

# European gas market developments in different energy transition scenarios

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## Introduction

- Increasing deployment of low carbon energy producing technologies towards 2050
- Affects markets and infrastructure requirements
- Strong interaction between electricity and gas markets requires integral research approach

→ What role for gas in future energy transition?

(focus on transition in electricity generation)

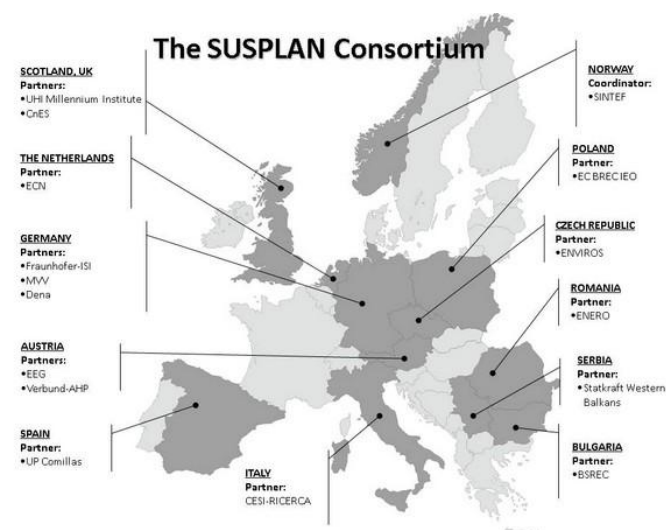
→ What are gas market implications?

(i.e. sourcing, infrastructure investment)

# Introduction to SUSPLAN project

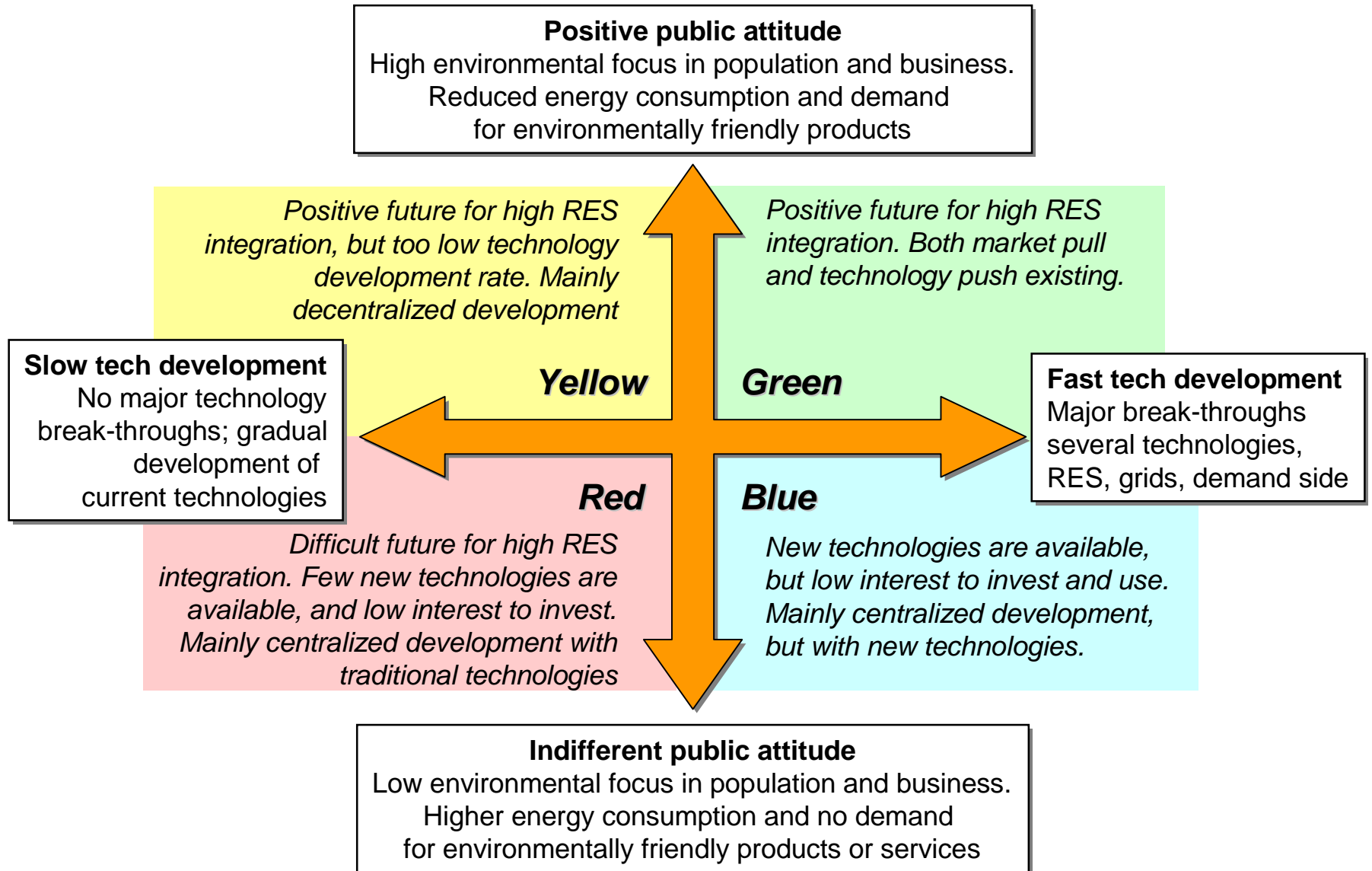


- EU FP7 project with focus on developing regional and pan-European guidelines for more efficient integration of renewable energy into future infrastructures
- ECN responsible for WP3 on trans-national infrastructure developments

