



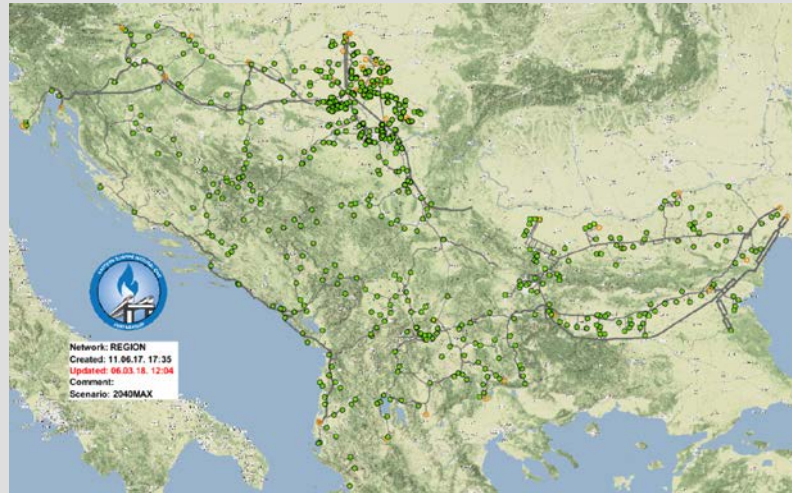
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Energy Technology and Governance Program

Regional Development Model, Current Status and Next Steps Eastern Europe Natural Gas Partnership USAID/USEA



13th Gas Forum

September 20, 2018
Ljubljana, Slovenia



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Project Background



The EE-NGP was established by the United States Agency for International Development (USAID), the United States Energy Association (USEA) and Natural Gas TSOs of Eastern Europe in May 2017



The EE-NGP is modeled after the Southeast Europe Cooperation Initiative (SECI) Transmission System Planning Project/Working Group which has been active in the region since 2001, providing technical and analytical support to the regional electricity transmission system operators



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Project Background

Gas TSOs of Eastern Europe were formally invited to join the EE-NGP

Members of the EE-NGP include the following:

- **ALBGAS (Albania)**
- **BH-GAS D.O.O. (Bosnia & Herzegovina)**
- **BULGARTRANGAZ (Bulgaria)**
- **PLINACRO D.O.O. (Croatia)**
- **MINISTRY OF ECONOMIC DEVELOPMENT (Kosovo)**
- **GA-MA AD - SKOPJE (Macedonia)**
- **MONTENEGRO BONUS (Montenegro)**
- **SRBIJAGAS (Serbia)**
- **EUSTREAM (Slovakia) (3/16/18)**
- **TRANGAZ (Romania) (Observer)**





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Project Background

- The following TSOs have expressed an interest to join the group:
 - GAS PROMET AD PALE (**Bosnia & Herzegovina**)
 - SARAJEVO GAS A.D. (**Bosnia & Herzegovina**)
 - DESFA (**Greece**)
 - NAFTOGAZ (**Ukraine**)



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EE-NGP Objectives

The EE-NGP is intended to:

- Supplement system development activities and ongoing Energy Community processes and provide a forum for the gas transmission network system operators in the region to develop national and common regional gas network development models
- Perform technical analyses to optimize gas network infrastructure development
- Discuss topics of common interest
- The long-term objective of the Partnership is to enable the creation of a regional gas market with the potential for US gas supplies.



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EE-NGP Objectives

- Promoting regional cooperation in natural gas network planning in Eastern Europe
- Improving the capacity of the TSOs to develop forecasting simulation models of internal natural gas networks, interconnections and storage facilities
- Supporting regional harmonization of natural gas transmission planning methodologies and operational principles
- Conducting analysis to identify potential natural gas transmission investment projects to expand natural gas markets while ensuring security and reliability of the regional power system
- Promoting the results of analyses to a wide audience of policy, regulatory, and industry officials
- Accelerating development of natural gas pipeline infrastructure in Eastern Europe



