Greece at the Crossroads of the Energy Roadmap

Thessaloniki Summit 2016

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World primary energy demand

	Clean Air Scenario (Mtoe)						CAAGR**
	2013	2020	2025	2030	2035	2040	2013-2040
Coal	3 909	3 849	3 656	3 456	3 329	3 253	-0.7%
Oil	4 225	4 386	4 323	4 227	4 136	4 086	-0.1%
Gas	2 902	3 165	3 406	3 616	3 778	3 926	1.1%
Nuclear	646	830	920	1 033	1 113	1 180	2.3%
Hydro	326	384	431	479	525	566	2.1%
Bioenergy*	1 376	1 421	1 389	1 399	1 436	1 498	0.3%
Other renewables	161	321	478	677	907	1 153	7.6%
Total	13 546	14 356	14 604	14 887	15 223	15 663	0.5%

* Includes the traditional use of solid biomass and modern use of bioenergy. ** Compound average annual growth rate.

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Aim to ensure access to

Affordable

Reliable

E N E R G Y

Sustainable

Modern

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NEED FOR CLEAN ENERGY

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Latest estimates attribute 6.5 million premature deaths due to air pollution

(Energy and Air Pollution, World Energy Outlook Special Report)

Premature death cases attributable to outdoor air pollution by selected region and scenario

		European Union	Mexico	China	India	Indonesia	Brazil	South Africa
2015	Mean	339 600	12 500	1 049 600	590 400	71 100	22 000	14 800
	Upper range	458 400	17 000	1 489 200	880 600	98 900	30 200	20 300
	Lower range	220 700	8 300	523 500	359 000	36 800	14 000	8 200
2040 NPS	Mean	226 300	15 500	1 495 300	915 600	117 800	36 100	16 900
	Upper range	305 500	21 900	2 122 700	1 374 900	163 700	50 200	23 700
	Lower range	147 100	10 300	772 400	548 600	60 000	23 200	9 000
2040 CAS	Mean	177 200	5 700	1 085 600	559 100	19 100	13 300	4 000
	Upper range	239 200	9 800	1 515 100	760 200	26 600	19 800	5 600
	Lower range	115 100	3 300	618 100	362 800	12 400	8 300	2 600

Note: NPS = New Policies Scenario; CAS = Clean Air Scenario. Source: IIASA.

