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United States Energy Association

Energy Technology and Governance Program

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

USAID Energy Investment Activity (EIA) Project
Security of Gas Supply in Bosnia and Herzegovina Conference

July 2, 2018
Jahorina, Bosnia and Herzegovina

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

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**)
- BULGARTRANSGAZ (**Bulgaria**)
- PLINACRO D.O.O. (**Croatia**)
- MINISTRY OF ECONOMIC DEVELOPMENT **(Kosovo)**
- GA-MA AD - SKOPJE (**Macedonia**)
- MONTENEGRO BONUS **(Montenegro)**
- SRBIJAGAS **(Serbia)**

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)**
  - TRANSGAZ **(Romania)**
  - EUSTREAM **(Slovakia)**
  - NAFTOGAZ **(Ukraine)**


HUNGARY
SLOVENIA
LJUBLJANA
ZAGREB
ROMANIA
BUCHAREST
CROATIA
BOSNIA HERZEGOVINA
SARAJEVO
BELGRADE
SERBIA
MONTENEGRO
PODGORICA
UNMI KOSOVO
Pristina
SOFIA
BULGARIA
SKOPJE
FYROM
TIRANA
ALBANIA
Adriatic Sea
Transport by pipeline
under 24"
24" to 36"
36" and over
project
Cross-border interconnection point within Europe
Cross-border Europe
Under construction or Planned
LNG Import Terminal
Under construction or Planned
Depleted (Gas) field on shore / offshore
Gas storage project
030 Rogatec
058 Dravaszerdahely
048 Kiskundorozsma
053 Negru Voda I (RO) / Kardam (BG)
IAP
TAP
TESLA
EASTRING
TRANS-BALKAN PIPELINE
Eagle LNG
Source: ENTSOG

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.

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

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

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

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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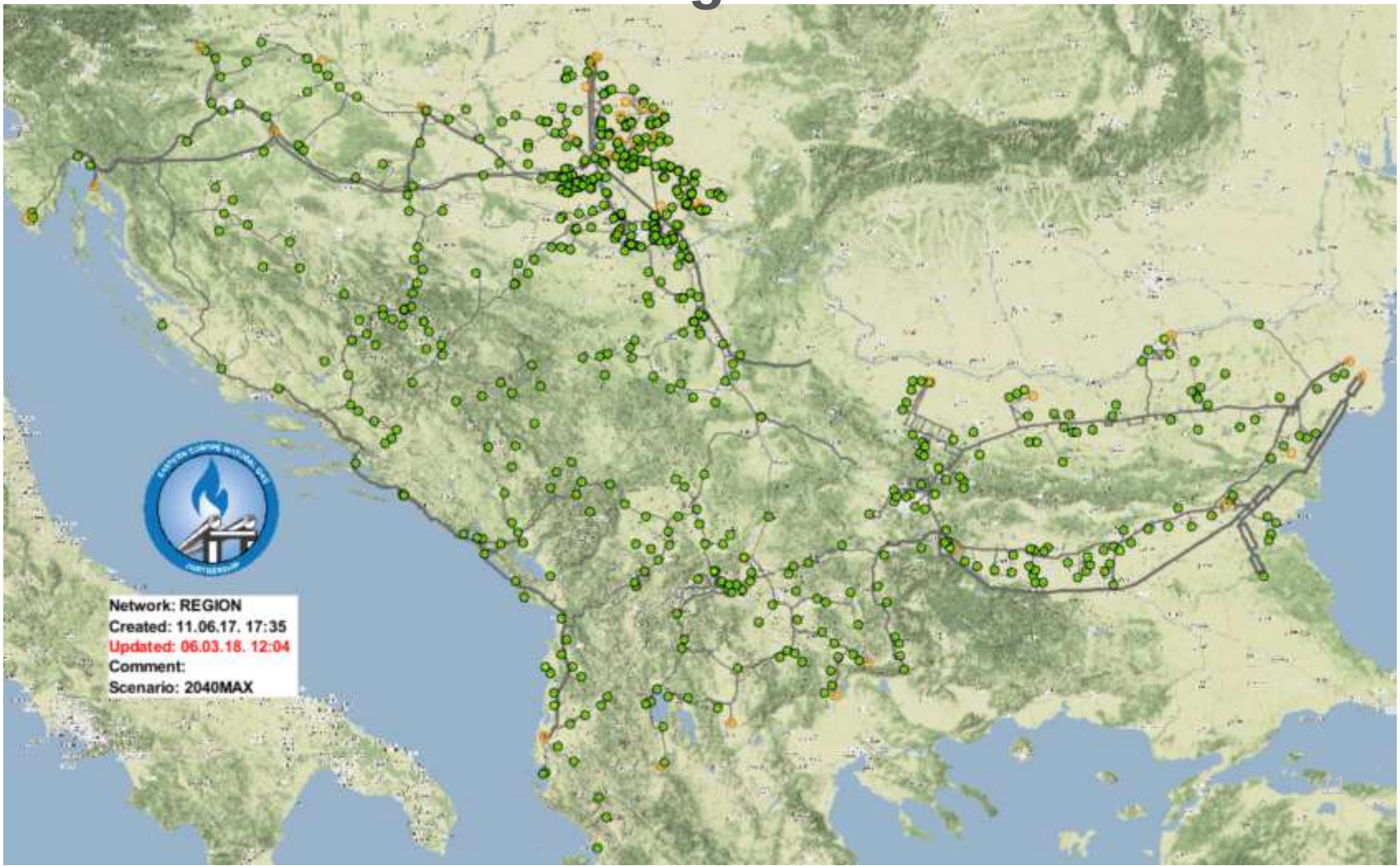
EE-NGP Regional Model



