

# Selection of Projects of Energy Community Interest (PECI s)

Presentation REKK / DNV GL

- Gas and oil -  
Vienna 14.02.2018

# Agenda

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1. Summary of country data received
2. Project eligibility for gas and oil projects
3. Project data verification and clarification
4. Finalization of Open Methodological questions
5. Introduction of the gas market modelling reference

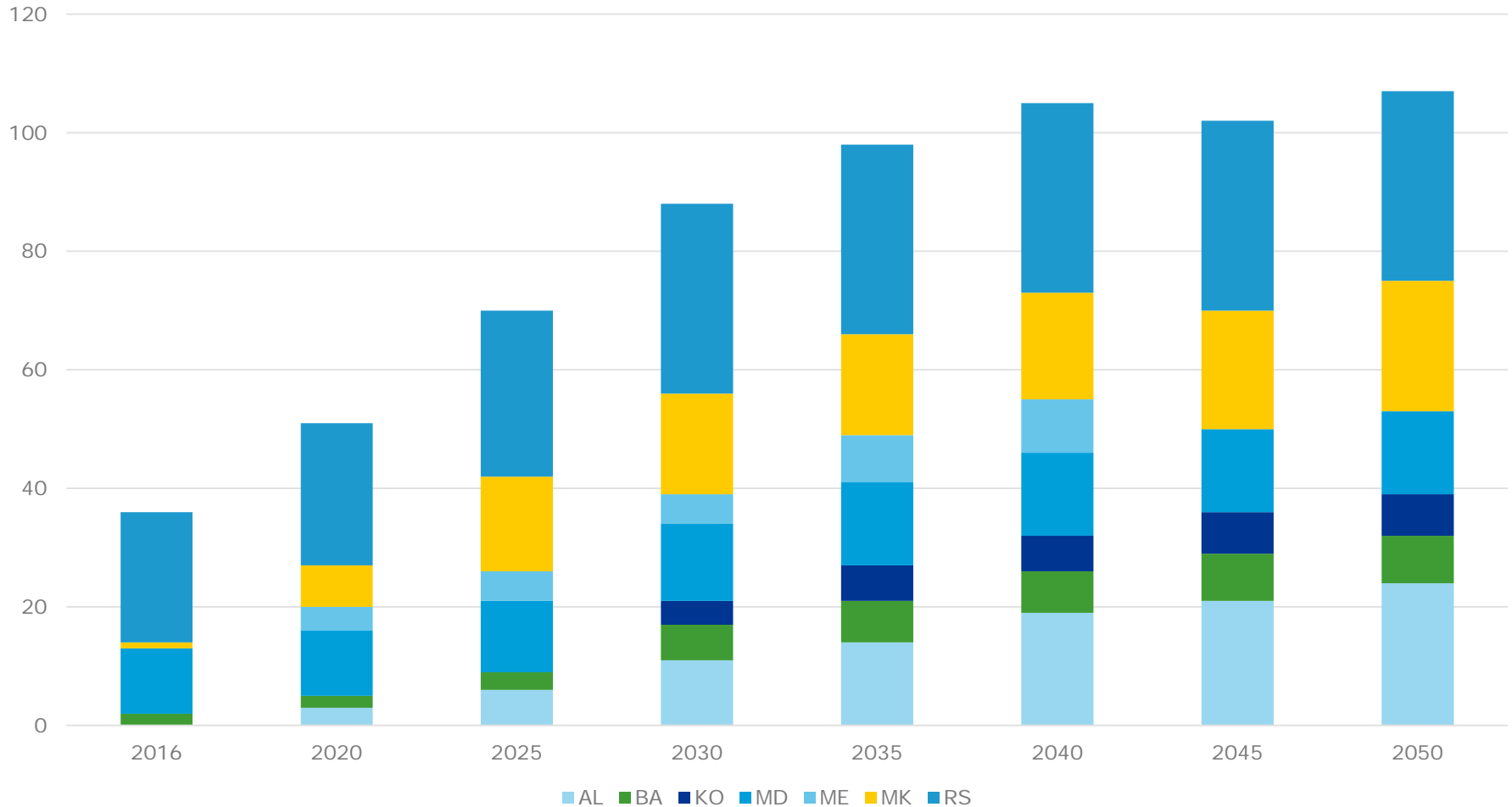
## Gas consumption in the EnC contracting parties TWh/year

		2016	2020	2025	2030	2035	2040	2045	2050
<b>Albania (2)</b>	AL	0.0	3	6	11	14	19	21	24
<b>Bosnia and Herzegovina (1)</b>	BA	2	2	3	6	7	7	8	8
<b>Georgia</b>	GE	24	30	33	36	41	44	44	44
<b>Kosovo*</b>	KO	0	0	0	4	6	6	7	7
<b>Moldova</b>	MD	11	11	12	13	14	14	14	14
<b>Montenegro (1)</b>	ME	0	4	5	5	8	9	9	9
<b>FYR of Macedonia</b>	MK		7	16	17	17	18	20	22
<b>Serbia</b>	RS	22	24	28	32	32	32	32	32
<b>Ukraine</b>	UA	327	369	368	371	375	394	394	394
<b>Total</b>		385	450	471	495	513	544	539	545

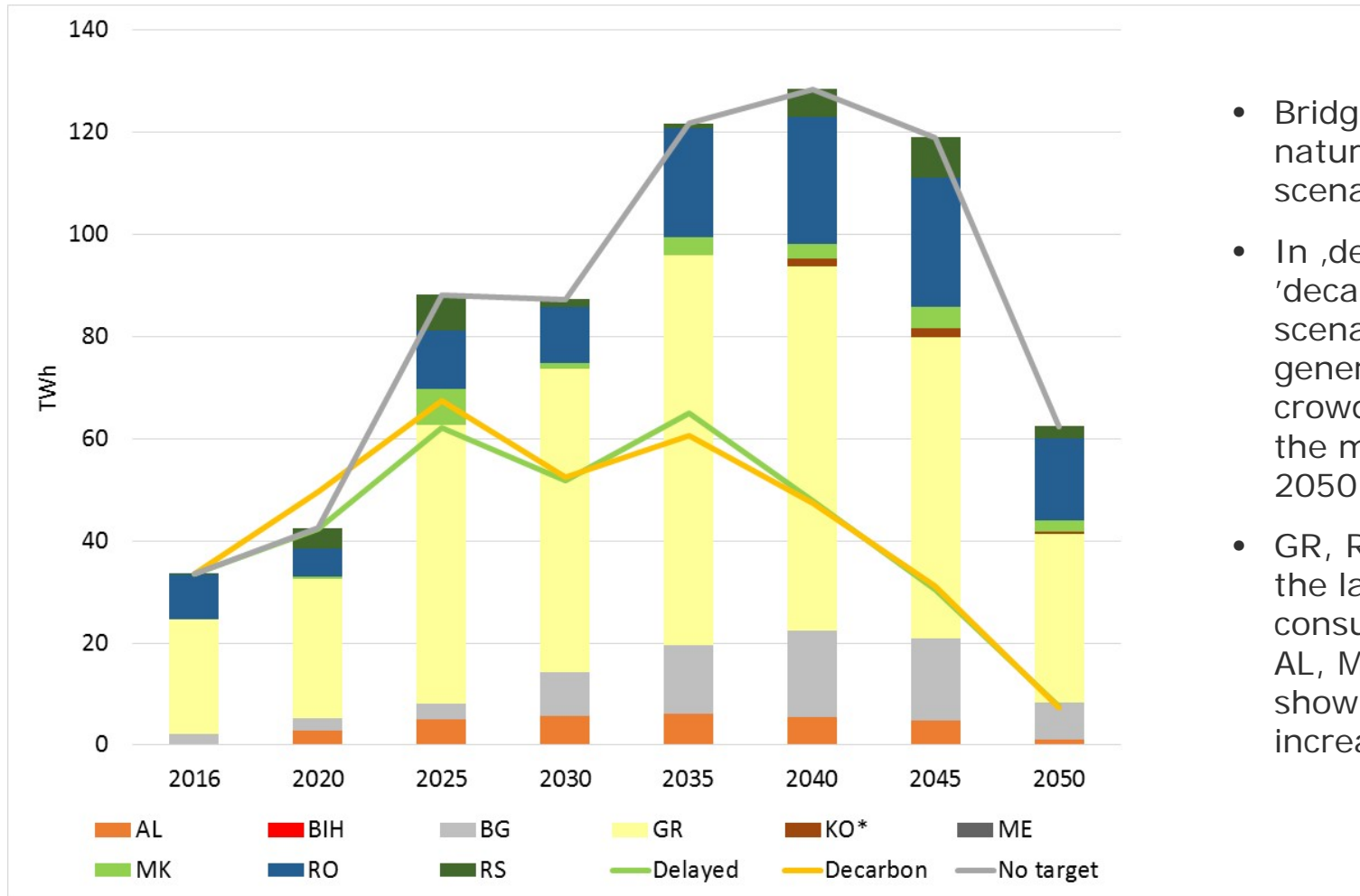
(1) The demand increase will only be used when the projects related to the country are assessed

(2) Demand split for TAP served demand and additional demand due to IAP is needed

# Total gas demand growth for WB6 – as submitted by the Group members



# Natural gas consumption in electricity generation – From a recent H2020 project: SEERMAP



- Bridging role of natural gas in all scenarios
- In 'delayed' and 'decarbonisation' scenario gas based generation is crowded out from the market by 2050
- GR, RO and BG are the large gas consumers. In WB6 AL, MK and RS show the highest increase

## Peak demand

### Daily peak demand in GWh/day

		2016	2020	2025	2030	2035	2040	2045	2050
<b>Albania</b>	AL	0							
<b>Bosnia and Herzegovina</b>	BA	18	23	35	65	75	79	84	89
<b>Georgia</b>	GE	140	156	175	194	214	233	233	233
<b>Kosovo*</b>	KO	0			51	77	82	87	92
<b>Moldova</b>	MD		93						
<b>Montenegro</b>	ME	0							
<b>FYR of Macedonia</b>	MK		23	23					
<b>Serbia</b>	RS	149	165	192	220	220	220	220	220
<b>Ukraine</b>	UA								

Absolutely no data received from Ukraine Peak demand data will be estimated. – used in MCA only