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EE-NGP Tasks

- **Exchanges of information** on policy, regulatory, market, commercial and environmental factors affecting the development of natural gas pipeline infrastructure in Eastern Europe
- **Exchanges of best practices** on natural gas transmission planning
- **Training** on the use and application of gas transmission planning modeling software
- **Developing harmonized national and regional natural gas pipeline models** with suitable detail for regional network analysis
- **National and regional analyses** necessary to accelerate the development of natural gas pipeline infrastructure in Eastern Europe
- **Identifying natural gas pipeline infrastructure projects** of regional significance
- **Organizing workshops** to disseminate the results of Working Group analyses to policy, regulatory and commercial audiences



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EE-NGP Regional Model Development

- Provided each member with a licensed copy of the SIMONE natural gas network planning software
- Conducted two training/workshops on how to utilize the SIMONE planning software
- Each EE-NGP member country utilized the SIMONE software to create their national network models



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National Model Preparation

- To further the capacity of the EE-NGP Working Group members after the training, detailed homework assignments were completed by members utilizing the SIMONE software to optimize their network models
- Each EE-NGP member prepared a homework presentation of their system optimization process, as well as, what was learned during the SIMONE training, including the following:
 - Country map with long-term demand points and pipeline supply options
 - Current system optimization with current loads
 - Long term hydraulic optimization (to find out long term pipeline diameters and long-term system layout)
 - Gradual demand growth scenarios (for 2025, 2030, 2035, and 2040)