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

EE-NGP Regional Model

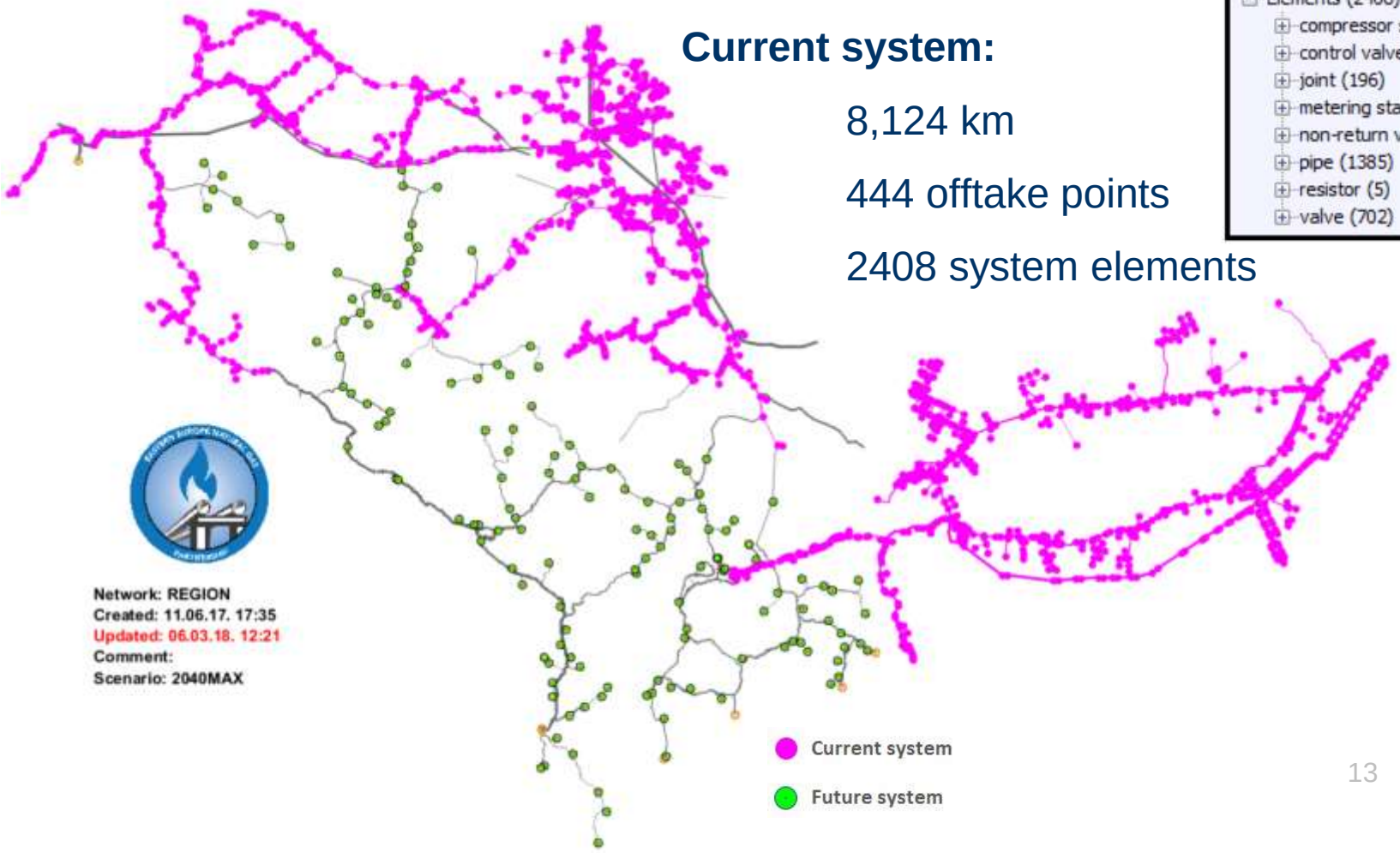
- Supply Nodes (33)
- Offtake Nodes (444)
- Nodes (1800)
- Elements (2408)
  - compressor station (14)
  - control valve (91)
  - joint (196)
  - metering station (11)
  - non-return valve (4)
  - pipe (1385)
  - resistor (5)
  - valve (702)

