Interplay Between Natural Gas, Lignite and Renewables

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Belgrade, June 14, 2017

Interesting geographical position in relation with gas markets…

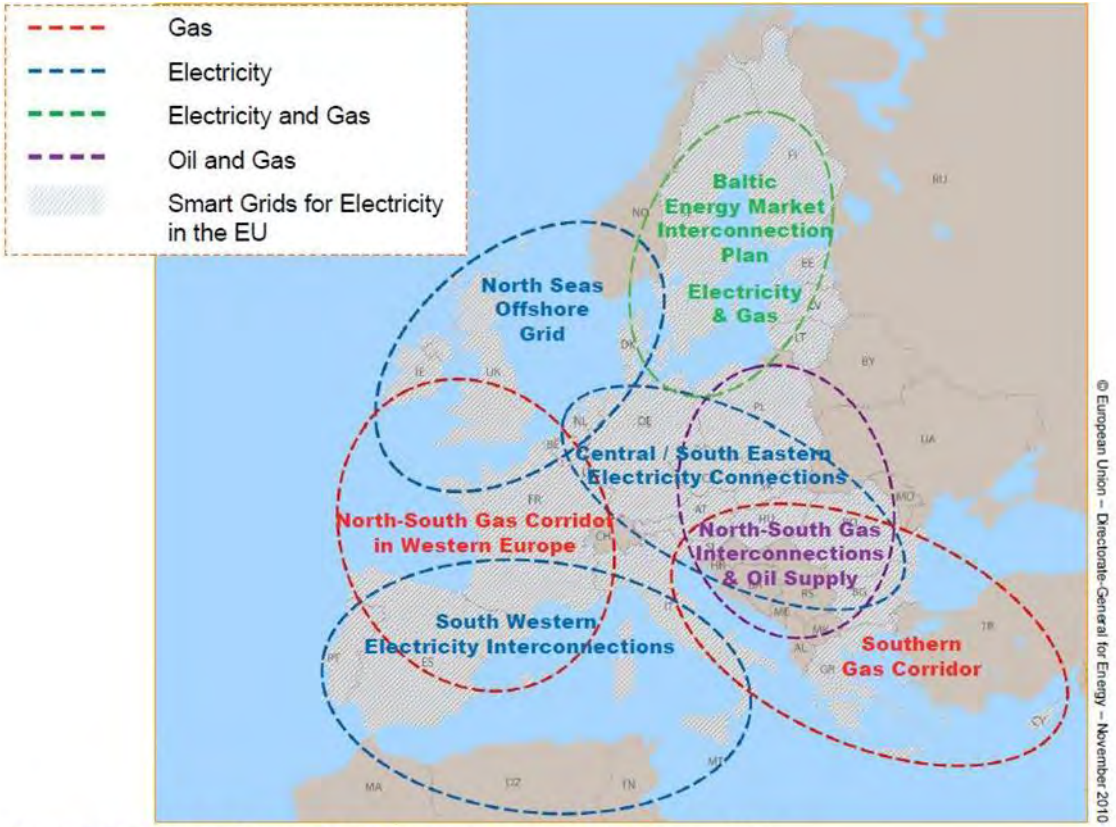
Source: https://www.oxfordenergy.org/wpcms/wp-content/uploads/2010/11/NG17-ThePotentialContributionofNaturalGasToSustainableDevelopmentinSoutheasternEurope-AleksanderKovacevic-2007.pdf

Table 4: Distances of LNG import terminals from selected LNG export ports

Export ports:	Corpus Christi (USA)		Qatar	
Import terminals:	Nautical miles	days	Nautical miles	days
Swinojusce (Poland)	6445	15.0	8101	18.8
Amsterdam (Netherlands)	6179	14.3	7254	16.8
Rijeka (Croatia)	7330	17.0	4966	11.5
Istanbul (Turkey)	7629	17.7	4493	10.4

