

Likely impacts of the Energy Union Package on the Danube Region: gas market integration, supply security and decarbonisation

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Contribution of the Danube Region to the debate on the Energy Union



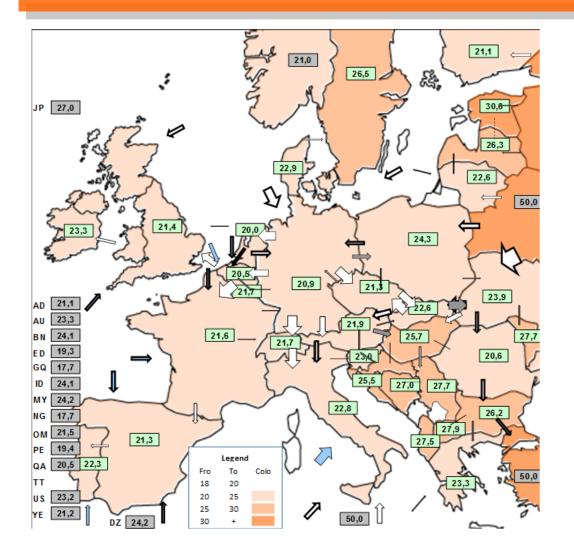
- 1. A fully integrated European energy market
 - full implementation of 3rd package and infrastructure policy
- 2. Energy security, solidarity and trust
 - builds upon the Energy Security Strategy of May 2014
- 3. Decarbonisation of the economy
 - ambitious climate objectives, road to Paris
 - becoming No 1 in renewables
- REKK conducted 3 brief analyses to support formulating DR position
 - Gas market modelling
 - Decarbonisation policy analysis



- The more efficient use of existing infrastructure, improved interconnectivity, increased supply source diversity (hardware) and refined regulation (software) are the key drivers for market integration and supply security improvement
- How can the following measures help to increase market integration and improve supply security in the DR?
 - Enabling reverse flow on existing pipelines
 - Better interconnectivity through PCIs
 - More LNG flow to Europe
- Methodology: Simulations by the European Gas Market Model

European Gas Market Model – major characteristics

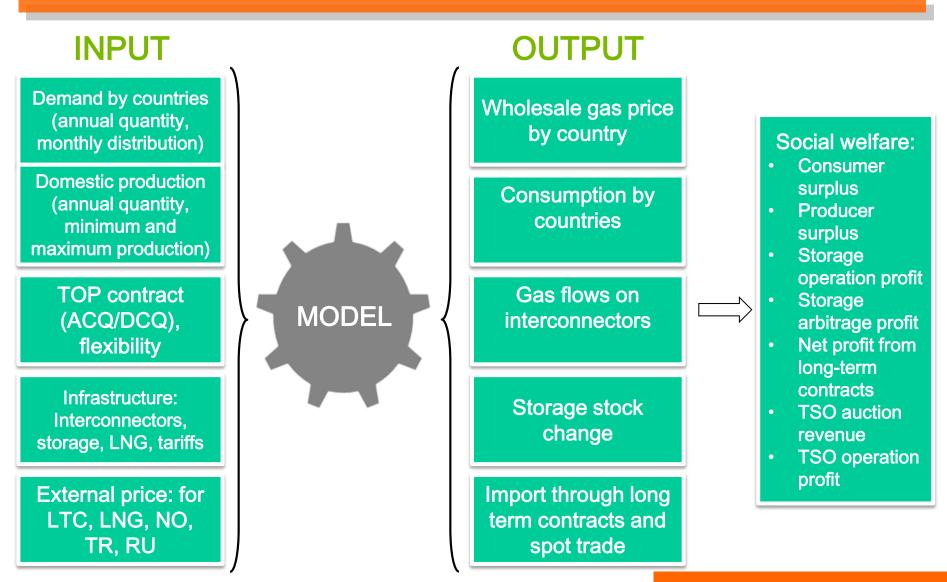




- Whole Europe (35 countries) is modelled
- Competitive prices by countries;
 12 months
- Trade is based on long term contracts and spot trade within the EU and with exogenous countries (NO, RU, TR, LNG)
- Natural gas flows and congestions
 on interconnectors
- Physical constraints are interconnection capacities (transmission tariffs are also included)
- Trade constraints: TOP obligations
- Domestic production and storage facilities are included
- Arrows: modelled gas flows
- LNG market representation is linked to Asian LNG prices

One gas year – 12 months





EGMM references



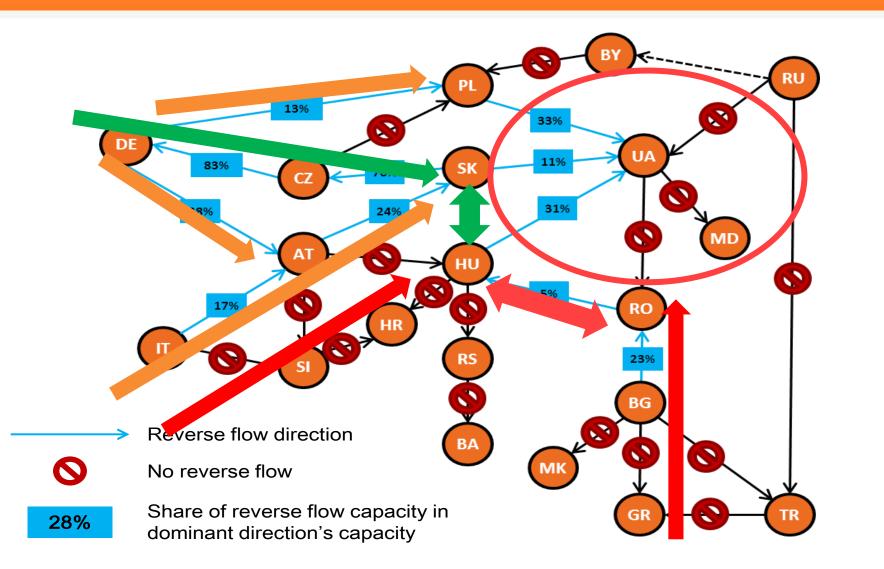
- Analysis of the CSEE gas storage market; the impact of system use charges on the demand for gas storage capacity (E.ON, 2012) and (MoFA, 2013)
- CBA of PECI projects for the Energy Community (2013)
- The impact of gas infrastructure corridors on the regional gas market (MoFA RoBoGo, March 2014), FGSZ South Stream (April 2014)
- Supply Security analyses related to the Ukrainian crisis (2014, Atlantic Council, EFET, IDDRI)
- Towards2030 Dialogue
- CBA of PCI projects for the Hungarian Energy and Public Utility Regulatory Authority (2014-2015)
- Measures To Increase The Flexibility And Resilience Of The European Natural Gas Market (2014, IEA)
- Supporting analysis for the Central Eastern and South-Eastern Europe Gas Connectivity (CESEC) initiative on behalf of the EC