Current system:

8,124 km

444 offtake points

2408 system elements



EE-NGP Regional Model

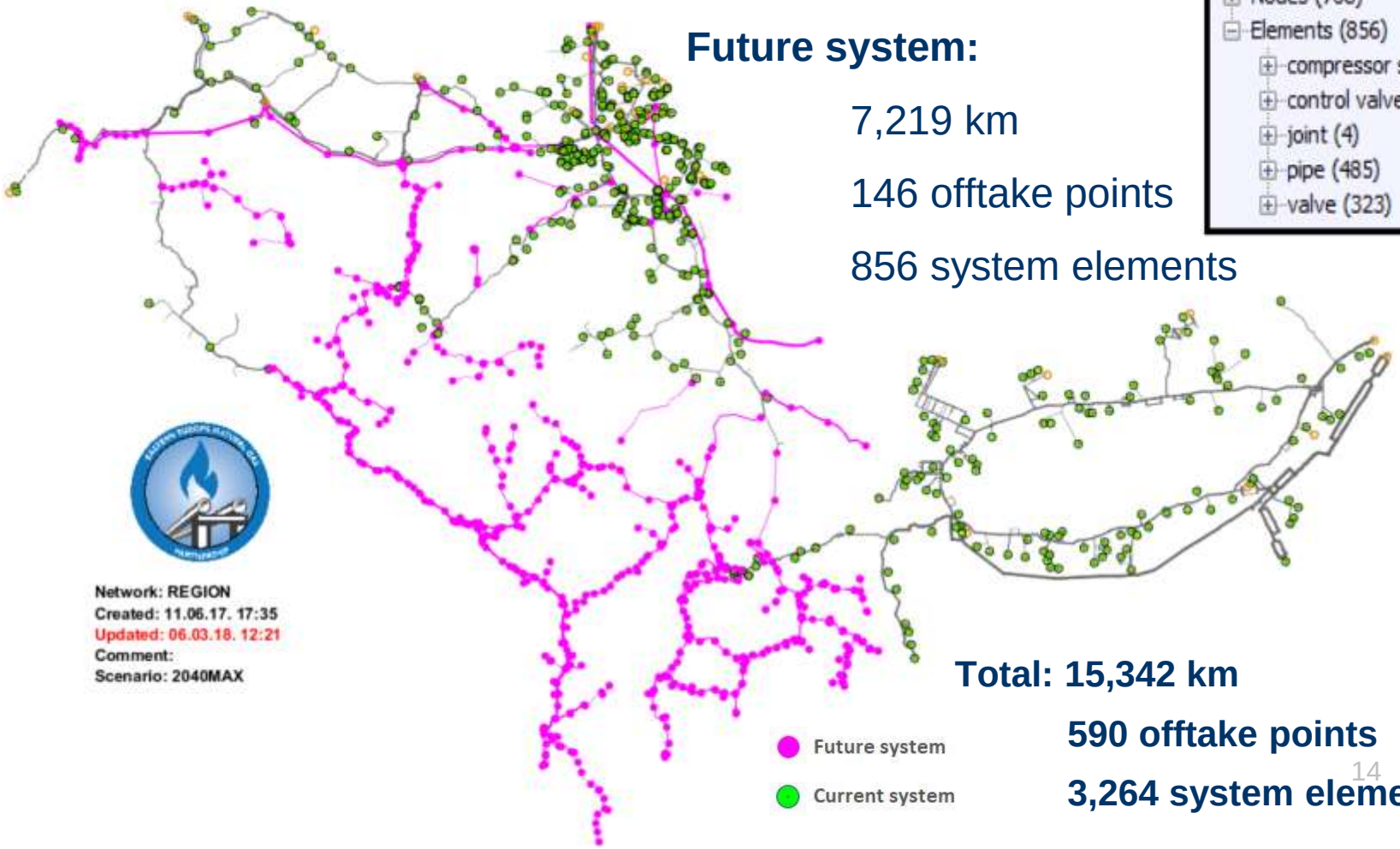
- Supply Nodes (8)
- Offtake Nodes (146)
- Nodes (708)
- Elements (856)
  - compressor station (1)
  - control valve (43)
  - joint (4)
  - pipe (485)
  - valve (323)