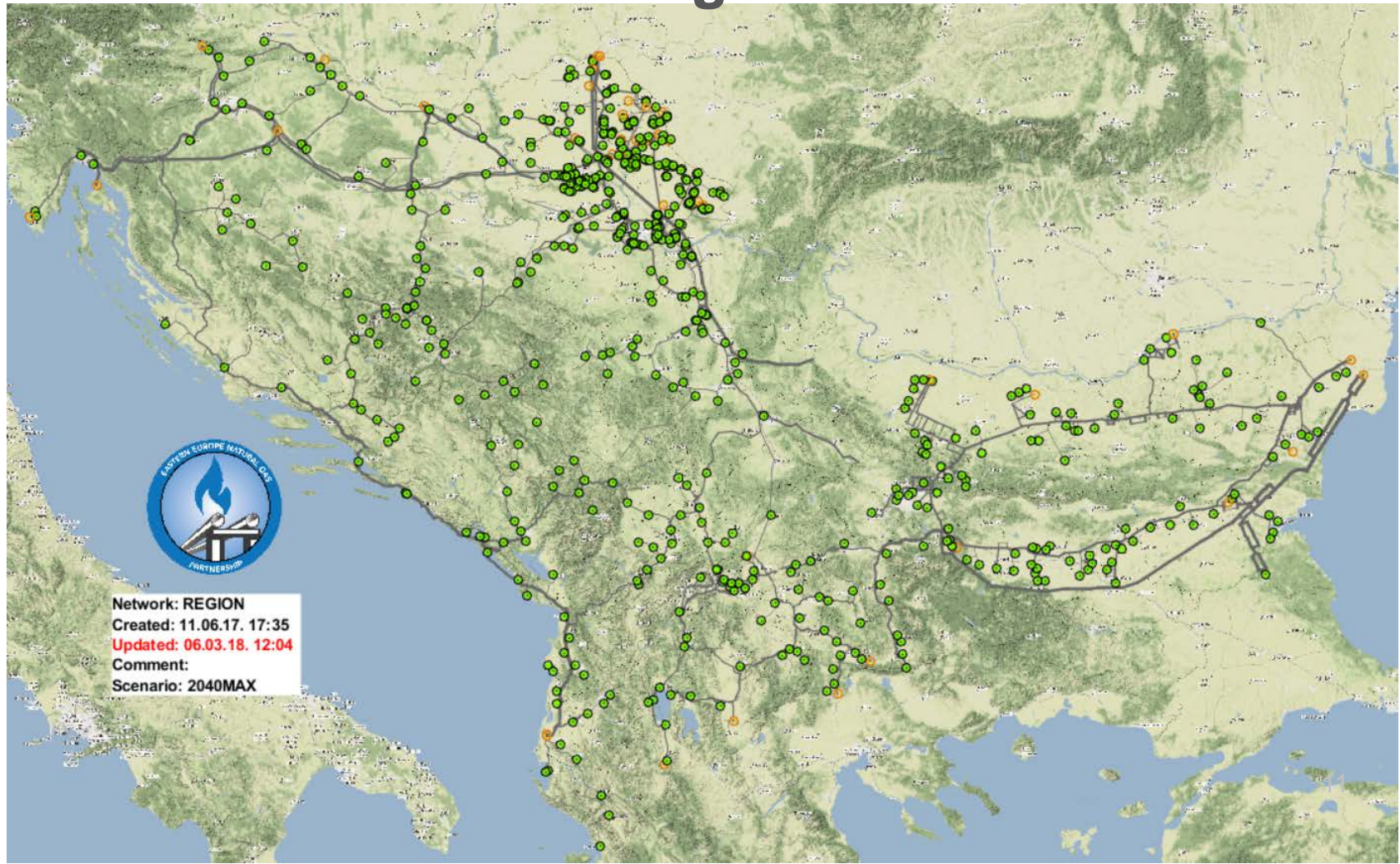


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EE-NGP Regional Model





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EE-NGP Regional Model

- The regional model includes all data necessary to optimize technical development of the gas transmission system:
 - Pipelines (name, diameter, length, roughness)
