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Potential for a Gas Hub in South East Europe & Turkey

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AIM & CONTENTS

AIM

- To explore the possibilities of creation of a liquid gas trading hub within the South East Europe and Turkey region (SEET).

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SUMMARY

- North West European have already developed gas hubs with reliable pricing signals driven by market forces
- SEET Region (South East Europe and Turkey) gas markets are not yet developed to form a liquid trading hub. Countries in the region have started showing intentions for hub creation driven mainly by supply security concerns.
- Templates for roadmap to hub creation have been developed by ACER¹ and EFET². SEET Region is behind in meeting the requirements of these templates.
- This study scores the SEET region against ACER and EFET criteria and discusses further action to achieve progress.

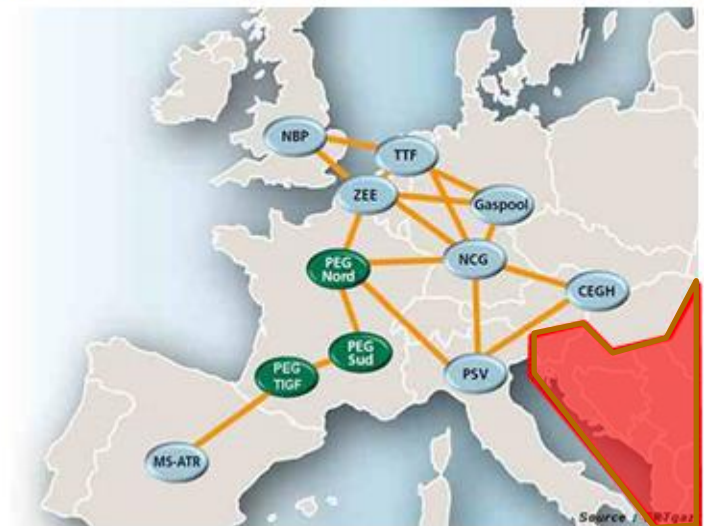
¹ Agency for the Cooperation of Energy Regulators

² European Federation of Energy Traders

INTRODUCTION

- Starting from the late 90s, North West European countries have developed gas hubs where gas trading started to take place in transparent, increasingly liquid platforms generating reliable price signals.
 - British NBP started operations in 1997 followed by Dutch TTF in 2003. Belgium, Germany, France, Austria and Italy followed the trend. These trading points are examples of functional gas markets in Europe, albeit of variable success.
 - Combination of fundamentals (large gas surplus), governmental, regulatory and Infrastructural factors have been the key drivers behind creation and strength of these gas hubs.
 - By 2013, 53% of total amount of gas sold in Europe (a lot more in NWE) is done so under gas-to-gas competition, mostly on trading hubs. This shows a significant change from 2005 where only 15% of gas was priced on gas-to-gas. (Source: *Wholesale Gas Price Formation Report, IGU 2015*).
- SEET has not yet developed liquid gas trading hubs** and compared to NW Europe, is still at early stages of market liberalization. Countries in the Region signal aspirations for further market liberalization and hub creation. (i.e. Turkey based on market size and regional role as a new supply corridor to Europe and each of Greece, Bulgaria and Romania based on specific competitive advantages)
- Templates for operational gas hubs have been created** and are kept up to date: the Gas Target Model (GTM) by ACER on the regulators' side and the Guidelines for European Gas Hubs by EFET on the traders' side.
- Potential hub development in SEET will be assessed in this study with reference to ACER and EFET templates.**

SEET: Far from European Gas Hubs



ACER 2015 Gas Target Model (GTM) – Background

Europe still needs more connectivity and more reference pricing points. ACER helps to set policy framework through its Gas Target Model work.

- ACER launched the first GTM in December 2011 as a «conceptual» model for EU gas markets
 - Articulated the goal of an integrated competitive European Gas Market – in line with the ‘3rd Energy Package’
 - Clear principles of «functional gas markets» were identified
- GTM and its principles were updated in January 2015. Major drivers behind the update were:
 - **Europe still behind targets set in the 2011 Model**
 - Only 2 (TTF, NBP) out of 11 hubs met its development criteria
 - Low degree of market integration, especially in SEE
 - Inefficient use of existing cross-border capacity
 - Barriers behind capacity access: contractual limitations (delivery point or resale restrictions), lack of liquid hubs and lack of counterparties

ACER estimated 2013 **gross welfare loss of EUR 7bn due to insufficient market connectivity** in EU countries, while further optimisation of unused capacity may result in an estimated **EUR 1.5bn welfare gain**.
 - **Threats to Security of Supply**
 - Abundance of single supply source, especially in SEE countries
 - Lack of ability to replace dominant supplier in case of supply cuts
 - Downward trend in domestic production (North Sea and Groningen)
 - New domestic production still far in the future (East Med, Black Sea)
 - **Uncertainty in future demand**
 - Global factors (US shale gas, decelerated BRIC growth, displacement by coal)
 - Weak economic indicators in Europe
 - Rise of renewables (encouraged by EU climate policies)
 - Weak Emissions Trading Scheme (ETS) so far

ACER 2015 GTM - Metrics

ACER criteria aim to address key elements of current hubs as well as fundamental requirements for hub formation.