Future system:

7,219 km

146 offtake points

856 system elements

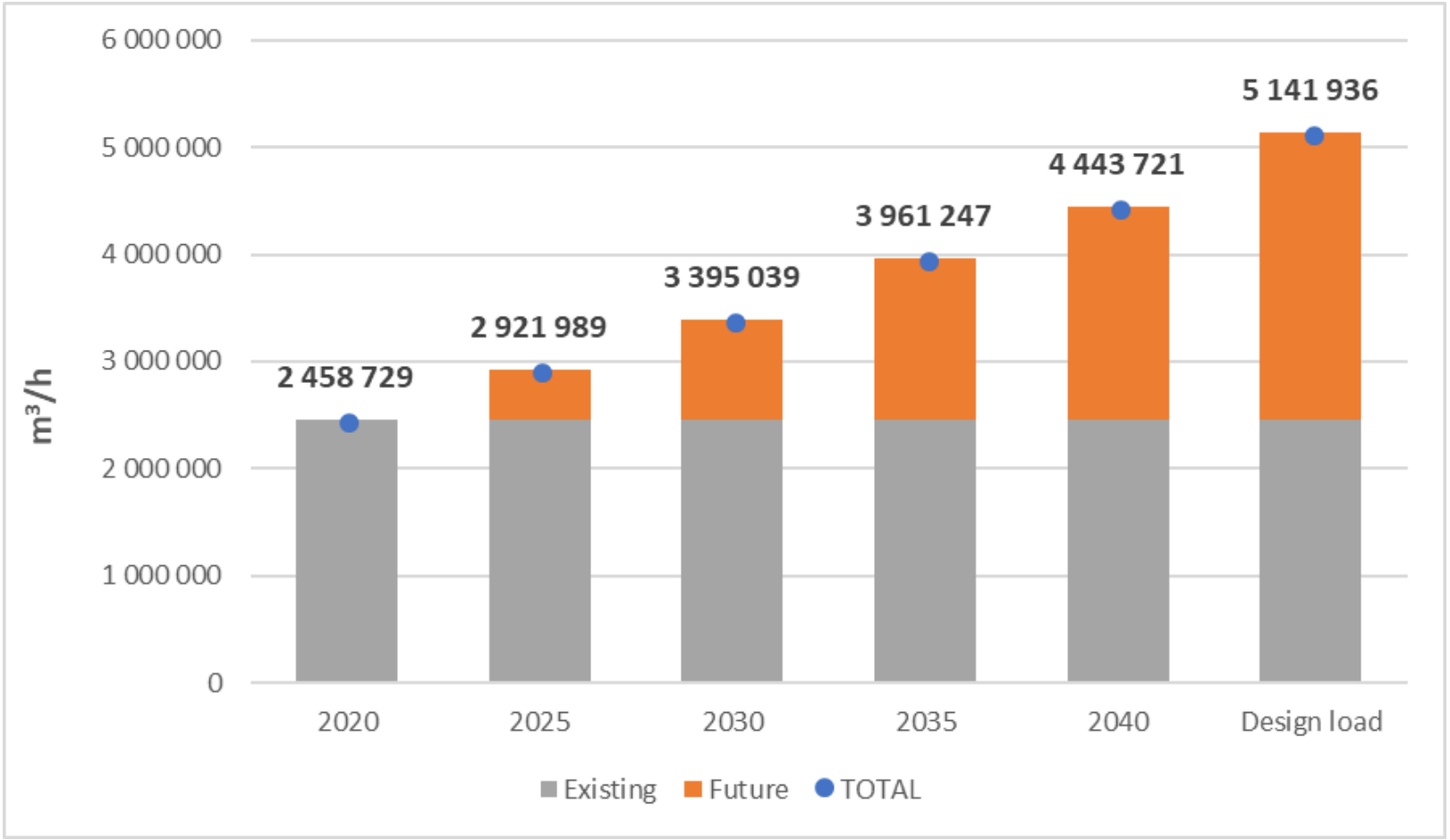


Total: 15,342 km

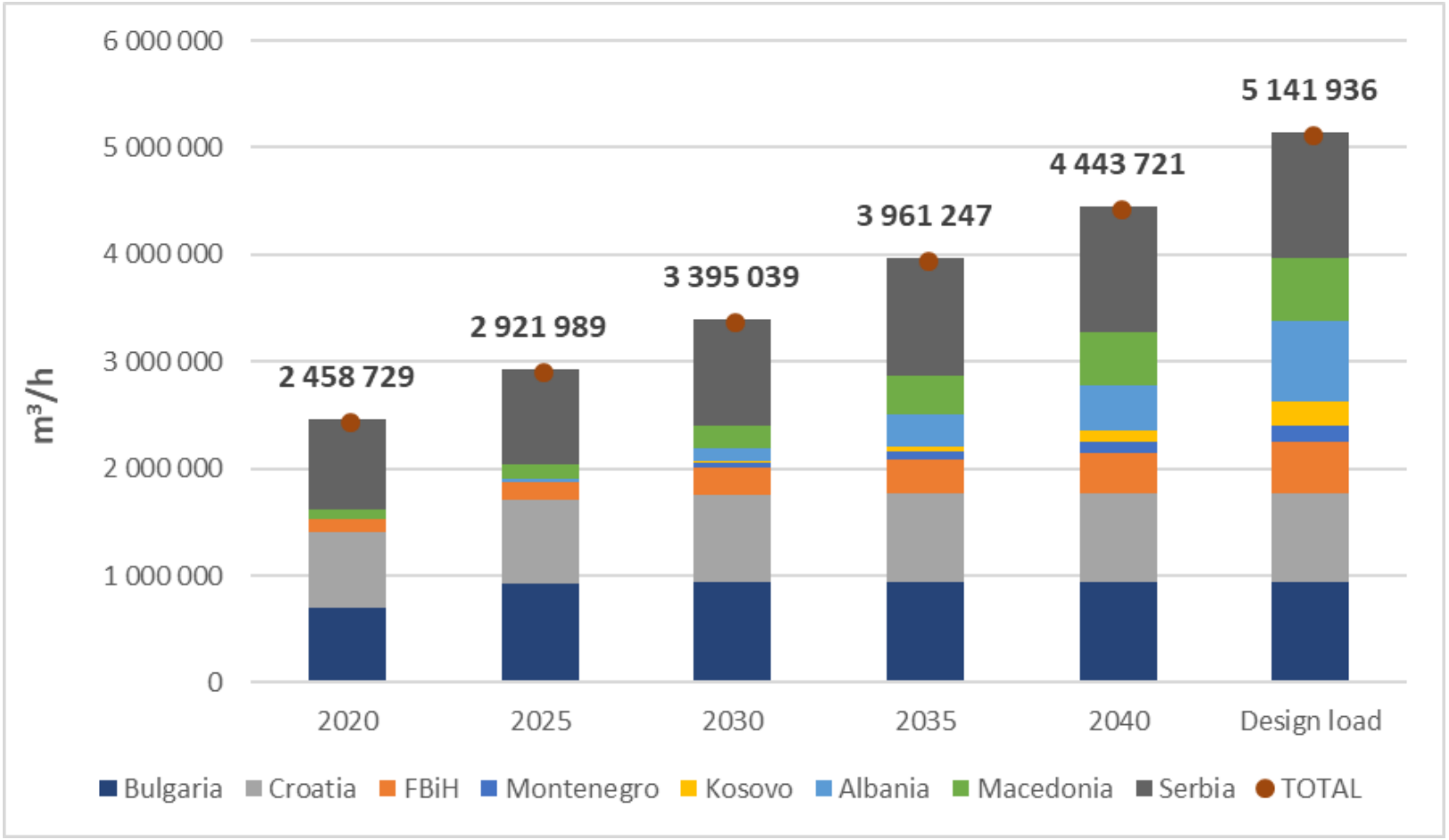
590 offtake points

3,264 system elements

EE-NGP Regional Model Loads



EE-NGP Regional Model loads



