

Infrastructure needs in the gas corridors: TYNDP 2017 supporting data

Regional Group – 12 December 2016

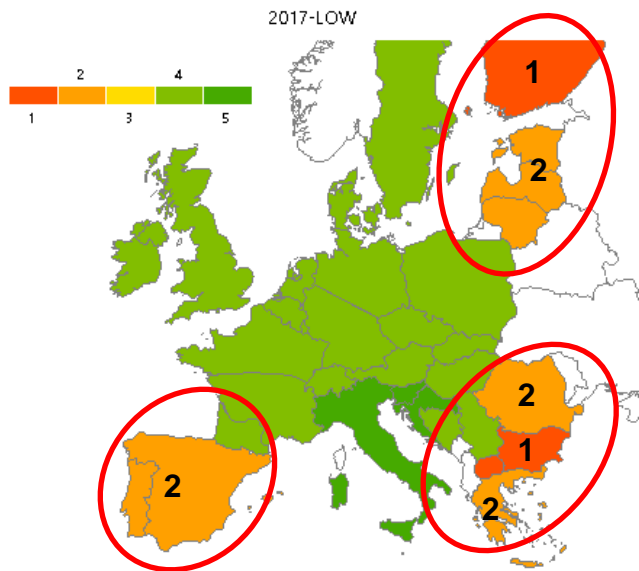
ENTSOG System Development Team



Access to limited supply sources (1)

Countries currently having significant access only to 1 or 2 supply sources

> **2017 state of play** based on TYNDP supply diversification indicator (SSPDi)



Do countries have a significant access to the below supply sources (yes=1 / no=0)?

Country	Supply sources					Total
	Algeria	LNG	Norway	Russia	Indigenous Production (NP)	
Bulgaria	0	0	0	1	0	1
Estonia	0	1	0	1	0	2
Spain	1	1	0	0	0	2
Finland	0	0	0	1	0	1
Greece	0	1	0	1	0	2
Lithuania	0	1	0	1	0	2
Latvia	0	1	0	1	0	2
Portugal	1	1	0	0	0	2
Romania	0	0	0	1	1	2

LNG is a multi-source supply: limited access to sources including LNG impacts on competition.

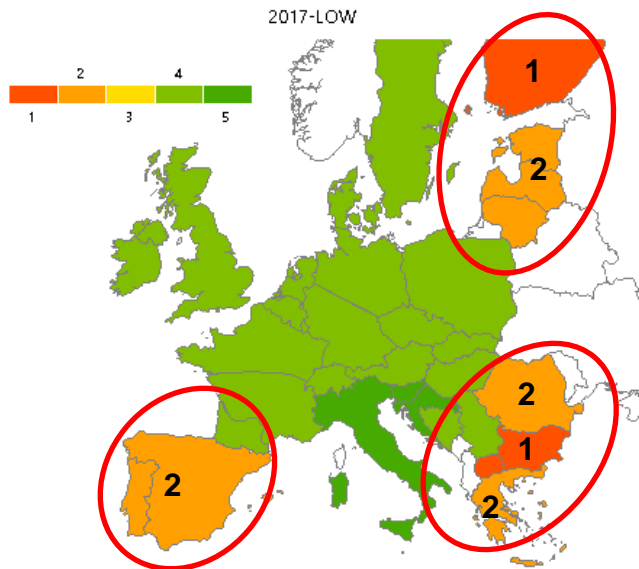


Access to limited supply sources (2)

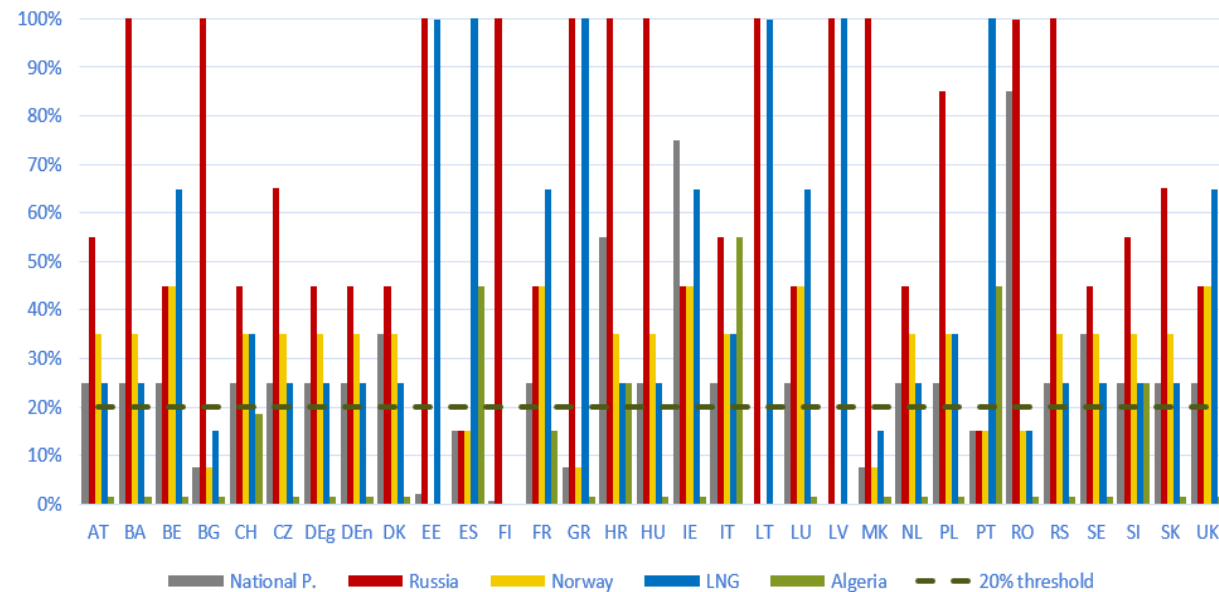
- > **SSPDi** = infrastructure perspective to the share of countries' demand able to benefit from a given supply source
 - Computed based on gas infrastructure as of 2017, with all countries simultaneous trying to access the source
 - Impact considered **significant** when share is **at least 20%**
- > **Access to Supply Sources** = for how many sources is SSPDi $\geq 20\%$. Access limited when < 3 sources