# Infrastructure capacities

Pipeline	From market	To market	Maximum flow GWh/d	Transmission fee		Note	
				Exit €/MWh	Entry €/MWh		
HU-RS	HU	RS	142	1.62	0.99		
RS-BA	RS	BA	14	2.67	0.16		
BG-MK	BG	MK	27	0.90	2.03		
UA-HU	UA	HU	600	6.24	0.97		
HU-UA	HU	UA	183	0.51	2.25	Transmission fee for Georgia and TANAP will be estimated! Regional average tariff will be applied.	
UA-MD	UA	MD	94	4.42	3.47		
UA-PL	UA	PL	136	5.11	1.23		
PL-UA	PL	UA	45	0.91	2.25		
UA-SK	UA	SK	2 288	6.58	0.80		
SK-UA	SK	UA	281	1.11	2.25		
UA-RO	UA	RO	954	5.26	0.73		
RO-MD	RO	MD	1	1.00	1.00		
MD-RO	MD	RO	0	1.00	1.00		?
RU-UA	RU	UA	7 620	0.00	2.25		
RU-GE	RU	GE/ARM	140	?	?		
AZ-GE	AZ	GE	72	?	?	Socar Gas	
AZ-GE	AZ	GE/TR	238	?	?	SCP Gas	
GE-AR	GE	AR	119	?	?		
GE-TR	GE	TR	216	?	?		
Source:	for capacity: GIE, IEA for tariffs: NRA homepages 2017						

# Storage facilities

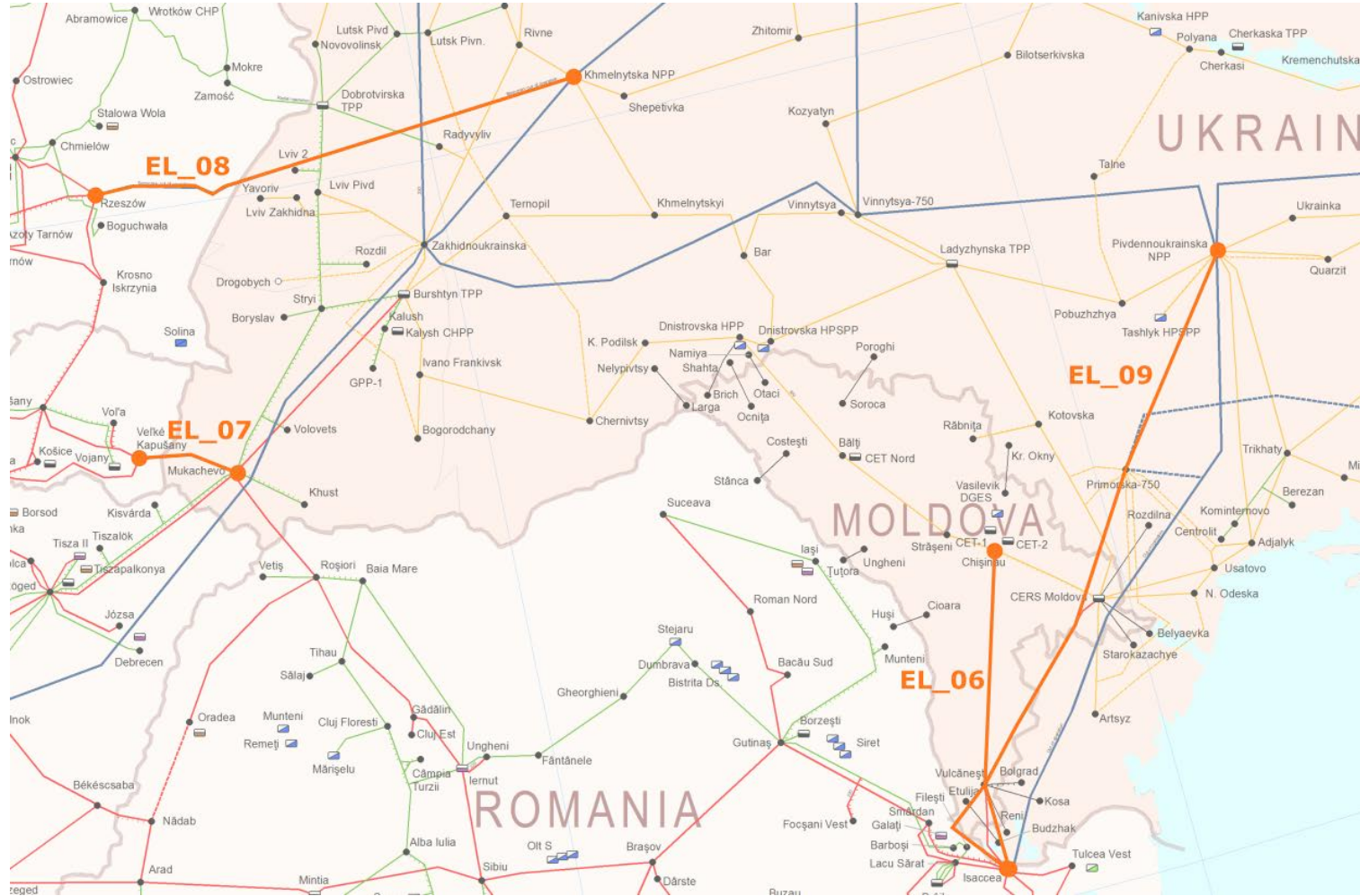
Storage	Market	Working gas	Capacity			Infrastructure fees		
			Injection	With- drawal		Storage fee	Exit from TSO	Entry to TSO from storage
		GWh/d	GWh/d	TWh	€/MWh	€/MWh	€/MWh	
Storage_ RS	RS	5	26	47	1.68	0	0	