Conclusion

- ✓ During the first year 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

EE-NGP Next Steps

- The EE-NGP Regional Model will enable technical and economic analyses, including:

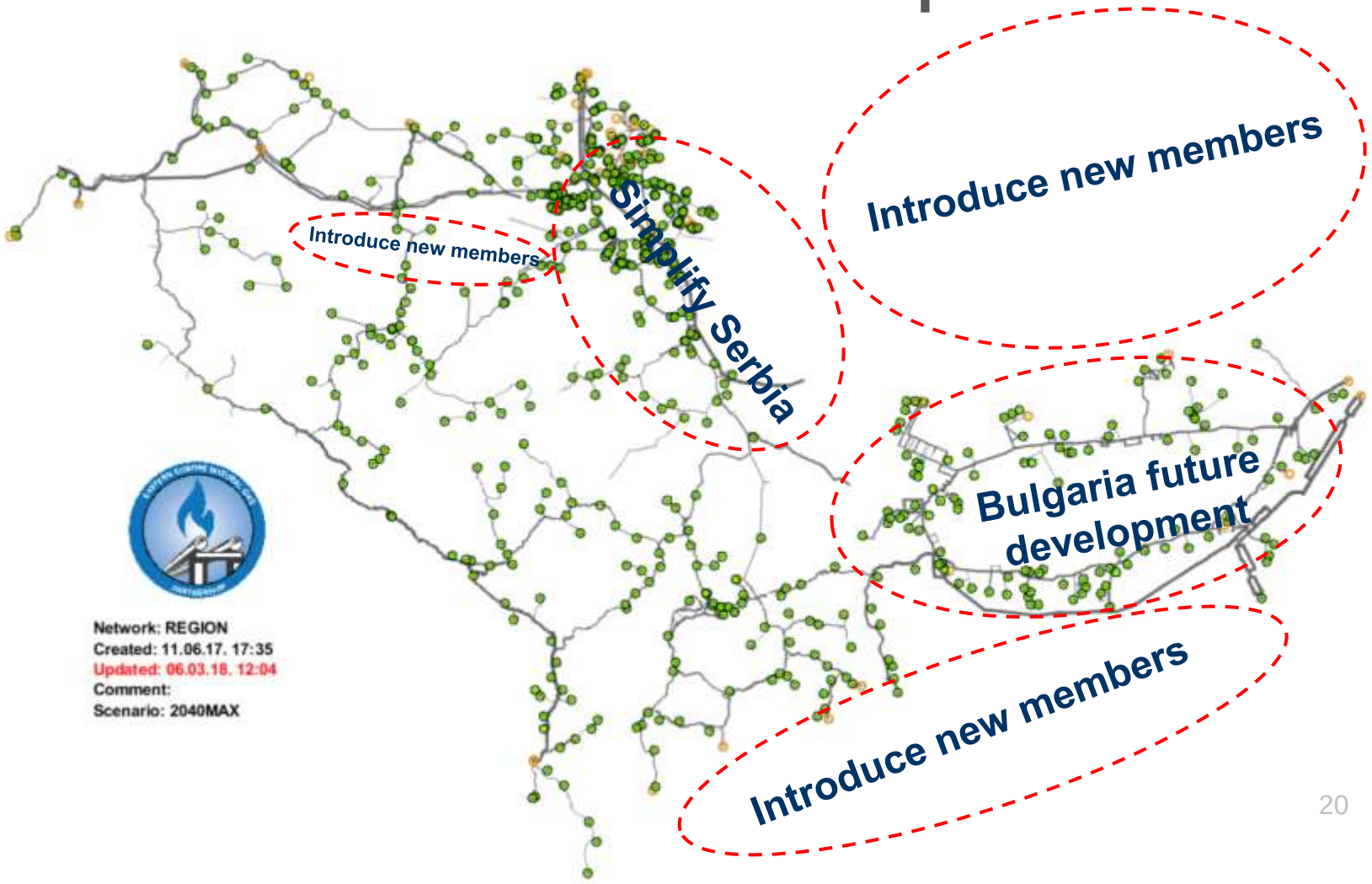
  - least cost gas supply options
  - estimates of high, medium and low gas consumption
  - proposed interconnections
  - impact and benefits of new LNG gas supply on gas quality in the region
  - impact and benefits of possible underground gas storage development
  - other aspects of system development