2017

Overview



Shares per source for each country



LNG is a multi-source supply: limited access to sources including LNG impacts on competition.

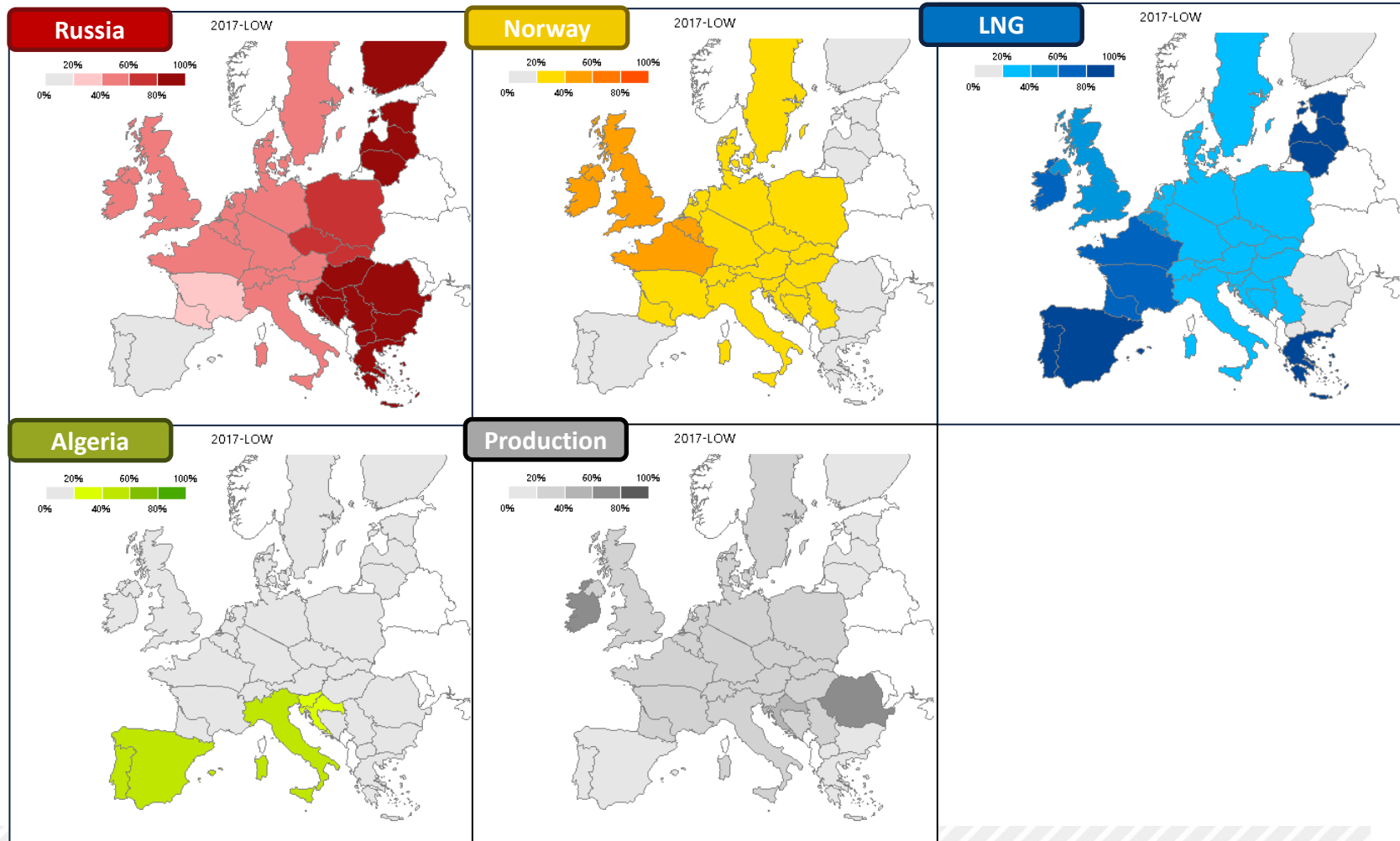
At EU-level, Libyan and Azeri (from 2020) volumes are too low to have any significant impact through SSPDi