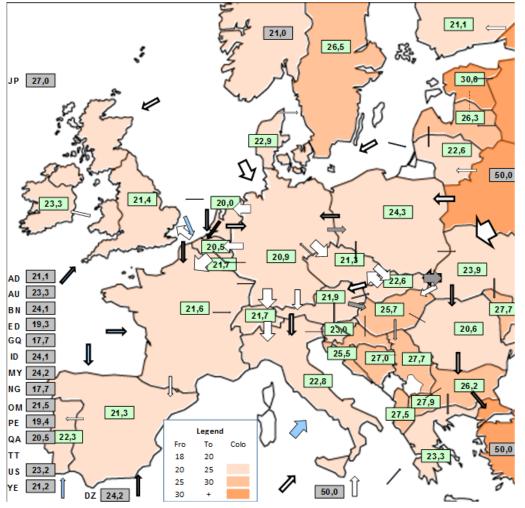
1. Gas market integration impacts of Energy Union

Much improvement since 2009. Implemented physical reverse flow projects





Modelled reference wholesale gas prices in 2015 (€/MWh) – operating infrastructure as of January 2015

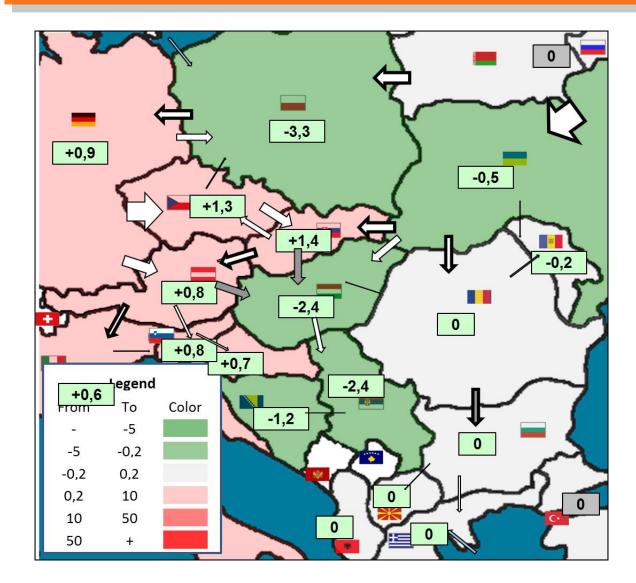


The Danube region is

- more expensive than the rest of Europe (DR average price is 24.2 €/MWh 0.4 €/MWh above whole European average)
- Differences within the region still exist. (7 countries above EU average 6 under average. Price difference between cheapest (RO) and most expensive (SB) is 7,1 €/MWh
- The physical congestion on HAG (between Austria and Hungary) still prevents the Balkan region to trade on Western European hubs, and the dominance of a single supplier is reflected in higher prices.
- The gap between Western and Eastern prices is however closing, (Russian contract re-negotiations)
- Ukraine benefits from the new reverse flow deliveries through Slovakia
- Romania is less dependent on external sources and not interconnected

New infrastructure integrates markets (change in €/MWh)



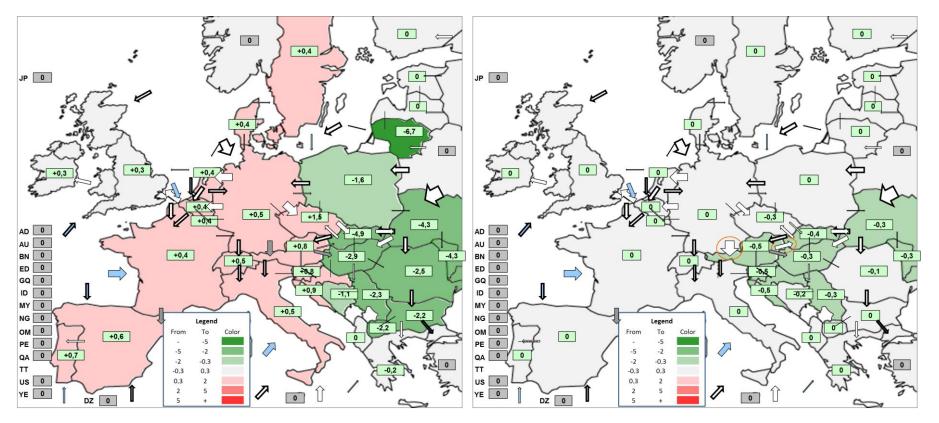


- When ongoing infrastructure construction (HU-SK and LNG in Poland) becomes operational, Poland will benefit from the spot LNG flows, while all other countries, colored green on the map will benefit from the better interconnectivity to the more liquid Western European market.
- Important to note: the better interconnectivity will have a slight price increase effect in Western Europe, from the Danube Region countries, this applies to the Czech Republic and Slovakia and to a lesser extent also to Germany, Austria and Slovenia.



