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Baltic Gas Supply Security Policy: Cost and Political Choices

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E·S·R·C ECONOMIC & SOCIAL RESEARCH COUNCIL

Main messages

1. Baltic States have low levels of gas supply security
2. LNG is the only credible ‘full security’ option (and strategic storage for Latvia)
3. Pan-Baltic LNG is (somewhat) cheaper, but raises serious political issues
4. National LNG terminals mean ~10% security tax on gas
5. Backing-up heat generation offers a highly flexible option to ‘buy’ cheaper, partial gas supply security

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1. Baltic gas situation
2. Baltic gas security situation
3. What can be done? How much it costs?
    a. Gas security infrastructure
    b. National or pan-Baltic?
4. Widening the choice: backing up heat generation
5. Conclusions

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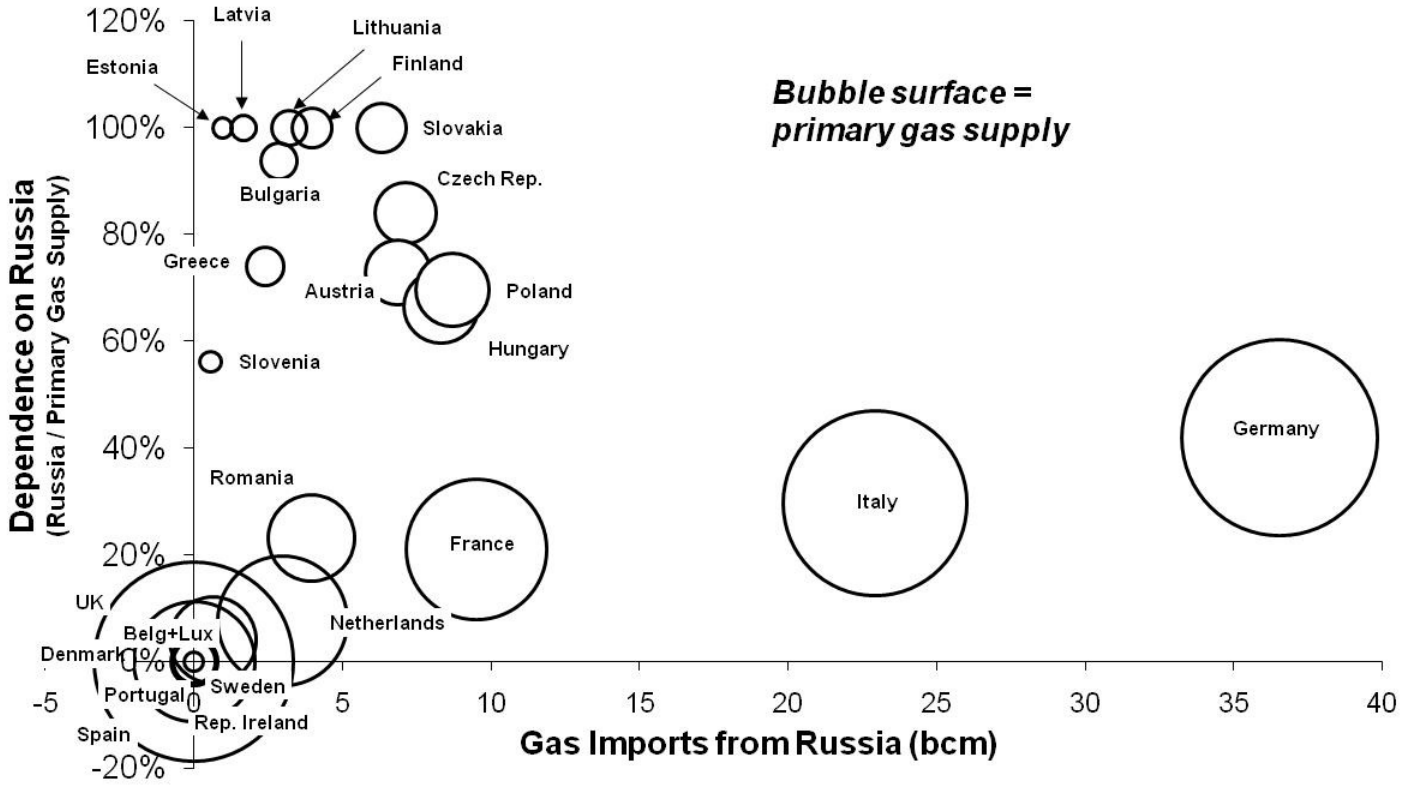
Russian gas in Europe



Data source: BP Statistical Review; Eurostat; National Statistics -- 2008 data

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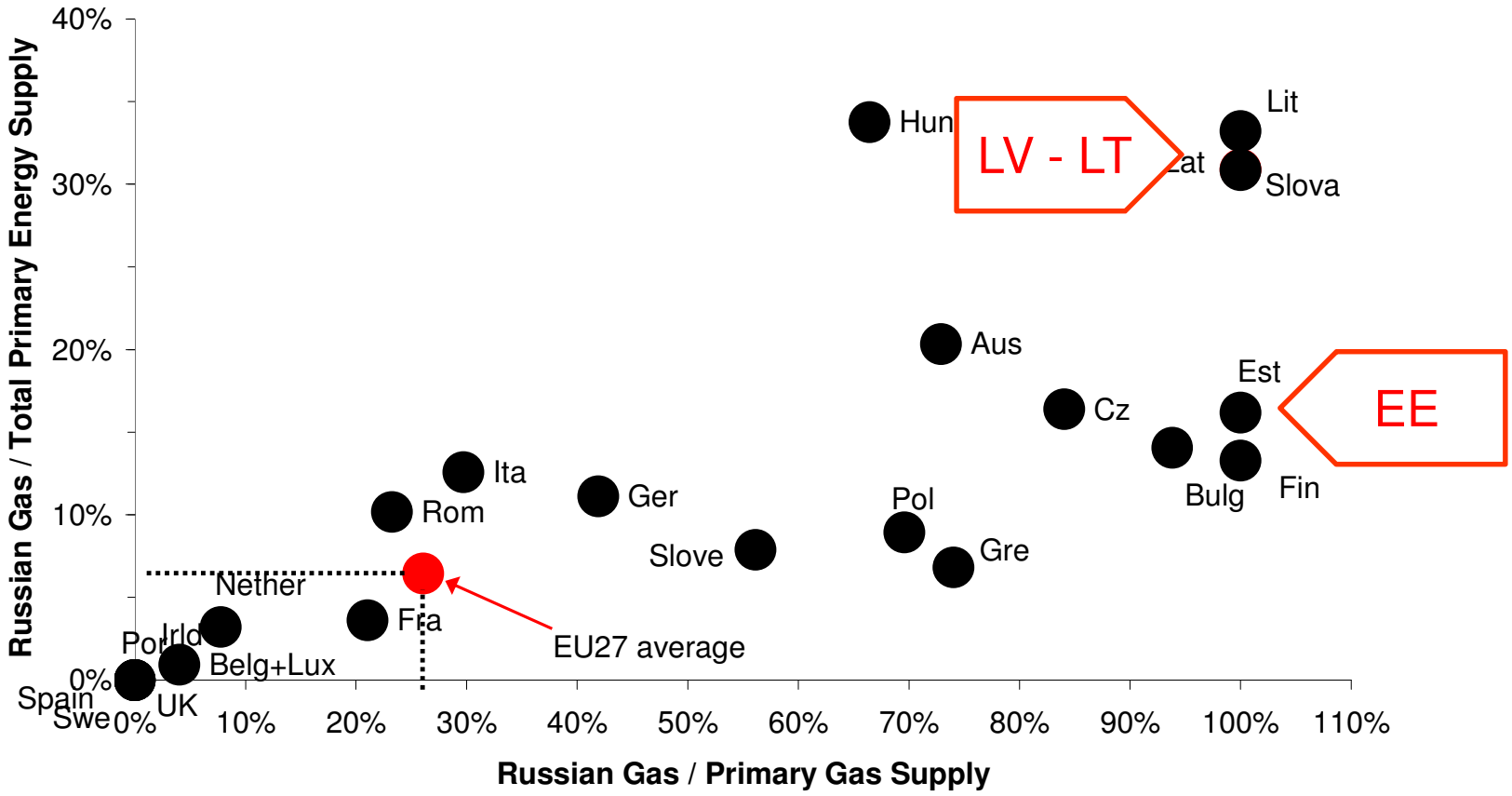
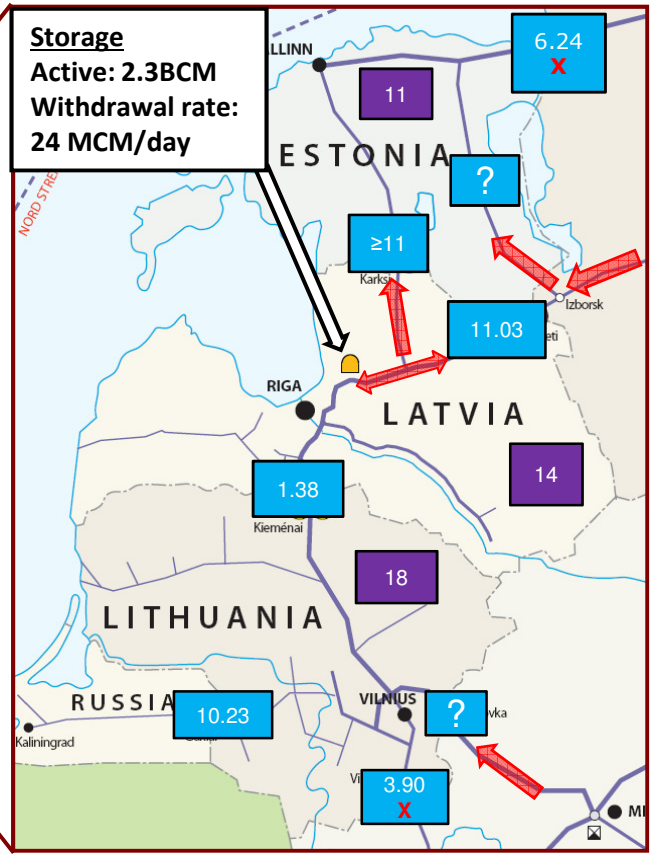
Russia-dependent Europe