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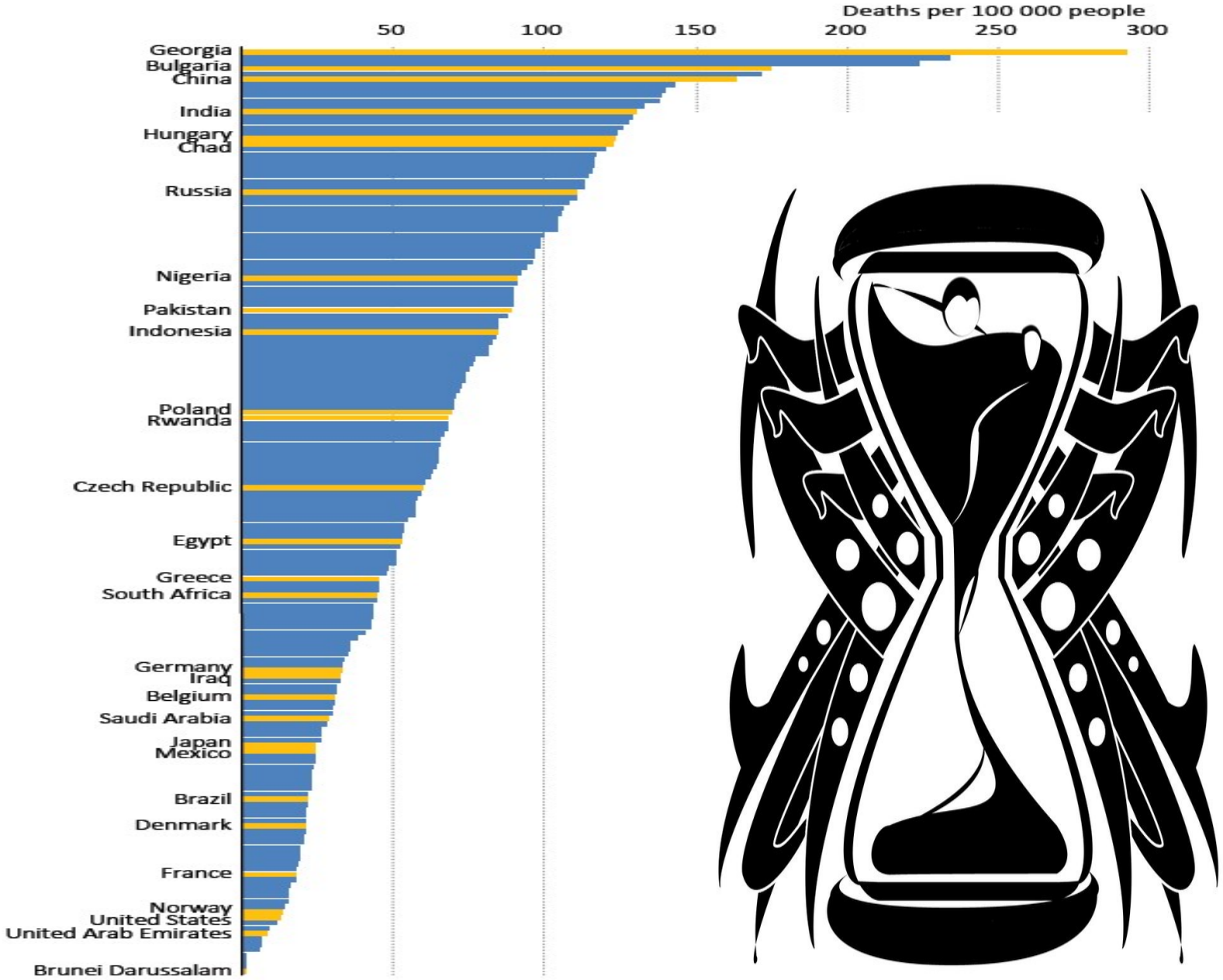
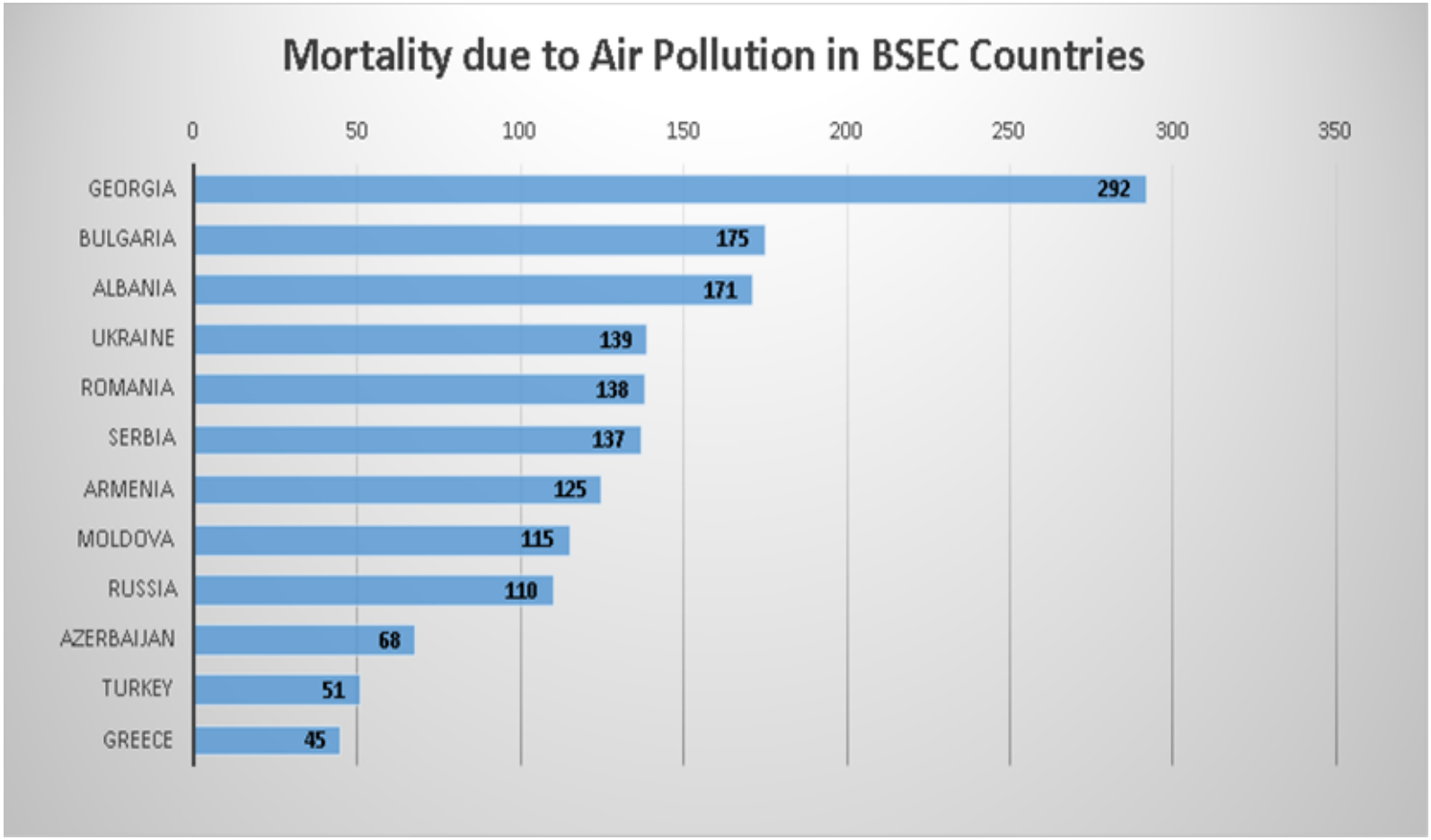
Mortality rate attributed to air pollution (household and outdoor) by country, 2012





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- Energy production and use is the most important source of air pollution coming from human activity ***(Energy and Air Pollution, World Energy Outlook Special Report)***
  - Approx. two third of total energy is consumed by end users, for example EU citizens, industry, transport etc. Around one third is mainly used for electricity generation and in other energy transformation processes e.g in refineries **(http://ec.europa.eu/eurostat/cache/infographs/energy/bloc-3a.html).**
- As the predominant source of air pollution, the energy sector must be at the forefront of action to improve air quality around the world.