 - Block valves (name, diameter)
 - Control valves (name, diameter, min input pressure, max output pressure)
 - Compressor stations (name, diameter, min input and max output pressure)
 - Resistors
 - Non-return valves



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EE-NGP Regional Model

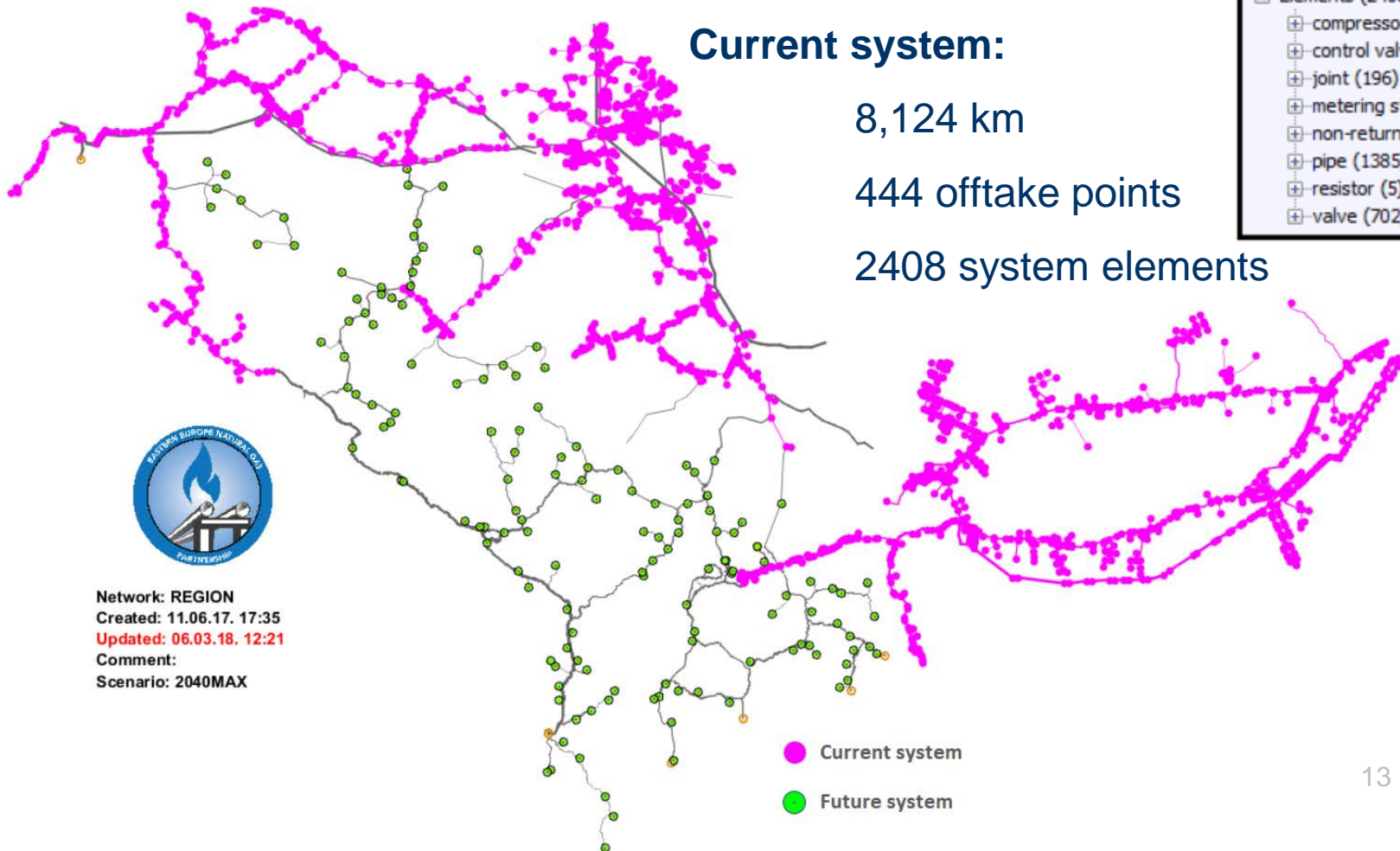
Current system:

8,124 km

444 offtake points

2408 system elements

+	Supply Nodes (33)
+	Offtake Nodes (444)
+	Nodes (1800)
+	Elements (2408)
+	compressor station (14)
+	control valve (91)
+	joint (196)
+	metering station (11)
+	non-return valve (4)
+	pipe (1385)
+	resistor (5)
+	valve (702)



Network: REGION
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Updated: 06.03.18. 12:21
Comment:
Scenario: 2040MAX

● Current system
● Future system

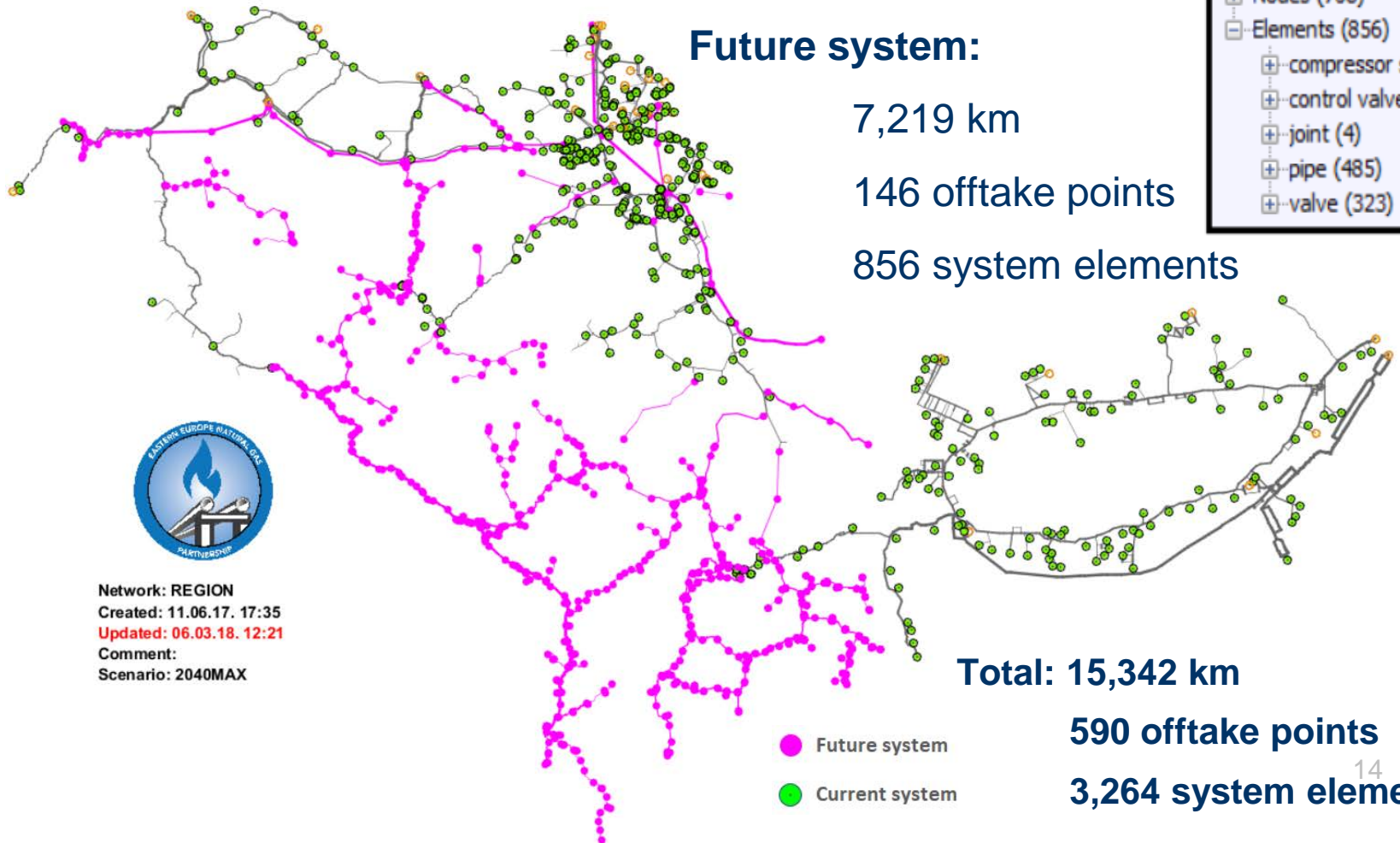


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EE-NGP Regional Model



Future system:

7,219 km

146 offtake points

856 system elements

- ⊕ Supply Nodes (8)
- ⊕ Offtake Nodes (146)
- ⊕ Nodes (708)
- ⊖ Elements (856)
 - ⊕ compressor station (1)
 - ⊕ control valve (43)
 - ⊕ joint (4)
 - ⊕ pipe (485)
 - ⊕ valve (323)



Network: REGION
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Comment:
Scenario: 2040MAX