Source: National statistics; BP Statistical Review of World Energy 2009

The Baltic States

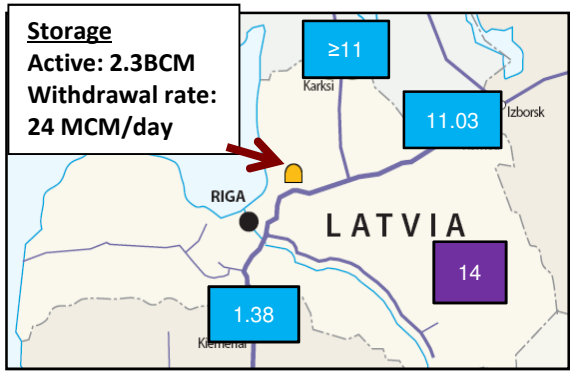


Source: Gas Transmission Europe

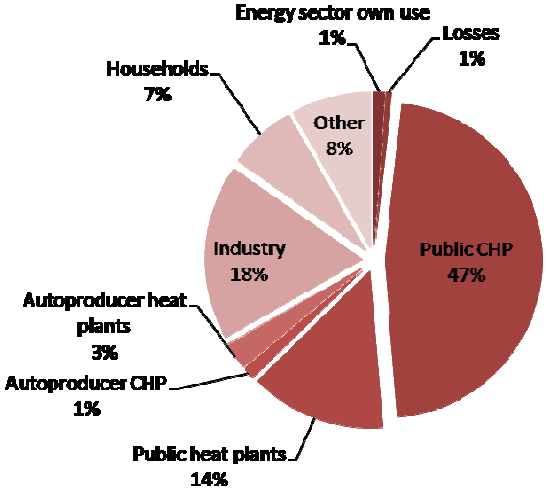
Baltic Gas Systems and Markets

Annual: 1.7 BCM/year (0.17bcf/d)
Peak: 14 MCM/day
Gas Source: Gazprom

Transmission Network:

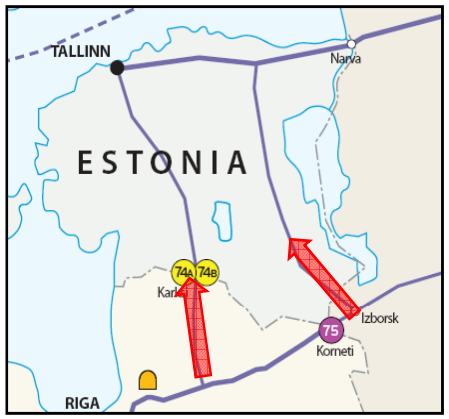


Structure of consumption:



Annual: 1.003 BCM/year (0.1bcf/d)
Peak: 11 MCM/day
Gas source: Gazprom

Transmission Network:



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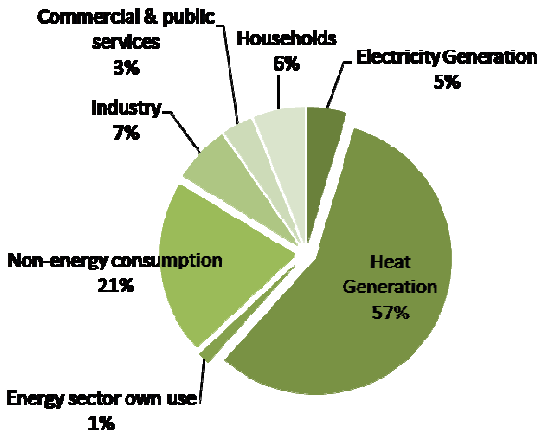
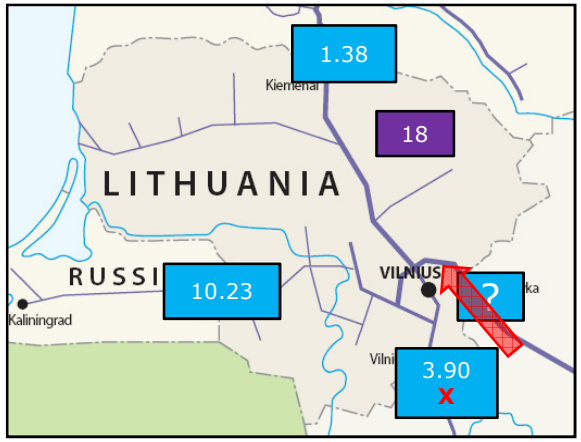


Annual: 3.77 BCM/year (0.4bcf/d)
Peak: 18 MCM/day
Gas source: Gazprom

Transmission Network:



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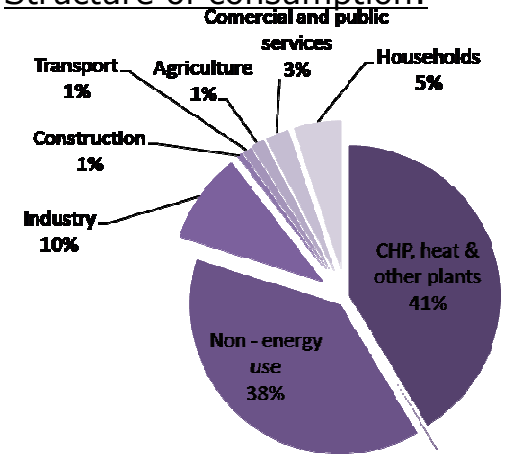

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What is gas supply security?

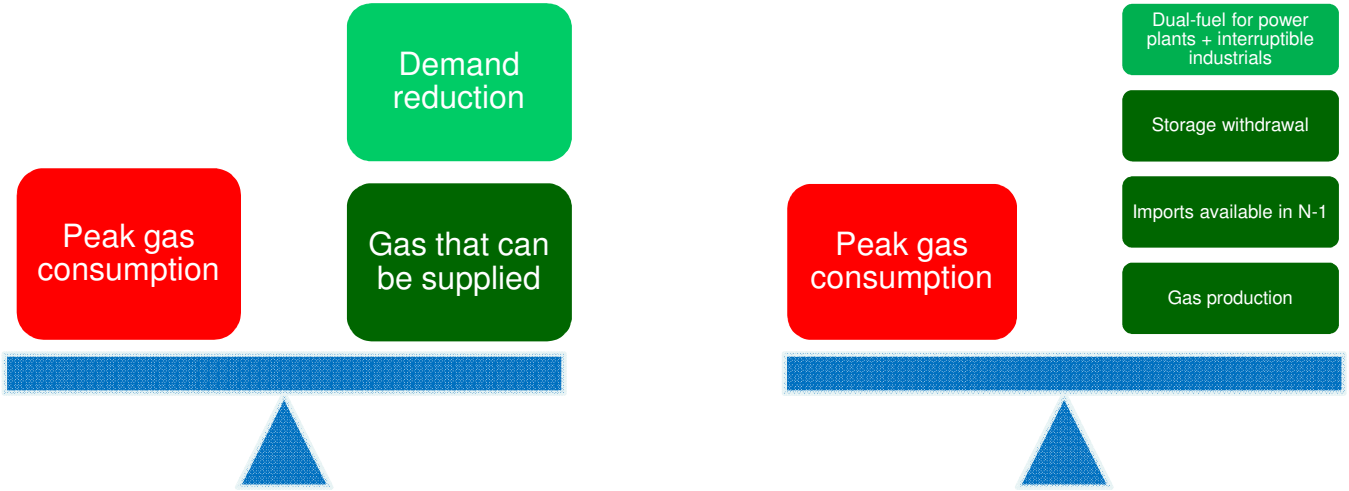
- ‘Gas supply security’ refers to the ability of the energy system to meet contracted final energy demand under a gas supply disruption.

- Concretely, in Russia-dependent Europe:

  What happens if supplies of Russian gas are lost on a peak consumption day?