A «Functional Market» should satisfy metrics for «Market Participants' Needs» and also pass the «Market Health» test.

Market Participants' Needs

These metrics are related to relatively developed markets where wholesale price formation is already driven by supply and demand forces

- Order book volume
- Bid-offer spread
- Order book price sensitivity
- Number of trades



*Indicators on competitive gas market with reliable pricing signals for spot, forward and futures trading. Special focus on **ability for far-dated contracts** – crucial step to enable long-term supply security*

Market Health

These metrics are pre-requisites of formation of functional markets

- Herfindahl-Hirschmann Index (HHI)
- Number of supply sources
- Residual Supply Index
- Market concentration for bid and offer activities
- Market concentration for trading activities



Indicators on supply security and diversification, first-steps of hub creation

Diversification indicators where trading activity exists

ACER 2015 GTM - Metrics

As SEET does not yet have a trading hub, some GTM metrics do not apply. The analysis will concentrate on the remaining metrics related to Market Health.

- **Herfindahl-Hirschmann Index (HHI) - Target: below 2000**
 - An indicator for market concentration or degree of competition.
 - Fully monopolized market – one player, 100% share, HHI of 10000.
 - Extreme of high competition – say 100 players, 1% share each, HHI of 100.
 - Particularly useful to show status of monopolistic structures in SEET.
 - $HHI = \sum (\% \text{ market share of each player})^2$
- **Number of Supply Sources – Target: at least 3**
 - Refers to number of supplying countries rather than commercial entities
 - Most SEET countries rely on a single source for imported pipeline gas. (Turkey and Greece are exceptions)
 - Increased number of supplying countries reached by LNG spot sources
- **Residual Supply Index - Target: at least 110% @ 95% of days**
 - Ability of market to replace its largest external supplier in case that supplier fails to deliver
 - $RSI = (\text{Total Supply} - \text{Supply by Largest Supplier}) / \text{Total Demand}$
 - Challenging in traditional contractual environment (may be invalidated due to significant systemic local oversupply)
 - Subject to 'common mode failure' if say largest supplier failure leads to simultaneous failure of other suppliers.
- **Ideally, a market will feature:**
 - **Many small market participants** helps meet the HHI criterion
 - **Many supply sources** helps meet the Number of Supply Sources criterion
 - **Balanced supply portfolio** helps meet the RSI criterion

ACER 2015 GTM - Metrics

Current Market Situation and Assessment:

Metrics values for SEE countries

	Number of Sources	HHI	RSI
Greece	9	5181	131%
Bulgaria	2	7587	13%
Romania	4	3270	104%
Croatia	5	5987	125%
Slovenia	5	5027	74%
TARGET	≥ 3	≤ 2000	≥ 110%

Source: ACER, 2012 data

9 sources for Greece represent multiple spot LNG sources

Degree of Dependence on Single Supplier

Country	Consumption (bcm)	Net Imports (bcm)	2012 RU% on Imports
Romania	18	2	100
FYROM	0,1	0,1	100
Bulgaria	2,6	2,48	100
Bosnia & Herzegovina	0,4	0,4	100
Serbia	2,4	2,0	99
Croatia	3,2	0,6	96
Montenegro	0	0	90
Greece	3,5	3,5	57
Slovenia	1,1	1,0	47
Turkey	35	34	46
Albania	0,03	0	-

Source: V. Tsachevsky, Energy Mgt in S.E.Europe, E-Publications of Pan-European Institute, 2/2013. RU: Russia

Notes:

- None of the SEE countries comply with the criteria because of high degree of dependence on a single supplier
- Turkey has the greatest number of pipeline suppliers (Russia, Azerbaijan and Iran)
- Diversity within the SEE mostly driven by LNG (i.e. Greece) and interconnections with adjacent markets (i.e. Hungary, Turkey)
- However **high market concentration (high HHI)** and **low capability to replace dominant supplier (low RSI)** indicate barriers for hub creation.

Each metric addresses current market barriers:

- High degree of dependence on single supplier. *SEE countries are proven to be most affected in case of prolonged supply cuts from Russia (source: ENTSOG 2013 simulation results) (low RSI)*
- Low level of interconnection with adjacent markets (so fewer supply sources)
- Lack of transparent market structures / markets dominated by incumbents (*High HHI*)

