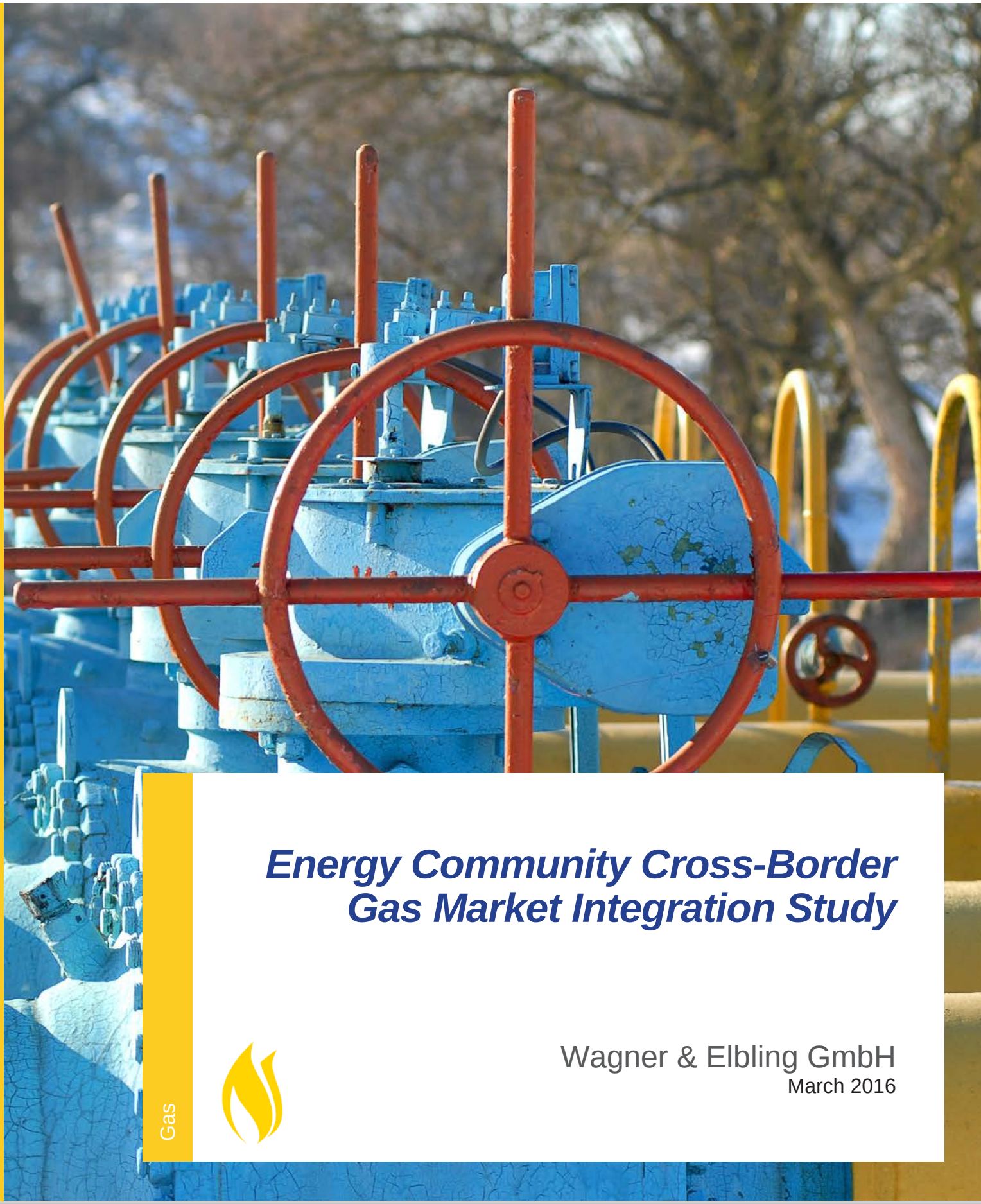
Energy Community



Gas

Energy Community Cross-Border Gas Market Integration Study

Wagner & Elbling GmbH

March 2016

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ABOUT US

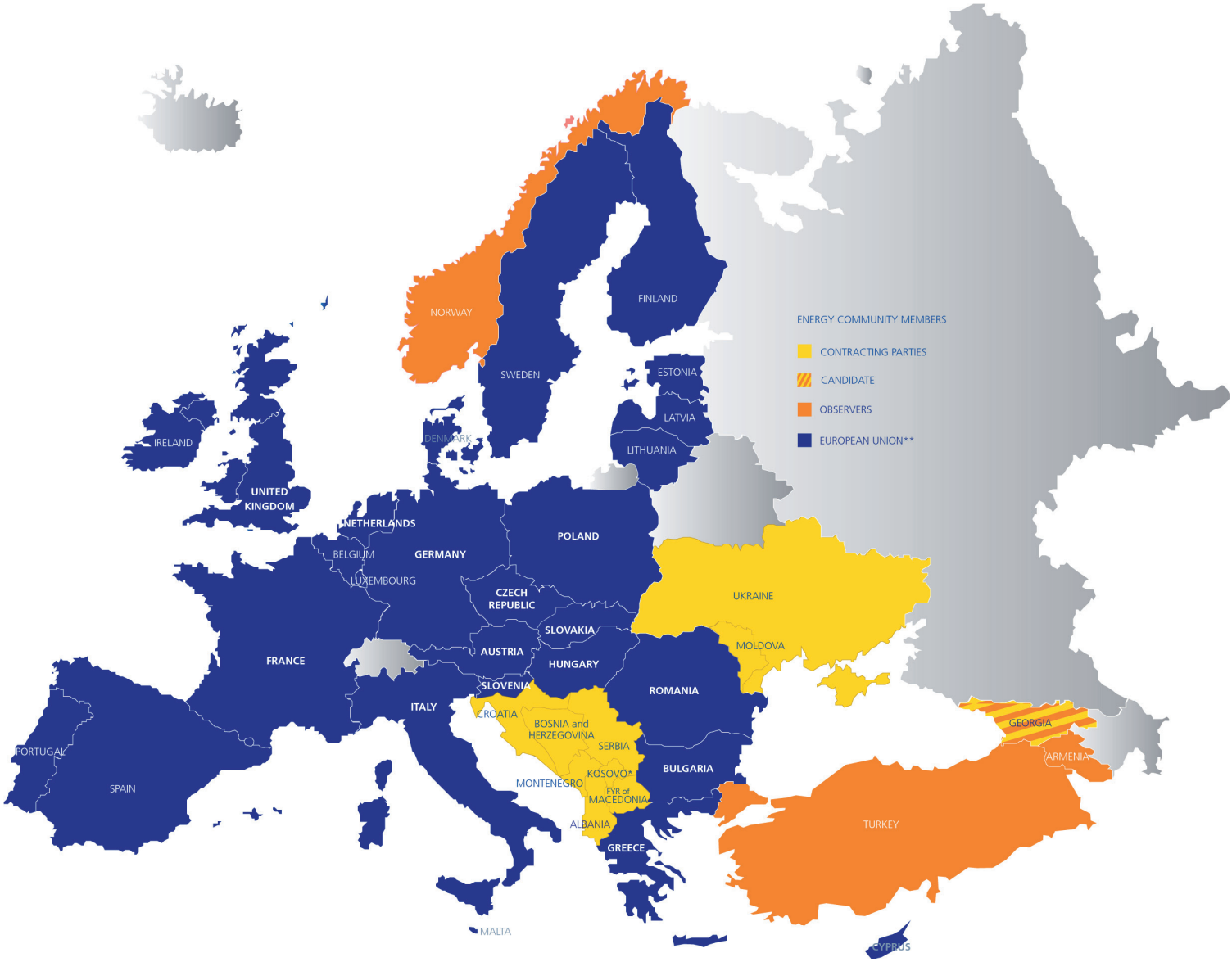
THE ENERGY COMMUNITY IS AN INTERNATIONAL ORGANISATION DEALING WITH ENERGY POLICY FOUNDED BY THE ENERGY COMMUNITY TREATY, WHICH ENTERED INTO FORCE IN JULY 2006.

The Parties to the Treaty are the European Union and eight Contracting Parties from South East Europe and the Black Sea region: Albania, Bosnia and Herzegovina, Kosovo*, former Yugoslav Republic of Macedonia, Moldova, Montenegro, Serbia and Ukraine. Georgia, Armenia, Norway and Turkey participate as Observers.

The Energy Community's mission is to extend the EU internal energy market to South East Europe and beyond on the basis of a legally binding framework. The overall objective of the Energy Community Treaty is to create a stable regulatory and market framework in order to:

- Attract investment in power generation and networks to ensure stable and continuous energy supply that is essential for economic development and social stability;
- Create an integrated energy market allowing for cross-border energy trade and integration with the EU market;
- Enhance the security of supply;
- Improve the environmental situation in relation with energy supply in the region; and
- Enhance competition at regional level and exploit economies of scale.

For further information about the Energy Community, please visit our website: www.energy-community.org.



** This designation is without prejudice to positions on status, and is in line with UNSCR 1244 and the ICJ Opinion on the Kosovo declaration of independence.*

ENERGY COMMUNITY

Cross-Border Market Integration Study

Final Report v1.0

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Vienna, 18 February 2016

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Wagner & Elbling GmbH, Vienna, Austria.

EXECUTIVE SUMMARY: THE STUDY AT A GLANCE – SCOPE AND RESULTS

The main objective of the Energy Community is to extend the EU internal energy market to South East Europe and beyond, allowing for cross-border energy trade and integration with the EU market. In line with this objective, the Energy Community Secretariat has tendered this study on cross-border gas market integration in the Energy Community with the objective to assist the establishment of well-functioning regional wholesale natural gas markets in SEE/CEE and their integration in the EU internal natural gas market.

Starting point of this study has been an assessment of the current state of development of the Contracting Parties' natural gas markets from an infrastructure as well as market functioning perspective. Special attention has been placed on the development of an infrastructure base case for a potential market integration comprising existing and already planned infrastructure.

Based on the obtained results, the potential geographic scopes of market integration (in total four regional market integration options – MIOs – comprising Contracting Parties and neighbouring EU markets) have been developed and analysed based on their actual potential to directly access new gas sources (Direct Market Access analysis).

In a next step a cost-benefit analysis (CBA) has been prepared for these four market integration options. In the CBA the potential for welfare creation and for improved market functioning as a result of market integration have been considered.

Based on a differentiated analysis of topological preconditions, harmonization prerequisites and potential barriers of the market integration tools provided in the ACER Gas Target Model (AGTM), a recommendation for the market integration tools to be applied has been prepared per country and for every market integration option. In a final step, a rough market integration action plan has been developed which gives a general overview of the next steps forward.

Based on the results of this study, it can be concluded that Market Integration in the Energy Community:

- is **feasible** for the considered integration options;
- is **beneficial** because it is expected to create welfare benefits and contribute to the development of functioning markets;
- can be implemented on **existing infrastructure** (3 of 4 integration options);
- does **not require much more effort** than what would be necessary to fully transpose EU regulations anyway;
- shall be brought on the way **as soon as possible** to realize identified benefits.

EXECUTIVE SUMMARY: NATIONAL GAS MARKETS

Starting point of this study was a data retrieval process involving the regulators of the Contracting Parties. For each national gas market, a fact-sheet regarding the current market state was prepared, comprising information (where applicable and provided) on:

- Overall gas market development, compliance and supply & demand
- Market roles, wholesale market and capacity model
- Balancing model, flexibility instruments and tariff model
- Market pricing and gas transport costs

These factsheets were first aligned with the Energy Community Secretariat and then provided to and bilaterally aligned with each Contracting Party's national regulatory authority.

The completed national market factsheets reveal that, at the moment, the gas markets of Contracting Parties are characterized by big differences regarding their development state and market design, where some countries currently even have no gas market at all.

The status quo results for the *AGTM* metrics provided in the table below show a large improvement potential, implying substantial benefits through market integration:

	AGTM THRESHOLD	BA	MD	RS	UA	MK	AL	KS*	ME
NUMBER OF SUPPLY SOURCES	≥3	1 RU	2 RU, RO	2 RU, IP	5+ RU, DE, FR, NO, IP	1 RU	1 IP	n.a.	n.a.
HERFINDAHL-HIRSCHMANN INDEX	≤2.000	10.000	9.980	10.000	4.333	10.000	n.a.	n.a.	n.a.
RESIDUAL SUPPLY INDEX	≥110%	0%	27%	24%	88%	0%	n.a.	n.a.	n.a.
MARKET PARTICIPANTS' NEEDS	no organized market as of yet in the Contracting Parties → no order book volumes, bid-offer spread, order book price sensitivity, number of trades								

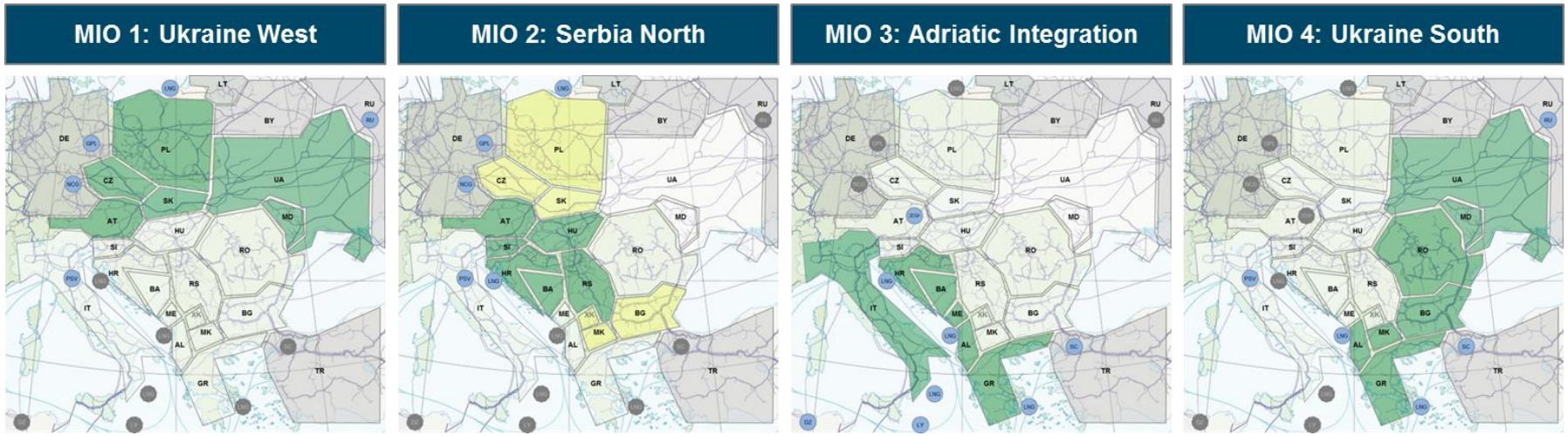
Red…metric threshold not fulfilled, green…metric threshold fulfilled

The data aligned in this step also played a vital role in all subsequent steps of this study (e.g. geographic scope, cost-benefit-analysis).

EXECUTIVE SUMMARY: MARKET INTEGRATION OPTIONS FOR CEE/SEE

Market integration options defined:

Within the scope of the study 19 countries (8 Energy Community Contracting Parties and 11 GRI SSE members) have been analyzed based on feasibility criteria (gas sources, interconnection, organized gas market, consumption and timescale) to identify the most viable geographical market integration options for the Contracting Parties from the large amount of theoretical possibilities. The following four market integration options (MIOs) were aligned with the Energy Community Secretariat and represent the result of a formal consultation with the regulators:



Direct market access (DMA):

The increase of direct market access of multiple supply sources is seen as a strong motivation of market integration and the major precondition to efficient and competitive markets. Since market barriers like capacity bookings, contractual bottlenecks and different balancing systems are effectively removed by market integration, it is sensible to assess the potential of such increased direct market access for different geographical combinations. The study introduces the DMA indicator that states what percentage of the net import demand of a Contracting Party could be covered (due to market integration) from new direct sources, based on the available transport capacities. The approach followed in this study determines the maximum potential per source-target combination and reflects current import and transit patterns.

The results (see section 3.2.3; Table 12) show significant potential for the Contracting Parties to directly access new sources in the pre-selected MIOs and were used to demonstrate the viability of the MIOs in terms of sourcing options for the Contracting Parties.

EXECUTIVE SUMMARY: COST-BENEFIT ANALYSIS – MARKET FUNCTIONING PERSPECTIVE (*AGTM*)

AGTM market health metrics:

The following table summarizes the comparison results of the pre-merger situation of stand-alone markets with the post-merger situation of Contracting Parties being part of integrated markets regarding the fulfilment of *AGTM* market health metrics. The results clearly show that market integration will improve market health of Contracting Parties significantly:

	PRE-MERGER			POST-MERGER (IN ALL MIOs[1])		
	NO. SUPPLY SOURCES	HHI	RSI	NO. SUPPLY SOURCES	HHI	RSI
ALBANIA	n.a.	n.a.	n.a.	✓	✗	✓
BOSNIA-HERZEGOVINA	✗	✗	✗	✓	✗	✓
KOSOVO	n.a.	n.a.	n.a.	✓	✗	✓
MACEDONIA	✗	✗	✗	✓	✗	✓
MOLDOVA	✗	✗	✗	✓	✗	✓
MONTENEGRO	n.a.	n.a.	n.a.	✓	✗	✓
SERBIA	✗	✗	✗	✓	✗	✓
UKRAINE	✓	✗	✗	✓	✗	✓

✓…metric threshold fulfilled, ✗… metric threshold not fulfilled

Due to the current market structure in CEE/SEE (and market shares of gas producers supplying these markets at import level) the Herfindahl-Hirschmann Index will improve but without meeting the threshold set by the *AGTM*.

AGTM market participants' needs metrics:

As Contracting Parties do not have managed wholesale markets yet, the input data required for the calculation of the market participants' needs metrics are not available. However, in combination with increased market size of integrated markets it can be assumed that over time market integration will lead to similar results as EU markets with comparable market size (e.g. TTF, PSV, GASPOOL or NCG) currently achieve.

[1] Note that individual metric values in general differ for a Contracting Party in different market integration options, for detailed figures see section 4.1.1.

EXECUTIVE SUMMARY: COST-BENEFIT ANALYSIS – WELFARE PERSPECTIVE

The selected market integration options promise significant net benefits as results of identified gross benefits and costs of market integration even though benefit quantification was focussed only on primary benefits.

Given the different market integration models proposed in the *AGTM*, the cost-benefit analysis (CBA) was prepared for the "maximum integration" provided by a full market merger of currently separated national markets. To the extent possible, effects have been quantified focussing on a mid-term situation of steady-state market integration. In some cases the current level of gas market development and/or a lack of required and reliable input data did not allow for quantification and a qualitative assessment had to be executed.

The following table provides an overview of the considerable primary benefits of market integration – increased wholesale and retail market efficiency – as results of the permutation of two benefit categories scenarios analyzed for a "low" and "high" scenario each:

		OVERALL RANGE OF QUANTIFIED BENEFITS BASED ON PERMUTATION OF SCENARIO RESULTS			
	CONSIDERED CONTRACTING PARTIES	PERMUTATION 1 LOW WHOLESALE EFFICIENCY LOW RETAIL EFFICIENCY	PERMUTATION 2 LOW WHOLESALE EFFICIENCY HIGH RETAIL EFFICIENCY	PERMUTATION 3 HIGH WHOLESALE EFFICIENCY LOW RETAIL EFFICIENCY	PERMUTATION 4 HIGH WHOLESALE EFFICIENCY HIGH RETAIL EFFICIENCY
MIO 1 „UKRAINE WEST INTEGRATION"	MD, UA	EUR 110 m	EUR 314 m	EUR 669 m	EUR 872 m
MIO 2 "SERBIA NORTH INTEGRATION"	BA, RS	EUR 3 m	EUR 6 m	EUR 59 m	EUR 62 m
MIO 3 "ADRIATIC INTEGRATION"	AL, BA, ME	Even though the current state of gas market development, existing infrastructure or the knowledge of new infrastructure (e.g. CESEC projects) does not allow the same quantification for MIO 3 and MIO 4, it can be expected that the fundamental effects of market integration equally apply and thus create welfare benefits accordingly.			
MIO 4 "UKRAINE SOUTH INTEGRATION"	AL, BG, MD, MK, UA				

In addition to the benefit results stated above, there also exists a multitude of secondary effects which add to overall net benefits (these could not be quantified due to insufficient data), e.g. improved storage market efficiency, efficiency gains from joint trading access and balancing operations, lowered balancing costs, etc.

EXECUTIVE SUMMARY: INTEGRATION TOOLS

The Contracting Parties' gas markets currently face major transformations to fulfil the required compliance with the 3rd EU energy package as stated in the Acquis and the planned adaptations of the European network codes. The additionally required harmonization and coordination prerequisites resulting from full market integration can be even challenging for countries already compliant with the European legal framework.

Therefore a concept which reduces the number of harmonization needs and implementation barriers to overcome and still delivers most benefits seems preferable, leading to the following recommended integration tools:

- Trading region: Offers almost all benefits of a full market merger with significantly reduced implementation efforts, also maintaining the option of maximizing the scope of market integration at later stages
- Satellite market (if the preconditions are met): Offers the same benefits as the trading region and requires lowest implementation efforts

The following table shows the recommended integration tool per Contracting Party based on the individual fulfilment of the preconditions:

	TRADING REGION	SATELLITE MARKET
ALBANIA	✓	✗
BOSNIA-HERZEGOVINA	✓	✓[2]
KOSOVO	— [3]	— [3]
MACEDONIA	✗	✓
MOLDOVA	✗	✓
MONTENEGRO	✓	✗
SERBIA	✓	✓[2]
UKRAINE	✓	✗

✓…preconditions for integration tool fulfilled, ✗… preconditions for integration tool not fulfilled

[2] Preconditions are met as long as PECI projects with new entry capacity into these countries are not commissioned.
[3] Given the infrastructure base case, there is no connecting infrastructure planned for Kosovo and thus preconditions cannot be assessed.

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1 BACKGROUND, INTRODUCTION AND SCOPE OF THIS STUDY

1.1 ENERGY COMMUNITY

The Energy Community is an organisation bringing together the European Union at one hand, and countries from South East Europe and the Black Sea at the other. It was established by the Energy Community Treaty in October 2005 in Athens which entered into force in July 2006.

The Energy Community consists of the following Contracting Parties (CPs): Albania, Bosnia and Herzegovina, the Former Yugoslav Republic of Macedonia, Kosovo*[4], Moldova, Montenegro, Serbia and Ukraine.

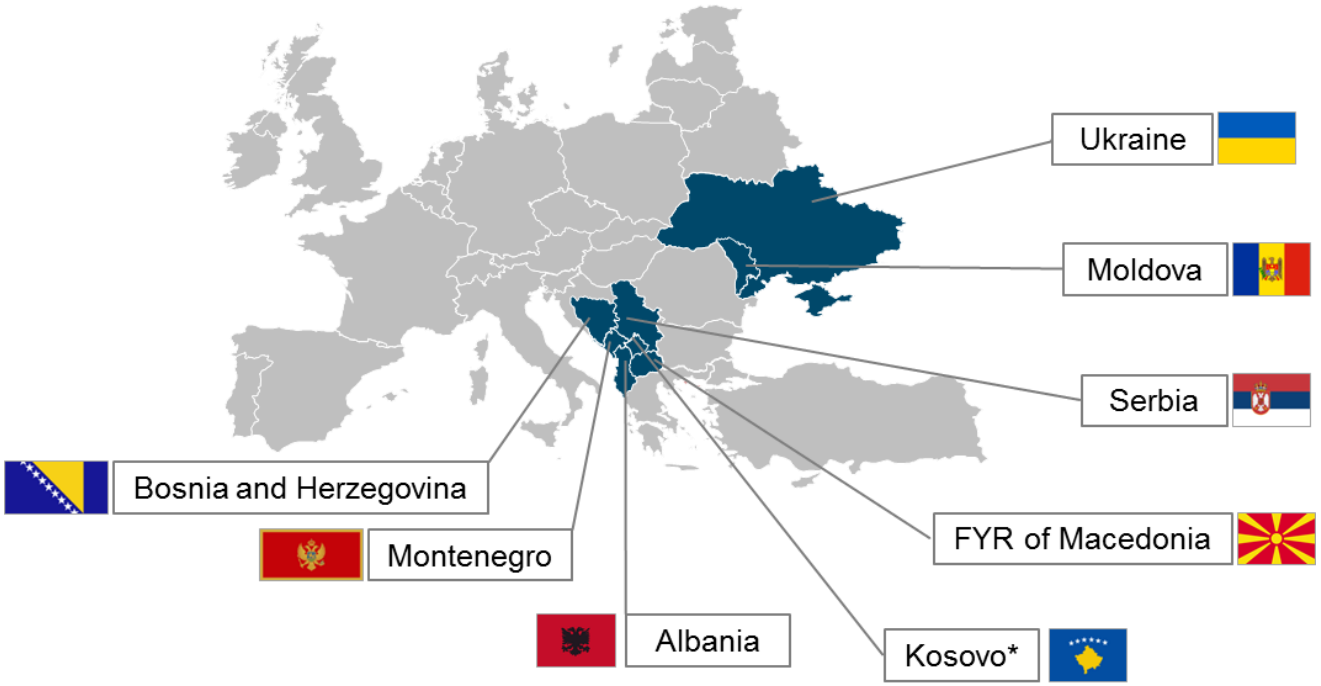


Figure 1: Energy Community Contracting Parties

[4] Throughout this study this designation is without prejudice to positions on status and is in line with UNSCR 1244 and the ICJ Opinion on the Kosovo declaration of independence.

The main objective of the Energy Community is to extend the EU internal energy market to South East Europe and beyond, allowing for cross-border energy trade and integration with the EU market. The legal framework for this initiative is given by the acquis communautaire including EU's Third Energy Package. The deadline for the implementation of the thereby required principles was 01 January 2015. Additionally, the network code regulations related to the EU's Third Energy Package (hereinafter for the sake of simplification referred to as "NCs") can be adopted in the form of procedural acts.

Recently, the Energy Community joined the activities of the Gas Regional Initiative South South-East ("GRI SSE") which among other topics include the implementation of the NCs by identifying and following pilot projects at regional and cross-border level and the fostering of market integrations by models as suggested in the Gas Target Model (GTM).

In this context, the Energy Community Secretariat has tendered the study on cross-border gas market integration in the Energy Community with the objective to assist the establishment of well-functioning regional wholesale natural gas markets in SEE/CEE and their integration in the EU internal natural gas market. In this context, Wagner, Elbling & Company was tasked to contribute to this development by preparing the named study.

1.2 INTRODUCTION TO MARKET INTEGRATION

The main goal regarding future gas market development is the creation of well-functioning market areas. As stated by ACER in the European Gas Target Model (*AGTM*), countries shall therefore assess whether they can possibly meet this challenge by analyzing their fulfilment of the proposed *AGTM* metrics (market participants' needs and market health). Well-functioning, in this context, refers to a liquid trading point offering standardized products at reference prices and a market with a sufficient degree of security of supply, resilience and competition. Entry/exit-zones shall therefore be as large as existing infrastructure allows and shall not be defined on the basis of national boundaries.

To achieve this vision, ACER suggests the consideration of a market reform which – inter alia – can be the implementation of market integration. The starting point for the implementation of such a reform is the organisation of gas markets as entry/exit-systems coinciding with a single balancing zone including a virtual trading point (VTP) as foreseen by *EU Regulation (EC) 715/2009*.

ACER provides three[5] market integration tools (further explained in chapter 5):

- *Market merger:* Neighbouring gas markets fully merge their balancing zones and VTPs (supported by an integrated cross border-entry-exit system also including end users).
- *Trading region:* Neighbouring gas markets merge their VTPs and establish a cross-border balancing zone covering all transmission systems but refrain from fully merging national end user balancing systems (supported by an integrated cross border-entry exit system).
- *Satellite market*: A gas market (satellite market) does not establish its own VTP but co-uses the VTP of a neighbouring, better functioning market (feeder market).

By supporting cross-regional initiatives which endeavour market integrations, the main goal is to eliminate barriers between members and facilitate future cross-border projects. This is targeted by an early implementation of the EU NCs, keeping in mind that first NCs already became binding in 2015 in the EU.

Studies regarding cross-border market integration in Europe, regarding the fulfilment of the *AGTM* metrics[6] by creating such integrated areas and analyzing welfare benefits of those, are also high up on the agenda of NRAs and TSOs. Among others, the following developments serve as examples for conducted (respectively projected) market integration projects:

- The initiatives in Germany whereby formerly separated German market areas have been reduced to only two by market mergers. Currently the German regulator is conducting a study on further (also cross-border) market integration possibilities.
- The **BeLux** project[7] has entered into force in October 2015 and merges the Belgian with the Luxembourgian gas market.
- The application of a possible trading region has been studied in the context of the CEE Trading Region[8] (**CEETR**) where the gas wholesale markets of Austria, Czech Republic and Slovakia shall be integrated.
- The satellite concept has been conducted when integrating the Austrian gas markets Vorarlberg and Tyrol with the German market area NetConnect Germany (the **COSIMA** project[9]).
- On 01 April 2015, a common market area made up of the GRTgaz South and TIGF areas has been set up (**Trading Region South**).

