entsog

european network
of transmission system operators
for gas

Gas Coordination Group

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The Ukraine crisis and EU SoS

Overview of Stress Test modelling by ENTSOG

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Image Courtesy of Thyssengas

Results

Disruptions would have a regional impact on Europe - mitigation needs a cooperative approach

Worse case scenarios (e.g. long disruption during a cold winter) would affect nearly all EU countries –
but still cooperation is the best way to face it

Legal notice

ENTSOG has prepared this analysis at European Commission request in good faith and has endeavoured to prepare this document in a manner which is, as far as reasonably possible, objective, using information collected and compiled by ENTSOG from its members, Member States and stakeholders together with focus on gas infrastructures as enablers for crisis mitigation.

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Background

Winter Risk Assessment 2014/15

> Analysis of possible consequences of crisis scenarios defined by EC

> Main conclusions presented to May 2014 Madrid Forum:

- Ukraine disruption has regional impact on countries from HU to GR
- Russian disruption has further impact on Baltic region
- A relative low level of storage at the beginning of the winter could induce additional disruptions as far as North-West Europe and Italy

EC asks ENTSOG to support Stress Test

> Member States' Stress Test based on scenarios defined by EC

> ENTSOG – supported by GIE – added top down perspective

> Member States interaction managed via EC and Gas Coordination Group

> Final report submitted to EC on 24 September 2014

Scenarios considered by ENTSOG

Main parameters defined by European Commission

- Disruptions:
  - All Russian supply or transit through Ukraine
  - September to February period or February
- Average climatic conditions plus possible Cold Spell early February
- Reverse transit from Slovakia to Ukraine and exit from Romania to Moldova
- Full availability of OPAL or limitation to 50% of the capacity

Data used in the analysis

- Monthly demand per balancing zone: average forecast for Winter Supply Outlook 2013/14 unless update by TSO or Member States
- Imports capped at the average level which on the Dec. 2012 – Feb. 2013 reference period (Dec. 2013 – Feb. 2014) for Algeria

Results are not a forecast of disruption or any crisis management *but the output of a modelling approach to a set of input data*

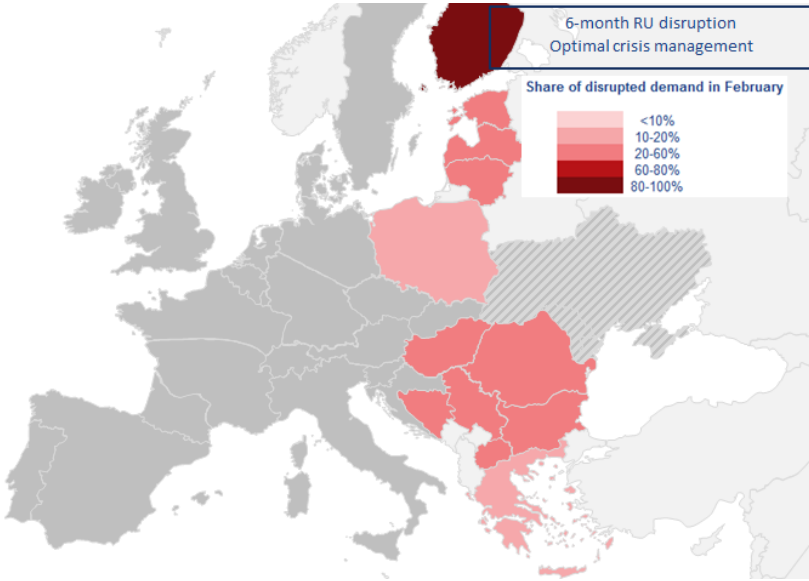
Crisis management by market & institutions

Definition of 2 modelling approaches (e.g. 6-month RU disruption)

> **Optimal crisis management**

- Price-responsive market functioning
- Perfect cooperation between Member States