Access to limited supply sources (3)

2017

Shares per source for each country (geographical view of previous slide bar graph)





Dependence on a single supply (1)

Countries currently showing an unreducible dependence to a concrete source amounting to minimum 25%

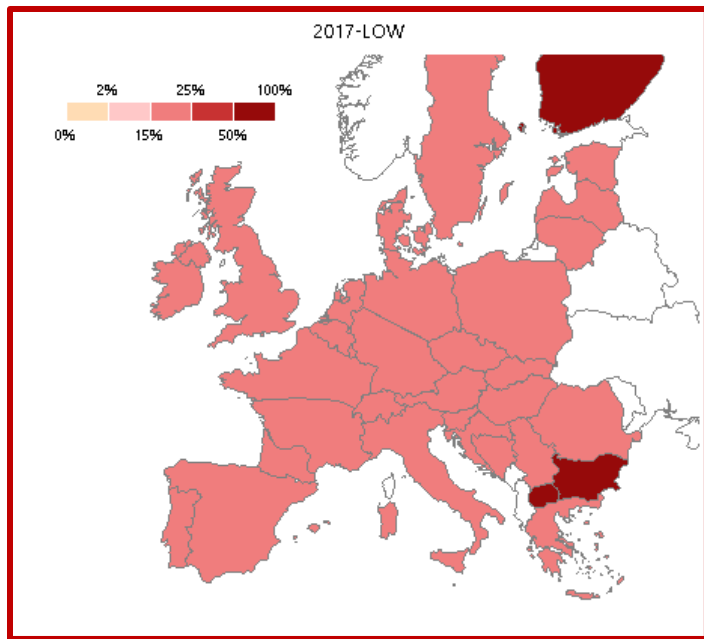
> 2017 state of play based on TYNDP 2017 cooperative supply dependence indicator (CSSD)

	RU	LNG
Finland	x	
Spain		x
Portugal		x
Bulgaria	x	

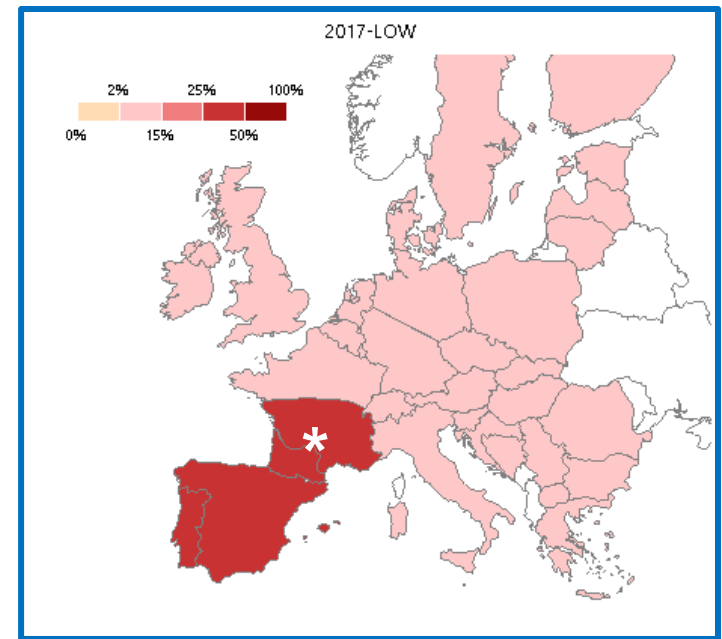


Dependence on a single supply (2)

- > Infrastructure perspective to dependence on a single **supply source** = **unreducible share** of this source necessary for a country to cover its demand on a yearly basis => where infrastructures do not allow the source to be substituted by other sources
 - Based on TYNDP **CSSD** indicator = Cooperative supply source dependence
 - Cooperative means: countries will align their dependence level as long as infrastructures allow for it
 - Case where countries show higher dependence than neighbours are linked to infrastructure limitations
 - **Dependence > 25%** indicates that at least one quarter of the demand need to be supplied from this source
 - LNG being a multi-source supply, dependence impacts on competition



CSSD - Russia



CSSD - LNG LNG: multi-source supply

* In France, projects commissioned in 2018 solve the issue



Exposure to route disruption (1)

- > TYNDP 2017 analysis, as presented to Regional Groups in Oct-Nov-16, indicated that only cases of Russian import route disruption create demand curtailment risks



Exposure to route disruption (2)