[5] Other, amended or combined solutions are not excluded if better fitting the relevant countries for reaching their market integration goals.
[6] See also Annex 3 „Calculation Specification for Wholesale Market Metrics“ of the *AGTM*
[7] http://www.fluxys.com/belgium/en/Services/Transmission/BeluxMarketIntegration/MarketIntegretion1
[8] http://www.e-control.at/documents/20903/-/-/f98546cb-9bcd-470e-a3f8-73fa0c0a3c99
[9] http://www.e-control.at/de/marktteilnehmer/gas/gasmarkt/marktmodell-tirol-und-vorarlberg (available in German only), http://www.aggm.at/en/competence-center/cosima

The establishment of functioning gas markets is also a central objective of the Energy Community. Combining the views EU countries and Contracting Parties of the Energy Community, market integration would have the potential to accelerate the process of overall market development by:

- substantially expanding existing (respectively projected) EU market zones towards South East Europa and the Black Sea Region and
- accelerating the long and tedious process of market development as experienced in many EU markets by integration with already established EU markets and market places.

In this context, the present study deals with the identification and analysis of different market integration options for Energy Community Contracting Parties towards EU countries, with their impact on participating Contracting Parties and associated tasks to achieve market integration.

1.3 STUDY SCOPE

Referring to the tender documents, the following high-level scope has been defined for this study:

> *"Overall objective of the study is to assist Beneficiaries in establishing well-functioning regional wholesale natural gas markets in SEE/CEE and their integration in the EU internal natural gas market."*
>
> *"Specific objective of the study is to provide a market model for SEE/CEE gas market integration in line with the requirements of the 3rd Package, relevant network codes and AGTM as well as to prepare an action plan for its implementation."*

1.4 WORK APPROACH AND STRUCTURE OF THE REPORT

Based on the defined scope, the development of the study was structured in six main work packages as shown in the following figure.

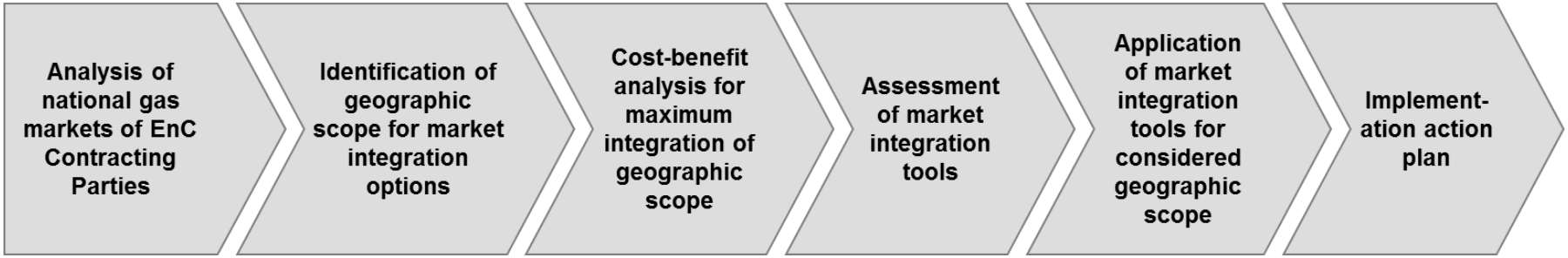


Figure 2: Work approach

Regular alignments with the Energy Community Secretariat have been a central element of the study preparation process. For the presentation and discussion of interim results six workshops of ECS and Wagner, Elbling & Company took place in 2015:

- Alignment 1 (10 June) - Discussion of national market assessment and alignment for development of market integration options
- Alignment 2 (29 June) - Final selection of market integration options for further analysis
- Alignment 3 (06 July) - Fundamentals of cost-benefit analysis
- Alignment 4 (20 August) - Cost-benefit analysis results and market integration tools
- Alignment 5 (01 September) - Final selection of market integration tools per country
- Alignment 6 (21 September) - Implementation action plan

In addition to these alignments, the NRAs of relevant countries (both EU GRI SSE and Contracting Parties) have been involved in the course of two consultation phases. These phases have been introduced by telephone conferences and a presentation of interim results by Wagner, Elbling & Company. Subsequently, NRAs have been invited to contribute to study development by providing feedback:

- Telephone conference 1 (09 July) with subsequent consultation phase on the definition of the geographic scope of market integration
- Telephone conference 2 (04 September) with subsequent consultation phase on the draft report sections of the cost-benefit analysis and market integration tools

The report of this study is structured according to the processed work packages and, therefore, consists of six main chapters with the following contents:

- **National gas markets of Energy Community Contracting Parties:** Chapter 2 presents the general characteristics of the Contracting Parties' national gas markets and their current state of market design by introducing national market factsheets based on information provided by ECS and the national regulatory authorities. Furthermore, the capacity situation (based on existing and projected infrastructure) has been evaluated and summarized for this study in the so-called infrastructure base case.
- **Development of market integration options in CEE/SEE:** A pre-selection of market integration options based on defined feasibility criteria, followed by a direct market access analysis in which the improvement to direct market access for involved Contracting Parties has been analyzed. Based on these results the geographic scope of market integration is defined (chapter 3).
- **Cost-benefit analysis for maximum integration of selected geographic scope:** The identified market integration options have been assessed with a cost-benefit analysis (based on maximum integration provided by a full market merger) evaluating the market functioning perspective based on the *AGTM* metrics and the welfare perspective with its potential benefits for participating Contracting Parties in chapter 4.

- **Integration tools for market integration:** This chapter provides a description of the characteristics and preconditions of different integration tools defined by the *AGTM*, their implications on the cost-benefit analysis and related harmonization prerequisites and implementation barriers.
- **Proposed application of market integration tools:** Based on the results of the previous chapter and against the background of the selected geographic scope, chapter 7 provides for every Contracting Party a proposal regarding the application of a market integration instrument.
- **Implementation action plan:** In the concluding chapter 8, the potential actions towards realization of discussed market integration are described.

2 NATIONAL GAS MARKETS OF ENERGY COMMUNITY CONTRACTING PARTIES

The assessment of information related to market integration for the analyzed region, i.e. the eight Contracting Parties of the Energy Community, calls for a structured framework which was realized by the introduction of national market factsheets.

The collected and summarized information provided by public reports of ECS and ECRB, ECRB wholesale market monitoring questionnaires and complementary figures and descriptions received from NRAs of Contracting Parties, does not only serve as an introduction to the structure and characteristics of considered markets, but also as an important information source for subsequent work packages such as the cost-benefit-analysis of selected market integration options.

In the following subsections, the Contracting Parties' gas markets are described on an aggregate level and the infrastructure base case for all subsequent analyses is introduced.

2.1 GENERAL CHARACTERISTICS

To get a first impression of the considered gas markets, an overview of the main characteristics of the Contracting Parties' gas markets is provided. Table 1 states the role of gas, which indicates the share of gas in total national energy consumption (in %), the domestic consumption and the domestic production (using the latest data made available by NRAs).

	BOSNIA	MOLDOVA	SERBIA	UKRAINE	MACEDONIA	ALBANIA	KOSOVO	MONTENEGRO
ROLE OF GAS	3%	40%	12.5%	34%	4%	1%	0%	n.a.
CONSUMPTION (BCM/A)	0,17	1,05	1,90	42,02	0,14	0,003	0	n.a.
PRODUCTION (BCM/A)	0	0,00011	0,44	22,46	0	0,016	0	n.a.

Table 1: Overview of the three main characteristics of Contracting Parties' gas markets

Bearing in mind these main features of the Contracting Parties' gas markets, one can imagine the different market conditions. For the majority of countries, gas does not play an important role in the total energy consumption and gas demand is rather low. Ukraine is by far the largest gas market within the considered countries whereas Kosovo and Montenegro do not have existing gas markets at the moment.

2.2 CURRENT STATE OF MARKET DESIGN

Based on the said, detail analyses regarding the current state of development of the Contracting Parties' gas markets, the following table provides a summary of the current situation based on metrics provided by the ACER Gas Target Model (*AGTM*):

	AGTM THRESHOLD	BA	MD	RS	UA	MK	AL	KS*	ME
NUMBER OF SUPPLY SOURCES	≥3	1 RU	2 RU, RO	2 RU, IP	5+ RU, DE, FR, NO, IP	1 RU	1 IP	n.a.	n.a.
HERFINDAHL-HIRSCHMANN INDEX	≤2.000	10.000	9.980	10.000	4.333	10.000	n.a.	n.a.	n.a.
RESIDUAL SUPPLY INDEX	≥110%	0%	27%	24%	88%	0%	n.a.	n.a.	n.a.
MARKET PARTICIPANTS' NEEDS	no organized market as of yet in the CPs → no order book volumes, bid-offer spread, order book price sensitivity, number of trades								

Table 2: Current state of market development

Notes regarding the interpretation of the above table:

- Red…metric threshold not fulfilled, green…metric threshold fulfilled, IP…indigenous production
- The first three rows refer to the *AGTM's* market health metrics focussing on competitiveness, resilience and the security of supply of a market.
- The last row refers to the *AGTM's* market participants' needs metrics regarding the functioning of the traded market, which currently does not exist in the Contracting Parties.

Notwithstanding the substantial differences of national markets, the results above show a huge improvement potential. While the current absence of an established gas market has not allowed the calculation of metrics for some markets (Kosovo, Montenegro) the market health metrics results only meet the thresholds provided by the *AGTM* in the case of Ukraine's number of supply sources. As traded wholesale markets including an appropriate level of transparency are not established yet, market participants' needs metrics could not be calculated. This conclusion underlines that continued efforts are required in order to, among others:

- facilitate competition in all market segments through effective unbundling and implementation of transparent market rules in line with the Acquis;
- foster security of supply through infrastructure developments (see next section) as well as appropriate market-based measures and
- complete market opening through the establishment of functioning traded markets.

2.3 INFRASTRUCTURE BASE CASE

The interconnection situation (existing and planned), the domestic gas consumptions and the indigenous productions of the countries in the study scope region are one of the foundations for the selection of feasible market integration options, as well as for subsequent analyses. This chapter provides an overview of the data used, the assumptions and the combined high-level picture of the regional situation ("infrastructure base case").

2.3.1 Base data: Interconnection capacity

NO.	DATA ITEM	DATA SOURCES
1.	Existing capacities	■ The existing capacities were assessed according to the *ENTSOG Capacity Map 2015* and complemented by the data contained in the ESC questionnaires and national market factsheets.
2.	Planned capacities: ■ PECIs	■ All Projects of Energy Community Interest (PECIs) were included in the further analysis and the assumed capacities are based on the given upper limit of technical capacity (see Table 4 below).
3.	Planned capacities: ■ Additionally included infrastructure (based on ECS input)	■ Physical reverse flow from Romania to Ukraine at 17,1 bcm/a ■ Increase of interconnection from Romania to Moldova at Ungheni amounting to 0,3 bcm/a ■ Interconnector Greece-Bulgaria ■ TANAP capacity at the Turkish and Greek border with 10 bcm/a

Table 3: Interconnection capacity base data

Not regarded:

- CESEC[10] projects other than PECIs, as no capacity information is provided in the *CESEC Memorandum of Understanding*.
- Any further projects currently discussed (e.g. Turkish Stream, Tesla, Eastring, AGRI, BRUA, etc.). Such projects are still subject to achieving important milestones, while the recent past has shown a large discrepancy between projects in an advanced planning stage and the eventual realization of these projects.

No.	ID	Description	Geographical scope	Expected availability from	Projected inter-connection capacity	Used in further analysis
1.	G008	Ionian Adriatic Pipe-line	AL-ME-HR-BA	2020	up to 5 bcm/a	5 bcm/a
2.	G022	Trans Adriatic Pipe-line	GR-AL-IT	2020	10 bcm/a, exp. up to 20 bcm/a	10 bcm/a
3.	G002	EAGLE LNG Terminal	AL	2019	4-8 bcm/a floating vessel	8 bcm/a
4.	G006	Pipeline HR-BA	North BH to center (Slobodnica-Bosanski Brod-Zenica)	2019	up to 5 bcm/a	5 bcm/a
5.	G003	Pipeline HR-BA	SW BH to center (Ploce - Mostar - Sa-rajevo/Zagvozd - Posušje/Travnik)	2018 HR (BA: n/a)	1,5-2,5 bcm/a	2,5 bcm/a
6.	G007	Pipeline HR-BA	NW BH supply island (Lička Jesenica-Tržac-Bosanska Krupa)	2023	1-1,5 bcm/a	1,5 bcm/a
7.	G010 G011	LNG Terminal HR + Pipeline HR-BA	West HR to N BH (Zlobin-Bosiljevo-Sisak-Kozarac-Slobodnica)	2019 (pipeline)	6 bcm/a send-out capacity acc. to recent CEF fund-ing	6 bcm/a

[10] http://ec.europa.eu/energy/en/topics/infrastructure/central-and-south-eastern-europe-gas-connectivity

No.	ID	Description	Geographical scope	Expected availability from	Projected inter-connection capacity	Used in fur-ther analysis
8.	G009	Pipeline HR-RS	Continuation BH-HR-1 to NW RS (Slo-bodnica-Sotin-Bačko Novo Selo)	2023	6-7 bcm/a	7 bcm/a
9.	G013	Pipeline BG-RS	SW RS to Sofia-Region (Nis-Dimitrovgrad)	RS: n/a, BG: 2017	1,8 bcm/a	1,8 bcm/a
10.	G021	Pipeline modernizati-on	Urengoy-Pomary-Uzhgorod Pipeline	—	no new capacity	—

Table 4: List of PECIs

2.3.2 Base data: Domestic consumption and indigenous production

No.	Data item	Data sources
1.	Annual domestic consumption	■ Contracting Parties: 2014 data from ECS questionnaires/consumption provided by NRAs for 2014 ■ EU countries: *Eurogas preliminary Gas Consumption 2014*
2.	Annual indigenous production	■ Contracting Parties: 2014 data from ECS questionnaires for Ukraine and 2013 data from *ECS Annual Implementation Report 2014* for Serbia ■ EU countries: *Eurostat* data for 2013
3.	Annual net import demand	Introduced as the difference between consumption and production

Table 5: Consumption and production base data

2.3.3 Combined view of the infrastructure base case

Summarizing all capacities and using the consumption and production data as stated above results in a schematic interconnection capacity map, the so-called *infrastructure base case*, which provides all necessary information regarding the current situation at a glance:

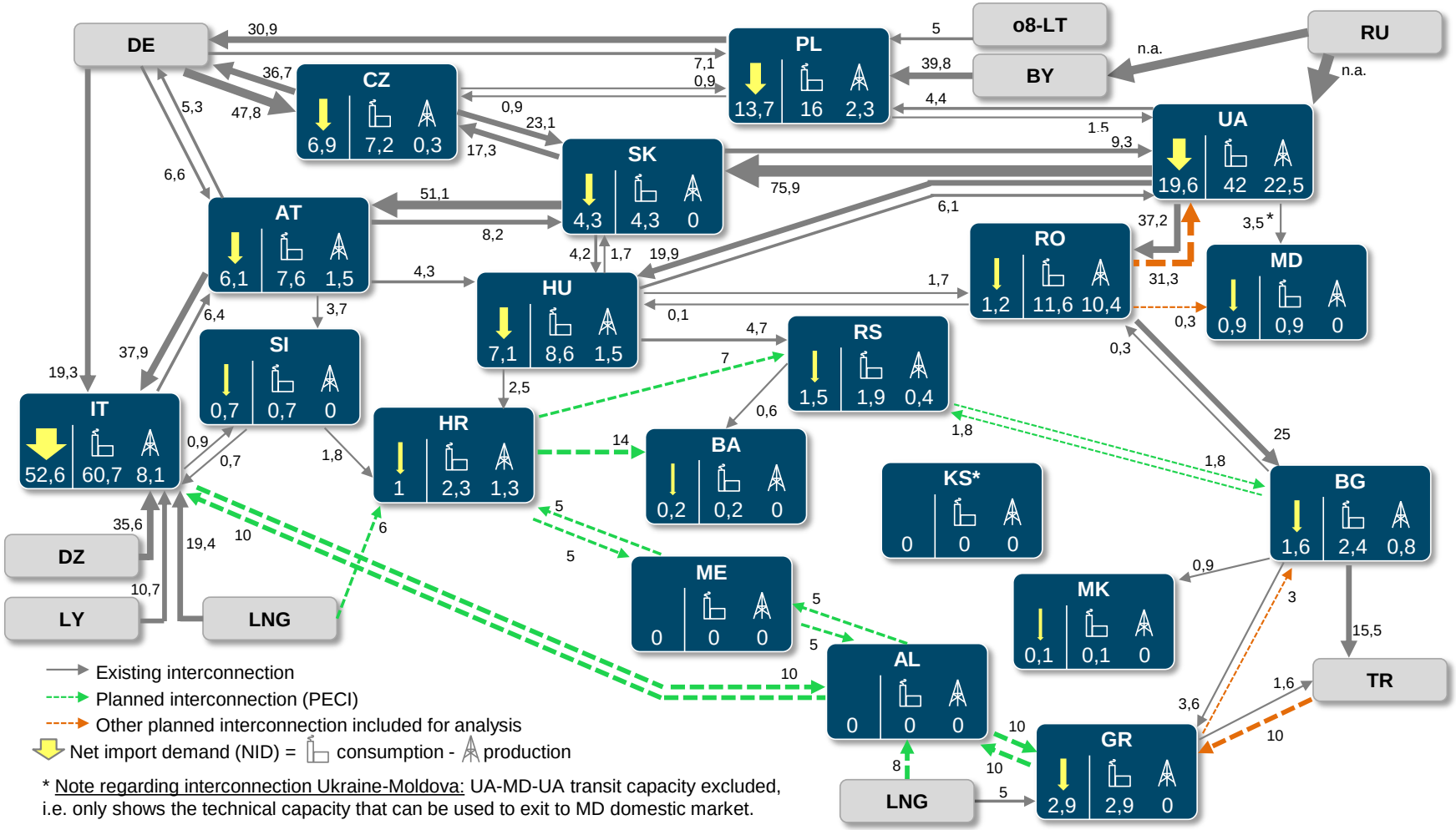


Figure 3: Interconnection capacity map

3 DEVELOPMENT OF MARKET INTEGRATION OPTIONS IN CEE/SEE

This chapter is set out to develop market integration options (MIOs) for the study's regional scope of 19 CEE and SEE countries:

- 8 Energy Community Contracting Parties
- 11 GRI SSE members

These countries combine very different structural components in terms of domestic consumption, indigenous production, interconnection infrastructure, market development and regulatory setup and cover a significant part of geographic Europe:

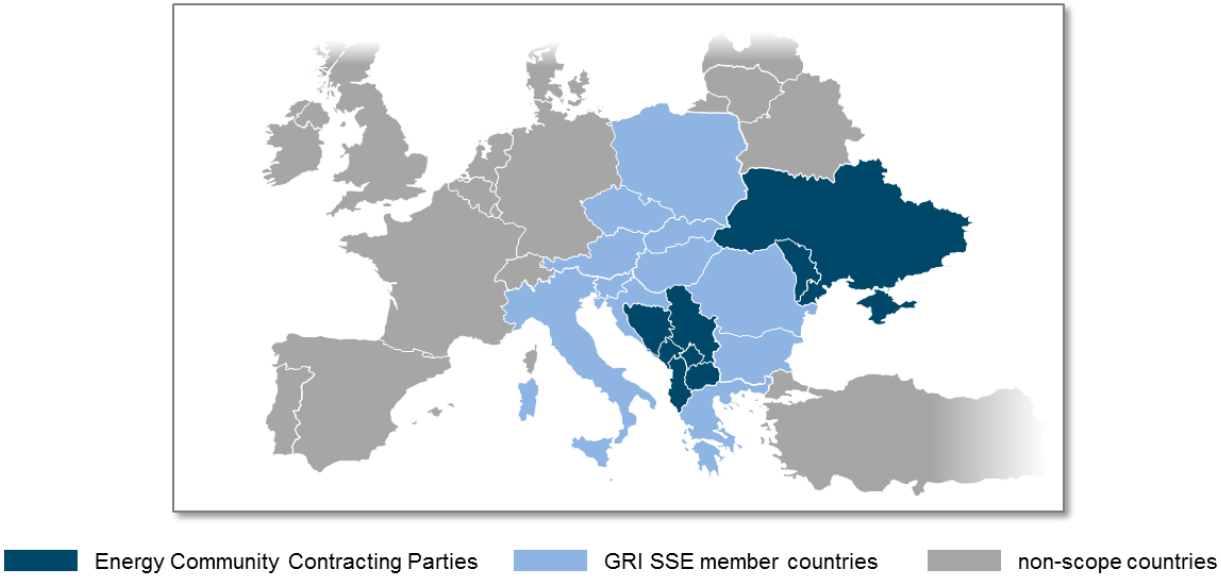


Figure 4: Regional scope for the development of market integration options

To develop options for well-functioning regional wholesale natural gas markets, a two-step approach is applied:

- In a first step, a pre-selection (section 3.1) of a limited number of MIOs based on certain feasibility criteria is conducted.
- This is followed by a direct market access (DMA) analysis for each pre-selected MIO (section 3.2) in which the improvement to direct market access for involved contracting parties is analyzed and the scope is re-adjusted where reasonable.

3.1 PRE-SELECTION OF MARKET INTEGRATION OPTIONS

The pre-selection of market integration options (MIOs) shall aim to cut down the large number of combinatorial possibilities. In theory, the 19 scope countries could be combined to arbitrary combinations, ranging from MIOs with only two participating countries to one single integrated market for all 19 scope countries, meaning that even under the condition that a MIO shall contain at least one Contracting Party there would be more than half a million theoretical potential market integration options.

This reduction is made by applying a set of feasibility criteria:

- gas sources
- interconnection
- gas hub
- timescale
- consumption

These criteria are explained in the following section 3.1.1, the results are provided in section 3.1.2.

Focus and starting point of the definition of market integration options are the Contracting Parties (for other GRI SSE countries different/additional options may exist which are not in the scope of the study) and the infrastructure base case (see section 2.3).

3.1.1 Feasibility criteria

NO.	FEASIBILITY CRITERION	RATIONALE	STUDY APPROACH
1.	**Gas sources**	Market integration shall improve the access to sources for the contracting parties by removing/reducing previous barriers.	■ Starting from an Energy Community Contracting Party, rough (direction based) corridors to directly access new sources for this country are identified. ■ This approach is schematically shown and explained in figure 6.

NO.	FEASIBILITY CRITERION	RATIONALE	STUDY APPROACH
2.	**Interconnection**	Market integration options without (planned) physical interconnection shall not be analyzed further.	Selection of potential MIOs in a way that participating countries form a connected graph (i.e. for each two participating countries a route within the MIO can be found that connects them under the infrastructure base case)
3.	**Organized gas market (gas hub)**	The most efficient way to achieve a well-functioning regional gas market is by connecting the currently underdeveloped gas markets to an already developed gas market, drawing from e.g. market volumes, customer base, experience and market platform technology instead of a full build-up from the ground.	Assessment based on the development status of gas hubs according to the latest EFET European gas hub development study.[11] For the details and the classification see section 3.1.1.2 below
4.	**Consumption**	Market functioning is strongly driven by the gas volumes available in the market, as can be seen by the example of the major European gas markets. Complementary to the sourcing side, a large demand side in the integration scope drives the development of a well-functioning regional gas market.	Adding up of potential MIO countries' consumption figures as provided by the infrastructure base case should yield a total domestic consumption of more than or equal to 20 bcm/a (initial *CEER Gas Target Model* threshold).

[11] EFET European gas hub development study, 01 July 2015

NO.	FEASIBILITY CRITERION	RATIONALE	STUDY APPROACH
5.	**Timescale**	■ Market integration depends first of all on the availability of infrastructure. With only the current infrastructure considered, market integration possibilities for some countries would not look too bright. ■ Regarding planned infrastructure on the other hand, theoretically a lot of integration potential exists, but often with unclear realization horizon/probability. ■ A second driver regarding the timescale is the number of countries involved, as the implementation complexity naturally rises with the amount of parties to coordinate.	The timescale criterion was mainly used to develop a practical view on planned infrastructure (infrastructure base case), gas hub developments and MIO size (number of participating countries).

Table 6: Pre-selection criteria

3.1.1.1 Overview of sources considered

There are two types of gas sources:

- physical sources: net production countries (connected by import pipelines) and LNG terminals
- market sources[12]: existing (virtual) gas hubs agglomerating physical sources of various origins

Note that storage can only be used to source gas temporarily and thus is not a relevant source for analyzing market integration options.

So under the infrastructure base case, the following sources for developing market integration options (and also later in the DMA assessment) are considered:

[12] The selection of market sources for this study is explained in section 3.1.1.3

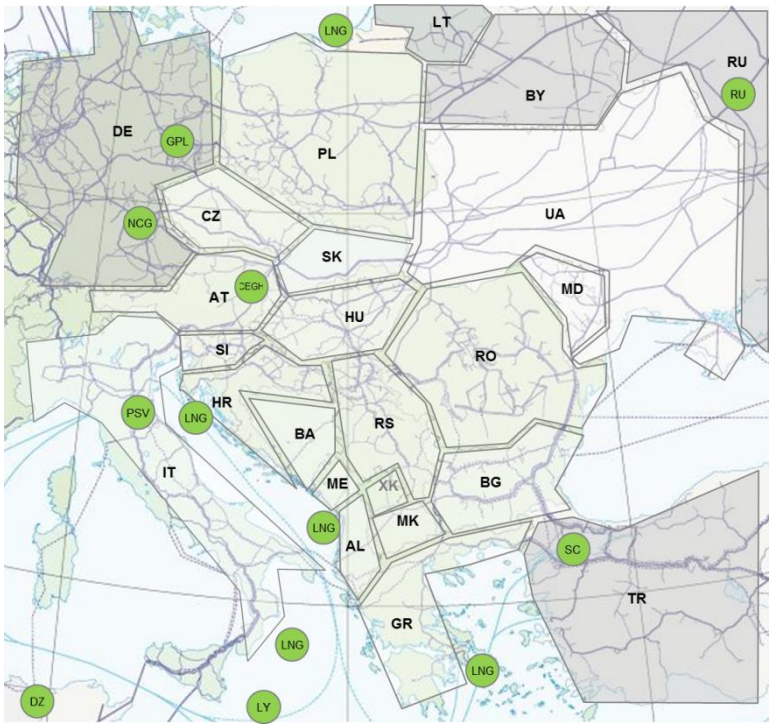
No.	Source type	Source reference	Directly connected scope countries	Source overview map (background map: ENTSOG)
1.	physical	LNG Italy	IT	 **Figure 5: Source overview map**
2.	physical	LNG Greece	GR	
3.	physical	LNG Poland	PL	
4.	physical	LNG Croatia	HR	
5.	physical	LNG Albania	AL	
6.	physical	Algeria	IT	
7.	physical	Lybia	IT	
8.	physical	Russia	UA	
9.	physical	Southern Corridor	GR	
10.	market	VTP NCG	AT, CZ	
11.	market	VTP Gaspool	CZ, PL	
12.	market	VTP PSV	AL, AT, SI	
13.	market	VTP CEGH	IT, HU, SI, SK	

Table 7: Sources for the pre-selection of market integration options

3.1.1.2 Details criterion 1: Corridor approach for market integration options with direct access to new sources

The corridor approach is characterized by creating an integrated market that provides for Contracting Parties new direct access to sources, thus removing/reducing previous barriers. Direct access to sources in this context means that in the integrated market sources can be accessed from the common VTP by a single cross-border transport, contrary to the current situation where multiple countries (with separate network codes, balancing provisions and possible contractual congestions) must be crossed on the way from the source to the regarded Contracting Party.

So starting from an Energy Community Contracting Party, rough direction based corridors to directly access new sources for this country are identified, as outlined below:

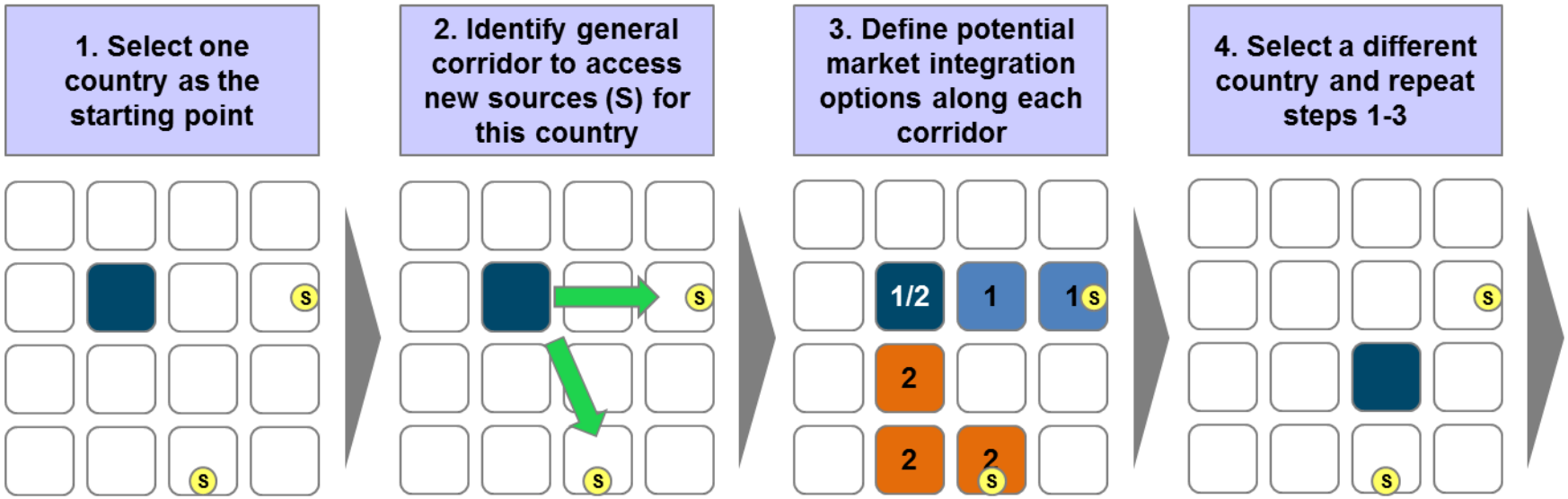


Figure 6: Schematic illustration of the approach to determine MIO corridors

3.1.1.3 Details criterion 3: Organized gas market

According to EFET, the gas hub development study (*EFET Hub Development Study 2015*) emerged from an observation that many new virtual trading points and gas hubs were implemented across EU and in connected markets, in very different ways. However, differences in implementation result in increased transaction costs (for both traders and hub operators) and unnecessary levels of operational complexity, which will ultimately reduce the overall benefits derived from the Internal Energy Market. This led to the development of a "best practice" model, based on EFET's experiences (good and bad) in other markets that could be used to advise NRAs and TSOs of what traders look for in a hub.