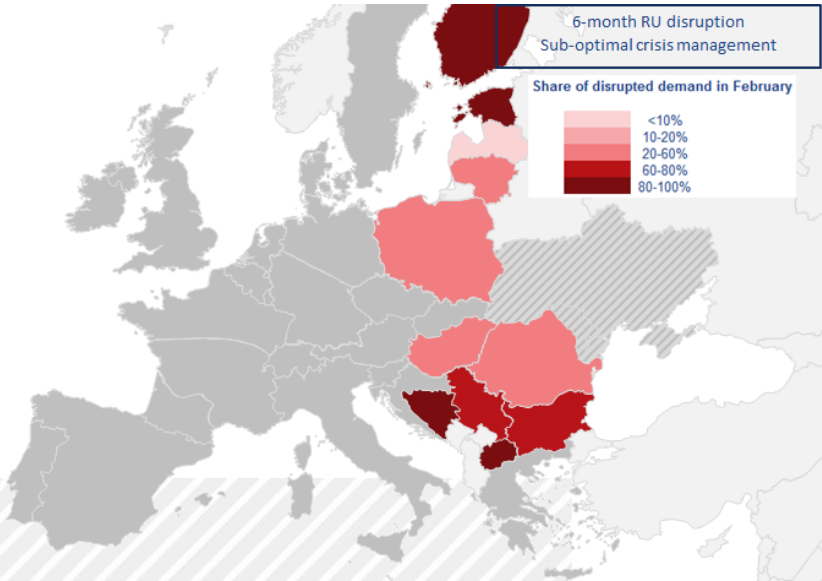
→ ***Disruption spread among a maximum of countries in order to reduce relative impact***



> **Sub-optimal crisis management**

- Price-responsive market functioning
- Member States export gas only if own demand completely satisfied

→ ***Disruption focused on limited number of countries but with higher relative impact***

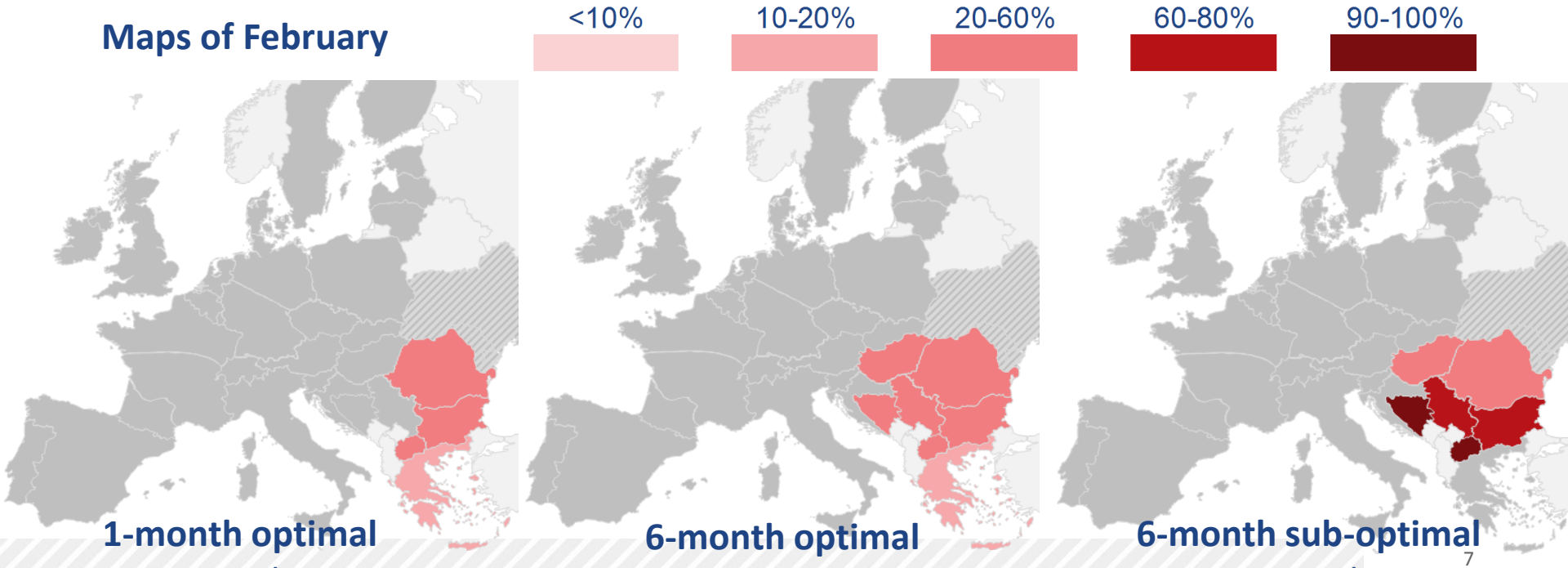


Ukraine disruption – Demand disruption

Potential impact under different scenarios

- Impact on South-East Europe is the same as under Russian disruption
- Limitation of flows through OPAL may not impact the amount of disrupted demand but will require even more LNG to compensate the Ukraine transit
- Regional production, storage and LNG will not take full benefit of existing interconnections in case of sub-optimal crisis management