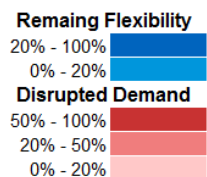
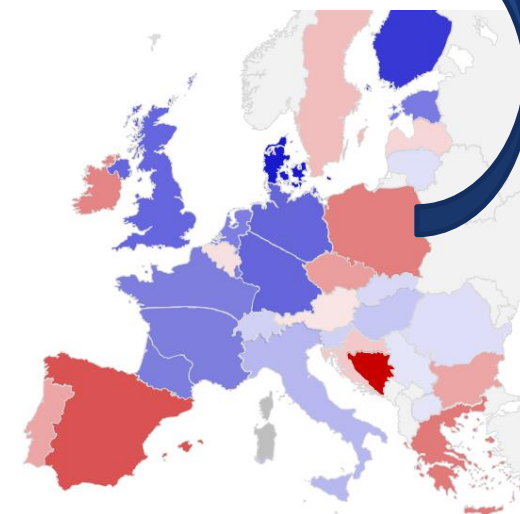
High demand situation
(peak day)



Belarus transit disruption



* For Poland increasing demand over time puts the country at risk



Yearly Average
Demand Change 2017 - 2035

> -50 %

0%

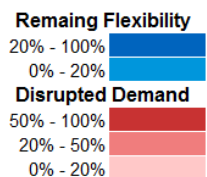
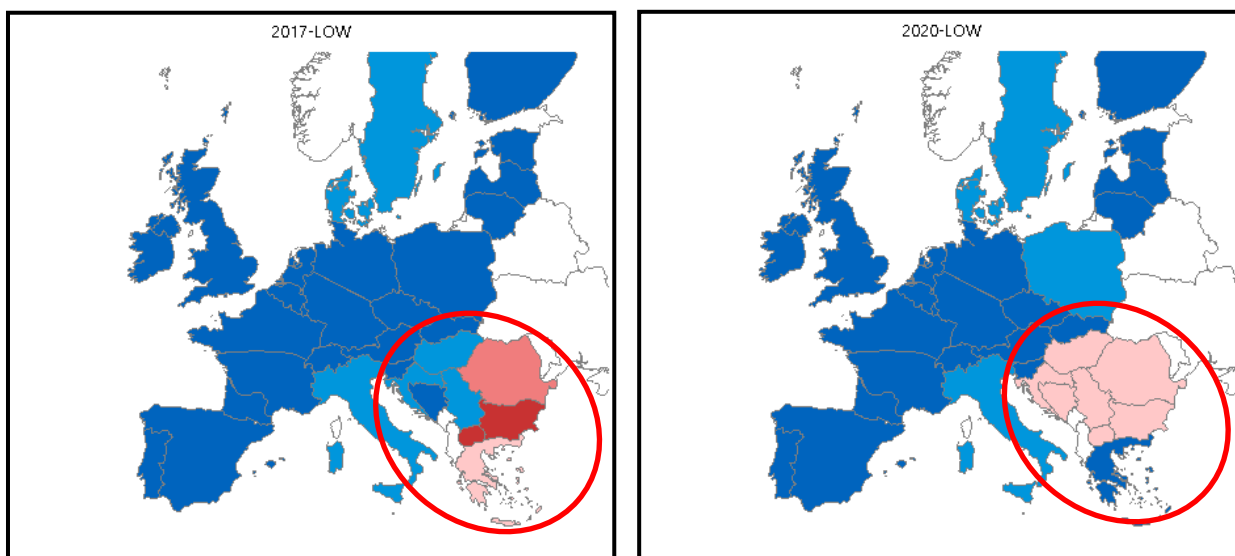
> 50 %

Exposure to route disruption (3)

High demand situation
(peak day)