The EFET scoring mechanism solely focuses on structural preconditions (e.g. hub firmness, standardised contract available, brokers/exchange operating), thus does not include any information on actual trade data (liquidity, volume, etc.). This means the results provided in the *EFET Hub Development Study 2015* give a basic high-level overview of the current status of European gas hub structural maturity and were used in the present study to separate gas hubs in the scope countries[13] and in countries directly adjacent to them into two categories (tiers):

	REQUIREMENT	DESCRIPTION
TIER 1 HUBS	Score larger or equal to 10 out of 20 points under the EFET scoring mechanism	Gas hubs that have reached a degree of structural maturity seen sufficient to act as the starting point for a new market (established by market integration)
TIER 2 HUBS	Score lower than 10 out of 20 points under the EFET scoring mechanism	Gas hubs that have made some progress towards becoming an organized market place but still lack vital structural preconditions and thus are not assumed as a viable starting point for a new market (established by market integration)

Table 8: Hub categories

[13] Not all scope countries (e.g. Slovenia, Croatia and all Contracting Parties) were evaluated in the *EFET Hub Development Study 2015*, but from experience it can be safely said that they do not fall under tier 1.

This leads to the following categorization:

No.	Gas hub	EFET score (2015)	Structural maturity category
1.	NCG (Germany)	19	Tier 1
2.	Gaspool (Germany)	19	Tier 1
3.	PSV (Italy)	15	Tier 1
4.	CEGH (Austria)	14	Tier 1
5.	Czech Republic	8,5	Tier 2
6.	Slovakia	7	Tier 2
7.	Hungary	6,5	Tier 2
8.	Greece	6	Tier 2
9.	Poland	5,5	Tier 2
10.	Turkey	4,5	Tier 2
11.	Romania	1,5	Tier 2
12.	Bulgaria	1	Tier 2

Table 9: Relevant gas hubs evaluated in the EFET gas hub development study

The tier 1 hubs were selected as potential market sources in this study.

Notes:

- This categorization is further supported by the *AGTM* metrics, as all tier 1 gas hubs exhibit promising metric results.
- Consequently, the categorization is based on past information on market development, while future developments of tier 2 markets could provide beneficial to market integration. E.g. in Poland, traded volumes on the gas exchange TGE have increased recently, which could justify further analysis of Poland's VTP as a potential market source.

3.1.2 Pre-selection results: MIO corridors for further analysis

From the large number of combinatorial possibilities the following four MIOs corridors were determined according to the criteria outlined above and aligned with the Energy Community Secretariat in mid June 2015:

MIO CORRIDOR	REFERENCE	SOURCING DIRECTION	POTENTIALLY PARTICIPATING COUNTRIES	
			CPs	GRI SSE
MIO corridor 1	Ukraine West integration corridor	Central/Western Europe	UA, MD	SK, AT, CZ, PL
MIO corridor 2	Serbia North integration corridor	Central/Western Europe	RS, BA, MK, KS*	AT, HU, SK, CZ, PL, HR, SI, BG
MIO corridor 3	Adriatic integration corridor	Central/Southern Europe	AL, BA, ME, KS*, MK	HR, GR, IT
MIO corridor 4	Ukraine South integration corridor	Central/Southern Europe	UA, MD, MK, AL	RO, BG, GR

Table 10: Pre-selected market integration corridors

The following figure shows an overview of the MIO corridors of the pre-selection (background map: ENTSOG):

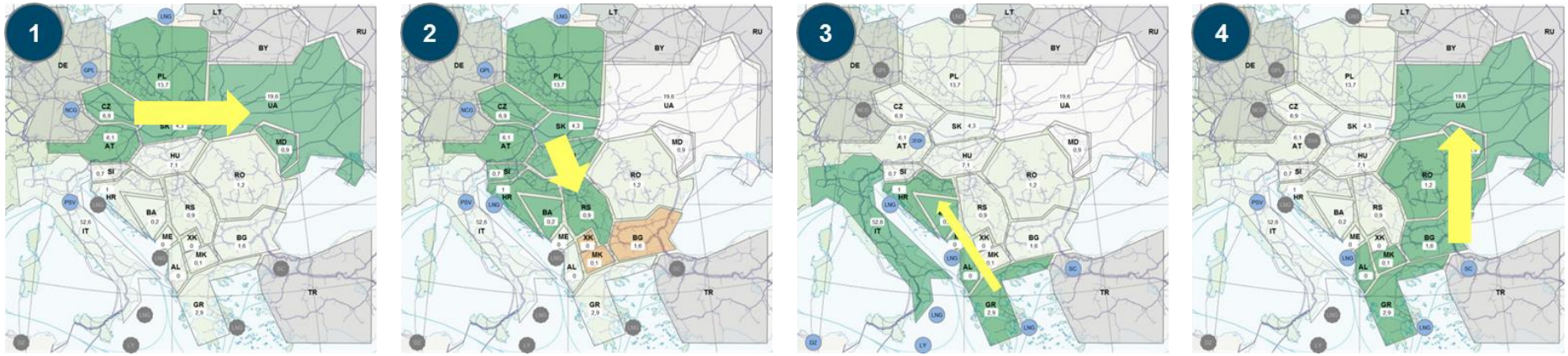


Figure 7: Overview of pre-selected MIO corridors

These potential MIOs were further refined in the next step and subjected to a formal consultation with the regulators. The final results can be found in section 3.3.

Notes:

- A non-inclusion of some countries in the geographical scope does not preclude them from becoming part of an actual market integration project. It just indicates that based on the feasibility criteria, the information available and from the perspective of contracting parties their inclusion is not required.
  - Example: Slovenia is not included in MIO corridor 3 ("Adriatic integration"): Slovenia is neither strictly required to make this market integration option feasible, nor would its inclusion provide notable benefit to the contracting parties of this option (AL, ME, BA). Of course, if the Adriatic market integration scope is going to be realized, an inclusion of Slovenia can be envisaged (and might be beneficial from Slovenia's perspective).
- Consideration of existing regional market integration initiatives in the market integration options:
  - The CEETR platform (consisting of Austria, Slovakia and the Czech Republic) is covered by MIO 1 ("Ukraine West") and MIO 2 (Serbia North").
  - The Visegrád 4 platform (consisting of Hungary, Slovakia, Czech Republic and Poland) is covered by MIO 2 ("Serbia North").
  - In general these existing initiatives can either facilitate implementation of pre-selected MIOs or potentially extend these MIOs by additional countries without additional effort (if successful).

3.2 DIRECT MARKET ACCESS ANALYSIS

The next step for deriving the market integration options is to analyze the previously defined integration corridors in terms of actual potential to directly access new gas sources (i.e. quantification, as the source perspective for the integration corridors was a purely qualitative one).

What is direct market access (DMA) and why is it important?

The contribution of a gas source to competition on the virtual trading point of a market strongly depends on market barriers between source and virtual trading point. Such market barriers are for example:

- capacity booking per interconnection point, e.g.:
  - availability problems
  - dependency problems
  - contract management
- tariffs per interconnection point, e.g.:
  - implying pancaking effects
  - subject to different/ non-transparent tariff methodologies
- transitions between market and balancing frameworks per country, e.g.:
  - completely different balancing systems even where fully compliant with *NC BAL*
  - different network access regimes
  - different market frameworks (OTC platforms, brokers, exchanges – if any)
- registration/permits per country, e.g. for:
  - shippers
  - suppliers
  - balancing parties

In effect, market barriers “shield off” different supply sources from the virtual trading point to a varying degree. Where in an example market gas from one source is directly available at the border, gas from most other sources requires transfer over many different countries subject to the barriers above, effectively reducing the potential these sources have to compete on the regarded market.

Direct market access thus is a precondition to increase competition: As market integration effectively removes/reduces these market barriers, sources can then be accessed from the previously individual markets on a direct basis, thus more efficiently and eventually paving the way for increased competition:

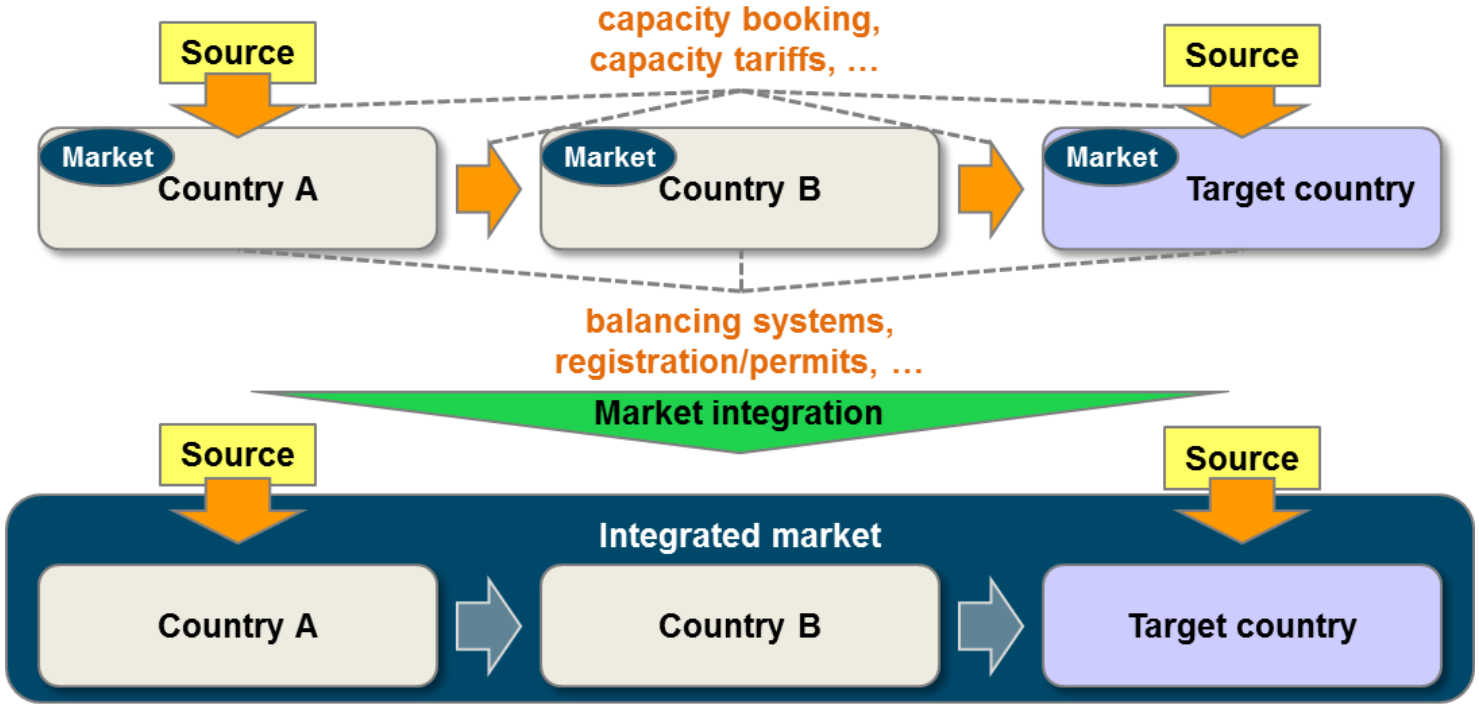


Figure 8: Schematic effect of market integration on barriers to access sources

This implies that the integration scope (i.e. involved countries) shall aim to maximize direct market access for the integration partners (effect only for CPs analyzed), of course limited by the physical ability (and respecting capacity requirements for existing gas flows through integrated market) of the integrated system.

Introduction of the DMA indicator to quantify the increase in direct market access by market integration:

The underlying fundamental question is: What contribution can be expected by direct access to new sources to supply source competition in a target market (here: the Contracting Parties), without any negative impacts on the supply situation of the other markets?

Definition:

The DMA value indicates what percentage of the *net import demand* of the *target* could be covered by the *new direct source*, based on the *available transport capacities*.

- *Target*: The country for which the DMA shall be assessed (i.e. one of the Contracting Parties)
- *Net import demand*: The annual gas import quantity required to fulfil domestic demand that cannot be covered with indigenous production
- *New direct source*: A gas source that becomes directly accessible to the assessment target country by market integration
- *Available transport capacities*: Technical capacity that is not blocked by existing gas flows (see also section 3.2.1.1)

Since this study consists of four pre-selected MIO corridors, each containing multiple Contracting Parties, gaining direct access to many different new sources, the DMA indicator has to be determined for in total 47 independent source-target pairings (background map: ENTSOG):

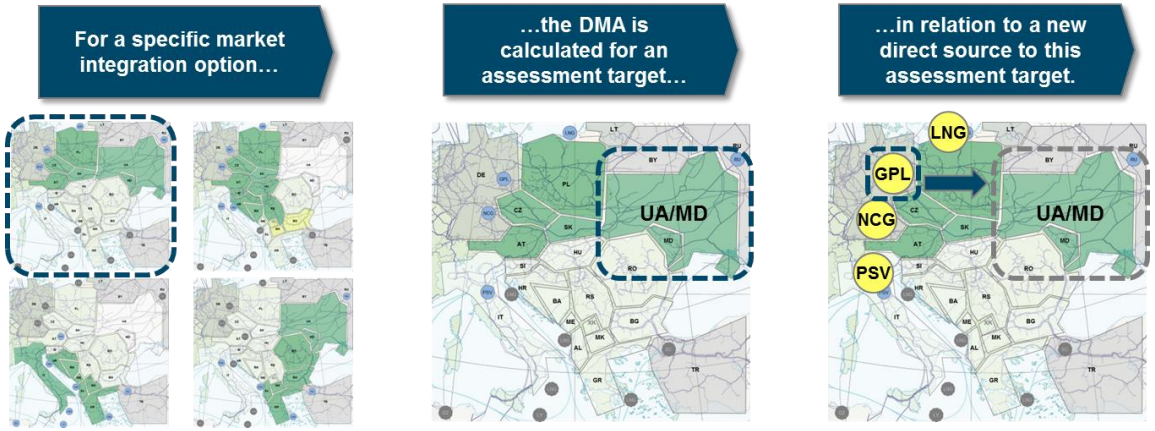
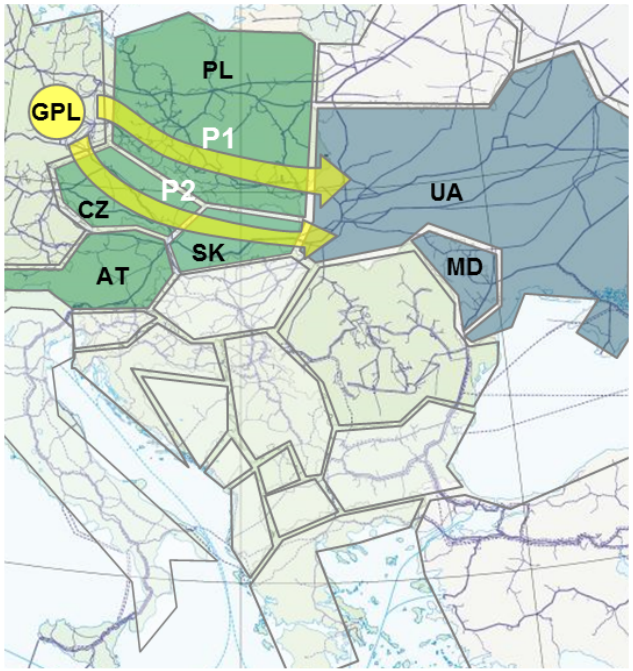


Figure 9: Procedure to determine DMA indicator values

3.2.1 DMA calculation method and example calculation

DMA example scenario:

- **"Ukraine West", determining the direct market access for Ukraine/Moldova to the new source GASPOOL in Germany**
- **Rounded figures**



Background map: ENTSOG

1. Define the feasible paths within the MIO to transport from source to target

$Paths\ i$
$Segments\ j$

Path	Segment 1	Segment 2	Segment 3
P1	GPL>PL	PL>UA	—
P2	GPL>CZ	CZ>SK	SK>UA

2. Determine the capacities available per interconnection segment

$$AC_{ij} = TC_{ij} - BC_{ij}$$

Segment	Technical capacity (TC)	„Blocked" capacity (BC)	Available capacity (AC)
GPL>PL	7 bcm/a	2 bcm/a	5 bcm/a
PL>UA	1 bcm/a	—	1 bcm/a
GPL>CZ	13 bcm/a	5 bcm/a	8 bcm/a
CZ>SK	23 bcm/a	7 bcm/a	16 bcm/a
SK>UA	9 bcm/a	—	9 bcm/a

3. Determine the total capacity available to the target to access the source

$$AC = \sum_{Paths\ i} \min_{Segments\ j} \{AC_{ij}\}^{*}$$

Path	Total available capacity (AC)
P1	1 bcm/a
P2	8 bcm/a
Total	9 bcm/a

4. Calculate the DMA ratio

$$DMA_{Source>Target} = \frac{AC_{Source>Target}}{NID_{Target}}$$

Available capacity (AC)	Net import demand (NID)	DMA
9 bcm/a	20 bcm/a	45%

* Note that in the summation it has to be respected that some paths may use a segment jointly, e.g. if P1 would go over SK, too.

For the base data used to calculate the DMA see section 2.3 (infrastructure base case) and section 3.2.1.1 (blocked capacity).

3.2.1.1 Details regarding blocked capacity

The DMA indicator shall provide a view on the new direct market access a Contracting Party gets additionally to current gas flows to/from other countries. In other words, it shall provide a realistic picture by only assuming unused capacity potentially available for new direct market access. The best proxy for the quantification of existing import and transit patterns of the non-target countries are allocations at interconnection points, as they directly reflect the historical transport needs of market participants:

> Definition:
>
> Blocked capacity is the capacity at an interconnection point *used* by existing import and transit flows and thus is not available for the target country to access the new source.
>
> - *Usage*: Annual average of entry/exit-allocations at the respective interconnection point

The following base data was used to determine the blocked capacity:

No.	Data item	Data sources
1.	Average annual usage	■ Calendar year 2014 allocations taken from *ENTSOG Transparency Platform* (pipeline interconnections as well as LNG terminals) or directly from TSO websites ■ The calendar year 2014 provides the most up-to-date picture, especially since previous years do not reflect the rather strong impact of the change in Ukraine's sourcing on gas flows.

Table 11: Base data for the determination of blocked capacity

Example calculation for the effect of blocked capacity (simplified):

Serbia sourcing from LNG in Poland in MIO 2, looking at the interconnection segment PL>CZ:

- Technical capacity of the Interconnection segment PL>CZ: 0,93 bcm/a
- Capacity usage 2014 based on allocated re-nominations: 0,41 bcm
  - As Serbia currently doesn't import gas via Poland, this whole usage has to be regarded as blocked for Serbia's access to Polish LNG
  - Capacity available for Serbia sourcing from LNG in Poland on the interconnection segment PL>CZ: 0,52 bcm/a
- Incidentally, on the transport path from LNG/PL to RS this is the limiting segment (i.e. lowest available capacity).
- DMA then is obtained as the ratio of this minimum available capacity and the NID of Serbia (1,45 bcm) → 36% → Serbian net import demand may theoretically be covered up to 36% from the new LNG terminal in Poland.

Note 1: Previous indirect source access by the Contracting Party shall fully turn into direct source access: The blocked capacity needs to be stripped from the effect of existing (indirect) imports of the Contracting Party from a source, otherwise the DMA indicator would only show the additional (not the full) potential provided by market integration. To account for these existing imports, their routing – possibly over multiple countries – has to be analyzed and subtracted from the blocked capacity.

A basic example for this is Ukraine's sourcing from the West in 2014:

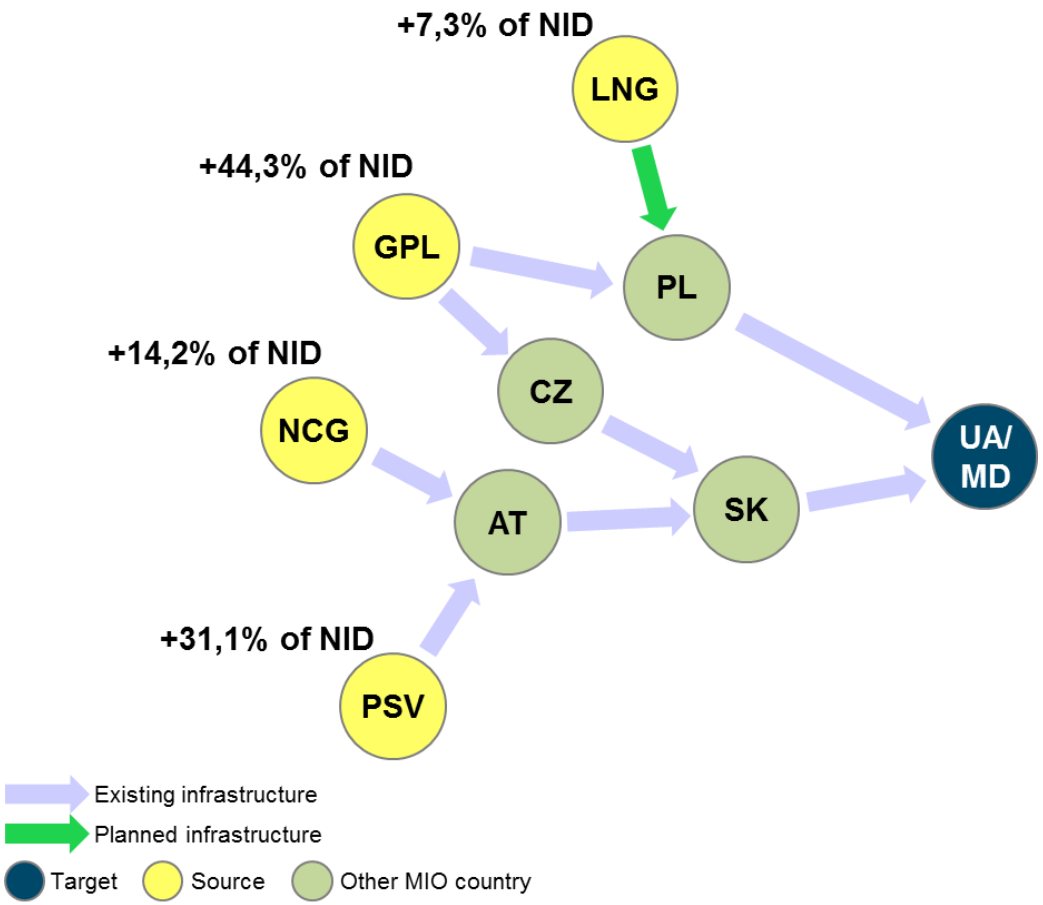
- Ukraine's imports via Slovakia (Budince SK>UA) amounted on average to about 8,2 bcm in 2014.
- This gas could have come either via Austria or via the Czech Republic and can be safely assumed to have been completely consumed in Ukraine.
- As there is no information on exact transit flows for Ukraine, a sound assumption is to map Ukraine imports via Slovakia pro-rata to the AT>SK and CZ>SK borders based on the respective allocations:
  - total imports AT>SK: 1,1 bcm in 2014 → 7% → Ukraine imports via AT estimated at 0,6 bcm for 2014
  - total imports CZ>SK: 14,5 bcm in 2014 → 93% → Ukraine imports via CZ estimated at 7,6 bcm for 2014

Note 2: For new infrastructure blocked capacity is assumed as zero, as the actual usage possibility will depend on long-term contracts that will have to reflect in one way or another the requirement of the respective Contracting Party to be supplied via this new infrastructure**.**

Note 3: Current contractual congestion is not a topic if the interconnection point connects two countries in an integrated market, since the interconnection usage will not be subject to capacity booking of market participants any more but will be based on operational needs and technical possibilities.

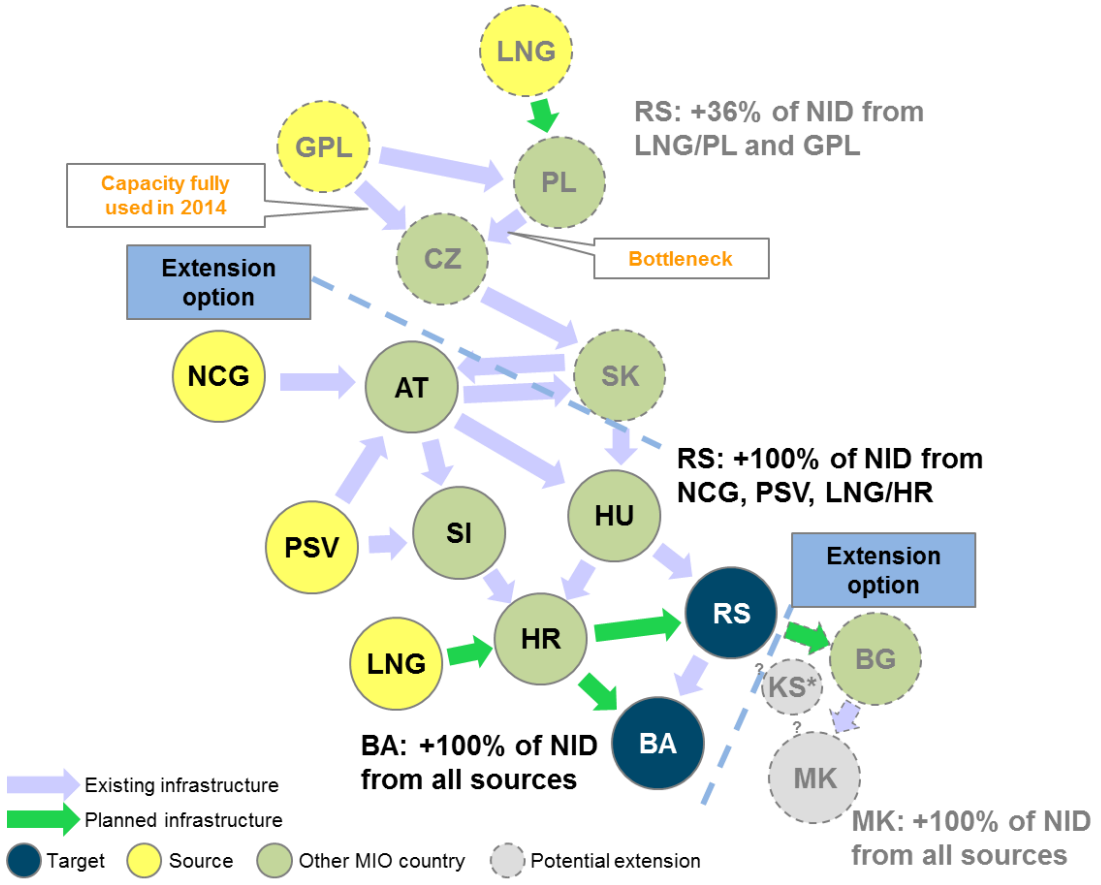
3.2.2 DMA results in detail

3.2.2.1 DMA MIO 1: Ukraine West

DMA RESULTS	EXPLANATION, REMARKS
	■ **Countries involved (CPs/GRI SSE): 2/4** ■ Contribution of Poland restricted due to low technical capacity PL>UA (approx. 1,5 bcm/a) ■ Direct access to NCG is limited by congestion situation at DE>AT border ■ Apart from finalization of the LNG terminal Świnoujście, access to new sources independent from planned infrastructure Note: Arrows only indicate directions used for DMA of the target countries to focus on core topic.