Source: Author calculation based on http://ports.com/

Prompts political attention…

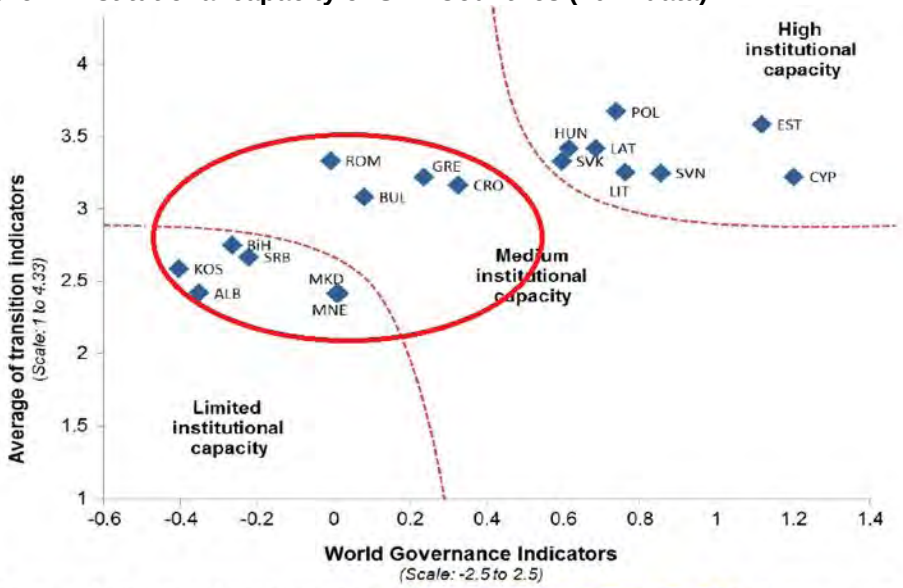


Presentation of J.M. Barroso to the European Council, 4 February 2011

Source: Barroso, J.M. (http://ec.europa.eu/europe2020/pdf/energy_en.pdf), page 13.

…with little real investment opportunity…

Figure 7: Institutional capacity of SEE Countries (2014 data)



Source: Authors' calculations, EBRD Assessment of Transition Challenges, and the World Bank's World Governance Indicators.

Source: Sanfey, et al. (EBRD, January2016)

… distracted away from realities …

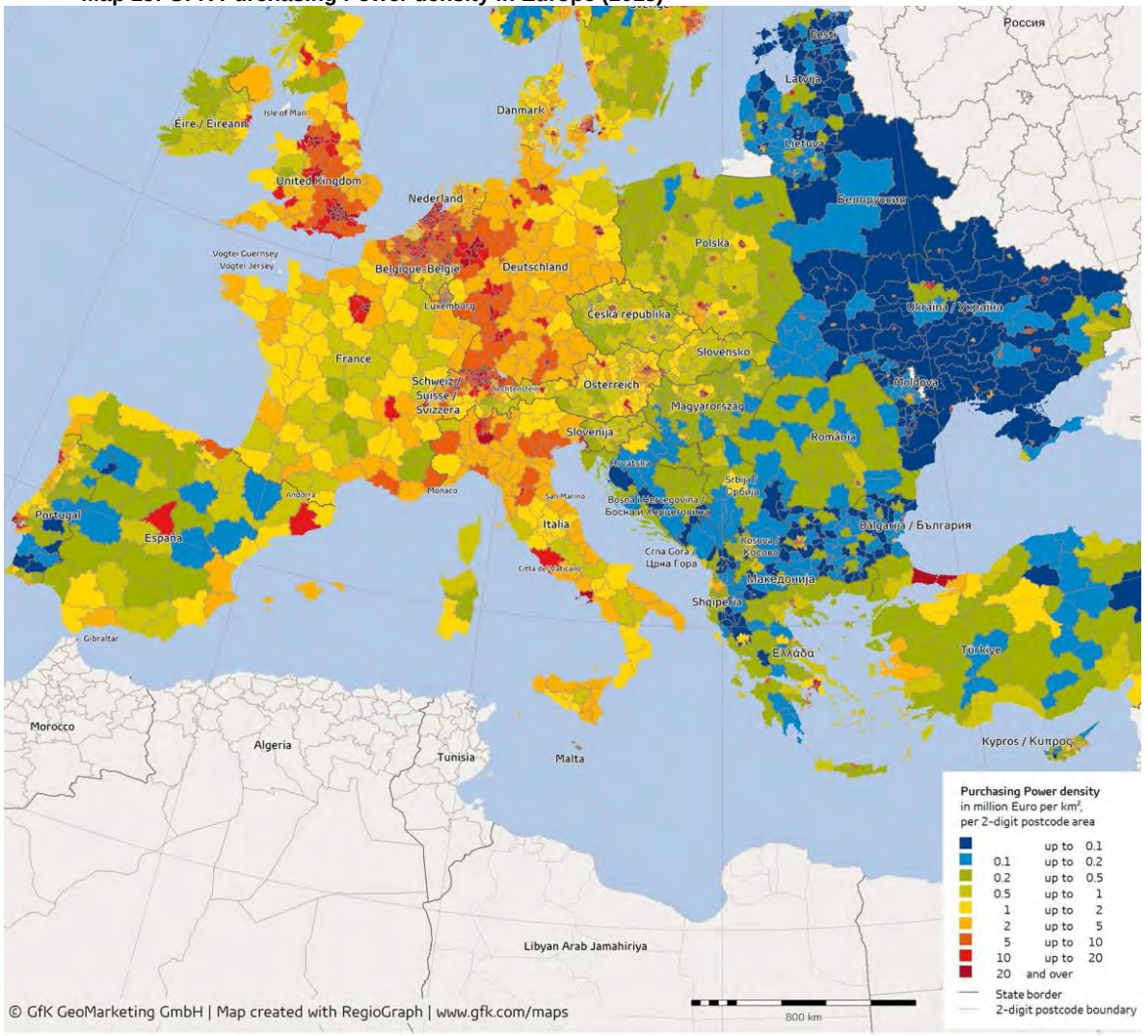
Table 2: Complex Energy Indicators (2012)