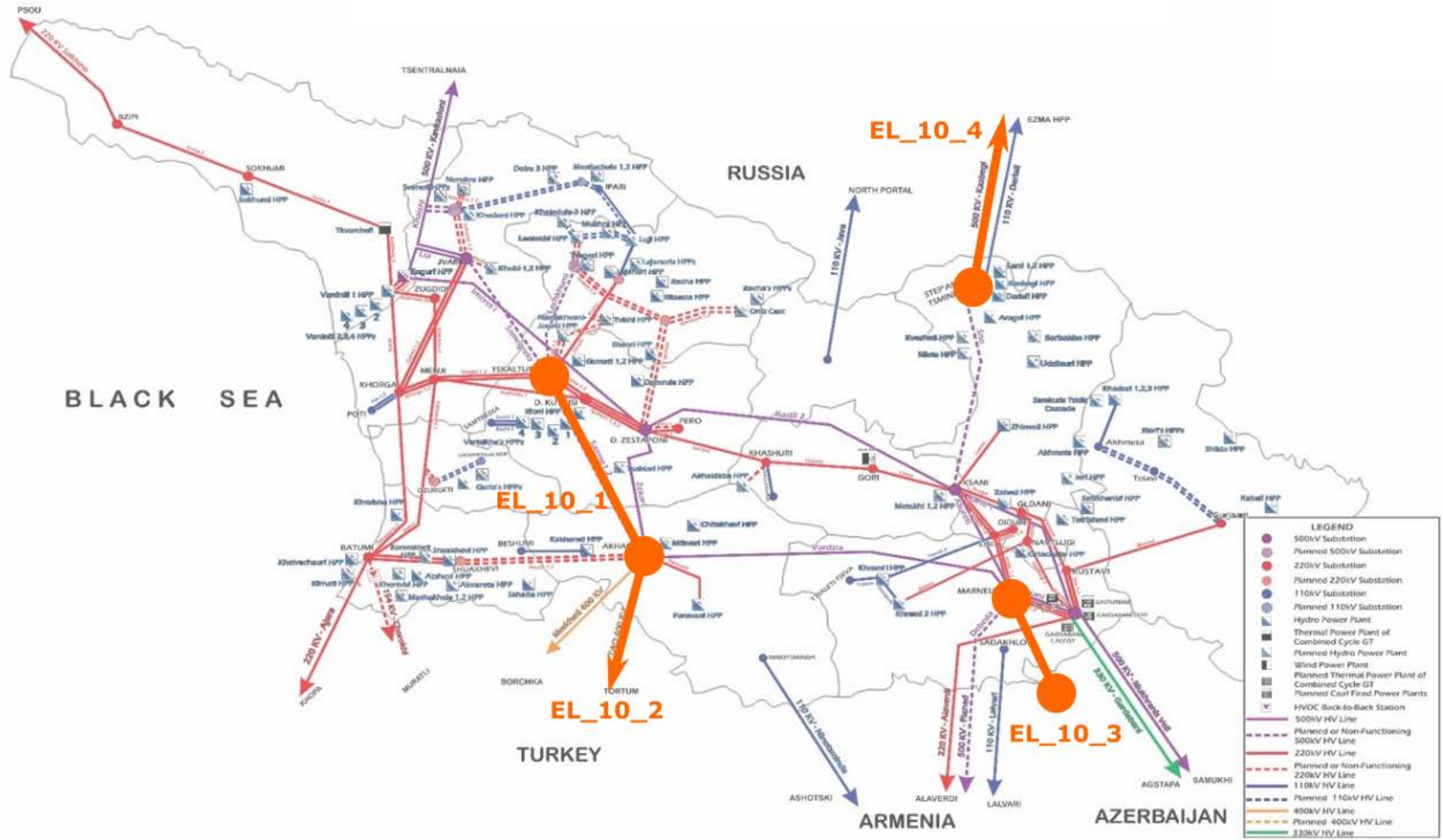
# Electricity projects 1-5, 11



# Electricity projects 6-9



# Electricity projects 10.1-10.4

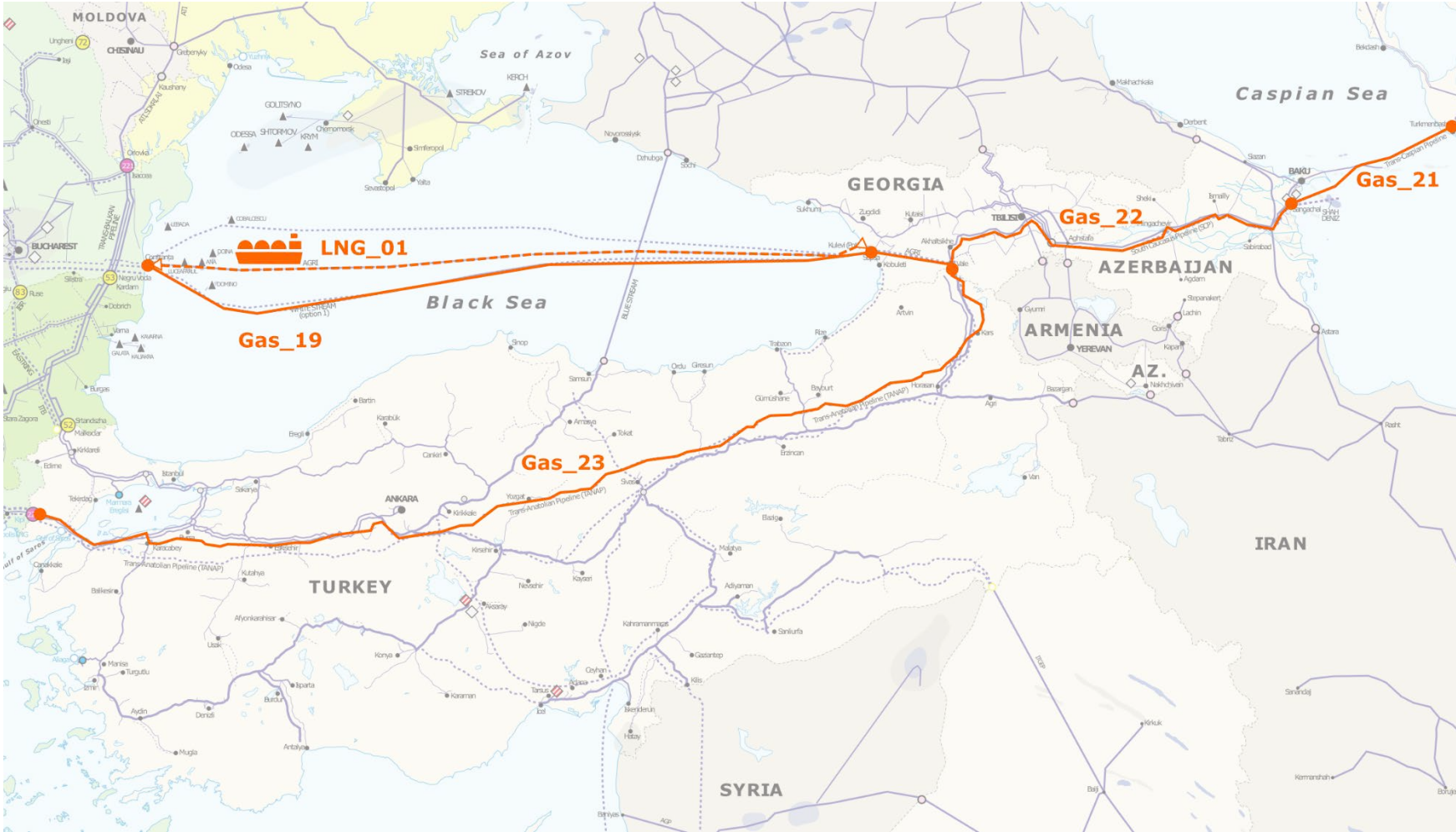




# Natural gas projects (Balcans and Eastern Europe)



# Natural gas projects (Caucasus and Turkey)





# Oil projects



## Summary of submitted projects

	<b>Elec- tricity transmi ssion</b>	<b>Elec- tricity storage</b>	<b>Gas trans- mission</b>	<b>Gas storage</b>	<b>LNG</b>	<b>Smart grid</b>	<b>Oil</b>	<b>Total</b>
<b>Submitted projects<sup>1</sup></b>	11*	0	20	1	1	0	2	35
<b>Submitted investment cost</b>	920	0	16 317	142	6294	0	381	24 054
<b>Future investment need<sup>2</sup></b>	715	0	2 183	142	6294	0	381	9 715

[1] Number of projects that will be evaluated as some projects were merged into one.

[2] Investment cost of projects already under construction is excluded.

## Summary of submitted projects I.

Project code	Project name	Project promoter
GAS_01	Interconnection Pipeline BiH-HR (Slobodnica-Brod-Zenica)	BH-Gas Ltd Sarajevo Gas Producing and Transporting Company
GAS_02	Interconnection Pipeline BiH-HR (Licka Jesenica-Trzac-Bosanska Krupa)	BH-Gas Ltd Sarajevo Gas Producing and Transporting Company
GAS_03	Interconnector BiH-HR (Ploce-Mostar-Sarajevo Zagvozd-Posusje-Travnik)	BH-Gas Ltd Sarajevo Gas Producing and Transporting Company
GAS_04A	Stip - Strumica - Bulgarian border	GA-MA Joint stock company Skopje
GAS_04B	Gas Interconnection Greece-Former Yugoslav Republic of Macedonia (IGF)	MER, DESFA
GAS_08	Gas Interconnector Serbia Romania	Public Enterprise Srbijagas Novi Sad
GAS_09	IBS Bulgarian	Ministry of Energy of the Republic of Bulgaria
GAS_09	IBS Serbian	Ministry of Energy of the Republic of Bulgaria
GAS_10	Gas Interconnector Serbia-Croatia RS Part	Public Enterprise Srbijagas Novi Sad
GAS_10	Gas Interconnector Serbia-Croatia HR Part	Plinacro, limited liability company for natural gas transmission
GAS_11	Gas Interconnector Serbia Macedonia - Section on the Serbian territory	Public Enterprise Srbijagas Novi Sad
GAS_12	Gas Interconnector Serbia Montenegro (incl. Kosovo) - Section Niš (Doljevac) - Priština	Public Enterprise Srbijagas Novi Sad



## Summary of submitted projects II.

Project code	Project name	Project promoter
GAS_13	Albania Kosovo Gas Pipeline (ALKOGAP)	Ministry of Infrastructure and Energy of Albania
GAS_14	Gas interconnection Poland - Ukraine	GAZ-SYSTEM
GAS_15	Firm capacities from HU to UA	PJSC UKRTRANSGAZ
GAS_16	IONIAN ADRIATIC PIPELINE (IAP)	Plinacro d.o.o.
GAS_18	NTS RO-MD	SNTGN TRANSGAZ SA Ministry of Economy and Infrastructure of Republic of Moldova
GAS_19	White Stream	White Stream Ltd
GAS_20	Trans-Balkan Bi-directional Flow	PJSC UKRTRANSGAZ
GAS_21	TCP	W-STREAM CASPIAN PIPELINE COMPANY LIMITED
GAS_22	„(Future) Expansion of the South-Caucasus Pipeline" (SCP-(F)X)	Socar Midstream Operations Ltd.
GAS_23	TANAP	State Oil Company of the Republic of Azerbaijan (SOCAR)
GAS_ST_01	Underground Natural Gas Storage in Dumrea Area (UGS Dumrea)	Ministry of Infrastructure and Energy of Albania
LNG_01	AGRI LNG	AGRI LNG Project Company SRL - Romania

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## General criteria of project eligibility

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Article 4 of the Adapted regulation defines the criteria for projects of Energy Community interest as follows:

- (a) the project falls in at least one of the energy **infrastructure categories and area** as described in Annex I of the Adapted regulation;
- (b) the potential overall **benefits of the project**, assessed according to the respective specific criteria in paragraph 2, **outweigh its costs**, including in the longer term; and
- (c) the project meets any of the following criteria:
  - (i) involves at least two Contracting Parties or a Contracting Party and a Member State by **directly crossing the border** of two or more Contracting Parties, or of one Contracting Party and one or more Member States,
  - (ii) is located on the territory of one Contracting Party and has a **significant cross-border impact** as set out in Annex III.1 of the Adapted regulation.

Projects of common interest should also be a part of the **latest available ENTSOG 10-year network development plan**, with the exception of those located in a Contracting Party where the TSO of which is not a member of ENTSOG. For those, the relevant projects shall be part of the national TYNDPs.

## General criteria of project eligibility – 2.

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### Natural gas infrastructure categories:

- transmission pipelines for the transport of natural gas and bio gas that form part of a network which mainly contains high-pressure pipelines, excluding high-pressure pipelines used for upstream or local distribution of natural gas;
- underground storage facilities connected to the above-mentioned high-pressure gas pipelines;
- reception, storage and regasification or decompression facilities for liquefied natural gas (LNG) or compressed natural gas (CNG);
- any equipment or installation essential for the system to operate safely, securely and efficiently or to enable bi-directional capacity, including compressor stations.

### Significant cross-border impacts:

- project involves investment in reverse flow capacities or changes transmission capacities with over 10% across the borders of the CPs and/or MSs concerned
- In case of **gas storage or LNG**, significant cross border impacts occur if the project aims at supplying directly or indirectly at least two CPs, and/or one or more MSs

## Eligibility of gas projects I.

CODE	NAME	From country to country	Crossing border of two CPs + MSs	Type of infrastructure	Infrastructure category	Reverse flow (RF) or capacity increase over 10% (CI)	TYNDP/N NDP	Candidate for (PCI/PECI -PMI /none of the above)
GAS_01	Interconnection Pipeline BiH-HR (Slobodnica-Brod-Zenica)	HR-BA	Yes	New interconnector	gas transmission system	CI	BiH Part: TRA-N-224 / CRO Part: TRA-N-066	PMI
GAS_02	Interconnection Pipeline BiH-HR (Licka Jesenica-Trzac-Bosanska Krupa)	HR-BA	Yes	New interconnector	gas transmission system	CI-one	BiH Part: TRA-N-910; CRO Part: TRA-N-303	PMI
GAS_03	Interconnector BiH-HR (Ploce-Mostar-Sarajevo Zagvozd-Posusje-Travnik)	HR-BA	Yes	New interconnector	gas transmission system	CI	BiH Part: TRA-N-851; HR Part: TRA-N-302	PMI
GAS_04A	Stip - Strumica - Bulgarian border	BG-MK	No	New interconnector, Existing pipeline extension, Reverse flow possibility on existing pipeline	gas transmission system	CI	The BG TYNDP explicitly denies the need for any BG-MK project	Currently not eligible

## Eligibility of gas projects II.

CODE	NAME	From country to country	Crossing border of two CPs + MSs	Type of infrastructure	Infrastructure category	Reverse flow (RF) or capacity increase over 10% (CI)	TYNDP/NNDP	Candidate for (PCI/PECI -PMI /none of the above)
<b>GAS_04 B</b>	Gas Interconnection Greece-Former Yugoslav Republic of Macedonia (IGF)	GR-MK	Yes	New interconnector	gas transmission system	CI	TRA-N-980 and TRA-N-967	PMI
<b>GAS_08</b>	Gas Interconnector Serbia Romania	RS-RO	No	New interconnector	gas transmission system	CI	Not part of the Romanian TYNDP	PMI
<b>GAS_09</b>	IBS Bulgarian	BG-RS	Yes	New interconnector	gas transmission system	CI	TRA-F-137	PECI
<b>GAS_09</b>	IBS Serbian	RS-BG	Yes	New interconnector	gas transmission system		TRA-F-137	