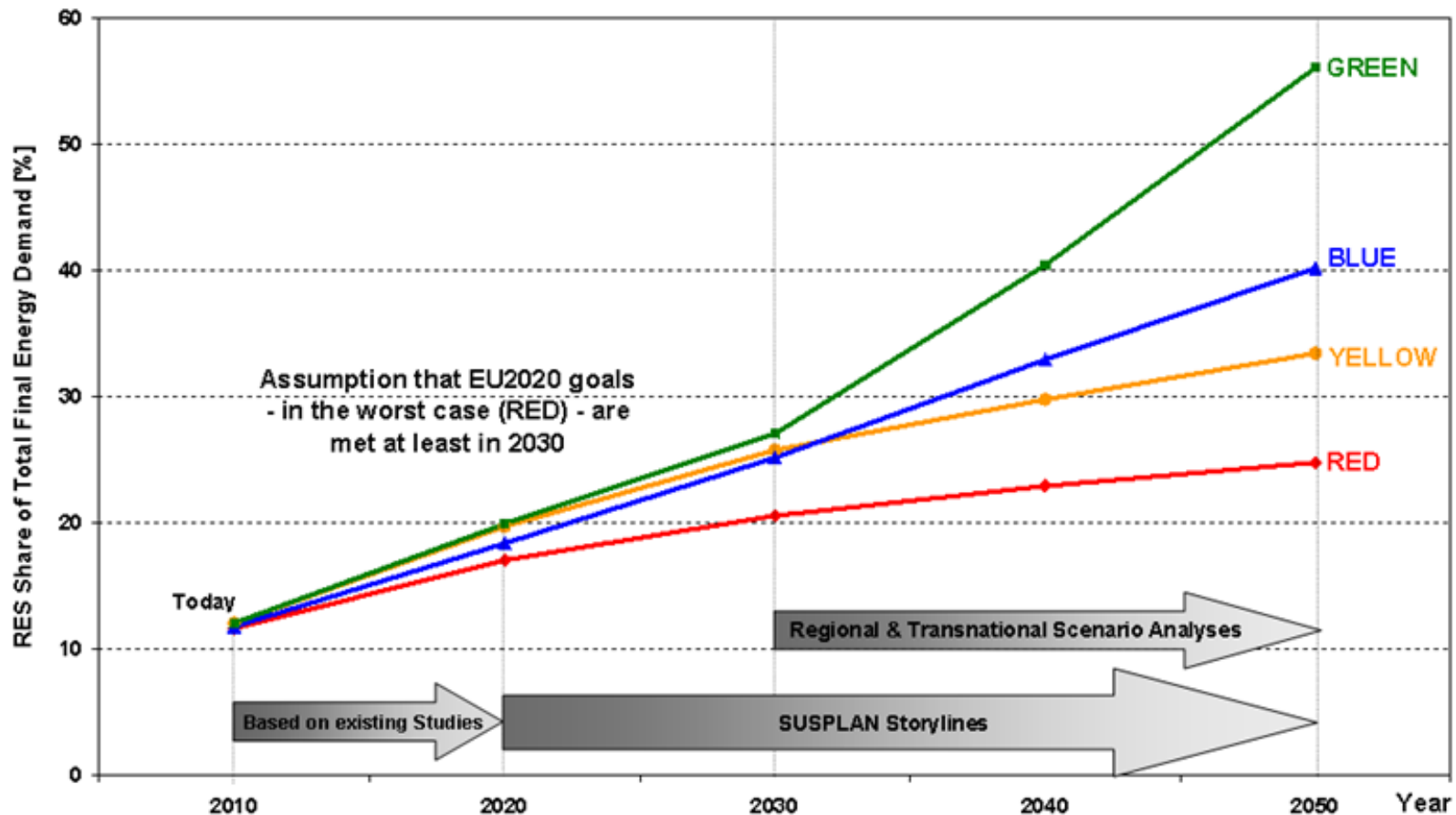


## Research approach SUSPLAN

- Model-based
  - Simulation model representing European electricity market and transmission infrastructure (MTSIM model RSE)
  - Simulation model representing European gas market and gas infrastructure (transmission, LNG, storage) (Gastale model ECN)
  - Economic optimization
- Interactive analysis
  - Iterations between the two models, both allowing for optimal deployment of existing capacity and expansion of capacity
- Long-term perspective
  - Starting point 2030, analysis for 2030 – 2050