Measuring gas supply security

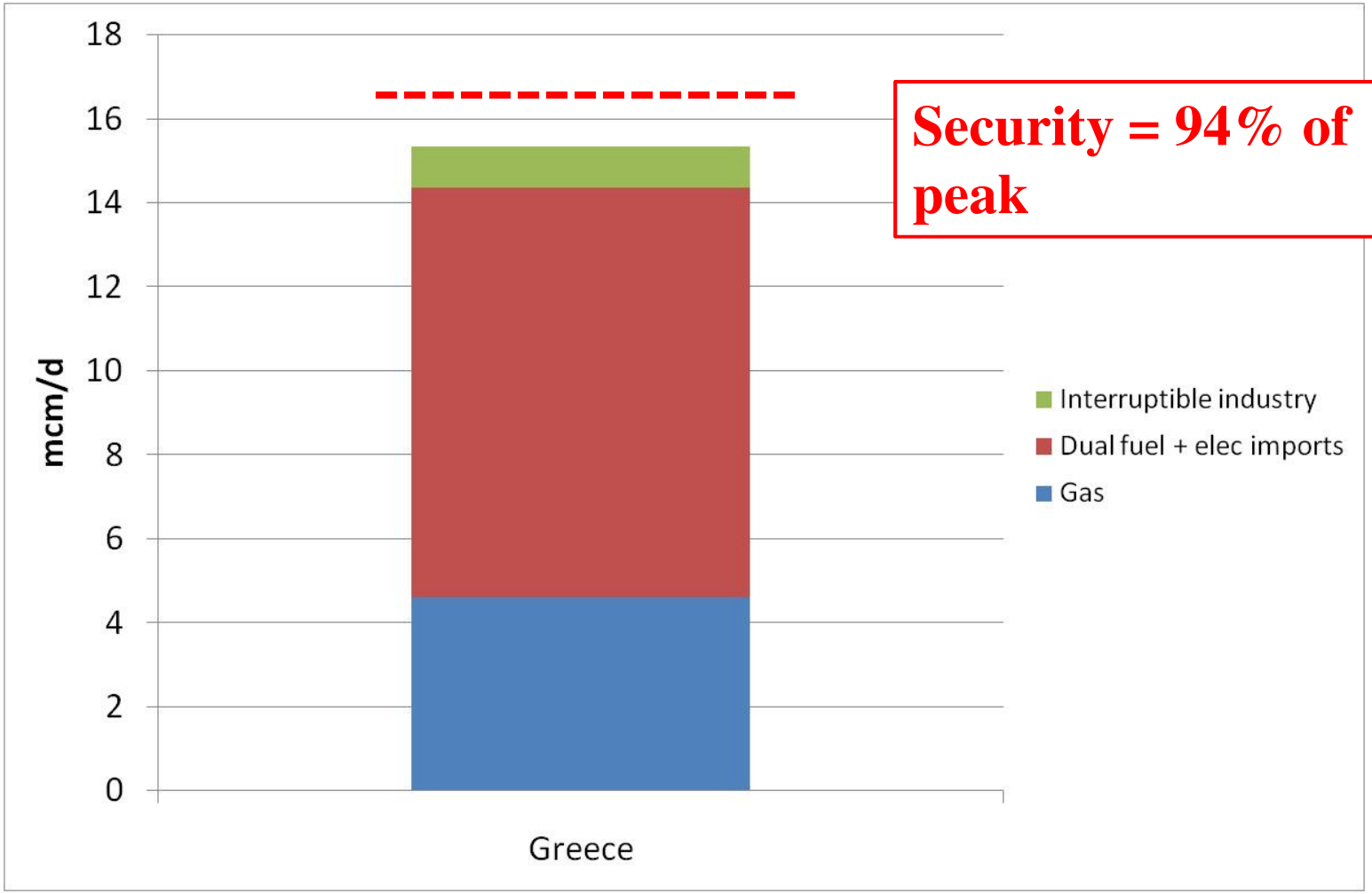
- Gas Supply Balance when Russian Gas not Available



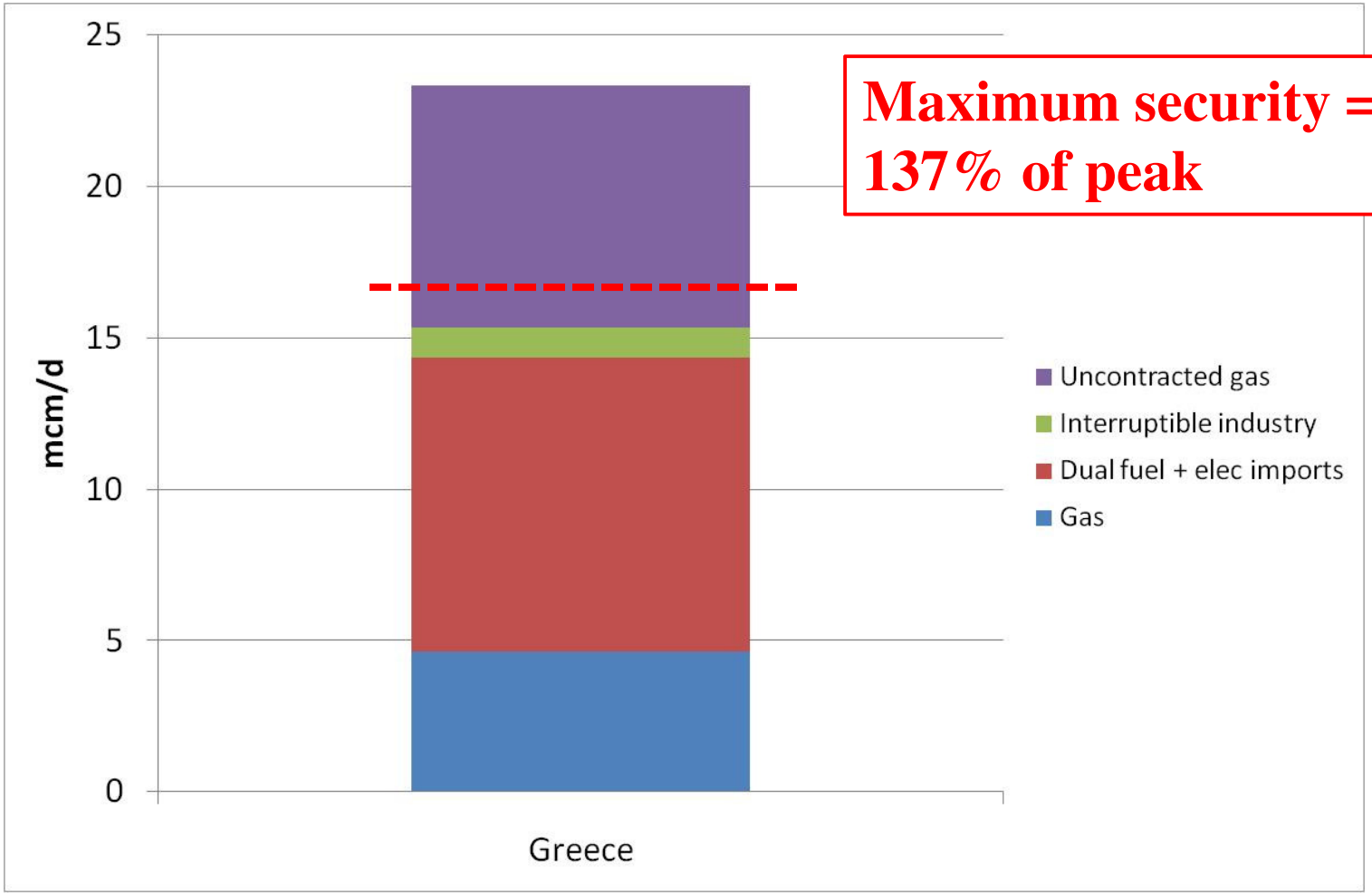
- Gas Supply Security Indicator – 1st Day of Total Disruption

GSS =  +  as % of 

Example: Greece in 'N-1'



Greece in 'N-1'



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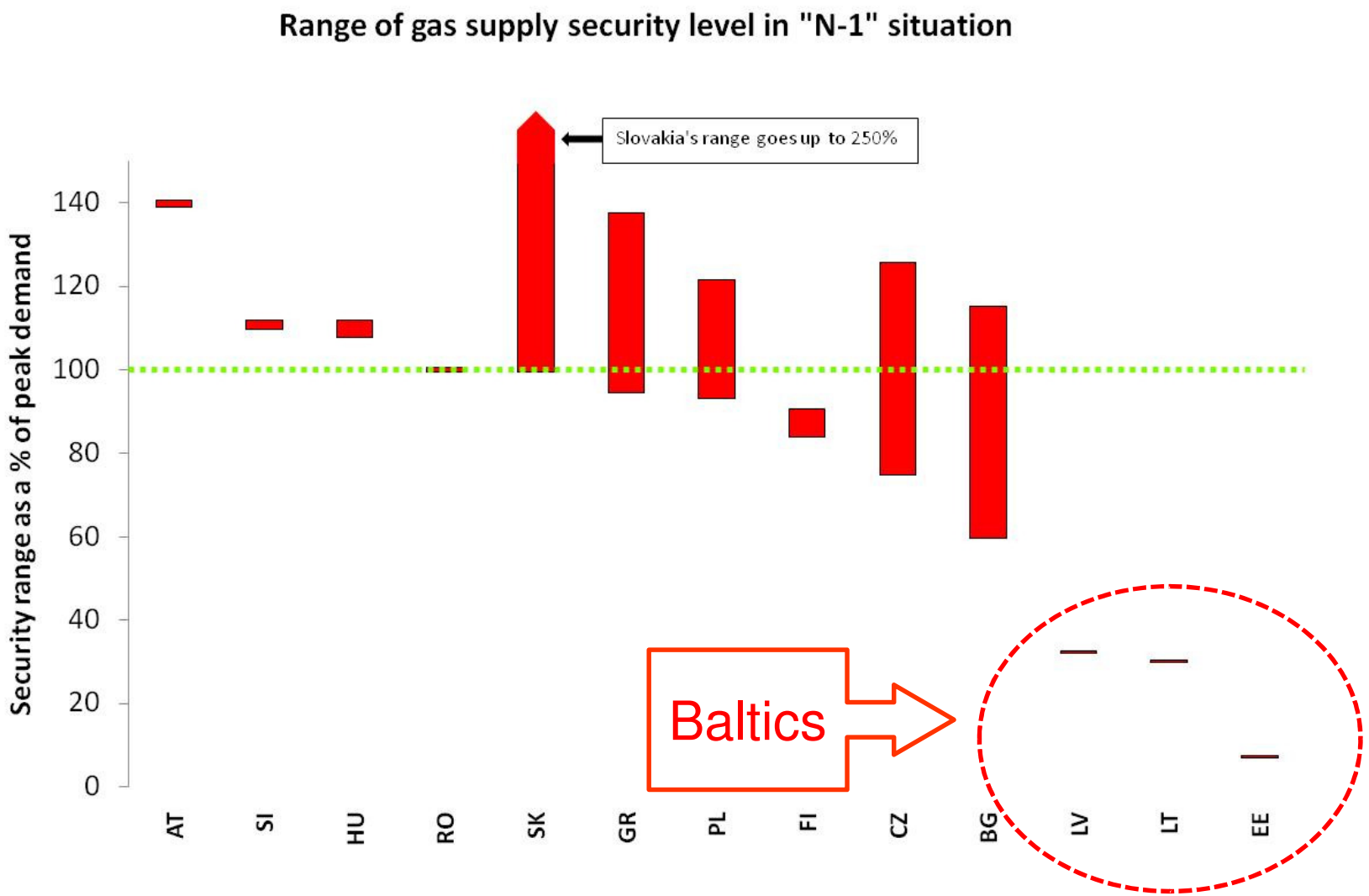
Gas security indicator – Results