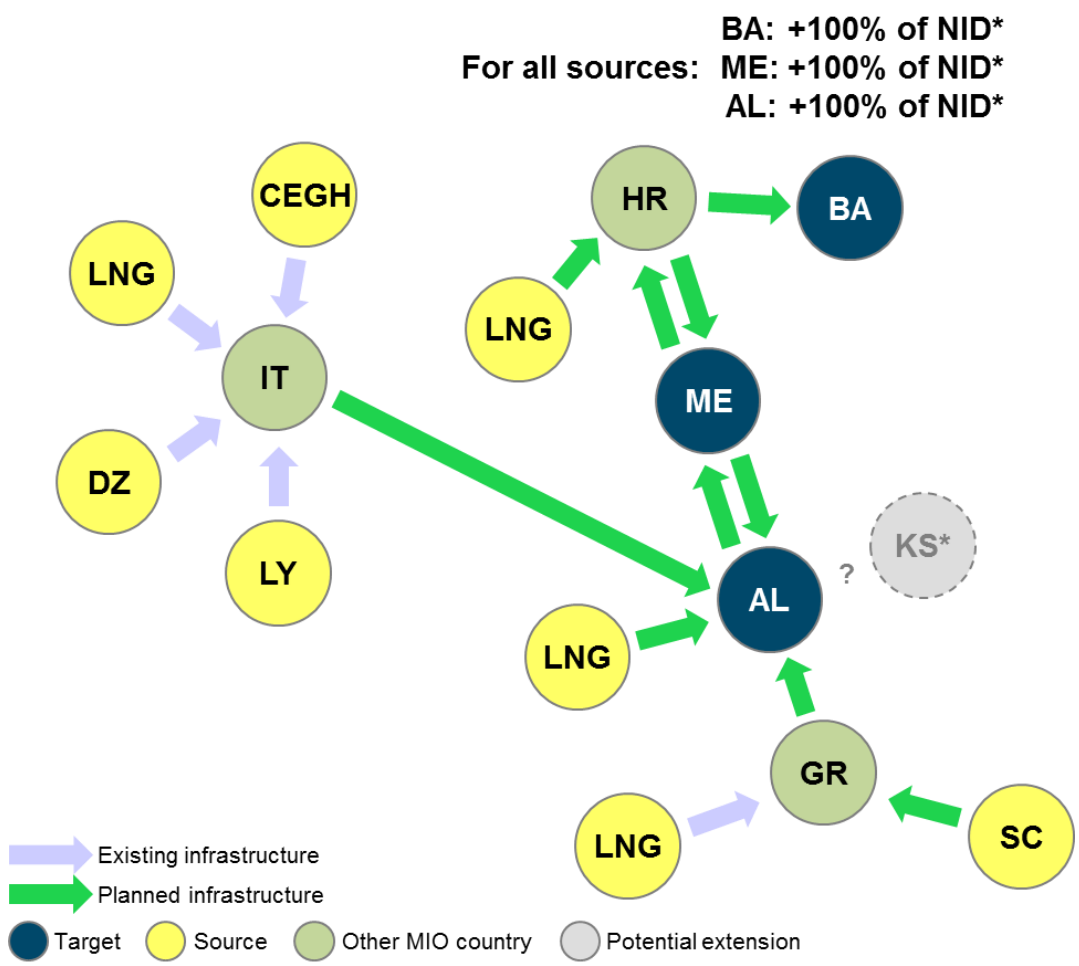
3.2.2.2 DMA MIO 2: Serbia North

DMA RESULTS	EXPLANATION, REMARKS

	■ **Countries involved (CPs/GRI SSE): 2/4**
	■ Capacity to PL (for LNG and GPL) limited by inter-connection PL>CZ: from the 0,93 bcm/a roughly 0,41 bcm/a are blocked based on 2014 allocations
	■ DMA for GPL to RS restricted by fully blocked capacity GPL>CZ in 2014
	■ Access to new sources partly dependent on planned infrastructure[14]:
	  ■ PECI HR-RS required for 100% DMA for RS from PSV (else 67,4%)
	  ■ PECI BG-RS required for any DMA for MK
	  ■ PECI LNG HR required to provide new LNG source
	■ Extension option for Macedonia (based on recent decision on RS-BG interconnector)
	■ Future potential to include Kosovo either via RS or via MK
	
	Note: Arrows only indicate directions used for DMA of the target countries to focus on core topic.

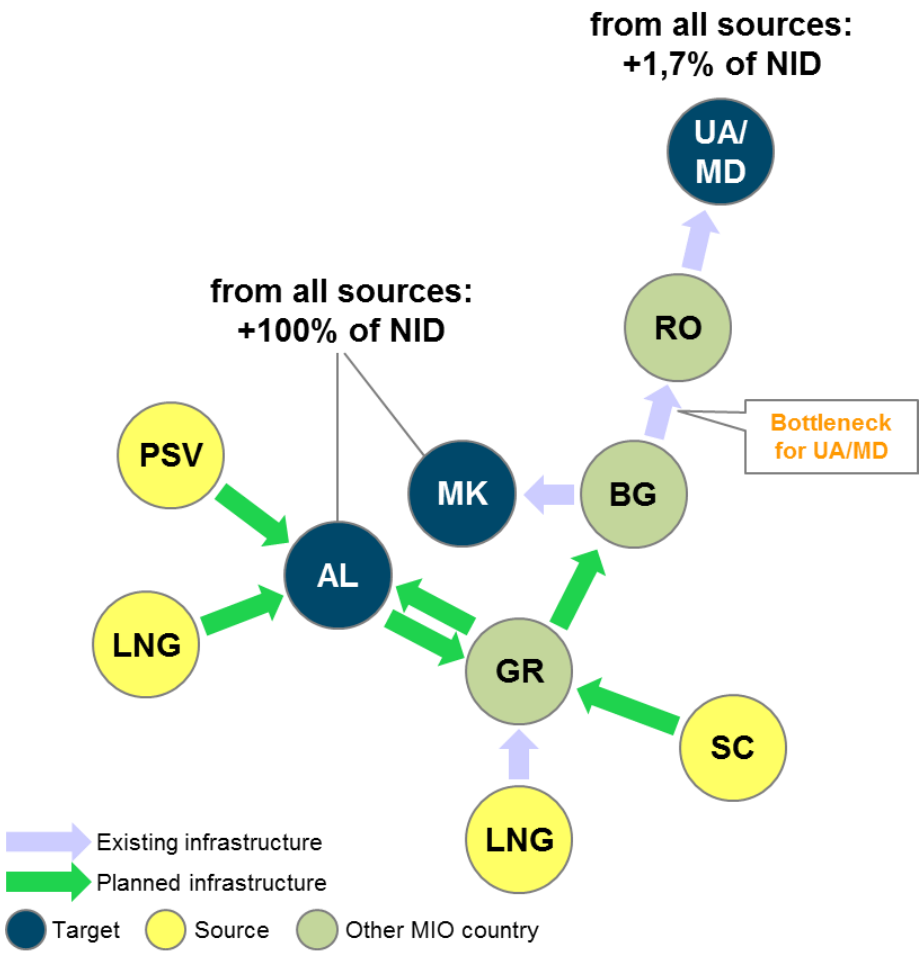
[14] This planned infrastructure is part of the CESEC priority projects and conditional priority projects, see *CESEC Memorandum of Understanding*.

3.2.2.3 DMA MIO 3: Adriatic integration

DMA RESULTS	EXPLANATION, REMARKS
	■ **Countries involved (CPs/GRI SSE): 3/3** ■ In general, very high potential to access different sources for the contracting parties along the Ionian Sea and Adriatic Sea ■ Prerequisite: Realization of PECI projects ■ Note that the consumption forecast for these countries is quite low and there is still some headroom for higher demand and still very good sourcing access. ■ Access to new sources fully dependent on planned infrastructure ■ *Net import demand figures based on 2020 projection provided in *ECS Strategy and PECIs* p.47) Note: Arrows only indicate directions used for DMA of the target countries to focus on core topic.

3.2.2.4 DMA MIO 4: Ukraine South

DMA RESULTS	EXPLANATION, REMARKS

	■ **Countries involved (CPs/GRI SSE): 4/3**
	■ Data available suggests bottleneck for route towards Ukraine at BG>RO border:
	  ■ ENTSOG does not publish any technical capacity in direction BG>RO, as a figure is only available from BulgarTransGaz but not also from Transgaz in RO.
	  ■ So for this analysis, the most recent (end 2014) technical capacity of only 0,3 bcm/a as stated by BulgarTransGaz was taken.
	  ■ DMA for early 2014 technical capacity of about 2,2 bcm/a would be about 10,7% instead of 1,7%.
	■ Access to new sources fully dependent on planned infrastructure (e.g. priority projects according to *CESEC Memorandum of Understanding*)
	
	Note: Arrows only indicate directions used for DMA of the target countries to focus on core topic.

3.2.3 Direct market access summary

DMA model characteristics:

Determination of the maximum potential per source-target combination:

- By focussing on each source-target combination, the maximum potential of direct market access is derived on an individual basis.
- It is assumed that a source can be used for the Contracting Party to diversify its gas supply, as long as sufficient interconnection capacity is available.

Current import and transit patterns reflected:

- Existing import and transit patterns of the non-target countries reduce firm interconnection capacity available for direct market access.
- No consideration of virtual reverse flows (uncertain, but would further improve direct market access possibilities)

Annual view on capacity, consumption and production figures:

- The calculation is made based on annual averages and therefore relies on seasonal structuring for the target country downstream to bottlenecks by storage and by shifting of gas flows between different supply sources.
- Using net import demand reflects indigenous production of the country.

DMA results summary:

In the following results tables, the target countries are listed in the first column and the new direct sources are listed in the first row:

MIO 1 UKRAINE WEST

DMA to/from	IT/PSV	DE/NCG	DE/GPL	PL/LNG
UA/MD	31,1%	14,2%	44,3%	7,3%

MIO 2 SERBIA NORTH (EXTENSION OPTIONS MARKED IN GREY)

DMA to/from	DE/NCG	HR/LNG	IT/PSV	PL/LNG	DE/GPL
RS	100%	100%	100%	36%	36%
BA	100%	100%	100%	100%	100%
MK	100%	100%	100%	100%	100%

MIO 3 ADRIATIC INTEGRATION

DMA to/from	AT/CEGH	HR/LNG	IT/LNG	IT/DZ	IT/LY	AL/LNG	GR/LNG	GR/SC
BA	100%	100%	100%	100%	100%	100%	100%	100%
ME*	100%	100%	100%	100%	100%	100%	100%	100%
AL*	100%	100%	100%	100%	100%	-	100%	100%

MIO 4 UKRAINE SOUTH

DMA to/from	PSV	SC	GR/LNG	AL/LNG
UA/MD	1,7%	1,7%	1,7%	1,7%
MK	100%	100%	100%	100%
AL*	-	100%	100%	-

Table 12: DMA results per MIO

* Since these countries do not have a gas sector yet, DMA was calculated with a NID based on a 2020 forecast provided by ECS.

Note that DMA figures cannot simply be added up, as different source-target combinations may use (partly) the same infrastructure.

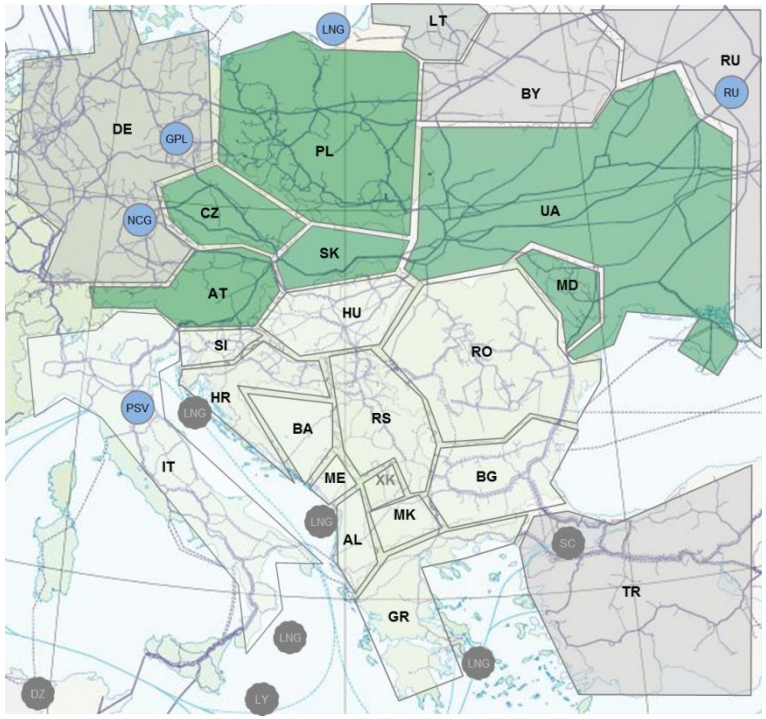
3.3 RESULTS: MARKET INTEGRATION OPTIONS FOR CEE/SEE

After identification of the most suited market integration options based on the pre-selection, the DMA assessment and in alignment with the ECS, in the formal consultation with NRAs in July 2015 the final market integration options were defined as follows:

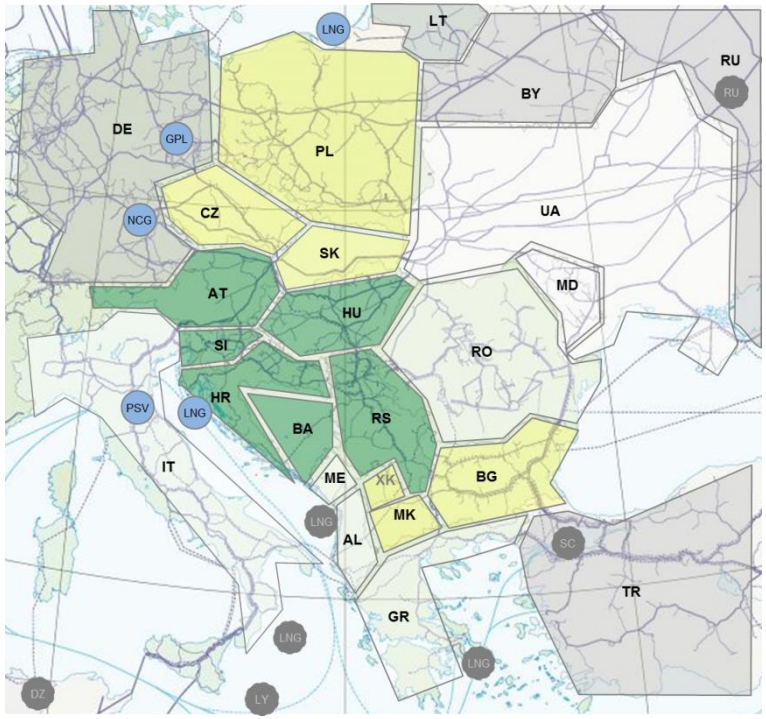
	MIO 1 UKRAINE WEST		MIO 2 SERBIA NORTH		MIO 3 ADRIATIC INTEGRATION		MIO 4 UKRAINE SOUTH	
PARTICIPATING COUNTRIES (GREY: EXTENSION OPTIONS)	CPs: ■ UA ■ MD	GRI SSE: ■ AT ■ CZ ■ SK ■ PL	CPs: ■ RS ■ BA ■ (MK) ■ (KS*)	GRI SSE: ■ AT ■ HR ■ SI ■ HU ■ (BG) ■ (SK) ■ (CZ) ■ (PL)	CPs: ■ AL ■ BA ■ ME ■ MK	GRI SSE: ■ HR ■ GR ■ IT	CPs: ■ UA ■ MD ■ AL ■ MK	GRI SSE: ■ RO ■ BG ■ GR
PROPERTIES	■ Includes CEGH market ■ Provides considerable direct access to new sources for UA & MD ■ Based on existing infrastructure		■ Includes CEGH market ■ Provides extensive direct access to new sources for RS & BA ■ Based on existing infrastructure ■ Flexibility for scope extension (integrate MK and KS*)		■ Includes PSV market ■ Provides extensive direct access to different sources for Ionian-Adriatic region ■ Fully depends on planned infrastructure		■ Does not include mature market ■ Relatively low direct access to new sources for Ukraine ■ Fully depends on planned infrastructure	
NEW DIRECT SOURCES	4		3 (extended: 5)		8		4	
DEPENDENCE OF DMA ON PLANNED INFRASTRUCTURE	only for LNG/PL		only for LNG/HR (extended: and LNG/PL)		full		full	
TOTAL NID	51,5 bcm/a		16,5 bcm/a (extended: 43,2 bcm/a)		56,6 bcm/a		26,4 bcm/a	

Table 13: Summary of MIOs for the geographical scope of this study

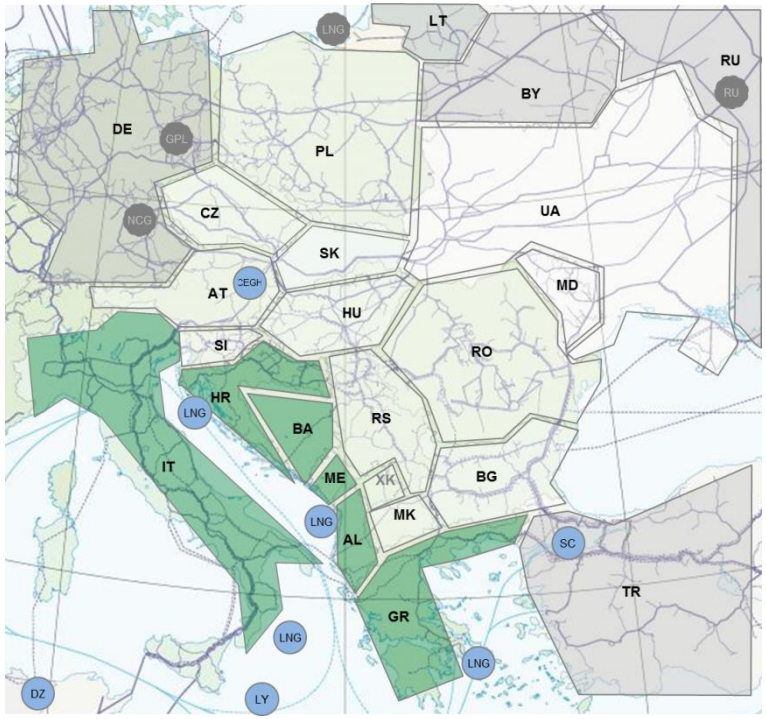
3.3.1 MIO 1: Ukraine West integration

GEOGRAPHICAL SCOPE (background map: ENTSOG)	PARTICIPATING COUNTRIES	SHORT DESCRIPTION	AGGREGATED NET IMPORT DEMAND	IMPROVED MARKET SITUATION
	<u>CPs:</u> ■ UA ■ MD <u>GRI SSE:</u> ■ AT ■ CZ ■ SK ■ PL	■ Based on existing infrastructure only ■ Integrate Ukraine towards the West, to gain direct access to the closest mature gas hubs in Western Europe ■ CEETR-project (AT, CZ, SK) provides a good starting point for market integration ■ Covers already advanced markets and potential for LNG	51,5 bcm/a	<u>Includes relevant markets:</u> ■ Tier 1: AT ■ Tier 2: CZ, SK, PL <u>Direct access to sources:</u> ■ Gaspool VTP (via PL, CZ) ■ NCG VTP (via AT, CZ) ■ PSV VTP (via AT) ■ LNG (via PL) ■ Russia (via UA)

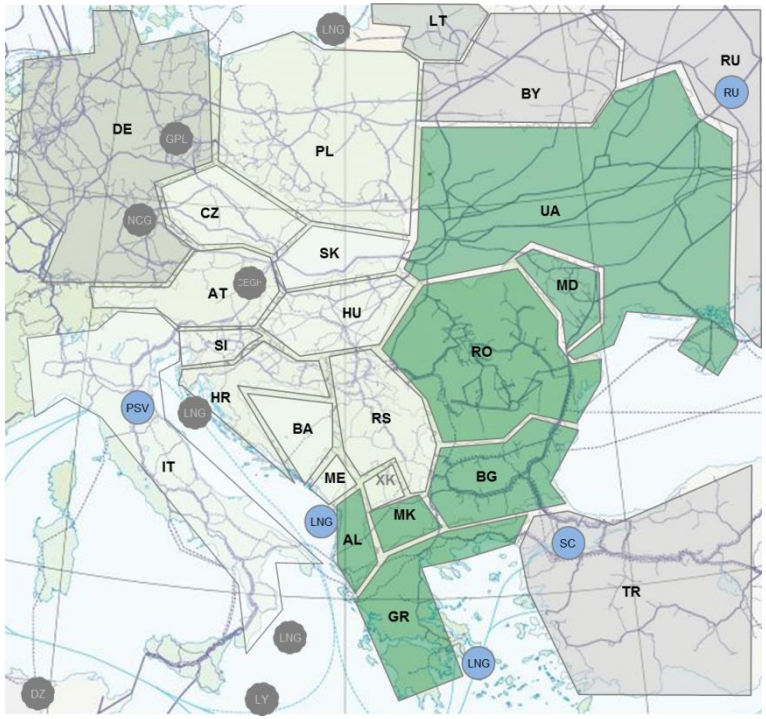
3.3.2 MIO 2: Serbia North integration

GEOGRAPHICAL SCOPE (background map: ENTSOG)	PARTICIPATING COUNTRIES	SHORT DESCRIPTION	AGGREGATED NET IMPORT DEMAND	IMPROVED MARKET SITUATION
 *yellow: extension options*	CPs: ■ RS ■ BA ■ (MK) ■ (KS*) GRI SSE: ■ AT ■ HR ■ SI ■ HU ■ (BG) ■ (SK) ■ (CZ) ■ (PL)	■ Mainly based on existing infrastructure ■ Analogous to the Ukraine West corridor, the aim is to integrate Serbia towards the North(-West), to gain direct access to the closest mature gas hubs in Western Europe ■ Covers already advanced markets and potential for LNG ■ Provides the possibility for market integration of Bosnia/Herzegovina without requiring new infrastructure ■ Optional extension to Macedonia (and potentially even Kosovo)	16,5 bcm/a (43,2 bcm/a)	Includes relevant markets: ■ Tier 1: AT ■ Tier 2: HU, CZ, SK, PL Direct access to sources: ■ NCG VTP (via AT, CZ) ■ PSV VTP (via AT, SI) ■ LNG (via HR, PL) ■ Gaspool VTP (via CZ, PL)

3.3.3 MIO 3: Adriatic integration

GEOGRAPHICAL SCOPE (background map: ENTSOG)	PARTICIPATING COUNTRIES	SHORT DESCRIPTION	AGGREGATED NET IMPORT DEMAND	IMPROVED MARKET SITUATION
	CPs: ■ AL ■ BA ■ ME ■ MK GRI SSE: ■ HR ■ GR ■ IT	■ Fully depends on planned infrastructure ■ Scenario that includes all Contracting Parties covered by the IAP ■ Italy will function as the developed market place ■ Integration with Greece to directly access the southern corridor ■ Croatia is mainly added to provide the interconnection of Bosnia with IAP (depends on eventual routing of IAP)	56,6 bcm/a	Includes relevant markets: ■ Tier 1: IT ■ Tier 2: GR Direct access to sources: ■ LNG (via GR) ■ LNG (via HR, planned) ■ Southern Corridor (via GR) ■ CEGH VTP (via IT) ■ [NCG VTP (via IT by transit through CH)] ■ Algeria (via IT) ■ Libya (via IT)

3.3.4 MIO 4: Ukraine South integration

GEOGRAPHICAL SCOPE (background map: ENTSOG)	PARTICIPATING COUNTRIES	SHORT DESCRIPTION	AGGREGATED NET IMPORT DEMAND	IMPROVED MARKET SITUATION
	<u>CPs:</u> ■ UA ■ MD ■ AL ■ MK <u>GRI SSE:</u> ■ RO ■ BG ■ GR	■ Fully depends on planned infrastructure ■ Integrate Ukraine to the South towards Greece to access Southern Corridor gas and LNG, as well as Romanian indigenous production. Furthermore, via Albania PSV and Eagle LNG may be accessed ■ Ukraine‘s gas sourcing from the West continues similar as currently done via SK, HU and PL ■ Provides the possibility for market integration of MK without requiring new infrastructure ■ Probably lower market development speed for this geographical scope	26,4 bcm/a	<u>Includes relevant markets:</u> ■ Tier 1: — ■ Tier 2: GR, RO, BG <u>Direct access to sources:</u> ■ PSV VTP (via GR) ■ Southern Corridor (via GR) ■ LNG (via GR) ■ LNG (via AL) ■ Russia (via UA)

4 COST-BENEFIT ANALYSIS

Based on the definition of the potential geographic scope of market integration (see previous chapter 3), an assessment of associated costs and benefits of such integration projects has been performed.

Given the different market integration models proposed in the *AGTM*, the cost-benefit analysis (CBA) is prepared for the “maximum integration” provided by a full market merger of currently separated national markets. Based on these results, the implications of integrating these markets with alternative market integration tools (trading region, satellite market) will be analyzed at a later stage when considering the market integration tools in detail.

In line with the *AGTM* requirements for such assessments, the following 2 perspectives have been considered:

- market functioning perspective and
- welfare perspective.

To the extent possible, the respective costs and benefits have been quantified and for reasons of comparability results are stated in EUR/year. By doing so, the analysis focuses on mid-term effects of steady-state market integration. The analysis period for benefit quantification (of primary categories) is calendar year 2014. If data for 2014 are not available, respective data available for 2013 are considered as default values.

In some cases the current level of gas market development and/or a lack of required and reliable input data has not allowed for quantification. In such cases a qualitative assessment has been executed.

The overall treatment of the selected geographic market integration options in the cost-benefit analysis is summarized in the following table:

	COUNTRIES	GENERAL TREATMENT IN THE COST-BENEFIT ANALYSIS
MIO 1 „UKRAINE WEST INTEGRATION“	AT, CZ, MD, PL, SK, UA	Analyzed and quantified to the extent possible
MIO 2 “SERBIA NORTH INTEGRATION”	AT, BA, HU, HR, RS, SI[15]	Analyzed and quantified to the extent possible
MIO 3 “ADRIATIC INTEGRATION”	AL, BA, GR, HR, IT, ME	Current level of gas market development of the Contacting Parties included in MIO 3 does not allow for a quantification of results (no gasification yet, currently minor share of gas in total energy consumption due to non-access to gas sources, dependence on infrastructure projects to gain access).
MIO 4 “UKRAINE SOUTH INTEGRATION”	AL, BG, GR, MD, MK, RO, UA	Due to lack of information regarding infrastructure investments to overcome capacity restrictions between Bulgaria and Romania (for gas flows towards Ukraine) MIO 4 has not been quantified regarding welfare benefits but could be a feasible option for market integration if sufficient interconnection capacities are created when implementing the CESEC priority projects according to the *CESEC Memorandum of Understanding*.

Table 14: Treatment of the selected MIOs in the cost-benefit analysis

4.1 MARKET FUNCTIONING PERSPECTIVE

According to the *AGTM*, a series of metrics is used to assess whether wholesale markets are well-functioning. Based on the analysis of relevant data and information for considered markets, two main groups of metrics have been evaluated:

- *Market health metrics*: focussing on the competitiveness, resilience and the security of supply of a market
- *Market participants' needs metrics*: focussing on the availability of products and the liquidity of a market

In addition to the calculation methodology the *AGTM* also states thresholds for these metrics that indicate a well-functioning wholesale market.

[15] For MIO 2, possible extensions are: BG, CZ, MK, SK, PL.

4.1.1 Market health metrics

According to the *AGTM*, this set of metrics is used to assess how "healthy" a wholesale market is, i.e. how competitive, resilient and how secure its supply is, by using the following metrics:

- Number of supply sources
- Herfindahl-Hirschmann Index (HHI)
- Residual Supply Index (RSI)

In the following section the theoretical concept and rationale of these metrics is introduced and the results of conducted calculations – both for the individual Contracting Parties to be integrated and projected to considered MIOs - are presented.

4.1.1.1 Number of supply sources

General concept

The number of supply sources indicates the diversity of supply sources of a given market. It counts the supply sources per market from imports (pipeline gas or LNG) and indigenous production. Since it does not directly reflect the competitive level of a market, it should always be considered in context with other metrics like the Herfindahl-Hirschmann Index or the Residual Supply Index. According to ACER, three or more supply sources per country are considered the minimum to achieve a reasonable diversification of supplies.

Calculation methodology

Supply data for Contracting Parties has been provided by NRAs and used for analysis accordingly[16]. For EU members included in considered MIOs *Eurostat* import data has been used under the assumption that only countries that have a surplus of production are regarded as sources. For non-EU countries, consumption and production data from *BP Statistical Review 2015* were used to determine net exporting countries.

[16] Supply to Ukraine from Western sources has been detailed by secondary research and usage of the following internet source: http://www.theinsider.ua/rus/business/kto-i-otkuda-postavlyal-gaz-v-ukrainu/

Results for individual Contracting Parties[17]

	BA	MD	RS	UA	MK	AL	KS*	ME
No. of Supply Sources	1 RU	2 RU, RO[18]	2[19] RU, IP	5+ RU, DE, FR, NO IP[20]	1 RU	1 IP	n.a.	n.a.

Table 15: Number of supply sources for Contracting Parties

Results for considered MIOs based on existing sources

	Countries	No. of supply sources	Overview of sources
MIO 1 Ukraine West	AT, CZ, MD, PL, SK, UA	7	Russia, Norway, Netherlands, Qatar, Egypt, Trinidad and Tobago, indigenous production
MIO 2 Serbia North	AT, BA, HU, HR, RS, SI[21]	10	Russia, Norway, Netherlands, Qatar, Egypt, Trinidad and Tobago, Algeria, Libya, Kazakhstan, indigenous production
MIO 3 Adriatic Integration	AL, BA, GR, HR, IT, ME	16	Russia, Norway, Netherlands, Qatar, Egypt, Trinidad and Tobago, Algeria, Libya, Kazakhstan, Nigeria, Peru, Oman, Yemen, Iran, Azerbaijan, indigenous production
MIO 4 Ukraine South	AL, BG, GR, MD, MK, RO, UA	14	Russia, Norway, Netherlands, Qatar, Egypt, Trinidad and Tobago, Algeria, Nigeria, Peru, Oman, Yemen, Iran, Azerbaijan, indigenous production

Table 16: Number of supply sources for considered MIOs

[17] Note: IP is used to abbreviate indigenous production.
[18] According to NRA information there is also a minor amount of indigenous production (<1% of imports) that was not qualified as supply source for this metric.
[19] In 2013 the number of supply sources was 3 since additionally gas from Kazakhstan was imported.
[20] There are also minor supplies from companies situated in other European, which in total amount to approx. 3% of imports and were not qualified as supply sources for this metric.
[21] Including all possible extensions (BG, CZ, MK, SK, PL) for MIO 2, the number of supply sources stays the same.

4.1.1.2 Herfindahl-Hirschmann Index

General concept

The Herfindahl-Hirschmann Index (HHI) measures the concentration of gas producers supplying an examined market and is often used by competition authorities when investigating mergers or acquisitions. Higher HHI indicates higher market concentration, i.e. fewer suppliers or greater market shares by few suppliers. According to the AGTM the threshold for the HHI requires a HHI less than 2.000.

Calculation methodology

The HHI is calculated as sum of squared market shares (in %) of gas producers supplying a market at import level. This requires data on supply per supplying country, composition of that country's supply by company and ownership of companies.