Price effect of new infrastructure + reverse flow built since 2009 (€/MWh)

Price effect of allowing 100% reverse flow on all EU-EU border (€/MWh)



In normal scenario DE-AT and AT-SK additional reverse flows would be used

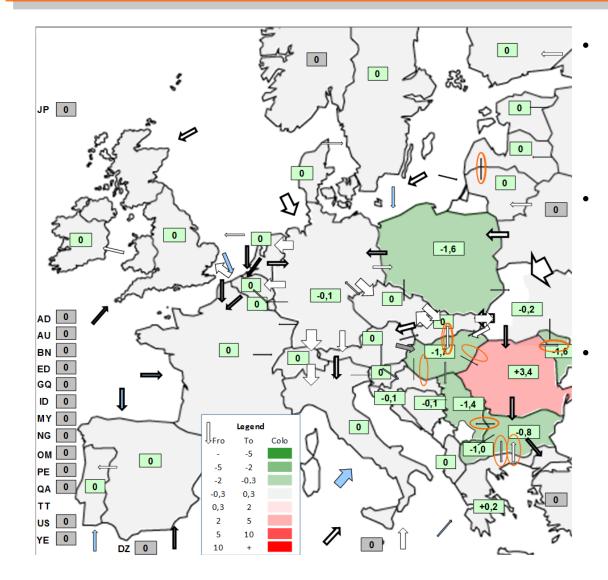
Short-term gas PCI projects



4	Short-term projects	(2014 - 2016)		
ŧ	Name project	Details	Capacity	Finished bv
Baltic	gas market			
1	LT: LNG vessel	Vessel (not a PCI). Status: operational since Oct 2014	50 GWh/day	End 2014
2	Klaipėda-Kiemėna pipeline upgrade together with LT-TV upgrade	Capacity enhancement of the connection from Klaipėda to the LT-LV interconnector. Status: EIA and engineering design	57,4 GWh/day	2020
Gas oj	ptionality in Central and South-East Europ	ie e		
l	PL: LNG terminal	Terminal in Swinoujscie and connecting pipeline (not a PCI due to maturity). Status: under construction	150 GWh/day	End 2014
2	EL-BG interconnector	New interconnector to support diversification and deliver Shah Deniz gas in Bulgaria. Status: permitting, EIA (2 years delay)	134 GWh/day	2016
1	BG: storage upgrade	Increase storage capacity in Chiren; Status: pre-feasibility	up to 5,78 TWh/year mobil gas capacity	2017
5	HU-HR reverse flow	Reverse flow enabling gas flows from Croatia to Hungary. Status: feasibility studies.	76 GWh/day	2015
5	HU-RO reverse flow	Project to enable gas flows from Romania to Hungary. Status: feasibility studies	127 GWh/day	2016
,	BG-RS interconnector	New interconnector supporting SoS in Bulgaria and Serbia. Status: EIA, routing, financing (issued with Srbijagas unbundling to access finance)	80 GWh/day	2016
;	SK-HU interconnecter	New bi-directional pipeline. Status: construction	SK-HU: 126,8 HU-SK: 50,75 GWh/day	2015
	RO-MV interconnector	Under construction (in delay)	30 GWh/day	2016

Effect of the short term PCI projects of the Energy Security Strategy





- Average price change in the DR region is moderate: -0,2 €/MWh (-0,5%)
 - The only new source in the region is Romania (present domestic production)
- Romanian wholesale price goes up: Romanian producers benefit
 - Regulatory/physical barrier: RO-BG spot trade not possible
- All short term PCIs in DR are used to some extent except for RO-HU and HR-HU reverse flows:
 - Exit tariff from RO to HU is very high
 - Little use of HR-HU reverse flow without Croatian LNG