## Eligibility of gas projects III.

CODE	NAME	From country to country	Crossing border of two CPs + MSs	Type of infrastructure	Infrastructure category	Reverse flow (RF) or capacity increase over 10% (CI)	TYNDP/N NDP	Candidate for (PCI/PECI - PMI /none of the above)
GAS_10	Gas Interconnector Serbia-Croatia RS Part	RS-RS	Yes	New interconnector	gas transmission system	CI	TRA-F-070	PMI
GAS_10	Gas Interconnector Serbia-Croatia HR Part	HR-RS	Yes	New interconnector	gas transmission system		TRA-F-070	
GAS_11	Gas Interconnector Serbia Macedonia - Section on the Serbian territory	RS-MK	No	New interconnector	gas transmission system	CI	TRA-N-965 (FYROM part) FYROM section missing	Currently not eligible
GAS_12	Gas Interconnector Serbia Montenegro (incl. Kosovo) - Section Niš (Doljevac) - Priština	RS-KO*	Yes	New interconnector	gas transmission system	CI	Kosovo TYNDP? Or a letter of consent	PECI, further clarification required

## Eligibility of gas projects IV.

CODE	NAME	From country to country	Crossing border of two CPs + MSs	Type of infrastructure	Infrastructure category	Reverse flow (RF) or capacity increase over 10% (CI)	TYNDP/NNDP	Candidate for (PCI/PECI-PMI/none of the above)
GAS_13	Albania Kosovo Gas Pipeline (ALKOGAP)	AL-KO	Yes	New interconnector, New compressor station, Internal pipeline	gas transmission system	CI	TRA-F-1028	PECI
GAS_14	Gas interconnection Poland - Ukraine	PL-UA	Yes	New interconnector; Existing pipeline extension; New compressor station; Internal pipeline	gas transmission system	RF	PL part: TRA-N-621, UA part: TRA-N-561	PMI
GAS_15	Firm capacities from HU to UA	HU-UA	Yes	Reverse flow possibility on existing pipeline	gas transmission system	RF	HU part: TRA-N-586, UA part: TRA-N-645	PMI
GAS_16	IONIAN ADRIATIC PIPELINE (IAP)	AL-HR	Yes	New interconnector	gas transmission system	CI	TRA-N-068	PMI



## Eligibility of gas projects V.

CODE	NAME	From country to country	Crossing border of two CPs + MSs	Type of infrastructure	Infrastructure category	Reverse flow (RF) or capacity increase over 10% (CI)	TYNDP/NNDP	Candidate for (PCI/PECI-PMI /none of the above)
GAS_18	NTS RO-MD	RO-RO	Yes	New interconnector	gas transmission system	CI-one	TRA-N-357	PMI
		MD-MD	Yes	Existing pipeline extension, Internal pipeline	gas transmission system	CI	RO claims one directional, MD bidirectional	PECI, further clarification required
GAS_19	White Stream	GE-RO	Yes	New interconnector	gas transmission system	CI-one	TRA-N-053; Group Fiche SGC 08	PMI
GAS_20	Trans-Balkan Bi-directional Flow	RO-UA	Yes	Reverse flow possibility on existing pipeline	gas transmission system	RF	joint submission but we could not find TYNDP reference	PECI, further clarification required
GAS_21	TCP	TM-AZ	Yes	New interconnector	gas transmission system	CI-one	TRA-N-339	PECI

## Eligibility of gas projects VI.

CODE	NAME	From country to country	Crossing border of two CPs + MSs	Type of infrastructure	Infrastructure category	Reverse flow (RF) or capacity increase over 10% (CI)	TYNDP/NNDP	Candidate for (PCI/PECI-PMI /none of the above)
GAS_22	„(Future) Expansion of the South-Caucasus Pipeline“ (SCP-(F)X)	AZ-GR-TR	Yes	New interconnector; Existing pipeline extension; New compressor station	gas transmission system	CI-one	TRA-F-395 (in the questionnaire) TRA-N-1138 (in ENTSOG-TYNDP)	PECI
GAS_23	TANAP	TR/GE-TR/GR	Yes	New interconnector	gas transmission system	CI-one	TRA-F-221	PECI
GAS_ST_01	Underground Natural Gas Storage in Dumrea Area (UGS Dumrea)	AL-AL	No	Salt cavern, depleted storage	underground storage facility	not applicable	new project	PECI
LNG_01	AGRI LNG	GE-RO-AZ	Yes	LNG terminal	gas transmission system	not applicable	TRA-N-276	PMI

## Comments on the eligibility of gas projects

The projects that are **submitted only up to the border** of a country can not be considered cross-border projects, as long as they are not connected to the neighboring countries' grid. This problem is mostly related to the projects submitted by Serbia and to FYR of Macedonia.

- The **Macedonian and Bulgarian interconnector (GAS\_04A)**. The Bulgarian part is explicitly not required by the Bulgarian TYNDP: „this Plan does not consider a need of additional capacity to this country (Macedonia), nor development of any interconnection with it” (TYNDP Bulgaria16 p.26 para 2.4)
- The **Serbian-Macedonian interconnector (GAS\_11)** was not submitted by the Macedonian party – we need information and at least on the connection point to the Macedonian system, pipeline length and diameter and cost information and planned commissioning date, however a joint submission would be the best solution.
- **Gas Interconnector Serbia Montenegro** (incl. Kosovo\*) - Section Niš (Doljevac) – Priština (**GAS\_12**) is submitted for part of the route by a single promoter. The project does not reach Montenegro. Name is misleading or not correct. The project is not part of any strategic document of Kosovo\* and/or Montenegro, so we need a letter of consent from Kosovo\* and Montenegro (?).

**GAS 04A and GAS\_11 can not be assessed and proceed to the CBA assessment as long as data are missing.**

**GAS\_12 could be analyzed, under the condition that technical and name issues and letter of consent are available.**

## Eligibility criteria – Oil

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- The general criteria presented for Gas projects apply for Oil projects as well (Article 4, a), b), c)).
  - The infrastructure categories described in Annex I are the following:
    - pipelines used to transport crude oil;
    - pumping stations and storage facilities necessary for the operation of crude oil pipelines;
    - any equipment or installation essential for the system in question to operate properly, securely and efficiently, including protection, monitoring and control systems and reverse-flow devices

## Eligibility criteria – Oil

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- The following specific criteria are included in the eligibility check process:
  - Is the submitted project included on former PCI and PECl/PMI lists?
  - The project shall contribute to all of the following criteria:
    - security of supply
    - environmental risk mitigation
    - interoperability

## Eligibility of oil projects – general criteria

	Name of the project	Infrastructure	CPs and MSs included	Costs and benefits
OIL_01	Brody-Adamovo oil pipeline project	pipeline (396 km), pump stations (1 main, 29 block valve)  Eligible	Ukraine and Poland  Eligible	Eligible
OIL_02	Transportation of different crudes of oil via Southern Druzhba pipeline	pipeline extension (1 446 km) storage facility (50 000 m <sup>3</sup> )  Eligible	Georgia, Ukraine, Hungary (later stage: Austria, Czech Republic, Slovakia) Eligible	Eligible

## Eligibility of oil projects – specific criteria

	PCI status	Security of supply	Environmental risk mitigation	Interoperability
OIL_01	<p>Yes, PCI 9.1 in 2015</p> <p>Eligible for PECl status</p>	<p>The project contributes to security of supply by reducing single supply source dependency</p> <p>Eligible</p>	<p>The project contributes to protecting the natural environment and health</p> <p>Eligible</p>	<p>The project will enhance the interoperability of the European oil transportation system</p> <p>Eligible</p>
OIL_02	<p>No</p> <p>As including an MSs, eligible to PMI status only</p>	<p>The project contributes to security of supply by reducing single supply source dependency</p> <p>Eligible</p>	<p>The project contributes to protecting the natural environment and health</p> <p>Eligible</p>	<p>The project will help to enhance the interoperability of the European oil transportation system</p> <p>Eligible</p>

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## Project data verification and clarification

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- Technical data verification is checking whether the project proposed is **connecting to the existing network** and whether **all parts** of the investment **were submitted**. In case of missing parts or uncertainty of interdependency of submitted projects further clarification is asked from project promoters.
- **Cost data verification** is based on **ACER (2015) investment cost** Report8 figures. The benchmark unit costs are applied to the submitted projects technical data.
- Furthermore, **matching projects, complementarities** and competitive potentials between the proposed projects, as well as **project clusters** are identified. The submitted project data is then further verified to achieve a complete set of the necessary project data, which will serve as a basis for the project assessment.

