PLINACRO Ltd

Security of Supply by TSO

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Enlargement and Integration Workshop
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Croatian Gas Transmission Company

- **Plinacro established by unbundling of gas transmission activity from INA Plc in 2001**
- **From 2002 100% state-owned company**
- **Defined as Croatian TSO (Gas Transmission System Operator) by Gas Market Act**
- **In charge of natural gas transmission; maintenance, managing and supervision of the entire gas transmission system and its development and construction**

NETWORK & NETWORK UNDER CONSTRUCTION

Technical data - 2002

- 1,641 km of high-pressure pipelines
- 137 MRSs
- Transmission - 2.95 bcm of gas
- max. capacity 560.000 m³/h

Technical data - 2007

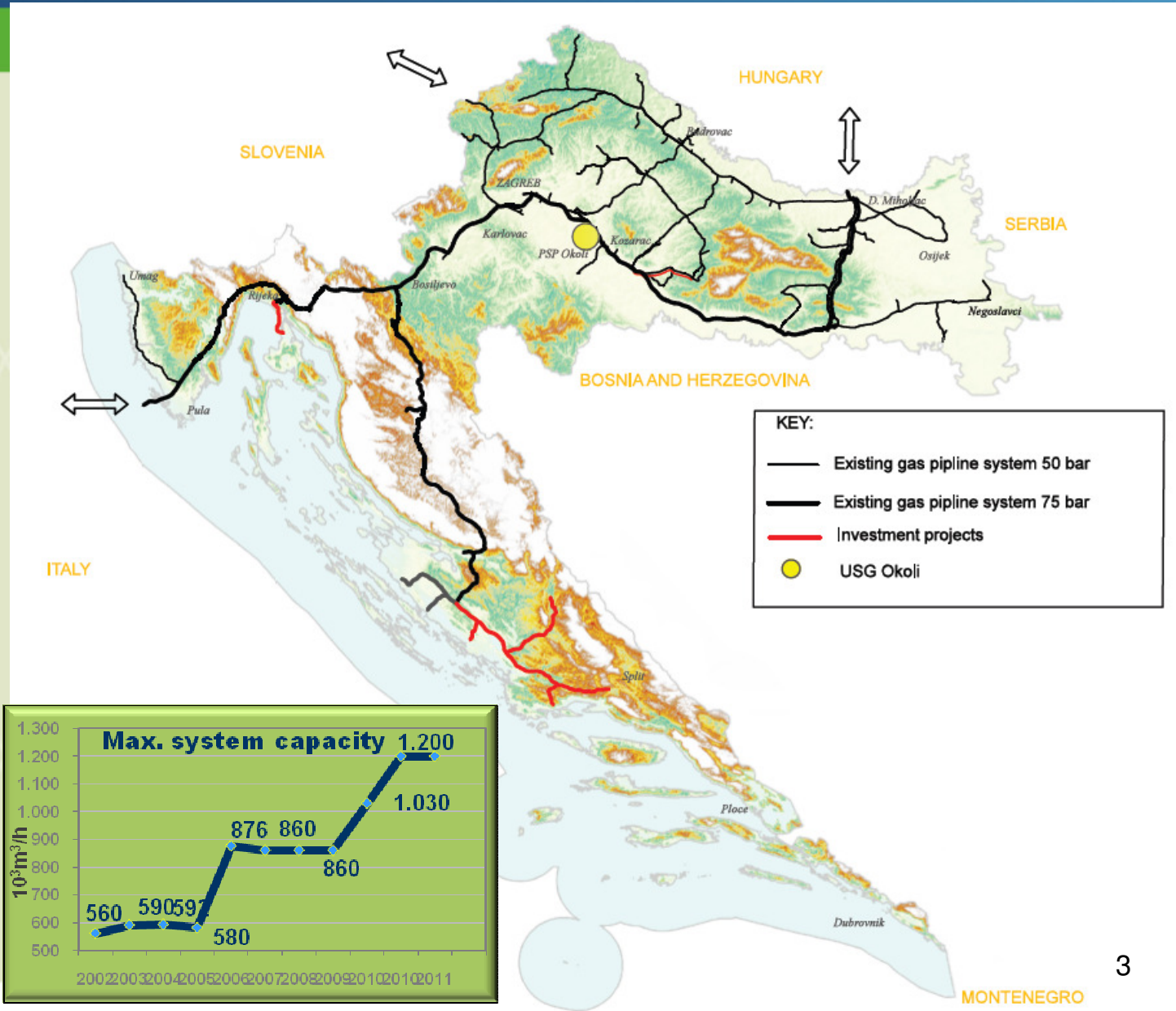
- 2,085 km of high-pressure pipelines
- 9 entry points
- 151 exit points
- DC - new SCADA, CS system
- Transmission - 3.1 bcm of gas