(Energy and Air Pollution, World Energy Outlook Special Report)

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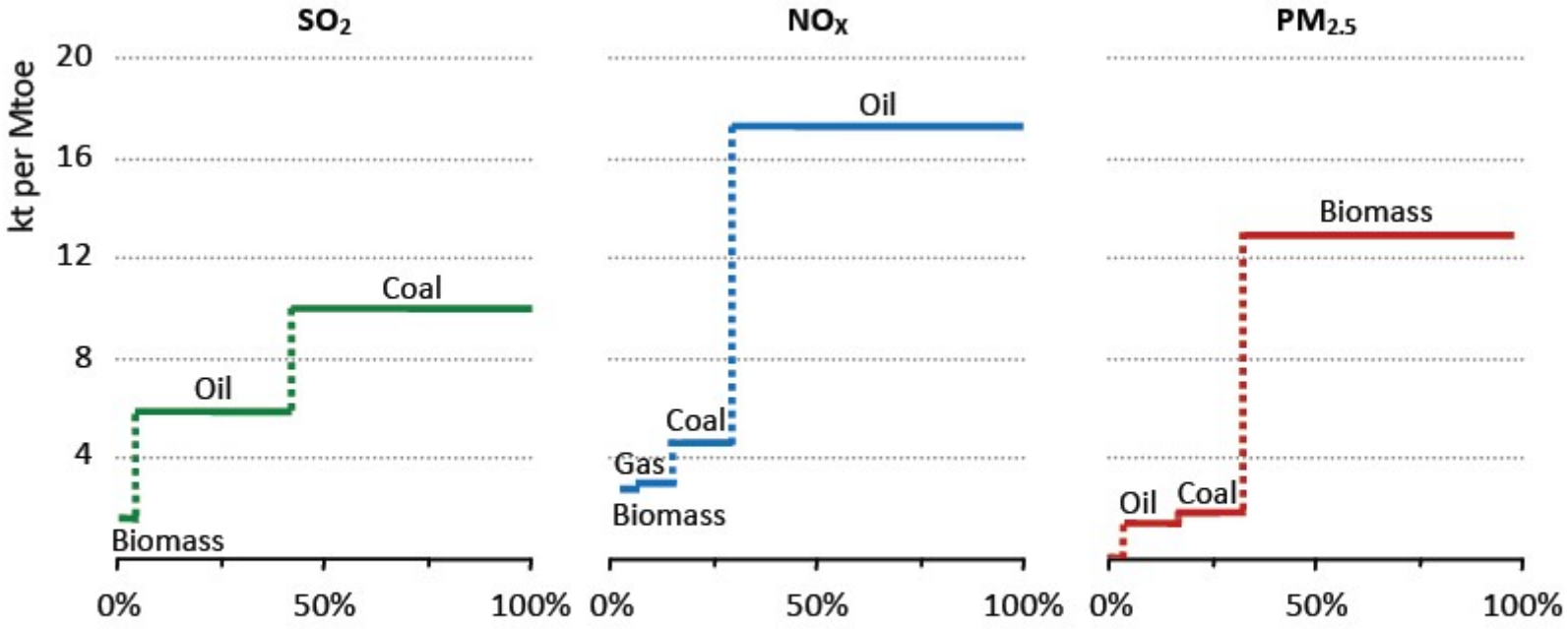
Global average emissions factors and share of major pollutant emissions by fuel, 2015



G20 recognizes that natural gas can be a less emission intensive fossil fuel, and can play an important and effective role in moving towards a low GHG emission energy future.

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NEED FOR NATURAL GAS

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Primary natural gas demand by region

	1980	2009	2015	2020	2025	2030	2035	2009-2035*
OECD	**959**	**1 518**	**1 654**	**1 705**	**1 746**	**1 804**	**1 841**	**0.7%**
Americas	660	811	852	877	900	928	951	0.6%
United States	*581*	*652*	*680*	*685*	*692*	*703*	*710*	*0.3%*
Europe	264	537	604	627	644	666	671	0.9%
Asia Oceania	35	170	198	201	202	210	219	1.0%
Japan	*25*	*97*	*118*	*122*	*122*	*125*	*126*	*1.0%*
Non-OECD	**557**	**1 558**	**1 911**	**2 183**	**2 417**	**2 668**	**2 909**	**2.4%**
E. Europe/Eurasia	438	627	698	723	763	797	830	1.1%
Caspian	*n.a.*	*107*	*124*	*131*	*143*	*151*	*161*	*1.6%*
Russia	*n.a.*	*426*	*467*	*478*	*495*	*513*	*530*	*0.8%*
Asia	36	357	531	686	796	921	1063	4.3%
China	*14*	*93*	*197*	*301*	*366*	*435*	*502*	*6.7%*
India	*2*	*59*	*76*	*99*	*120*	*150*	*186*	*4.5%*
Middle East	35	343	402	450	509	578	622	2.3%
Africa	13	99	112	129	142	153	161	1.9%
Latin America	35	133	168	196	208	220	233	2.2%
Brazil	*1*	*20*	*41*	*60*	*70*	*80*	*91*	*5.9%*
World	**1 516**	**3 076**	**3 565**	**3 888**	**4 164**	**4 473**	**4 750**	**1.7%**
European Union	*n.a.*	*508*	*572*	*593*	*608*	*626*	*629*	*0.8%*

*Compound average annual growth rate.