## Cost verification

- Submitted costs were compared to ACER (2015) investment benchmarking cost figures. All prices are indexed to 2016 to be comparable to the submitted values
- All compressor stations were new investments, their investment unit costs were the following, dependent on the calculation method:
  - Average: 2.1 m€/MW
  - Median: 2.0 m€/MW
- Unit investment costs of pipelines per km:

Diameter categories	<16"	16-27"	28-35"	36-47"	48-57"
Average cost, 2005-14 €	527 511	707 235	1 063 992	1 463 314	2 432 732
Median cost, 2005-14 €	449 937	637 851	1 017 354	1 384 805	2 357 408

Source: ACER: Report On Unit Investment Cost Indicators And Corresponding Reference Values For Electricity And Gas Infrastructure: Gas Infrastructure (Publishing date: 23/07/2015)

## Cost verification for natural gas transmission projects I.

CODE	NAME	Total CAPEX m€ (estimated indexed price 2016)		TOTAL CAPEX m€, real 2016 prices	Differenc e AVERAGE prices	Differenc e, MEDIAN prices	Note
		MEDIAN 2005- 2014	AVERAGE 2005- 2014				
GAS_01	Interconnection Pipeline BiH-HR (Slobodnica-Brod- Zenica)	93	103	94	-8%	7%	OK
GAS_02	Interconnection Pipeline BiH-HR (Licka Jesenica- Trzac-Bosanska Krupa)	62	70	49	-30%	-21%	OK
GAS_03	Interconnector BiH-HR (Ploce-Mostar-Sarajevo Zagvozd-Posusje-Travnik)	119	132	116	-12%	-3%	OK
GAS_04A	Stip - Strumica - Bulgarian border	54	59	40	-33%	-25%	<b>Bulgarian part is missing</b>
GAS_04B	Gas Interconnection Greece-Former Yugoslav Republic of Macedonia (IGF)	106	117	120	2%	13%	OK
GAS_08	Gas Interconnector Serbia Romania	62	69	55	-21%	-12%	OK

## Cost verification for natural gas transmission projects II.

CODE	NAME	Total CAPEX m€ (estimated indexed price 2016)		TOTAL CAPEX m€, real 2016 prices	Differenc e AVERAGE prices	Differen ce, MEDIAN prices	Note
		MEDIAN 2005- 2014	AVERAGE 2005- 2014				
GAS_09	IBS Bulgarian	40	44	66	49%	66%	Slightly above the range
GAS_09	IBS Serbian	70	77	54	-31%	-23%	OK
GAS_10	Gas Interconnector Serbia-Croatia RS Part	61	67	60	-11%	-1%	OK
GAS_10	Gas Interconnector Serbia-Croatia HR Part	104	109	87	-20%	-16%	OK
GAS_11	Gas Interconnector Serbia Macedonia - Section on the Serbian territory	19	22	9	-62%	-55%	<b>Macedoni an part is missing</b>
GAS_12	Gas Interconnector Serbia Montenegro (incl. Kosovo) - Section Niš (Doljevac) - Priština	73	81	160	98%	120%	<b>Very much above the range, section to Monteneg ro missing</b>

## Cost verification for natural gas transmission projects III.

CODE	NAME	Total CAPEX m€ (estimated indexed price 2016)		TOTAL CAPEX m€, real 2016 prices	Differenc e AVERAGE prices	Differenc e, MEDIAN prices	Note
		MEDIAN 2005- 2014	AVERAGE 2005- 2014				
GAS_13	Albania Kosovo Gas Pipeline (ALKOGAP)	277	308	200	-35%	-28%	OK
GAS_14	Gas interconnection Poland - Ukraine	247	262	241	-8%	-2%	OK
GAS_15	Firm capacities from HU to UA	20	21	41	92%	99%	Cost doubled from 2015
GAS_16	IONIAN ADRIATIC PIPELINE (IAP)	523	546	583	7%	12%	OK
GAS_18	NTS RO-MD	277	302	242	-20%	-13%	OK

## Cost verification for natural gas transmission projects IV.

CODE	NAME	Total CAPEX m€ (estimated indexed price 2016)		TOTAL CAPEX m€, real 2016 prices	Differenc e AVERAGE prices	Differenc e, MEDIAN prices	Note
		MEDIAN 2005- 2014	AVERAGE 2005- 2014				
GAS_19	White Stream	1439	1501	4105	84%	76%	OK
GAS_20	Trans-Balkan Bi-directional Flow			15			<b>Could not be verified due to missing technical and cost data</b>
GAS_21	Trans Caspian Pipeline	1322	1375	1580	15%	19%	OK
GAS_22	„(Future) Expansion of the South-Caucasus Pipeline" (SCP-(F)X)	1309	1370	4205	207%	221%	<b>Very much above the range</b>
GAS_23	TANAP	3919	4061	4195	3%	7%	OK

# Cost verification for gas storage and LNG projects

- In case of the Dumrea storage interquartile range was estimated, the first alternative (salt cavern type) fits into the range, but the second (depleted storage) is very much below the estimated range
- In case of AGRI LNG terminal technical data for the liquefaction terminal was missing so the estimated prices are significantly lower than the submitted costs

	Withdrawal capacity (mcm/day)	Interquartile range unit cost € million		Interquartile range € million		Submitted CAPEX € million
		25%	75%	25%	75%	
<b>Alternative 1</b>	300	0.2	0.5	60	150	69
<b>Alternative 2</b>	1 200	0.2	0.5	241	601	74

	Total CAPEX m€ (estimated indexed price 2016)		Submitted Total CAPEX € million, 2016
	AVERAGE 2005-2014	MEDIAN 2005-2014	
<b>AGRI LNG</b>	3101	1783	6294

## Data for modelling – transmission I.

Project code (Country A-B)	Total cost (M€)	Commission date	Capacity from A to B (GWh/day)	Capacity from B to A (GWh/day)
GAS_01 (BiH-HR North)	94	2023	44	44
GAS_02 (BiH-HR West)	49	2026	0	73
GAS_03 (BiH-HR South)	116	2023	38	75
GAS_04A (Macedonia-Bulgaria)	40	2020	25	25
GAS_04B (Macedonia-Greece)	120	2020	76	76
GAS_08 (Serbia-Romania)	55	2020	35	35
GAS_09 (Bulgaria-Serbia)	119	2022	39	39
GAS_10 (Serbia-Croatia)	147	2026	33	33
GAS_11 (Serbia- Macedonia)	9	2021	10	10
GAS_12 (Serbia-Kosovo*)	160	2026	26	26
GAS_13 (Kosovo* -Albania) <sup>1</sup>	200	2022	53	53
GAS_14 (Poland- Ukraine)	241	2020	153	2015
GAS_15 (Hungary-Ukraine)	41	?	180	0 (existing)

<sup>[1]</sup> According to the submission, capacity is in the 47.8–63.7 GWh/day range. 53 GWh/day was used in PECI2.



## Data for modelling – transmission II.

Project code (Country A-B)	Total cost (M€)	Commission date	Capacity from A to B (GWh/day)	Capacity from B to A (GWh/day)
GAS_16 (IAP, Albania-Montenegro)	583	2023	120	120
GAS_16 (IAP, Montenegro-Croatia)			110	110
GAS_18 (Romania-Moldova)	242	2019	43	43
GAS_19 (WS, Georgia-Romania)	4105	2022	490	0
GAS_20 (TBP, Romania-Ukraine)	14 (P1)	2019 (P1) 2021 (P2) 2024 (P3)	43 (P1) 143 (P2) 574 (P3)	0 (existing)
GAS_20 (TBP, Ukraine-Moldova)				
GAS_20 (TBP, Moldova-Ukraine)			43 (P1) 143 (P2) 574 (P3)	0 (existing)
GAS_21 (TCP, Turkmenistan-Azerbaijan)	730 (P1) 830 (P2)	2020 (P1) 2022 (P2)	490 (P1) 980 (P2)	0
GAS_22 (SCP, Azerbaijan-Georgia)	4205	2022	855	0
GAS_23 (TANAP, Georgia-Turkey)	4195	2018	485	0
GAS_23 (TANAP, Turkey-Greece)			317	0

## Data for modelling gas storage and LNG

Project	Total cost (M€)	Commission date	Working gas (TWh)	Withdrawal capacity (mcm/day)	Injection capacity (GWh/d)
UGS Dumrea Alternative 1	69	2024	3	15	Missing data
UGS Dumrea Alternative 2	74		11	70	Missing data

Project	Total cost (M€)	Commission date	Maximum annual capacity (TWh/year)	Maximum sendout capacity (GWh/day)	Storage capacity (GWh)
AGRI LNG	6 294	2030	88	240	3500

# Verification of oil projects

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- Technological and geographical cross check
  - OIL\_01: clear, submitted as for the PCI selection
  - OIL\_02: not perfectly clear whether the project holds without the investments planned in the EU countries (eg. HU., Sk..)
- Cost verification
  - OIL\_01: clear, submitted as for the PCI selection
  - OIL\_02: As the project is utilizing existing pipelines, it justifies the very low investment cost needs.

Question: OIL\_01 claims not to be dependent on anything, but OIL\_02 claims that OIL\_01 is dependent on OIL\_02

Logical incoherence around reverse flow development need in Odessa.

## Interdependencies between projects (based on the submissions)

CODE	NAME	Other projects are depending on that projects	The project is depending on other projects
GAS_08	Gas Interconnector Serbia Romania	No	BRUA
GAS_13	Albania Kosovo Gas Pipeline (ALKOGAP)	No	GAS_16 (IAP) (TAP)
GAS_16	IONIAN ADRIATIC PIPELINE (IAP)	Gasification in the region (Albania, Montenegro, southern Croatia and southern Bosnia and Herzegovina) (?)	(TAP)
GAS_19	White Stream	GAS_21 (TCP2)	GAS_21 (TCP2) GAS_22 (SCP-X/FX)
GAS_20	Trans-Balkan Bi-directional Flow	No	(GR-BG-RO sections)
GAS_21	Trans Caspian Pipeline	TCP1: GAS_22 (SCP-X/FX) GAS_23 (TANAP) (TAP) TCP2: GAS_19 (WS)	TCP1: GAS_21 (TCP2) TCP2: GAS_22 (SCP-X/FX)
GAS_22	„(Future) Expansion of the South-Caucasus Pipeline" (SCP-(F)X)	GAS_22 (SCP-X/FX) GAS_23 (TANAP) (TAP)	GAS_22 (SCP-X/FX) GAS_23 (TANAP) (TAP)
GAS_23	TANAP	GAS_22 (SCP-X/FX)	GAS_22 (SCP-X/FX)
LNG_01	AGRI LNG	No	(New NTS developments for taking over gas from the Black Sea shore)

Missing data: GAS\_11 (RS-MK)

## Clustering projects for assessment

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- Does GAS\_03 (Croatian-Bosnian) needs to be analysed with IAP?
- Southern route:
  - SCP-FX will be analysed as a standalone project
  - TCP will be analysed only together with SCP-FX due to existing LTCs (Capacity constraint)
  - White stream is clustered with SCP-FX / SCP-FX + TCP (Capacity and supply constraint)
  - AGRI is clustered with SCP-FX / SCP-FX + TCP (Capacity and supply constraint)
- TANAP will be part of the reference, hence it will be analysed TOOT
- Reverse flow on Trans-Balkan shall be modelled allowing reverse flow between TR-BG, BG-RO. (cost of these?)