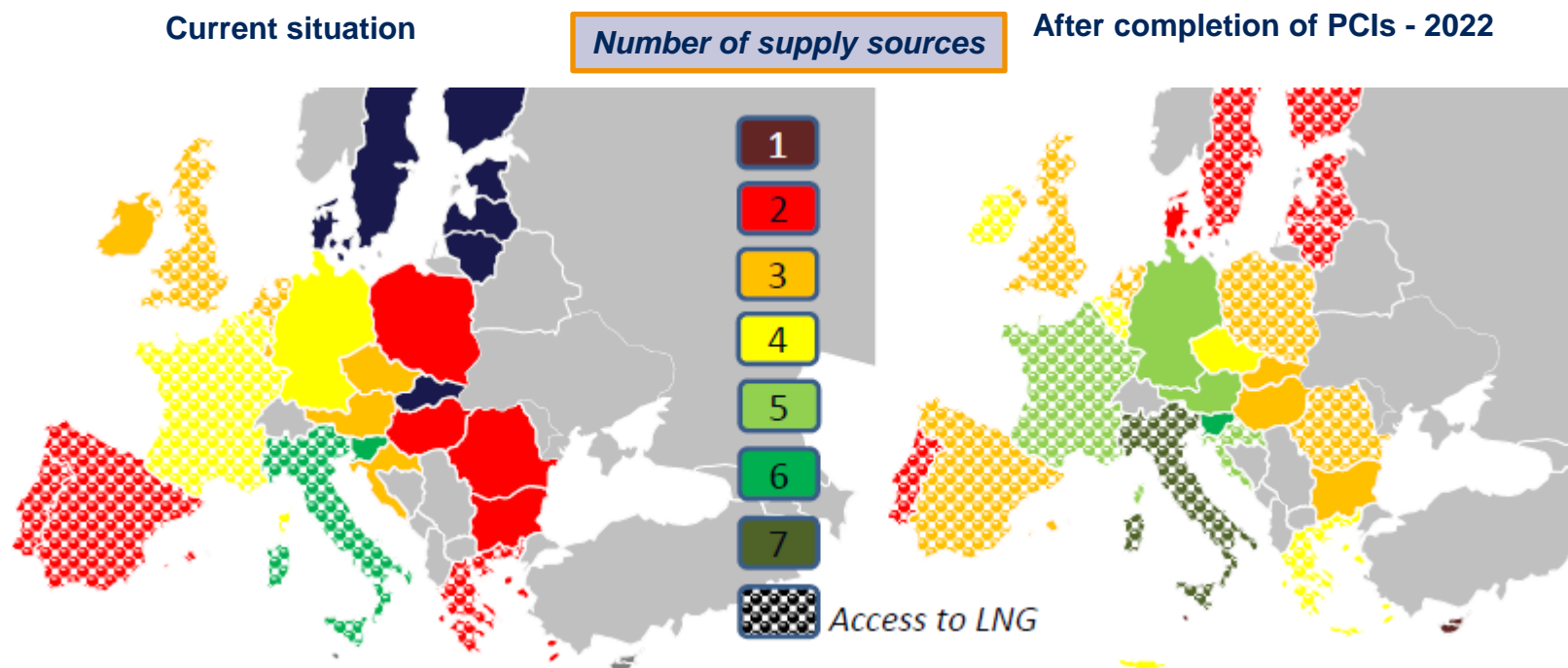
Fundamental barriers identified by GTM criteria are lifted through increased interconnection capacity and access to new supply sources as interconnections increase size of market zone and expand supply options.

Projects of Common Interest (PCI)

- EC has identified **PCIs** which should:
 - Serve for further integration of gas markets (by connecting market zones or improving existing interconnections)
 - De-bottlenecking flows will lead to arbitrage opportunities and result in strong price connectivity. **Potential gross welfare gains are the appropriate measure for project selection.**
 - Increase competition in the markets
 - Strengthen supply security through supply diversification (increased number of supply sources)
- A PCI would benefit from fast-track permitting and adequate financial resources
- **Limited availability of project funding in the region is the major challenge behind realization of PCIs**
 - Initial PCI list includes 107 gas projects with total investment cost of 53bn euros (source: EC)
 - CEF (Connecting Europe Facility) allocated a total of 5.8bn euros for all PCIs (gas and electricity)
 - **CEF funding represents only about 3% of the total investment needed – but may help to attract other funds**
- Specific focus to Priority Projects that serves for security of supply, especially in SEE markets where the connectivity is weak, may help materialize the identified projects with the funding available.

Once implemented, PCIs will diversify supply sources to the SEE countries and Turkey.

- **Southern Gas Corridor** increases supply diversity in the Region – Greece, Bulgaria and Romania will have access to at least 3 pipeline gas resources each on a continuous basis.
- New **LNG terminals** in North East Greece and Croatia will provide a fourth (at least), independent source of gas, especially if accompanied by fully functional regional interconnections.



