

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)

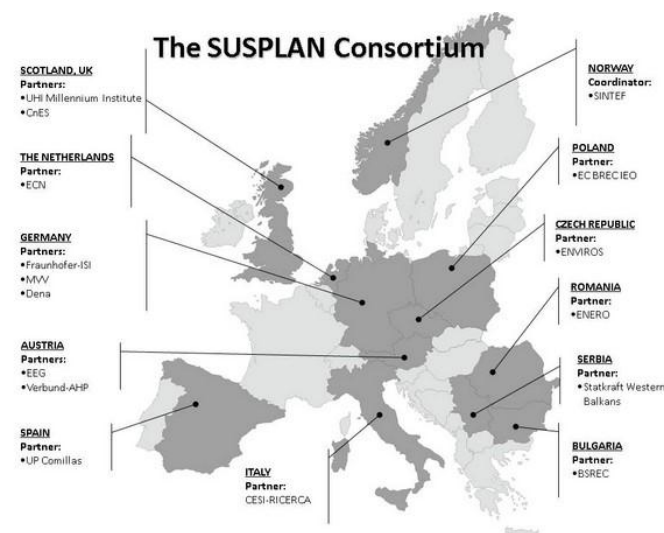
→ What are gas market implications?

(i.e. sourcing, infrastructure investment)

Introduction to SUSPLAN project

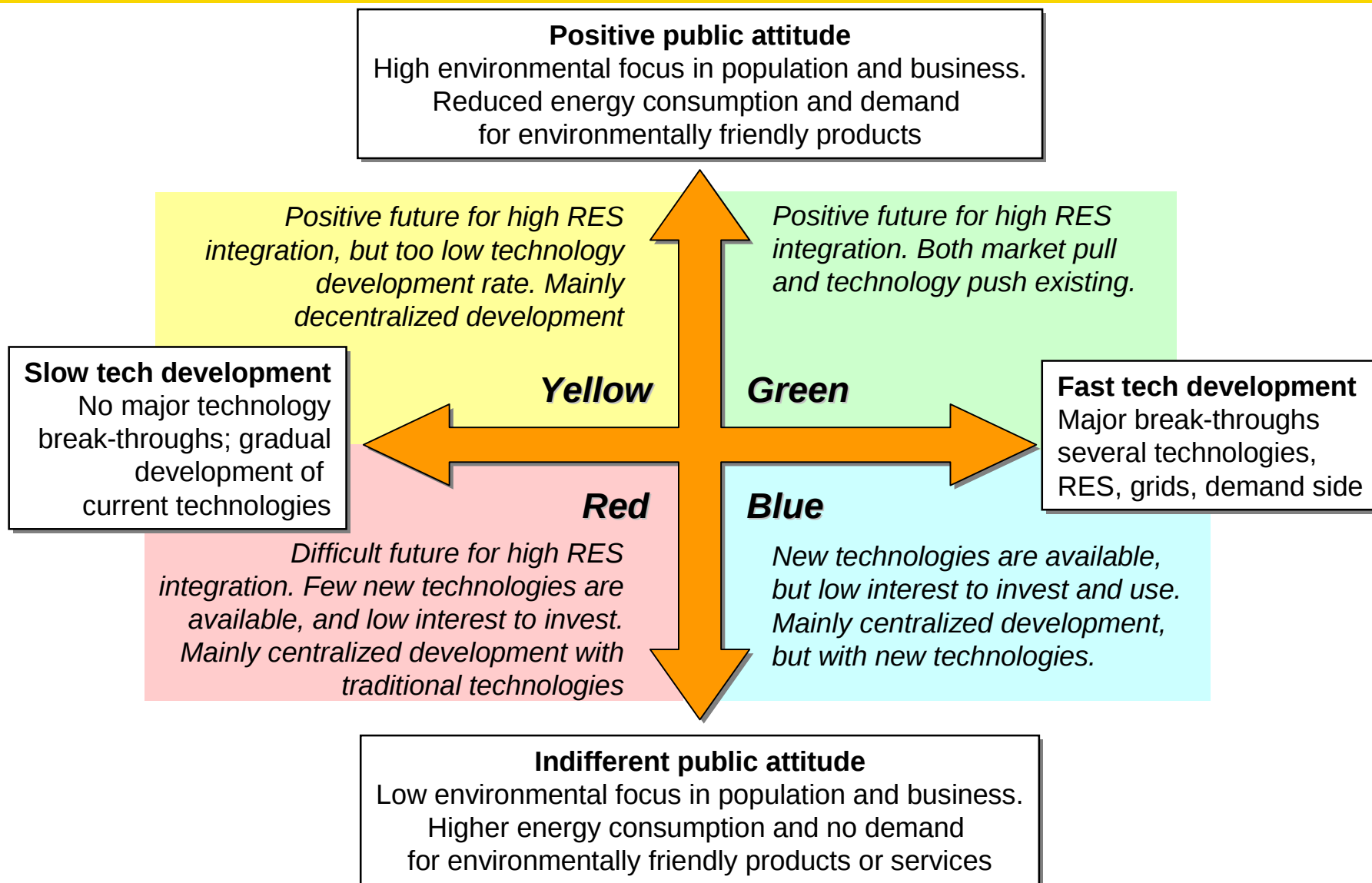


- EU FP7 project with focus on developing regional and pan-European guidelines for more efficient integration of renewable energy into future infrastructures
- ECN responsible for WP3 on trans-national infrastructure developments

