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**SEERMAP**

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South-East Europe Electricity Roadmap

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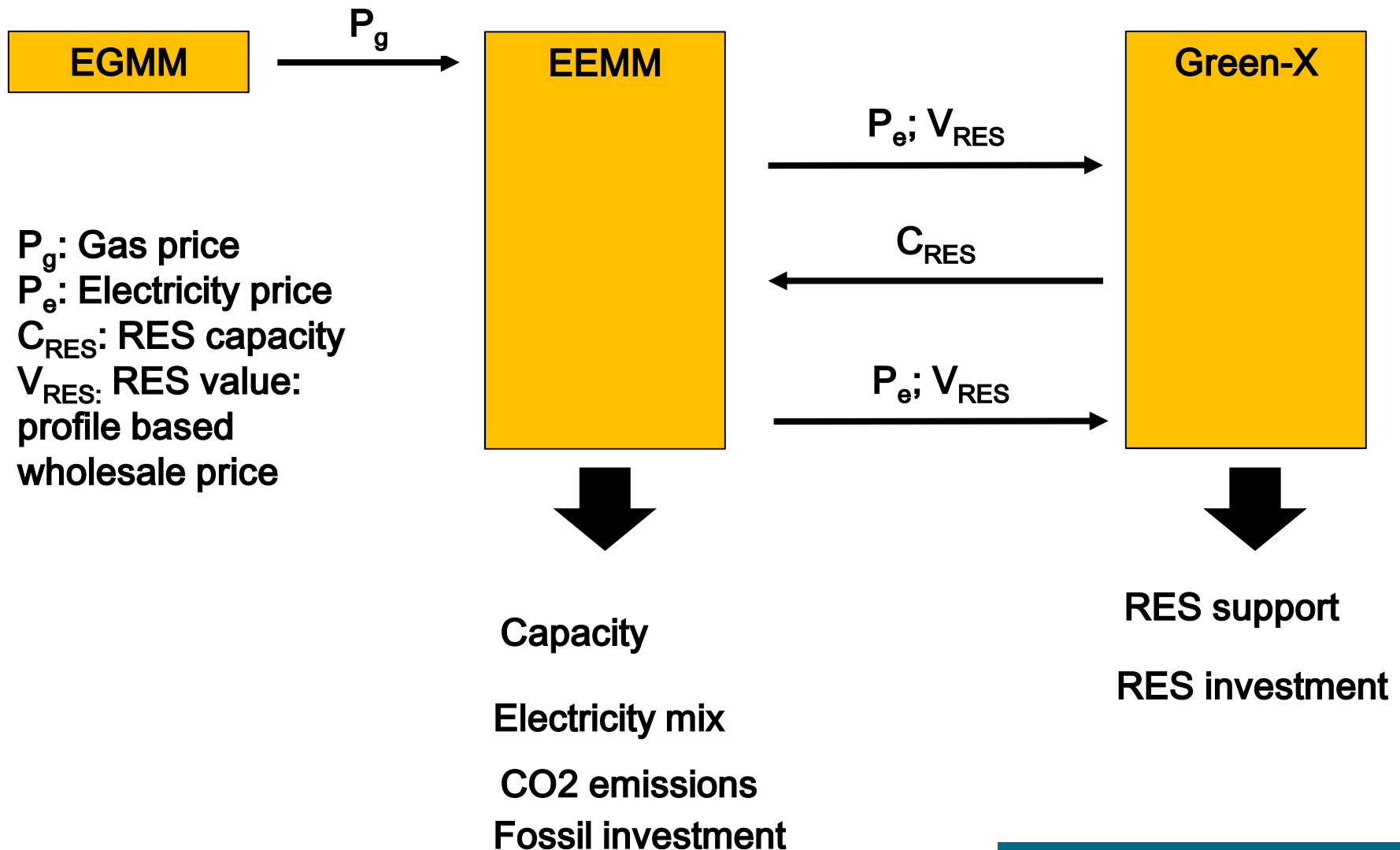
# Gas sector modelling in SEERMAP