For all Contracting Parties without publicly available information on the detailed composition of supply market shares of individual firms, calculations have been made based on the following assumptions:

- for all supplying countries with import shares > 5% (Russia, Qatar, Libya, Algeria) supply is attributed to an individual supply company based on desk research of export structure/framework of these countries;
- for all supplying countries with import shares ≤ 5% supply is also attributed to an individual supply company since the consideration of potentially more than one supply company per such supply country would have negligible influence on the calculated HHI (< 1% of HHI).

Using *Eurostat* data for EU members and import data for Contracting Parties provided by NRAs, the HHI for all Contracting Parties and considered MIOs has been calculated. The HHI for EU members, used as comparison for the obtained results, is stated according to results provided by the *AGTM*.

Note that due to the focus on import market shares, for an integrated market the overall HHI can be higher than the HHI of some individual countries.

Results for Contracting Parties

	BA	MD	RS	UA	MK	AL	KS*	ME
HERFINDAHL-HIRSCHMANN INDEX	10.000	9.980	10.000	4.333[22]	10.000	n.a.	n.a.	n.a.

Table 17: Herfindahl-Hirschmann Index for Contracting Parties

[22] Company shares used as provided by the following internet source: http://www.theinsider.ua/rus/business/kto-i-otkuda-postavlyal-gaz-v-ukrainu/

Results for selected MIOs

	Countries	HHI for separated markets		HHI for integrated market
		EU countries	Contracting Parties	
MIO 1 Ukraine West	AT, CZ, MD, PL, SK, UA	AT 7.500	UA 4.333	8.060
		CZ 9.051		
		SK 9.595	MD 9.980	
		PL 4.550		
MIO 2 Serbia North (incl. extensions)	AT, BA, HU, HR, RS, SI (BG, CZ, MK, SK, PL)	AT 7.500	BA 10.000	7.877 (8.168)
		CZ 9.051		
		SK 9.595		
		PL 4.550	RS 10.000	
		SI 5.027		
		HU 3.198		
		HR 5.987		
MIO 3 Adriatic integration	AL, BA, GR, HR, IT, ME	IT 2.093	BA 10.000	2.805
		HR 5.987	ME n.a.	
		GR 5.181	AL n.a.	
MIO 4 Ukraine South	AL, BG, GR, MD, MK, RO, UA	RO 3.270	UA 4.333	8.081
		BG 7.587	AL n.a.	
		GR 5.181	MD 9.980	
			MK 10.000	

Table 18: Herfindahl-Hirschmann Index for considered MIOs

4.1.1.3 Residual Supply Index

General concept

The Residual Supply Index (RSI) measures a market's potential to be sufficiently supplied by alternative sources in case of ceased supplies of the currently largest supplier. It determines, from a capacity perspective, the relationship between the sum of the supply capabilities of all suppliers except the largest source and total demand in the market. A high RSI means that the largest supplier is less pivotal for a market in order to meet its demand. ACER states a threshold of at least 110% of consumption.

Calculation methodology

The RSI is calculated as the sum of potential import volumes (excl. the largest supplier) and indigenous production in relation to the consumption of the examined market according to the following formula (all input data in energy units per annum):

$$RSI = \frac{IP + RAI_{Pipeline} + RAI_{LNG}}{C}$$

- IP…annual indigenous production
- $RAI_{Pipeline}$…remaining available imports (pipeline entries), from all but the largest supplier
- RAI_{LNG}… remaining available imports (LNG entries), from all but the largest supplier
- C…annual consumption

To obtain the remaining available imports the following methodology is applied:

- The largest supplying country of an examined market is determined on the basis of historical import volumes according to the results of national market review (factsheets for Contracting Parties, see section 2.2 and *Eurostat* import data for EU members).
- The pipeline (or LNG) routes used by the largest supplier are assumed to be not available for the supply of the examined market any more. All other pipeline and LNG technical entry capacities (based on the results of the national market review) which may be used to import gas into the examined market are considered as remaining capacities (RC).
  - Note: For the considered countries, it can be assumed that there are no transit volumes which need to be deducted from the calculated potential import volumes (on a firm capacity basis) since these transits always represent gas delivered by the countries' largest supplier and thus will not remain in place, if its supply to a considered country ceases.

- These remaining annual technical entry capacities are transferred into potentially available import volumes applying the utilization percentages according to the *AGTM* methodology[23]:
  - 85% utilization of technical pipeline entry capacities → $RAI_{Pipeline} = 0{,}85 * RC_{Pipeline}$
  - 75% utilization of technical LNG regasification capacities → $RAI_{Pipeline} = 0{,}75 * RC_{LNG}$

The RSI has been calculated for all Contracting Parties and considered MIOs. The RSI for EU members, used as comparison for the obtained results, is stated according to results provided by the *AGTM*. The results are summarized in the tables below.

Results for Contracting Parties

	BA	MD	RS	UA	MK	AL	KS*	ME
RESIDUAL SUPPLY INDEX	0%	27%	24%	88%	0%	n.a.	n.a.	n.a.

Table 19: Residual Supply Index for Contracting Parties

[23] See also *AGTM* annex 3 section 7.7.3

Results for selected MIOs

	Countries	RSI for separated markets		RSI for integrated market
		EU countries	Contracting Parties	
MIO 1 Ukraine West	AT, CZ, MD, PL, SK, UA	AT 143%	UA 88%	156%
		CZ 159%		
		SK 369%	MD 27%	
		PL 56%		
MIO 2 Serbia North (incl. extensions)	AT, BA, HU, HR, RS, SI (BG, CZ, MK, SK, PL)	AT 143%	BA 0%	130% (161%)
		CZ 159%		
		SK 369%		
		PL 56%	RS 24%	
		SI 74%		
		HU 60%		
		HR 125%		
MIO 3 Adriatic integration	AL, BA, GR, HR, IT, ME	IT 108%	BA 0%	158%
		HR 125%	ME n.a.	
		GR 131%	AL n.a.	
MIO 4 Ukraine South	AL, BG, GR, MD, MK, RO, UA	RO 104%	UA 88%	137%
		BG 13%	AL n.a.	
		GR 131%	MD 27%	
			MK 0%	

Table 20: Residual Supply Index for considered MIOs

4.1.2 Market participants' needs metrics

In addition to market health metrics, the *AGTM* includes the analysis of market functioning against the background of market participants' needs regarding available products and liquidity in order to enable their effective management of wholesale market risks.

The following table provides an overview of these metrics incl. an explanation of their rationale and the input data required for calculation.

	Explanation	Input Data
Order Book Volumes	■ Examines the availability of sufficient bid and offer volumes ■ Calculated separately for bid- and offer- side on spot, prompt and forward market ■ Higher volumes → better market functioning	Full set of visible order book entries for day-ahead, front-month and forward products
Bid-Offer Spread	■ Examines how close best offer-price and best bid-price are (as percentage of best bid-price) ■ Calculated separately for spot, prompt and forward market ■ Lower spread → better market functioning	Full set of visible order book entries for day-ahead, front-month and forward products
Order Book Price Sensitivity	■ Examines how close average offer and bid prices are to the best prices ■ Calculated separately for bid- and offer- side on sport, prompt and forward market ■ Lower mark-ups and mark-downs → better market functioning	Full set of visible order book entries for day-ahead, front-month and forward products
Number of Trades	■ Examines presence of sufficient number of executed trades ■ Calculated separately for spot, prompt and forward market ■ Higher number of trades → better market functioning	Full set of trades for day-ahead, front-month and forward products

Table 21: Market participants' needs metrics overview

Given the current state of development of the Contracting Parties' gas markets, organised wholesale markets are not established yet. Therefore, the input data required for the calculation of these metrics are not available and an alternative approach needs to be taken.

Alternative approach to estimate market participants' needs metrics for considered MIOs

Currently, the Contracting Parties clearly do not meet the *AGTM* requirements for market participants' needs. However, focusing on the future situation and considering the integration of these national markets with EU markets in order to establish the MIOs considered in this study, the analysis results regarding market health in section 4.1.1 show, that market integration will:

- improve direct access to additional supply sources substantially;
- reduce market concentration and
- strengthen the markets' resilience while reducing the dependence from their largest suppliers.

Based on the results above, the considered MIOs meet the *AGTM* requirements not entirely but for the majority of market health metrics, which is the same for most of functioning EU gas markets. In combination with increased market size (e.g. referring to the metric "market zone size" of the initial gas target model) of integrated markets, it can be assumed that, over time, market integration will lead to the same results for market participants' needs metrics for considered MIOs as EU markets with comparable market size currently achieve.

The following tables provide an overview for the range of results for the market participants' needs metrics defined in the *AGTM* achieved by EU markets with comparable market size[24] (>30 bcm):

- PSV (IT) with 61 bcm/a;
- GASPOOL (DE) with 35 bcm/a;
- NCG (DE) with 41 bcm/a;
- TTF (NL) with 35 bcm/a;
- NBP (UK) with 72 bcm/a.

The tables below show the lowest value of these markets in line "from" and the highest value of these markets in line "to" and thus give a range of results these markets achieve and an indication of to be expected results for the considered MIOs.

[24] Source: *Eurogas preliminary Gas Consumption 2014*

		Forward products Wholesale market metrics (absolute values), 2013								
		Metric 1 Average liquid order book horizon (months) with at least 120MW in the order book		Metric 2 Average bid-offer spread (%)		Metric 3 Order book price sensitivity: Average price markup/markdown (%) on best offer/bid				Metric 4 Average trading horizon (months)
		Offer side	Bid side	12th month	24th month	12th month: for 120 MW		24th month: for 90 MW		
						Offer side	Bid side	Offer side	Bid side	
> 30 bcm/a	from	0,3	0,3	0,2%	0,4%	0,2%	0,1%	0,1%	0,1%	0,3
	to	24,1	23,8	1,4%	0,6%	0,2%	0,2%	0,1%	0,2%	24,1
Threshold		≥17 months ahead with at least 120 MW		≤0.7% of bid-price for 24 months ahead		≤0.2% price distance between average price for 120 MW and best price for 24 months ahead				≥22 months with at least 8 trades per day

Table 22: Market participants' needs metrics - forward products

		Front month product Wholesale market metrics (absolute values), 2013					
		Metric 1 Median volume (MW) in the order book		Metric 2 Average bid-offer spread (%)	Metric 3 Order book price sensitivity: Average price markup/markdown (%) for 120 MW on best offer/bid		Metric 4 Median number of deals per day
		Offer side	Bid side		Offer side	Bid side	
> 30 bcm/a	from	74	71	0,2%	0,1%	0,1%	3
	to	837	872	1,3%	0,3%	0,4%	350
Threshold		≥470 MW		≤0.2% of bid-price	≤0.1% price distance between average price for 120 MW and best price		≥160

Table 23: Market participants' needs metrics – front-month products

		Day-ahead product Wholesale market metrics (absolute values), 2013					
		Metric 1		Metric 2	Metric 3		Metric 4
		Median volume (MW) in the order book		Average bid-offer spread (%)	Order book price sensitivity: Average price markup/markdown (%) for 120 MW on best offer/bid		Median number of deals per day
		Offer side	Bid side		Offer side	Bid side	
> 30 bcm/a	from	250	270	0,2%	0,00%	0,00%	17
	to	6.062	6.149	1,0%	0,27%	0,23%	483
Threshold		≥2.000 MW		≤0.4% of bid-price	≤0.02% price distance between average price for 120 MW and best price		≥420

Table 24: Market participants' needs metrics - day-ahead products

4.2 WELFARE PERSPECTIVE

4.2.1 Fundamentals of the analysis

Welfare creation based on market integration net benefits

From a theoretical point of view, market integration leads to welfare creation if attributed gross benefits of market integration exceed costs attributed to market integration. For the market integration options considered in this study there are no costs being attributed to market integration, because:

- the infrastructure base case considered for the analysis is based on PECI projects which are planned irrespectively of market integration;
- quantified benefits reflect remaining interconnectivity restrictions of markets to be integrated and are therefore reduced accordingly;
- one-off costs[25] are potentially offset by savings of establishing market functions for individual markets. Since it is not foreseeable whether this effect results in net savings or additional costs, this effect has not been considered. This effect is illustrated by the following two scenarios assuming 5 participating and to-be-integrated markets (figures are illustrative and exemplary):
  - *Scenario 1 – market functions not yet established in separate markets → net savings case:*
    - cost of establishing central balancing entity and VTP operator for integrated market = EUR 5 m
    - avoided costs on otherwise (without market integration) required establishing of central balancing entities and VTP operators in each country = EUR 15 m (5 countries à EUR 3 m per country)
    - net savings due to market integration = EUR 10 m (- actual costs + avoided costs)
  - *Scenario 2 – market functions already established in separate markets (costs already incurred) → additional costs case:*
    - costs of establishing central balancing entity and VTP operator for integrated market = EUR 5 m
    - avoided costs = 0 (costs already incurred, since market functions in each market are already established)
    - net costs = EUR 5 m

The overall logic and main assumptions regarding the determination of market integration's potential net benefits are summarized in the following figure:

[25] One-off costs are e.g. project costs of implementing the market integration, setup costs for required (cross-border) entities, etc.

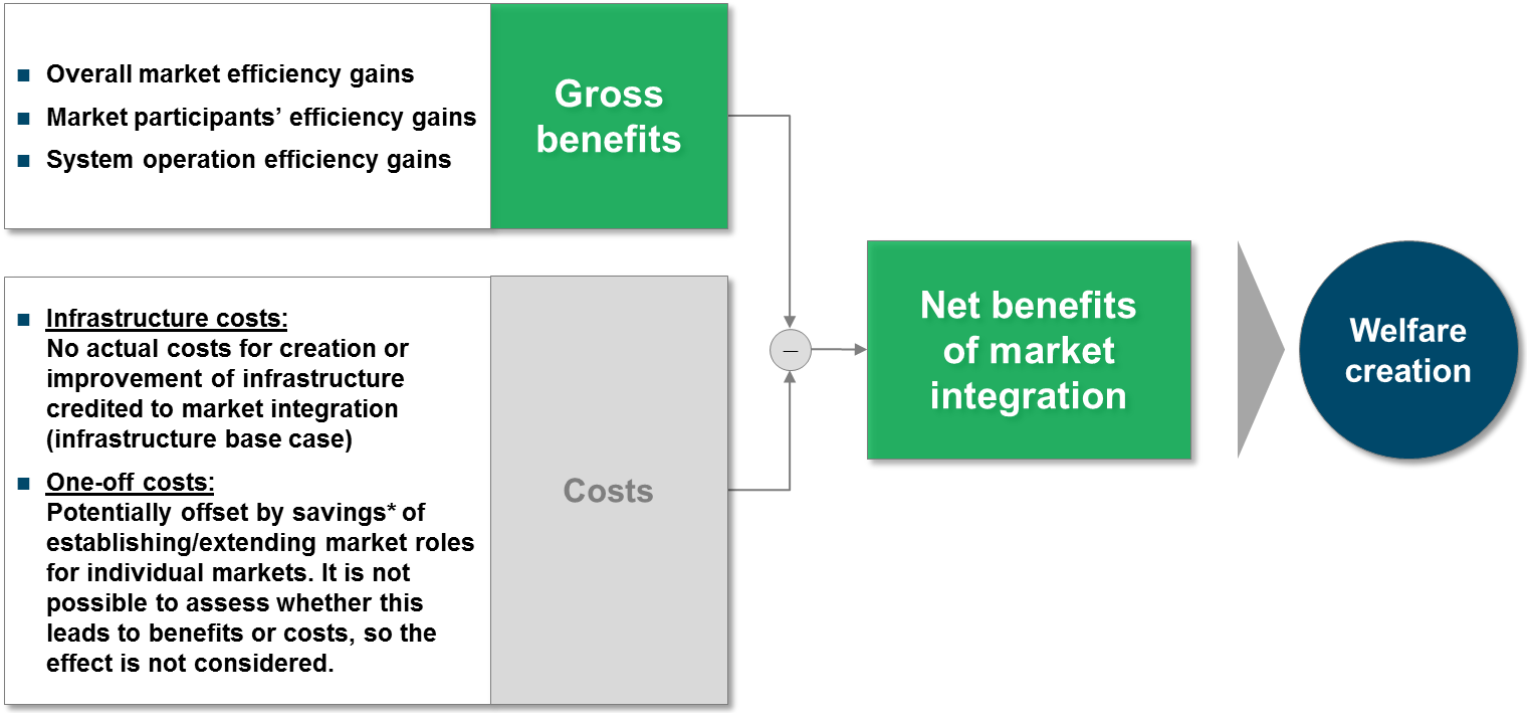


Figure 10: Welfare creation

Note (* in figure): Savings in the sense of avoided costs of implementing functionalities e.g. regarding market based balancing and VTP operation in individual countries.

End users of Contracting Parties as focal point of welfare accrual

Even though benefits may initially be pocketed by larger market participants, in a competitive and functioning market environment these benefits will ultimately trickle down and reach the end user at the endpoint of the gas value chain. Therefore, the end users and – to be more precise – the Contracting Parties end users' total costs of gas supplies are the focal point of benefits' accrual and central point for the welfare benefit analysis. Note that potential benefits for TSOs, other infrastructure operators or system roles are not considered (no welfare creation).

Benefit categories

The following figure provides an overview of considered welfare benefit categories:

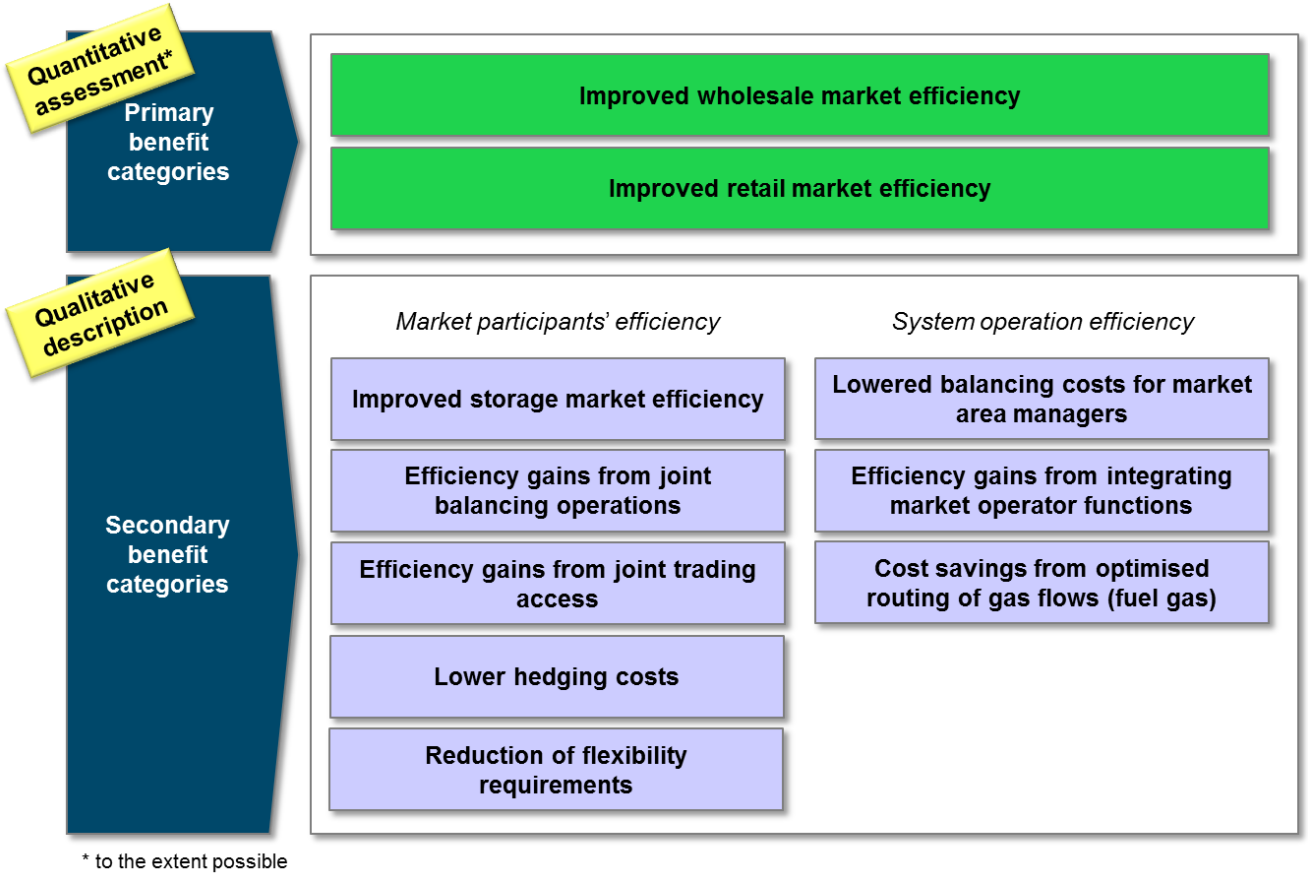


Figure 11: Primary and secondary welfare benefits – overview

The primary benefit categories represent, based on previous market integration CBAs, the most substantial benefits. In addition to a quantitative assessment of these benefits, the study also includes a qualitative description of secondary benefit categories where input data limitations have not allowed a quantitative analysis.

4.2.2 Improved wholesale market efficiency

Current development state of Contracting Parties' national wholesale markets

At the moment, all Contracting Parties have national markets separated, with distinct price and national balancing zones.

As a consequence, market participants willing to be active in more than one national market are facing various barriers, such as:

- *operational barriers*: separated and different market mechanisms for nomination and capacity booking at interconnection points, separate balancing in every market, separate registration and licensing requirements in every market, deposit of securities to different operators, etc.
- *commercial barriers*: contractual bottlenecks and capacity tariffs for transport of gas between markets which limit price alignment between the separated markets

These barriers are currently even higher since according to the *ECRB Analysis of Gas Transmission Balancing 2013*, these national balancing zones are governed by country-specific balancing rules which are in some cases not sufficiently detailed and in majority not (fully) compliant with the gas balancing framework stipulated for EU countries.

Moreover, the market health metrics, analyzed in section 4.1.1, indicate a comparably high level of market concentration in the wholesale market and thus underline the (historic) dominance of individual companies. Managed trading venues currently do not exist and, as a consequence, there are no transparent market price indices available.

Fundamental effect of market integration on wholesale market efficiency

As a result of merging the identified markets, market integration will lead to the disappearance of interconnection points from the sphere of network users. Tariffs, capacity bookings and contractual bottlenecks for transporting gas between formerly separated markets vanish and thus enable a more efficient use of the existing and envisaged gas transport infrastructure. The establishment of a single balancing system for the integrated market will lead to:

- a simplification of market operations and reduction of balancing risks due to the balancing of all injections into and withdrawals from the integrated market in a single balancing portfolio per network user;
- a concentration of all wholesale transactions and traders of now separated markets on a single VTP as central place of fulfilment.

Higher liquidity, reduced operational costs and risks will attract additional suppliers to start trading within this newly established market. This will further increase market liquidity and, in turn, stipulate competition.

Concerning the considered geographic scope it is important to point out, that the proposed MIOs envisage an integration of these Contracting Parties' gas markets with EU gas markets. In case of MIO 1, 2 and 3 this will provide direct access to already functioning EU gas hubs (CEGH

in case of MIO 1&2, PSV in case of MIO 3), and to new supply potentials through LNG terminals for MIO 4.Thus, Contracting Parties can benefit immediately from already established trading venues and functioning markets with a multitude of existing market participants and avoid undergoing the long and tedious process of market development as experienced in many EU markets.

As a consequence of market integration, concentrated market demand will meet a more diversified range of offers and can efficiently exclude least favourable quotes according to economic criteria. Since overall market prices are to be assumed the result of marginal prices (i.e. price of the least favourable offer necessary to cover demand), the exclusion of high-priced quotes effectively reduces overall market prices. Therefore, the integration of two formerly separated markets should not simply result in a new average price which is lower for one market and at the same time higher for the other market, thus creating benefits in one market at the costs of the other market, but lead to higher wholesale market efficiency creating overall benefits.

The following figures provide a schematic illustration of this development for two considered markets A and B. In figure 12, the initial situation of two currently separated markets is illustrated:

- Each market has net import demands of Demand_A respectively Demand_B and number of supply offers on the wholesale market with different marginal prices.
- Based on the concept of marginal prices this also leads to different market prices.
- Note: Blue arrows represent wholesale offers contracted to cover current demand, while white arrows indicate non-contracted offers (not needed to cover current demand).

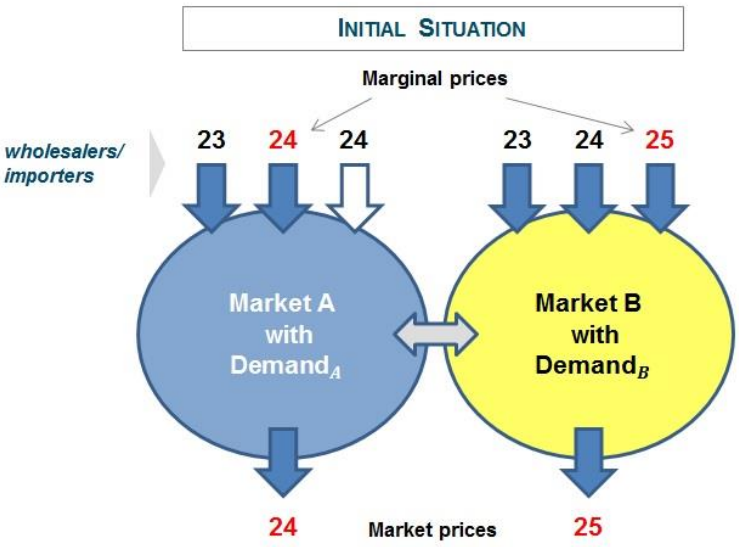


Figure 12: Initial situation at wholesale market level

The market integration creates a single net import demand of the integrated zone and concentrates all offers on the single VTP. The most efficient utilization of available gas supply offers on the wholesale market then leads to an exclusion of the offer with the highest price. Please note that this illustration still neglects the entrance of new market participants which would lead to an even more diversified range of offers.

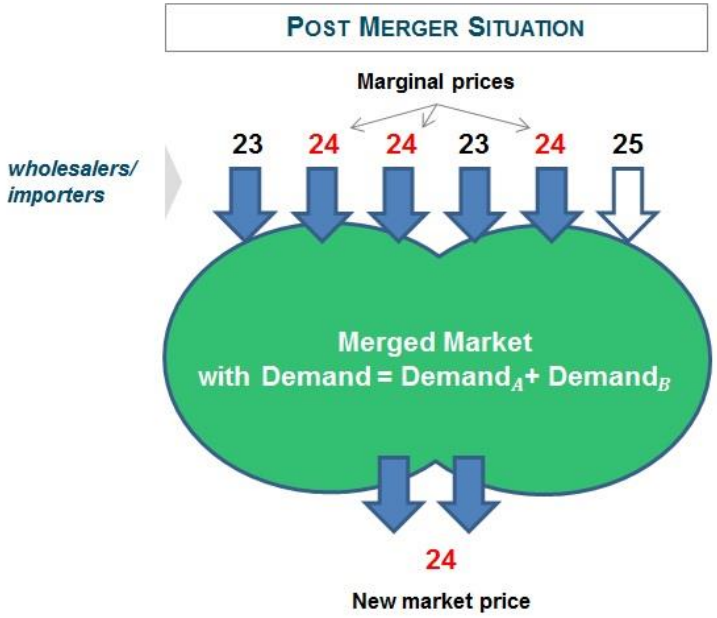


Figure 13: Post merger situation at wholesale market level

The resulting new market price of the merged market is lower than the market price of market B in the initial situation, while being at the same level for market A. Thus, the price difference represents an efficiency gain for the former market B (price reduction from 25 to 24 per unit) and leads to an overall increase of wholesale market efficiency.

Basic methodology for the valuation of the potential benefits (benefit quantification)

A straight-forward and direct valuation of the benefits of increased wholesale market efficiency would have to be based on complete knowledge of supply and demand curves respectively a full data set on bid and ask quotes on the wholesale market. Since this information is not even available for well-functioning EU markets, an approximating methodology relating to wholesale market price differences is used in comparable studies to assess the benefits of increased wholesale market efficiency.

Central assumption of this approximating methodology is that market integration potentially leads to a reduction of the wholesale market price of the integrated market to the lowest price level of the currently separated markets to be integrated (price effect).

This price effect is then multiplied with the affected market volumes of the formerly higher priced markets (volume effect), to assess the maximum benefit resulting from increased wholesale market efficiency. Based on the overall expectation that a functioning competition between market participants reflects any wholesale efficiency gains in end user prices, it can be assumed that the wholesale market price sets the price level relevant for the calculation of all end user prices. Therefore, a theoretical maximum benefit provided through increased wholesale market efficiency could be calculated as described in the formula below:

$$B_{max} = \sum_{d} (P_{HPM_d} - P_{LPM_d}) * V_{HPM_d}$$

Equation 1: Maximum benefit calculation

B_{max} indicates the maximum benefit, d the considered gas day, P_{HPMd} the wholesale market price of the higher priced market to be integrated on day d, P_{LPMd} the spot market price of the lower priced market to be integrated on day d and V_{HPMd} the end user demand volume of the higher priced market on day d.

Since, due to the current state of market development, representative wholesale prices are not available for Contracting Parties this commonly used valuation approach is not feasible. Therefore, the assessment of potential effects of increased wholesale market efficiency on Contracting Parties' markets can only be done indirectly and exemplary as described in the next section.

Applied approach for exemplary approximation of benefits

Against the background of described input data limitations, the benefits for the considered scope of market integration have been derived from the results of studies on wholesale market efficiency gains in alternative market integration settings and apportioned to the selected MIOs accordingly. The following studies for market integration projects have been considered:

- study on a full market integration of EU-27[26] and
- cost-benefit analysis for the integration of the German market areas NCG and GASPOOL[27].