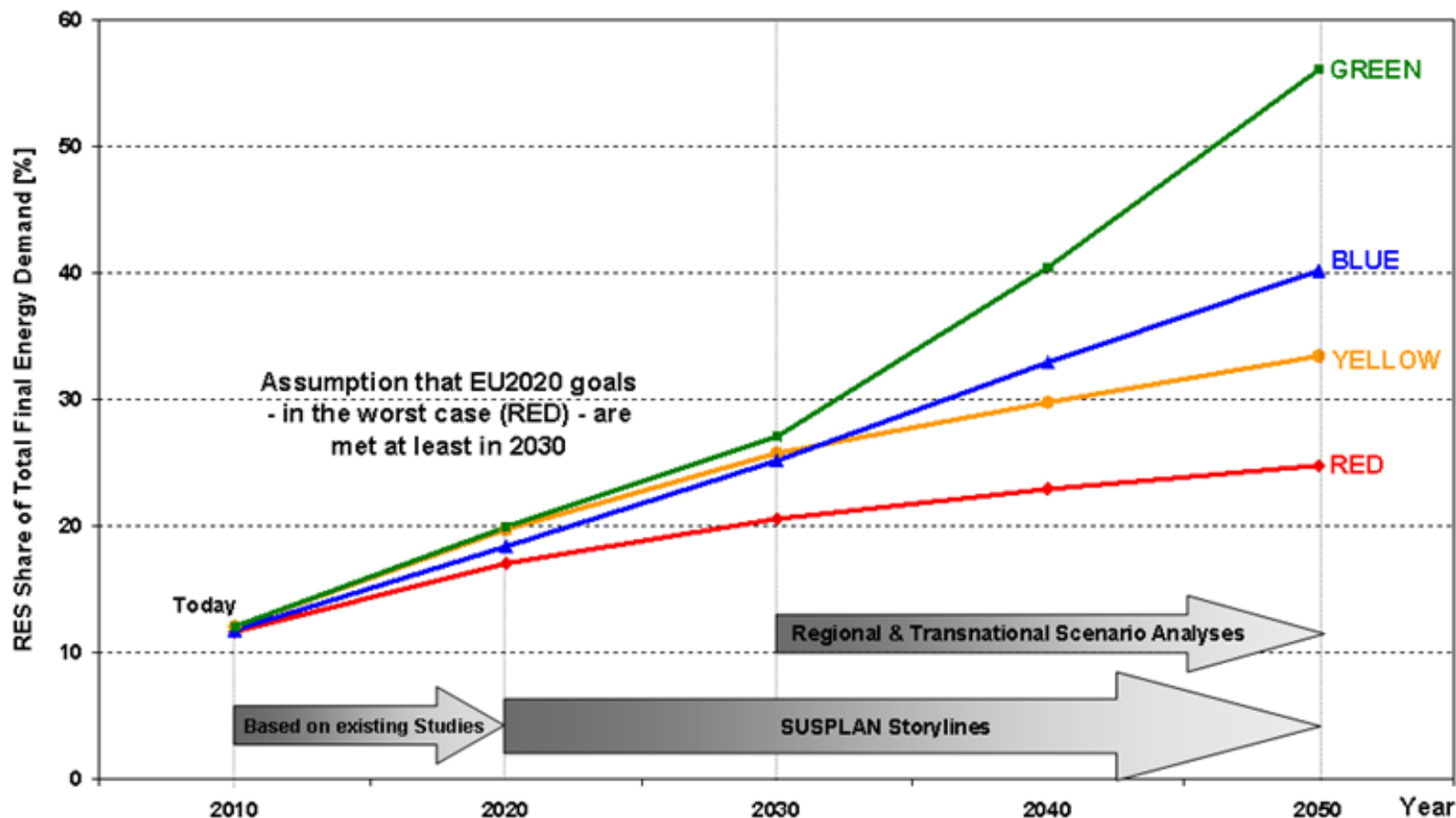


Research approach SUSPLAN

- 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

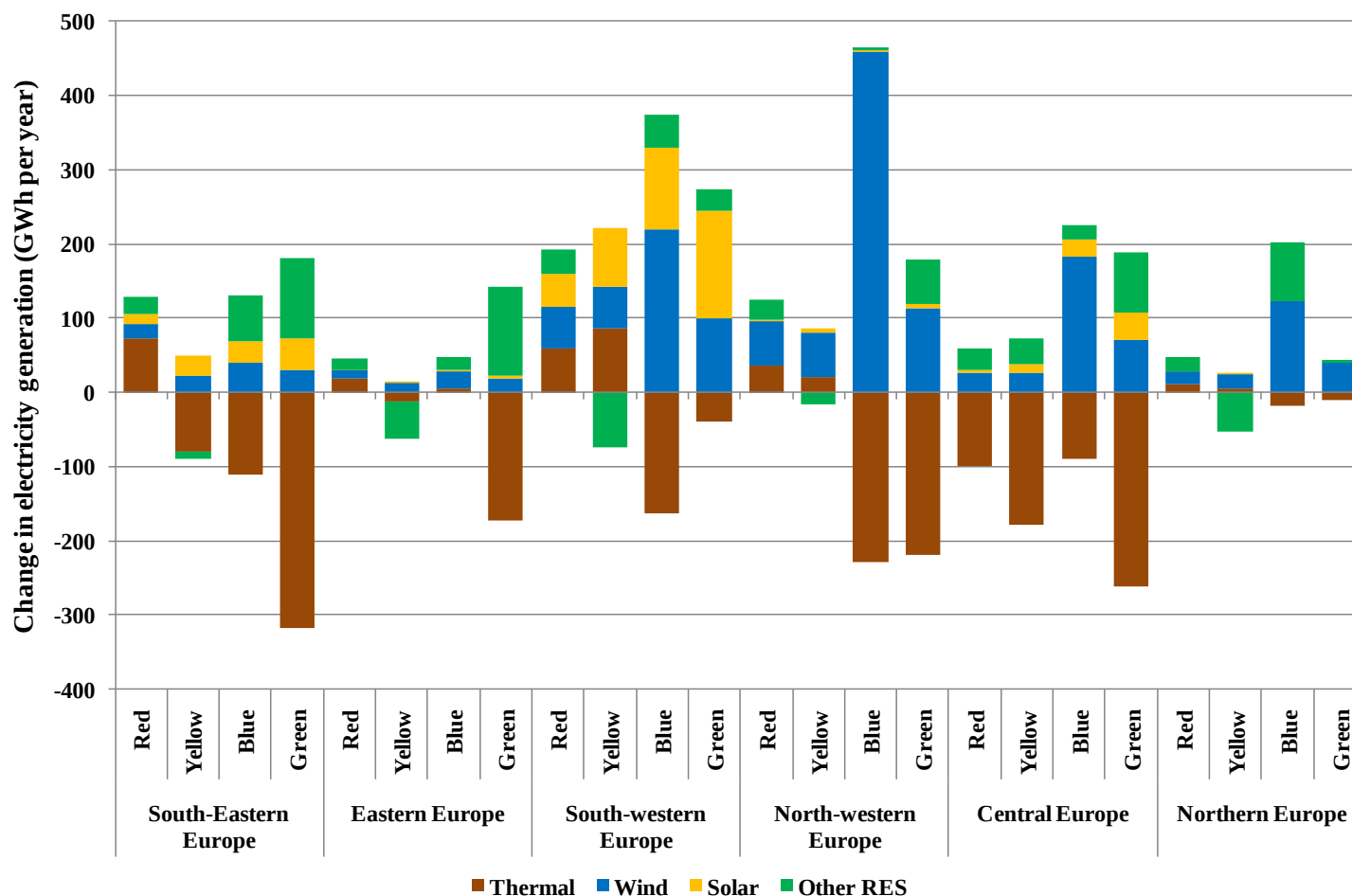


Share of renewables in total energy demand across SUSPLAN storylines

