

“Interconnectivity and Energy Security in S.E. Europe”

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INSTITUTE OF ENERGY

FOR SOUTH EAST EUROPE



Presentation Outline

- Existing gas & electricity interconnections
- Proposed Gas Interconnectors
- Proposed Electricity Grid Interconnections
- Benefits arising from the operation of interconnectors
- Interconnectors as key elements of long term energy strategy



Introductory Observations

- Energy security is key objective for all countries in SE Europe
- Need to secure smooth flow of fuel supplies within each country and between countries in the region
- Interconnectors to be seen as effective energy bridges
- Interconnectors can secure operation of alternative and secondary energy routes, therefore enhancing energy security



Existing Gas & Electricity Interconnectors

- In view of the size of gas volumes transported each year in the region, (85 BCM's) the number and size of interconnectors is limited
- As plans are currently in progress to use SE Europe as a transit area for large inter-regional gas pipelines the need for interconnectors is paramount
- Electricity grid connections between countries in SE Europe are more extensive than gas, thus contributing to much bigger energy flows
- Interconnectors both gas and electricity, are essential for the operation of integrated electricity & gas markets as envisaged by the “Energy Community”



Existing Gas Networks



Regional Electricity Grid



Turkey connection



Through 3 400kV interconnection lines :

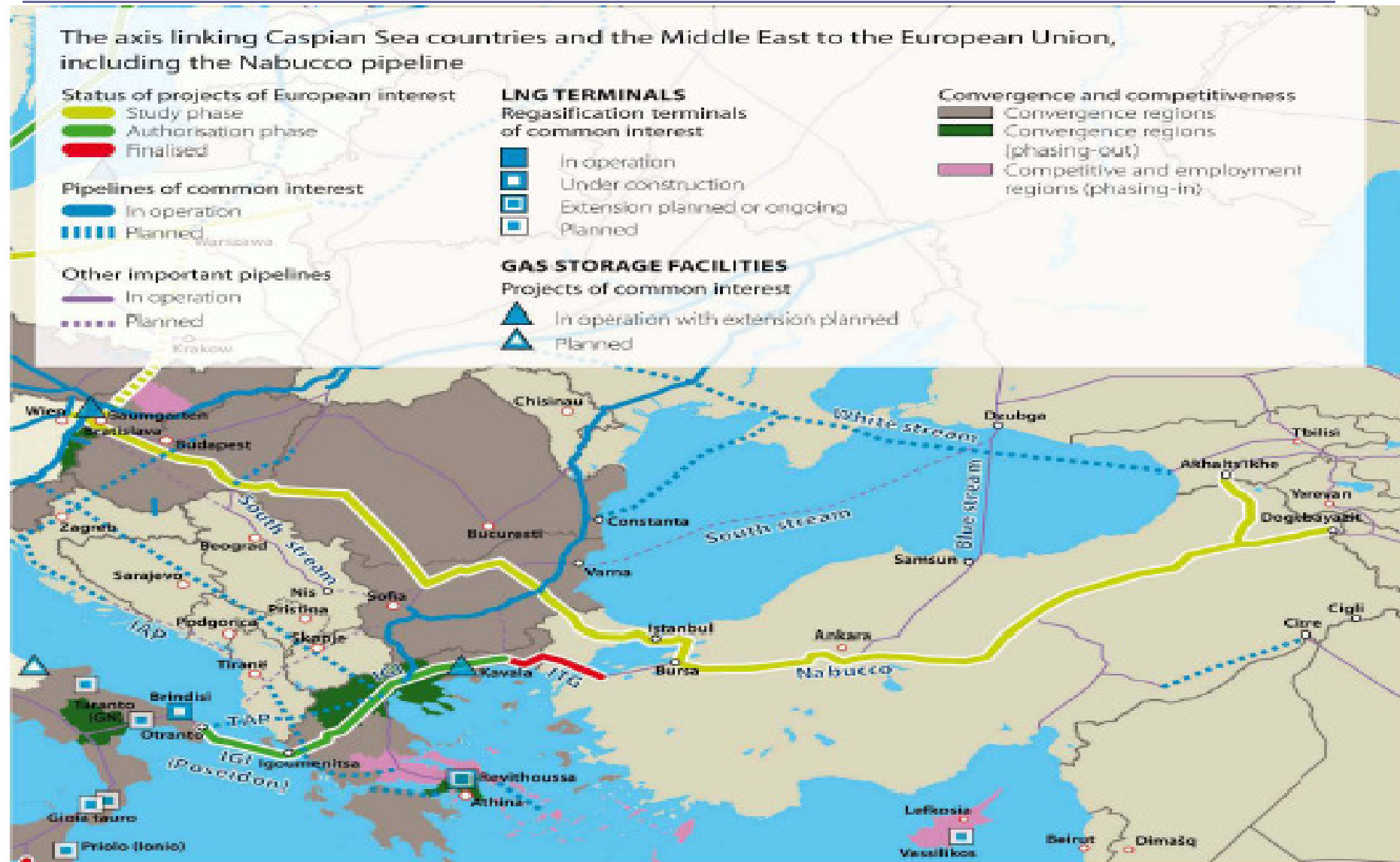
- Maritsa 3 – Hamitabat (line 1)
- Maritsa 3 – Hamitabat (line 2)
- N. Santa- Babaeski (line 3)