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Gas security infrastructure

- ‘Strategic’ national LNG terminals
  - Including one week peak consumption stored at terminal
- Strategic underground storage facilities (UGS)
  - Only credible for Latvia -- for EE and LT the facility would have to be in LV – not ‘national’
- Pipeline to Poland; gas would be sourced from
  - Planned Polish LNG terminal
  - Planned additional storage capacity
  - Possible ability to ship from Western Europe through Yamal-Europe
  - *All three are speculative*
- Pan-Baltic infrastructure
  - LNG terminal + pipeline to Lithuania (LV-EE existing)
  - UGS in Latvia + pipeline to Lithuania (LV-EE existing)

Financial Variables

- Security only investment – like buying insurance
  - No revenues from infrastructure
- 100% debt financed; guaranteed by government
- Amortisation period: 20 years
- Lifetime of infrastructure: 30 years
- Cost of capital / rate of return / discount rate
  - Gvt 10yr bond rate + risk premium
  - Average of 3 countries for ‘pan Baltic’ infrastructure

LNG as a gas security measure

- Size of storage tanks
  - 7 days of peak demand permanently stored – waiting for 1st cargo
  - Formulas for economies of scale and scope
  - Total Capex = 3 times storage tanks Capex
- Cost of Capital
  - Cost of money on Capex
  - Opportunity cost of capital on gas in storage tanks
- Annual Opex = 4% of total Capex
- During a disruption
  - Price of gas = spot Zeebrugge + $1/Mbtu + shipping

Pipelines as a gas security measure

- Capital expenditure
  - Length (in km) times € / km (range obtained from industry)
  - Compressor stations (cost obtained from industry)
- Cost of capital
- Operational expenditure
  - Maintenance of pipe and compressors (obtained from industry)
- During a crisis
  - Price of gas assumed equal to Russian contract price – debatable
- Not included
  - Cost of booking storage / LNG capacity in Poland

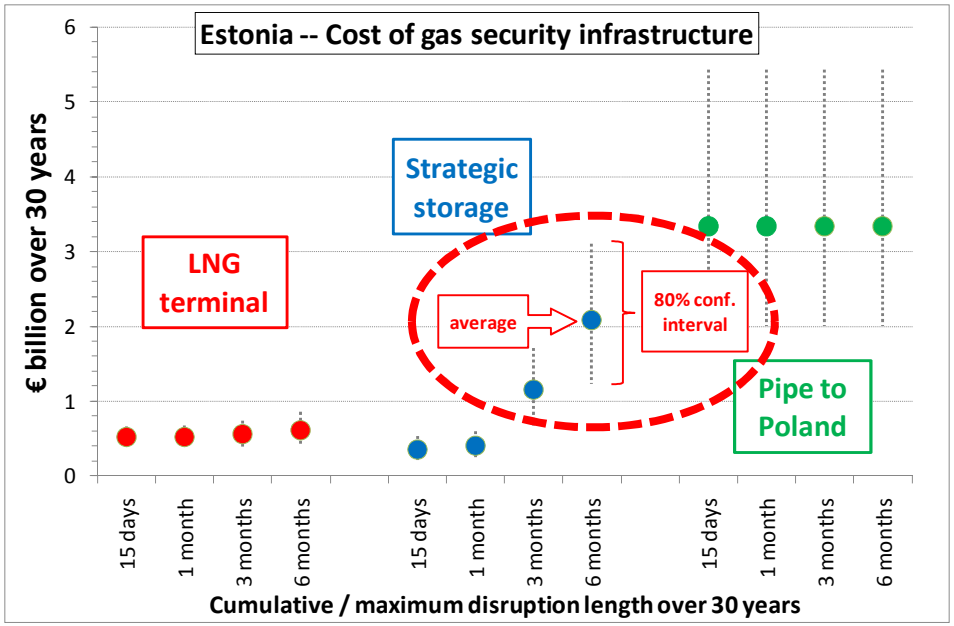
Strategic Underground Storage

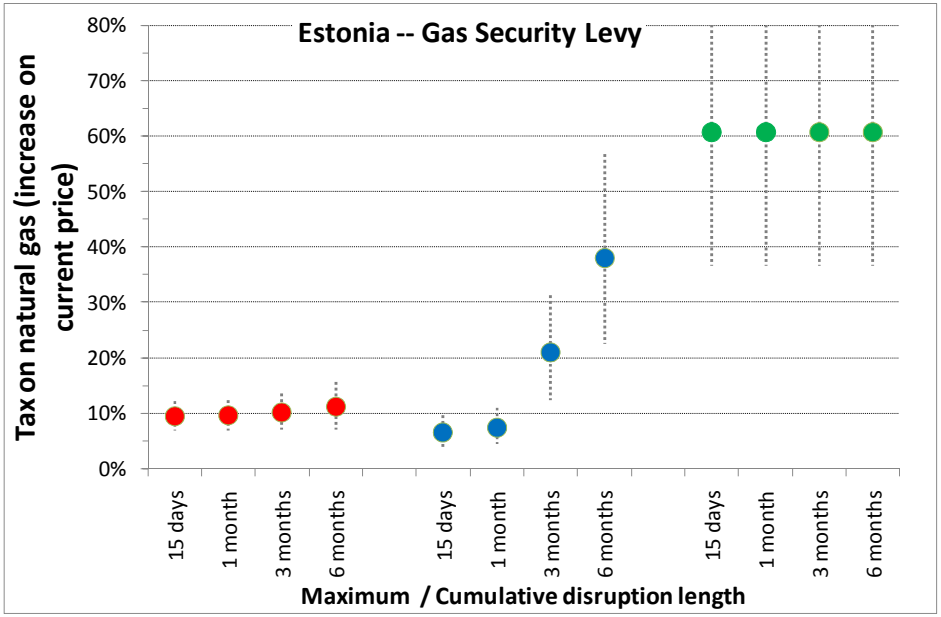
- Working volume
  - Country gas consumption during peak period
  - 15 peak days; peak month; peak period of 3 months
- Capital expenditure
  - 0.7€/m3 of working volume (for aquifers -- includes buying the gas)
- Cost of capital
  - Interest rate on Capex
  - Opportunity cost of capital on stored gas
- Operational expenditure
  - 3% of capex (industry figure)

Pan Baltic Security Infrastructure

- Risk correlation
  - Risks to EE & LV correlated, but risks to LT not correlated with EE + LV
  - Baltic LNG and UGS can be of smaller size than EE+LV+LT
- Baltic LNG: dimensioned for LT peak
  - 24 mcm/d larger than 14+8
- Baltic strategic storage: dimensioned for LV+EE demand
  - 3 months ‘peak’ supply to EE+LV larger than 1 month ‘peak’ for LT
- Baltic LNG and UGS located in LV, with 150km pipe to LT
  - Pipeline LV-EE already in place (and available in case of disruption)

Monte Carlo Simulations / Gas Security Levy





- Dealing with uncertainty
  - Monte Carlo simulations with all key variables
  - Average value and 80% confidence interval
- Gas Security Levy
  - Total cost divided by 30, divided by annual value of gas sales
  - Levy used to compare options across countries; pan-Baltic