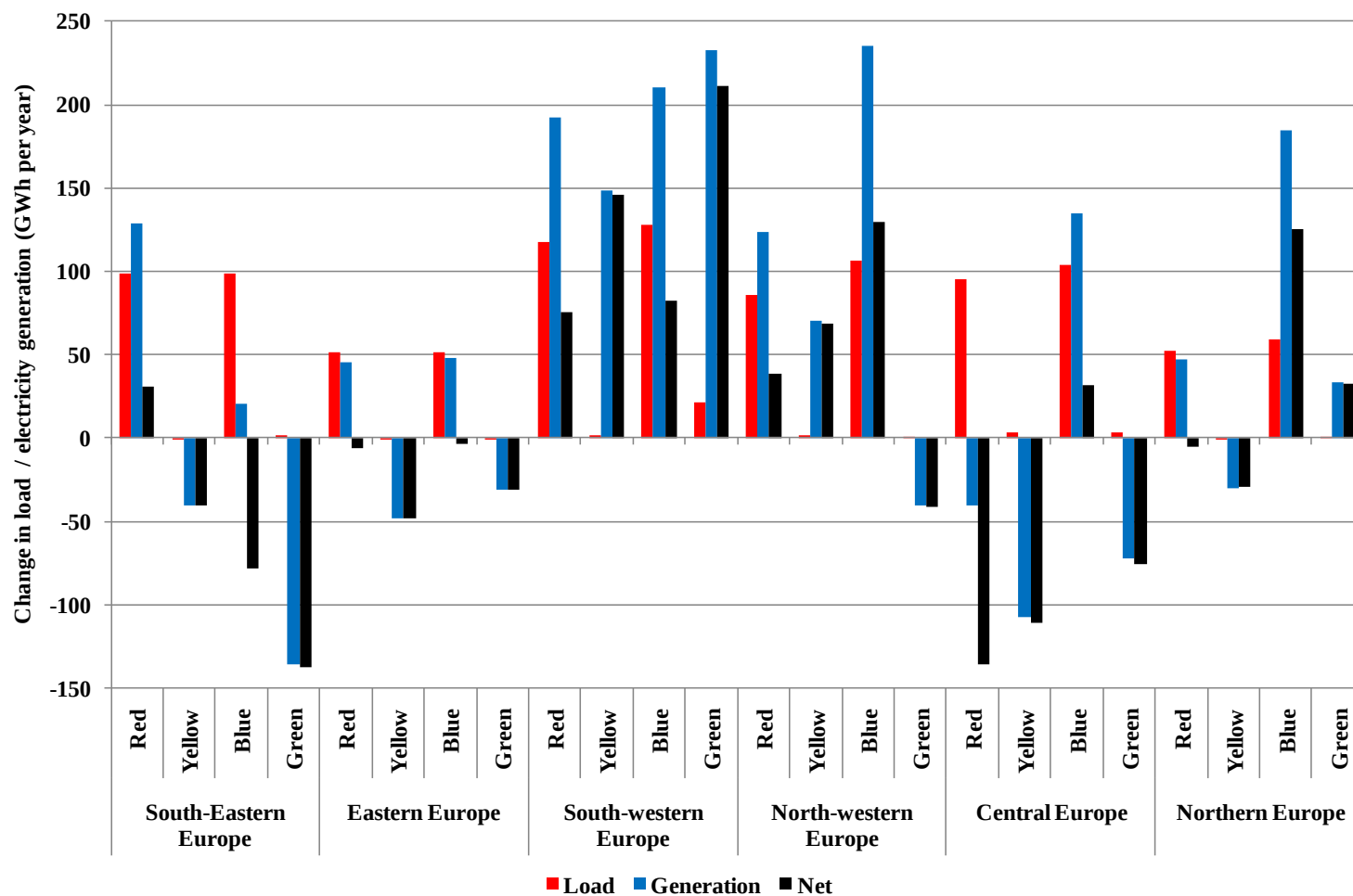


Developments in electricity generation

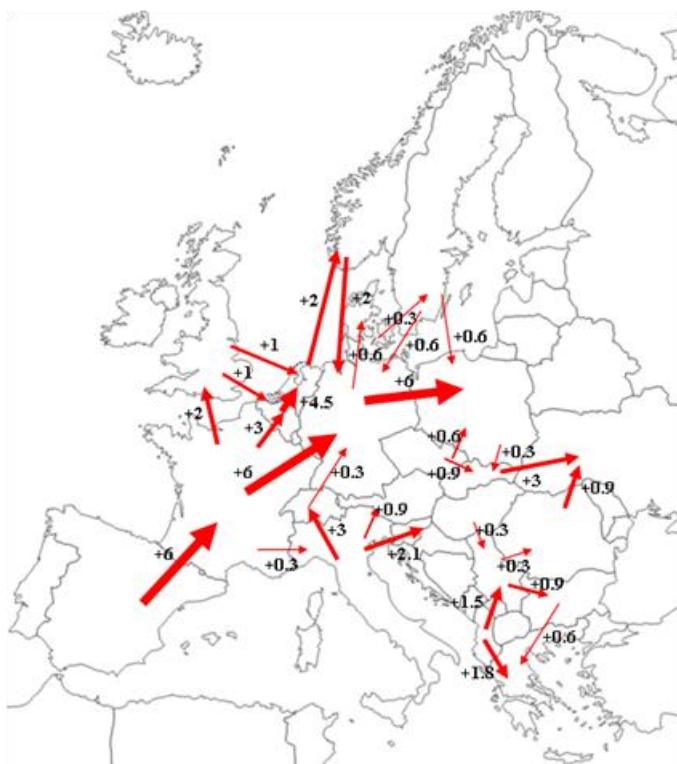
Large geographical differences



Total impact on generation and load