Region/ Country/ Economy	TPES/ Pop.	TPES/ GDP	TPES/ GDP (PPP)	Elec. Cons/ pop.	CO_2/ TPES	CO_2/ pop.	CO_2/ GDP	CO_2/ GDP (PPP)
	toe/ capita	toe/000 2005 USD	toe/000 2005 USD	kWh/ capita	t $CO_{2/}$ toe	t $CO_{2/}$ capita	kg CO_2/ 2005 USD	kg CO_2/ 2005 USD
World	1.90	0.24	0.16	2 972	2.37	4.51	0.58	0.38
OECD	4.19	0.13	0.13	8 089	2.31	9.68	0.31	0.31
Albania	0.66	0.18	0.08	1 943	1.84	1.21	0.34	0.15
Bosnia and Herzegovina	1.74	0.52	0.24	3 271	3.18	5.54	1.65	0.75
Bulgaria	2.51	0.54	0.21	4 762	2.41	6.06	1.31	0.50
Croatia	1.85	0.18	0.12	3 819	2.17	4.03	0.38	0.25
Greece	2.39	0.13	0.11	5 511	2.92	6.99	0.37	0.33
Macedonia (FYR)	1.41	0.41	0.15	3 625	2.93	4.13	1.19	0.44
Montenegro	1.71	0.37	0.16	5 412	2.16	3.70	0.80	0.35
Kosovo*	1.31	0.45	0.18	2 860	3.38	4.43	1.52	0.61
Romania	1.74	0.30	0.15	2 602	2.26	3.93	0.67	0.33
Serbia	2.00	0.52	0.21	4 371	3.05	6.10	1.58	0.63
Slovenia	3.40	0.18	0.14	6 778	2.09	7.11	0.38	0.29

Source: IEA, Key World Energy Statistics (2013)

… and limited purchasing power potential

Map 15: GFK Purchasing Power density in Europe (2013)