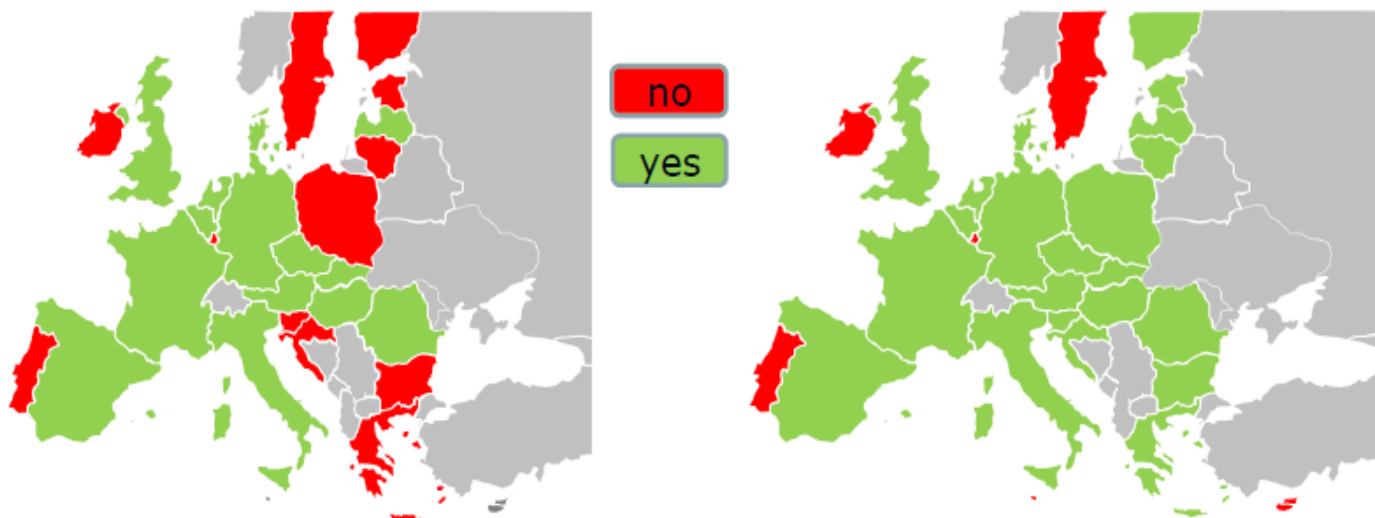
Supply sources: Azerbaijan (new), Russia, Norway, Algeria, Libya, LNG (as one source) and domestic production. Additional supply sources would at least cover 5% of country demand.

Source: EC, ENTSOG

Once implemented, PCIs will also strengthen security of supply through increased redundancy of supply routes

- **Interconnectors**
 - New: Greece-Bulgaria, Turkey-Bulgaria, Bulgaria-Serbia, Bulgaria-Romania, Ionian Adriatic Pipeline
 - Retrofit: More capacity Bulgaria-Greece, reverse flow Romania-Hungary
- Finalisation of these projects will result in more supply routes - SEE countries will meet **N-1 Infrastructure Standard**
 - **N-1 Infrastructure Standard is complementary to GTM RSI metric**
 - Defined as enough capacity to meet 1-in-20-year peak demand when the capacity of the largest infrastructure is deducted (*2010 Supply Security Regulation No 994*)
 - Expresses infrastructural resilience, whereas RSI represents contractual resilience

Compliance with the N-1 infrastructure standard – before and after (2022)



Source: EC, ENTSOG

All SEE countries will meet N-1 criterion if PCIs are implemented

EFET Guidelines – Roadmap to Hubs

I

Interconnections / infrastructure are necessary but not sufficient. Structural market changes supported by regulation are also needed.

- **EFET provides a practical delivery roadmap applicable to SEET complementing the fundamental requirements addressed by ACER's GTM**
- EFET has been developing best practices for hub creation and assessing, through them, the progress in current and towards potential gas trading hubs in Europe. A scoring mechanism has been devised and market assessments made (see Annex 1).
- EFET's European Gas Hub Development Guidelines
 - Set out a roadmap of milestones on the way towards the ultimate: a liquid gas trading exchange
 - Clearly define the roles and responsibilities in achieving these milestones of
 - National Regulatory Authorities (NRA),
 - Transmission System Operators (TSO) and
 - Market Participants (traders)
- However, **paramount to success is the dedication of Governments to mobilize stakeholders, in a quest for social welfare gains.**
- We concentrate on key SEET countries (**Turkey, Greece, Bulgaria and Romania**):
 - All seek to fulfill the institutional requirements towards a functional liquid gas trading hub
 - All are analyzed against EFET's Guidelines

EFET roadmap starts with establishment of a Virtual Trading Point and ends with the establishment of a liquid gas trading Exchange. Several reforms contribute along the way.



- First and foremost, steps must be discussed and implemented through **consultation with stakeholders** for each hub.

Steps include:

- Establishment of an Entry-Exit system with VTP(s) and clear access terms, title transfer and imbalance transfer services by the TSO is key to facilitate a hub.
- **Resolution of structural market issues** to foster liquidity and competition. Liquidity provider / market maker roles would be introduced and encouraged by the NRA.
- Establishment of a Hub Operator (HO) and definition of its governance rules by the NRA.
- Firmness of hub would be achieved after a while through a liquid balancing market facilitated by TSO/HO and reference prices for imbalance would thus be established.
- Development of standard contracts by market participants (i.e. EFET master trading agreements), availability of price reporting agencies and the coming of brokers would then facilitate an exchange.

EFET work is an excellent starting point setting clear steps that need to be taken by institutions. High level of market commitment is required to implement these steps. SEET countries should show full commitment supported by Governments. Otherwise, it will not be possible to achieve such a goal.