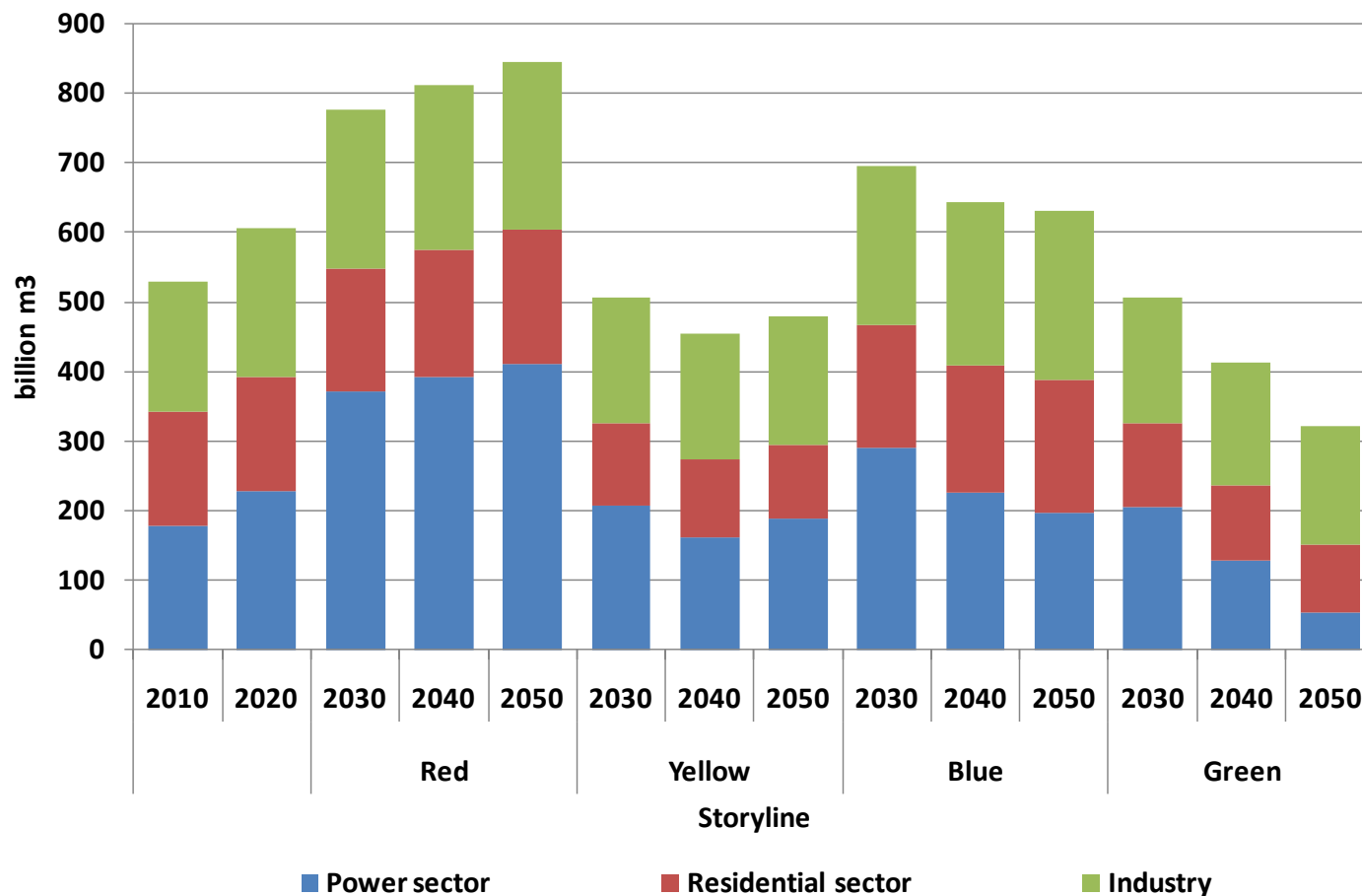
Implications for EU internal transmission infrastructure



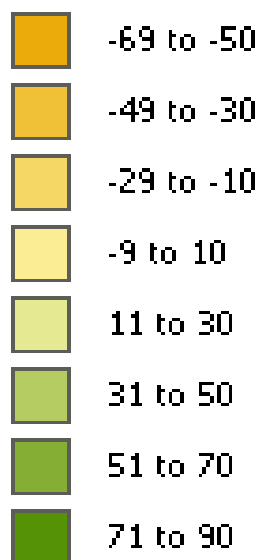
- Larger RES penetration in combination with low demand causes larger need for infrastructure investment