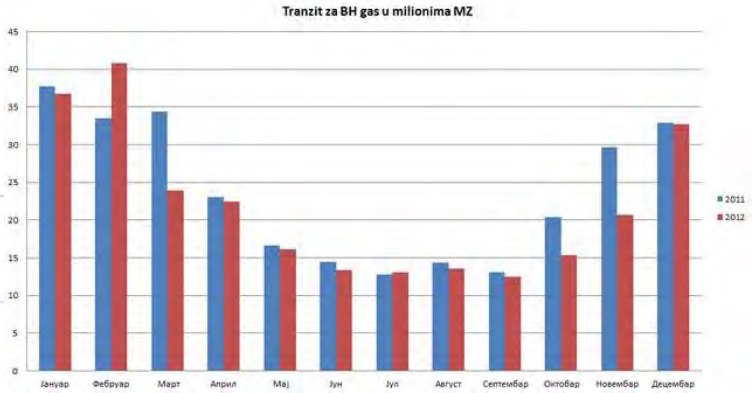


Source: GFK, 2014

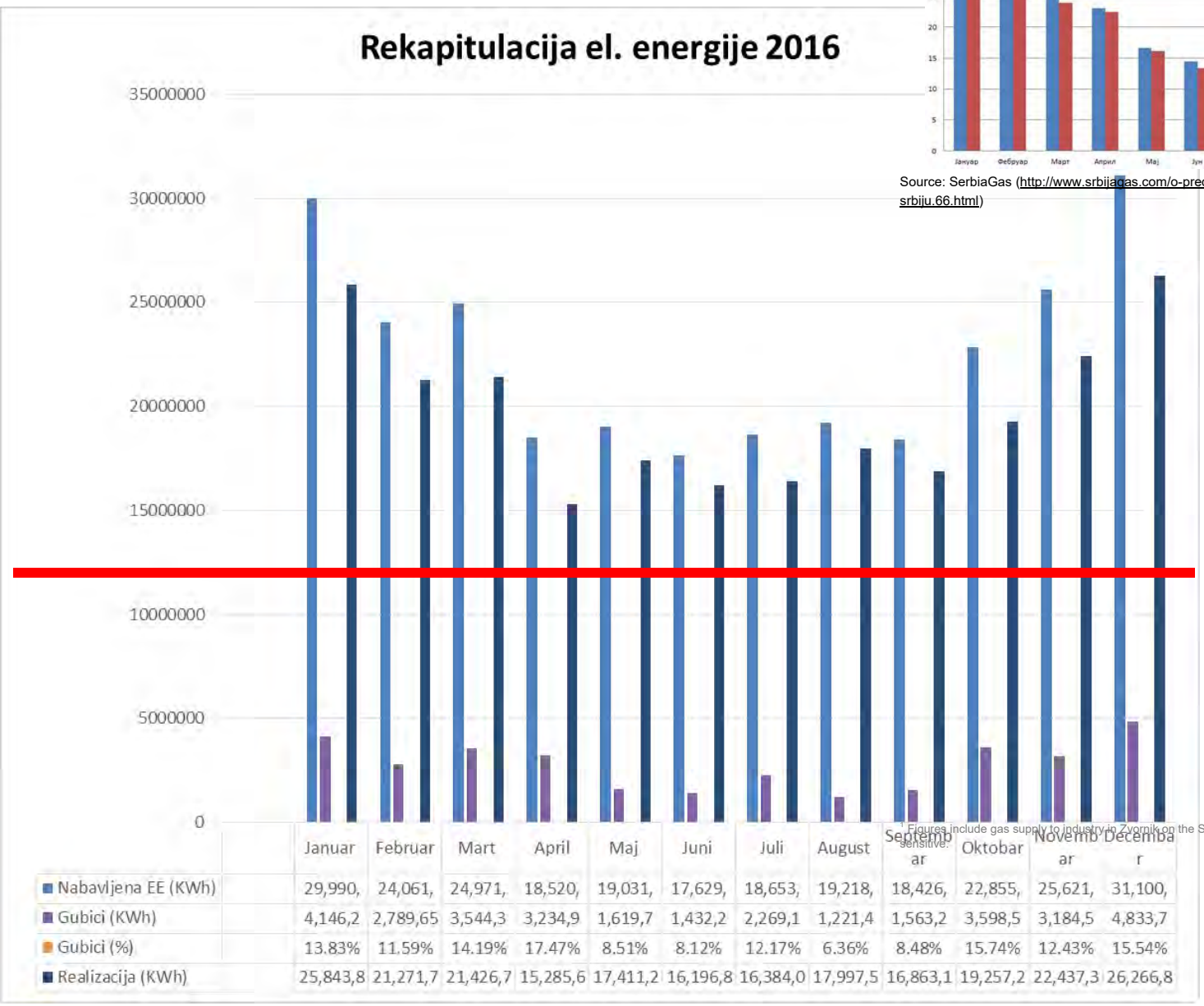
Very limited (and underutilized) gas infrastructure

Minimal security of demand

Figure 2: Monthly gas transit from Serbia to Bosnia and Herzegovina[1]



Source: SerbiaGas (http://www.srbijagas.com/o-preduzecu/delatnost/transport/tranzit-prirodnog-gasa-kroz-srbiju.66.html)



	Januar	Februar	Mart	April	Maj	Juni	Juli	August	Septembar	Oktobar	Novembar	Decembar
Nabavljena EE (KWh)	29,990,	24,061,	24,971,	18,520,	19,031,	17,629,	18,653,	19,218,	18,426,	22,855,	25,621,	31,100,
Gubici (KWh)	4,146,2	2,789,65	3,544,3	3,234,9	1,619,7	1,432,2	2,269,1	1,221,4	1,563,2	3,598,5	3,184,5	4,833,7
Gubici (%)	13.83%	11.59%	14.19%	17.47%	8.51%	8.12%	12.17%	6.36%	8.48%	15.74%	12.43%	15.54%
Realizacija (KWh)	25,843,8	21,271,7	21,426,7	15,285,6	17,411,2	16,196,8	16,384,0	17,997,5	16,863,1	19,257,2	22,437,3	26,266,8

[1] Figures include gas supply to industry in Zvornik on the Serbia–Bosnia border and steel works in Zenica that are not season-sensitive.

Impact of efficient space and water heating to electricity demand.