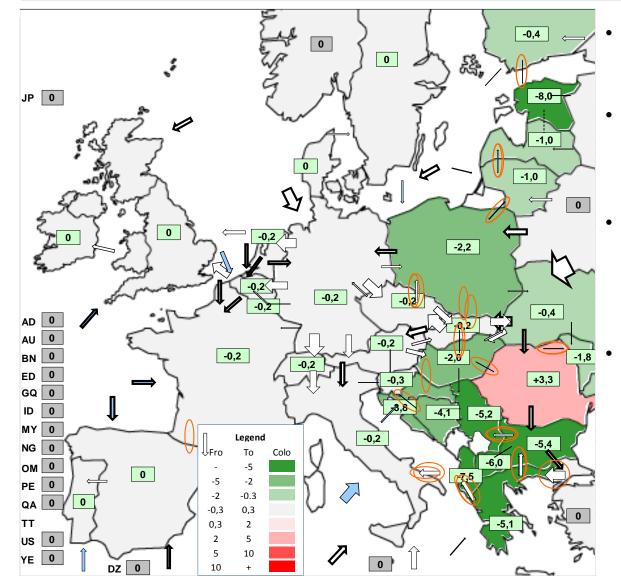
Mid-term gas PCI projects



B	Medium-term projects	(2017 – 2020)		
#	Name project	Details		Finished by
Balti	c gas market			
1	PL-LT interconnector	New bi-directional pipeline (GIPL) ending isolation of the Baltic States. Status: feasibility/FEED	PL-LT: 73,4 GWh/day LT-PL:30,6 GWh/day	2019
2	FI-EE interconnector	New bi-directional offshore pipeline ("Balticconnector"). Status: pre-feasibility/permitting	80 GWh/day	2019
3	Baltic LNG terminal	New LNG terminal with location to be decided (EE/FI). Status: pre-feasibility, permitting	FI: 133 GWh/day	2017
Enab	ling gas from Spain to flow nor			
1	ES-FR "Midcat" interconnector	New interconnection (including compressor) to enable bi-directional flows[1] between France and Spain. Status: feasibility study	ES-FR: 230 GWh/day	tbd
Clust	ter Gas optionality in Central an	d South-East Europe		
1	PL-CZ interconnector	New bi-directional pipeline between Czech Republic and Poland. Status: Feasibility/FEED, permitting (CZ) 153,2 GWh/day		2019
2	PL-SK interconnector[2]	New bi-directional pipeline between Slovakia and Poland. Status: final investment decision in 2014	PL-SK: 143,9 GWh/day, SK-PL: 174,5 GWh/day	2019
4	TANAP (TR-EL)	Trans-Anatolian Natural Gas Pipe bringing Caspian gas to the EU via Turkey and opening the Southern Gas Corridor. Status: feasibility/final investment decision	TR-GR: 348 GWh/day	2019
5	TAP (EL-AL-IT)	Intra-EU section of the Southern Gas Corridor. Direct connection to TANAP. Status: permitting	526,01 GWh/day (20 bcm/year)	2019
<u>ó</u>	IAP (AL-ME-HR)	New interconnector part of the Balkan Gas Ring and connected to TAP. Status: feasibility/FEED	HR-AL:30, HR-BiH: 30, HR-ME:15 GWh/day	2020
7	HR – LNG terminal	New LNG terminal in Krk supporting SoS and diversification in the Region. Status: feasibility/FEED (financing issues)	170 GWh/day (6,5 bcm/year)	2019
11	EL: Alexandroupolis LNG terminal	New LNG terminal in Northern Greece. Status: permitting	455 GWh/day	<u>2016[3]</u>
12	EL: Aegean LNG terminal	New LNG floating terminal at Bay of Kavala. Status: feasibility/FEED, permitting	155 GWh/day	2016[4]

Mid term projects – price difference compared to reference (€/MWh)





- Average price change in the region is -0,5 €/MWh (1,2%)
- Bulgaria and Serbia are the main beneficiaries in DR (above 5 €/MWh decrease in price)
- Several unused or underutilized infra: SK-PL and HU-SI
 - HR-HU is still not in use because of high tariff!
 - New source: Croatian LNG combined with TAP brings benefit to the whole region
 - Regulatory push on backhaul transactions on TAP is essential for these results!

Summary of market integration effect of PCIs



Market	Reference	Short-term	Mid-term	Price change due to short-term PCI projects (€/MWh)	Price change due to mid-term PCI projects (€/MWh)	Price change due to short-term PCI projects (%)	Price change due to mid-term PCI projects (%)
AT	21.9	21.9	21.7	-0.03	-0.22	-0.1%	-1.0%
BA	27.0	26.9	23.0	-0.13	-4.07	-0.5%	-15.1%
BG	26.2	25.4	20.8	-0.76	-5.35	-2.9%	-20.5%
CZ	21.3	21.2	21.1	-0.04	-0.22	-0.2%	-1.0%
DE	20.9	20.9	20.7	-0.07	-0.24	-0.3%	-1.1%
HR	25.5	25.3	21.6	-0.15	-3.81	-0.6%	-15.0%
HU	25.7	24.0	23.7	-1.71	-2.03	-6.6%	-7.9%
MV	27.7	26.1	25.9	-1.62	-1.79	-5.8%	-6.5%
RO	20.6	24.0	23.9	3.43	3.25	16.6%	15.8%
SB	27.7	26.3	22.5	-1.44	-5.20	-5.2%	-18.7%
SI	23.0	23.0	22.8	-0.04	-0.26	-0.2%	-1.1%
SK	22.6	22.6	22.4	-0.04	-0.22	-0.2%	-1.0%
UA	20.0	23.7	23.5	-0.22	-0.40	-0.9%	-1 7%
DR average	24.2	24.0	22.6	-0.22	-1.58	-0.9%	-6.5%
Whole Europe	23.7	23.6	22.1	-0.10	-1.60	-0.4%	-6.8%

Similar price decrease across Europe

Solidarity: helps those in worst situation

Effect of decreasing Japanese price on the LNG delivery to Europe and the wholesale prices in DR



Short- and mid-term PCI projects are assumed to be built

Conclusions on market integration



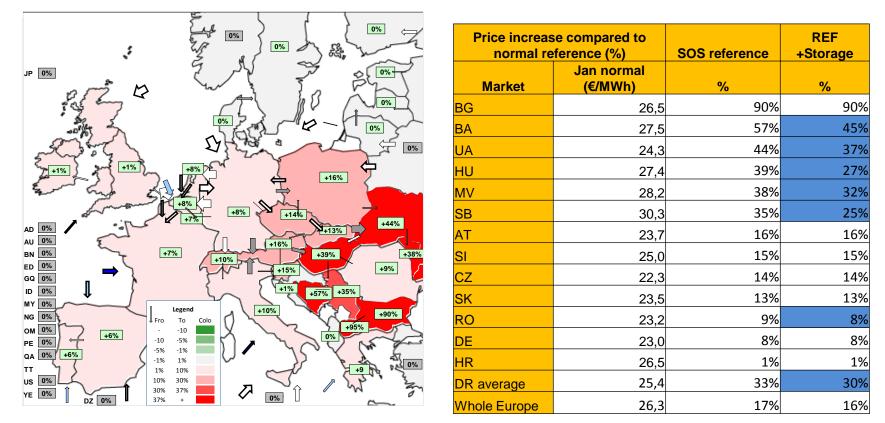
- The DR is a significant beneficiary of a more integrated European gas market and is fully supporting further integration efforts.
- The PCI process is key for the Danube Region. DR is ready to support the revision of the PCI list to arrive at the necessary level of regional interconnectivity at least cost (slightly reduced PCI list).
- Infrastructure upgrade and source diversification has already been effective to demolish the market power of the dominant supplier in several cases (CZ, SK, HU and UA)
- The regulatory scrutiny suggested by the Energy Union on transparency and access to pipeline capacities is key.
- Transmission tariff harmonisation would lessen regulatory barriers to trade across the Region and is key for market integration.
- Better regional interconnectivity provides for an effective spill-over of global LNG price changes towards landlocked countries in the Region. Therefore the development of an EU-level LNG policy, proposed by the Energy Union, is supported by the Danube Region.