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REKK

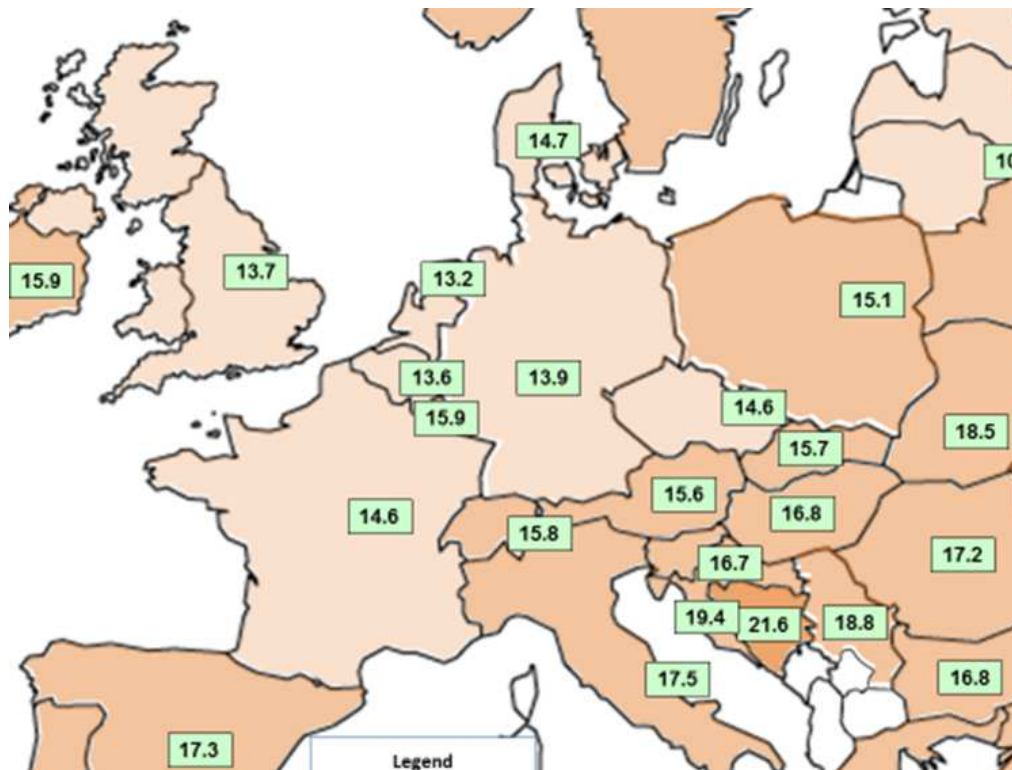
Belgrade, 3-4 May 2017