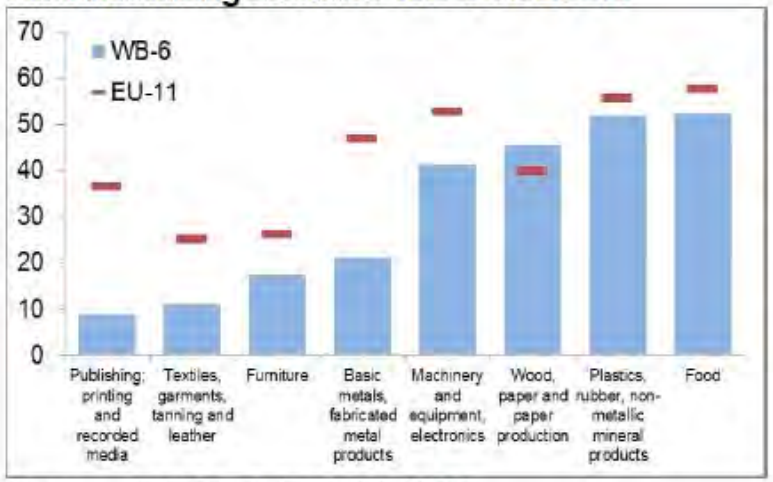
Impact of demand profile to network loses.

Power generation capacity requirement?

Source: Brcko District, 2017

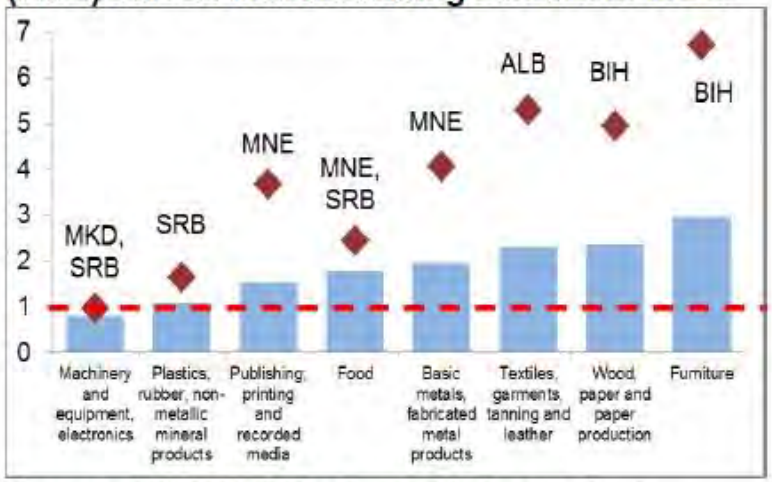
Industry competitiveness in Western Balkans

Chart 3. Labour productivities across manufacturing sectors: WB-6 vs EU-11



Source: EBRD BEEPS V, 2013.

Chart 4: Revealed comparative advantages (RCA) across manufacturing sectors in WB-6



Source: UNCTAD Trade matrix by products, 2016.

Note: Kosovo is not included. Countries that have the highest RCA in a certain industry group are marked.

Source: Ana Krešić, Jakov Milatović and Peter Sanfey: "Firm performance and obstacles to doing business in the Western Balkans | Evidence from the BEEPS", EBRD 2017

Despite needs of remaining customers

Table 5: Obstacles to doing business, by revealed cost

	ALB	BIH	MKD	KOS	MNE	SRB	Average
Tax rates	3.47	3.65	3.36	4.02	3.39	3.84	3.62
Competition from the informal sector	3.28	3.09	3.73	4.50	3.22	2.93	3.46
Electricity	3.32	2.57	3.34	4.01	2.73	2.50	3.08
Tax administration	2.61	2.51	2.19	3.07	2.18	2.84	2.57
Access to finance	1.47	1.79	1.97	2.89	1.58	1.84	1.92
Corruption	1.82	1.94	1.41	2.89	0.84	1.81	1.78
Access to land	2.07	1.57	1.85	2.10	1.54	1.52	1.78
Labour regulations	1.36	1.67	1.57	1.64	1.40	1.82	1.58
Crime, theft, disorder	0.85	1.07	1.13	2.48	0.79	1.08	1.23
Transport	0.89	1.12	1.26	1.88	0.90	1.03	1.18
Political instability	0.82	1.58	1.04	1.83	0.03	1.69	1.17
Customs and trade regulations	0.56	1.08	0.83	1.68	0.82	0.90	0.98
Business licensing	0.69	1.14	0.78	0.90	0.59	0.76	0.81
Inadequately educated workforce	0.57	0.52	0.89	1.31	0.27	0.79	0.73
Courts	0.39	0.67	0.62	0.82	0.24	0.86	0.60
Telecommunications	0.15	0.12	0.64	0.75	0.01	0.09	0.29