Technical data - September 2011

- 2,643 km of high-pressure pipelines
- 10 entry points
- 167 exit points
- 2 interconnections
- Transmission – 3.4 bcm of gas

Technical data - 2014

- 2,775 km of high-pressure pipelines
- 10 entry points
- 172 exit points
- 2 interconnections
- Transmission – 4,5 bcm of gas
- max. capacity 1.200.000 m³/h

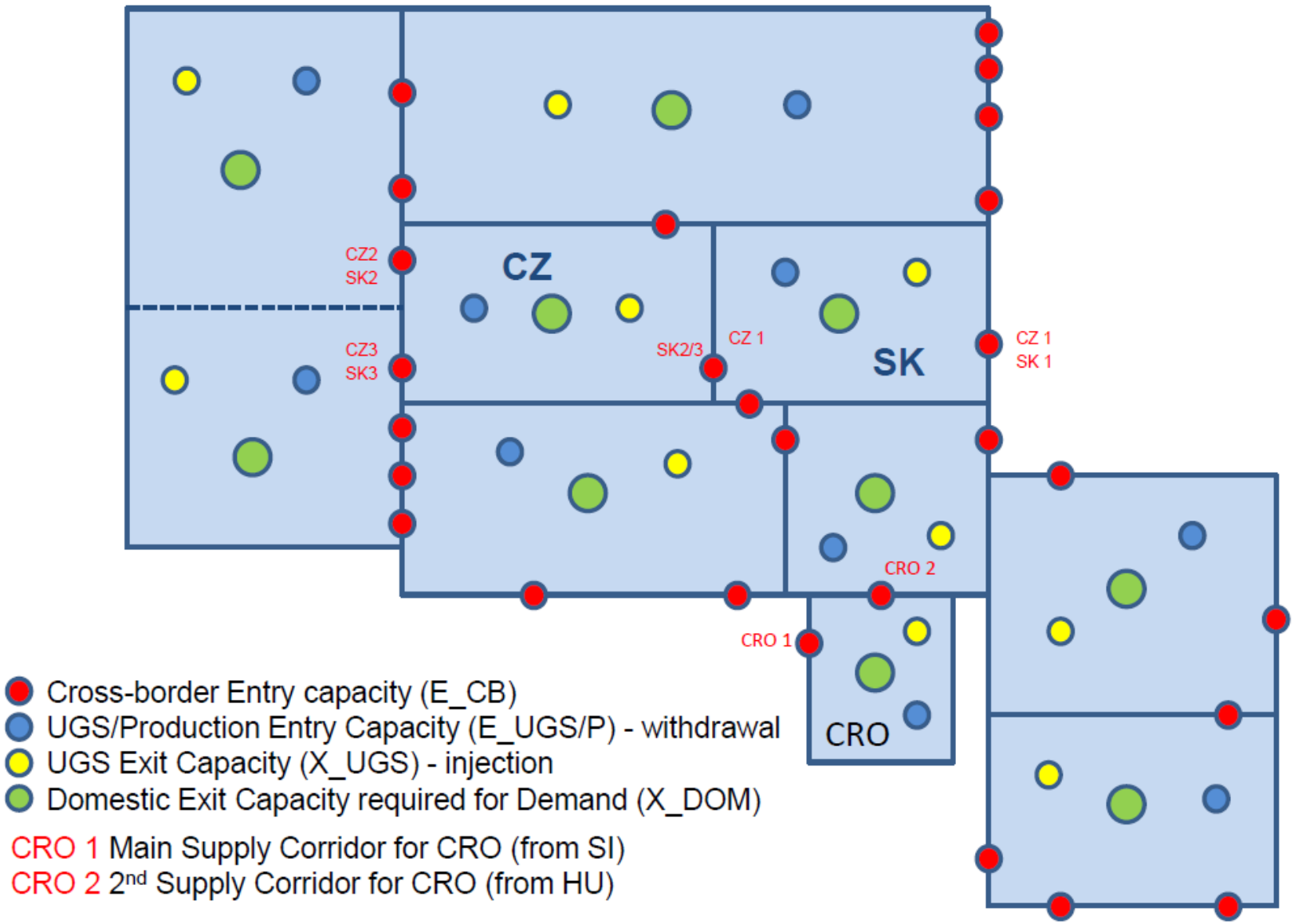


N-1 IN CEE REGION – FORMULA FOR CRO (WINTER)

$$N-1_{WINTER} = \frac{\sum_{i=2}^{n} E\_CB_i + E\_UGS + E\_P}{X\_DOM} \geq 1$$

E_CB_{CRO}	Smallest of all Cross-border Entry Capacities on Supply Corridor CRO
E_UGS/P_{CRO}	UGS and Production Entry Capacity in CRO