EFET Guidelines - TURKEY

Turkish institutions and market players are capable of ensuring hub formation

Steps to meet EFET guidelines:

- NRA should start holding consultations with the effective participation of stakeholders.
- TSO should establish daily pricing at the existing VTP based on supply/demand
- NRA should define transparent rules of governance of an HO, most probably the existing TSO.
- Government / NRA should engage in resolving the known structural market issues, to the benefit of strategic goals in the region. Examples include
 - deregulation of prices, transparent rules for cross-border trade, establishment of the incumbent – along with others - as a market maker and liquidity provider.
- As a consequence:
 - As balancing market at VTP develops and structural reforms supported by regulations are achieved, firmness of hub would be strengthened further through liquidity
 - Traders would adopt standard contracts, easing trades at the VTP.
 - PRAs would be attracted to cover transactions at the VTP, so adding transparency
 - As traded volumes increase, individual trades would be aggregated by credible brokers, acting as a risk buffer between the HO and small traders.
- The establishment of a gas trading Exchange would follow, most probably by one of the existing exchanges.
- **Price Index at the Exchange would then be recognized as a reliable price signal for the country and the region.**

EFET Guidelines - GREECE

Greek institutions and market players are already on course to a hub formation

Steps to meet EFET guidelines:

- TSO should establish an intraday market at the existing Virtual Nominations Point, starting with a Balancing Platform and evolving into a full Virtual Trading Point for physical and non-physical trades.
- TSO should be guided by the NRA to harmonize Nominations and Matching practices with neighboring countries, notably Bulgaria and Turkey (depending on regulatory progress there), for cross-border trade.
- NRA should define transparent rules of governance of an HO, most probably the existing TSO.
- Government / NRA should encourage players other than the incumbent to participate actively in the market. Examples include
 - Encouragement of the incumbent and other wholesalers to act as market makers and liquidity providers
 - Help to gas consumers (power producers, industry, distributors) to exploit the market at the VTP
- As a consequence:
 - As balancing market at VTP develops, firmness of hub will be strengthened through liquidity
 - Traders will adopt standard contracts, easing trades at the VTP.
 - PRAs would be attracted to cover transactions at the VTP, so adding transparency
 - As traded volumes increase, individual trades would be aggregated by credible brokers, acting as a risk buffer between the HO and small traders.
- The establishment of a gas trading Exchange would follow, most probably by one of the existing exchanges.
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Potential SEE Hub – I

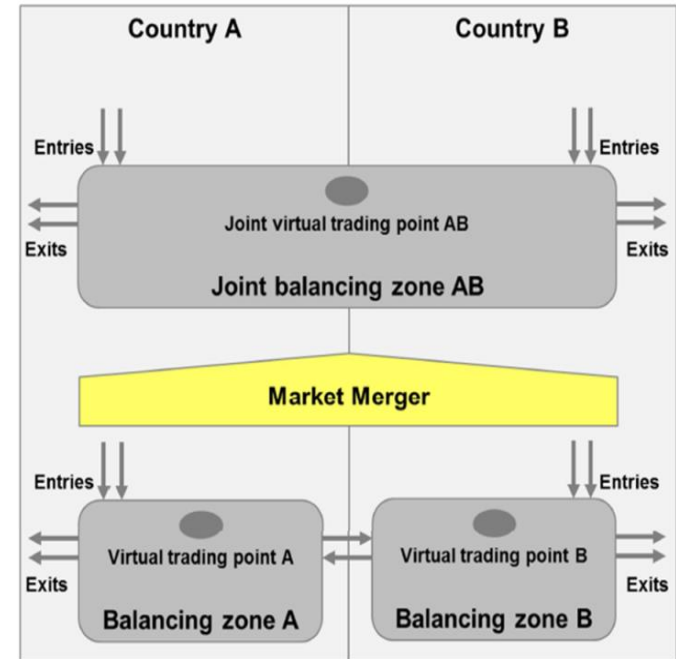
However diligently Greece develops a hub, its domestic market could do with more volumes. A joint SEE hub could be the solution.

- With the completion of planned infrastructure projects, GR, BG, RO would hit the GTM targets through access to multiple resources.
- Moreover, Greece, Bulgaria and Romania will be well-integrated among them to exercise cross-border gas trade.
- There is value in integration of these countries (compared to a single hub in each) as
 - The overall market size will be larger than otherwise, encouraging liquidity
 - The upstream and downstream connections of the new market will be many and diverse, including LNG
 - Competition will exist overnight, as players in each country (including incumbents) will compete against players in the other two countries.
 - The share of each incumbent will instantly reduce to a lower level, simply because of enlargement of their target market.
 - Prices will inevitably converge to a sustainable level.
 - Through price convergence, consumers are likely to enjoy a unified energy-cost environment, reducing mobility obstacles for people, business and goods within the new market.
- After creation of a SEE pricing hub:
 - Other markets, (Serbia, BH, Albania, FYROM, Montenegro) could act either as «satellite markets» (see ACER GTM Annex 6), when further necessary IC projects would be made operational and regulation would permit or follow their own path to national hubs. Eventually, one regional hub is likely to prevail. Croatia and Slovenia are most likely to attach themselves to the Italian PSV and the Austrian CEGH hubs.
- **Main prerequisite** of integration is to convince all countries involved that integration is the safest route to a welfare gain through:
 - Reduced energy poverty
 - Competitive industry (energy costs “in the market”)
 - More cost effective power production

Potential SEE Hub – II

A joint SEE hub would need stable steps and constant assessment of feasibility along the way.