Studies:

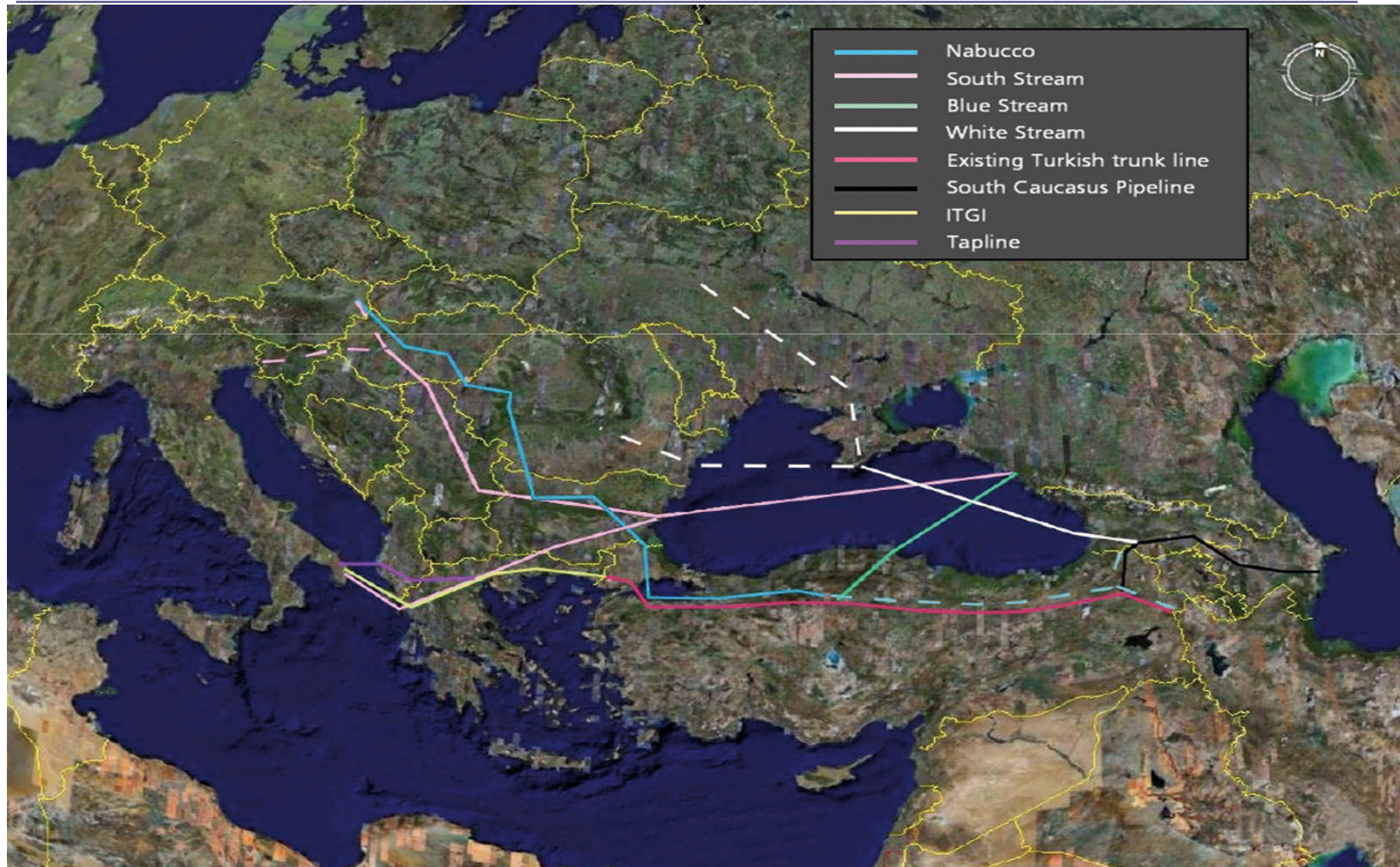
- 1st phase : static & dynamic
- 2nd phase: dynamic performance tests and required improvements in TR (frequency control)