X_DOM_{CRO}	Domestic Exit Capacity required to cover winter peak demand (1 in 20) in CRO

N-1 IN CEE REGION



- Cross-border Entry capacity (E_CB)
- UGS/Production Entry Capacity (E_UGS/P) - withdrawal
- UGS Exit Capacity (X_UGS) - injection
- Domestic Exit Capacity required for Demand (X_DOM)

CRO 1 Main Supply Corridor for CRO (from SI)
CRO 2 2nd Supply Corridor for CRO (from HU)

ENTRANCES BEFORE 2010

Entrances	
1. Rogatec (Slo)	1,5 bcm/y
2. Pula Terminal	1,5 bcm/y
3. UGS Okoli	0,6 bcm/y

N-1 in Croatia (Winter) – before 2010

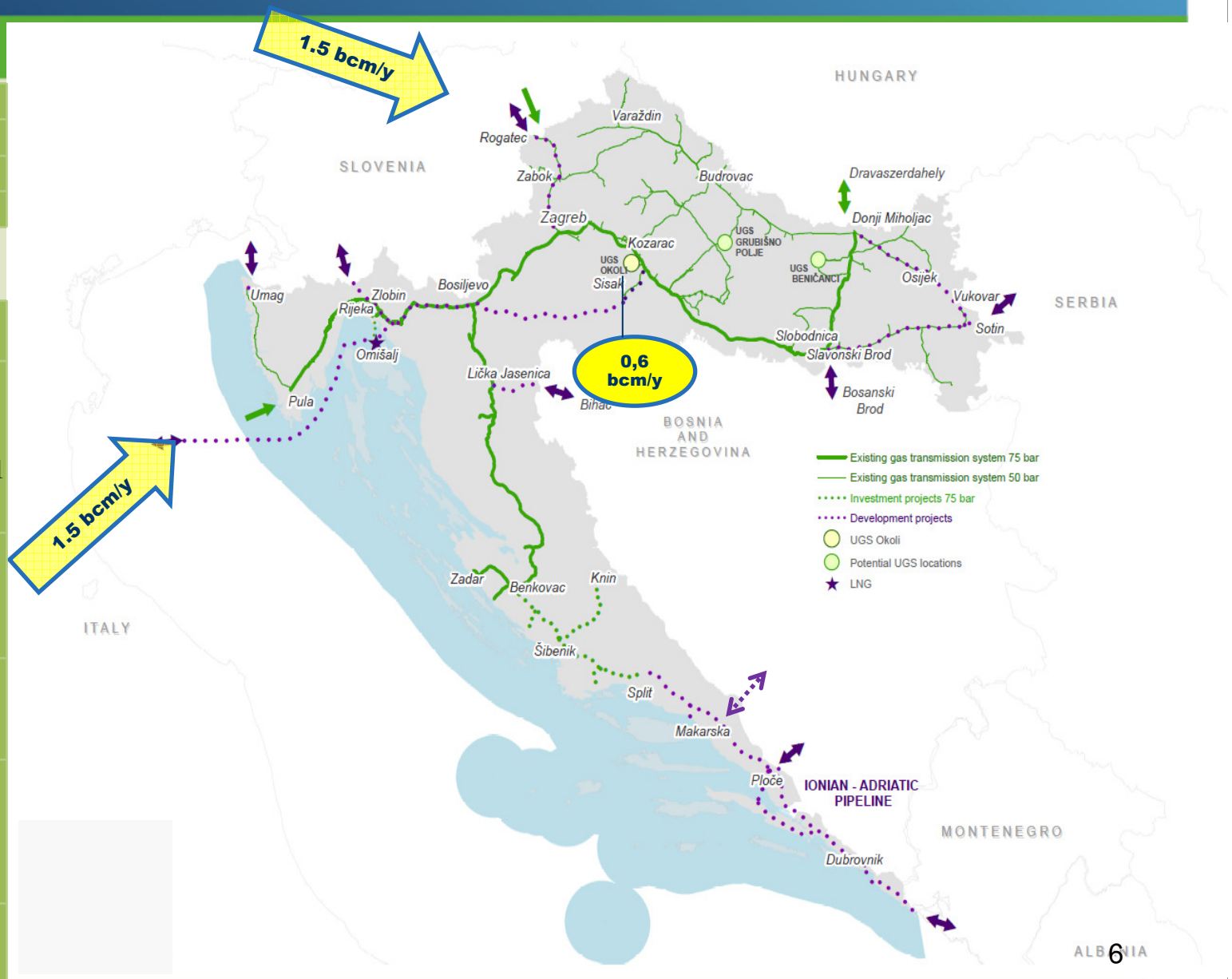
$$N-1=\frac{\sum_{i=2}^{n} E\_CB_i + E\_UGS + E\_P}{X\_DOM} \geq 1$$