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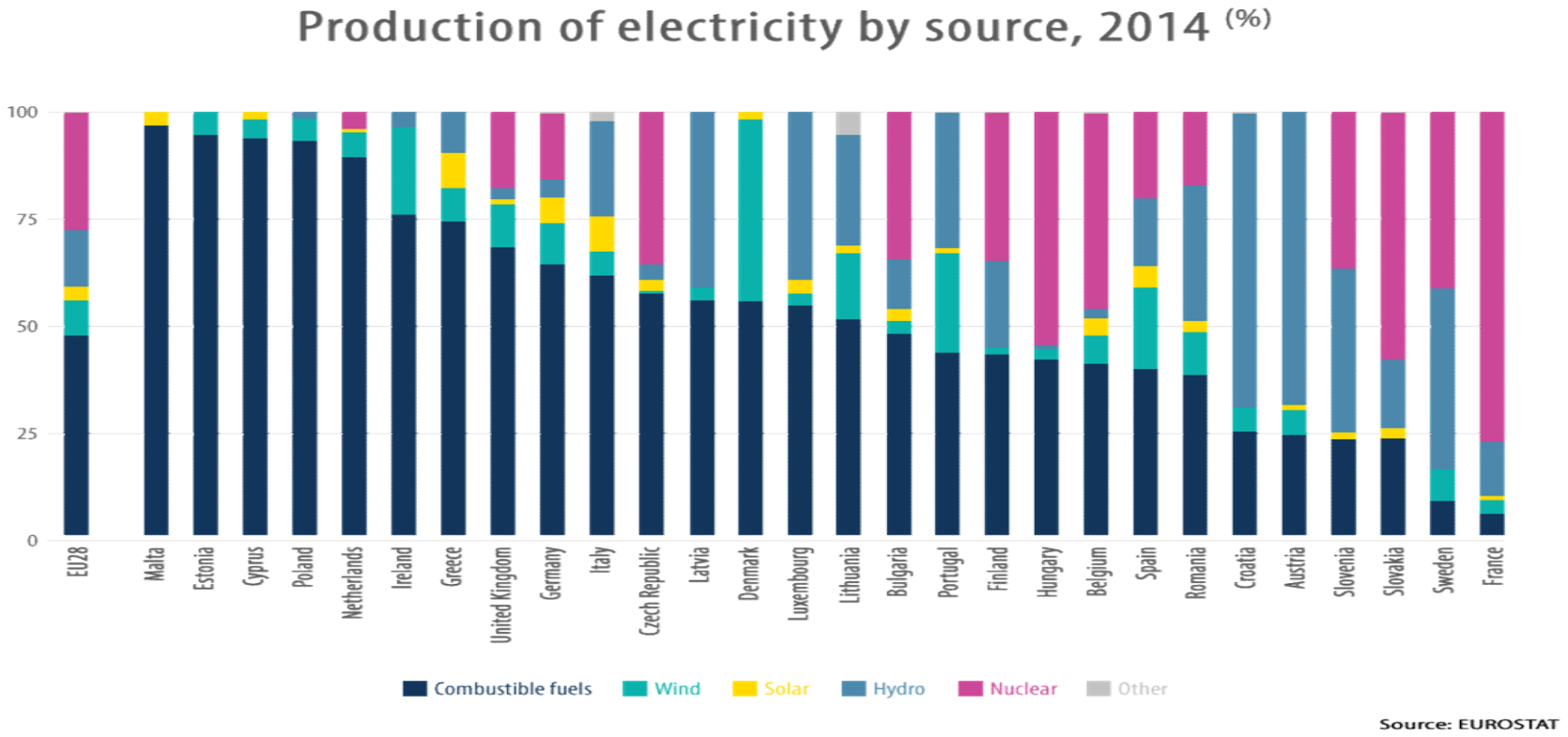
EU has an aging power plant fleet : The share of gas-fired power in the European power mix increases from 16% to 20% by 2040.



But, Europe is a growing gas importer region and natural gas production in the North Sea and on-shore is declining.

ACCESS TO NATURAL GAS

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EU's Proposed 12 Priority Corridors

South Eastern Europe (SEE)

- SEE is strategically located between the hydrocarbon-rich regions of the Caspian basin, including Russia and the Middle East, and the big energy-consuming countries of Europe.

- SEE region overdependence on energy imports is a defining characteristic of its economy.

- SEE is an EU priority Gas Corridor

- Turkey, Greece and SEE are well positioned to play an important role in the transit of hydrocarbon resources and in the diversification of oil and gas supplies, both within the Black Sea region and SEE and for Europe as a whole.

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Route Selection Criteria

???

- Commerciality ; Based principally on full chain value, including market prices and infrastructure access charges and tariffs
- Project deliverability ; Technical and organizational capacity to execute the project plans on schedule and within budget
- Financial deliverability ; Ability to cover development costs through equity, loans, grants or other funding
- Engineering design ; Scope and quality of the engineering plans

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Route Selection Criteria

???

- Alignment and transparency ; Willingness to cooperate technically with the related source of energy
- Operability ; The long-term capability to manage physical and commercial operations safely, efficiently and reliably
- Scalability ; The potential for expansion or addition of export facilities to allow transportation of increased volumes as further gas supplies become available

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Route Selection Criteria

???