# Modelling process: iterations



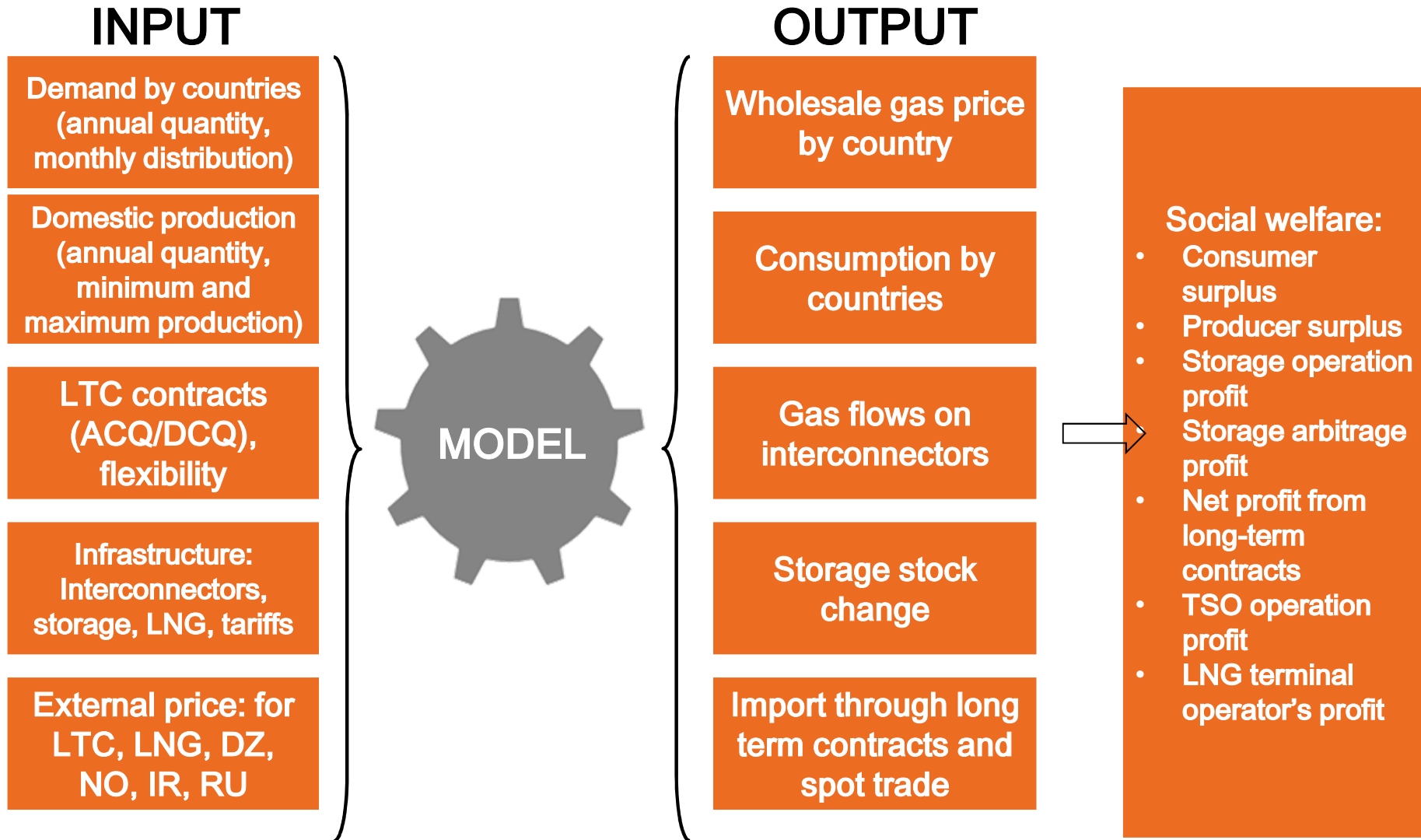
# European Gas Market Model – major characteristics