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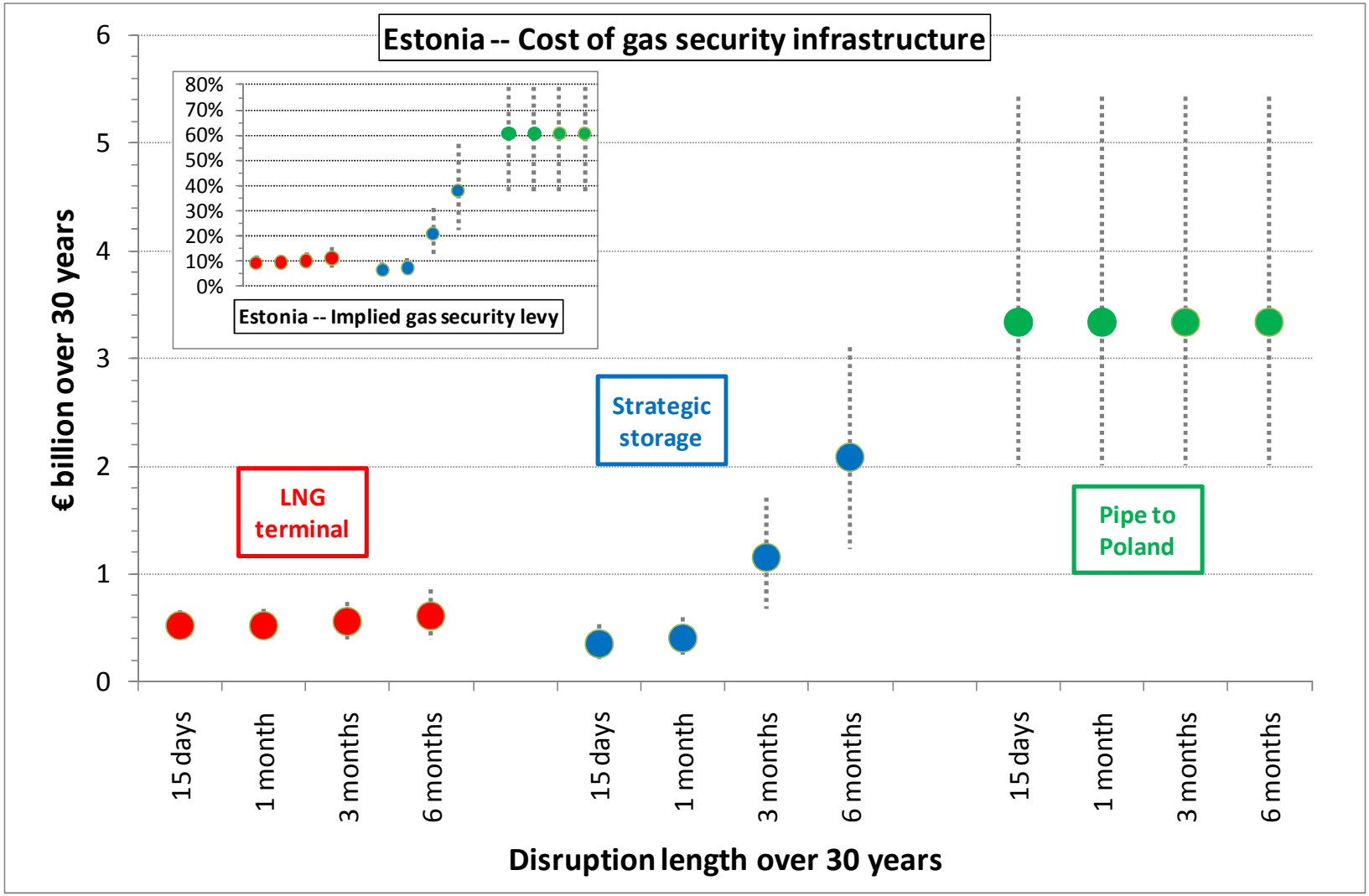
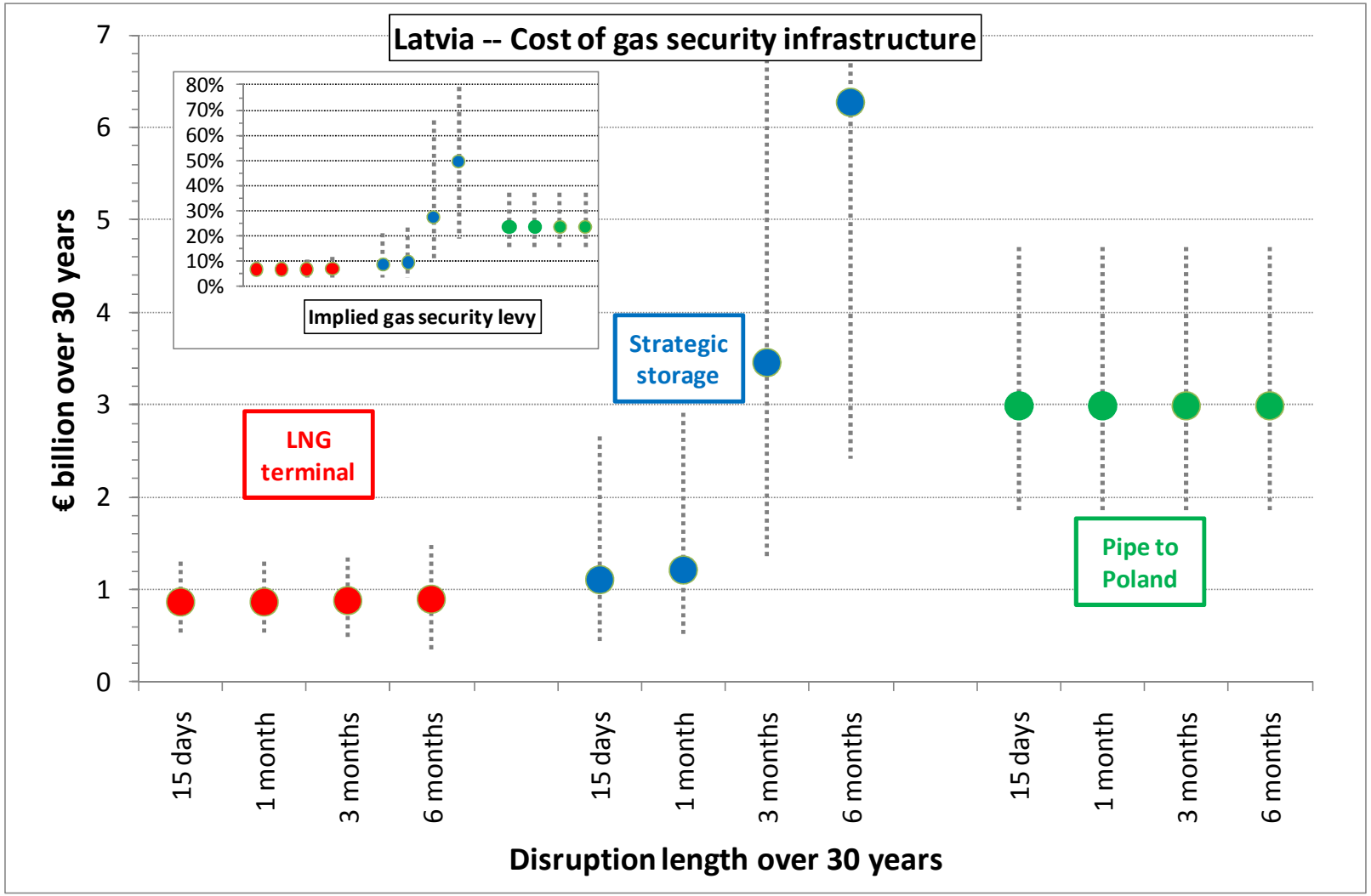
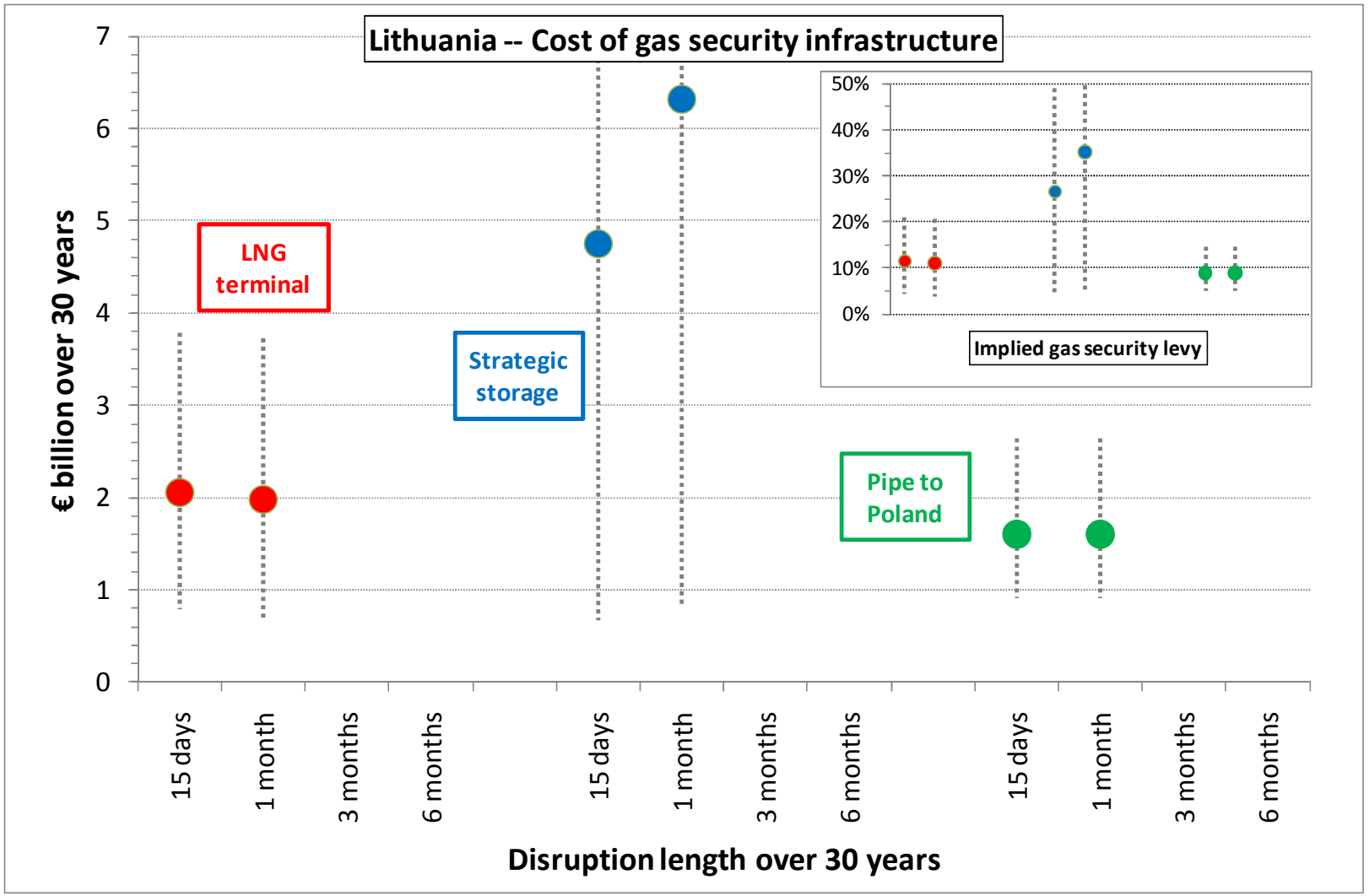
EE – cost of gas security infrastructure