2. Gas supply security impacts of Energy Union

Modelling a 100% supply cut on all Ukrainian pipelines in January





There is a significantly higher wholesale gas price increase in the DR countries (33%) than in whole Europe (17%). There are however only 6 countries that are effected more than the European average. These are: Bulgaria, Bosnia and Herzegovina, Ukraine, Hungary, Moldova and Serbia. When releasing the strategic gas stocks in HU (1,2 bcm) damages in Bosnia, Ukraine, Hungary, Moldova, Serbia would be lower.



	Scenario						
	Normal	Short-term SOS	Long-term SOS				
DE-AT expansion	х	х	х				
SI-AT							
IT-AT expansion							
SI-IT							
HR-SI							
DE-PL expansion							
PL-CZ							
AT-SK expansion	х	x	x				
GR-BG		x	х				
RO-HU			x				
HR-HU		х	x				
HU-AT							

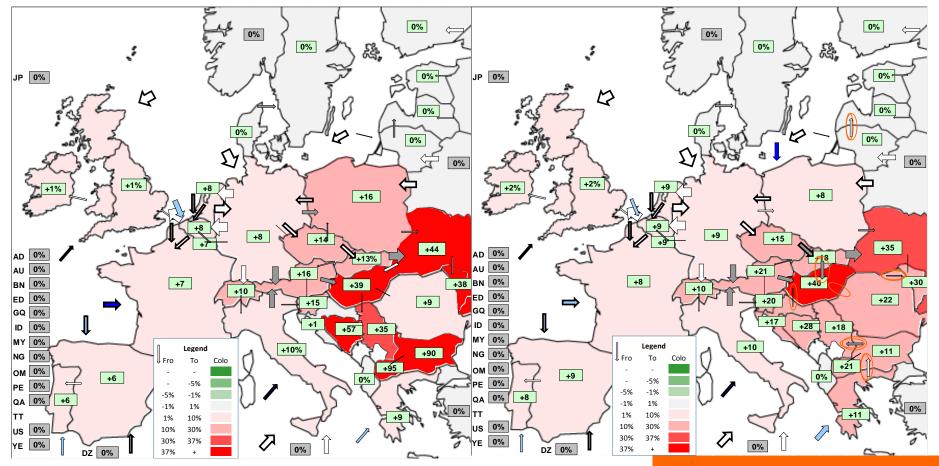
Adding further new reverse flow capacities to the region does not bring benefits in the magnitude that we experienced from 2009 to 2015. The most important projects have already been realized. There are two projects that bring benefits under normal circumstances: The extension of the reverse flow from AT to SK together with the DE-AT expansion. In the SOS runs above these most important projects 3 more projects experience flows during the crisis: GR-BG, RO-HU and HR-HU. The rest of the projects' exemption from the reverse flow obligation might be justified.

Short-term PCI projects significantly decrease the damages



Reference SOS January price increase (%) compared to reference normal scenario

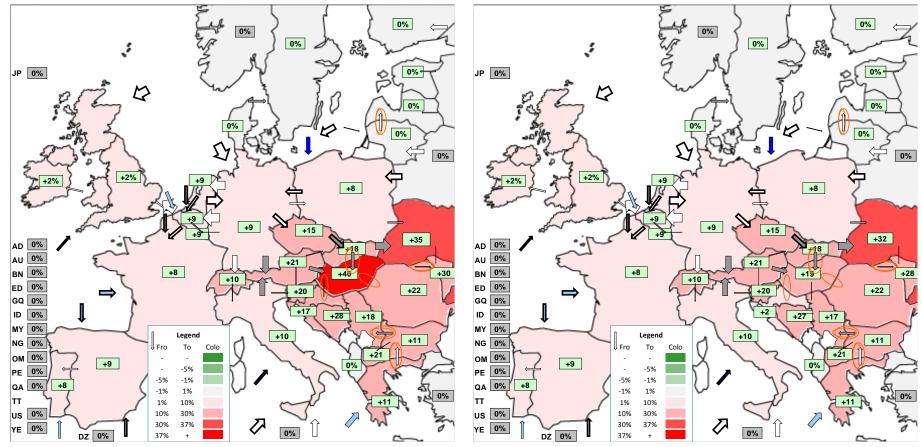
Short term PCI projects January SOS price increase (%)



Release of strategic storage stocks in Hungary brings regional benefits



Short term PCI SOS January price increase WITHOUT strategic storage released Short term PCI SOS January price increase WITH strategic storage released in Hungary

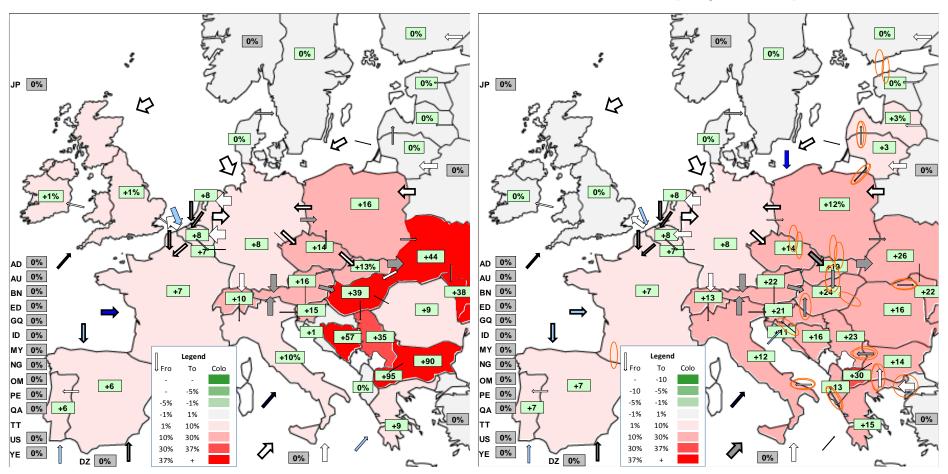


Effect of mid-term PCIs



Reference SOS

With mid term PCI projects implemented



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Summary of PCI projects' SOS effect