E_CBCRO - Smallest of all Cross-border Entry Capacities on Supply Corridor CRO

E_UGS/PCR- UGS and Production Entry Capacity in CRO

X_DOMCRO-Domestic Exit Capacity required to cover winter peak demand (1 in 20) in CRO

$N\text{-}1_{WINTER}$ **=0,83**



CROATIA – HUNGARY INTERCONNECTION

SLOBODNICA-DONJI MIHOLJAC-DRAVASZERDAHELY - VAROSFELD

- Diameter: DN800
- Operating pressure: 75 bar
- Total lenght: 300 km

- two-way gas flow
- min. border preassure 50 bar
- total capacity 6,5 bcm / y
- in operation 2011

EXISTING ENTRANCES

Existing entrances	
1. Rogatec (Slo)	1,5 bcm/y
2. Pula Terminal	1,5 bcm/y
3. UGS Okoli	0,6 bcm/y
4. Dravaszerdahely (Hu)	6,5 bcm/y

N-1 in Croatia (Winter) – EXISTING

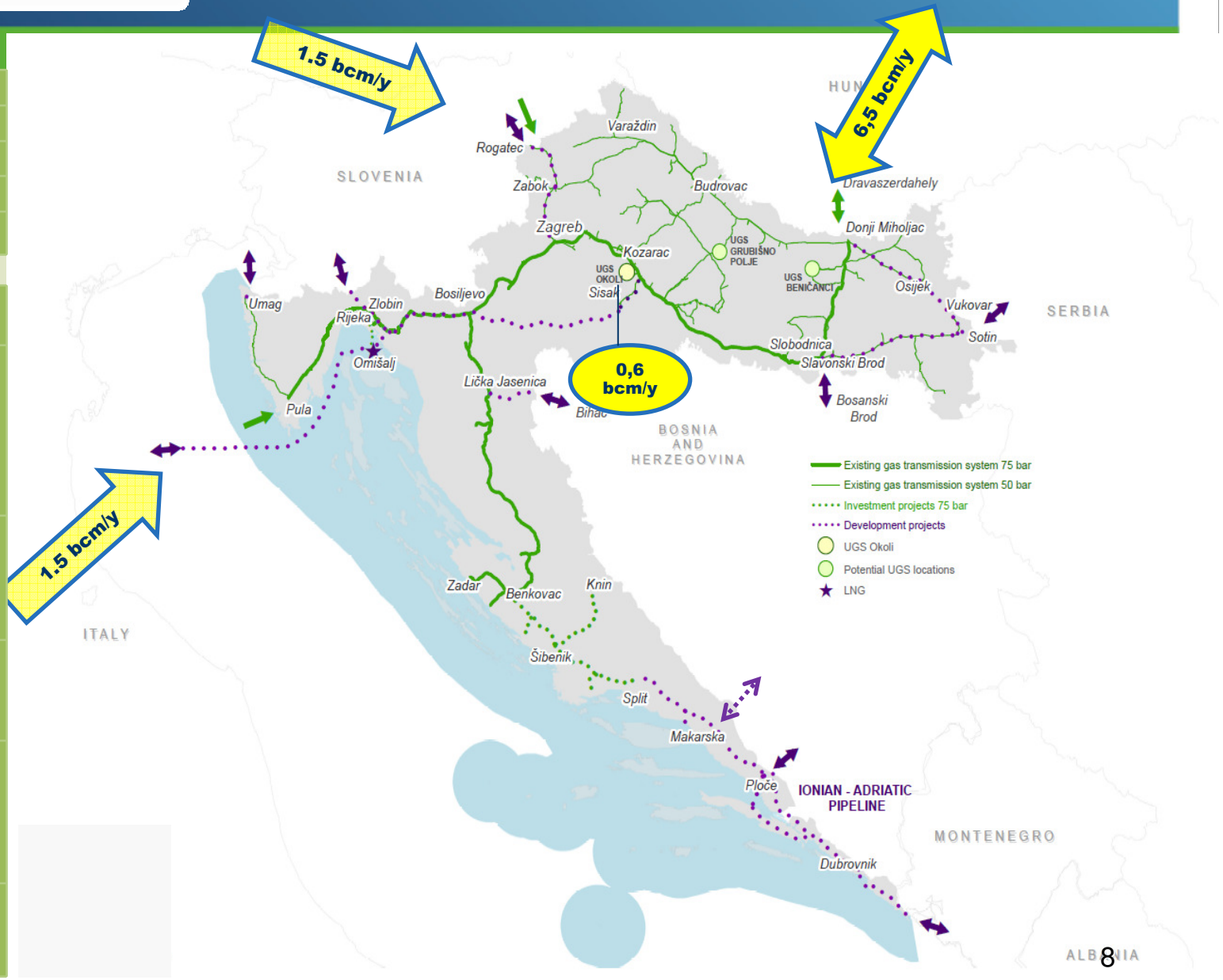
$$N-1 = \frac{\sum_{i=2}^{n} E\_CB_i + E\_UGS + E\_P}{X\_DOM} \geq 1$$

E_CBCRO - Smallest of all Cross-border Entry Capacities on Supply Corridor CRO

E_UGS/PCR- UGS and Production Entry Capacity in CRO

X_DOMCRO-Domestic Exit Capacity required to cover winter peak demand (1 in 20) in CRO

$N\text{-}1_{WINTER}$ **=1,15**



LNGRV

LNGRV

- construction of installations for connection of LNG regasification vessel to the gas transmission system