Wholesale gas price,  
€/MWh 2016

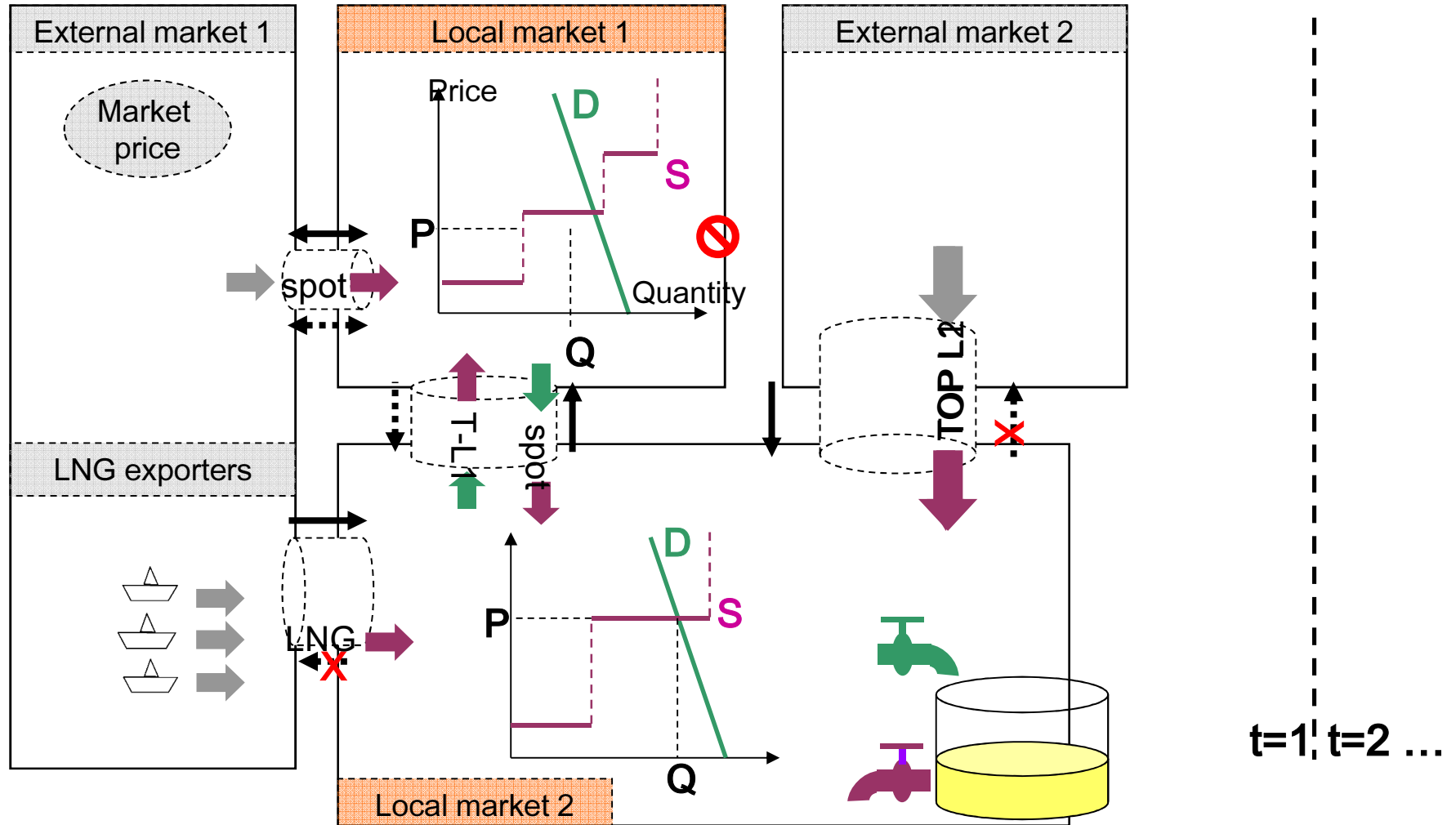


- Whole Europe (35 countries) is modelled
- Competitive prices by countries; price modelled for each 12 months
- Trade is based on long term contracts and spot trade within the EU and with exogenous countries and global LNG market (NO, RU, DZ, IR, LNG)
- Natural gas flows and congestions on interconnectors
- Physical constraints are interconnection capacities (transmission tariffs are also included)
- Trade constraints: TOP obligations with flexibility
- Domestic production and storage facilities are included
- LNG market representation is linked to Asian LNG prices

# One gas year – 12 months



# Model scheme



# Assumed fuel prices

|                         | 2016 | 2020 | 2025 | 2030  | 2035  | 2040  | 2045  | 2050  |
|-------------------------|------|------|------|-------|-------|-------|-------|-------|
| Crude oil; \$/bbl       | 37.5 | 79.1 | 91.1 | 110.0 | 115.0 | 120.0 | 125.0 | 130.0 |
| Exchange rate;<br>\$/€  | 1.1  | 1.1  | 1.1  | 1.1   | 1.1   | 1.1   | 1.1   | 1.1   |
| CO2 price, €/t          | 4.2  | 15.0 | 22.5 | 33.5  | 42.0  | 50.0  | 69.0  | 88.0  |
| ARA coal price,<br>€/GJ | 1.5  | 2.0  | 1.9  | 1.9   | 2.0   | 2.0   | 2.0   | 2.0   |