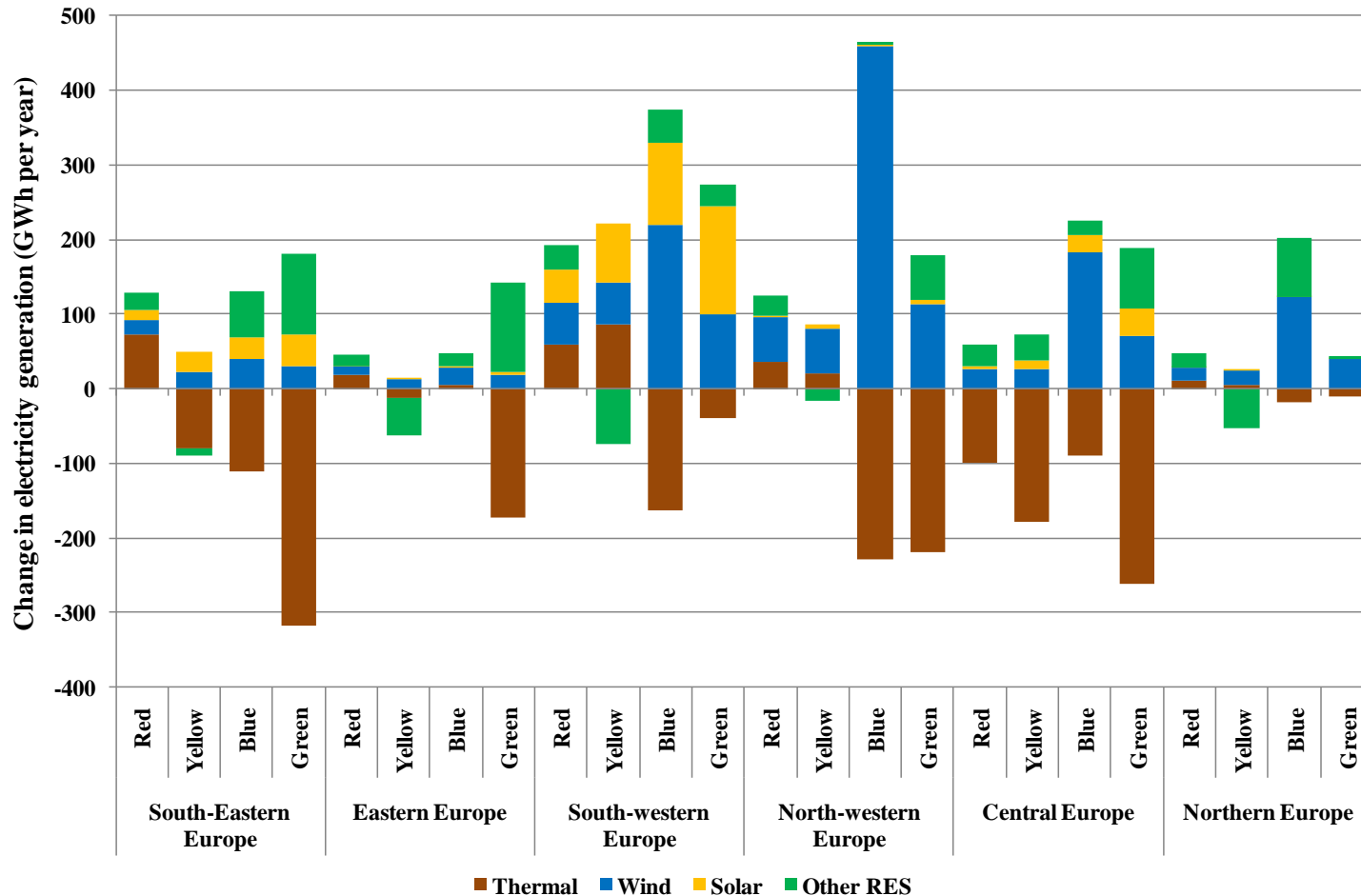


# Share of renewables in total energy demand across SUSPLAN storylines

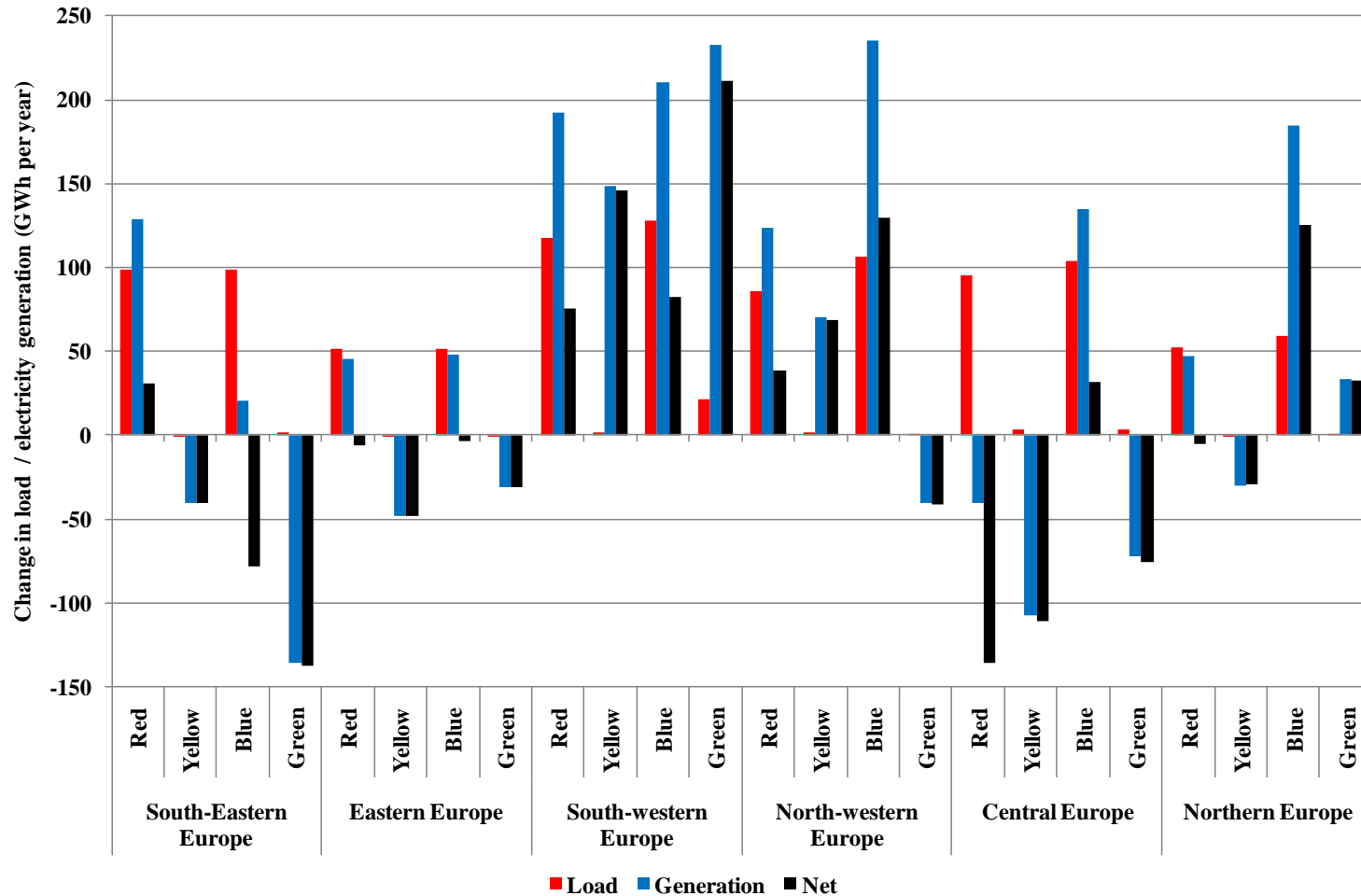


# Developments in electricity generation

## Large geographical differences