Total gas consumption

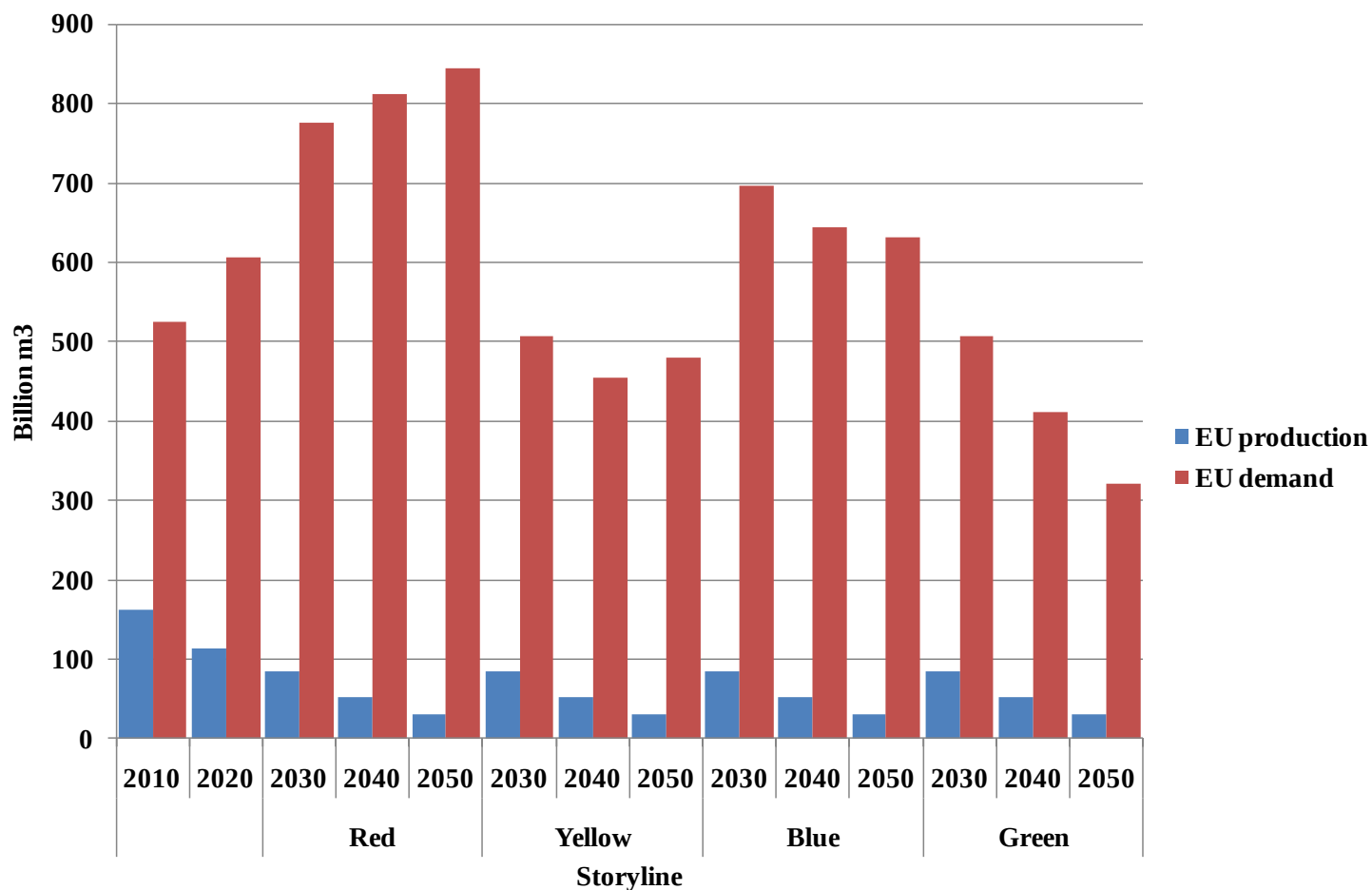
Power sector is main driver across storylines