- Public policy considerations ; Meeting the EC's stated objective of enhancing supply diversity of European natural gas markets, and ensuring sustained support from all stakeholders

- Additionally

  - Environment, Safety, Society
  - Stakeholder support
  - Technological maturity
  - Economic risk
  - Political risk
  - Social risk
  - Economic Development Impact

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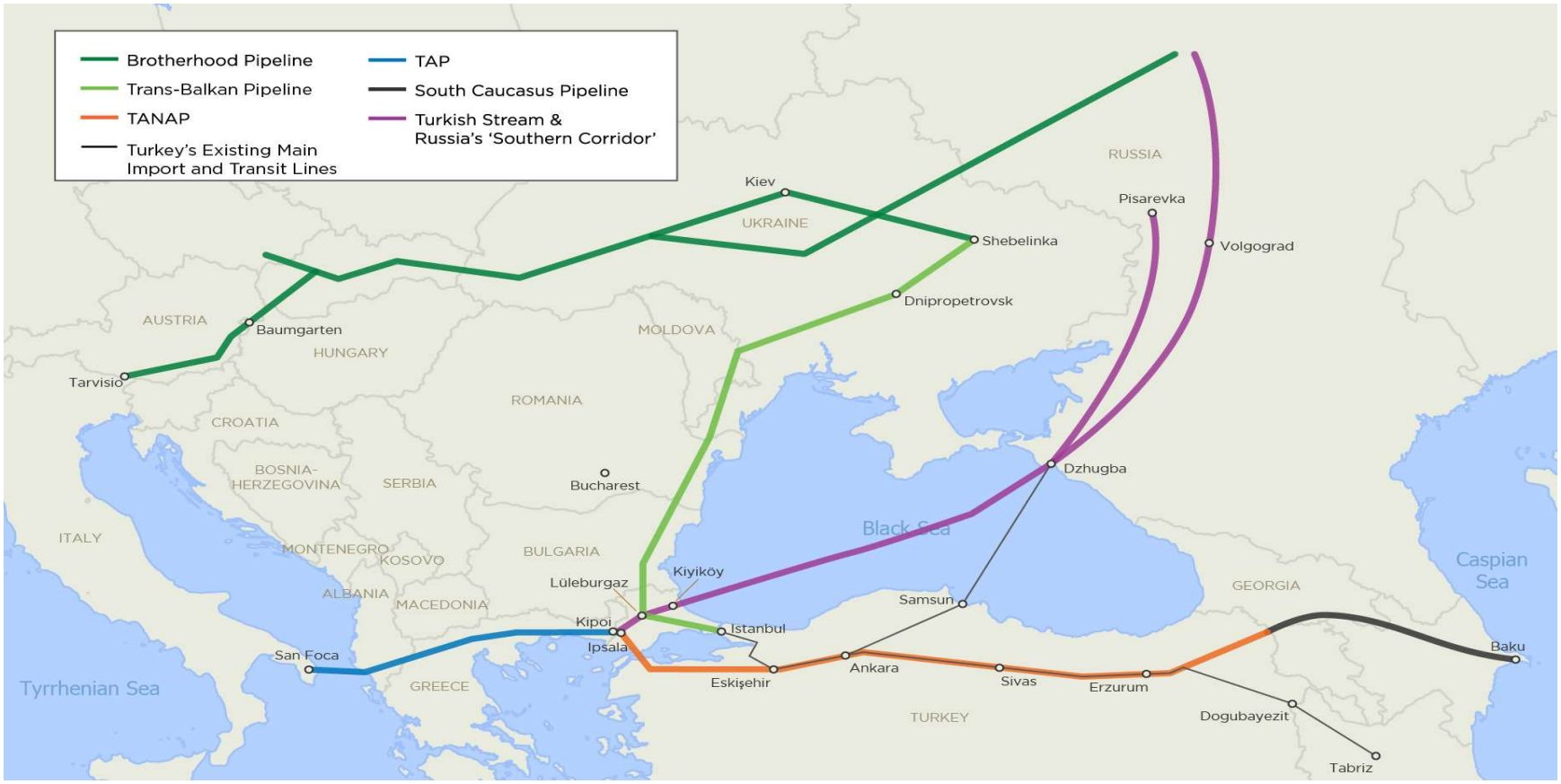
Diversity of Supply – Southern Gas Corridor (SGC)

- Shah Deniz Stage 2 is the starting point of the SGC and an integral part of the future gas supplies from the Caspian region through Black Sea region to Europe.
- The SGC is the value chain of 3 connected gas pipelines:
  1) Southern Caucasus Pipeline (SCP),
  2) Trans Anatolian Natural Gas Pipeline (TANAP) and
  3) Trans-Adriatic Pipeline (TAP).

Diversity of Supply – Turkish Stream



- The SGC and the proposed Turkish Stream will diversify the supply routes, but Greece still being strategically located.

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Diversity of Supply – Interconnectors

- Connectivity is paramount as it allows for diversity of supply routes.
- SGC will facilitate the development of ancillary gas infrastructure in SEE and regional market integration (i.e. ICGB - the Greek - Bulgarian interconnector). Gas will be further diversified into the Balkans and Central Europe.