Ukraine transit disruption



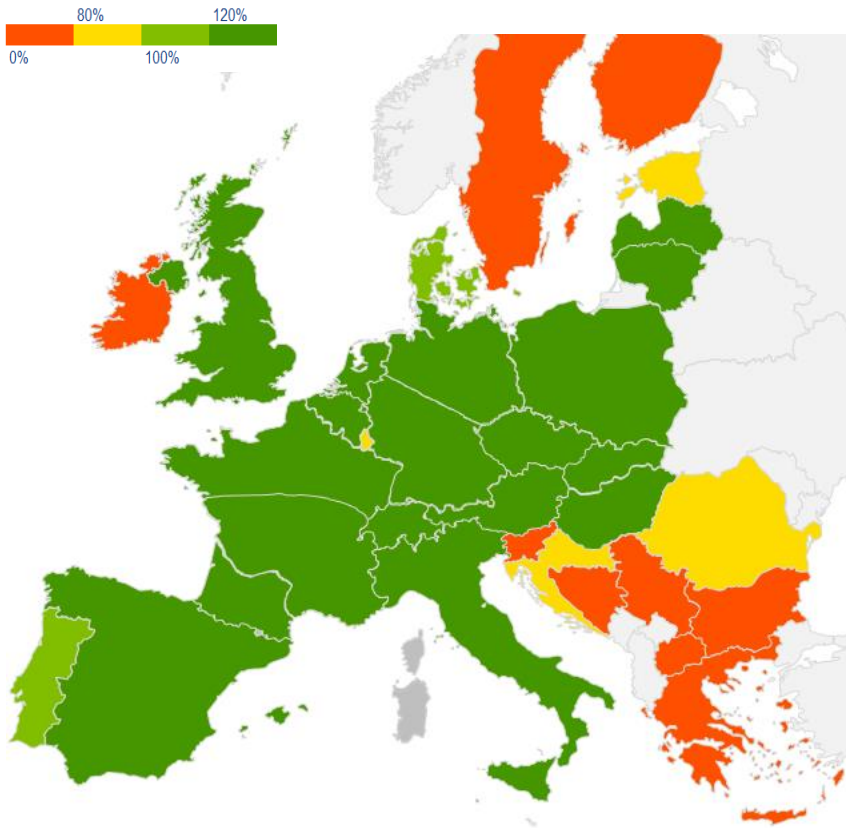
Projects foreseen to be commissioned by 2020 are needed to improve the situation. Remaining needs in 2020.



N-1 (ESW-CBA Methodology calculation)

TYNDP uses N-1 stemming from the ESW-CBA Methodology: derived from Reg 994 plus:

- > Capacities used are the one reported to TYNDP 2017, taking into account “lesser-of-rule”
- > Peak demand is the one under TYNDP 2017 scenarios
- > The resulting N-1 can be more conservative than the value reported by Member States



In 2017 N-1<100% for the following countries:

Bulgaria, Romania, Ireland, Sweden, Finland, Estonia, Luxembourg, Slovenia, Croatia, Greece

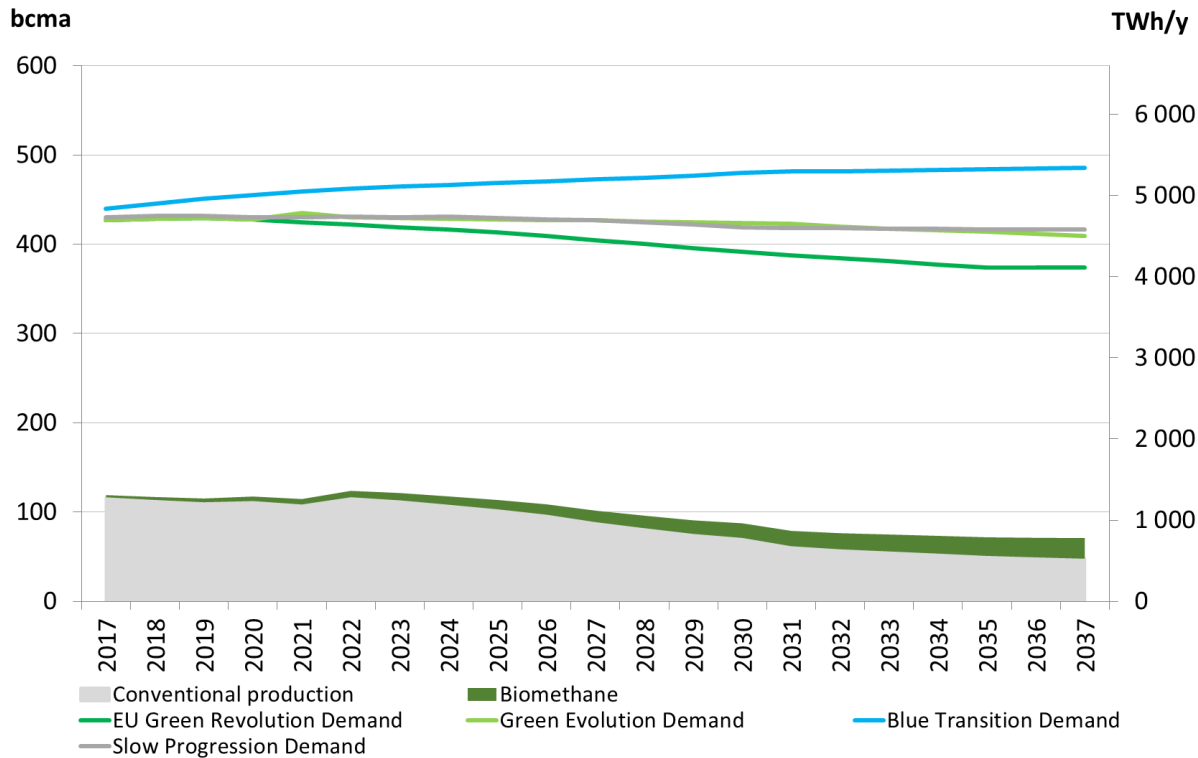
Following countries also have to be considered:

- Portugal 102% and lower than 100% in the future.
- Denmark 103% but faces decreasing indigenous production over time



Potential of new sources

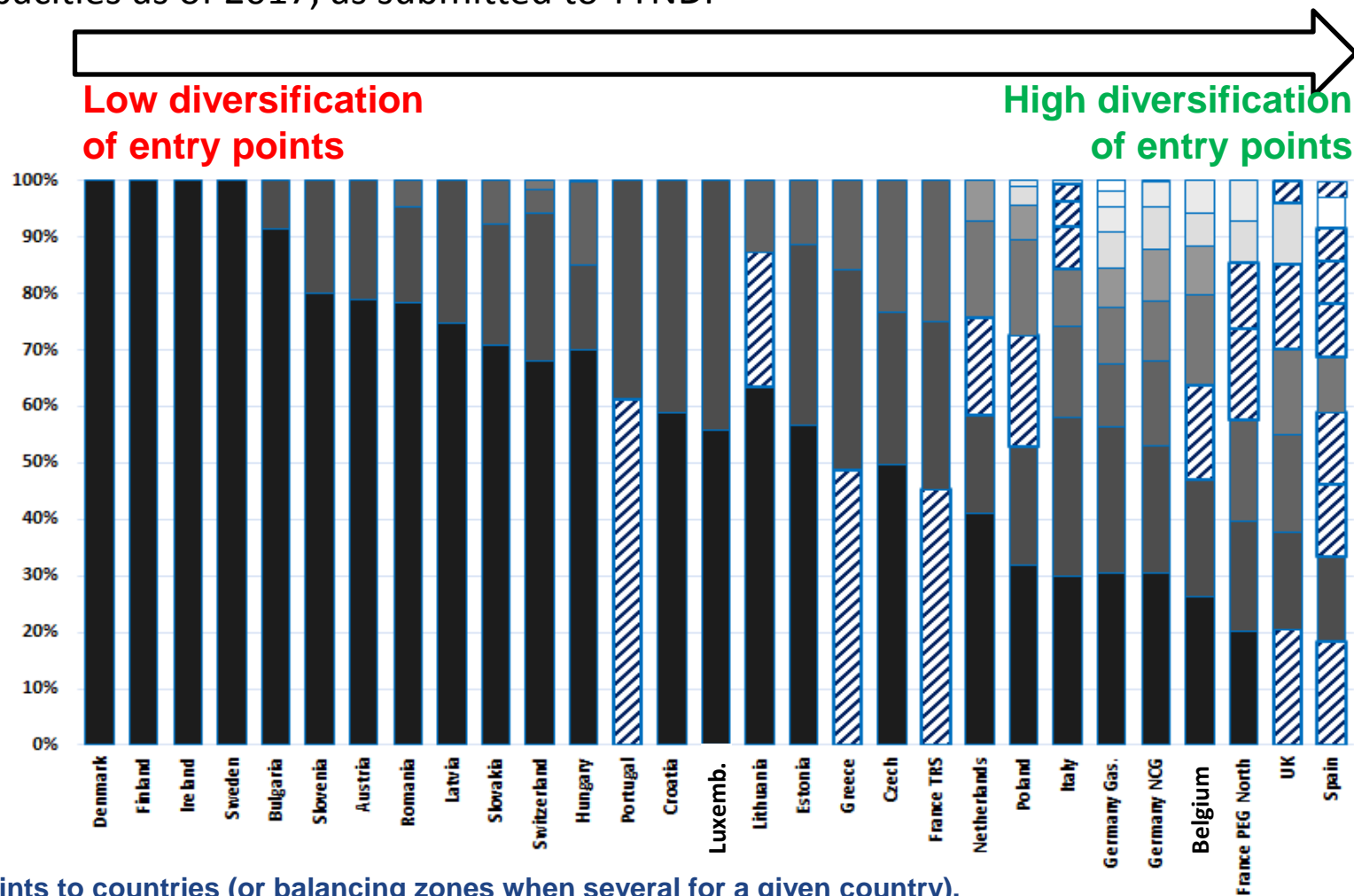
Increasing supply needs over time



Insufficient diversification of entry points (1)

> How are entry capacities split between the different entry points in each country?

- Capacities as of 2017, as submitted to TYNDP



Entry points to countries (or balancing zones when several for a given country).
 Multiple interconnections between 2 same countries shown as a single entry point.
 Import points to the EU counted individually.
 LNG terminals counted individually.