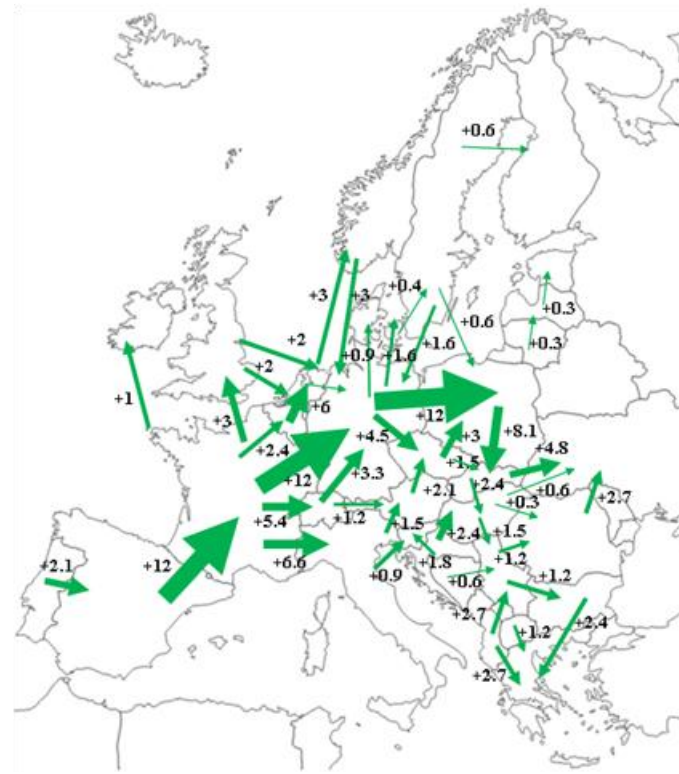
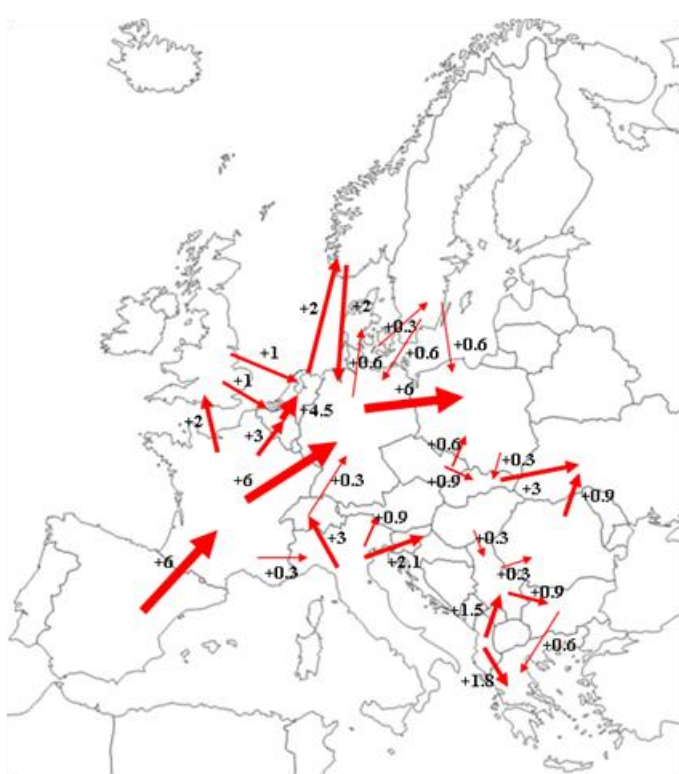


# Total impact on generation and load





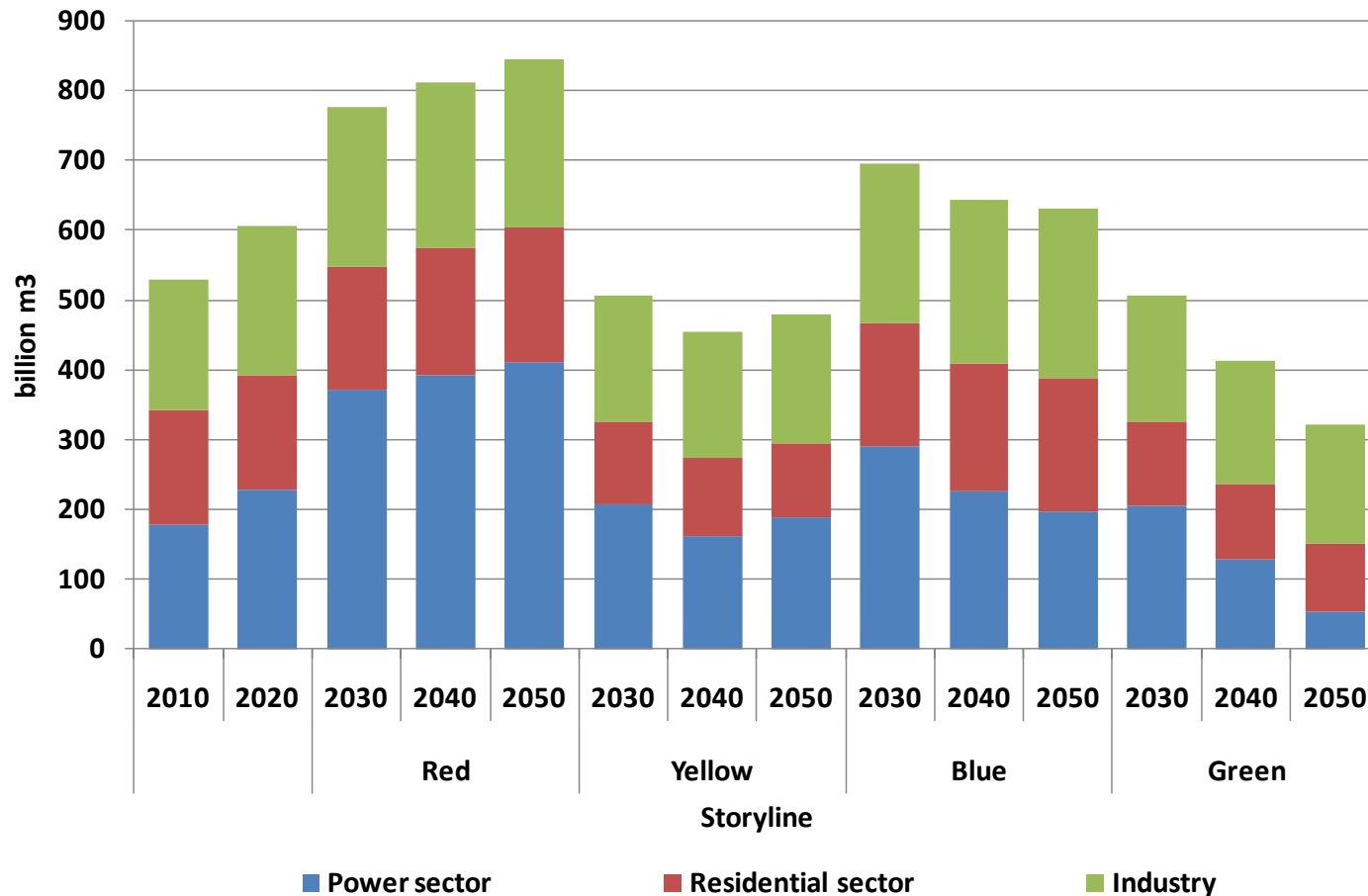
# Implications for EU internal transmission infrastructure