To start trial operation in 2010

Major gas projects under study and development (a)



Major gas pipeline projects under study and development (b)



Major Proposed Inter Regional Gas Pipelines



- Nabucco (30-32 BCM's)
- South Stream (63.0 BCM's)
- ITGI (10-12 BCM's)
- TAP (10-20 BCM's)



Proposed Gas Interconnectors – Group I (East Balkans)

- Greece-Bulgaria-Romania-Hungary Interconnectors and Greek LNG Terminals to comprise:
 - ✓ Komotini-Stara Zagora (170 kms) gas interconnector (known as IGB)
 - ✓ Kavala LNG terminal
 - ✓ Bulgaria-Romania interconnector known as IBR, (15 kms) crossing the Danube
 - ✓ Romania-Hungary Interconnector (109 kms) known as IRH (to link Arad in Romania to Szeged in Hungary)

All three interconnectors to be built with reverse flow capacity

Proposed Gas Interconnectors – Group II (West Balkans)



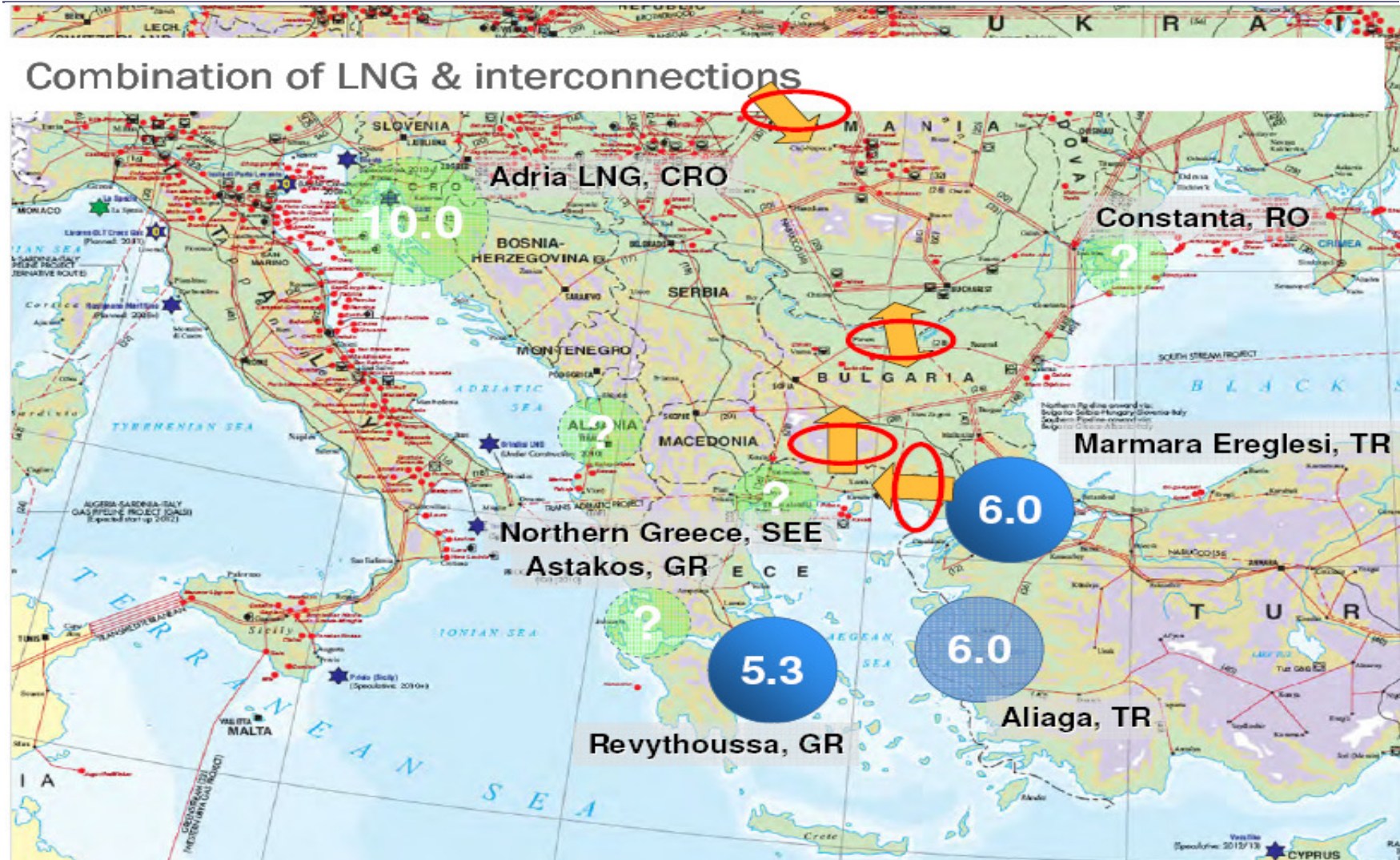
- The Croatian-Hungarian Gas Interconnector and the Krk/Adria LNG Project
 - ✓ Croatia-Hungary, known as ICH
 - ✓ Krk LNG terminal (10.0 BCM/y capacity)
 - ✓ The objective of ICH is to increase Hungarian import diversification away from Russia

- Bulgarian-Serbian Gas Interconnector
(80-100 kms, with 2.0 BCM/y capacity)

- Western Balkan Gas Ring Project
 - ✓ Entails the construction of several small to medium capacity n.gas interconnectors between the whole region of former Yugoslavia (No progress has been reported over the last 2 years)