Source: IEA (2016), EIA(2017)

## Natural gas price, €/MWh

|        | 2016 | 2020 | 2025 | 2030 | 2035 | 2040 | 2045 | 2050 |
|--------|------|------|------|------|------|------|------|------|
| AL     | n.a. | 19.3 | 22.0 | 24.0 | 26.3 | 29.9 | 32.7 | 32.7 |
| BiH    | 21.6 | 23.5 | 26.6 | 28.8 | 30.9 | 34.4 | 35.5 | 35.8 |
| BA_FED | 21.6 | 23.5 | 26.6 | 28.8 | 30.9 | 34.4 | 35.5 | 35.8 |
| BA_SRP | 21.6 | 23.5 | 26.6 | 28.8 | 30.9 | 34.4 | 35.5 | 35.8 |
| BG     | 16.8 | 19.3 | 22.3 | 24.2 | 26.5 | 30.1 | 32.7 | 32.4 |
| GR     | 16.6 | 17.9 | 20.7 | 22.6 | 24.9 | 28.5 | 31.3 | 31.4 |
| KO*    | n.a. | 20.7 | 23.8 | 26.0 | 28.1 | 31.6 | 32.7 | 33.0 |
| ME     | n.a. | 20.7 | 23.8 | 26.0 | 28.1 | 31.6 | 32.7 | 33.0 |
| MK     | n.a. | 21.9 | 24.9 | 26.9 | 29.2 | 32.8 | 35.3 | 35.0 |
| RO     | 17.2 | 18.0 | 22.3 | 24.2 | 26.3 | 29.  | 31.8 | 31.7 |
| RS     | 18.8 | 20.7 | 23.8 | 2.0  | 28.1 | 31.6 | 32.7 | 33.0 |
| HU     | 16.8 | 19.5 | 22.2 | 24.1 | 26.1 | 29.7 | 30.8 | 31.1 |
| DE     | 13.9 | 16.4 | 18.6 | 20.1 | 21.9 | 25.1 | 26.3 | 23.8 |

Source: EGMM of REKK

# New infrastructure on the Balkans

| Pipeline     | From | To | Capacity, GWh/day | Date of commissioning |
|--------------|------|----|-------------------|-----------------------|
| BG-RS        | BG   | RS | 51                | 2018                  |
| RS-BG        | RS   | BG | 51                | 2018                  |
| TR-GR2_TAP   | TR   | GR | 350               | 2019                  |
| GR-MK_TAP    | GR   | MK | 25                | 2019                  |
| AZ-TR_TANAP  | AZ   | TR | 490               | 2018                  |
| GR-BG        | GR   | BG | 90                | 2018                  |
| GR-BG        | GR   | BG | 151               | 2021                  |
| GR-IT_TAP    | GR   | IT | 334               | 2019                  |
| SI-HR2       | SI   | HR | 162               | 2019                  |
| HR-SI        | HR   | SI | 162               | 2019                  |
| GR-AL        | GR   | AL | 40                | 2019                  |
| BG-MK        | BG   | MK | 27                | 2020                  |
| HR-LNG       |      | HR | 108               | 2020                  |
| BG-RO        | BG   | RO | 14                | 2016                  |
| RO-BG        | RO   | BG | 14                | 2016                  |
| GR-LNG exp   |      | GR | 81                | 2017                  |
| RO-HU (BRUA) | RO   | HU | 126               | 2020                  |
| HU-RO (BRUA) | HU   | RO | 77                | 2020                  |