- Annex 6 of the GTM provides valuable guidance on how to pursue integration. Depending on progress on either side of each SEE border and on lowering non-gas related barriers (cultural, historical, political etc), integration may proceed in steps:
 - First, use **Market Coupling** to increase liquidity in each national hub.
 - Then, move by establishing a **Trading Region**.
 - Finally, go for full **Market Merger**.
- Variations and ad-hoc deviations to match the case might prove necessary.
- Though long in time, this sequence of steps is likely to provide a stable transition towards a robust regional SEE gas market, comparable to those of Central Europe if not Western Europe.
- This new SEE market is bound at some point along the way to link up with the Turkish market. Then, the whole SEET will have achieved its potential in enjoying healthy price signals and efficient investment allocation.



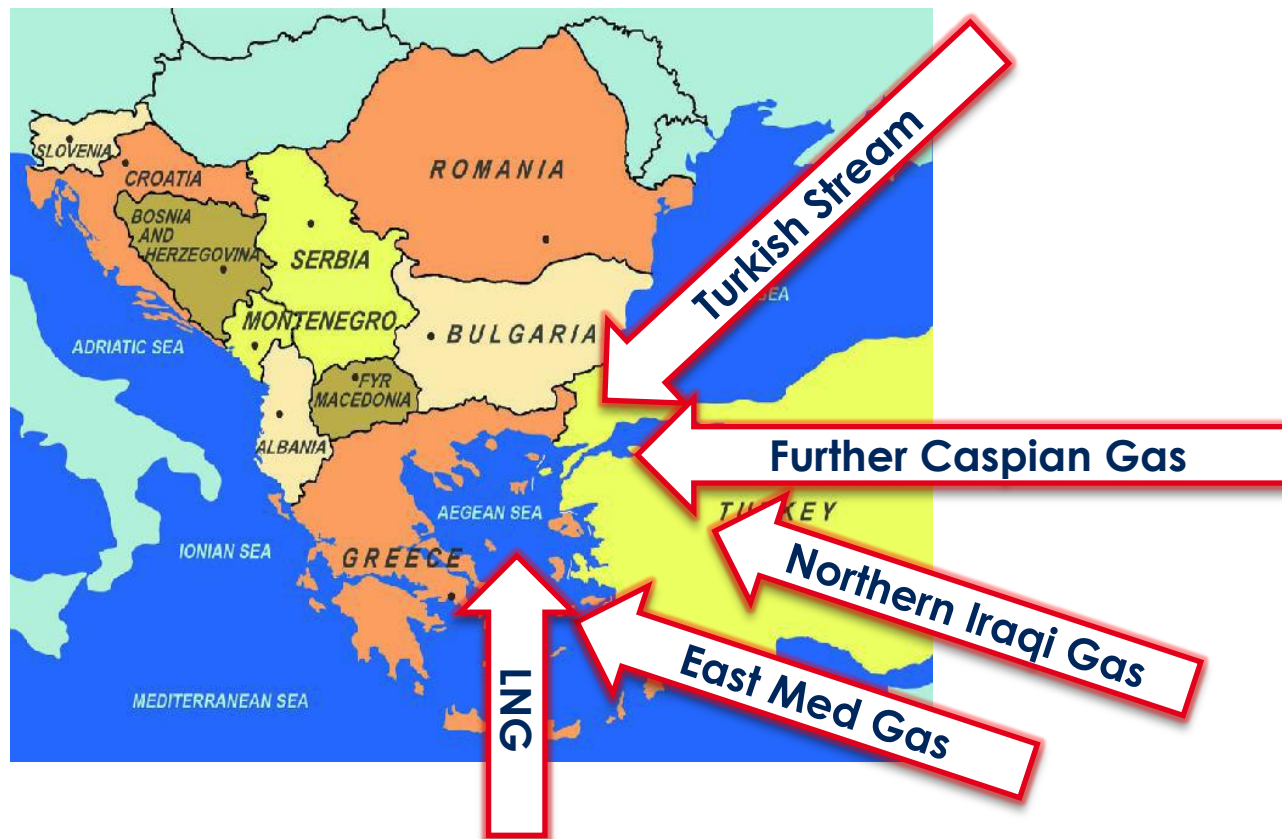
GTM Market Merger Model

- The final step towards a joint **SEE hub** would resemble the scheme above, albeit for three countries.
- Interim steps and additional work (regulatory and technical) would be required for such a result.

Potential New Sources & Routes

Multiple projects are considered in the region.

These projects would further bring supply and route diversification which should help liquidity in future hub(s) once implemented.