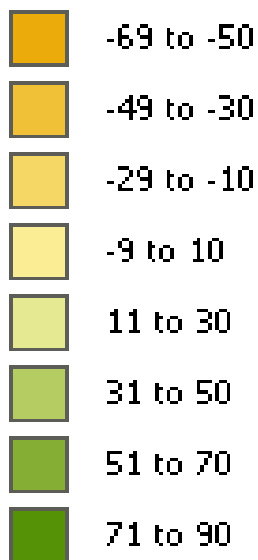
- Larger RES penetration in combination with low demand causes larger need for infrastructure investment

# Total gas consumption

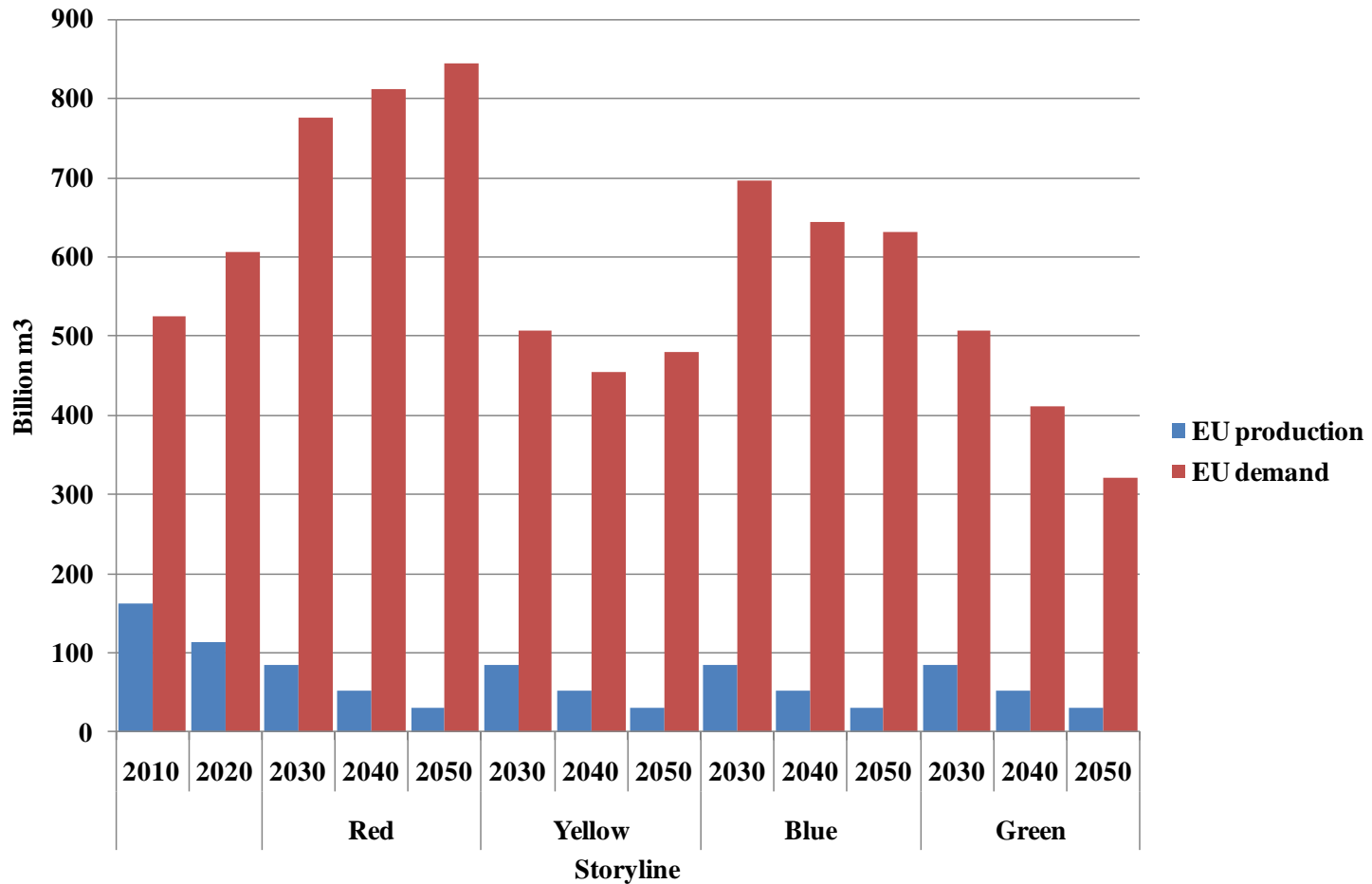
## Power sector is main driver across storylines