Maps of February

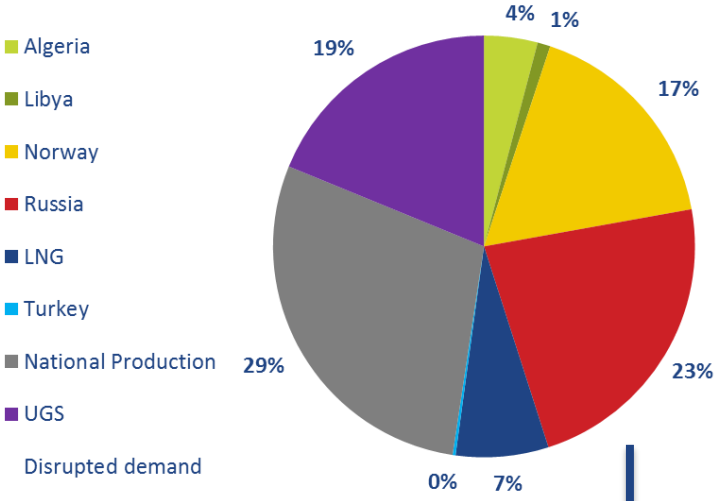


1-month optimal
9 TWh

6-month optimal
55 TWh

6-month sub-optimal
55 TWh

Ukraine disruption - Gas supply mix

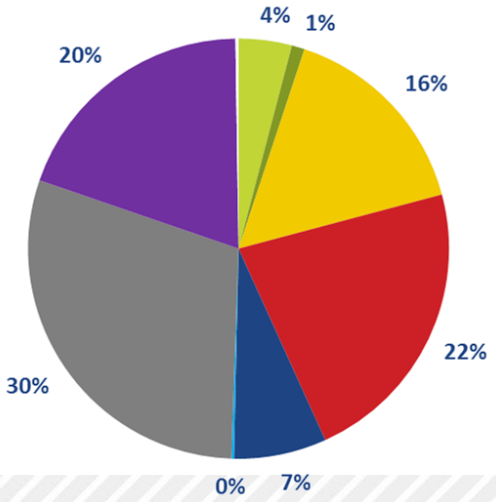


Reference Case from Sept. to Mar.

	TWh
DZ	155
LY	37
NO	644
RU	863

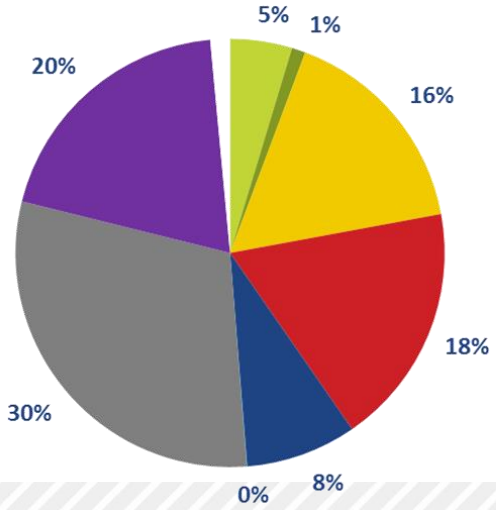
	TWh
LNG	268
TR	8
NP	1087
UGS	709

LNG: +0%
UGS: +3%



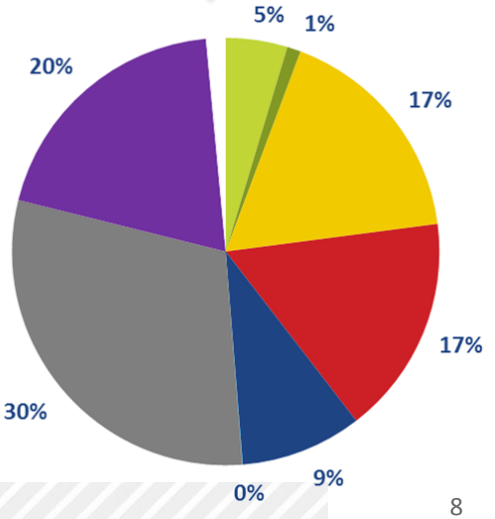
1-month OPAL 100% opt.