In the *booz&co. Market Integration Benefits Report 2013* written for the Directorate-General Energy of the European Commission in 2013, booz&co. concluded a maximum annual benefit of EUR 28 bn in 2030 for a full integration of EU27. Using this benefit calculation an absolute price reduction per energy unit (in EUR/MWh) supplied to EU end users can be obtained (price effect). Potential benefits for the present MIOs have been derived by multiplying demand volumes of Contracting Parties (volume effect) with this absolute price reduction.

[26] *booz&co. Market Integration Benefits Report 2013*
[27] *TSO/PwC Results of Cost-Benefit Analysis for Integration of GASPOOL/NCG 2012*

Considering the still existing heterogeneity of EU gas markets (different levels of market functioning and market diversification, different levels of competition, etc.), and the large number of countries considered, the full integration of EU27 analyzed in the booz&co. study assumes a tremendous development which looks far ahead into the future. Therefore, consideration of these study results for alternative market integration settings has to respect the level of unpredictability related to these numbers.

A second study[28] was conducted by the German gas TSOs and PwC in 2012, inter alia aiming to calculate the benefit gained by a more efficient wholesale gas market of an integrated German market area. The potential wholesale market efficiency gain of a NCG-GASPOOL market merger has been assessed by PwC generally in line with the methodology for the determination of maximum benefits described earlier in this section:

- spot prices for NCG and GASPOOL are analyzed on daily basis;
- spot price differences are multiplied with the day-ahead trading volume of the higher-priced market.

This resulted in a possible maximum benefit of EUR 27,5 million for OTC-trading and EUR 1,1 million for volumes traded at EEX for the gas year 2011/2012.

It is important to consider, that the study assumes wholesale market efficiency gains to affect only day-ahead trading volumes and thus neglects the wholesale market's importance in setting the price level for end user supplies.

Therefore, the total benefit stated above has been transferred into an absolute benefit per energy unit (price effect) based on data on day-ahead trading volumes provided by:

- the *OIES Publication on European Gas Hubs Price Correlation 2014* for the OTC market and
- the *BNetzA Monitoring Report 2013* for the EEX-based day-ahead market.

This resulting benefit per energy unit has been multiplied with the total demand volumes of respective Contracting Parties (volume effect) since in a functioning market environment competition will ensure that these efficiency gains trickle down to end users.

The integration of NCG and GASPOOL as analyzed by PwC represents the integration of two already well-functioning markets which are characterised by a strong interconnection and high price correlation. In contrast, the markets considered in the present study are mainly less developed and less competitive markets with independent price formations. As a consequence, benefit assessment on the basis of the PwC study is expected to underestimate the benefits from wholesale market efficiency for the Contracting Parties and therefore, represents a very conservative approach.

[28] *TSO/PwC Results of Cost-Benefit Analysis for Integration of GASPOOL/NCG 2012*

Since in both studies the indicated benefits refer to the theoretical maximum, the results below represent 50% of the respective theoretical maxima. This represents a common approach for obtaining a plausible benefit by applying the Laplace Rule for decisions under uncertainty assuming a uniform distribution of outcomes.

In order to properly reflect technical capacity restrictions between countries to be integrated, which potentially limit the actual realization of benefits, the results of the direct market access analysis (see section 3.2) are used to apportion theoretical benefits to considered markets/MIOs[29].

- MIO 1: 44,3% of total demand
- MIO 2: 100% of total demand (no capacity restrictions)

Based on the considerations and calculation steps described above, the following formula for benefit quantification has been applied:

$$B_{CP} = D_{CP} * b_{Scenario} * 0{,}5 * DMA_{MIO}$$

Equation 2: Calculation formula for benefits resulting from improved wholesale market efficiency

B_{CP} indicates the resulting benefit for Contracting Parties included in the considered MIO and D_{CP} the end user demand of Contracting Parties included in the considered MIO (in kWh). $b_{Scenario}$ represents the benefit obtained per energy unit (per kWh) according to the approximation via the above explained market integration studies and DMA_{MIO} serves for reflection of capacity restrictions in the benefit calculation. Given a uniform distribution of possible benefit outcomes, the application of the factor 0,5 serves for the determination of a plausible benefit based on the Laplace rule for decisions under uncertainty.

[29] Since DMA percentages have been calculated on the basis of net import demands and are now effectively applied to total demand volumes it is assumed, that domestic production will contribute proportionally to directly accessible new sources to wholesale market efficiency.

Results

The following table shows resulting theoretical benefits (in million EUR/year) of increased wholesale market efficiency in total for considered Contracting Parties:

	CONSIDERED CONTRACTING PARTIES	SCENARIO 1: STUDY NCG/GASPOOL MARKET INTEGRATION	SCENARIO 2: STUDY EU27 MARKET INTEGRATION
MIO 1 „UKRAINE WEST INTEGRATION“	MD, UA	EUR 15 m	EUR 574 m
MIO 2 “SERBIA NORTH INTEGRATION”	BA, RS	EUR 2 m	EUR 58 m
MIO 3 “ADRIATIC INTEGRATION”	AL, BA, ME	*not quantified (see Table 14 for details)*	
MIO 4 “UKRAINE SOUTH INTEGRATION”	AL, BG, MD, MK, UA	*not quantified (see Table 14 for details)*	

Table 25: Results for improved wholesale market efficiency

4.2.3 Improved retail market efficiency

Current development state of Contracting Parties' national retail markets

The development of the Contracting Parties' retail markets is characterized by significant levels of concentration of market power and price regulation in comparison to western European markets.

The latest *ECRB Retail Market Development Status Review 2014* provides the following relevant conclusions:

- Although most of the Contracting Parties' gas markets have a substantial number of retailers, only a very limited number of them has market shares higher than 5%. Taking into consideration e.g. the number of nationwide suppliers or the number of DSO networks with more than one supplier, this points out to the existence of regional or local monopolies.
- Not all customers in the Contracting Parties had a right to choose their supplier and/or customers are facing legal obstacles for changing the gas supplier.
- Regulation of end user energy prices is generally recognized as one of the main obstacles to creating competitive and well-functioning retail markets. This is especially the case when regulated prices are determined at levels below costs and/or when cross-subsidization between groups of customers exists.
- Currently, entry of new market participants is heavily limited by scarce infrastructure and the status wholesale market development (e.g. single source of gas, poor access to liquid wholesale markets, long-term contracts).

As a consequence, ECRB provides in the abovementioned report the central recommendation to establish an end user price formation being as market-based as possible.

Especially for countries with regulated prices below costs (requiring cross-subsidies), this may not lead to lower prices in the long run but will create an economically sustainable framework able to provide welfare benefits to both customers and economy over time.

Fundamental effect of market integration on retail market efficiency

At the moment the Contracting Parties' retail markets are included respectively attached to separated national balancing zones with distinct authorization/licensing requirements and regulations. Therefore, retailers cannot easily engage in cross-border competition and need to develop a market specific supply portfolio comprising gas and flexibility/storage in line with the retail demand acquired over time.

With market integration establishing a single balancing zone where existing supply sources of all retailers can be directly utilised to supply end users in the formerly other markets and harmonized regulations, these barriers will be removed. In effect, retail companies are able to benefit from overall portfolio/hedging effects in the integrated market area, from harmonized regulations and may also enjoy an integrated balancing regime which reduces balancing risks and costs related to the supply of end users in different markets.

Hence, it can be expected that retailers will start to supply costumers all over the merged market. This will stimulate market development and ultimately lead to:

- an increasing number of retail suppliers and a more diversified market;
- a transformation from seller's markets into buyer's markets with increased customer-orientation, leading among others to:
  - improved customer-service
  - increasing diversity of offered products and services
  - alignment of products and services to specific customer requirements
- increased market transparency
- more competitive pricing policies of e.g.
  - new suppliers willing to gain market shares and
  - existing suppliers in order to maintain market shares

In conclusion, these changes and developments result in a more customer-oriented and competitive retail market with increased price efficiency for end users where retail prices tend to decline. Experiences from developed European markets show that end user groups with high consumption already achieve maximum benefits from the liberalization of national markets with their retail prices being very close to wholesale prices (see section 4.2.2). Thus, further effects of market integration mostly affect the segment of residential and commercial end users.

To substantiate the occurrence of above mentioned market developments, the COSIMA project being the only already implemented cross-border market integration project and being the only cross-border market integration project where a study regarding its effects on the retail market has been conducted, serves as an example.

The COSIMA project ("Cross-border Operating Strongly Integrated Market Area") has been initiated to provide access to a liquid functioning market for the two – formerly separated – Western Austrian market areas and thus increase efficiency on all market levels.

Despite having established an entry-exit and balancing system as well as a theoretical 100% end users eligible to switch their suppliers the Western Austrian market areas Tyrol and Vorarlberg have been characterized pre-merger by:

- a non-functioning wholesale market at the existing but illiquid virtual trading point,
- high balancing costs and
- a high level of market concentration in retail dominated by incumbent suppliers.

The model became operative by 01 October 2013. Corner stone of the concept is the disappearance of capacity bookings between NCG and Tyrol/Vorarlberg and, as a consequence, a direct and congestion-free access of retail suppliers active in the Austrian market areas to the German VTP NCG and its traded market[30].

Analyzing the impact of COSIMA market integration on market development based on publicly available information[31], market integration brings along a significant increase of active suppliers:

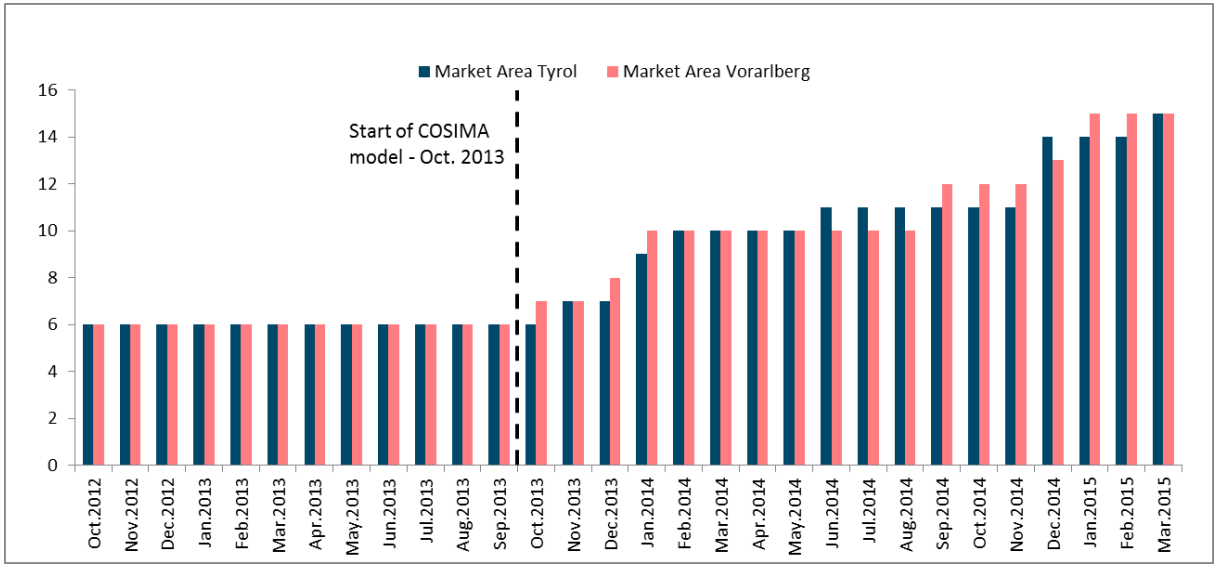


Figure 14: Number of active retail suppliers in Tyrol/Vorarlberg

The implementation of COSIMA has resulted in an immediate increase in the number of active retail suppliers and its continuous growth.

As a result of this increased competition, the development of retail prices in the Austrian market areas Tyrol/Vorarlberg shows a significant retail price reduction for the most competitive offers. The following table illustrates the reduction of average energy-only best price offers (network tariffs excluded) since the implementation of the COSIMA model for average residential end users.

[30] A detailed description of the COSIMA model characteristics is included in *AGTM* Annex 7.
[31] http://www.aundb.at/

	BEFORE COSIMA (OCT 2012 – SEP 2013)	WITH COSIMA (MAY 2014 – APR 2015)
MARKET AREA VORARLBERG	EUR 732,3	EUR 654,0
MARKET AREA TYROL	EUR 697,2	EUR 654,6

Table 26: Energy-only retail prices (with network charges) before and with COSIMA[32]

Since the average best price offers in the Austrian Market Area East have remained on a stable level in the considered period, these price reductions in Tyrol/Vorarlberg can be credited to market integration.

Basic methodology for the valuation of the potential benefits (benefit quantification)

As already described, it can be assumed that market integration will have influence on retail markets by providing a level playing field and thus stimulate competition. Beyond the expectable improvements regarding customer orientation and service, increased competition will result in competitive pricing which will ultimately drive down retail margins to an efficient level.

In this context, suppliers' retail margins have been considered as the difference between:

- representative wholesale market price of a considered national market and
- end user group specific energy-only prices (without taxes and non-energy items such as network tariffs, concession fees, etc.).

For benefit calculation, the difference between a country's current retail margin level and the lowest retail margin level in the MIO represents the potential benefit of market integration per energy unit (price effect). In a second step the volumes affected (volume effect) have to be estimated on the basis of assumed end user behaviour and price sensitivity (supplier switching rates, contract switching).

The extent to which this theoretical effect actually materializes strongly depends on the market framework's facilitation of competition and the end users consciousness for newly created market opportunities.

[32] Best-price data based on *E-Control Austria Price Monitoring Reports*

Input data limitations

Considering the current stage of development of the Contracting Parties' national markets and the level of market transparency, none of the above mentioned input data required for the benefit calculation are available. This limitation is a result of the current stage of market development, where:

- prices are for some countries a combination of energy and network components and cannot be coherently transferred to energy-only prices, as sufficient unbundling of supply/retail companies and transmission/distribution network operators has not been completed yet or representative network tariffs are yet to be defined;
- coherent wholesale prices required to calculate comparable retail margins (see above) do not exist;
- prices are often not sufficiently market based and it cannot be sufficiently assessed whether regulated retail prices in many of the Contracting Parties reflect a sustainable retail market situation for the supplier or if wholesale prices in general have influence on retail price formation;
- cross subsidies between different end user groups or from national budgets exist in order to keep retail prices at low levels, but are not transparent
- etc.

Therefore, the significance of current retail prices of Contracting Parties regarding the analysis of retail market efficiency cannot be estimated. Since the common approach for the calculation of benefits from improved retail efficiency is not feasible, the approach described below has been used to assess benefits for Contracting Parties.

Applied approach for exemplary approximation of benefits

Given the input data limitations stated above, a similar approach as in wholesale market efficiency has to be applied in the approximation of benefits from increased retail market efficiency. Thus, the benefits for the considered scope of market integration needs to be derived from retail market efficiency gains observed in comparable market integration settings.

Since in this case results from the actual implementation of a cross border market integration are available – in contrast to prospective results for potential integration projects - the before mentioned COSIMA market integration has been used as the basis for this exemplary approximation of retail market efficiency gains to be expected for Contracting Parties in the considered MIOs.

Besides COSIMA being the only cross border market integration project already implemented, the pre-integration characteristics of the Western Austrian gas markets are comparable to the situation in the considered Contracting Parties with respect to retail competition being dominated by incumbent suppliers and a non-existing wholesale market.

Central aspect of this exemplary quantification is the price effect (in the form of an energy-only price reduction per supplied MWh) of residential end users in Tyrol/Vorarlberg[33]. This value is calculated by dividing the identified annual benefits, being the result of price reductions as given in table 26, with the average annual demand of the considered end user group[34]:

	BEFORE COSIMA (OCT 2012 – SEP 2013)	WITH COSIMA (MAY 2014 – APR 2015)	ANNUAL REDUCTION	REDUCTION PER ENERGY UNIT
MARKET AREA VORARLBERG	EUR 732,3	EUR 654,0	EUR 78,3 -10,7%	5,22 EUR/MWh -10,7%
MARKET AREA TYROL	EUR 697,2	EUR 654,6	EUR 42,6 -6,1%	2,84 EUR/MWh -6,1%

Table 27: Energy-only retail prices (with network charges) before and with COSIMA and identified annual benefits for best-price offers[35]

Multiplying this price reduction per supplied energy unit with the considered Contracting Parties' residential end user demand (volume effect) delivers an approximation of benefits from increased retail market efficiency per considered Contracting Party.

As said above, the volumes profiting from this price effect are dependent on the share of residential end users, which are:

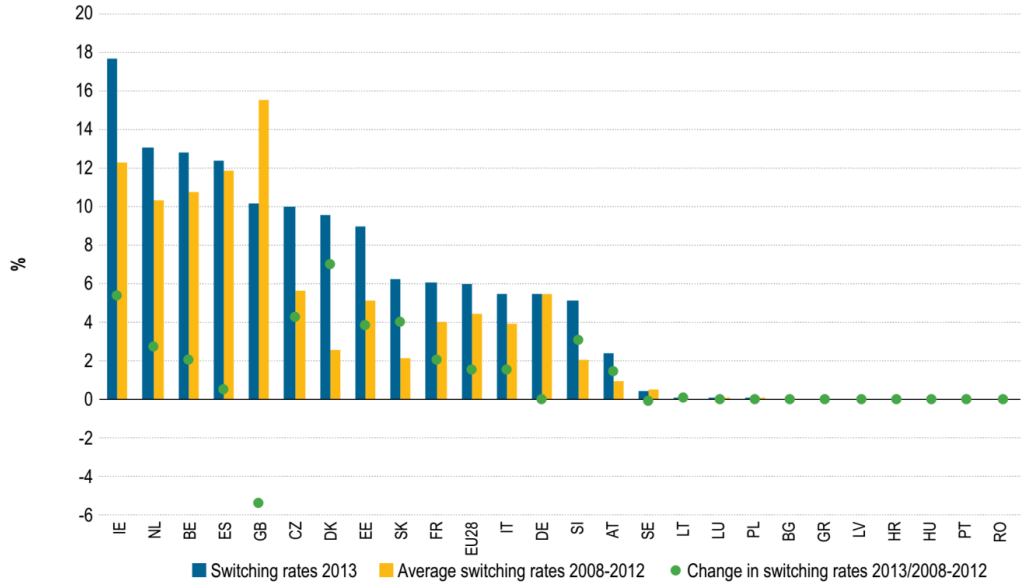
- eligible to freely choose and switch their supplier and
- price-sensitive and willing to select cheaper market offerings based on economic criteria

Assuming unlimited customer eligibility as required by the EU's 3rd Energy Package and its transposition for the Energy Community (the Acquis), analysis of customer behaviour in European markets shows that switching rates are rather low but mostly increasing.

[33] Since experiences from developed European markets show that end user groups with high consumption already achieve maximum benefits from the liberalization of national markets the focus on residential end user captures all significant potential benefits.
[34] The *E-Control Austria Price Monitoring Reports* are based on an average annual demand for Austrian residential end users of 15.000 kWh.
[35] Best-price data based on *E-Control Austria Price Monitoring Reports*

This is illustrated by the following figure extracted from the *ACER Monitoring Report 2014*:

Figure 27: Switching rates for gas household consumers in Europe – 2008–2012 and 2013 (% and ranked according to switching rates in 2013)



Source: CEER National Indicators Database (2014) and ACER calculations

Figure 15: Switching rates Europe - *ACER Monitoring Report 2014*

Given the dependence of the actually attainable benefits of retail market efficiency on the customer readiness to switch to more favourable market offerings, conceivable scenarios of customer behaviour are considered.

These scenarios have been derived from data on customer behaviour for the German gas market (*BNetzA Monitoring Report 2014*), since these are the only relevant and reliable data, including percentages for customers who have changed their supplier or their contract up to date, that have been found[36].

[36] Respective analyses in *ACER Monitoring Report 2014* concerning customers with different supplier are doubtful since for Germany the number obviously corresponds with end users having a new contract, not a new supplier.

German data on customer behaviour are considered applicable since:

- Germany is numbered among developed and competitive markets and thus provides a mid-term perspective on potential market development and
- is characterized by an average switching behaviour within EU28 (one of the lowest in developed markets, see figure 15 and thus can be considered a conservative benchmark.

Using the latest available data for Germany (year 2013), benefits of increased retail market efficiency are calculated for the following two scenarios:

1. **Scenario "End users with new supplier":** 13,9% of residential end users in Germany, in 2013, have been supplied by a supplier not being their incumbent supplier.
2. **Scenario "End users with new supplier or new contract*":*** Retail competition does not only create savings by end users switching to new suppliers, but also forces existing suppliers to lower their prices in order to retain existing customers and market shares. Thus the share of profiting end users can be extended to include those who have changed to a cheaper supply contract with their existing supplier. Taking again into account the German share of this group of residential end users (59,6%) delivers a plausible benefit assessment.

Given the experiences made with price monitoring in EU countries, it can be assumed that changing to an alternative supply plan of the existing supplier will not realize the full potential of price reductions (as compared to price-aggressive low cost suppliers) and thus for this group only 50% of the maximum price reduction are considered for the benefit calculation.

Based on the considerations and calculation steps described above, the following formula for benefit quantification has been applied:

$$B_{CP} = RD_{CP} * b_{COSIMA} * p_{Scenario}$$

Equation 3: Calculation formula for benefits resulting from improved retail market efficiency

B_{CP} indicates the resulting benefit for Contracting Parties included in the considered MIO, RD_{CP} the residential demand of Contracting Parties included in the considered MIO (in kWh), b_{COSIMA} the benefit per energy-unit obtained by the exemplary approximation via the COSIMA benefits (in kWh). $p_{Scenario}$ indicates the percentage of benefiting end users according to the scenarios explained above and serves for alignment of the resulting benefit to an assumed customer switching behaviour.

Results

The following table shows resulting theoretical benefits (in million EUR/year) of increased retail market efficiency in total for considered Contracting Parties:

	CONSIDERED CONTRACTING PARTIES	SCENARIO 1: END USERS WITH NEW SUPPLIER	SCENARIO 2: END USERS WITH NEW SUPPLIER OR NEW CONTRACT
MIO 1 „UKRAINE WEST INTEGRATION“	MD, UA	EUR 95 m	EUR 299 m
MIO 2 “SERBIA NORTH INTEGRATION”	BA, RS	EUR 1 m	EUR 4 m
MIO 3 “ADRIATIC INTEGRATION”	AL, BA, ME	*not quantified (see Table 14 for details)*	
MIO 4 “UKRAINE SOUTH INTEGRATION”	AL, BG, MD, MK, UA	*not quantified (see Table 14 for details)*	

Table 28: Results for improved retail market efficiency

4.2.4 Secondary benefits without quantification

In addition to the already described primary benefits of market integration, there are also secondary effects which add to the overall benefit. In contrast to the primary welfare benefits assessed with quantification, the group secondary benefits remains without final benefit quantification due to a lack of reliable data required for their calculation.

Nonetheless, they have sufficient importance since these secondary effects provide additional benefits, thus strengthening quantitative results of primary benefits. The secondary benefits are classified into two main areas, namely *market participants' efficiency* and *system operation efficiency,* with actual benefits attached to them (see figure below).

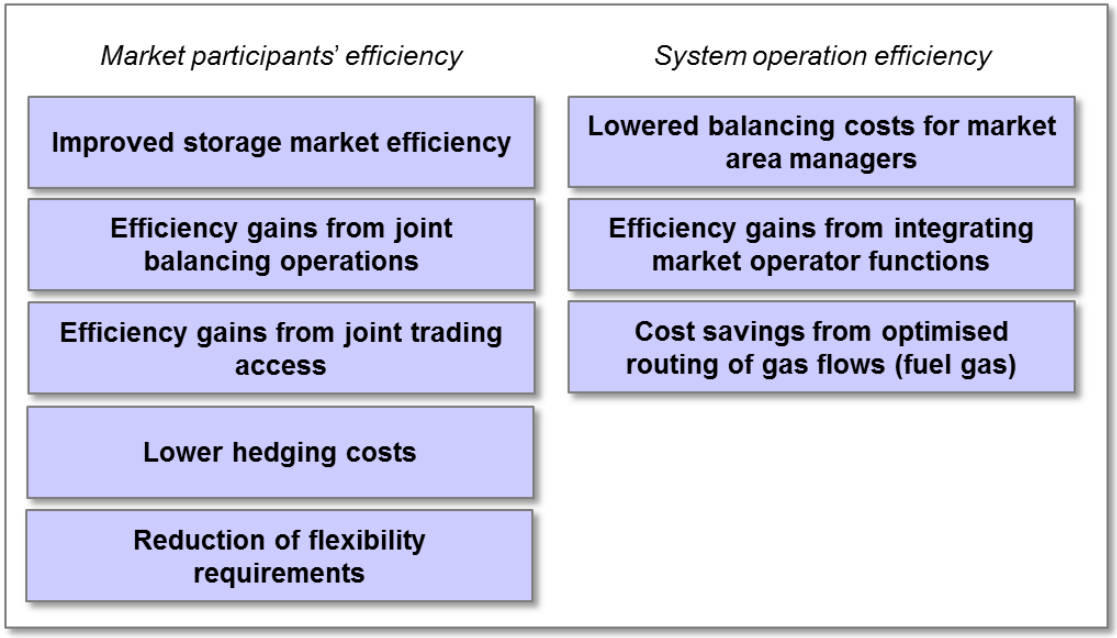


Figure 16: Secondary benefits overview

4.2.4.1 Secondary benefits category 1: Market participants' efficiency

A market integration project enables market participants being currently active in more than one of the to-be-integrated markets to act more efficiently. The main driver for these efficiency gains is the concentration of currently separated market operations for different markets to a single market. The aspects of the efficiency gains are described in detail in the following section.

Improved storage market efficiency

Market integration enhances competition between storage facilities (and their operators), since all storages located in the formerly separated markets will be directly accessible from this joint market. This emerging level playing field for storage products offered to market participants will ultimately lead to a more efficient storage market with a tendency for storage prices to decline.

In addition market integration will lead to the establishment of a functioning wholesale market where the summer-winter spread on the traded market gives an indication for the current market value of storage. Assuming that current summer-winter spreads of EU markets to be integrated into the MIOs will radiate out, this will lead again to more storage market efficiency.

Efficiency gains from joint balancing and portfolio operations

When integrating markets a single balancing zone comprising all markets is established. This simplification enables market participants which are currently operating balancing accounts in more than one of the to-be-integrated markets to reduce the number of balancing accounts to be managed and thereby save costs of related operations.

Additional to potential savings on registration fees or general requirements for financial securities, indirect costs related to operations within different balancing accounts and associated activities can be reduced. Such activities are, among others:

- on-going monitoring of allocation data and resulting balancing positions and resolution of issues related to it (allocation data, clearing process, etc.)
- checks of invoices for balancing and hub usage
- monitoring of national regulatory developments, impact assessment of upcoming changes related to the balancing group management operation and coordination of internal system changes to reflect market rules
- administrative contact with balancing entity/hub operator

These costs occur in all markets in which market participants are active and, therefore, the establishment of one single balancing zone, as envisaged by market integration, results in efficiency gains for all market participants active in more than one market. Cost savings should materialize in the form of reduced labor costs and cost reductions related to the no longer necessary adaption of IT-systems to reflect distinctive bal-

ancing regimes. The lack of transparency regarding the information about market participants' (intended) activities in to-be-integrated markets does not permit a plausible conclusion about the occurrence and the size of this benefit.

Efficiency gains from joint trading access

Similarly to the above described efficiency gains regarding balancing group accounts, such an effect does apply for the joint trading access in a merged market area too.

In theory, companies currently trading on more than one of the to-be-integrated markets will profit from the market integration by the concentration of the entire wholesale trading on a single market place of the merged market area. Thus, they can remove the formerly separated markets from their list of actively traded markets and save costs. Direct costs related to the membership and technical connection to trading venues as brokers and exchanges, including clearing entities, as well as indirect costs for the activities required to operate such trading venues are removed.

In practical terms, the current state of development of traded markets is low and trading access rarely exists. Anyhow, the envisaged implementation of an integrated market zone with a single access to a traded market concentrated on a single VTP will ultimately save costs compared to developing markets in a separated way.

Lower hedging costs

In the context of long-term contracts, sellers of gas tend to index contract prices to a stable market where the buyer is not dominant in order to avoid threats of market manipulation. On the other hand, buyers like to see the prices indexed to their local hub price to avoid mark-to-market risks from spreads arising between the "index-market" and their home market.

If market integration enables the development of a diversified market in such a way that the single hub of the integrated market area is accepted as point of price reference for price indexation, costs for importers can be reduced, since they do not have to provide for mark-to-market risks for hedging indexed gas supply contracts at third hubs.

These costs can be substantial in absolute terms, since the volumes involved potentially comprise all import contracts to be indexed on market prices.

Reduction of flexibility requirements

From a network user's commercial balancing perspective, the merger of markets to an integrated market area provides for the opportunity that existing currently distinct end user portfolios in all of the currently separated markets are either combined or flexibility needed to structure demand and supply can effectively be exchanged between portfolios on the single virtual trading point.