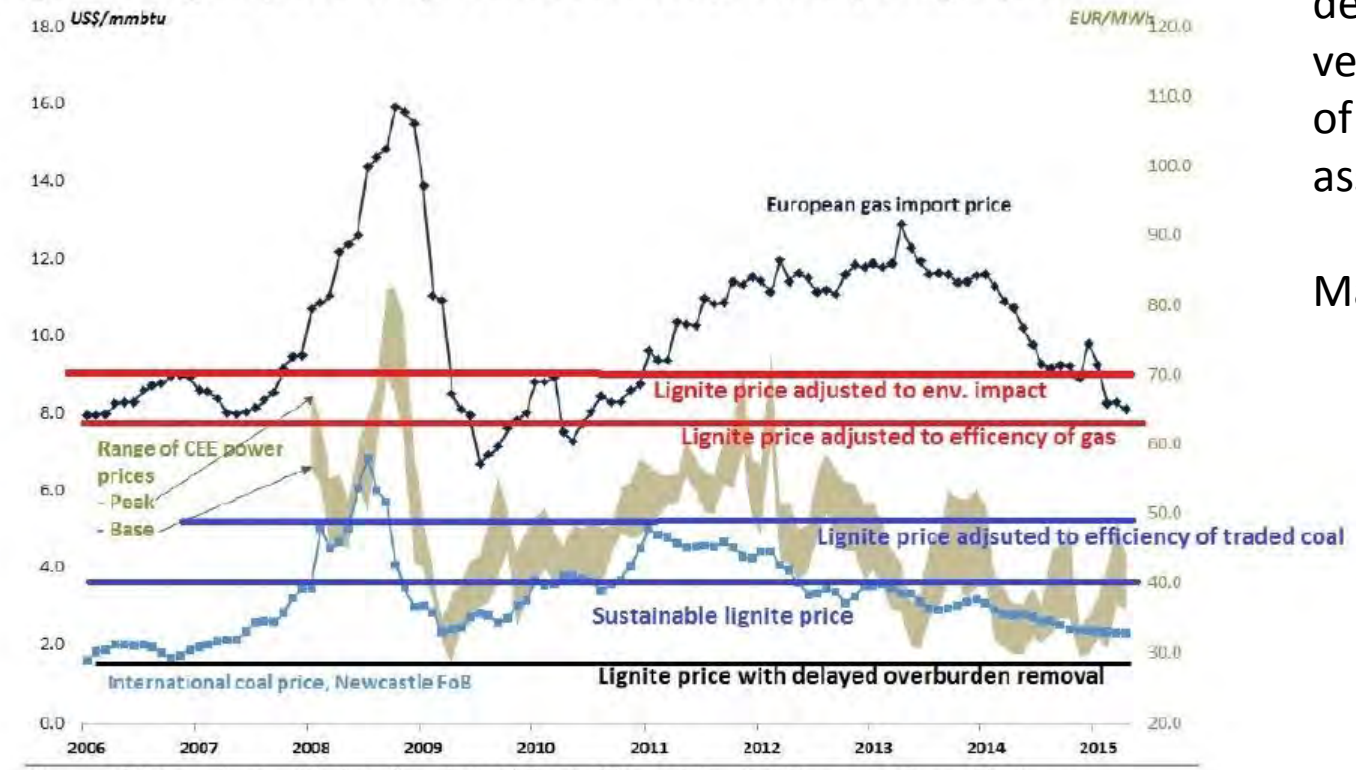
Source: BEEPS V.

Note: Even though the dependent variable takes value between 0 and 4, conditional mean is slightly higher than 4 in some cases because the regression is not bounded.

Source: Ana Krešić, Jakov Milatović and Peter Sanfey: "Firm performance and obstacles to doing business in the Western Balkans | Evidence from the BEEPS", EBRD 2017

and potential competitiveness (?)

