Impact of new interconnection lines on the EU electricity market

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Motivation

1. EU binding targets:
   - 27% of renewables by 2030
   - GHG emissions in 2030 40% below 1990 levels
2. Political choice to subsidise generation from renewable energy sources (RES)

1. New questions about how to accommodate RES:
   - Storage capacity expansion
   - Transmission network and interconnection expansion
2. Understand who is affected by these expansions/investments

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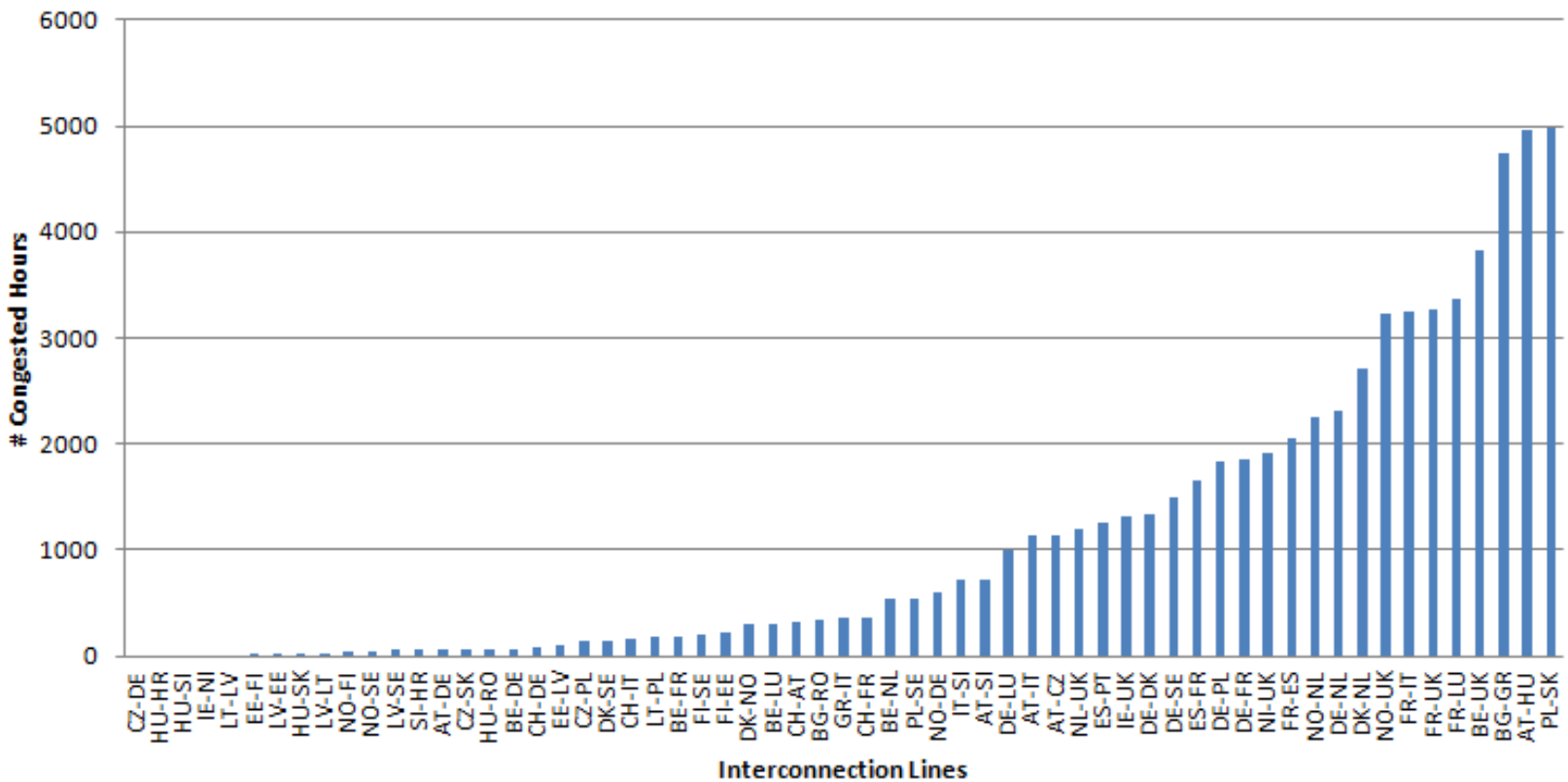
Choice of proposed line expansions:

Figure: Hours of congestion per year, all lines



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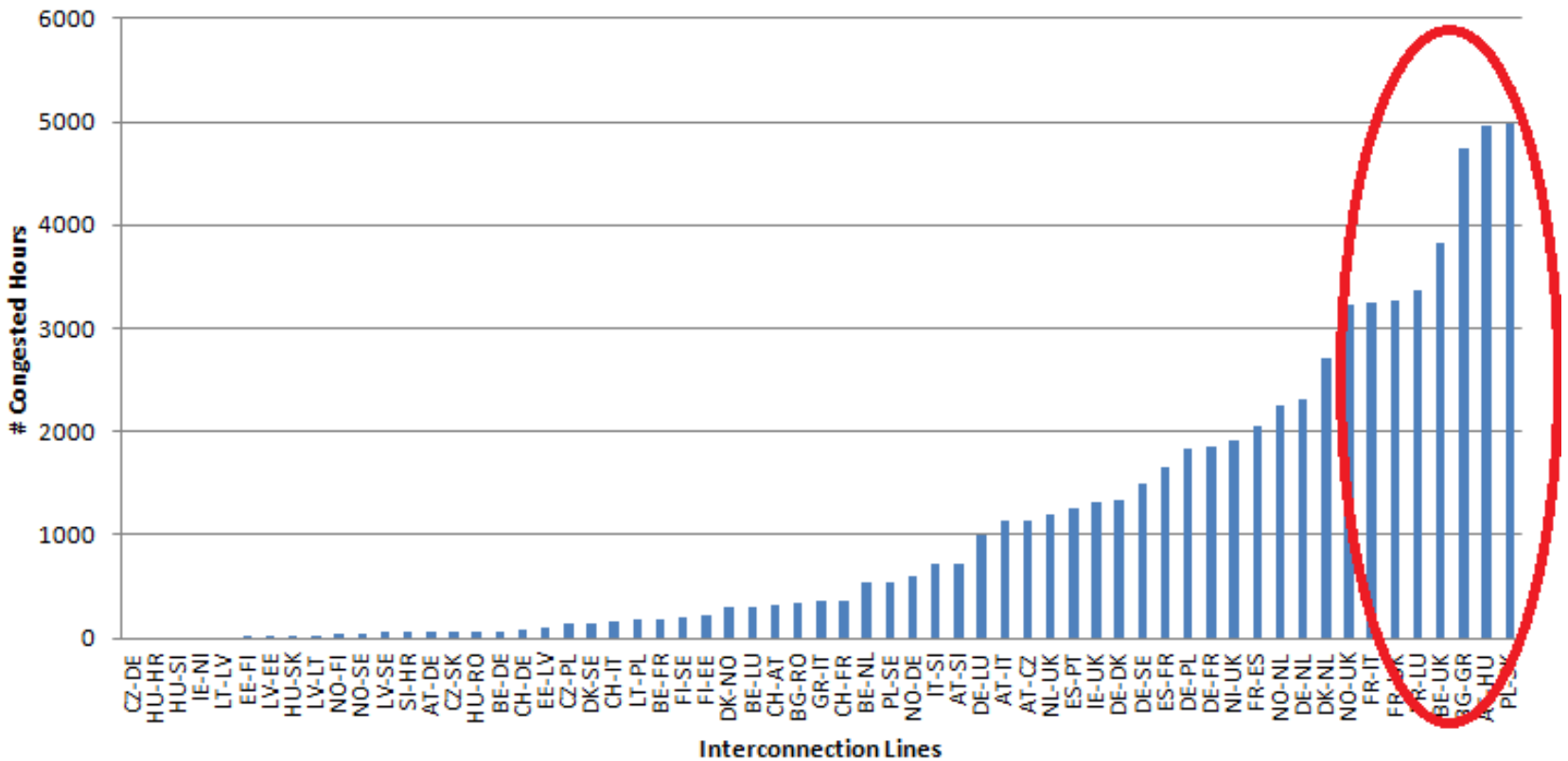
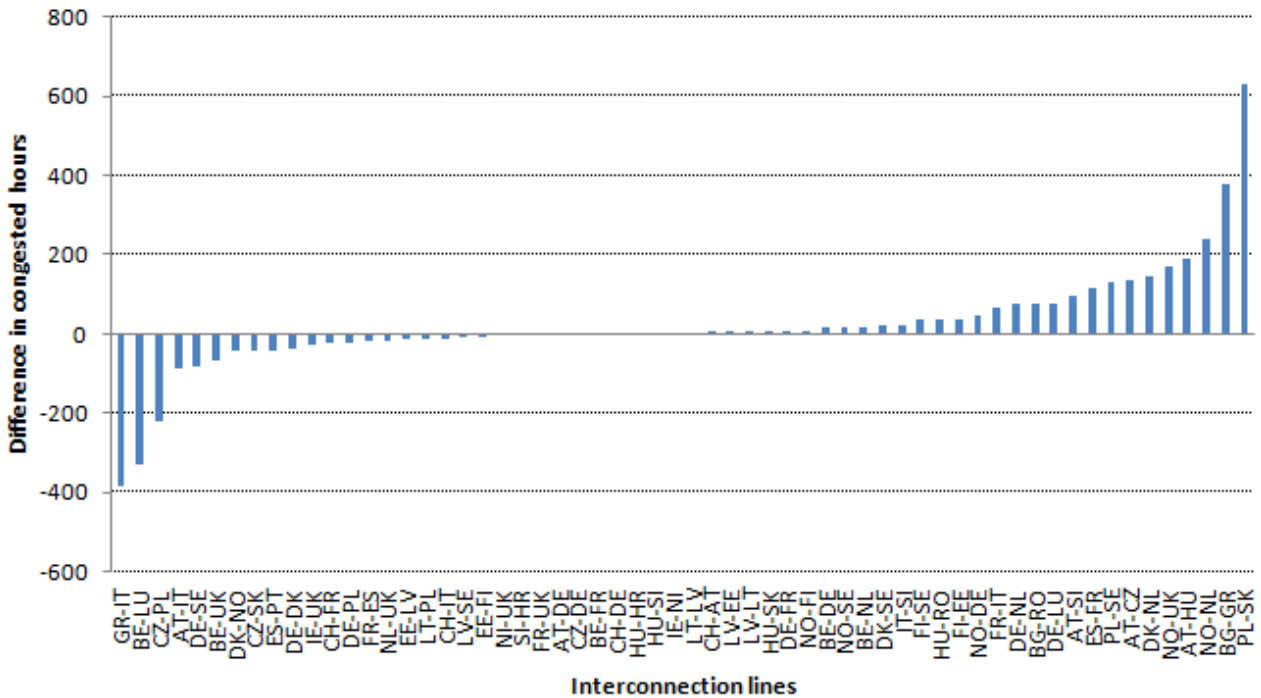