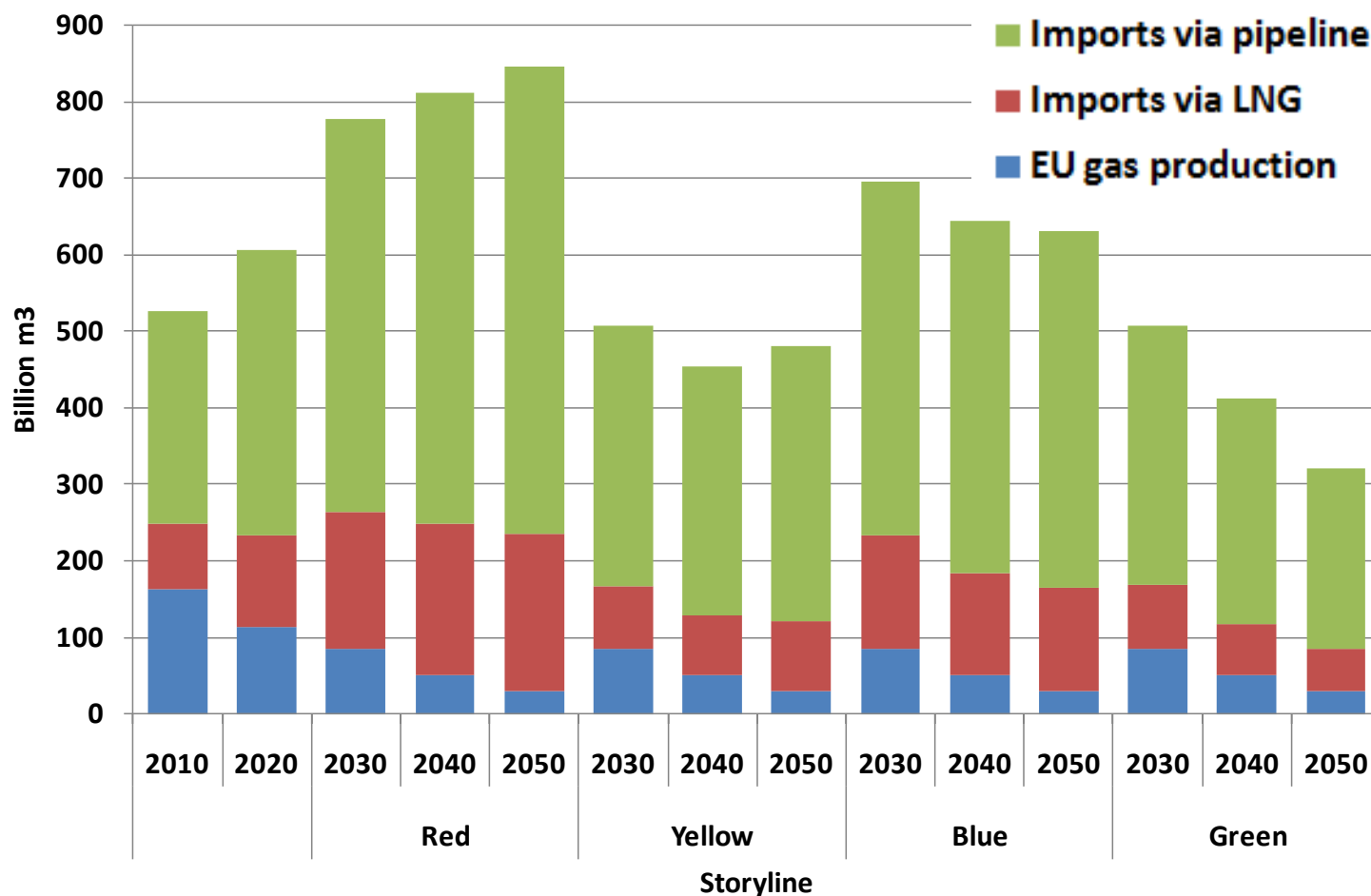
Gas demand Change between 2010 - 2050 (in billion m³)