Figure 13: Lignite prices compared to traded coal, electricity and gas prices



Source: ECA analysis with data from World Bank, IEA and Central European Power Exchange

Source: https://www.energy-community.org/portal/page/portal/ENC_HOME/DOCS/3758164/192E17AC7BED4BDEE053C92FA8C0D198.PDF, page 58. Lignite price estimates are provisionally estimated by Author

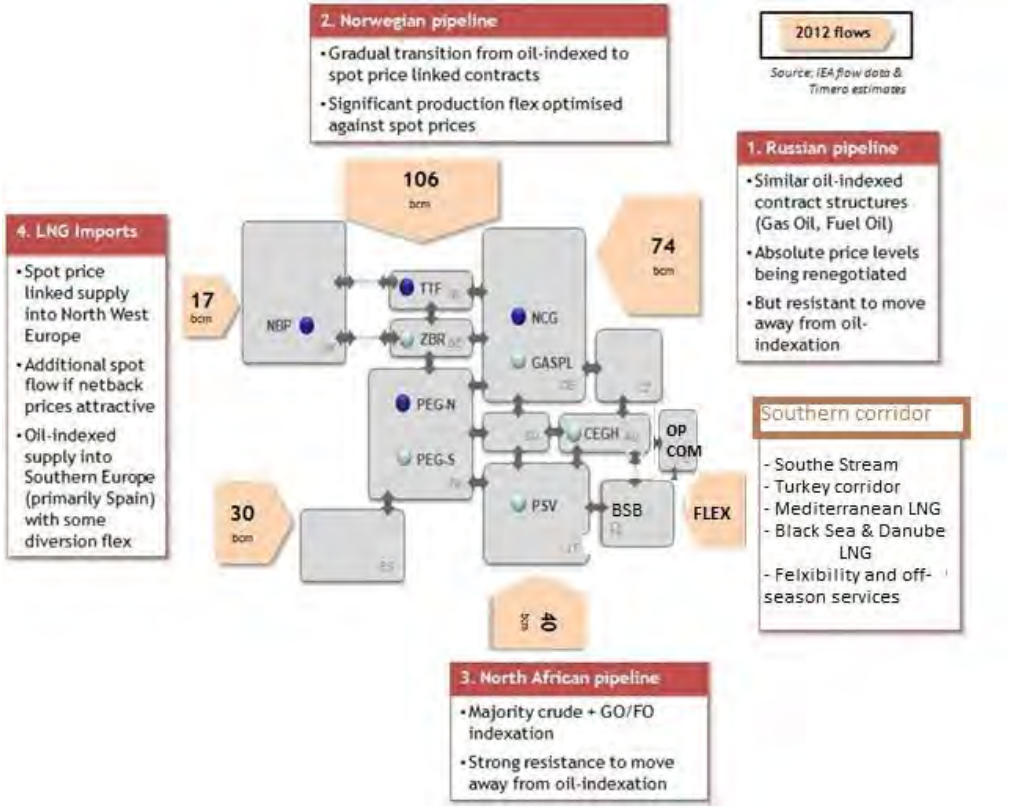
Utilization rate of depreciated assets versus utilization rate of low investment cost asset?

Maintain or replace?

That may be served by existing infrastructure

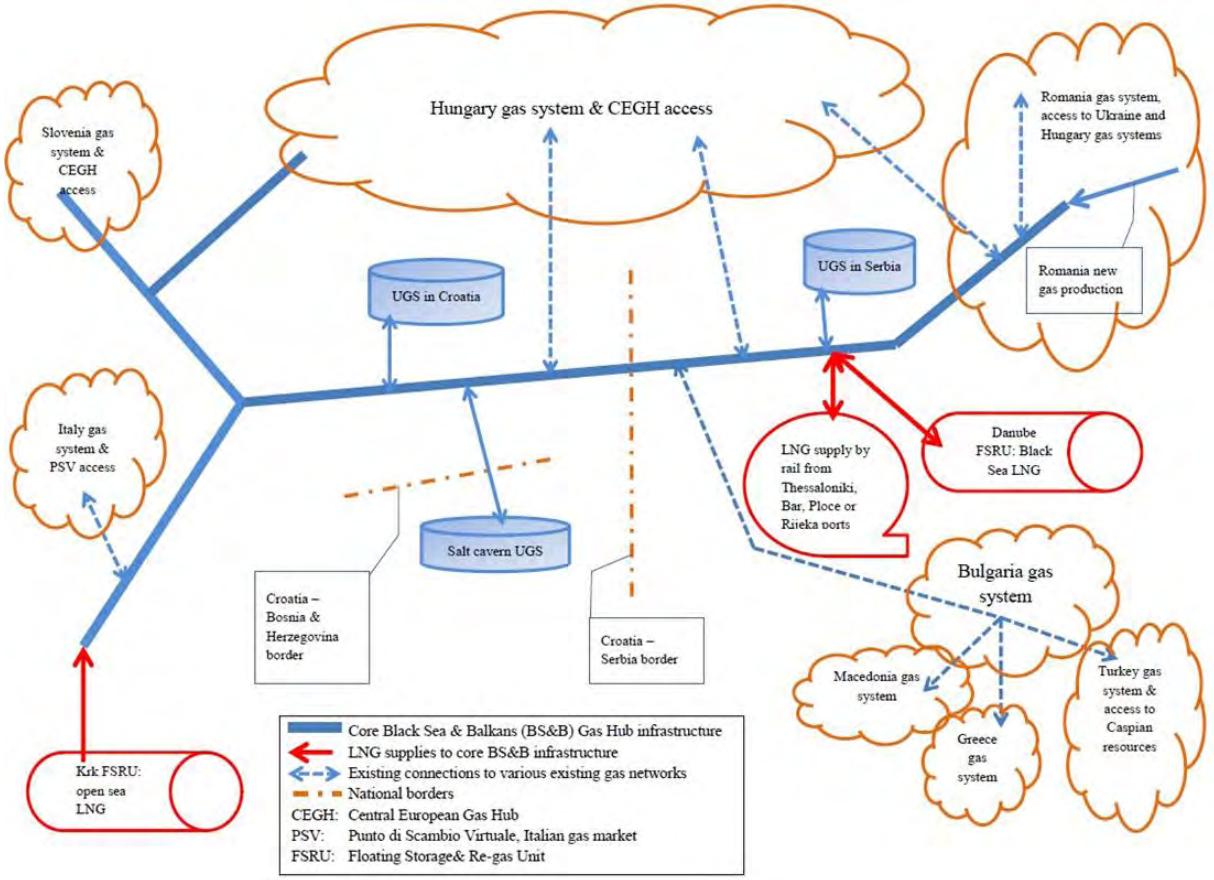
To provide interesting services to the European market