Total: 15,342 km

590 offtake points

3,264 system elements

- Future system
- Current system

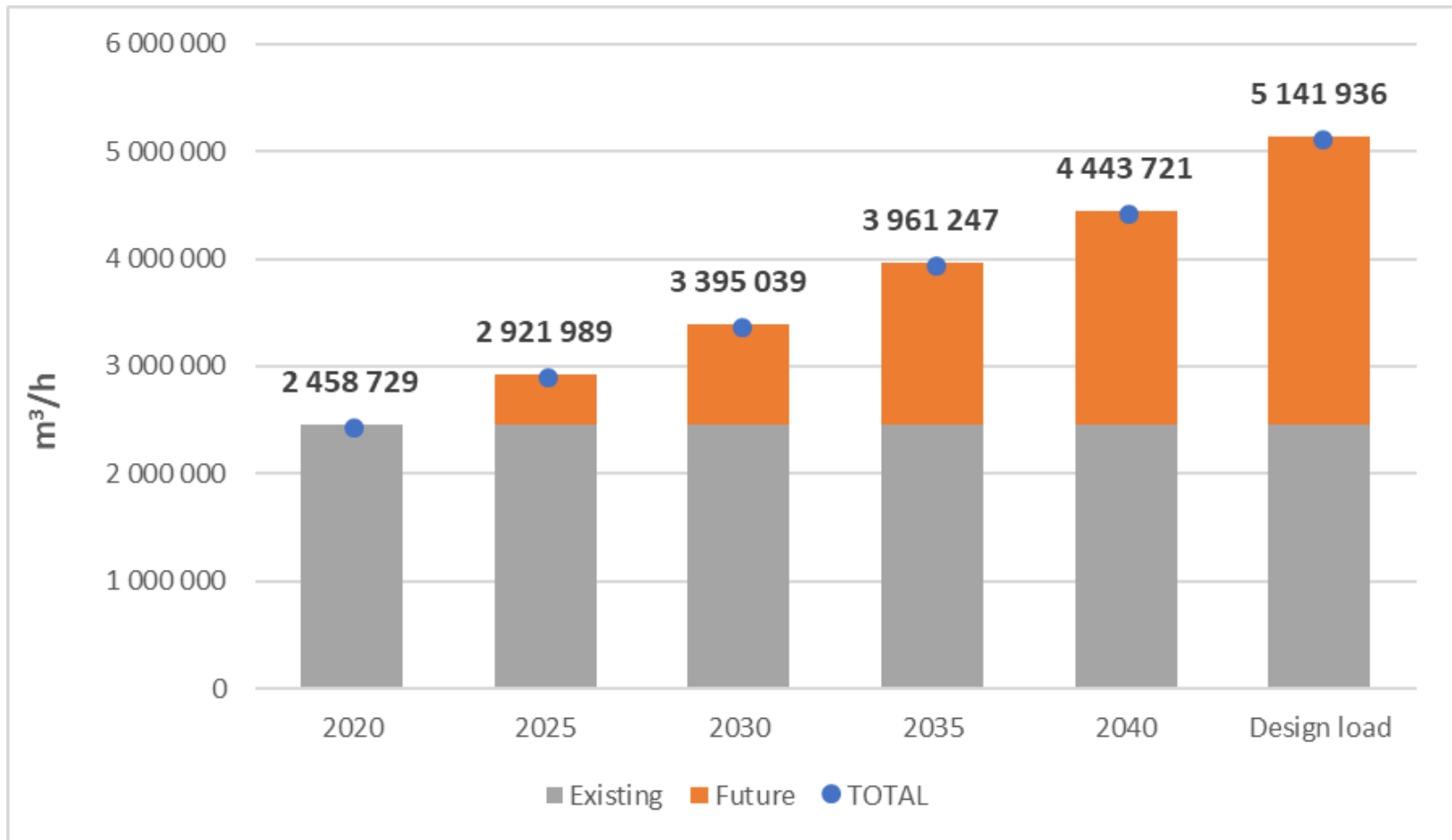


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EE-NGP Regional Model Loads



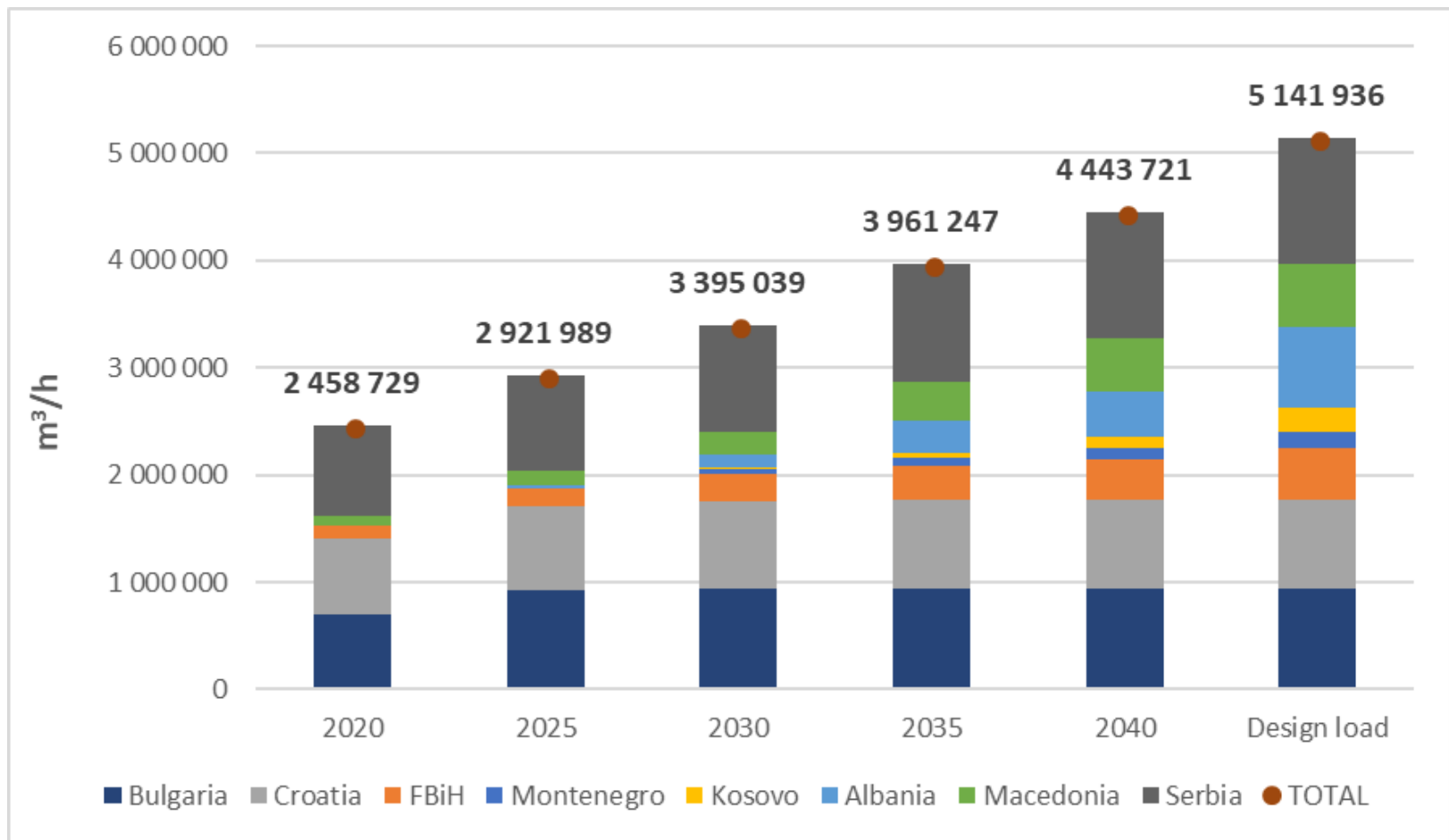


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EE-NGP Regional Model loads





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Load Forecasting Workshop

- ✓ MAED-Model for Analysis of Energy Demand
- ✓ Forecasting of Final Energy Consumption - Transport Sector, Industry, Households, Service Sector
- ✓ Case Studies: Methodology for Gas Consumption Forecasting in the EE-NGP Region (Bosnia & Herzegovina, Macedonia, Montenegro)
- ✓ Distribution of the Potential Gas Consumption in the EE-NGP Region
- ✓ Gas Consumption Growth Depending on Economic Indicators, Development Plans and Construction Dynamics



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Conclusion

- ✓ During the first 16 months of the EE-NGP, the members have developed their national transmission system planning models
- ✓ The members are able to optimize their gas transmission systems and have the necessary tools to perform complex regional analyses necessary to increase national and regional security of supply, as well as, increase national and regional diversification of supply sources with minimal investment costs
- ✓ EE-NGP regional model will be used to conduct technical and economic analyses necessary to optimize the build-up of domestic natural gas pipeline networks and interconnections between countries required to transport new sources of natural gas which are expected to be delivered to the region
- ✓ The model will support the optimization of the future pipeline system with the goal of increasing security and diversification of supply



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EE-NGP Next Steps

- The EE-NGP Regional Model will enable technical and economic analyses, including:
 - least cost gas supply options
 - estimates of high, medium and low gas consumption
 - proposed interconnections
 - impact and benefits of new LNG gas supply on gas quality in the region
 - impact and benefits of possible underground gas storage development
 - other aspects of system development
- The analysis will provide recommendations for internal pipeline development, interconnections and storage investment proposals required to optimize the regional network and promote wholesale natural gas trade.



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EE-NGP Next Steps: Regional Analyses

- Comparisons of long term development costs and economics of gradual load development growth and total potential for 2040 load optimization scenarios
- Optimization of the regional gas system to reach a long term least cost N-1 solution for countries in the region
- ✓ **Optimization of the regional gas system to reach least cost maximum diversification of gas supply for countries in the region**
- BRUA and Bulgaria/Romania supply potential to region; (Bulgaria-Romania-Hungary-Austria gas pipeline)
- Impact of UGS capacity expansion in Serbia on the regional security of supply
- Domestic resources development (Romania, Montenegro, Albania)
- Impact of LNG on gas quality in the region