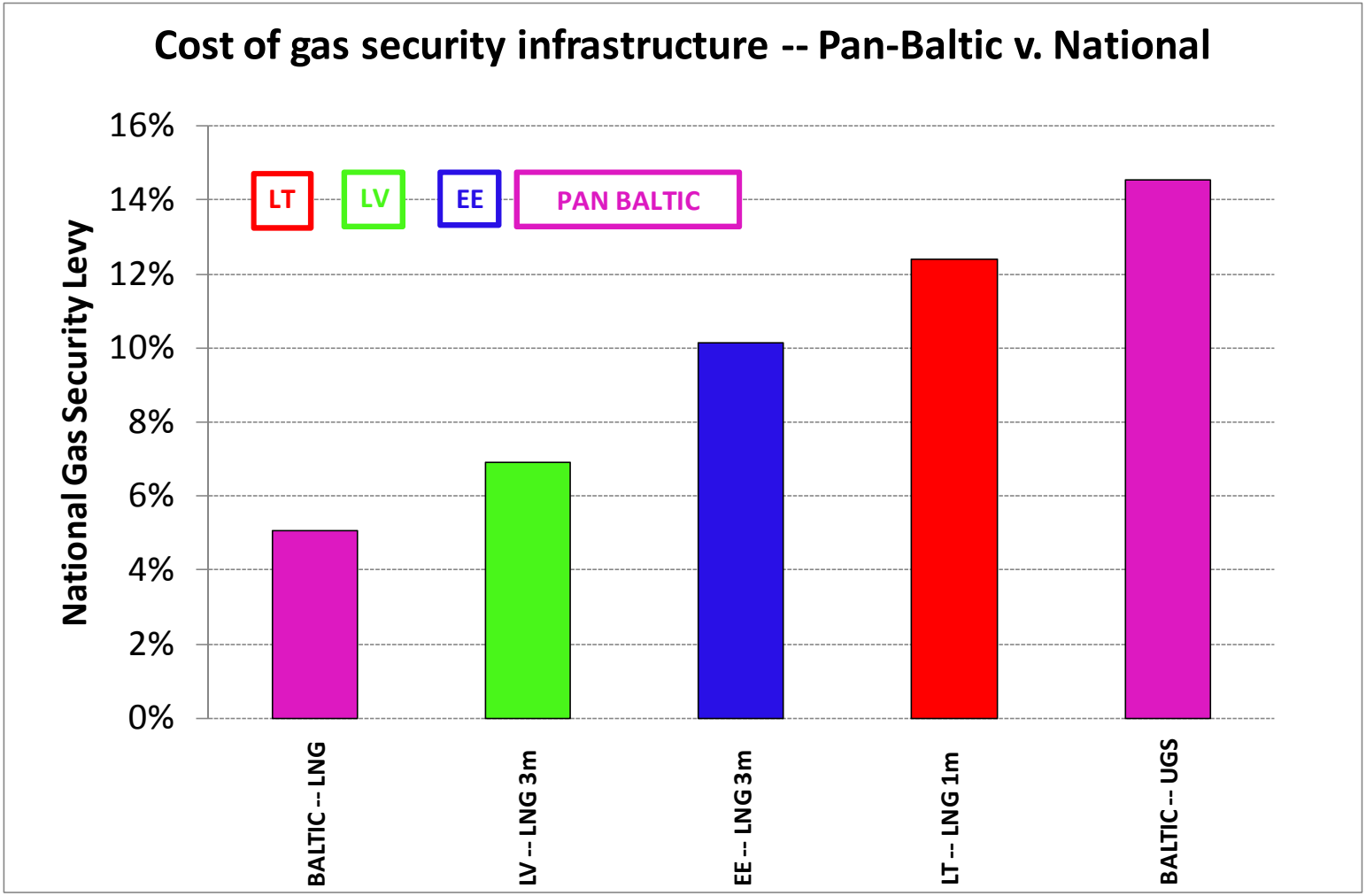
LV – cost of gas security infrastructure



LT – cost of gas security infrastructure



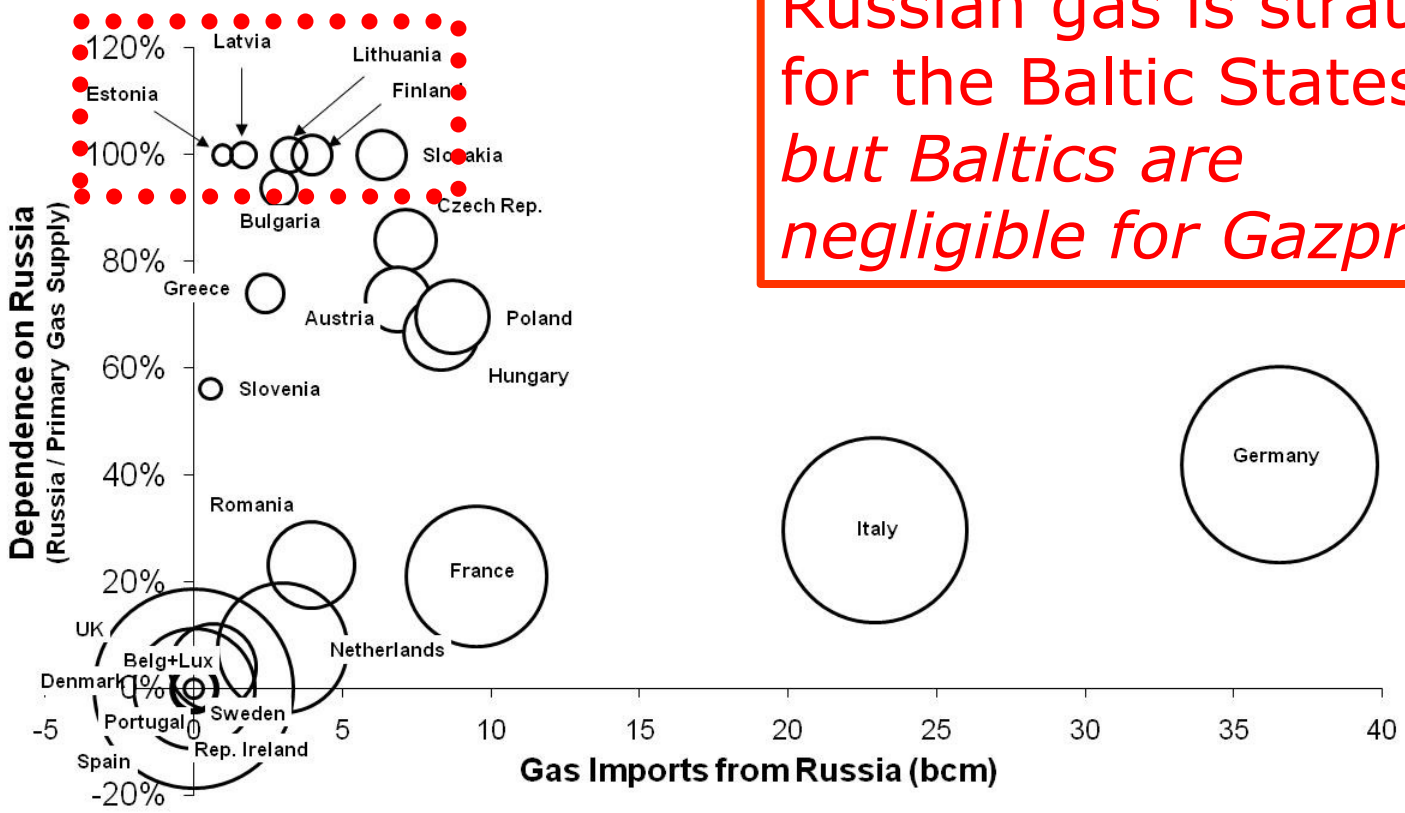
Pan-Baltic terminal is cheaper



Cheaper, but

- Beyond cost, political feasibility issues:
- Serious credibility issue for LT and EE (if terminal in LV)
- Supposes a single transmission system operator – at least a high level or co-operation between TSOs, regulators and governments
- The three Baltic gas companies are (de-facto) controlled by Gazprom – Would need radical reforms, hugely contentious, and politically very risky – especially (though not only) for Latvia
- Hard to see Latvia co-operating, at least until 2017

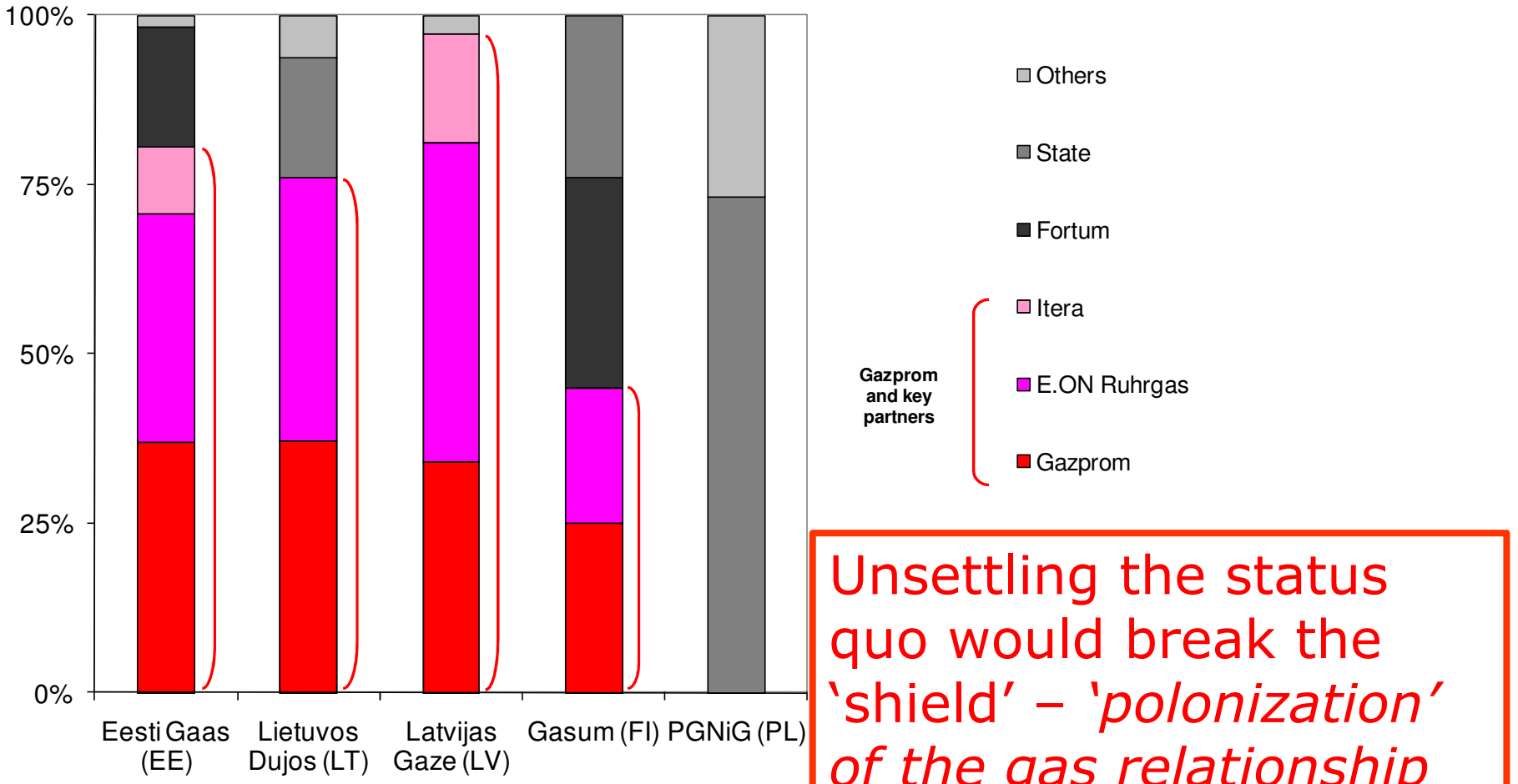
Asymmetric dependence



Russian gas is strategic for the Baltic States – *but Baltics are negligible for Gazprom*