### DEMAND addumptions

- For IAP: demand growth of Albania should be split between TAP and IAP
- For Bosnian demand growth should be separated for Bosnia West project

# Agenda

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1. Summary of country data received
2. Project eligibility for gas and oil projects
3. Project data verification and clarification
4. Finalization of Open Methodological questions
5. Introduction of the gas market modelling reference

## How to model Georgia?

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- **Geographical coverage of EGMM was extended to** allow for the assessment of projects in **Georgia**, as it became member of the Energy Community
  - Modelling will **consider neighboring countries** and other countries affecting the Georgian gas market, such as Turkmenistan and Azerbaijan
  - Turkmen gas is sourced at a cost lower than competing Russian gas
  - Problem of missing tariffs: average Energy Community CP tariffs are assumed

## Modell iteration with the electricity market modell

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- Gas demand adjustment in the electricity sector requires a **sectoral break-down of forecasted demand** for each modelled country
  - Data for the EU-28 will be obtained from **latest Primes**,
  - For EnC Contracting Parties **Project Promoters or Group Members are expected to submit** the sectoral demand (data from Montenegro has already been received)



## Modelling non-gasified markets

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- Modelling welfare gains in countries with **no currently existing gas sector** (Albania, Kosovo\*, Montenegro) is problematic as benefits are highly over-estimated if we use the current methodology outlined by the Regulation
  - The Consortium suggested to **consider the gasification costs** in these countries, project promoters affected could provide the necessary costs for the analysis. Since the benefits are considered on a country level, so the costs also have to be considered on a country level. After careful consideration and since demand would first build up on the transmission line, **we do not insist on additional DSO cost to be included.**
  - Although the consumer welfare change is indeed overestimated, as the new source will not create entirely new demand but will substitute existing fuels, this argument holds true for all other projects and countries as well. As it is beyond the scope of this project to identify how and to what extent other fuel markets are impacted, and no easy rule of thumb could be suggested, **we propose not to reduce the modelled social welfare.**
  - In the final result table in a comment we will draw the attention of decision makers on these shortcomings of the assessment.

## Benefit/cost ratio – indicator of CBA

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- We will calculate both NPV and B/C ratios for the projects, but we will use the B/C ratio in the PINT (Put-in-one-at-time) case for ranking the projects. Justification: NPV favors large projects.
- Both information will be available for the project promoters for their own project.

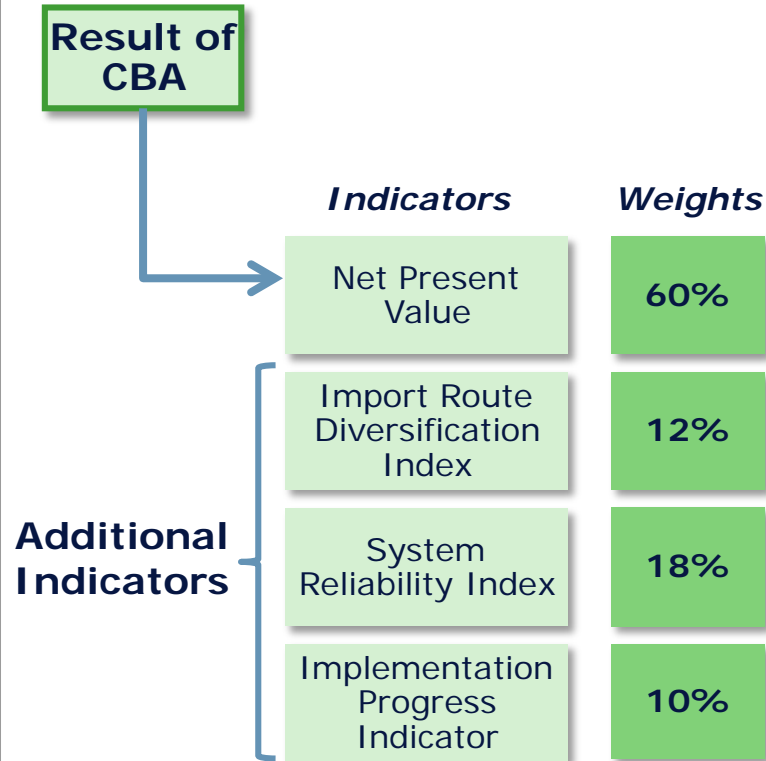
# Modelling SoS

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- Valuation of **SoS** at **5%** is based on the probability of shock scenario of one-in-twenty occurrence.
  - The 5% weight assumes 100% chance of occurrence of one month full Ukrainian disruption within the next 20 years, which is a strong statement and this means that SoS is strongly considered together with the calculated indicator.
- Previously SoS was simulated by cut of Russian supplies through Ukraine for one month in January.
- As the strong dependency of the Energy Community CPs on Russian gas is about to decrease from 2020, as new source is delivered through TAP, the SoS approach needs to be reviewed.
- Consortia suggests that two SoS are simulated:
  - Russian supply cut through Ukraine (all pipelines) in January
  - Azeri source is cut in January

# Overview on Multi-Criteria Assessment Methodology

## Multi-Criteria Assessment



Proposed weights have been used in previous assessment and reflect the following arguments:

- CBA covers 3 key benefits: market integration (price convergence), security of gas supply, and contribution to reduce emissions (CO2 savings)
- Net benefit of a single infrastructure project considering benefits *and* costs is only assessed within CBA, additional indicators consider only additional benefits (not cost)
- Benefits are quantified and monetised within CBA (based on market modelling), additional indicators in MCA evaluated qualitatively
- Impact on competition only indirectly covered in CBA (price convergence), market model assumes perfect competition → IRD as proxy for competition
- CBA incorporates only some aspects of security of supply measured on monthly basis → SRI to account for daily operational flexibility and ability of system to withstand extreme conditions
- IPI to account for uncertainty of projects in consideration phase and to favour projects with clear implementation plan / preparatory activities already started
- Proposed weights provide good balance of above reasoning

# Improved reporting of data

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Improvement of the content and presentation of the CBA Project Fiche, by presenting separately the monetised results, the non-monetised quantitative indicators, and the qualitative assessments, as described in Annex I to this Opinion;

Besides the detailed results of CBA as presented in 2016, Project Promoters will receive a excel sheets on results of modelled corner years (2020, 2030, 2040, 2050).

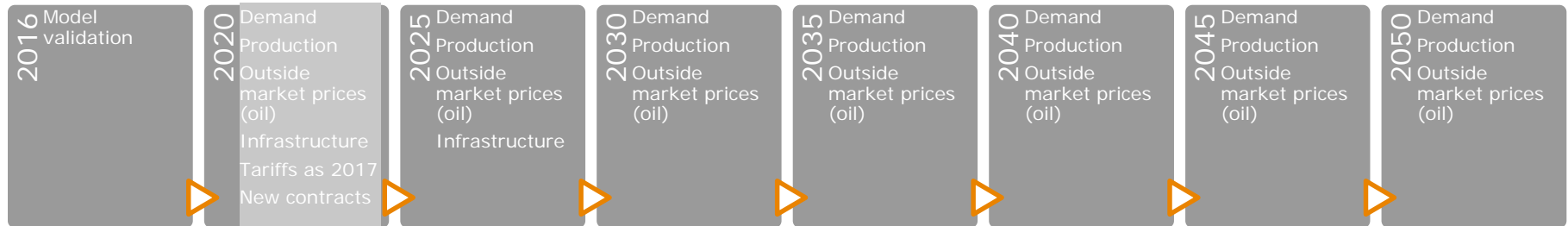
# Agenda

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# Reference building

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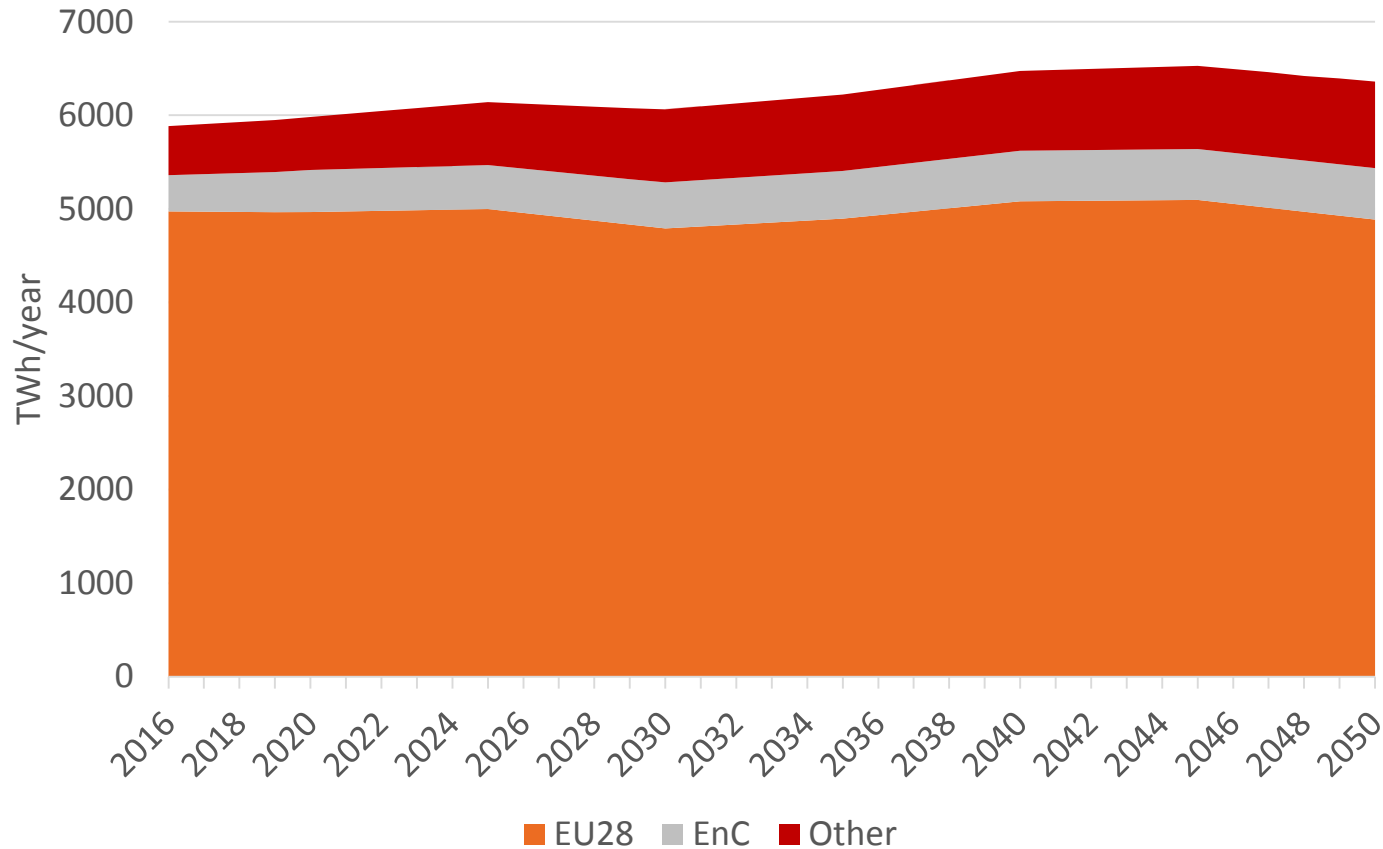