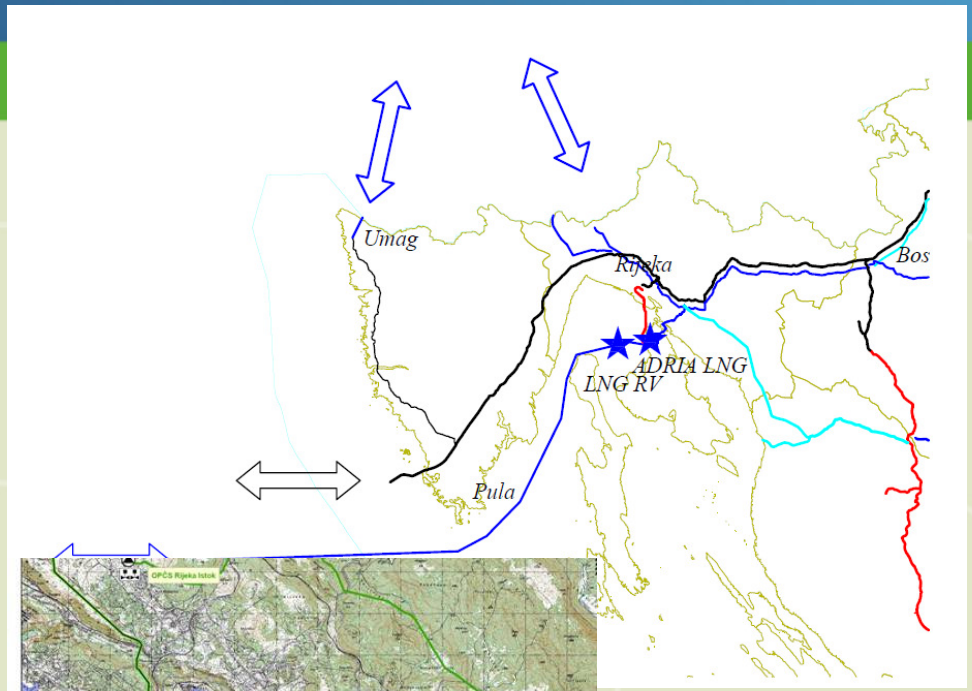
1st phase: - LNGRV
- Installation for receiving LNGRV
- Capacity: 1-2 bcm/y

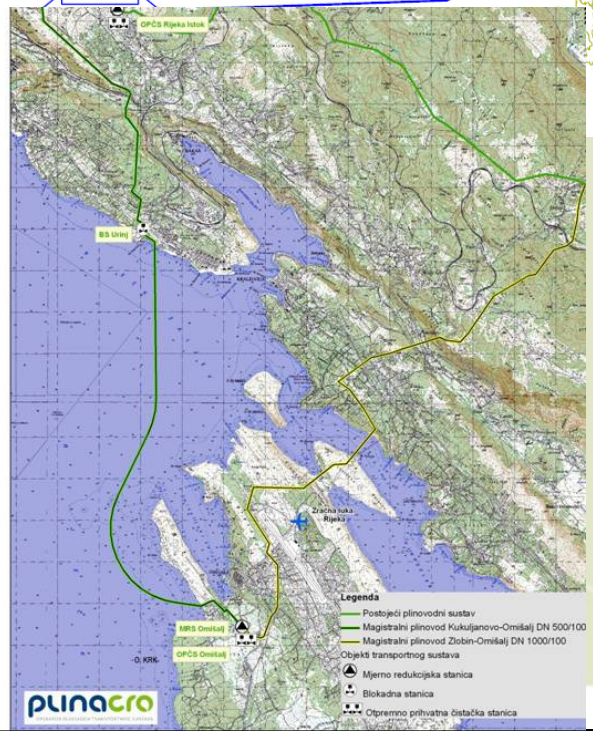
2nd phase – FSU- LNG storage – on a vessel
- Onshore Regasification - a part of the future LNG terminal
- Capacity: 2-4 bcm/y

3rd phase: - Construction of LNG vessel onshore in compliance with the required capacity
- Capacity: 4-6 bcm/y

<u>N-1 in Croatia (Winter) – INCLUDING LNGRV</u>

$N\text{-}1_{WINTER} = 1{,}46$





IONIAN – ADRIATIC PIPELINE (IAP)

Connection of gas transmission **system of Lika and Dalmatia with TAP Project (Trans – Adriatic- Pipeline)**

MP Split (HR) – Fieri (ALB) DN800 - DN1000 / 75 bar, L= 520 km

Supply with natural gas - **Albania, Montenegro, Bosnia and Herzegovina and Croatia**