In any case

- **Producing / Exporting country**
  - Azerbaijan
  - Russia
  - Other Countries

- **Crossroad / Transiting country**
  - Georgia for Turkey
  - Turkey for Greece and Bulgaria
  - Greece for Bulgaria, Albania, Italy and other Balkan Countries
  - Albania for Italy and other Balkan Countries
  - Ukraine for Moldova
  - Moldova for Romania
  - Bulgaria for Romania or vice versa, Greece and Turkey

- **Importing country (End users)**
  - Albania, Azerbaijan, Bulgaria, Georgia, Greece, Moldova, Romania, Russia, Turkey, Ukraine, Italy and other EU and Balkan Countries

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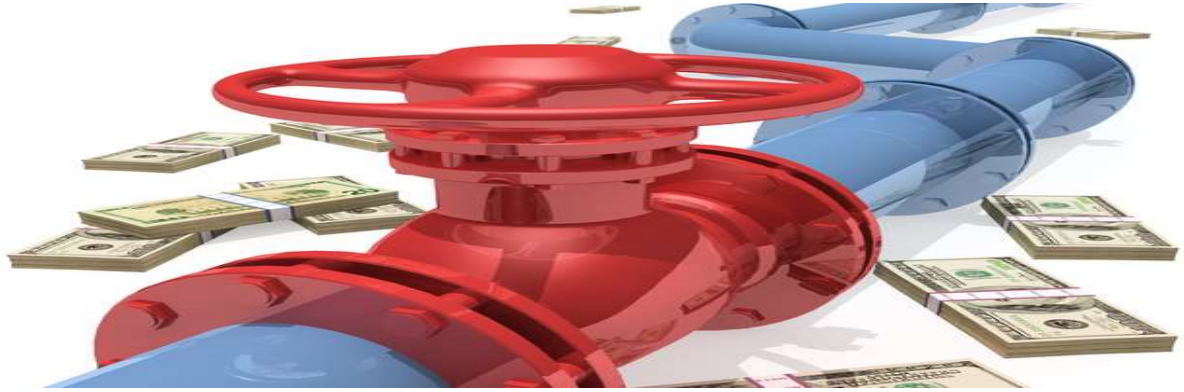
Greece is well positioned to play an important role as a first front country of European Union in gas transportation to many countries in Europe.



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Its success requires

- Extensive cooperation and collaboration

- Mutual common approach to all problems

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REGIONAL IMPLICATIONS

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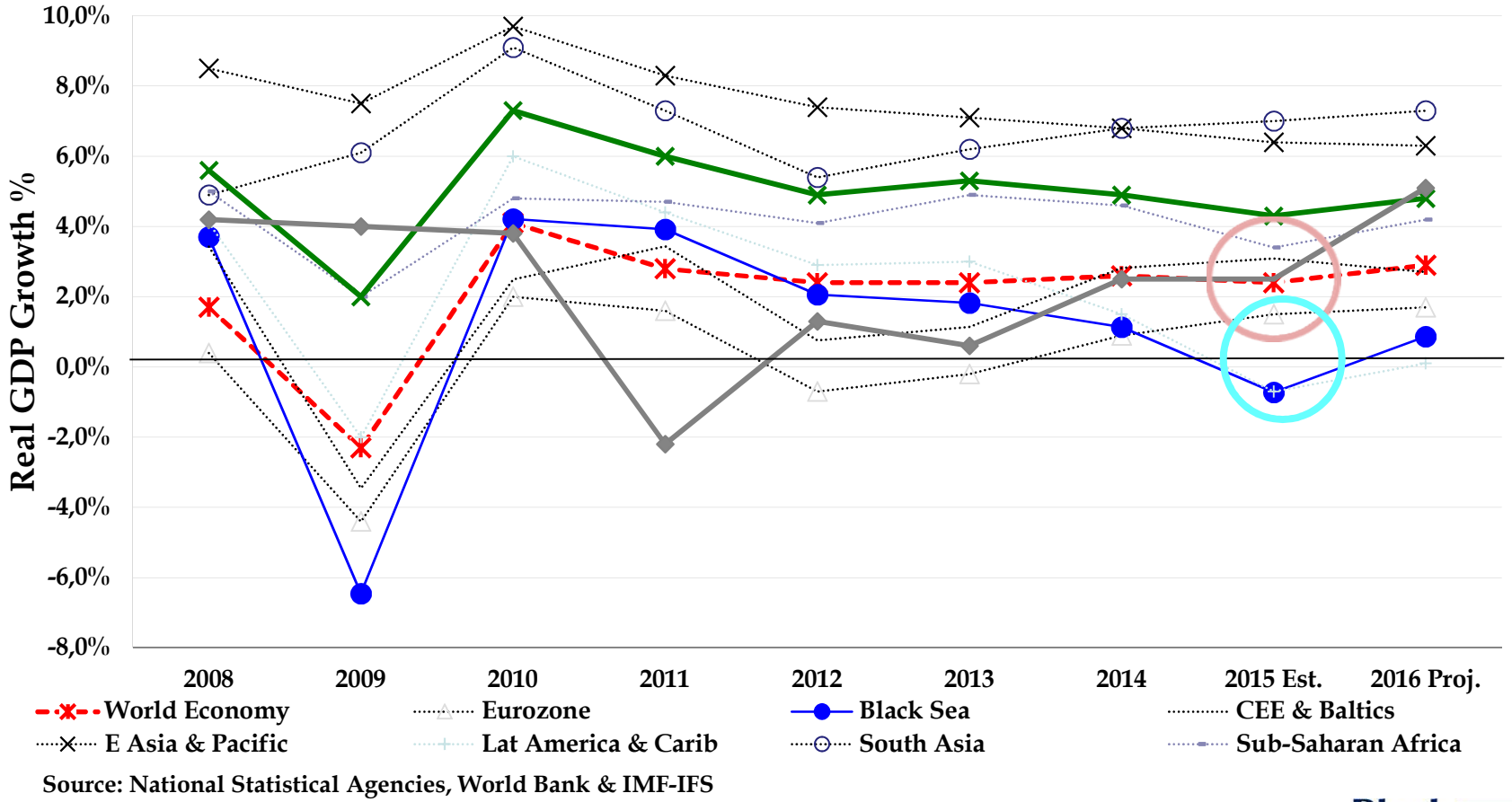
Positive impact on the growth - BSEC was poorest performing region globally, along with Latin American and Caribbean Countries