LNG: +16% **UGS: +3%**



6-month OPAL 100% opt.

LNG: +27%
UGS: +3%



6-month OPAL 50% opt.

Russian disruption – Demand disruption

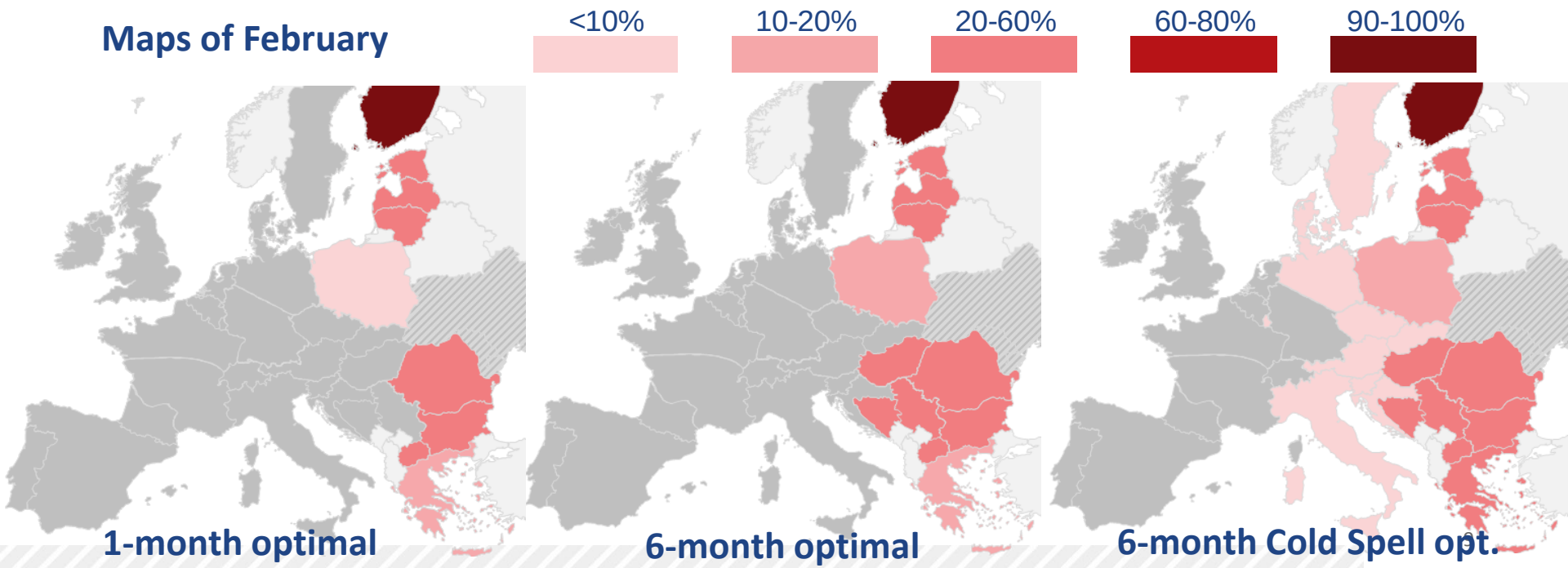
Potential impact under different scenarios

