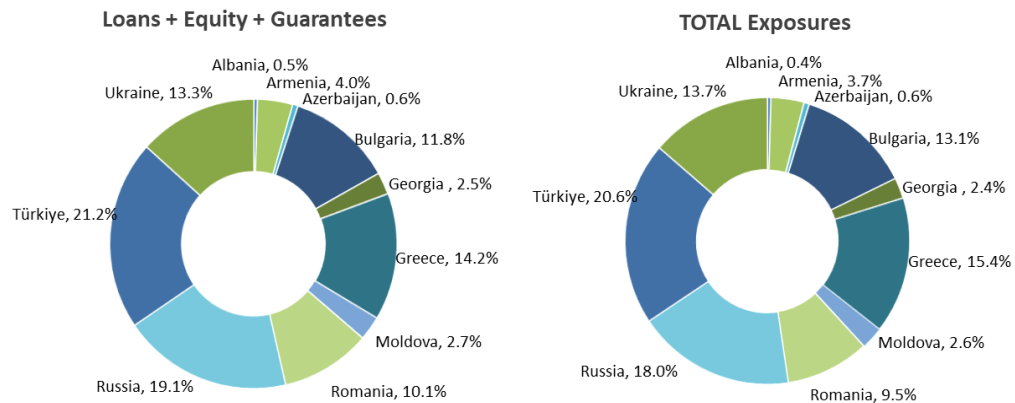
Azerbaijan



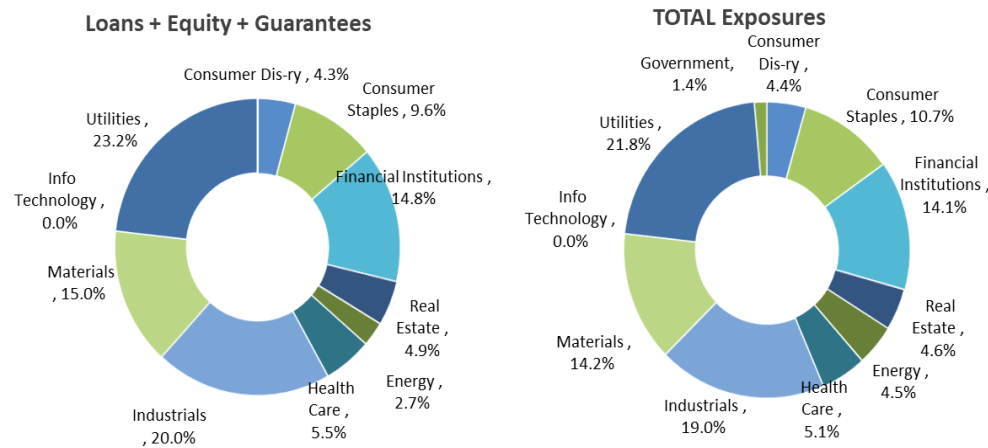
Capital: Baku
Population: 9.2m
GDP: \$68.7bn
GDP per cap.: \$7,442

Portfolio Across Countries and Sectors

Portfolio by Country



Portfolio by Sector



BSTDB Energy Portfolio

- BSEC Countries focused on basic needs & security of supply
- Carbon usage still high (gas, oil, coal)
- RES growing from very low base
- RES primarily financed with State and MDB support



**Project
Cost**

**Total: EUR 450 m
BSTDB: EUR 50 m**

Borrower

Bulgarian Energy Holding

Term

5 years

Sector

Utilities

Summary

Participation in the tap issue of their June 2018 EUR 400m Eurobond issue. The funds will be used for their ongoing capital investment program.

EnergoPro (Bulgaria)



**Project
Cost**

**Total: EUR 370 m
BSTDB: EUR 42 m**

Borrower

EnergoPro

Term

5 years

Sector

Utilities

Summary

Participation in the primary bond issue as an anchor investor to finance the ongoing improvement and developments of the electricity grid and metering system and of the other markets of EnergoPro operations.

Energean Oil & Gas (Greece)



Project Cost	BSTDB: EUR 90m
Borrower	Energean Oil & Gas
Term	8 years
Sector	Natural Resources
Summary	Support the company's existing oil development programme to access additional oil reserves in the Prinos, Prinos North and Epsilon operating oil fields, located offshore Greece (Prinos-Kavala Basin).



Project Cost	Total: EUR 360 m BSTDB: EUR 50 m
Borrower	Eurohold
Term	5 years
Sector	Utilities
Summary	BSTDB participated in an investment regarding the acquisition of CEZ's assets in Bulgaria and/or refinancing of the existing debt.

ENERGOPLAN SA

Project Cost	up to EUR 8m
Borrower	Energoplan
Term	5 years
Sector	Utilities
Summary	Unfunded Risk Guarantees on behalf of the company to RAE the energy licensor.

Gurmat Geothermal Power Plant (Turkey)

Project Cost	BSTDB: USD 1b
Borrower	Gurmat Electric Uretim
Term	15 years
Sector	Energy
Summary	Financing of the construction and operation of 170MW geothermal power plant southwestern Turkey



Galnaftogaz (Ukraine)



Project Cost	Total: USD 220 m BSTDB: USD 20 m
Borrower	Concern Galnaftogaz
Term	7 years
Sector	Utilities
Summary	CAPEX program and expansion of the Borrower's gas filling stations network in Ukraine

Ingulets Solar PV (Ukraine)



Project Cost

**Total: EUR 56 m
BSTDB: EUR 19.5 m**

Borrower

Ingulets Solar PV

Term

10 years

Sector

Renewable Energy

Summary

Development, construction and operation of an up to 58 MW solar power plant project Ingulets, to be located in the Mykolvyiv region in Southern part of Ukraine.



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Project Cost	Total: EUR 1.7 b BSTDB: EUR 160 m
Beneficiary	PPC
Term	5 years
Sector	Energy / Utility
Summary	Corporate Loan for financing PPC's capital expenditure program for the period 2019- 2020 which is expected for its electricity distribution networks.



RENGY DEVELOPMENT



Scatec Solar
Improving our future™

**Project
Cost**

**Total: EUR 53 m
BSTDB: EUR 18.5 m**

Borrower

Rengy Bioenergy Solar PV

Term

10 Years

Sector

Renewable Energy

Summary

Development, construction and operation of three solar parks of total capacity of 47 MW: (i) Afanasievka of 14 MW, (ii) Taborovka of 16 MW and (iii) Tokarivka of 17 MW, located in the Mykolaiv region in Southern part of Ukraine

Syvash Wind (Ukraine)



Project Cost

**Total: EUR 390 m
BSTDB: EUR 30 m**

Borrower

Syvash Wind

Term

10 year

Sector

Renewable Energy

Summary

Development, construction and operation of the wind park of total capacity of 250 MW, to be located in the Kherson region in Southern part of Ukraine

Thank you

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