 LNG entry points



Insufficient diversification of entry points (2)

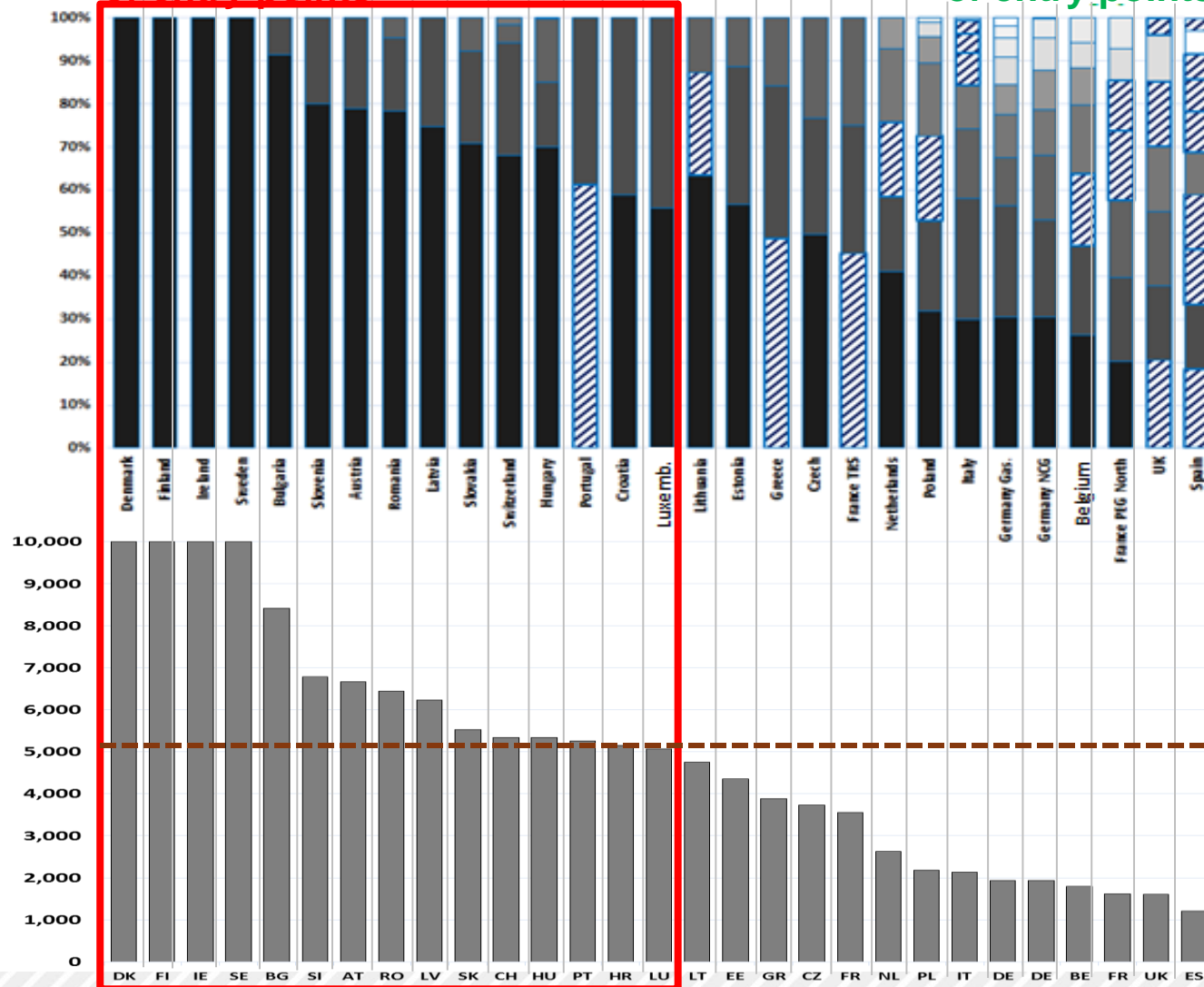
- > The information on entry capacities is summarised in the **Import Route Diversification** indicator (IRD)
 - IRD is an **HHI** indicator on shares of entry capacities
 - e.g country with 3 entry points, respectively 20%, 30% and 50% of the entry capacities, $IRD = 20^2 + 30^2 + 50^2 = 3800$
 - IRD ranges from **10 000 (worst)** to **0 (best)**
 - A country with a single entry point would have an IRD of 10,000
 - A country with 2 entry points of same capacity would have an IRD of 5,000
 - A country with 3 entry points of same capacity would have an IRD of 3,333
 - IRD is defined in the CBA Methodology
 - At country level (or balancing zone level where several balancing zones)
 - Multiple interconnections between 2 same countries/zones counted as a single entry point
 - Imports points to the EU counted individually
 - LNG terminals counted individually
- > Geography (number of borders) impacts on IRD
- > For **countries where one entry capacity outweighs the other entries** the IRD can show under-diversification. This is for example the case of countries with a high transit import capacity.