This will result in a reduction of overall flexibility requirements – i.e. the requirements to cover the variation between structured end user consumption and typically "flat" gas procurement with flexibility instruments such as gas storage or contract flexibility. The overall structuring requirements will be smaller than the sum of the structuring requirements of the currently separated markets, since opposing load variations are cancelled out.[37] This effect is illustrated in the figure below:

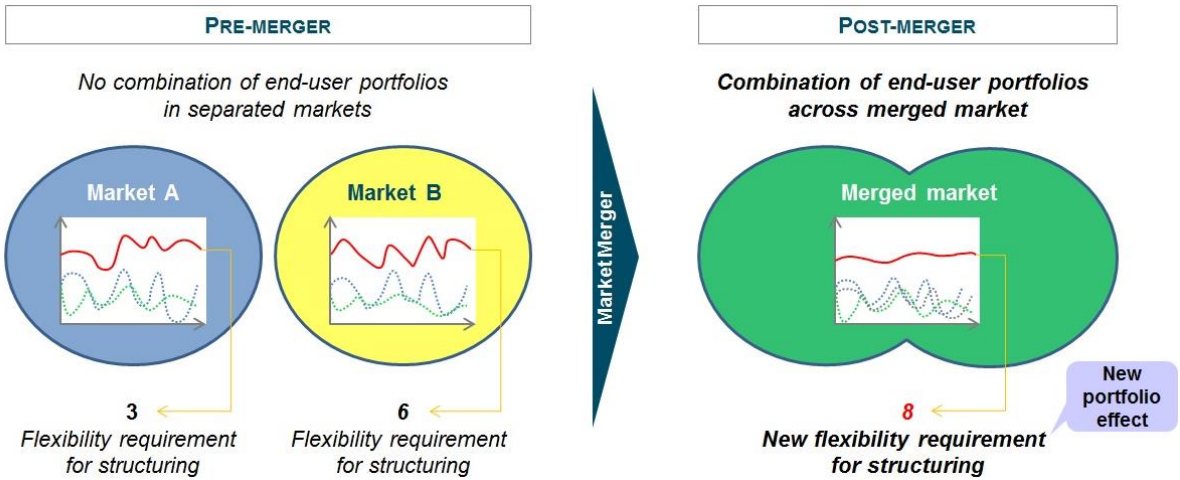


Figure 17: Schematic reduction of the flexibility requirement for structuring in the merged market area

These reduced overall structuring requirements lead to reduced demand for flexibility and therefore yield cost savings as a result of the market merger.

Structuring requirements to be covered by network users or the balancing system are treated equally, since in the end all costs are paid by end users and cost savings trickle down to end users and create welfare benefits.

[37] The additional effect brought about by the market merger is hence to enable such load variation cancelling across the border on a large scale and without any further transportation costs.

4.2.4.2 Secondary benefits category 2: System operation efficiency

The integration of former separated markets leads to an increased system operation efficiency since different activities and positions related to the system can be centralized and thus conducted more efficiently.

Lowered balancing costs for market area

The integration of currently separated market areas facilitates a more efficient operation of balancing actions set by TSOs.

This is based on the assumption that opposing linepack situations in different currently separate but to-be-integrated markets of the merged market area can by cancelled out physically by a joint coordination of gas flows between TSOs on a technical level beyond the sphere of network users. This avoids the buying/selling of gas on the market in order to maintain an appropriate linepack level and as result thereof reduces balancing costs.

According to the latest *ECRB Retail Market Development Status Review 2014* the balancing of Contracting Parties is not yet fully compliant with the balancing network code (*NC BAL*) applicable for EU countries and distinct models for operation balancing are often not yet in place. This allows no quantification of the potential benefit at the current state, but implementing a *NC BAL* compliant model for operational balancing of an integrated market area will certainly create efficiency gains compared to the current state.

Efficiency gains from integrating market operator functions

As a merged market area is characterized, among others, by a single VTP and a single balancing system, it has the potential that these functions are operated by a central single entity for the entire market area instead of executing these required regulatory functions separately for each market. Due to this, apart from savings on one-off costs (which are not considered according to section 4.2.1) additional savings on operating costs can be achieved by a centralized approach for the integrated market area, which represents an additional efficiency gain.

Considering the current state of market development of Contracting Parties, these functions are not fully operational yet. Therefore, market integration would provide the opportunity for an overall more efficient movement towards an efficient and functioning gas market, as the interim step of implementing these functions in every single market can be skipped.

Cost savings from optimised routing of gas flow (fuel gas)

The establishment of an integrated market relocates all nominations of network users to entry and exit points of the newly integrated market and former entry/exit points between to-be-integrated markets disappear for them.

These points become market-internal points where gas flows are coordinated by TSOs and give TSOs larger flexibility to move gas through the integrated market in the most efficient way. This can be expected to result in cost reductions regarding fuel gas, especially if the most efficient routing of gas flows is currently hindered by contractual delivery obligations at then market-internal points.

This benefit, of course, increases with the size of the merged market area, since by merging more markets more currently bookable interconnection points disappear and thus give TSOs more flexibility in jointly managing their network operations.

5 INTEGRATION TOOLS FOR MARKET INTEGRATION

According to the *AGTM*, three different tools for the integration of gas markets are considered: *market merger*, *trading region* and *satellite market*[38]. These tools' main characteristics, preconditions and the resulting implications for the conducted CBA (see chapter 4) are described in the following sections. Additionally, focusing on the implementation of such tools, harmonization prerequisites and implementation barriers are further analyzed.

5.1 MARKET MERGER

Description

- When realizing a *market merger*, two or more neighbouring gas markets fully merge their balancing zones and consequently their VTPs, thus creating a fully integrated market.
- This is underpinned by an integrated cross-border entry/exit-system including all end users.
- Hence, the main characteristics of a market merger are:
  - an integrated balancing zone including transmission and distribution systems,
  - an integrated entry-exit system including end users, where the interconnection capacity between TSOs and DSOs is booked and paid for by DSOs not shippers,
  - the existence of a cross-border balancing entity which is also in charge of the system energy management,
  - harmonized obligations for suppliers (e.g. licenses, minimum storage requirements, etc.).

[38] Other or combined solutions are not excluded if better fitting the relevant countries for reaching the market integration target.

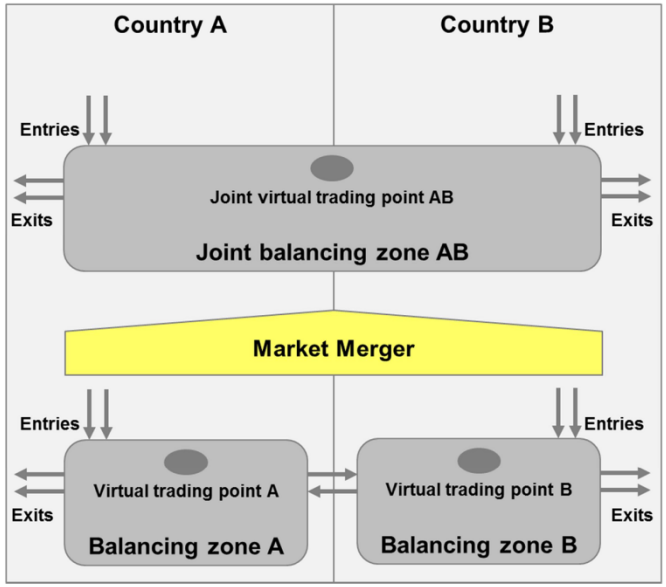


Figure 18: Schematic illustration of market merger concept[39]

- The market merger enables maximum benefit creation in all benefit categories.
- However, it requires the largest harmonization including balancing rules, metering, allocation and regulatory cooperation and legislative actions in member countries.

Preconditions

To conduct a market merger, two preconditions have to be fulfilled:

- the gas markets are directly connected or plan to build interconnection capacity and
- all included gas markets have at least one other relevant entry point from another source (if this condition is not met, a satellite market is the simpler solution delivering mostly the same benefits).

[39] Source: *AGTM*

CBA implications

A marker merger is the most extensive form of market integration. While it requires the highest integration efforts, it delivers also maximum benefits. Therefore, all benefits described and analyzed in chapter 4 are to be expected to the full extent without any deductions.

Harmonization prerequisites and implementation barriers

Assuming Contracting Parties' compliance with the Energy Community acquis and EU NCs, the following table summarizes harmonization pre-requisites and potentially existing barriers regarding a full market merger.

No.	Prerequisites / Harmonization needs	Barriers
Integrated entry/exit-system		
1.	Inclusion of all entries and exits into/from the transmission and distribution systems in a cross-border entry/exit system (and balancing zone)	■ Potential legal definitions of national entry/exit zones (balancing zones)
2.	Elimination of bookings at interconnection points between to be integrated markets (→market-internal interconnection points)	■ Existing contracts (aggravated if existing contracts do not follow an entry/exit-logic) ■ Potential inter-governmental agreements
3.	Cost allocation mechanism to compensate for lost revenues due to eliminated bookings at market-internal interconnection points	-
4.	Coordination of capacity calculation and allocation making use of market-internal interconnection capacities to provide freely allocable and firm capacities at entry/exit points of the integrated market area	-
5.	The interconnection capacity between TSOs and DSOs is booked and paid for by the DSOs (and cannot and need not be booked by shippers).	■ Potential legal obligations for capacity booking of network users at interconnection points between transmission and distribution system
6.	Coordination of gas flows at market-internal interconnection points between TSOs	-

No.	Prerequisites / Harmonization needs	Barriers
7.	Coordination of network development to meet demand for firm capacities at entry/exit points of the integrated market area	-
8.	Coordination of regulatory oversight on network development and capacity calculation between NRAs	-
Integrated balancing system		
9.	Implementation of harmonized nomination and allocation rules according to *NC BAL* for: ■ entries and exits into/from the transmission systems ■ VTP ■ end user exits	■ Potential legal regulations on metering, allocation and balancing rules for end users ■ Heterogeneous, country-specific technical metering standards for end users
10.	Implementation of harmonized overall balancing rules (calculation of imbalance quantities and charges, calculation of neutrality charges, within-day-obligations, operational balancing, information provision)	■ Potential legally defined country-specific balancing rules considering technical preconditions concerning metering and allocation of end users
11.	Establishment of a cross-border balancing entity ("market area operator") that is also in charge of system energy management for the merged markets in collaboration with the merged markets' TSOs.	■ Potential legal definitions concerning institutional responsibility for balancing (e.g. naming of the company responsible for balancing and VTP access)
12.	Coordination of regulatory oversight of the cross-border balancing entity and the balancing rules	-
13.	Agreement on the handling of different national currencies in cross-border balancing	■ Potential foreign currency issues also for purely local/regional suppliers of end users (retailers)
14.	Agreement on the handling of different applicable national laws and jurisdiction for contractual obligations of balancing	-

NO.	PREREQUISITES / HARMONIZATION NEEDS	BARRIERS
Security of Supply		
15.	Obligatory harmonization of national emergency plans, respectively development of a cross-border market-wide emergency plan	■ Potential legal provisions hindering harmonization of national emergency plans or the development of a cross-border market-wide emergency plan (e.g. national supply prevailing exits to other markets)
16.	Obligatory harmonization of the definition of protected customers	■ Potential differing legal definitions of protected customers
17.	Obligatory harmonization of obligations to be fulfilled by suppliers (e.g. licenses, minimum storage requirements, etc.), by TSOs and the market area operator with regard to security of supply	■ Potential incompatible, legal definitions of obligations with regard to security of supply in different countries
18.	Obligatory harmonization of regulatory and administrative responsibility for the screening of obligations with regard to security of supply has to be clarified	■ Potential legal definitions of regulatory competence

Table 29: Prerequisites/harmonization needs and barriers - market merger

5.2 TRADING REGION

Description

- The trading region consists of two or more neighbouring gas markets that establish a cross-border balancing zone with a single (joint) VTP, covering all transmission systems but maintain national end user balancing systems.
- The main characteristics are:
  - an integrated balancing zone and entry-exit system including only transmission systems (cross-border trading zone),
  - separated national balancing zones for end user loads (end user zones),
  - end user managers which are in charge of physically balancing end user zones,
  - harmonized obligations for suppliers (e.g. licenses, minimum storage requirements, etc.).

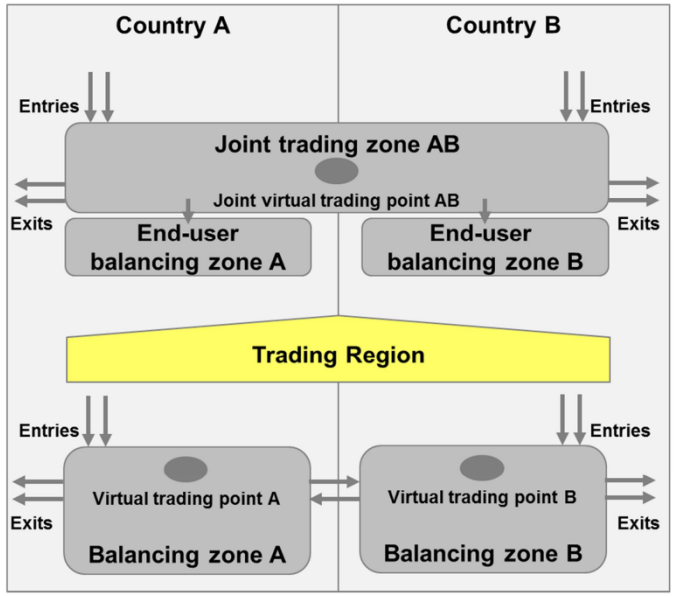


Figure 19: Schematic illustration of trading region concept[40]

- The concept can be implemented fairly quickly because no cross-border alignment of end user balancing rules (and potentially also the underlying metering and allocation rules) is required.
- Since end user balancing systems are not merged between gas markets, related synergies are left untapped (that could be tapped using the market merger concept).

Preconditions

The implementation of a trading region requires two preconditions which coincide with those of a market merger:

- the gas markets are directly connected or plan to build interconnection capacity and
- all included gas markets have at least one other relevant entry point from another source (if this condition is not met, a satellite market is the simpler solution delivering mostly the same benefits).

[40] Source: *AGTM*

CBA implications

In comparison to market integration with a full market merger a trading region provides very similar welfare benefits.

Some reduction of welfare benefits might occur for the following categories:

- improved retail market efficiency;
- efficiency gains from joint trading operations;
- efficiency gains from integrating market operator functions.

The following table provides an overview of these categories and arguments for potentially lower benefits than a market merger[41]:

	DEVIATION FROM MAXIMUM BENEFIT BASED ON MARKET MERGER
IMPROVED RETAIL MARKET EFFICIENCY	Lower benefits to be expected since remaining market barriers might hinder retail competition. Remaining barriers are: ■ registration per national end user zone required; ■ different regulations for end user zone balancing; ■ potentially remaining capacity bookings and/or related operational issues at the interface transmission/distribution.
EFFICIENCY GAINS FROM JOINT BALANCING OPERATIONS	Lower benefits to be expected because of separated balancing for national end user zones: ■ Separate balancing accounts remain in place for every national end user zone and the joint balancing zone. Thus, market participants' efforts for balancing operations in all these market segments are still required.

[41] For all other welfare benefit categories the "trading region model" creates no restrictions for implementation of an operational balancing model delivering the same welfare benefits as a full marker merger. The actual utilization of these benefits, however, is subject to the detailed definition of the operation model (cooperation of system operators, etc.).

	DEVIATION FROM MAXIMUM BENEFIT BASED ON MARKET MERGER
EFFICIENCY GAINS FROM INTEGRATING MARKET OPERATOR FUNCTIONS	Lower benefits because national entities for balancing of remaining national end user balancing zones are still required: ■ potential for cost saving is limited to joint balancing of injections/withdrawals into/from the joint trading region on transmission level; ■ in addition to that every national end user zone still requires its separate balancing operation.

Table 30: Benefit categories potentially lower for trading region than for market merger

Harmonization prerequisites and implementation barriers

Assuming Contracting Parties' compliance with the Acquis and EU network codes, the following table summarizes harmonization prerequisites and potentially existing barriers regarding a trading region.

NO.	PREREQUISITES / HARMONIZATION NEEDS	BARRIERS
Integrated entry/exit-system[42]		
1.	Inclusion of all entries and exits into/from the transmission systems in a cross-border entry/exit system (and the trading balancing zone)	■ Potential legal definitions of national entry/exit zones (balancing zones)
2.	Elimination of bookings at interconnection points between to be integrated markets (→market-internal interconnection points)	■ Existing contracts (aggravated if existing contracts do not follow an entry/exit-logic) ■ Potential inter-governmental agreements
3.	Cost allocation mechanism to compensate for lost revenues due to eliminated bookings at market-internal interconnection points	-

[42] The *AGTM* also mentions that interconnection capacity between TSOs and DSOs shall be booked by DSOs (as in market merger). In our opinion this is not mandatory, since this interconnection is to be nominated by shippers in the trading region model and can therefore be also booked by shippers.

NO.	PREREQUISITES / HARMONIZATION NEEDS	BARRIERS
4.	Coordination of capacity calculation and allocation making use of market-internal interconnection capacities to provide freely allocable and firm capacities at entry/exit points of the integrated market area	-
5.	Coordination of gas flows at market-internal interconnection points between TSOs	-
6.	Coordination of network development to meet demand for firm capacities at entry/exit points of the integrated market area	-
7.	Coordination of regulatory oversight on network development and capacity calculation between NRAs	-
Integrated balancing system		
8.	Implementation of harmonized nomination and allocation rules according to *NC BAL* for[43]: ■ entries and exits into/from the transmission systems ■ VTP	-
9.	Implementation of a simplified balancing mechanism on the basis of balanced nominations for the trading zone	-

[43] End user exits are not part of the trading region and, as a consequence, harmonized rules are not required for these network points. Therefore, related barriers identified for the market merger concept do not exist.

NO.	PREREQUISITES / HARMONIZATION NEEDS	BARRIERS
Security of Supply		
10.	Optional* harmonization of national emergency plans, respectively development of a cross-border market-wide emergency plan	■ Potential legal provisions hindering harmonization of national emergency plans or the development of a cross-border market-wide emergency plan (e.g. national supply prevailing exits to other markets)
11.	Optional* harmonization of the definition of protected customers	■ Potential differing legal definitions of protected customers
12.	Optional* harmonization of obligations to be fulfilled by suppliers (e.g. licenses, minimum storage requirements, etc.), by TSOs and the end user balancing managers with regard to security of supply	■ Potential incompatible, legal definitions of obligations with regard to security of supply in different countries
13.	Optional* harmonization regulatory and administrative responsibility for the screening of obligations with regard to security of supply has to be clarified	■ Potential legal definitions of regulatory competence

Table 31: Prerequisites/harmonization needs and barriers - Trading region

*It is conceivable, that national end user zones have differing regulations concerning security of supply, which as a consequence would mean that the trading region would have to be suspended in an emergency case. This would reduce the benefits to be expected to the extent these national regulations reduce access to supply and flexibility sources in other national markets.

5.3 SATELLITE MARKET

Description

- A gas market (satellite) does not establish or maintain its own VTP but “co-uses” the VTP of a neighbouring gas market (feeder) creating an integrated wholesale market.
- The satellite market concept is mainly characterized by:
  - separated balancing systems for satellite and feeder,

- a designated entity of the satellite market (satellite manager) which is in charge of
  - interconnection capacity bookings,
  - physically balancing of the satellite and
  - the transport from the VTP to the satellite's end users.

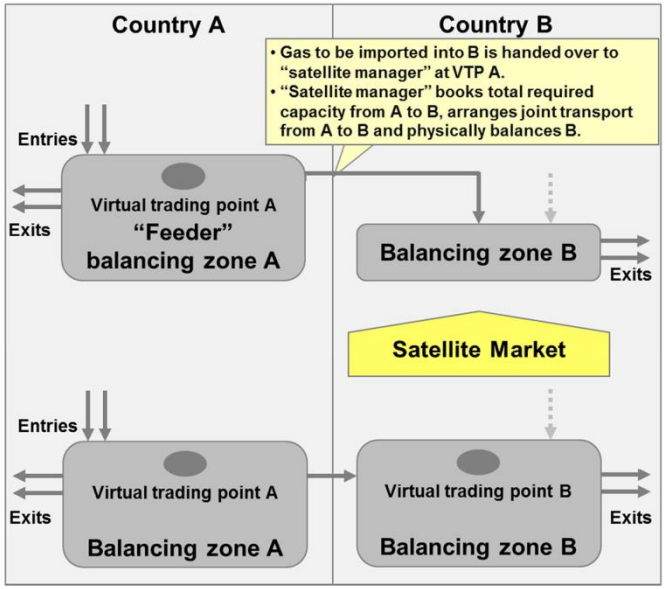


Figure 20: Schematic illustration of satellite market concept[44]

- If the preconditions (see below) are met, the satellite concept is easier to apply while it is realizing all of the trading region's benefits and most of the market merger's benefits (no cross-border alignments of market rules or cross-border institutions are necessary).
- Furthermore, it is an important fact that it does not affect the market organization or operations of the feeder market.

Preconditions

The satellite market tool requires the following preconditions:

[44] Source: *AGTM*

- a gas market neighbours a better functioning gas market and
- the potential satellite market receives almost all its gas imports from that better functioning market ("feeder market").

Note: If these preconditions are met, the preconditions for a market merger or a trading region are met (not true the other way around) too.

CBA implications

A satellite enables the creation of welfare benefits being similar to the trading region model. The following table provides an overview of benefit categories where implementation of a satellite market potentially leads to benefits being lower than the maximum benefits expected for a full market merger[45]:

	DEVIATION FROM MAXIMUM BENEFIT BASED ON MARKET MERGER
IMPROVED RETAIL MARKET EFFICIENCY	Lower benefits because satellite and feeder market remain separate markets and supplier willing to deliver gas to end users in both markets face: ■ separated balancing zones with potentially different conditions ■ potential differences in registration, licensing, securities, etc.
EFFICIENCY GAINS FROM JOINT BALANCING OPERATIONS	Lower benefits because of separated balancing for satellite and feeder market: ■ separate balancing portfolios remain in place and market participants' efforts for related balancing operations in both markets are still required.
EFFICIENCY GAINS FROM INTEGRATING MARKET OPERATOR FUNCTIONS	Lower benefits because national entities for balancing of feeder and satellite market are still required.

Table 32: Benefit categories potentially lower for satellite market than for market merger

[45] For all other welfare benefit categories the "satellite market model" creates no restrictions for implementation of an operational balancing model delivering the same welfare benefits as a full marker merger. The actual utilization of these benefits, however, is subject to the detail definition of the operation model (cooperation of system operators, etc.).

Harmonization prerequisites and implementation barriers

Assuming Contracting Parties' compliance with the Acquis and EU network codes, the following table summarizes harmonization prerequisites and potentially existing barriers regarding a satellite market.

Note: Since balancing systems remain separate no harmonization of balancing-systems and security of supply is necessary.

NO.	PREREQUISITES / HARMONIZATION NEEDS	BARRIERS
1.	Establishment of a designated entity of the satellite market area (the "satellite manager")	-
2.	Adaptation of the balancing regime of the satellite market to the satellite market concept	-
3.	The interconnection capacity from the feeder market area into the satellite market area is booked by the "satellite manager" and costs are allocated to exit tariffs in in the satellite market	-
4.	Elimination of existing bookings at interconnection points between to be integrated markets (→market-internal interconnection points)	■ Existing contracts (aggravated if existing contracts do not follow an entry/exit-logic) ■ Potential inter-governmental agreements

Table 33: Prerequisites/harmonization needs and barriers - Satellite market

6 PROPOSED APPLICATION OF MARKET INTEGRATION TOOLS FOR CONSIDERED GEOGRAPHIC SCOPES PER COUNTRY

Based on the MIOs which represent the considered geographic scope of market integration (see section 3.3) and the tools for integrating markets as provided by the AGTM (see previous chapter 5), this chapters consolidates these aspects and recommends the integration tool to be applied per market integration option.

These proposals are primarily based on the following decision criteria (described in detail in the following section):

- Applicability of integrations tools based on the fulfilment of preconditions provided in the AGTM
- Assessment of harmonization prerequisites and barriers differentiated for the integration tools

Implications of different integration tools on the expectable benefit of market integration

6.1 DECISION CRITERIA

6.1.1 Fulfilment of preconditions for different integration tools

The primary decision criterion is the fulfilment of the different preconditions of the market integration tools as presented by ACER. These preconditions reflect on the technical applicability of the market integration tools and are summarized in the following table:

	MARKET MERGER	TRADING REGION	SATELLITE MARKET
PRECONDITIONS	■ Gas markets are directly connected or plan to build interconnection capacity and ■ all included gas markets have at least one other relevant entry point from another source (if not met, concept can still be applied but satellite market is simpler).		■ A gas market (“satellite”) neighbours a better functioning gas market (“feeder”) and ■ the potential satellite market has no significant imports of gas from other markets but from the feeder.

Table 34: Summary of preconditions for different market integration tools

Considering the given infrastructure base case, which is also the basis for previously selected market integration options, the fulfilment of the preconditions for different market tools can be assessed. The results per Contracting Party are presented in the following table where (✓) indicates the fulfilment of the necessary preconditions, whereas (✗) signifies that the considered market integration tool cannot be applied.

	INTEGRATION TOOLS – INFRASTRUCTURE BASE CASE		
	MARKET MERGER	TRADING REGION	SATELLITE MARKET
ALBANIA	✓	✓	✗
BOSNIA-HERZEGOVINA	✓	✓	✗
KOSOVO*	✗	✗	✗
MACEDONIA	✓	✓	✓
MOLDOVA	✓	✓	✓
MONTENEGRO	✓	✓	✗
SERBIA	✓	✓	✗
UKRAINE	✓	✓	✗

Table 35: Fulfilment of preconditions for different market integration tools based on infrastructure base case

Note for (*): Given the infrastructure base case, there is no connecting infrastructure planned for Kosovo and therefore it does not fulfill the preconditions for any market integration tools.

The preconditions for the satellite market concept are also met by Bosnia-Herzegovina and Serbia, as long as the following PECI projects are not commissioned:

- Bosnia-Herzegovina: projects creating the interconnection Croatia>Bosnia-Herzegovina (completion dates: 2018, 2019 and 2023) and the Ionic Adriatic Pipeline part connecting Croatia>Bosnia-Herzegovina (completion date: 2020);
- Serbia: connecting pipeline Croatia>Serbia (completion date: 2023) and the interconnection project with Bulgaria (completion date: 2017);

Therefore, these countries could participate in market integration as satellite markets until the completion of above mentioned PECI projects. Afterwards, when interconnecting infrastructure is in place, Bosnia-Herzegovina and Serbia need to exchange this market integration tool for a trading region or a market merger, since preconditions for the satellite market concept are no longer met.

6.1.2 Harmonization prerequisites and barriers

The results of the detailed analysis of prerequisites and barriers for possible integration tools are provided in chapter 5. In general, the main findings are:

- The market merger requires the largest harmonization and faces the most barriers of all tools including balancing rules, metering, allocation and regulatory cooperation and legislative actions in member countries.
- The trading region requires less harmonization and generates fewer barriers, since national end user zones are not merged.
- The satellite market is the easiest concept since both markets remain separated.

6.1.3 CBA implications

As described in chapter 4, different integration tools have different implications on the CBA results. The market merger is the most extensive form of market integration and leads to all benefits described in the CBA. The trading region and the satellite market concept provide in comparison to market integration with a full market merger very similar benefits. Reductions of welfare benefits might occur for the following categories:

- improved retail market efficiency (since remaining barriers might hinder retail competition);
- efficiency gains from joint trading operations (since national end user balancing zones remain separated);
- efficiency gains from integrating market operator functions (since national entities for balancing separated end user zones are still required).

6.2 PROPOSED COMBINATIONS OF COUNTRIES AND MARKET INTEGRATION TOOLS

As described in in the previous parts of this chapter, all market integration tools have different characteristics and as a result different preconditions, welfare benefits, harmonization prerequisites and implementation barriers. Summarizing the main facts leads to the following overview:

	MARKET MERGER	TRADING REGION	SATELLITE MARKET
HARMONIZATION PREREQUISITES AND IMPLEMENTATION BARRIERS	Most harmonization prerequisites and implementation barriers	Fewer harmonization prerequisites and implementation barriers than a market merger	Easiest way of implementing a market integration
BENEFITS	Maximal benefits	Possible deductions of welfare benefits	
PRECONDITIONS	Preconditions met for all Contracting Parties		Preconditions not met for all Contracting Parties

Table 36: Summary of market integration tools' characteristics

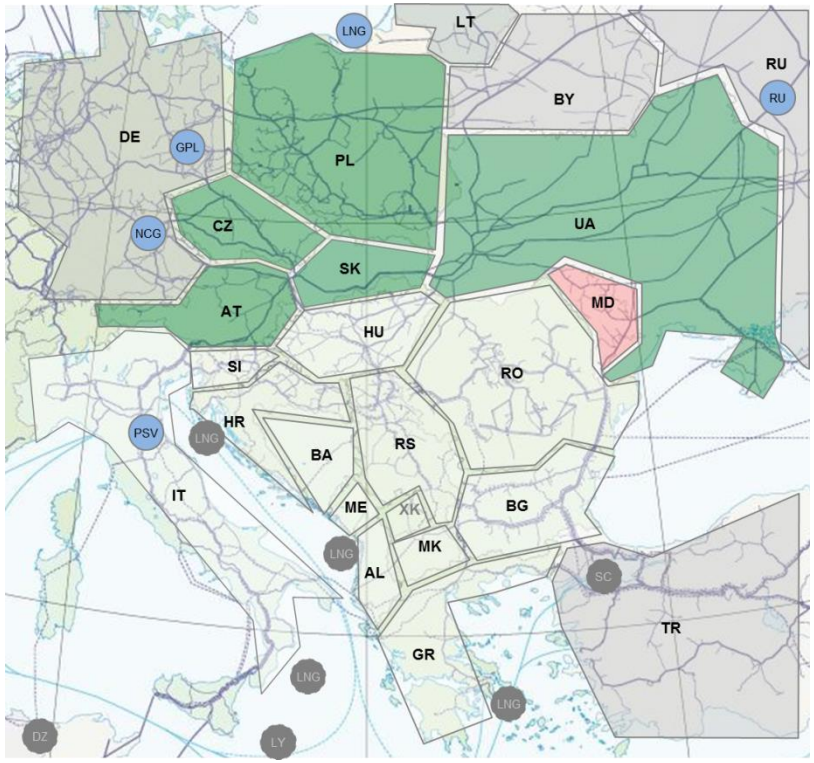
The Contracting Parties' gas markets currently face major transformations to fulfil the required compliance with the 3rd EU energy package as stated in the Acquis and the planned adaptations of the European network codes (see factsheets). The additionally required harmonization prerequisites resulting from full market integration can be even challenging for countries compliant with the European legal framework.