South East Europe Gas Interconnectors and LNG Projects

Combination of LNG & interconnections

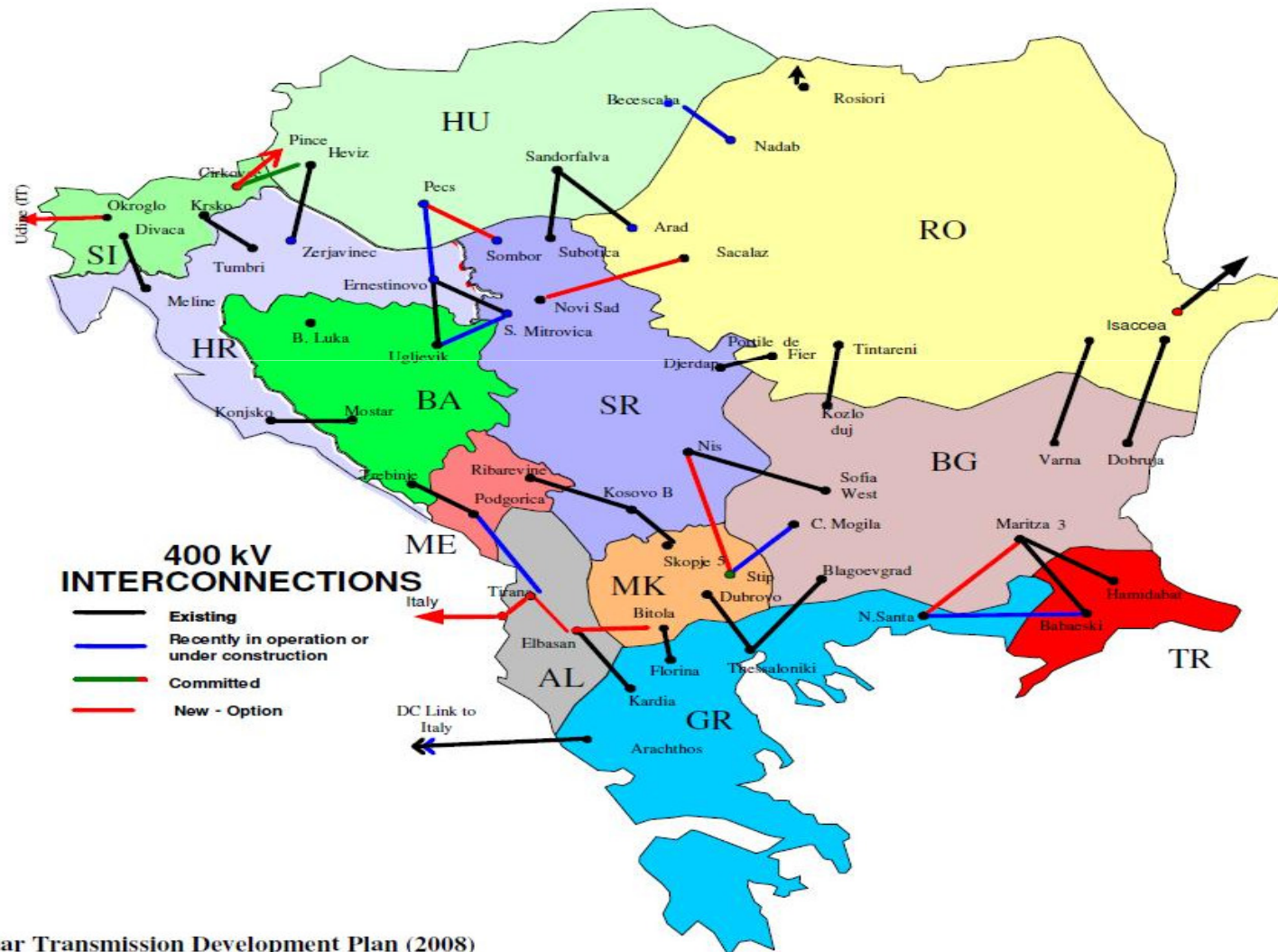




Electricity Grid Interconnections

- A. Projects recently completed
- B. Projects under construction
- C. Projects under discussion

Main Electricity Interconnections in S.E. Europe (existing and planned)



Source:
UCTE 10 Year Transmission Development Plan (2008)

Table 1: Projects recently completed in SE Europe

Table1 – Electricity Grid Connections in SE Euro (recently completed)