Source: ENTSOG TYNDP 2017

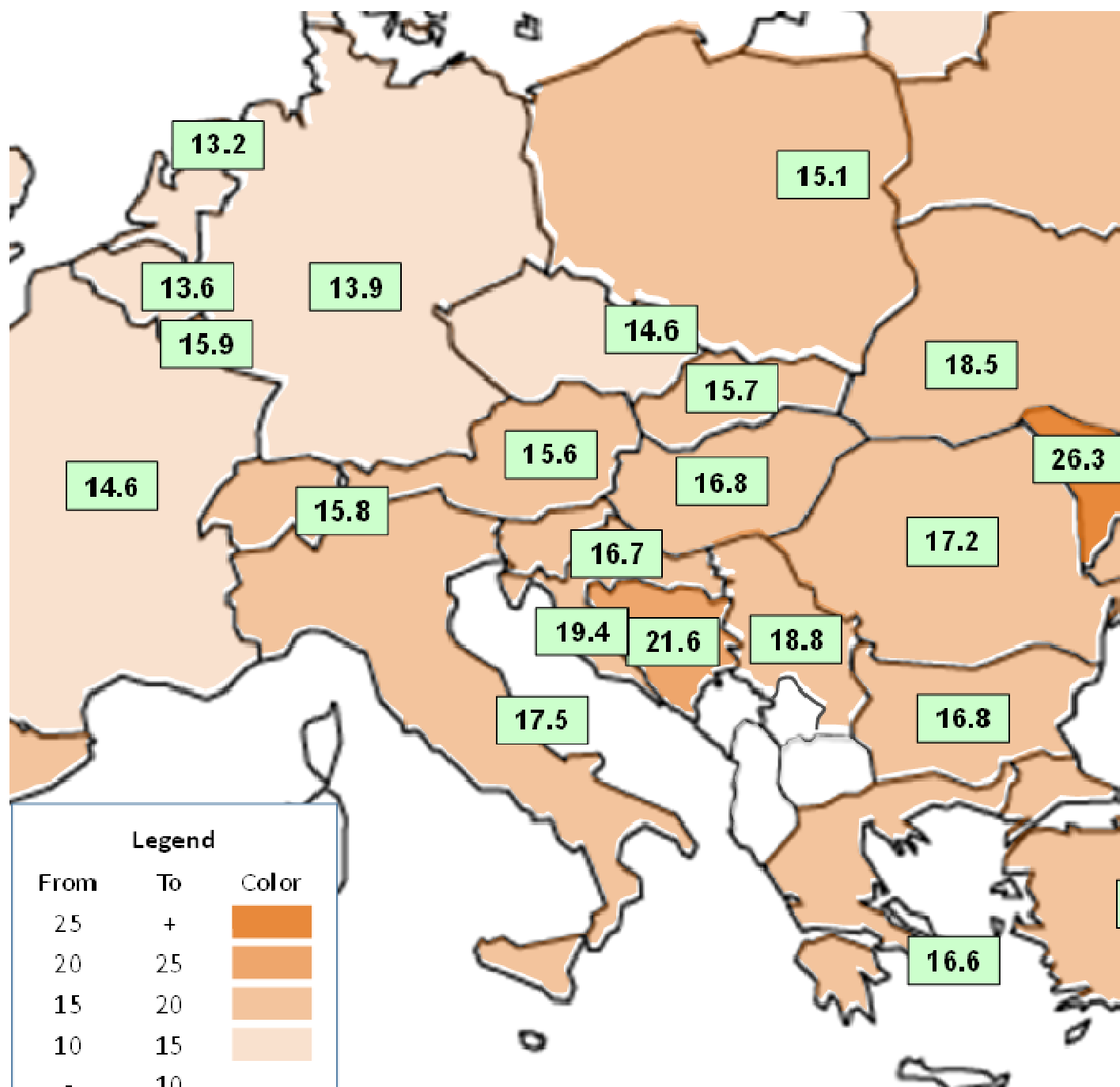
# Gas infrastructure developments up to 2020



- Gas infra developments in the SEE
- Closeness to TAP and TANAP are key to the price differences (transmission costs)
- After 2020: we assume connection to ME, KO\* as well

# SEERMAP

South-East Europe Electricity Roadmap



## Legend

| From | To | Color             |
|------|----|-------------------|
| 25   | +  | Dark Orange       |
| 20   | 25 | Orange            |
| 15   | 20 | Light Orange      |
| 10   | 15 | Very Light Orange |
| -    | 10 | White             |