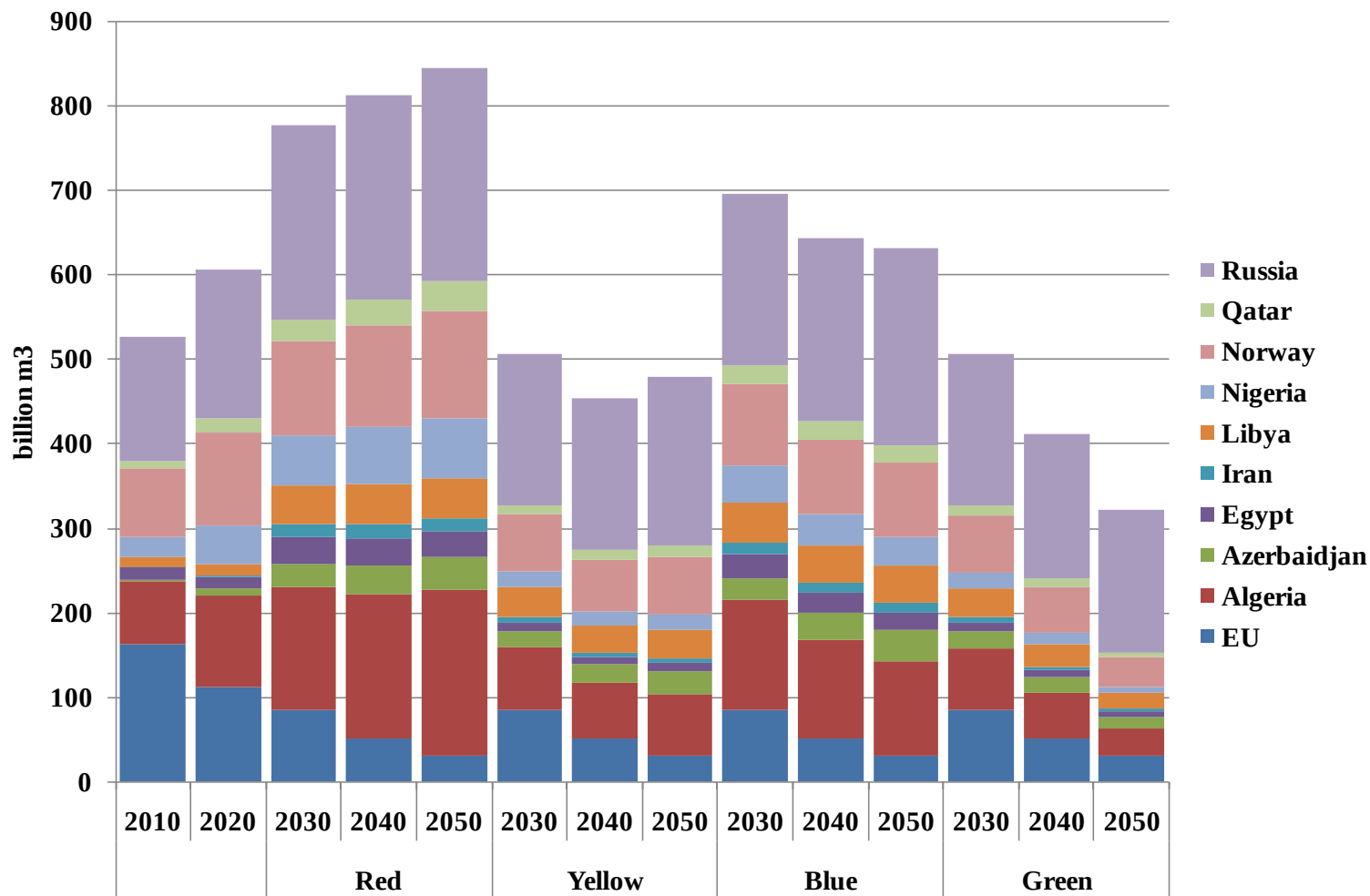
EU import gap across storylines



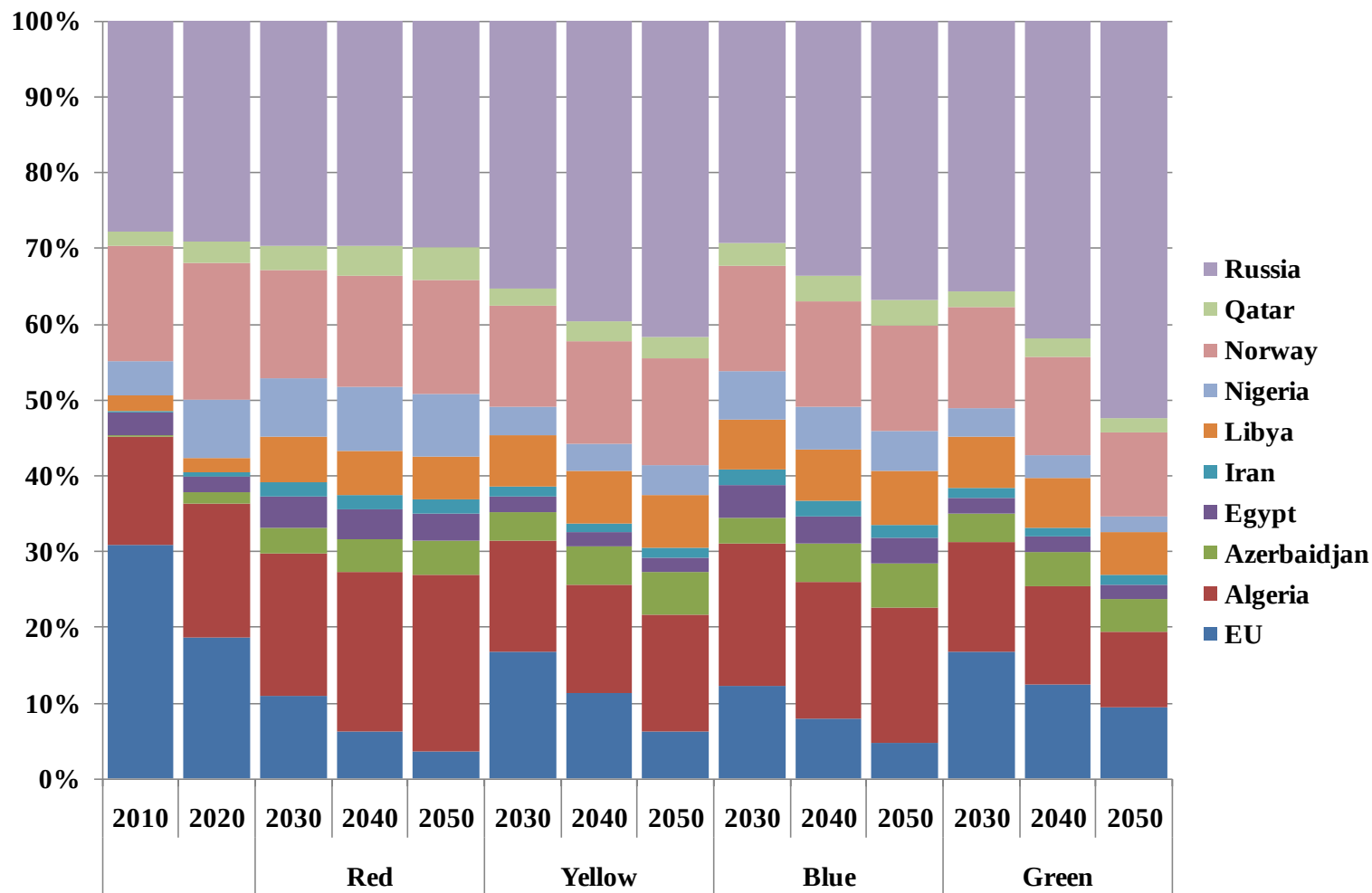
How does the EU fill this import gap?



Import dependency and gas supply mix (bcm)



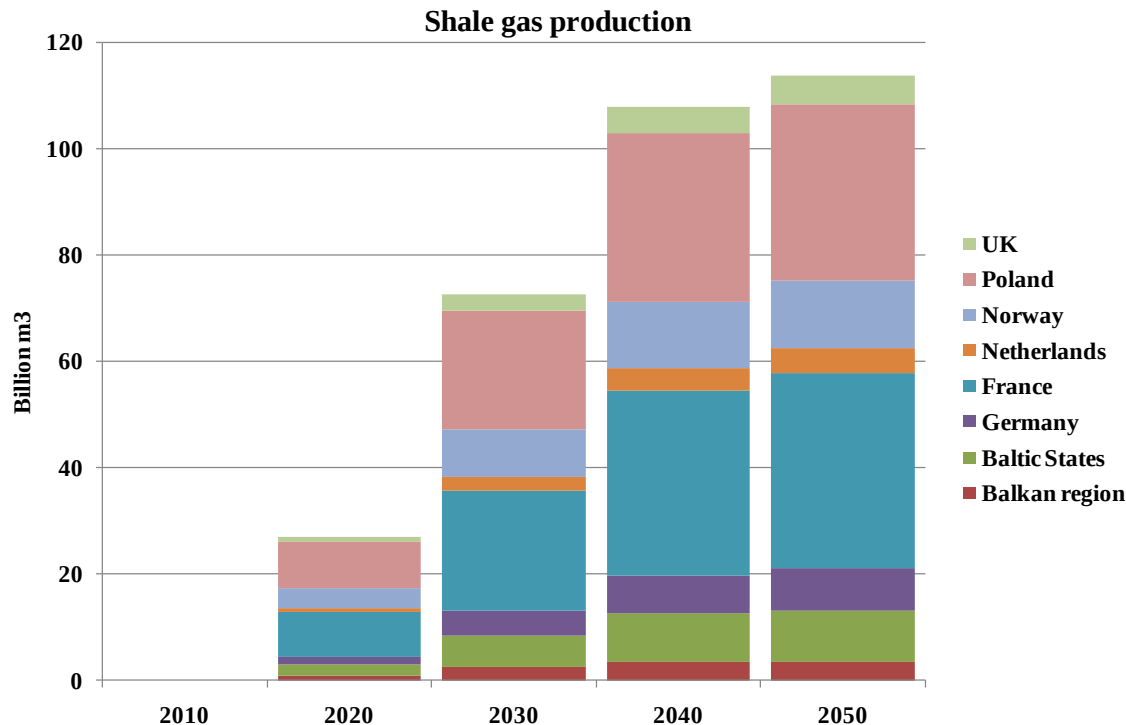
Import dependency and gas supply mix (%)