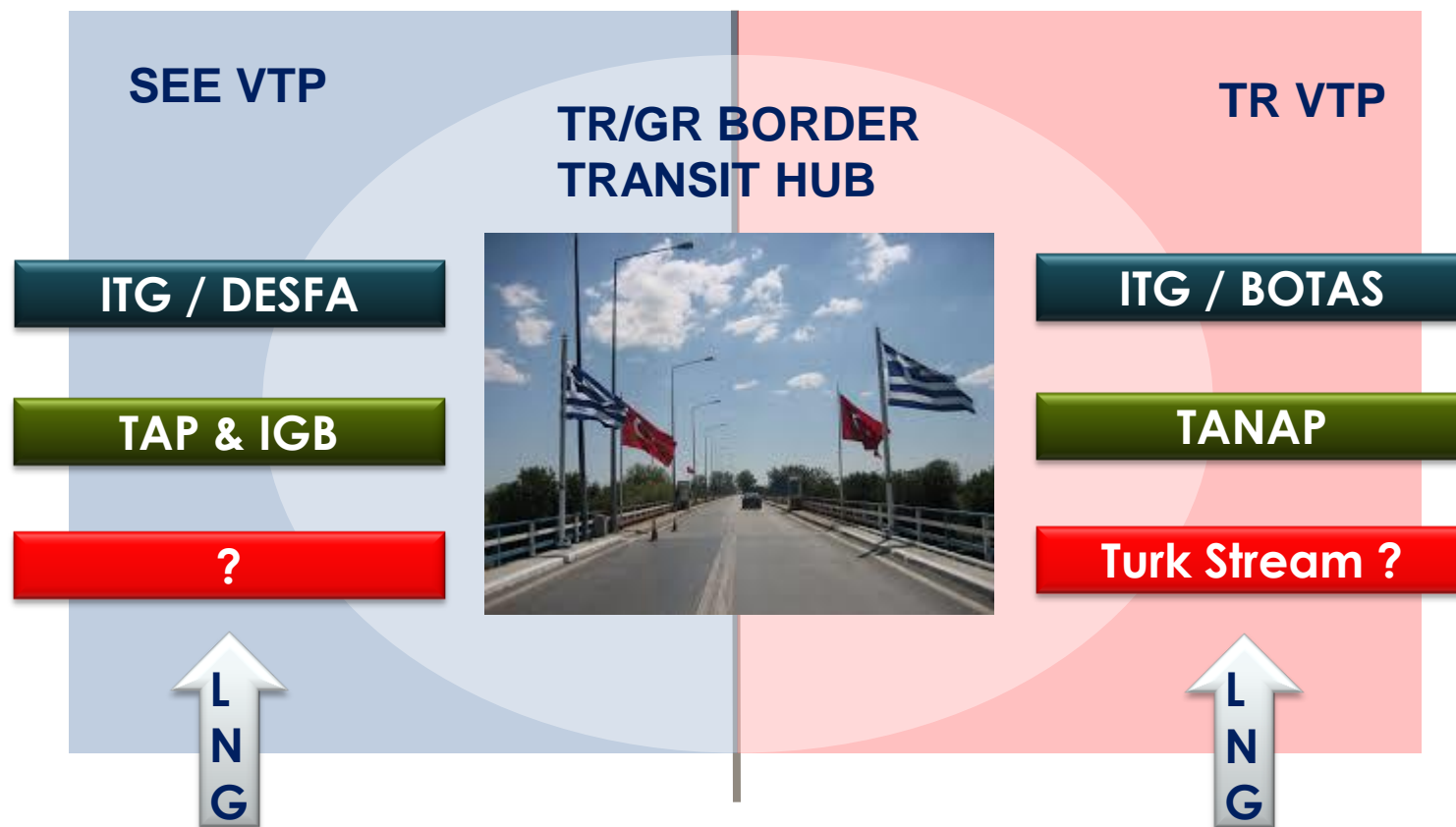


A new Transit Hub?

If regulation either side of the Turkish-Greek border allowed, a new transit hub could emerge.

Such a hub would:

- Resemble CEGH and ZEE in relying on transit flows rather than local markets
- Add liquidity to regional VTPs
- Allow arbitrage among VTPs
- Cement energy cooperation in SEET and beyond



Gas hubs and electricity

Whereas gas and electricity may be traded at separate hubs, it may make economic sense for joint exchanges to be set up, when hubs mature.

- A number of national players in the region promote the creation of national “energy exchanges” where both gas and electricity will be traded.
- Such combined exchanges are justified where a significant portion of a country’s physical gas flows end up as fuel for power generation; otherwise, such exchanges merely house two largely independent commodities with significant synergies only in the financial part.
- In SEET, gas has a significant role to play in power production and is significant in shaping the Marginal System Price of power.
- Moreover, significant amounts of power are traded among the countries of the region,
 - mostly cheap hydro- and nuclear power of the North flowing South
 - bidirectionally in some of the interconnection points between adjacent countries.
- In short, the emergence of gas pricing hubs among Greece-Bulgaria-Romania and separately in Turkey may trigger the emergence of similar regional exchanges of electricity
 - Either at the same location(s) with those of gas
 - Or totally independent.