- 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.

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

EE-NGP Next Steps



Gas Sector Development in the SEE Region

- The main “problem” related to gas sector development in the SEE region is uncertainty related to the construction of larger supply/transport routes, such as liquified natural gas, the Ionian Adriatic Pipeline, as well as others.
- The Ionian Adriatic Pipeline enables the development of the gas sector in Albania, in Montenegro and possibly in the southern part of Bosnia and Herzegovina. However, it lacks significant grants and has a high transport cost as well as lacking SEE gas markets.
- For a more acceptable Ionian Adriatic Pipeline tariff, transit is necessary to countries outside the region, such as Slovenia and Austria.

Gas Sector Development in the SEE Region

- Most of the countries in the region need to build new supply routes due to the gas demand growth, but it is questionable whether the relatively small market of some countries can withstand the cost of interconnection development.
- It is questionable whether the interconnections that should develop the gas market (such as Croatia-Serbia, Serbia-Macedonia or Serbia-Bulgaria) are acceptable - to what extent the market development and the expected reduction in gas prices would be sufficient to cover the investment costs of interconnection development.

Next Steps and Impact on BiH Gas Sector Development

- The first simulations show what is well known - the existing supply route in Bosnia and Herzegovina has been fully utilized
- With existing pressure conditions, there is no possibility for further market development or for sufficient gas supply for all customers, especially in case of an extremely cold winter
- Future simulations should show what would be the optimal supply route for BiH under the given simulation conditions

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USAID – NARUC Natural Gas Market Design and Grid Code Project

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Project Goals and Objectives

- Enhance energy security through harmonized natural gas policy frameworks in Europe and Eurasia.
- Support development of Transmission Grid Code frameworks tailored to country-specific features and context.
- Enhance trade and foster greater energy security by removing market-related obstacles and new supply opportunities.
- Utilize USAID/USEA regional network modeling to benefit regulators' understanding of regional infrastructure investment needs from the policy and regulatory perspective.

Participating Regulatory Commissions

Albania, Armenia, Bosnia and Herzegovina, Georgia, Kosovo, Macedonia, Moldova, Serbia, and Ukraine, in partnership with the Energy Regulators Regional Association (ERRA).

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Accomplishments To-date

- Presented EU and US gas market models discussed regulators' role in facilitating gas infrastructure development.
- Developed "Report on Harmonization and Standardization of Natural Gas Transmission Grid Codes for Southeast Europe Regulators," examining market integration and cross-border trade to enable compliance with the Third Energy Package requirements.
- Drafted "Regulatory Guide to Conducting Economic Appraisals of Gas Infrastructure Expansion and Network Plans" to enable regulatory review of Ten-Year Network Development Plans, including specific appraisal methodologies.
- Explored structures for enhanced coordination between regulators, TSOs, DSOs, and regional markets.

Potential Next Steps

- Consultants visit each commission to work on specific issues in gas sector.
- Support regulators on investment planning/appraisal review procedures.

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