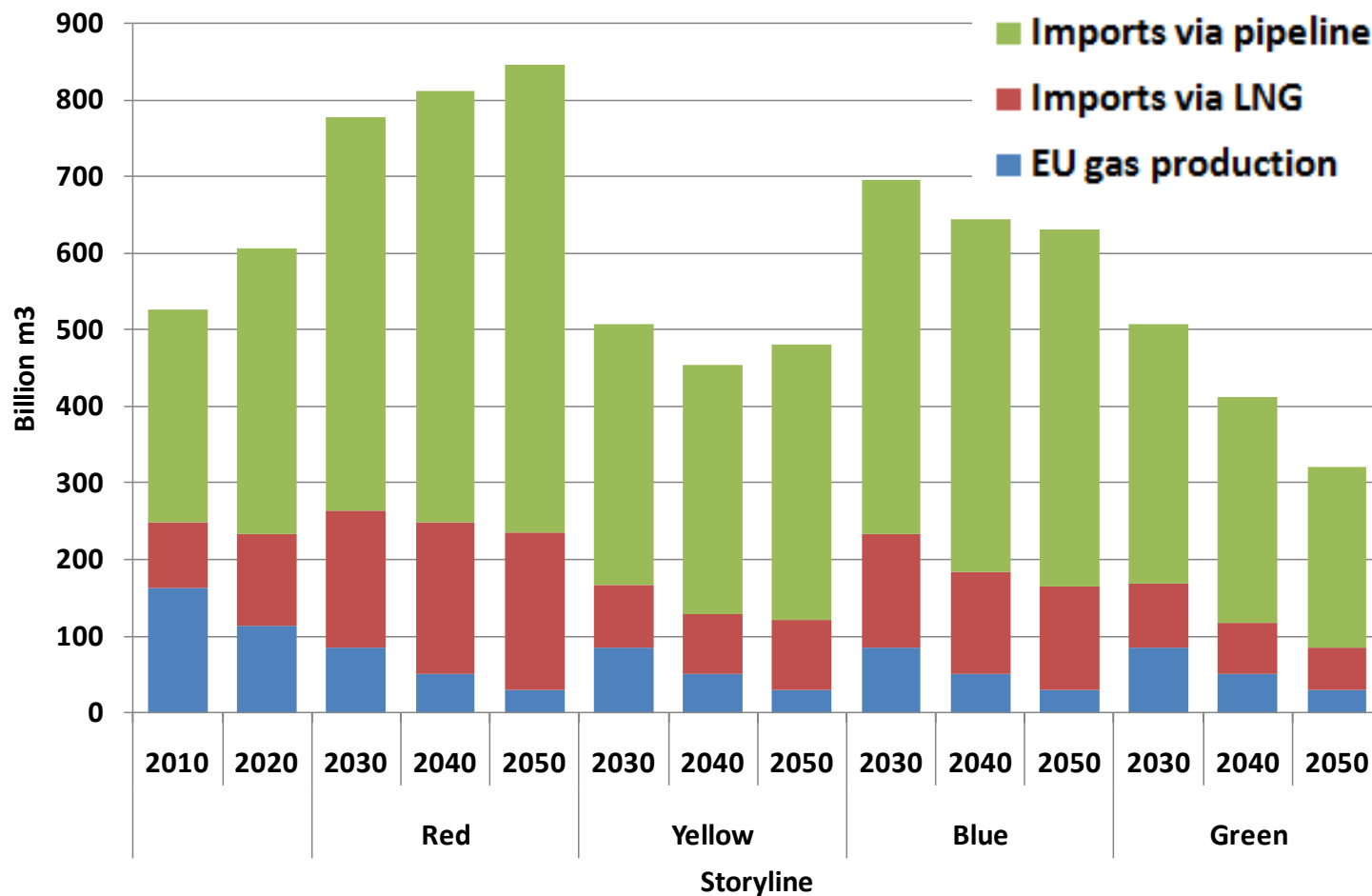
# Gas demand Change between 2010 - 2050 (in billion m<sup>3</sup>)