	e compared to erence (%)	SOS	SOS reference	Short term_SOS		Mid term_SOS	
Market	Jan (€/MWh)	Jan (€/MWh)	(€/MWh) % J		%	Jan (€/MWh)	%
AT	23,7	27,5	16%	28,6	21%	28,6	22%
BA	27,5	43,1	57% (45%)*	35,1	28% (27%)*	26,8	16%
BG	26,5	50,4	90%	28,9	11%	25,2	14%
CZ	22,3	25,4	14%	25,5	15%	25,1	14%
DE	23,0	24,7	8%	24,9	9%	24,4	8%
HR	26,5	26,7	1%	31,1	17% (2%)*	24,8	11%
HU	27,4	38,2	39% (27%)*	35,3	40% (19%)*	31,1	24% (20%)*
МК	27,4	53,4	95%	32,0	21%	28,2	30%
M∨	28,2	38,9	38%	36,3	30%	34,0	22%
RO	23,2	25,4	9%	31,7	22%	30,0	16%
SB	30,3	41,1	35% (25%)*	33,1	18% (17%)*	29,8	23%
SI	25,0	28,8	15%	29,9	20%	29,9	21%
SK	23,5	26,6	13%	27,7	18%	27,7	19%
	24,3	35,0	44% (37%)*	32,5	35% (32%)*	30,1	2.60/
DR average	25,4	34,3	33% (30%)*	30,5	21% (18%)*	27,8	19% (18%)*
Whole Europe	26,3	29,5	17%	27,9	12%	26,2	12%

* Figures change when the Hunganan strategic stock is released in the region (1,2 bcm)

The Hungarian strategic storage is very important regionally, until the necessary cross border capacity is achieved. With the mid term projects implemented only Hungary will need that stock.

With the mid term projects in place almost the same level of security is achieved in the DR region as in the EU. Most importantly no DR country would experience an extreme (above 30%) price increase due to a one month in winter security of supply shock. (Romanian price increase is not driven by the crisis but it is the consequence of eliminating the isolation of a relatively cheap country and allowing trade.)

More LNG to Europe



		Normal scenario		SOS scenario			
TWh	Reference	Assuming short- term PCIs	Assuming mid- term PCIs	Reference	Assuming short-term PCIs	Assuming mid- term PCIs	
Total LNG flow to							
Europe	781	787	775	786	792	784	
LNG flow to							
Croatia	-	-	13,8	-	-	18,8	
Congested							
terminals	-	-	-	FR, IT	IT,PL	IT,PL	

- No congested LNG terminal in Europe in a normal situation
- In case of SOS situation France and Italy gets congested
- When new LNG in PL comes online (Short term) the congestion from France moves to PL
- When Croatian terminal is implemented, it will receive LNG flows on a spot basis even under "normal" circumstances In SOS situation it is even more used.





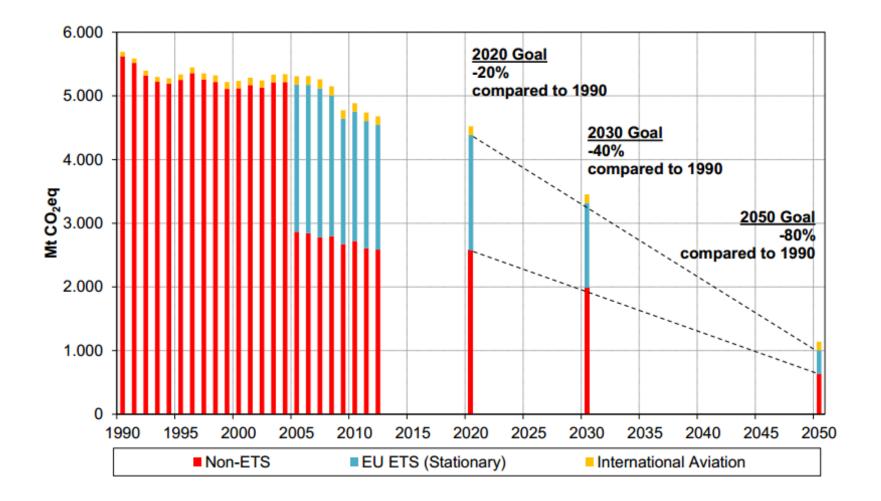
- Newly built infrastructure in Europe since 2009 has significantly improved gas supply security for Danube Region: the range of the price increase in the case of a supply shock significantly decreased in DR countries.
- From the additional reverse flows AT-SK, DE-AT expansion, GR-BG and HR-HU are proved to be the most important.
- Realization of selected PCI projects would significantly decrease the damages in Danube Region in the case of a supply shock. With the short- and mid-term projects in place almost the same level of security is achieved in the DR region as in the EU. No DR country would experience an extreme (above 30%) price increase due to a one month in winter security of supply shock.
- Hungarian strategic storage is also very important regionally.
- Croatian LNG brings significant benefits to the Danube Region both under normal and SOS circumstances.