Interconnection

- Optimal expansion planning (beyond TYNDP): Interconnection upgrade between Greece and Bulgaria
- New interconnection capacity installed: 1800MW

Figure: Difference in congested hours: baseline vs new investment



Main results

- EU **prices** go down from 88 to 87 €/MWh
- EU **profits** for generators go down from 203 to 202 Billion €
  - Profits of thermal generators decrease by 0.8%, profits of RES generators decrease by 0.5%
- Profits of **IC** owners per MW go down by 147 M€
- EU **emissions** go up by 0.35%

Welfare analysis/1

Table: Welfare analysis, Bulgaria and Greece, M€

	Bulgaria	Greece	Interconnector
Consumers	250	349	
Producers	- 199	- 325	
IC owner			46
SUM	**51.22**	**23.61**	**46.00**
IC costs (annualised)			-13
Net Welfare+costs	51.22	23.61	33.00

Welfare analysis /2

Table: Welfare analysis, Europe, M€

Consumers	3,088
Producers	- 2,403
IC profits	- 1
Net welfare	**683**
IC costs (annualised)	-13
Welfare + IC costs	**670**

Emission costs will go up by **119 M€**, these are included in the producers' profits

Conclusion

1. Interconnection expansion enables net welfare gains
2. Limited need for investment in interconnection beyond TYNDP
3. Interconnection does not necessarily decrease system emissions
4. Hypotheses are crucial: high gas prices drive generation from old and inefficient lignite and hard coal plants (despite high carbon prices)
5. Challenge: Who will invest?

Next steps:

- Impact of storage
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