Figure 16: Black Sea & Balkans (BSB) gas hub could be introduced as follows:

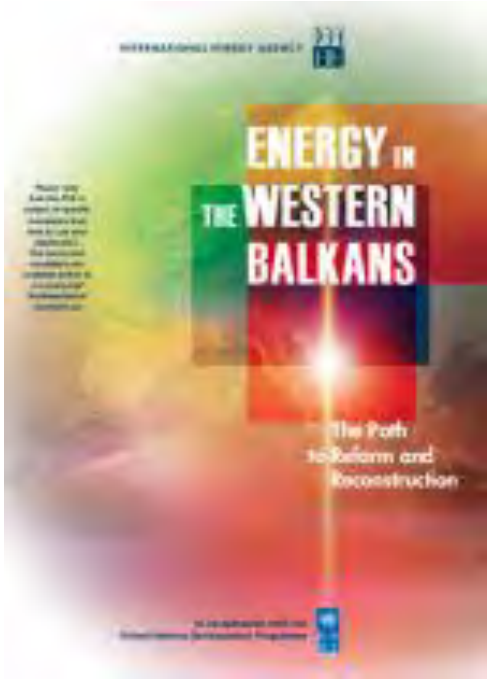


Source: Author estimate based on Timera

Balkan Gas Hub?



Further reading



http://www.iea.org/publications/freepublications/publication/Balkans2008.pdf

https://www.oxfordenergy.org/wpcms/wp-content/uploads/2017/02/Towards-a-Balkan-gas-hub-NG-115.pdf

Balkan Flood Extent 2014

Legend

- Cities/Towns
- Capital cities
- Power plant
- Waterways
- Major rivers
- Flood extent
- State borders
- Country borders

The flood extent was produced by our Zurich flood resilience alliance member IIASA. Data was derived from the Esri Disaster Response Program and is the approximate flood zone generated from available reports (esri.com). The basemap was provided by openstreetmap.org and fao.org.

Source: "Balkan Floods of May 2014: challenges facing flood resilience in a former war zone", Zurich Flood Resilience Alliance and Post Event Review Capability (PERC), Flood resilience review 05.15

Western Balkans 6: Nexus of risks

Underutilization of gas and oil pipeline infrastructure No access to international LNG market Competitiveness of oil refining?	Devastation of forest cover Change in hydro regime Erosion & landslides Floods	Phase out of lignite power plants: loss of 60% power generation capacity District heating deterioration
Poor transport integration to Adriatic Ionian region Port – Railway bottleneck Lack of economy of scale Limited railway capacity	**POVERTY & INSTABILITY** False perceptions Inadequate public statistics Human insecurity Stalled EU integration	Poor transport integration via Danube to Central Europe and Black Sea & Central Asia Belgrade Intermodal bottleneck
Exposure to gas &oil supply risks Fertilizers supply Devastation of agriculture assets	Hidden fiscal deficits Unsustainable nominal GDP Deterioration of public finances	Electricity & heat supply risk Loss of industrial competitiveness