Source: National Statistical Agencies, World Bank & IMF-IFS

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And ….

- Promote cooperation and solidarity among BSEC member states and regional market integration between BSEC member countries and the EU

- Enhance stability in BSEC member countries

- Increase the flow of international funds to the region

- Facilitate the development of ancillary gas infrastructure

- Contribute to the economic prosperity of the people distributing the welfare of the hydro carbon sources fairly among BSEC countries

- Escalate the level of clean air and decrease the mortality due to air pollution

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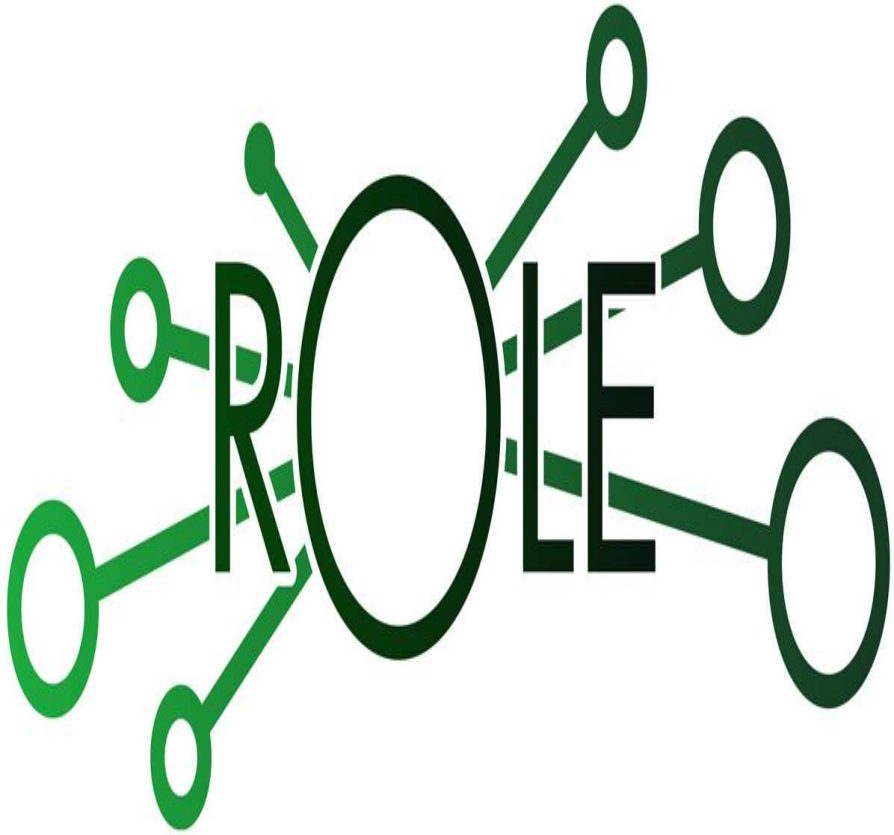
BSTDB`S



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BSTDB is unique :
Member
states join existing
and potential
pipelines
as either
producer or
both crossroad
and end user
country.