What are possible implications of shale gas developments across Europe?

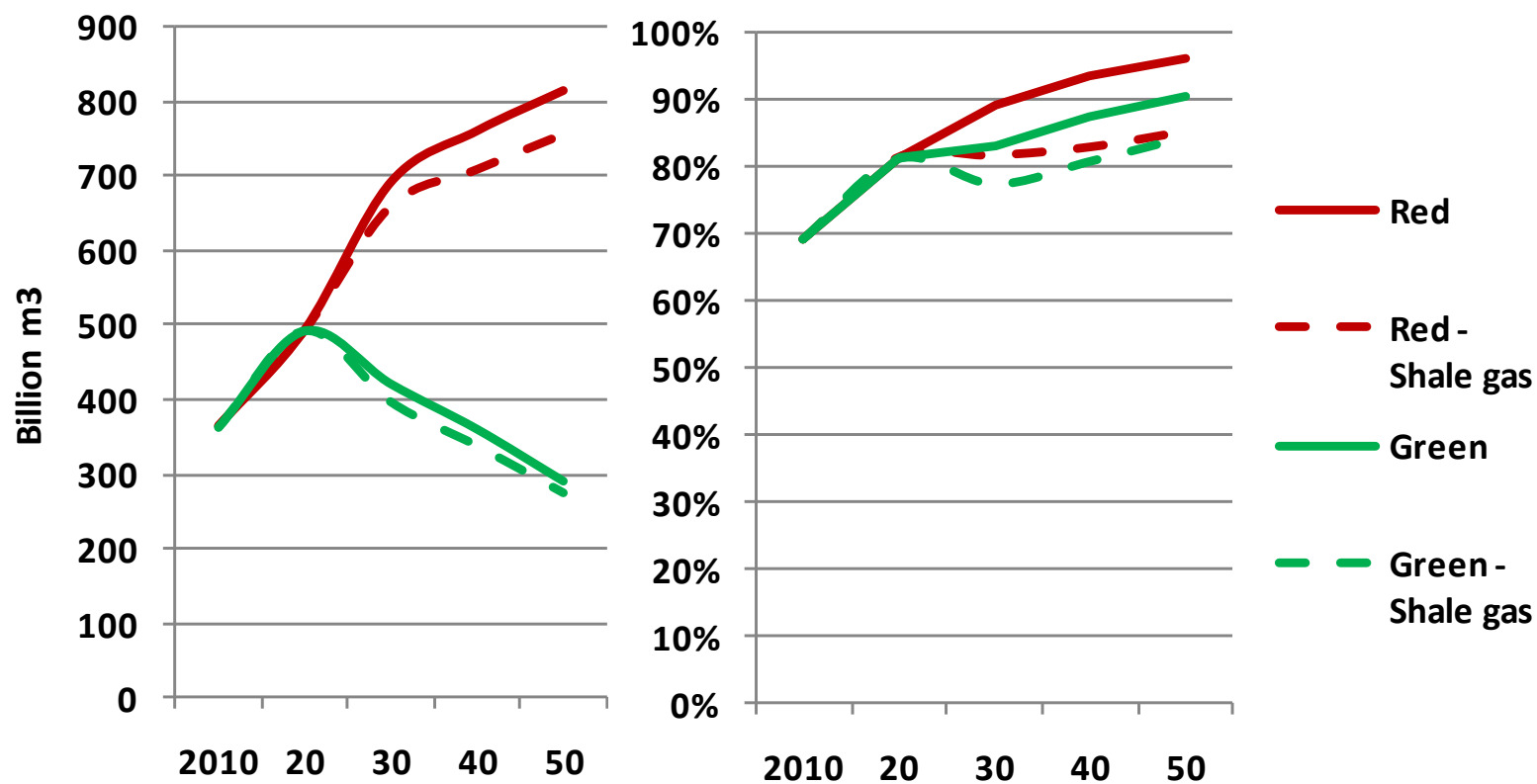
- Unconventional gas provides for more abundant (local) resources
- Downward pressure on prices:
 - Gas less scarce, lower gas prices
 - Less security of supply concerns (due to geographical spread of unconventional resources)
- Substitution of EU external supplies with (new) local supplies?

Role for shale gas?



- Assumptions:
- Production capacity:
 - 2020: 28 billion m³
 - 2030: 99 bcm billion m³
- Cost: 8 – 12 €-ct / m³
- ‘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 CO₂ 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>

Acknowledgement

This research has been financed by a grant of the Energy Delta Gas Research (EDGaR) program. EDGaR is co-financed by the Northern Netherlands Provinces, the European Fund for Regional Development, the Ministry of Economic Affairs and the Province of Groningen.

Thank you for your attention

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