	BU	GR	RO	SEE	TR
PowerGen from Gas	5%	22%	14%	14%	43%
Gas into PowerGen	38%	59%	24%	33%	48%

Source: EC DG Energy, 2014 Country Factsheets V.3,
TEIAS, EMRA

Annex

EFET European Gas Hub Development Guidelines & Country Analysis

EFET Scoring Mechanism

Developed hubs score 20 (i.e. UK NBP)

Responsible party	What should be done	Scoring mechanism
NRA	Establish a consultation mechanism	1 if group set up and English language
TSO	Entry-exit system established	½ for Entry Exit; 1 if a single VTP
TSO	Title Transfer	
TSO	Cashout rules	
TSO	Accessible to non-physical traders	1 if trade without signup to physical rules
TSO	Firmness of hub	0 if not firm; ½ if firmness "managed" by TSO; 1 if BUBD; 2 if fully market-based
TSO	Credit arrangements non-punitive	
NRA	Resolve market structural issues (defined role for historical player)	½ for release etc; 1 if market maker
NRA	Role of Hub operator	1 – role defined; 2 – gov'nce addressed
NRA	Agree regulatory jurisdiction if cross border	0 if cross border and no agreement; 1 if not cross border or does have agreement
Market	Establish a reference price at the hub for contract settlement	1 if price always available; ½ if deemed
Market	Standardised contract	1 if specialised contract – EFET or equivalent (or standard is sufficient)
Market	Price Reporting Agencies at the hub	1 if several' ½ if only one PRA
Market	Commercial / Voluntary market makers	
Market	Brokers	1 if voice or few ; 2 if systems and many
NRA	Establishment of exchange	1 if exchange appointed and hub is liquid; ½ if exchange appointed and hub illiquid
Market	Index becomes reliable and used as benchmark	1 if Market parties frequently requested

Bulgaria – Score 1½



Responsible party	What should be done	Comments	Score
NRA	Establish a consultation mechanism	Document released in Bulgarian language	½
TSO	Entry-exit system established		0
TSO	Title Transfer		0
TSO	Cashout rules		0
TSO	Accessible to non-physical traders		0
TSO	Firmness of hub		0
TSO	Credit arrangements non punitive		0
NRA	Resolve market structural issues (defined role for historical player)		0
NRA	Role of Hub operator		0
NRA	Agree regulatory jurisdiction if cross border		1
Market	Establish a reference price at the hub for contract settlement		0
Market	Standardised contract	Being discussed	0
Market	PRAs at the hub		0
Market	Market makers		0
Market	Brokers		0
NRA	Establishment of exchange		0
Market	Index becomes reliable and used as benchmark		0

Greece– Score 5



Responsible party	What should be done	Comments	Score
NRA	Establish a consultation mechanism		
TSO	Entry-exit system established	Under discussion	½
TSO	Title Transfer		1
TSO	Cashout rules		1
TSO	Accessible to non-physical traders		0
TSO	Firmness of hub	Allocated as nominated	½
TSO	Credit arrangements non punitive	Not established	0
NRA	Resolve market structural issues (defined role for historical player)	Gas release 10% of imports – prob at VTG	½
NRA	Role of Hub operator	Desfa runs VTP; HO not defined	½
NRA	Agree regulatory jurisdiction if cross border		1
Market	Establish a reference price at the hub for contract settlement	Imbalance published with 3 month delay	0
Market	Standardised contract		0
Market	PRAs at the hub		0
Market	Market makers		0
Market	Brokers		0
NRA	Establishment of exchange		0
Market	Index becomes reliable and used as benchmark		0

Romania – Score 2½



Responsible party	What should be done	Comments	Score
NRA	Establish a consultation mechanism		0
TSO	Entry-exit system established		0
TSO	Title Transfer		1
TSO	Cashout rules		0
TSO	Accessible to non-physical traders		0
TSO	Firmness of hub		0
TSO	Credit arrangements non punitive		0
NRA	Resolve market structural issues (defined role for historical player)		0
NRA	Role of Hub operator		0
NRA	Agree regulatory jurisdiction if cross border		1
Market	Establish a reference price at the hub for contract settlement		0
Market	Standardised contract	Being discussed	0
Market	PRAs at the hub		0
Market	Market makers		0
Market	Brokers		0
NRA	Establishment of exchange		½
Market	Index becomes reliable and used as benchmark		0

Turkey – Score 5½



Responsible party	What should be done	Comments	Score
NRA	Establish a consultation mechanism	Petform+EFET	1
TSO	Entry-exit system established	Under discussion	0
TSO	Title Transfer		1
TSO	Cashout rules		1
TSO	Accessible to non-physical traders	?	
TSO	Firmness of hub	?	
TSO	Credit arrangements non punitive	?	
NRA	Resolve market structural issues (defined role for historical player)	?	
NRA	Role of Hub operator	BOTAS	½
NRA	Agree regulatory jurisdiction if cross border		1
Market	Establish a reference price at the hub for contract settlement		
Market	Standardised contract	Proposed, unclear if adopted	½
Market	PRAs at the hub	Limited	½
Market	Market makers		0
Market	Brokers		0
NRA	Establishment of exchange		0
Market	Index becomes reliable and used as benchmark		0