> A February disruption has impact on Baltic region and far South-East of Europe

> September to February: regional impact extends to Hungary, Serbia and Bosnia

> Cold Spell: additionally impacted countries from Sweden down to Italy

Maps of February

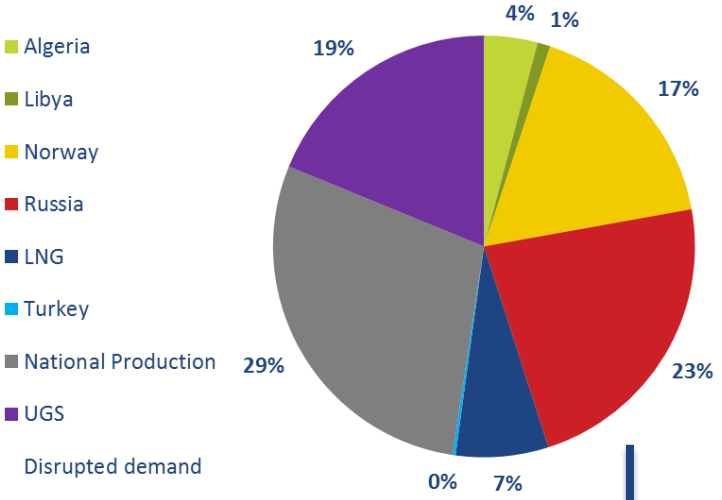


1-month optimal
17 TWh

6-month optimal
95 TWh

6-month Cold Spell opt.
105 TWh

Russian disruption - Gas supply mix

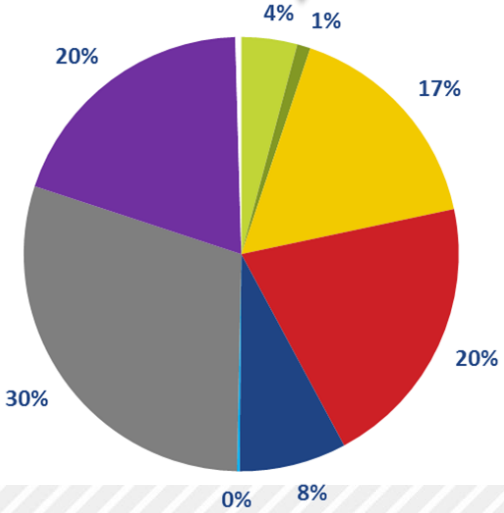


Reference Case from Sept. to Mar.

	TWh
DZ	155
LY	37
NO	644
RU	863

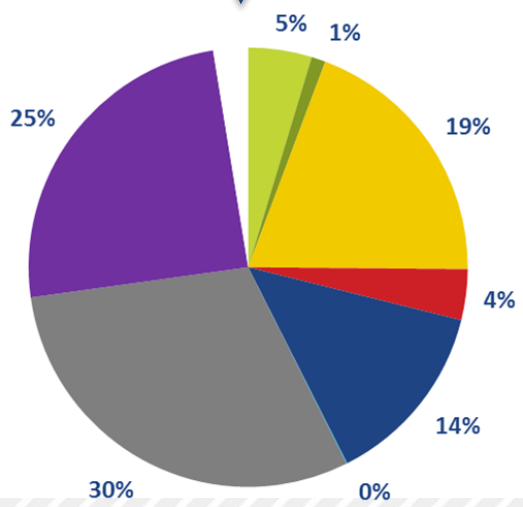
	TWh
LNG	268
TR	8
NP	1087
UGS	709

LNG: +12%
UGS: +3%



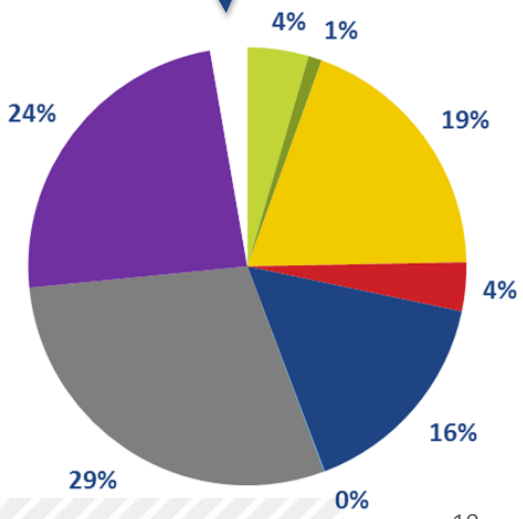
1-month optimal

LNG: +89% **UGS: +29%**



6-month optimal

LNG: +129%
UGS: +29%



6-month with cold spell opt.

Conclusions

South-East Europe still **strongly exposed** to disruption of transit through Ukraine as well as the Baltics if disruption extended to all Russian supplies.

Efficient use of gas infrastructures in mitigating such disruption **depends on**

> ability of impacted countries to send price signals to attract gas and

> on the cooperation between Member States:

→ "C" like Cooperation, Common Interest and Complete implementation of regulation

Strong adaptability of Central and Western Europe gas supply mix (**UGS / LNG imports**)

> able to send gas to impacted regions within existing infrastructures **but**

> at the **expense of a strong gas price increase**.

Importance of demand-side response in the further mitigation of the crisis (not covered in this analysis)

Thank You for Your Attention

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