# Input Data Sources for the reference years from 2018

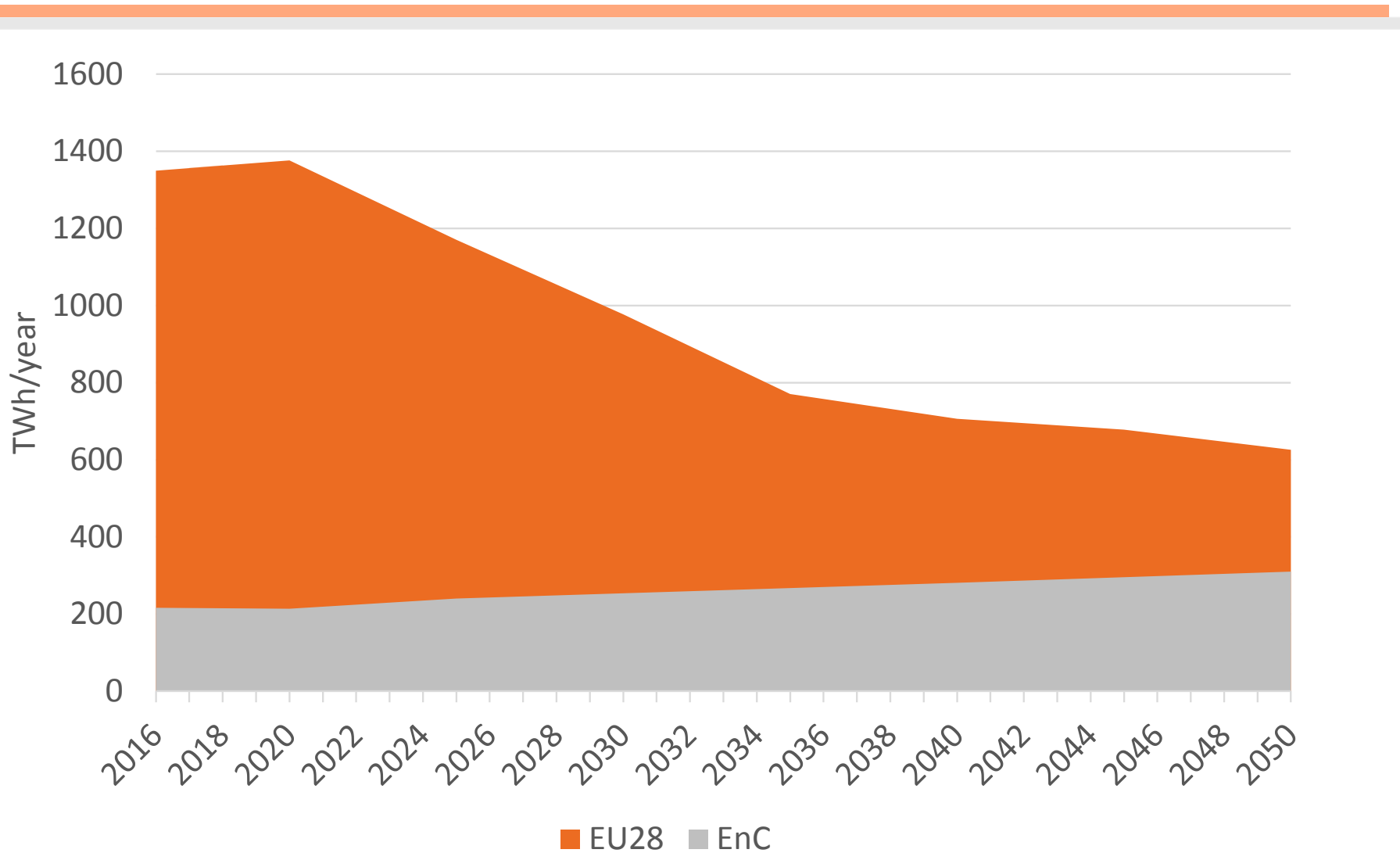
Input data	Unit	Source	Comment
Yearly gas demand	TWh/year	Primes ref 2016	For ENC CPs as collected
Monthly demand	In % of yearly	Eurostat	Based on fact data from 2013-15
Production	TWh/year	Primes ref 2016	For ENC CPs as collected
Pipeline Capacity	GWh/day	ENTSOG capacity map 16	For future projects ENTSOG TYNDP 2017
Pipeline Tariff on IP	€/MWh	REKK calculation; regulators websites as of 2017	Except for UA, where 2020 tariffs are used based on Naftogas data
Storage capacity	Working gas: TWh, Inj.. withdr: GWh/day	GSE	Data on each storage site – than aggregated on a country level
Storage tariff	€/MWh	Storage operators websites 2017 Jan	1 €/MWh cap is used
LNG regas capacity	GWh/day	GIE	Aggregated on a country level
LNG regas tariff	GWh/day	Operators websites	Entry into pipeline network is taken into account
LNG liquefaction	GWh/day	GIIGNL 2016	Source is constrained by liquefaction capacity
LNG transport cost	€/MWh	REKK calculation	Distance based. takes into account ship rates and boil off cost
Long term contracts	ACQ: TWh/year. DCQ: GWh/day	REKK collection from press + Cedigaz	TOP. flexibility. except for gas islands Delivery point on borders. Pricing based on foreign trade statistics. Delivery routes predefined



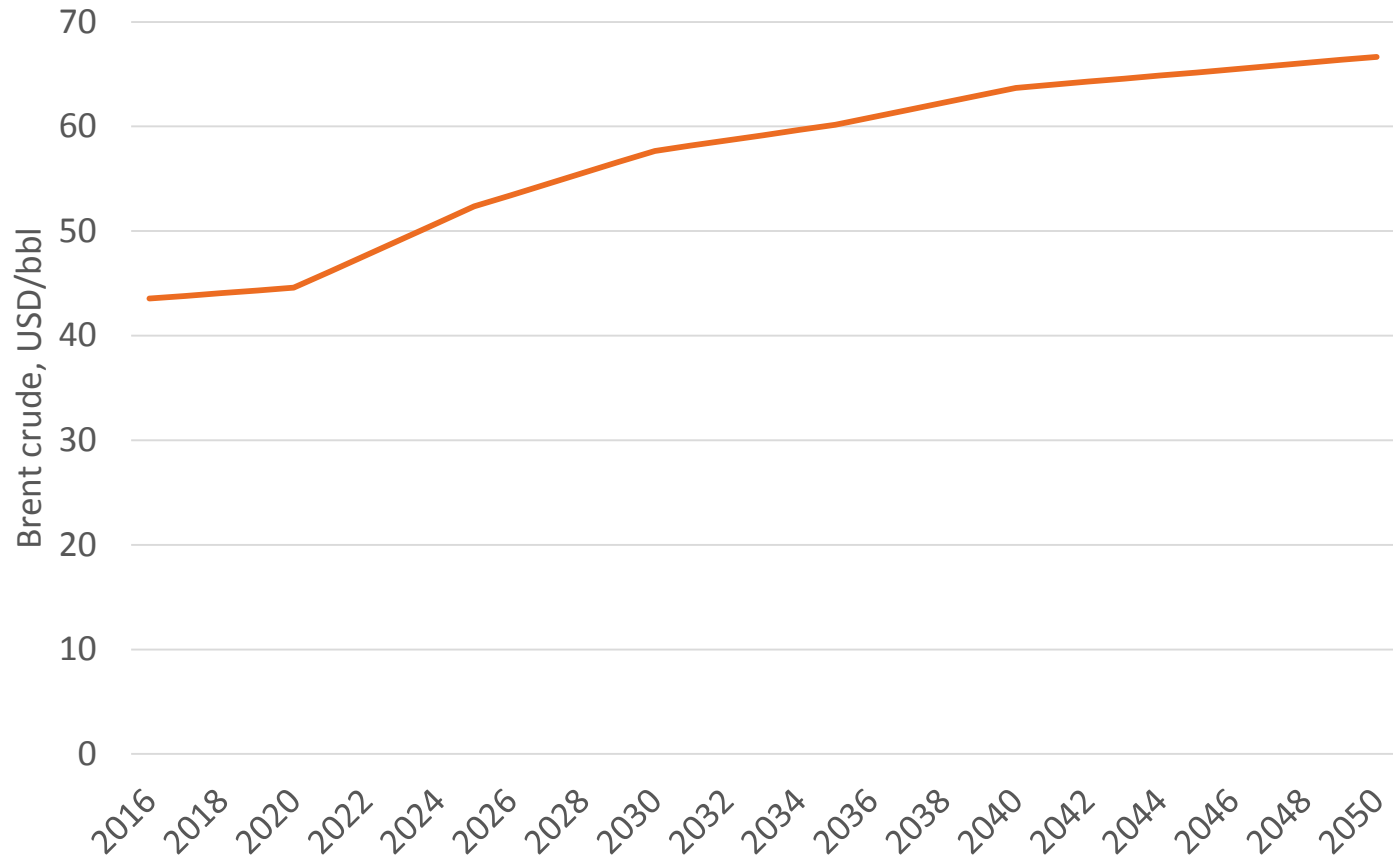
# Demand for the modelled region



# Production



# Oil price



# Infrastructure assumptions

- FID projects of the TYNDP 2017 are part of the reference + Balticconnector, BRUA, TAP, TANAP,
- From 2020 SCP1, TANAP, TAP IGB and Krk LNG are in the reference!
- New LTCs from Azerbaijan 2020: 1 bcm to BG, 1 bcm to GR, 8 bcm to IT – this can not be delivered without further extension of SCP

Transmission	Maximum flow (GWh/d)	Date of commissioning	Basis to include into reference for 2020
IT-CH	368	2018	FID
CH-FR	100	2018	FID
CH-DE	240	2018	FID
TR-GR_TAP	317	2019	FID
GR-MK_TAP	25	2019	FID
GE-TR_TANAP	485	2018	FID
GR-BG	90	2018	FID
GR-IT_TAP	334	2019	FID
GR-AL_TAP	40	2019	FID (source for Albania)
SI-HR	162	2019	FID
HR-SI	162	2019	FID
IT-AT	189	2018	FID
FI-EE	79	2020	FID according to project site
EE-FI	79	2020	FID according to project site