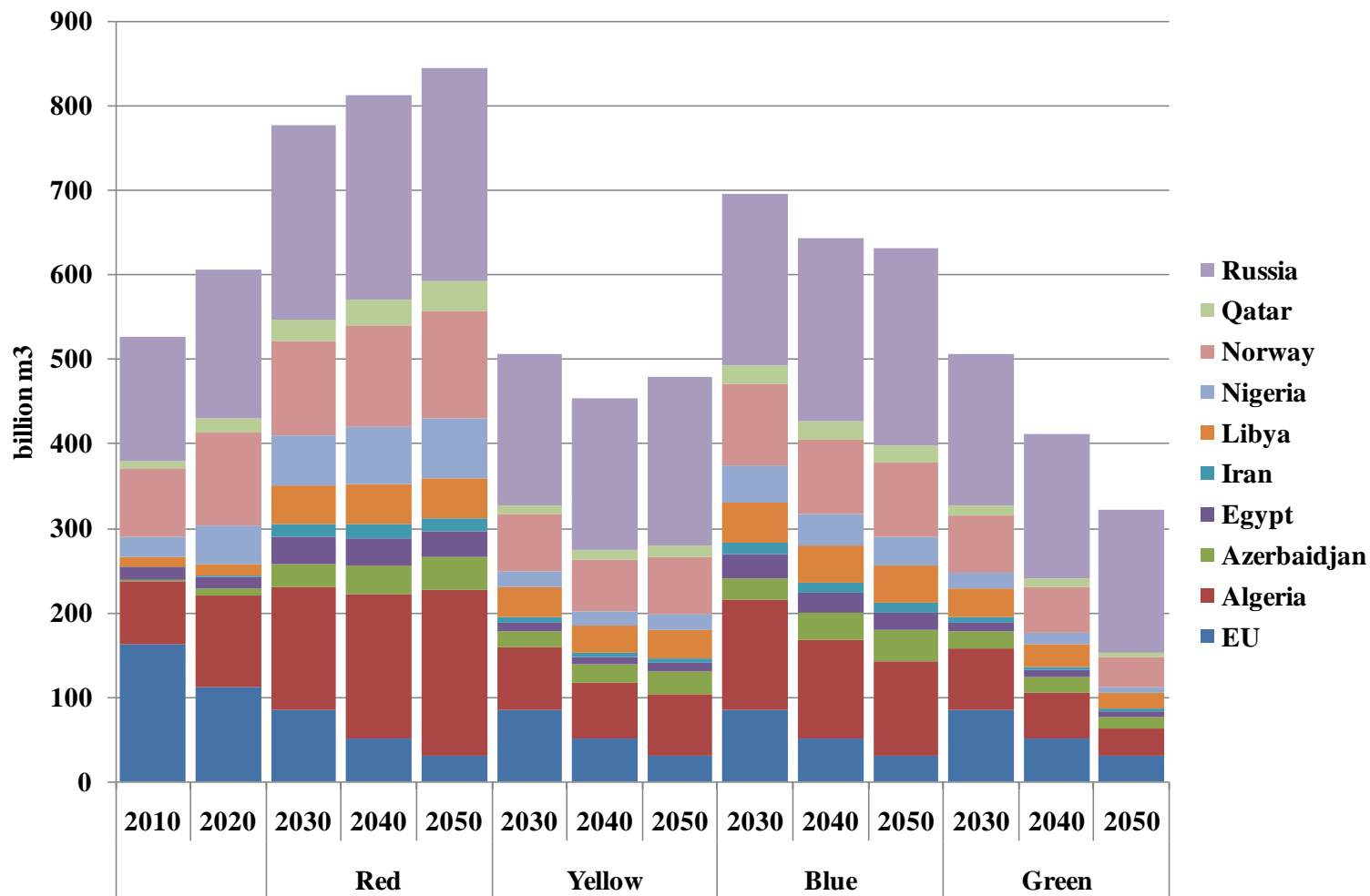
# EU import gap across storylines



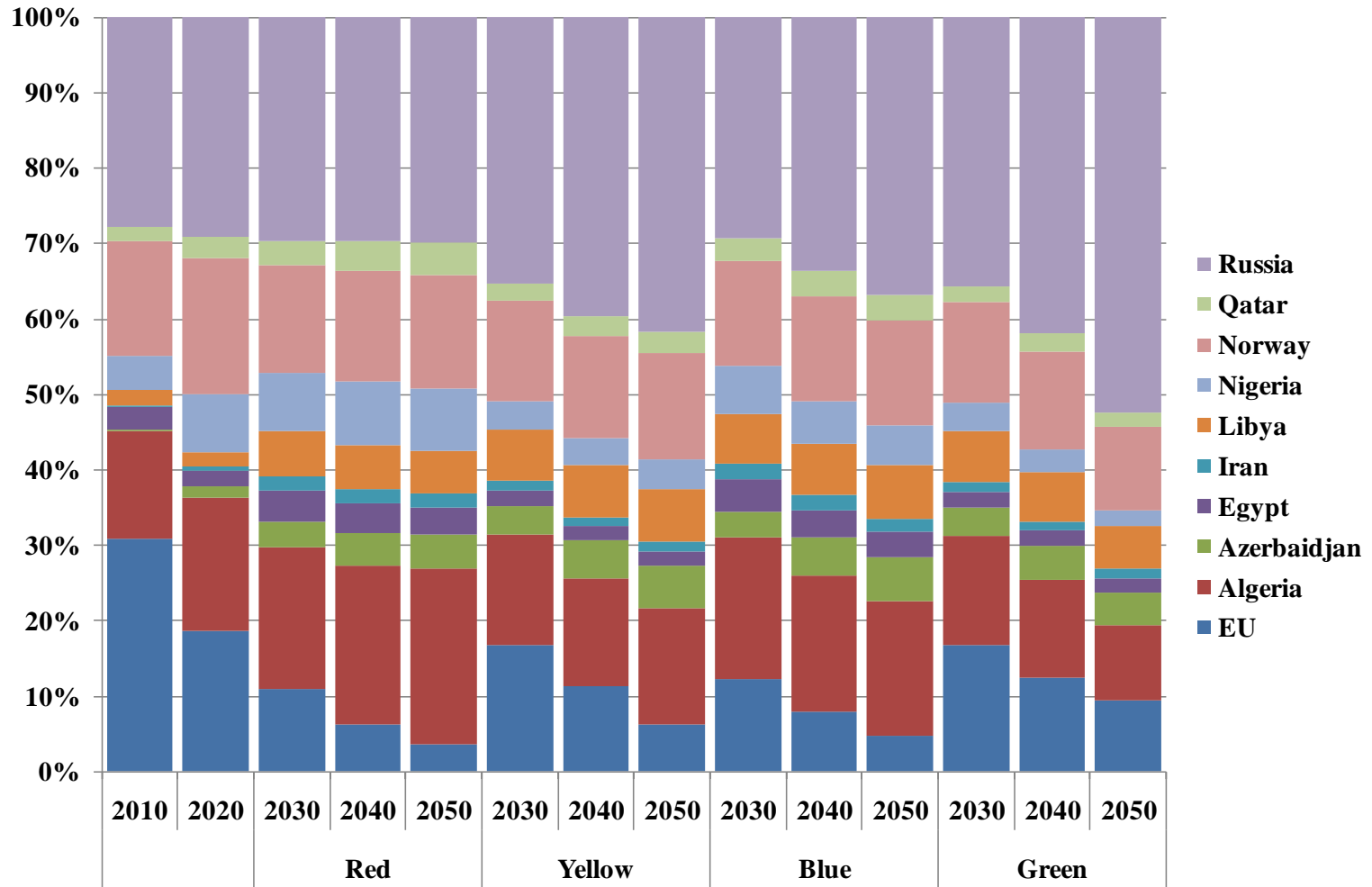
# How does the EU fill this import gap?



# Import dependency and gas supply mix (bcm)



# Import dependency and gas supply mix (%)

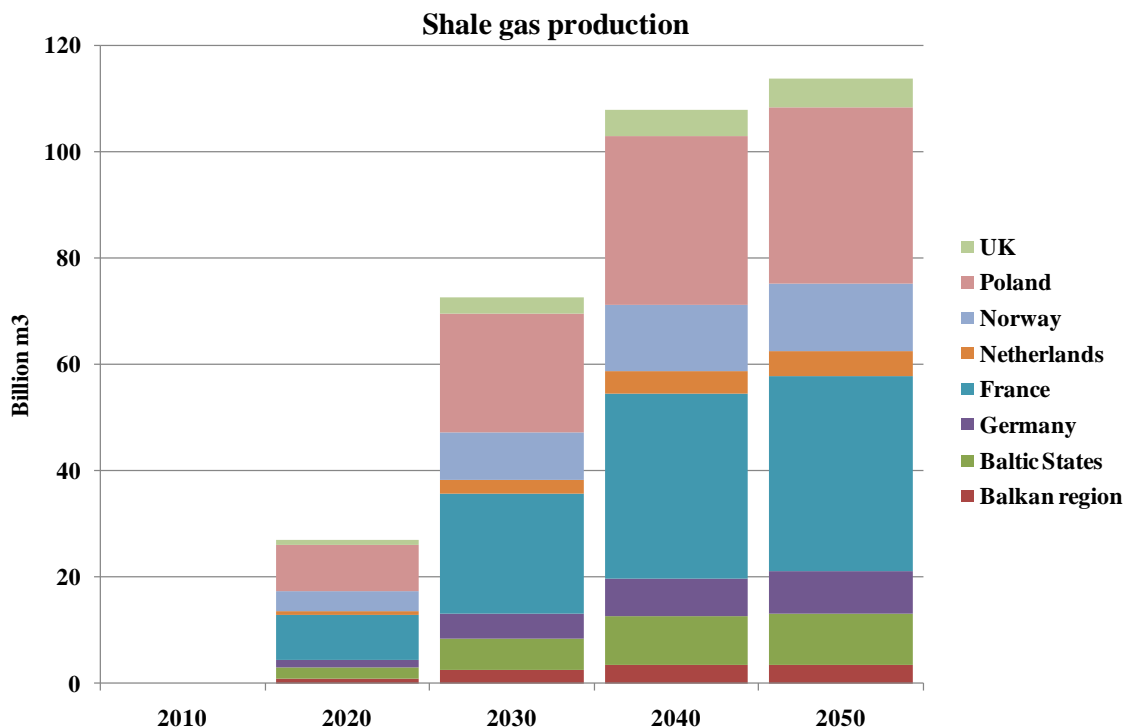


## What are possible implications of shale gas developments across Europe?

- Unconventional gas provides for more abundant (local) resources
- Downward pressure on prices:
  - Gas less scarce, lower gas prices
  - Less security of supply concerns (due to geographical spread of unconventional resources)
- Substitution of EU external supplies with (new) local supplies?