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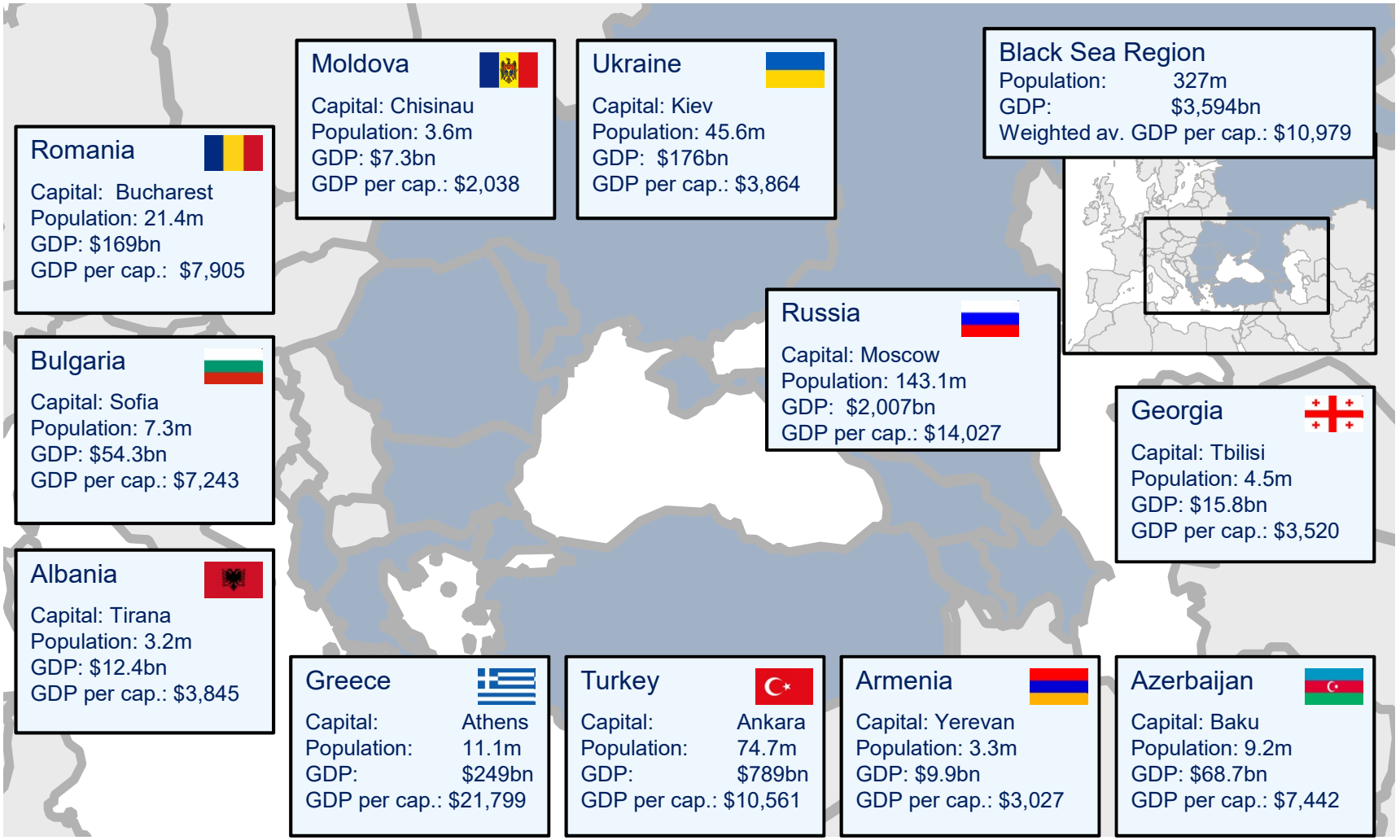

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BSTDB could serve as

- **A dialogue platform**

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For

- The development and integration of Electricity Trading Platforms
  - National vs. Regional platforms

- Collaboration
  Outlining of future infrastructure development needs
  Technical collaboration on market integration
  Priority for Projects of Common Interest (PCI)

BSTDB could serve as

- **A leading IFI**

Although the priorities are

1. Need for more connectivity investment
2. Need to replace existing power fleet
3. RES targets vs. national budgets
4. Growth / support of IPPs vs. incumbents (i.e. liberalization, EU Budget (2014-2020) already prioritizing some PCIs)
5. Need for private sector involvement

There is a limited sources of finance for these strategic investments

- Private sources small but growing: Infra funds, strategic investors, etc.

IFIs are still major funding source for these projects

- (BSTDB, EBRD, EIB, IFC, KfW, WB, etc.).

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Because,

- Overall the BSTDB has signed over **€3.5 billion** worth of investment for the Black Sea region including Greece.

- As of today BSTDB has lent **€780 million** (US$870 million) to energy and infrastructure related projects in the Black Sea region including Greece.

- Energy & Infrastructure at the BSTDB includes:
  - Oil & Gas (upstream, midstream and downstream)
  - Electricity (generation, transmission and distribution)
  - Renewable Energy Sources (biomass, geothermal, hydro, solar and wind)
  - Energy Efficiency
  - Municipal Infrastructure and
  - Telecoms, Information Technologies and Media.

We are ready …

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BSTDB: Strategy in Greece for 2015-2018

Priority attention to:

- BSTDB will continue offering its financial support for eligible energy and infra projects aiming to restore economic growth, improve infrastructure and enhance energy security in the Country;
- BSTDB will follow and seek added value involvement in various energy projects of high priority for both the Country and the wider Black Sea region including, among others, oil and gas storage facilities, pipelines and interconnectors;
- The Bank will also to support the development and upgrading of regional electricity markets;
- On the transmission side, this may involve participating in projects entailing reinforcement of power transmission infrastructure and interconnection between Greece and neighboring countries;

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BSTDB: Strategy in Greece for 2015-2018

- On the generation side, the Bank will seek opportunities to work with private Greek companies interested to be involved in power production schemes from both conventional and renewable sources;
- BSTDB will be willing to support the privatization priorities of the Government of Greece where the Bank's assistance can be offered in the form of post-privatization financing to upgrade the energy and infra facilities in the Country;
- Municipal infrastructure including sewage/waste treatment facilities, solid waste treatment, urban transport infrastructure and energy efficiency is another priority area where BSTDB can contribute with its financing products targeting:
  - ✓ energy efficient / saving projects for companies or households,
  - ✓ green logistics projects.
- Other involvement in energy and infrastructure operations may include creative arrangements such as PPPs.

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Thank you

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