3. Decarbonisation policy related issues in the Danube Region

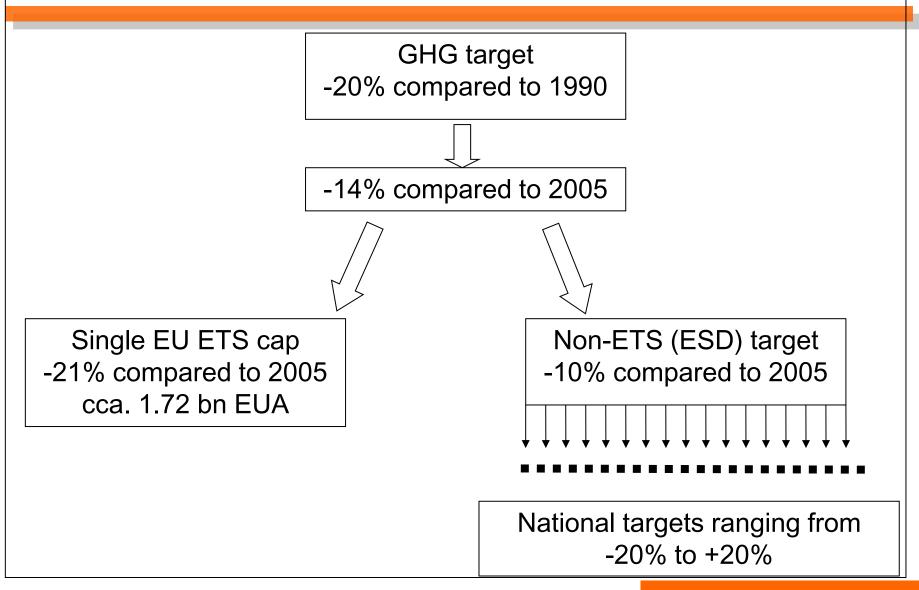
Long term reduction needs until 2050 under a 80% reduction scenario





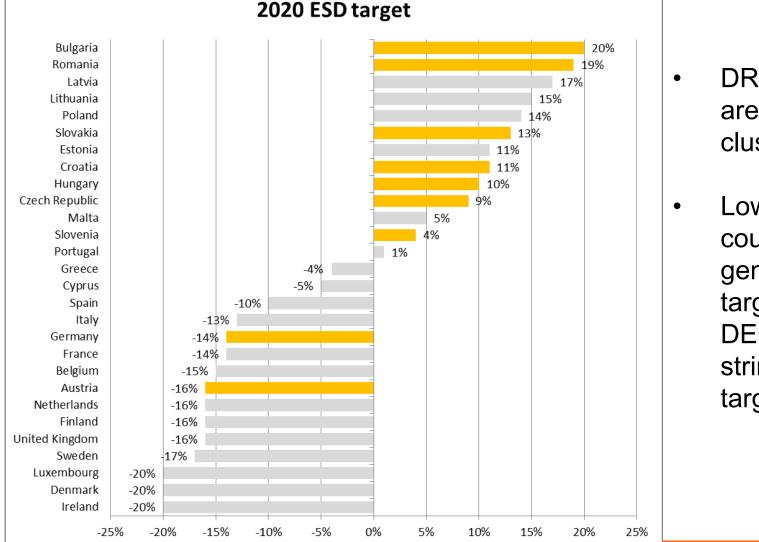
Source: Oko-Institute, 2014

2020 GHG target setting



2020 ESD targets

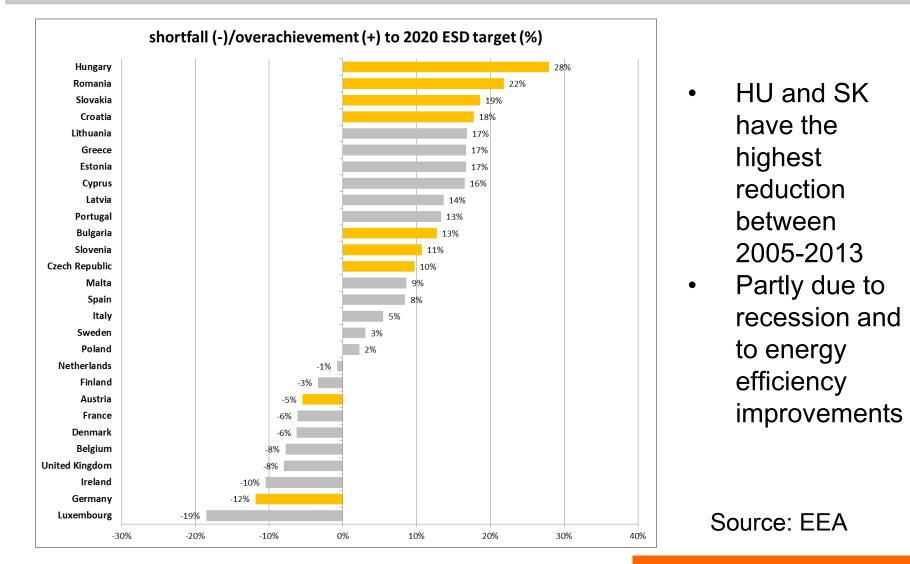




- DR countries are in two clusters
 - Low GDP countries have generous targets while DE, AT face stringent targets

2013 GHG emissions and the 2020 ESD target





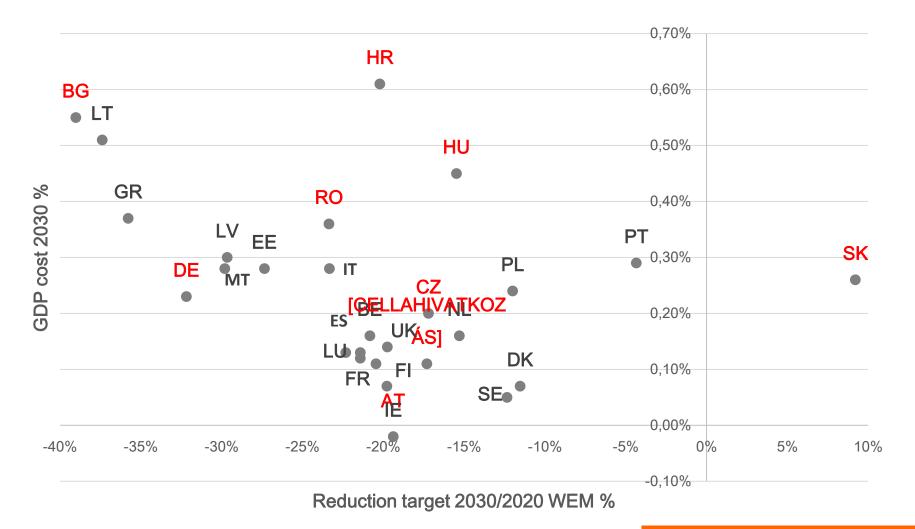
GHG emissions target scenarios for 2030 -Impact Assessment of the European Commission