Data source: BP Statistical Review; Eurostat; National Statistics -- 2008 data

Baltics 'shielded' by Gazprom's control



Unsettling the status quo would break the 'shield' – *'polonization' of the gas relationship*

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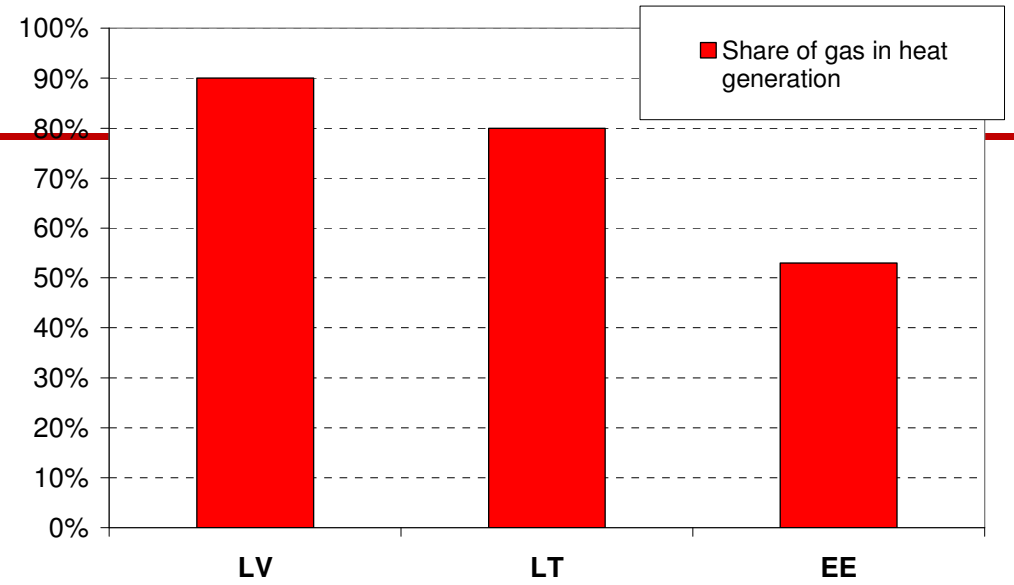
Widening the policy menu

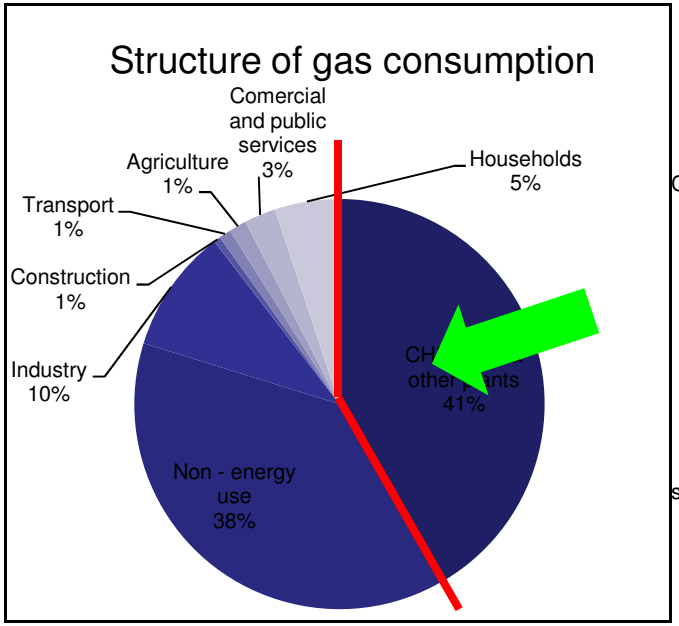
- Do not have to insure the full peak gas consumption
- Depending on risk-averseness/willingness to pay of society (or politicians), Baltics may go for partial gas security
- Insuring heat generation is the obvious candidate (see chart on next slide)
  - Can be implemented gradually
  - Can be dismantled quickly
- How much does it cost? How does it compare to strategic LNG terminals?

Heat generation ('pure', or in CHPs) is gas-dependent, and accounts for a large share of gas demand