## Storage and LNG facilities

Storage facility	Market	Working gas (TWh)	Capacity Injection (GWh/d)	Withdrawal (GWh/d)	Commissioning
Botas Tarsus	TR	11	319	319	2020
Silivri (Marmara)	TR	46	638	638	2020
Bordolano phase II	IT	7	109	185	2019

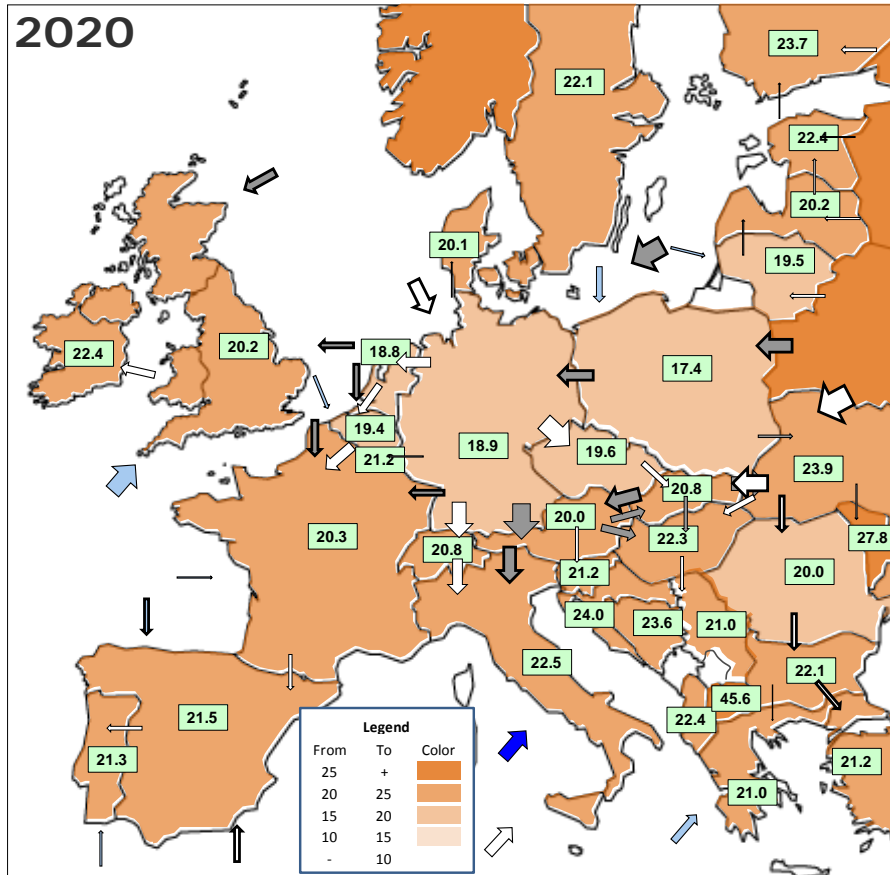
LNG	Maximum flow (GWh/d)	Date of commissioning	Basis to include into reference for 2020
GR-LNG expansion	156	2020	FID
PL_LNGext	67	2020	FID
ES-LNG ext1	192	2020	FID
ES-LNG ext2	256	2026	FID
HR_LNG	108	2020	Under binding OS

## Questions

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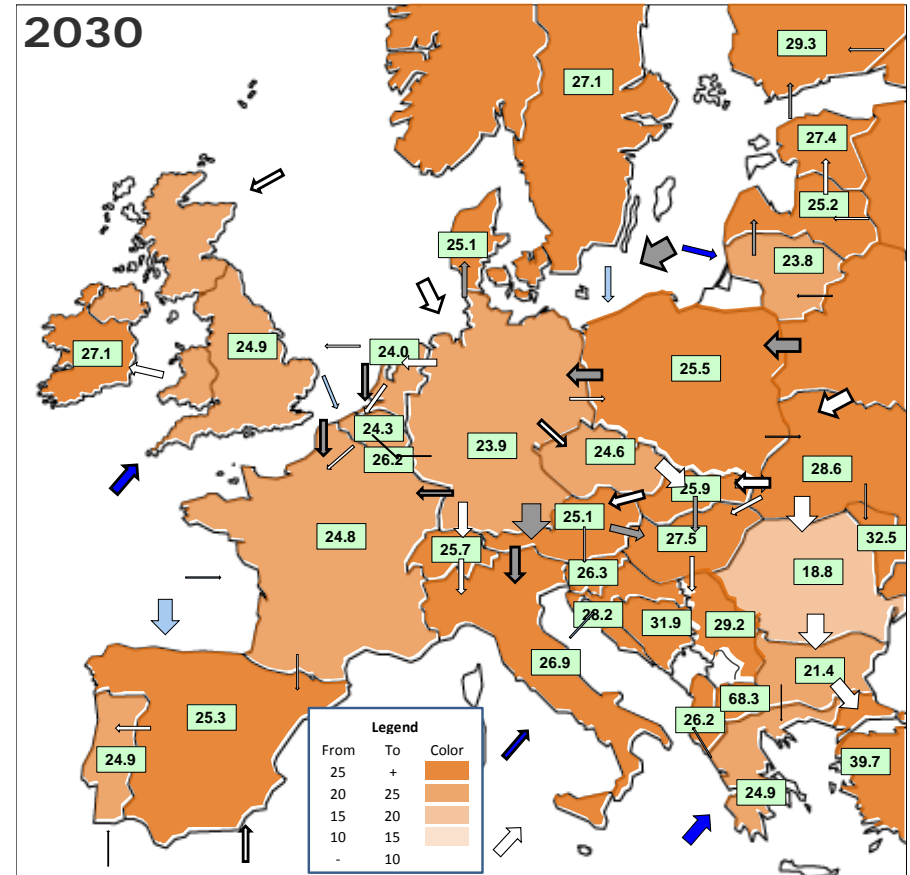
- Georgian supply mix: 12.4 TWh long term Contract from AZ, domestic production 0.23 TWh/yr. Demand in 2020 29.6 TWh/yr. Source?
- Bulgarian supply mix in 2020: 1 bcm/yr from Azerbaijan, BG overcontracted!!!

# Modelled wholesale gas price for 2020, 2030 €/MWh



EU28: 20 €/MWh

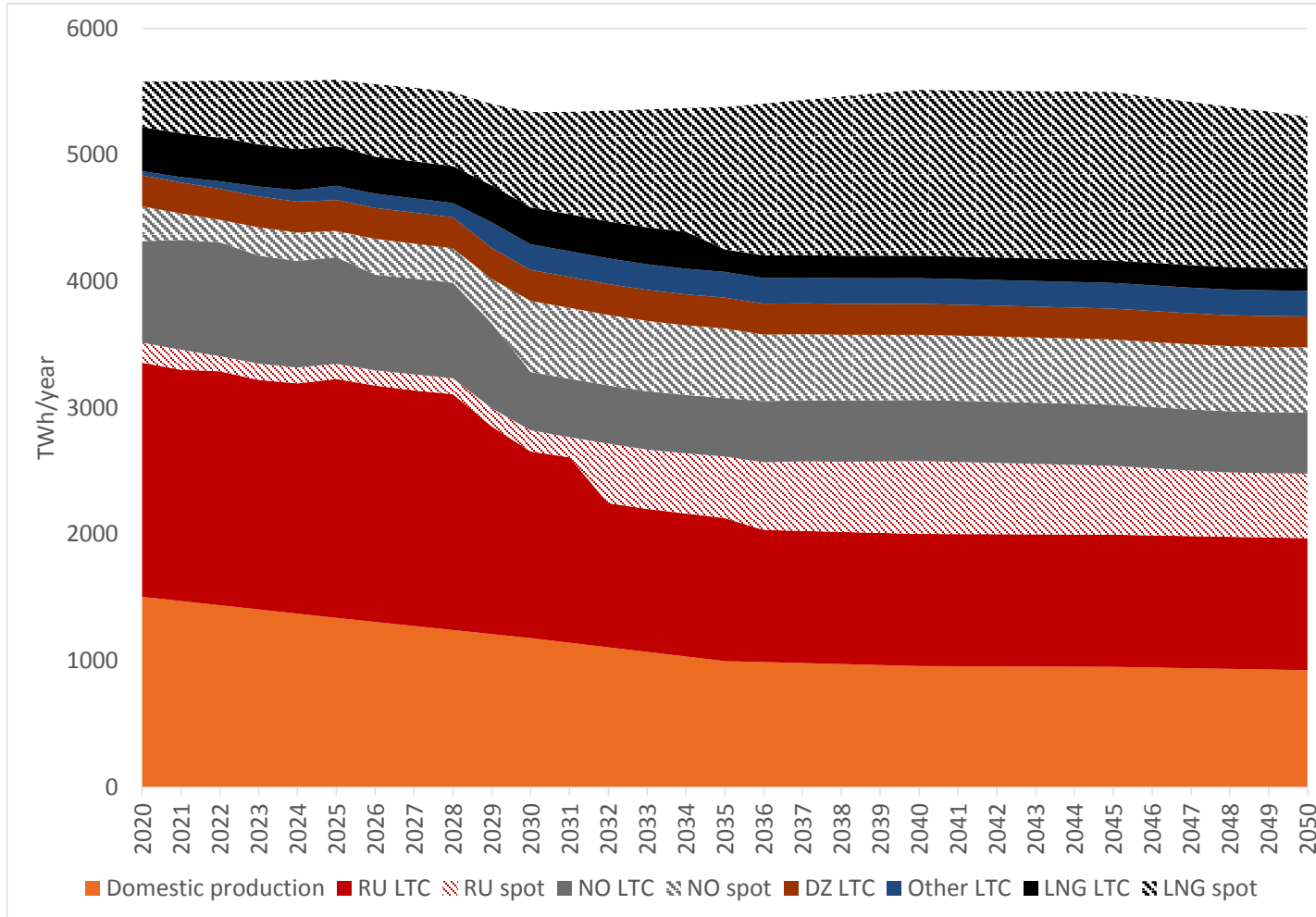
EnC: 24 €/MWh



EU28: 30 €/MWh

EnC: 30 €/MWh

# Draft reference supply mix





# Thank you!

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