	REF	35% GHG + EE	37% GHG	40% GHG REF	40% GHG REF+	40% GHG + EE	40% GHG + 30% RES + EE	45% GHG + 35% RES + EE	
GHG emissions reduction compared to 1990	-32.4%	-35.4%	-0.37	-40.4%	-40.6%	-40.3%	-40.7%	-45.1%	
RES share	24.4%	25.5%	24.7%	25.5%	26.5%	26.4%	30.3%	35.4%	
Energy savings	-21.0%	-24.4%	-22.9%	-24.4%	-25.1%	-29.3%	-30.1%	-33.7%	
GHG emissions reduction in the ETS sector compared to 2005	-36%	-37%	-38%	-42%	-43%	-38%	-41%	-49%	
GHG emissions reductio in the non-ETS (ESD) sector compared to 2005	-20%	-26%	-28%	-31%	-30%	-35%	-33%	-34%	
EUA price (€/t)	35	27	35	5	40	22	11	14	

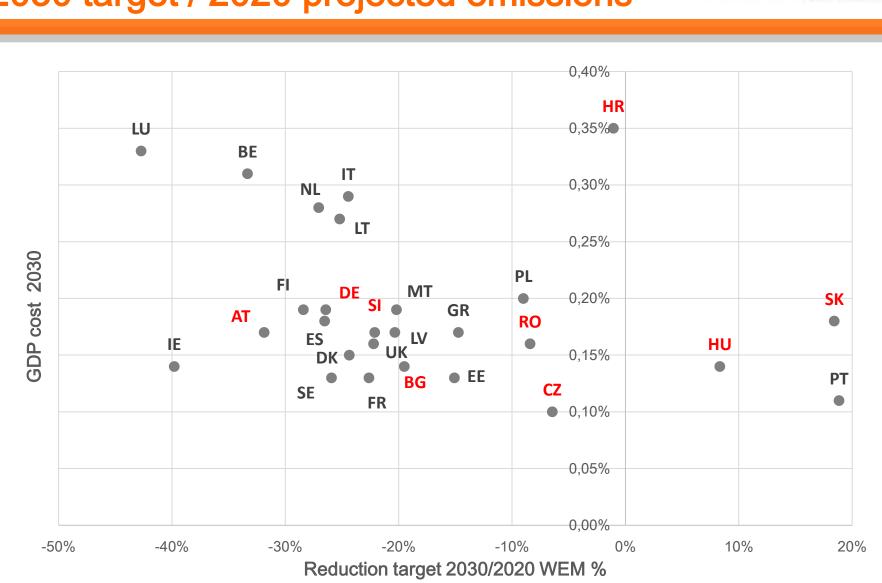
Source: SWD(2014) p16

Impact of proposed share of ETS/ESD reductions on DR?

Cost efficient method for ESD: 2030 target / 2020 projected emissions



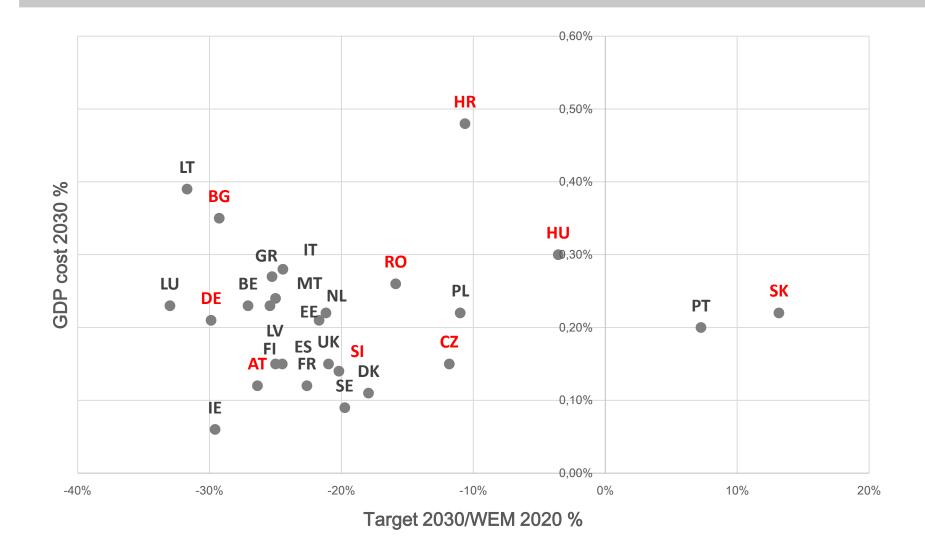
Based on: UK NON-PAPER, 2014



GDP/Capita method for ESD: 2030 target / 2020 projected emissions

Based on: UK NON-PAPER, 2014

Balanced scenario for ESD: 2030 target / 2020 projected emissions

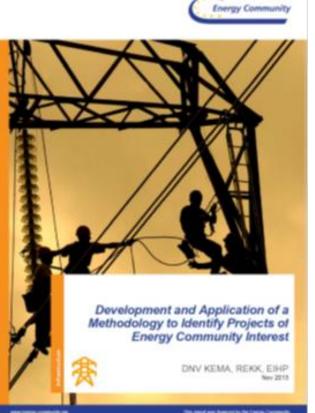




- Acknowledgement of early action is a key issue for the Danube Region countries
- Implication of the various alternative methods on the DR countries:
 - For DR the GDP/Capita target setting method is the most advantageous, having the lowest GDP cost of compliance.
 - In case of the cost efficient target setting GDP impacts are the highest for DR countries. Many DR countries (with lower per capita GDP) faces the highest GDP impact.
- Single obligatory climate target (CO₂) supports flexibility for DR to meet climate objectives (nuclear, efficiency)
- General RES target (27%) is feasible; political importance of RES-heat versus RES electricity in DR...
- ...therefore strong support for Actions 9 (2), 10 (2) and 13.



THANK YOU FOR YOUR ATTENTION!



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