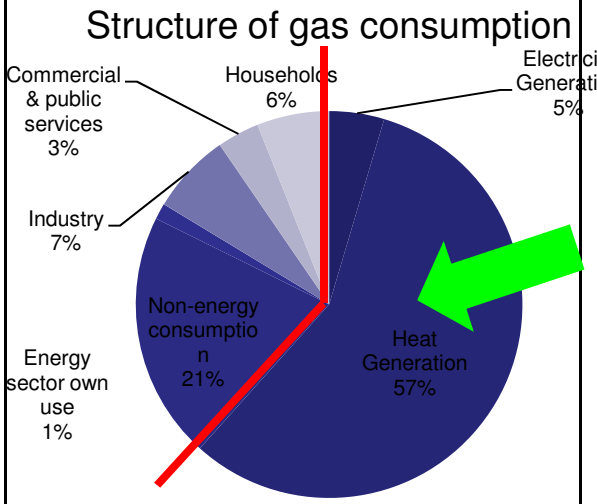


Source: National statistics

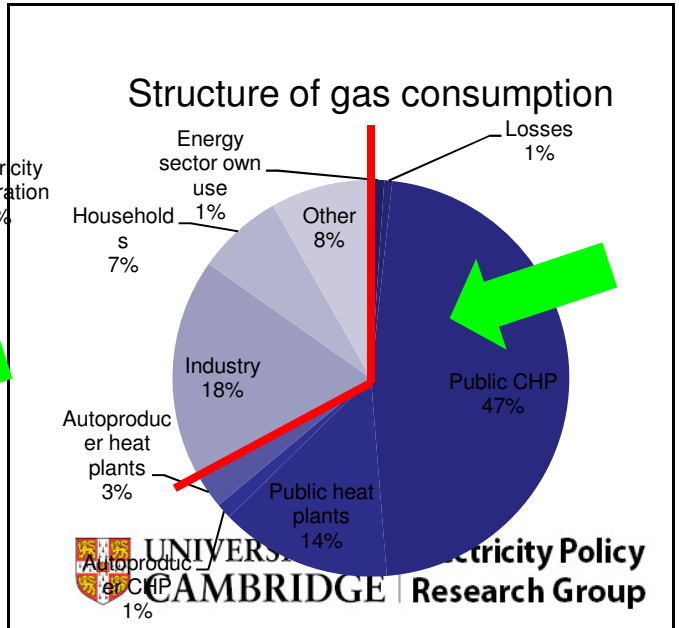
Lithuania



Estonia



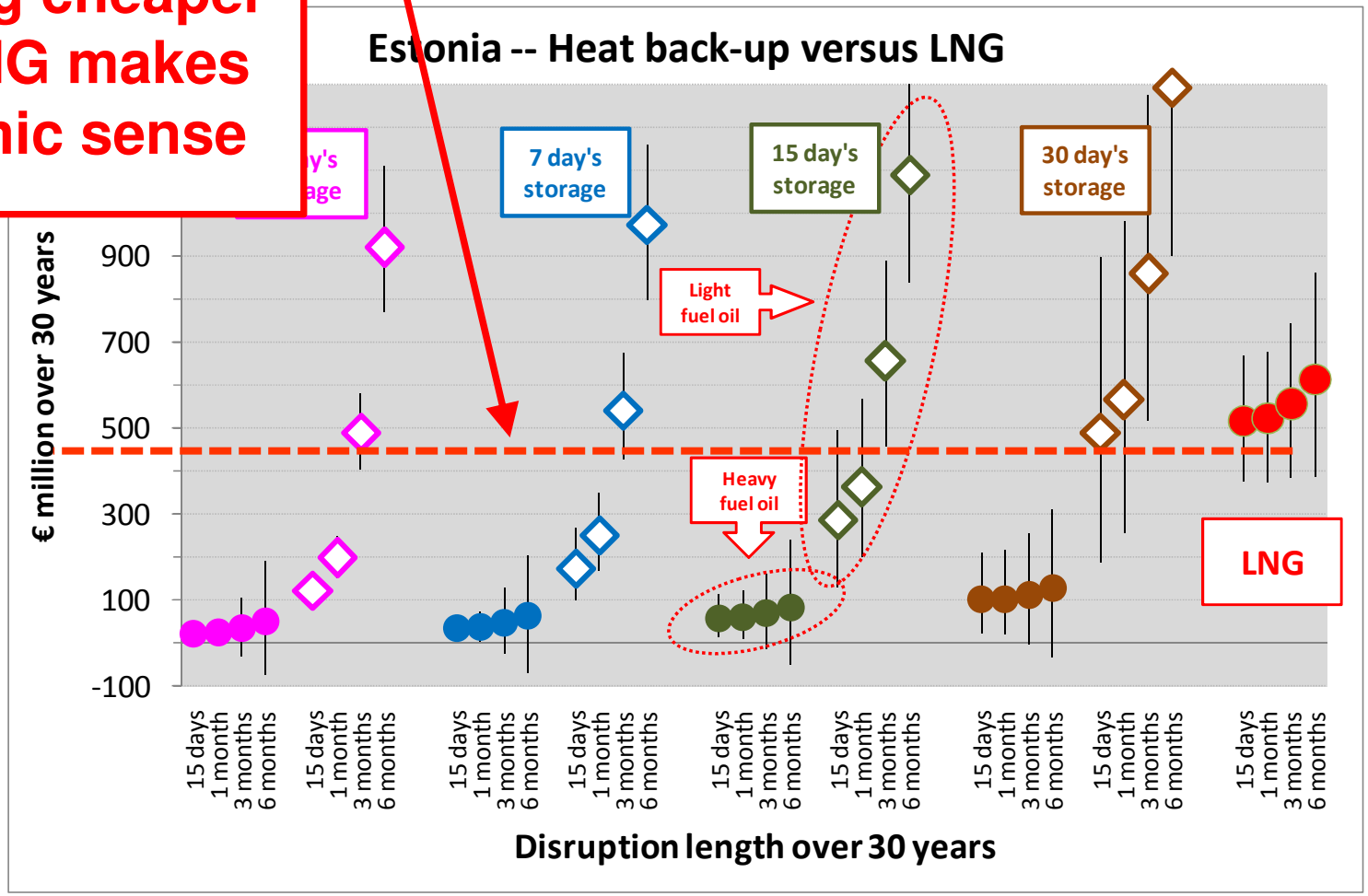
Latvia



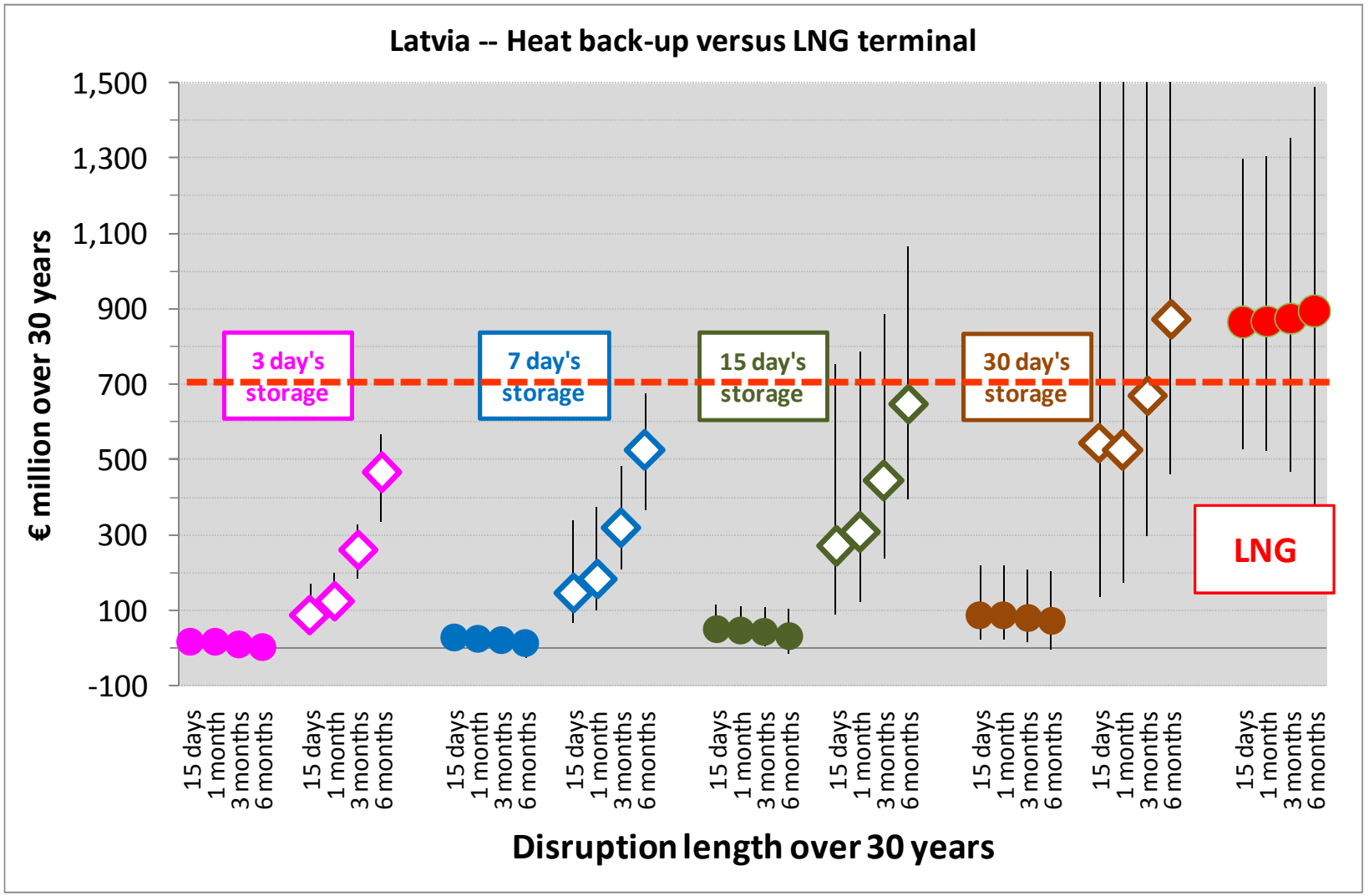
Sources: 2007 data, national statistics websites; company information; BP statistical world review

Heat back-up vs. LNG -- *Estonia*

Anything cheaper than LNG makes economic sense



Heat back-up vs. LNG -- *Latvia*



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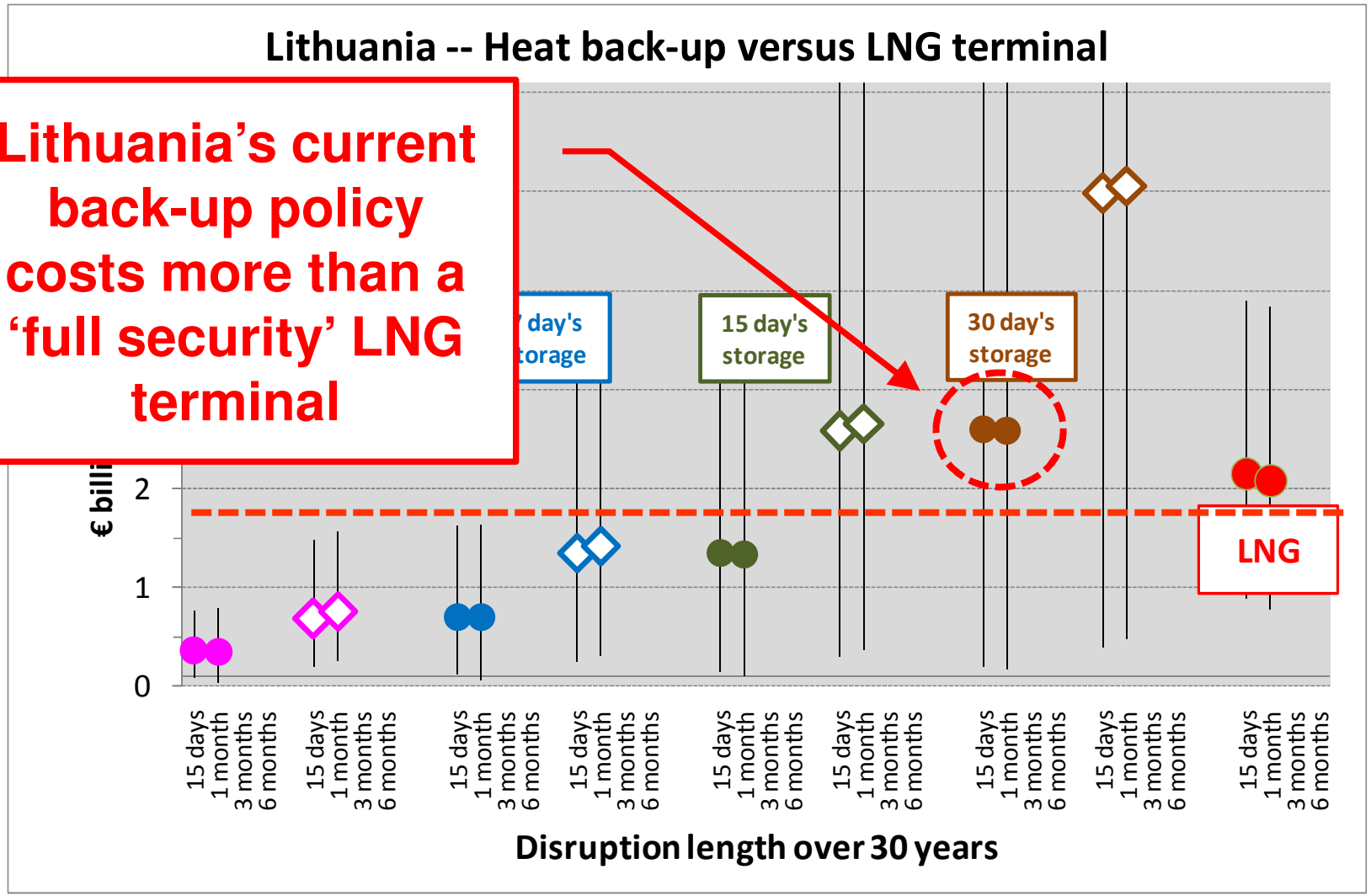
Heat back-up vs. LNG -- *Lithuania*



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Conclusions

1. Gas security can be measured
2. The cost of providing security can be calculated
   - *Baltic countries can make informed policy choices*
3. LNG is the only credible option for 'full gas security'
   - *Pan-Baltic LNG is somewhat cheaper – but politically tricky*
   - *National LNG is definitely possible financially & techically*
4. Backing up heat generation (mostly in CHPs) allows to buy partial gas security for cheap or even very cheap
5. Regional gas security co-operation
   - *Should not just be about regional infrastructure (BEMIP)*
   - *Policy exchange on national choices and implementation*