Therefore, considering this current state of Contracting Parties' gas market development, a concept which reduces the number of harmonization needs and implementation barriers to be overcome and still delivering reasonable benefits seems preferable. This can be achieved by implementing a trading region which offers almost all benefits of a full market merger with significantly reduced implementation efforts. This approach also maintains the option of maximizing the scope of market integration at later stages, allowing for future steps towards a full market merger.

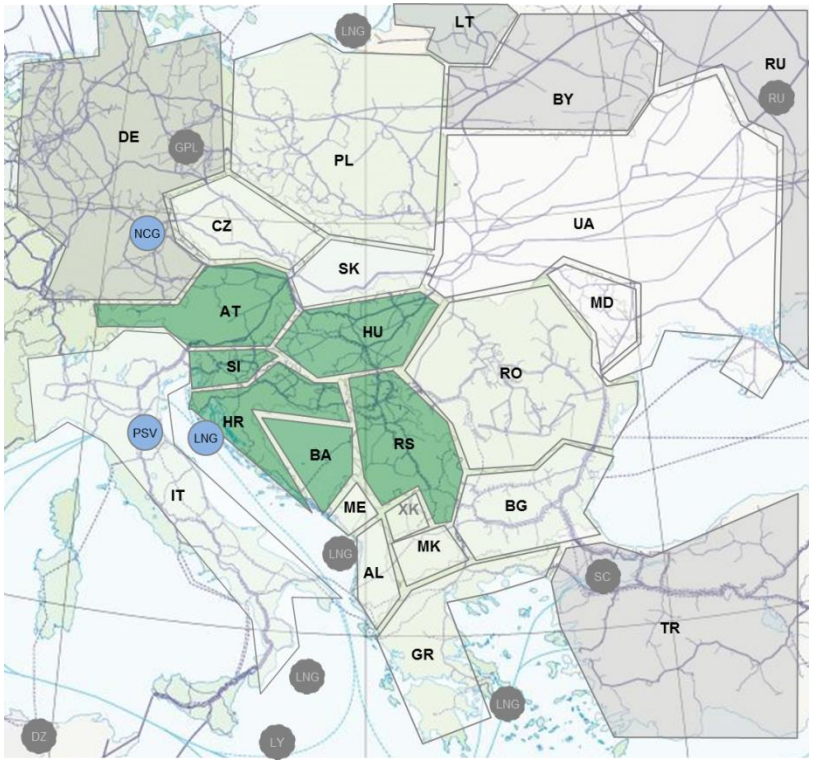
Of course, if the preconditions are met the satellite market is even easier to implement, delivering the same benefits as the trading region. Looking at the infrastructure base case, the necessary preconditions are met by Moldova and Macedonia (see section 6.1.1).

These considerations lead to the following proposed applications of market integration tools for the considered MIOs (see following figures) where green indicates countries participating in a trading region and rose indicates countries which are linked to the trading region as satellite markets.

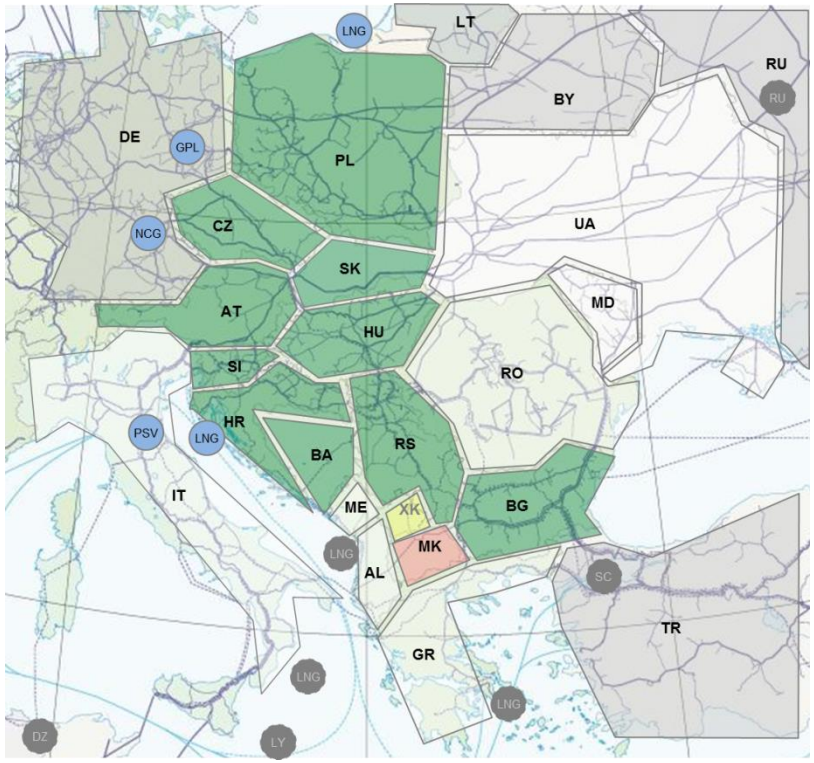
6.2.1 Market integration tools MIO 1: Ukraine West

GEOGRAPHICAL SCOPE (background map: ENTSOG)	MARKET INTEGRATION TOOLS APPLIED		REMARKS
	TRADING REGION	SATELLITE MARKET	
	■ UA ■ AT ■ CZ ■ SK ■ PL	■ MD	Apart from Moldova, which can participate as a satellite market, the participating countries form a trading region.

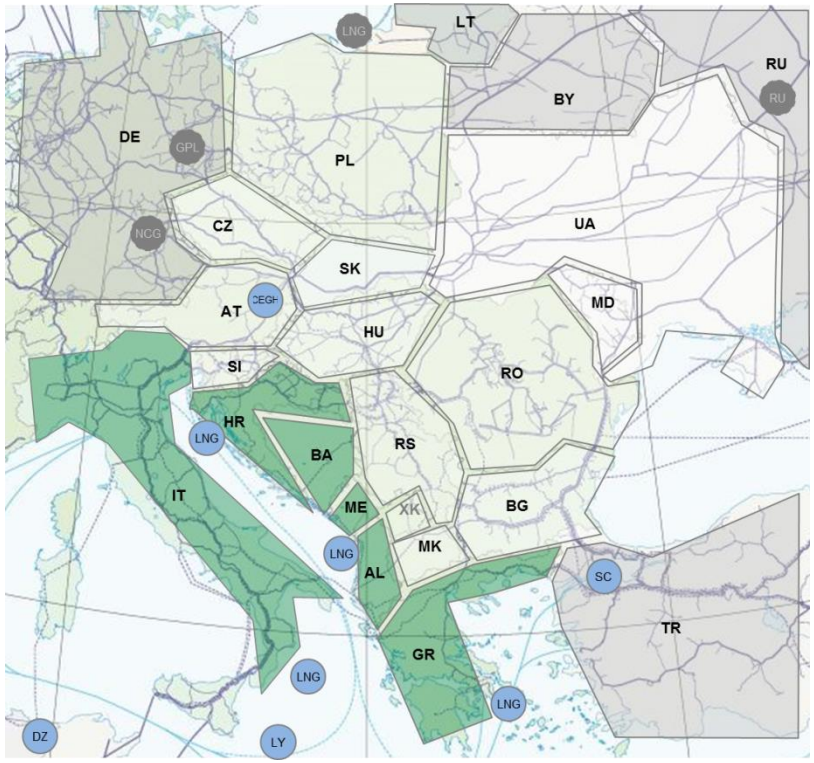
6.2.2 Market integration tools MIO 2: Serbia North

Geographical scope (background map: ENTSOG)	Market integration tools applied		Remarks
	Trading region	Satellite market	
	■ AT ■ HU ■ SI ■ HR ■ BA ■ RS	–	■ The whole market integration scope is set up as a trading region. ■ Alternatively (not shown in figure) as long as PECI projects interconnecting RS and/or BA to adjacent countries are not completed, these CPs could be integrated as satellite markets, keeping the harmonization efforts for both countries as low as possible (see section 6.1.1). Note that an interconnection of Serbia with Bulgaria negates the satellite market option for Serbia.

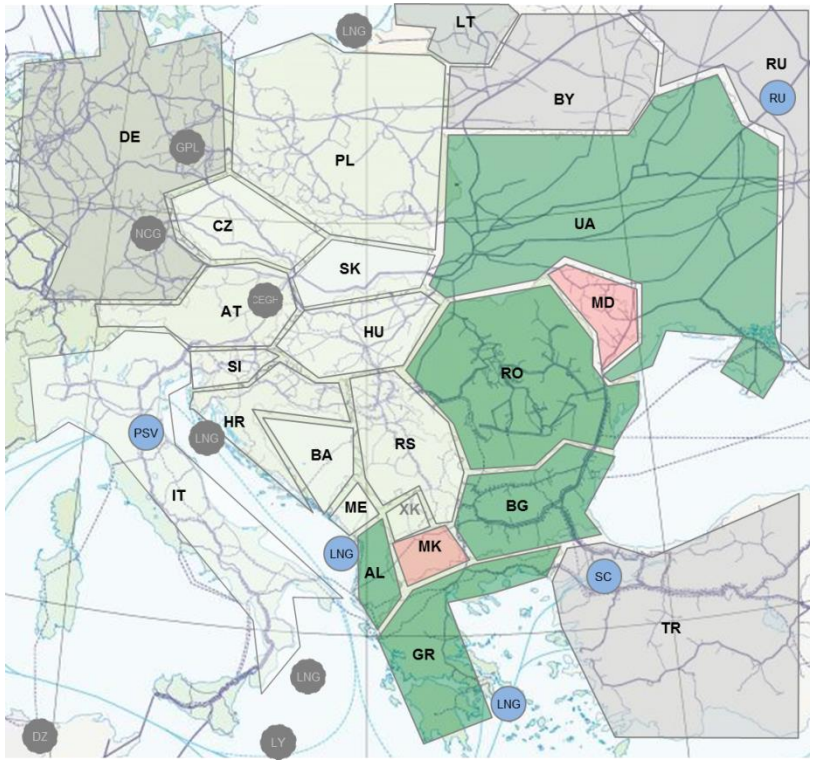
6.2.3 Market integration tools MIO 2: Serbia North (extended)

GEOGRAPHICAL SCOPE (background map: ENTSOG)	MARKET INTEGRATION TOOLS APPLIED		REMARKS
	TRADING REGION	SATELLITE MARKET	
	■ AT ■ HU ■ SI ■ HR ■ BA ■ RS ■ PL ■ CZ ■ SK ■ BG	■ MK ■ (KS*)	■ The extended Serbia North variant enlarges the trading region defined previously: ■ a) to the Southeast: BG and MK (could be satellite) and/or ■ b) to the North: SK, CZ, PL ■ Kosovo (marked in yellow) is a further possible extension, but at the moment no interconnections are planned and therefore no decision on the adequate integration tool can be made.

6.2.4 Market integration tools MIO 3: Adriatic Integration

GEOGRAPHICAL SCOPE (background map: ENTSOG)	MARKET INTEGRATION TOOLS APPLIED		REMARKS
	TRADING REGION	SATELLITE MARKET	
	■ AL ■ BA ■ ME ■ HR ■ GR ■ IT	–	The whole market integration scope is set up as a trading region.

6.2.5 Market integration tools MIO 4: Ukraine South

Geographical scope (background map: ENTSOG)	Market integration tools applied		Remarks
	Trading region	Satellite market	
	■ UA ■ RO ■ BG ■ GR ■ AL	■ MD ■ MK	For Moldova and Macedonia the satellite market tool is possible, all other countries would be integrated as a large trading region.

7 IMPLEMENTATION ACTION PLAN

The analyses of this study show:

- significant potential benefits from market integration in the Energy Community for the respective Contracting Parties and
- manageable implementation efforts as 3 of 4 integration options can be implemented on existing infrastructure and most of the effort required is already covered by the need to transpose EU regulations (a task which has to be completed irrespective of market integration).

It is now up to the Contracting Parties to realize these benefits by implementing market integration projects as soon as possible, also to avoid the need to revise/remove interim solutions.

A next crucial step is to gather interested stakeholders (especially the ones directly involved in the envisaged integration scope) and effectively promote the respective market integration project, with the goal of conducting a feasibility study. This “project promoter” would typically be a NRA or TSO from one of the benefitting Contracting Parties, but may in principle also be any other public or private sector entity.

This cooperation of interested stakeholders (the market integration platform) shall primarily act on the following points (also refer to section 7.1):

- define scope for the market integration
- secure funding for the project activities (e.g. staff resources, travel expenses, external services/studies)
- establish a suitable cooperation structure
- initiate the feasibility study

The Energy Community Secretariat, with its key aim to extend the EU internal energy market to South East Europe and beyond is perfectly positioned and has therefore been invited at 10th Gas Forum to efficiently organize, coordinate and support this market integration platform.

Organisations such as CESEC and the Gas Regional Initiative SSE have been put forward to provide a suitable project environment and framework for the activities aimed at market integration between Contraction Parties and EU member states. .

This preparatory phase can be referred to as “project building” where a rough idea is presented, discussed and subsequently developed to a stage that represents an actual project. From an abstract perspective, the following sequence of project phases seems a sensible approach to tackle market integration as a whole:

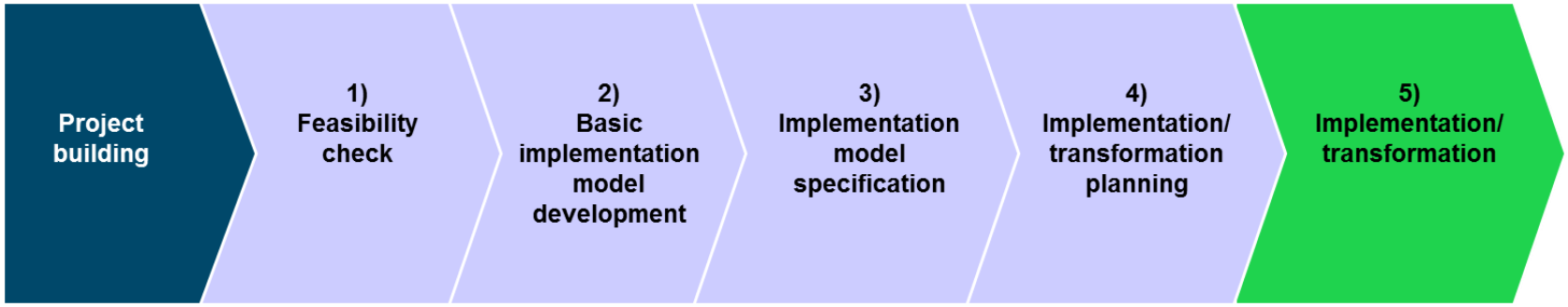


Figure 21: Project phases towards market integration

Phase 1) Feasibility check

- Goal: Demonstrate viability of the market integration project
- Exemplary activities:
  - define principles that need to be obeyed when creating this market integration option;
  - draft a basic (high level) interaction model between players;
  - develop market integration implementation perspective (institutions, timeline)
  - set up consultation (goals, questions, documents, platform, etc.)
  - compile and evaluate consultation input;
  - identify key learning from the consultation to be reflected in the model development

Phase 2) Basic implementation model development:

- Goal: Define the cornerstones of the integrated market
- Exemplary activities:
  - define the entity model principles (e.g. gas market roles, contract structure, national competences, cooperation requirements);
  - define the tariff principles (e.g. treatment of vanishing interconnection point revenues);
  - define the capacity principles (e.g. capacity qualities, calculation method);
  - define the operational balancing principles (e.g. physical flows);
  - define the commercial balancing principles (e.g. balancing rules).

Phase 3) Implementation model specification:

- Goal: Prepare the model specification in sufficient detail for the legislative processes
- Exemplary activities:
  - detailed definition of the trading region model implementation and of the satellite market model implementation:
    - detailed specification of the trading region model:
      - integrated entry/exit-system on transmission level;
      - integrated balancing-system;
      - security of supply (optional).
    - detailed specification of the satellite market model:
      - satellite manager establishment;
      - adaptation of balancing regime of satellite.
  - identification of national legal/regulatory framework amendment requirements;
  - definition of additionally required national legal/regulatory provisions;
  - running amended/new laws/regulations through the legislative processes (from drafting to enactment).

Phase 4) Implementation/transformation planning:

- Goal: Development of step-by-step plans by all involved stakeholders (e.g. NRAs, TSOs, gas exchange, traders/suppliers) to prepare the implementation/transformation
- Exemplary activities:
  - gap analysis present state vs. target state after project implementation;
  - definition of milestones;
  - detailed definition of project tasks;
  - setup of project organization.

Phase 5) Implementation/transformation:

- Goal: Put the market integration project into operation
- Exemplary activities:
  - setup of institutions;
  - legal changes (down to network code intricacies);
  - process and IT implementations;
  - transformation of existing contracts;
  - cooperation contracts.

It shall be noted that early harmonization efforts and close cooperation regarding cross-border topics (e.g. capacity allocation, congestion management principles, interoperability) but also on structural topics like e.g. balancing or capacity contracts can greatly speed up an eventually decided market integration, as this upfront cooperation:

- can reduce amendment requirements of national regulations due to market integration and
- sharpens communication, thus mitigating lost-in-translation overhead.

7.1 ACTION PLAN FOR THE PROJECT BUILDING PHASE

In general the project building phase is not a strongly structured and organized phase but develops more informally, depending on the force employed by the project promoter to push market integration and the willingness of key stakeholders to participate and contribute.

Four key actions need to be taken in the project building phase:

- **1) Specification of the project:**
  - Once a group of interested stakeholders has formed, the following key questions need to be answered:
    - What are the initial project goals?
    - What is the project scope? (countries involved, integration model per country, variants to be evaluated, etc.)
    - When are which results expected of the project? (general timeline, milestones)

        - How shall the initial cooperation structure be implemented? (organizational structure, voting/veto rights, administrative implementation, reporting obligations, etc.)
          E.g.:
            - task force in Energy Community;
            - implementation group in GRI SSE;
    - The main initiative (i.e. organization and detailed drafts) should come from the project promoter.
    - The amount of time reserved for the specification of the project should allow for all stakeholders to reach an agreement.
- **2) Definition of funding for the project activities:**
    - While the smaller cost items like expenditures for stakeholder staff involved in project activities or travel expenses are to be borne by each stakeholder, especially external procured services (studies, assessments, analyses) need clear cost allocation rules.
    - Note that acquiring funding for infrastructure investments is not included in this action item.
- **3) Implementation of the initial cooperation structure (market integration platform):**
    - At this point the organization tasked with project management starts working, e.g. by
        - setting up the work programme;
        - scheduling of meetings (topics, location, participants);
        - assignment of work items and
        - definition of reporting procedures.
    - In general, a market integration projects' roles and institutional framework are expected to transform in the course of the project. Where initially only a small number of organizations and participants are involved (focus: feasibility study), at later stages more parties will be introduced and/or workload will be shifted (especially come implementation).
- **4) Initiation of a feasibility study:**
    - This consists of the procurement of external services for the feasibility study, ranging from the precise formulation of the required services to the signing of the agreement.

By following these actions the result should be to get a sufficiently detailed picture on whether to initiate follow-up steps for the market integration project (i.e. consultation, basic implementation model development) or if alternative/amended approaches (i.e. different geographical scope) should be followed instead.

8 ANNEX

8.1 VERSION HISTORY

V	REPORT VERSION	DATE	REMARKS
v0.9	Draft final Report	13 November 2015	Draft final report provided to ECS for review
v1.0	Final Report	15 February 2016	Final Report provided to ECS

8.2 CONVENTIONS

- Numbers are represented with a comma as the decimal marker and a full stop for marking the thousands (e.g. EUR 1.000,00).
- If not explicitly stated otherwise, the following conventions regarding units as defined in Art. 13 *NC INTEROP* apply:
  - Energy figures are based on the GCV
  - Reference conditions for volume: 0 °C and 1,01325 bar(a)
  - Reference conditions for GCV (and energy): 25 °C
- Country codes are following the ISO 3166-1 alpha-2 definition.
  - Exception: Kosovo currently does not have an ISO-assigned country code and is abbreviated as “KS*” in this document.

8.3 TABLE OF REFERENCES

References throughout the document are printed in *Italics* and are listed in the following table:

NO.	REFERENCE	REFERENCE DESCRIPTION	DATED	OPTIONAL: LINK
1.	*AGTM*	ACER: European Gas Target Model – review and update	16 January 2015	http://www.acer.europa.eu/Events/Presentation-of-ACER-Gas-Target-Model-/default.aspx

No.	Reference	Reference description	Dated	Optional: link
2.	*ACER Monitoring Report 2014*	ACER/CEER: Annual Report on the Results of Monitoring the Internal Electricity and Natural Gas Markets in 2013	22 October 2014	http://www.acer.europa.eu/Official_documents/Acts_of_the_Agency/Publication/ACER_Market_Monitoring_Report_2014.pdf
3.	*BNetzA Monitoring Report 2013*	Bundesnetzagentur/Bundeskartellamt Monitoringbericht 2013 gemäß § 63 Abs. 3 i. V. m. § 35 EnWG und § 48 Abs. 3 i. V. m. § 53 Abs. 3 GWB	June 2014	http://www.bundesnetzagentur.de/SharedDocs/Downloads/DE/Allgemeines/Bundesnetzagentur/Publikationen/Berichte/2013/131217_Monitoringbericht2013.pdf?__blob=publicationFile&v=15
4.	*BNetzA Monitoring Report 2014*	Bundesnetzagentur/Bundeskartellamt Monitoringbericht 2014 gemäß § 63 Abs. 3 i. V. m. § 35 EnWG und § 48 Abs. 3 i. V. m. § 53 Abs. 3 GWB	14 November 2014	http://www.bundeskartellamt.de/SharedDocs/Publikation/DE/Berichte/Energie-Monitoring-2014.pdf?__blob=publicationFile&v=6
5.	*booz&co. Market Integration Benefits Report 2013*	booz&co. report prepared for DG ENER on Benefits of an Integrated European Energy Market	20 July 2013	https://ec.europa.eu/energy/sites/ener/files/documents/20130902_energy_integration_benefits.pdf
6.	*BP Statistical Review 2015*	64th edition of BP Statistical Review of World Energy	June 2015	http://www.bp.com/content/dam/bp/pdf/Energy-economics/statistical-review-2015/bp-statistical-review-of-world-energy-2015-full-report.pdf

No.	Reference	Reference description	Dated	Optional: link
7.	*CEER Gas Target Model*	CEER Vision for a European Gas Target Model Conclusions Paper	01 December 2011	http://www.ceer.eu/portal/page/portal/EER_HOME/EER_CONSULT/CLOSED%20PUBLIC%20CONSULTATIONS/GAS/Gas_Target_Model/CD/C11-GWG-82-03_GTM%20vision_Final.pdf
8.	*CESEC Memorandum of Understanding*	Memorandum of understanding on a joint approach to address the natural gas diversification and security of supply challenges as part of the Central and South-Eastern European Gas Connectivity (CESEC) initiative	10 July 2015	https://ec.europa.eu/energy/sites/ener/files/documents/CESEC%20MoU_signatured.pdf
9.	*E-Control Austria Price Monitoring Reports*	E-Control *Austria* price monitoring reports	Various	http://www.e-control.at/preismonitor
10.	*ECRB Analysis of Gas Transmission Balancing 2013*	ECRB Gas Transmission Balancing in the Energy Community	March 2013	https://www.energy-community.org/pls/portal/docs/2010184.PDF
11.	*ECRB Retail Market Development Status Review 2014*	ECRB Retail Market Development in the Energy Community, Status Review	December 2014	https://www.energy-community.org/portal/page/portal/ENC_HOME/DOCS/3544155/final_version_clean.pdf
12.	*ECS Annual Implementation Report 2014*	Secretariat's 2014 Annual Implementation Report of the Acquis under the Treaty Establishing the Energy Community	01 August 2014	https://www.energy-community.org/pls/portal/docs/3356393.PDF

No.	Reference	Reference description	Dated	Optional: link
13.	*ECS Strategy and PECIs*	Energy Community Strategy and Projects of Energy Community Interest	01 November 2013	https://www.energy-community.org/portal/page/portal/ENC_HOME/DOCS/2450177/Energy_Community_Publication_WEB.PDF
14.	*ECS Annual Implementation Report 2015*	Secretariat's 2014 Annual Implementation Report of the Acquis under the Treaty Establishing the Energy Community	01 September 2015	https://www.energy-community.org/portal/page/portal/ENC_HOME/DOCS/3872267/EnC_IR2015WEB.pdf
15.	*EFET Hub Development Study 2015*	EFET's 2015 review of the European Gas Hub Development Study	01 July 2015	http://www.efet.org/Cms_Data/Contents/EFET/Folders/Documents/EnergyMarkets/VTP_Assessment/~contents/SBX28G3U3L2PNND5/2015-Review-of-Hub-Scores_final.xlsx
16.	*ENTSOG Capacity Map 2015*	ENTSOG technical capacities at cross-border interconnection points on 01 January 2015	03 June 2015	http://www.entsog.eu/public/uploads/files/maps/transmissioncapacity/2015/ENTSOG_CAPMAP_2015.xlsx
17.	*ENTSOG Transparency Platform*	The Transparency Platform is based on information that is already published by individual TSOs on their websites.	–	https://transparency.entsog.eu/
18.	*EU Regulation 715/2009*	Regulation (EC) No 715/2009 of the European Parliament and of the Council of 13 July 2009 on conditions for access to the natural gas transmission networks	13 July 2009	http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32009R0715

No.	Reference	Reference description	Dated	Optional: link
19.	*Eurogas preliminary Gas Consumption 2014*	Eurogas publication on preliminary figures of European countries' gas consumption in 2014	25 March 2015	http://www.eurogas.org/uploads/media/Eurogas_Press_Release_-_New_Eurogas_data_confirms_dynamic_EU_gas_market.pdf
20.	*Eurostat*	Eurostat	–	http://ec.europa.eu/eurostat/
21.	*NC BAL*	Commission Regulation (EU) No 312/2014 of 26 March 2014 establishing a network code on Gas Balancing of Transmission Networks	26 March 2014	http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2014.091.01.0015.01.ENG
22.	*NC INTEROP*	Commission Regulation (EU) 2015/703 of 30 April 2015 establishing a network code on interoperability and data exchange rules	30 April 2015	http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2015.113.01.0013.01.ENG
23.	*OIES Publication on European Gas Hubs Price Correlation 2014*	OIES: European gas hubs price correlation: barriers to convergence?	September 2014	http://www.oxfordenergy.org/wpcms/wp-content/uploads/2014/09/NG-91.pdf
24.	*TSO/PwC Results of Cost-Benefit Analysis for Integration of GASPOOL/NCG 2012*	Ergebnisbericht Kosten-Nutzen-Analyse einer Marktgebietszusammenlegung von GASPOOL und NetConnect Germany nach § 21 GasNZV	October 2012	http://www.bne-online.de/de/system/files/files/attachment/20121031_Marktgebietsbericht%20Fernleitungsnetzbetreiber_Kosten-Nutzen-Analyse_Marktgebietszusammenlegung.pdf

8.4 LIST OF ABBREVIATIONS

Note that acronyms of companies (e.g. TSOs) and two-letter country codes (→ ISO 3166-1 alpha-2) are not contained in this list.

ACRONYM	MEANING
ACER	Agency for the Cooperation of Energy Regulators
AGTM	ACER Gas Target Model
CBA	Cost-benefit analysis
CEE	Central and Eastern Europe
CEER	Council of European Energy Regulators
CEETR	CEE Trading Region
CEGH	Central European Gas Hub
CESEC	Central and South Eastern European Gas Connectivity
COSIMA	Cross-border Operating Strongly Integrated market Area
CP	Contracting Party
DMA	Direct market access
DSO	Distribution system operator
EC	European Commission
ECRB	Energy Community Regulatory Board
ECS	Energy Community Secretariat
EEX	European Energy Exchange
EFET	European Federation of Energy Traders

ACRONYM	MEANING
ENTSOG	European Network of Transmission System Operators (Gas)
EU	European Union
EUR	Euro
E/E	Entry/exit
FERK	Regulatory Commission for Energy in the Federation of BA
GCV	Gross calorific value
GPL	Gaspool
GRI SSE	Gas Regional Initiative South South-East
HHI	Herfindahl-Hirschmann Index
IAP	Ionic Adriatic Pipeline
IP	Interconnection point
ITO	Independent transmission system operator
LNG	Liquefied natural gas
MIO	Market integration option
NBP	National Balancing Point
NC BAL	Network code on balancing
NCG	NetConnect Germany
NID	Net import demand
NRA	National regulatory authority

ACRONYM	MEANING
OTC	Over-the-counter
PECI	Project of Energy Community Interest
PSV	Punto di Scambio Virtuale
RERS	Regulatory Commission for Energy of Republika Srpska
RSI	Residual Supply Index
SEE	South-Eastern Europe
SERC	State Electricity Regulatory Commission in Bosnia and Herzegovina
TANAP	Trans-Anatolian gas pipeline
TAP	Trans Adriatic Pipeline
TSO	Transmission system operator
TTF	Title Transfer Facility
VTP	Virtual trading point