Project description	Comment
400kV HVDC submarine cable Galatina (IT)- Arachtos (GR)	Project completed in 2003.
Reconstruction of 400kV OHL <ul style="list-style-type: none"> - Trebinje-Gacko-Mostar (BH) – Konjsko (HR) - Mostar-Sarajevo (BH) - Sarajevo-Tuzla-Uglievik (BH) - Uglievik (BH) -Ernestinovo (HR) - Mostar substation (BH) 	Reconnection with the UCTE (9.11.2004) <ul style="list-style-type: none"> - Completed - Completed - Completed - Completed - Completed
Reconstruction of 220kV OHL <ul style="list-style-type: none"> - (BH)-Dakovo (HR) (2 lines) - Jajce/Prijedor (BH) – Mraclin (HR) - Prijedor (BH) – Meduric (HR) 	Reconnection with the UCTE (9.11.2004) <ul style="list-style-type: none"> - Completed - Completed - Completed
400kV T.L. (RO) and Sandorfalva (HU)	Project completed.
400kV T.L. Uglievik (BH) – Mitrovica (SR)	Completed in mid 2006
400kV T.L. Bitola (FYROM) – Florina (GR)	In operation since July 2007.
400kV T.L. Filippi-Nea Santa (GR) - Babaeski (TR)	Construction completed in summer 2008. Related to this project is the construction of the 400kV double-circuit line Lagadas-Filippi in .
400kV T.L. Stip (FYROM) - Ch.Mogilla (BG)	Completed by end of 2008.
400kV T.L. Nadad (RO) - Békéscsaba (HU)	Completed by end of 2008.
400kV Maritsa3 – Hamitabat (TR)	Completd 2030

Table2 – Electricity Grid Connections in SE Europe (under construction)

Project description	Comment
400kV T.L. Stip (FYROM) - Nis (SR)	Project agreed and initiated. To be completed by end of 2011.
400kV T.L. Tirana (AL) - Podgorica (ME)	Project under construction. Completed by end of 2009. The internal Albanian 400kV line Tirana-Elbasan is directly related to this project has also expressed an interest for this interconnection.

Table3 – Electricity Grid Connections in SE Europe (planned)

Project description	Comment
400kV Interconnection FYROM-Albania-Italy	Project under investigation. Feasibility study ongoing (BG, , IT).
400kV submarine link between and . Constanta (RO) – Pasakoy (TR)	Project under investigation. Preliminary studies ongoing.
400kV T.L. N.Santa (GR) – Maritsa 3 (BG)	MoU signed last April in .
HVDC submarine cable between and	Following the completion of the 400kV 500MW submarine DC link in 2003, a second submarine DC link is proposed.
400kV T.L. Sacalaz (RO) – Novisad (SR)	Under discussion
400kV T.L. Bitola (FYROM) – Elbasan (AL)	Under discussion
400kV Cable (AL) – (IT)	Merchant Line
400kV T.L. Pecs (HU) – Ernestinovo (HR)	In trial operation since
400kV Cable (IT) –(HR)	Under discussion
400kV T.L. Circovce (SI) – Pince (HU)	Under discussion
400kV T.L. Circovce (SI) – Heviz (HU)	Under discussion
400kV T.L. Circovce (SI) – Zerjavinec (HR)	Under discussion
400kV Cable Tirat (ME) – Villanova (IT)	Under discussion



Conclusions

- Interconnectors are seen as key elements in the region's long term energy strategy
- Interconnectors, both electricity and gas, are cost effective because of their relatively small size, therefore low capital cost and speedy construction
- Interconnectors can be easily planned as their operation does not depend on new gas or electricity supplies

Conclusions

- They further contribute towards:
 - ✓ import diversification
 - ✓ increased security of supply
 - ✓ improvement of system operation by providing cushion supplies
 - ✓ improvement of storage capacity (in the case of gas)
 - ✓ greater system flexibility
 - ✓ improvement of overall energy flows
 - ✓ optimized economic system operation
- Governments must give priority to electricity & gas interconnections over large scale intercontinental projects



**Thank you for
your attention !**