Max capacity: **5 bcm/y**

Possibility of **transit** of natural gas to Central and Western Europe

Possibility of **reverse flow**

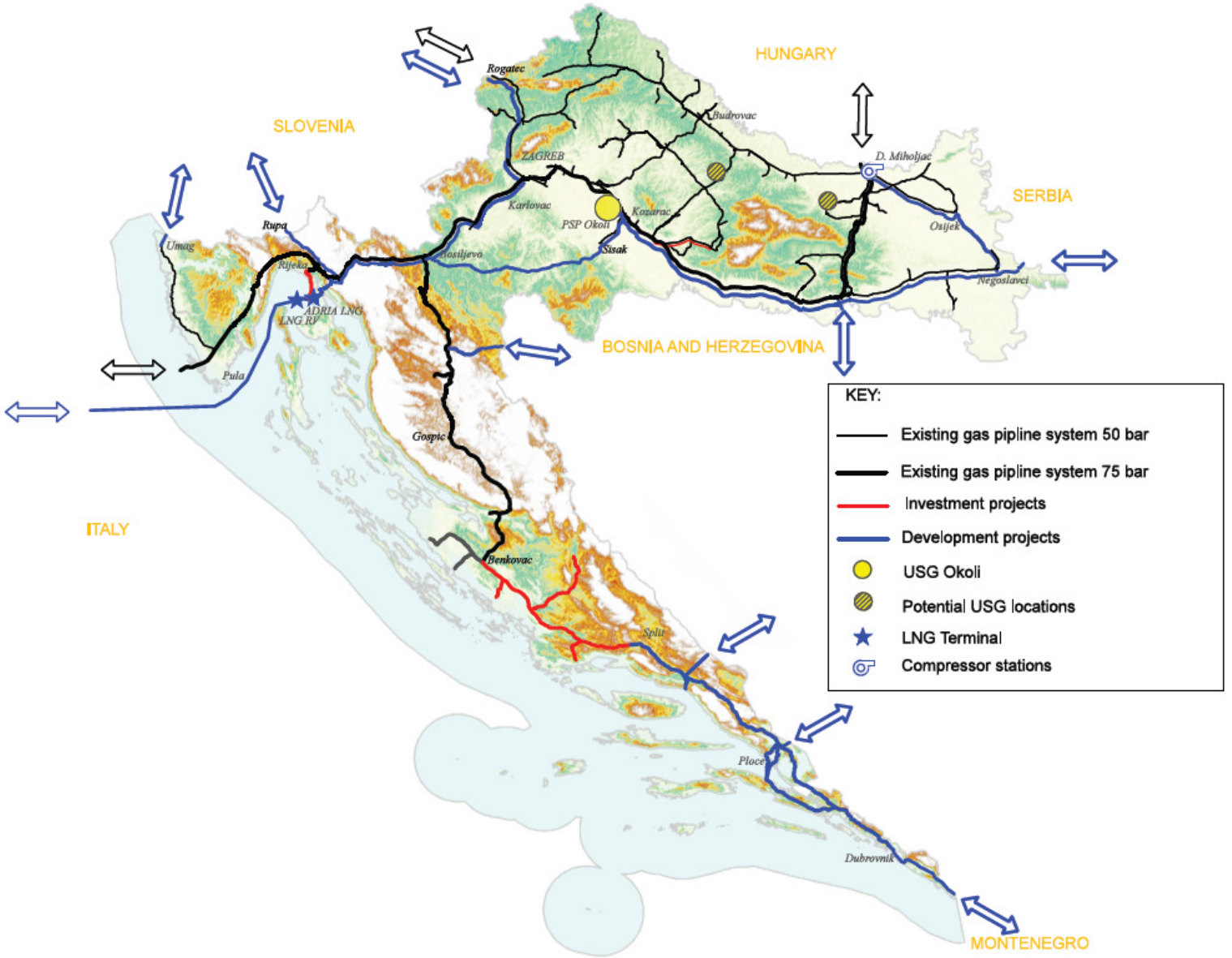
N-1 in Croatia (Winter) – INCLUDING IAP

$N\text{-}1_{WINTER} = 1{,}62$

DEVELOPMENT PROJECTS

N-1 in Croatia (Winter) – INCLUDING LNGRV + IAP

$N\text{-}1_{WINTER} = 1{,}92$



GAS INFRASTRUCTURE PROJECTS IN SE EUROPE

FOURTH CORRIDOR

Source: ECA, SEE Regional Gasification Study

Thank you for your attention!

Dubrovnik, 5-7 October 2011

Goran Frančić
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