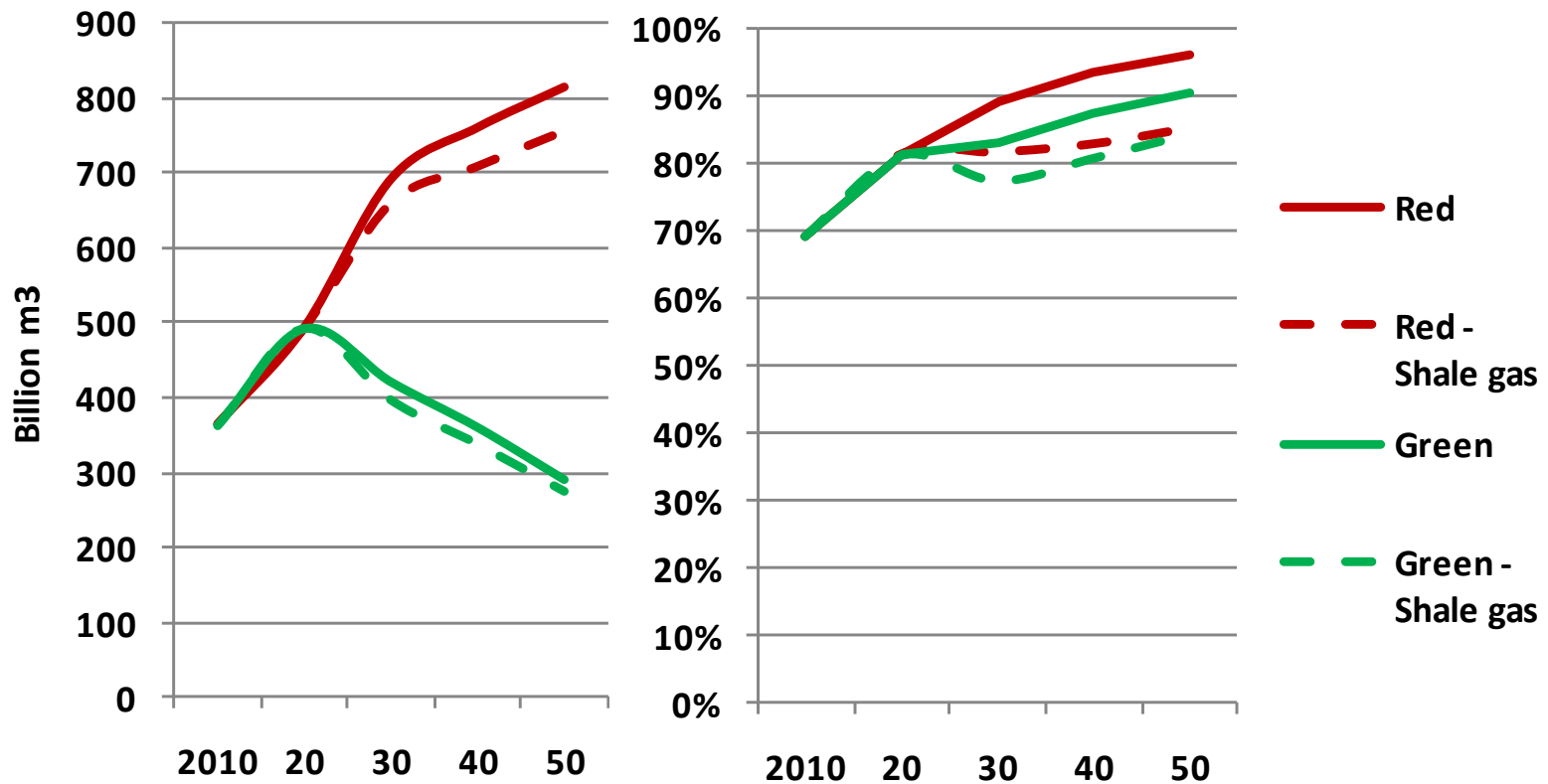


# Role for shale gas?



- Assumptions:
- Production capacity:
  - 2020: 28 billion m<sup>3</sup>
  - 2030: 99 bcm billion m<sup>3</sup>
- Cost: 8 – 12 €-ct / m<sup>3</sup>
- ‘Optimistic scenario’

# Shale gas implications for import dependency and supply mix



## Shale gas implications for infrastructure investment

- Increased investment in parts of Europe due to changing gas flow pattern
  - For example in Eastern Europe due to Polish exports
- Less investment in LNG import capacity
  - Avoided LNG imports from a.o. Nigeria, Egypt
- Relatively little decrease in Russian gas imports
  - ‘Cheap’ available pipeline capacity

## Conclusions

- Gas and electricity demand interdependent, peak in gas demand likely in 2025/2030
- Highly diversified supply for EU as whole (with regional differences) irrespective of level
- Shale gas implications: some internal investment required + substitution of most expensive supply options: limited overall EU impact?
- More research needed on:
  - Interactions between gas, electricity and CO<sub>2</sub> markets
  - Implications for EU infrastructure investment strategies

## EDGaR:

### Understanding gas sector intra- and inter-market interactions (UGSIIMI)

- Cooperation between TU Delft, RUG, KEMA, and ECN
- Focus:
  - Explore and understand gas sector interactions within the gas sector amongst technology, players, and markets, and interaction between gas and electricity
- <http://www.edgar-program.com/nl/projects/A1>

**Thank you for your attention**

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