Insufficient diversification of entry points (3)

Low diversification
of entry points

High diversification
of entry points



Shares of entry capacities

IRD indicator

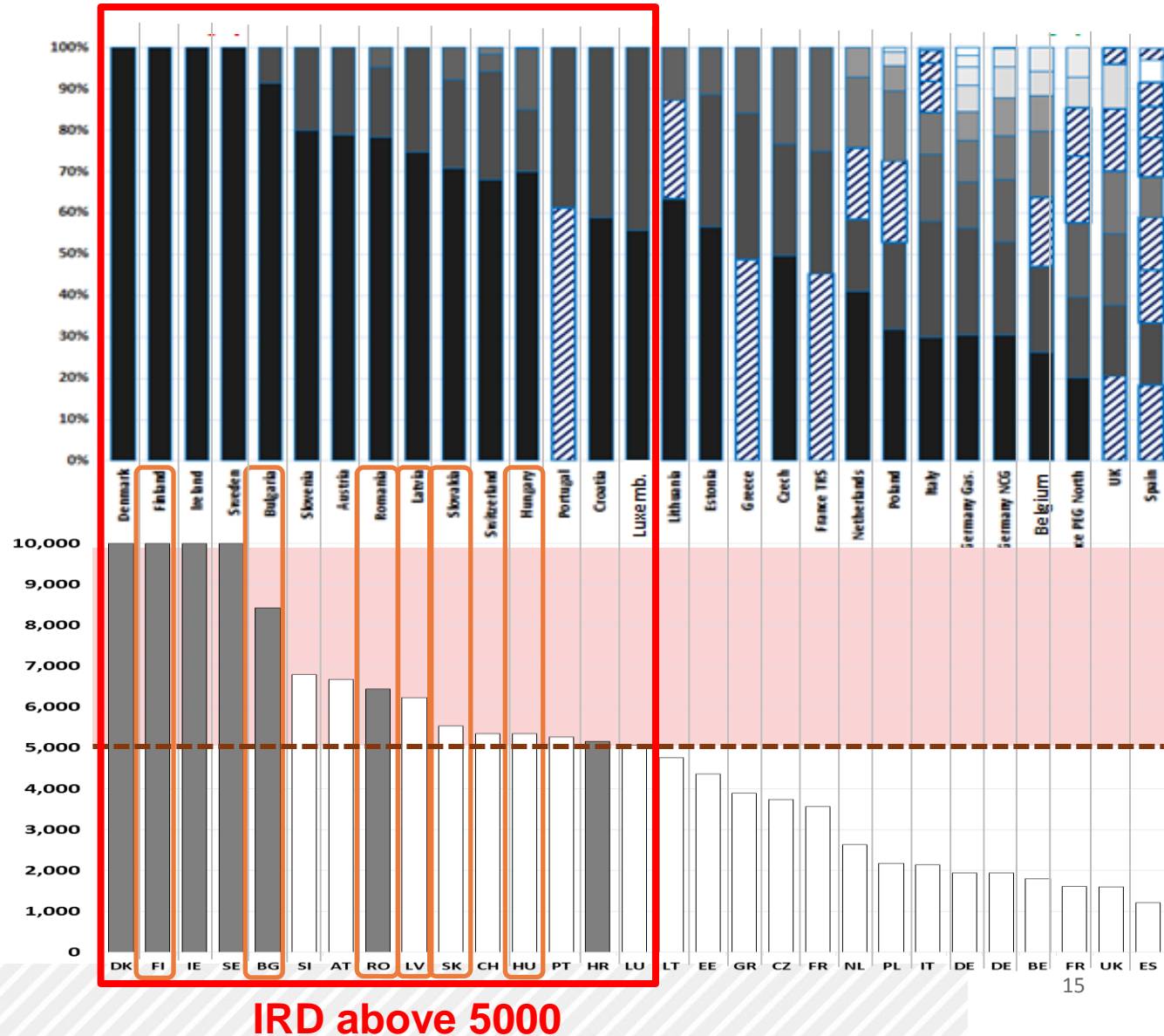
> A **threshold of 5.000** corresponds to a case with two entry points perfectly balanced in terms of entry capacity.

IRD above 5000



Insufficient diversification of entry points (4)

- > A **second step** has been taken for countries where $IRD > 5000$, to address the cases where an entry capacity outweighs the other entries, entry capacities (e.g. transit countries)
- > It consists of an additional calculation capping all entry capacities by the country demand
- > Resulting countries are those shown in grey
- > To complement the assessment, countries with $IRD > 5000$ and **at least one import point** (connected to an extra-EU supply source) are **highlighted in orange**



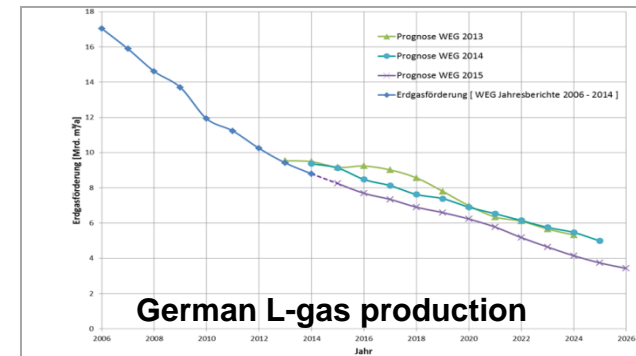
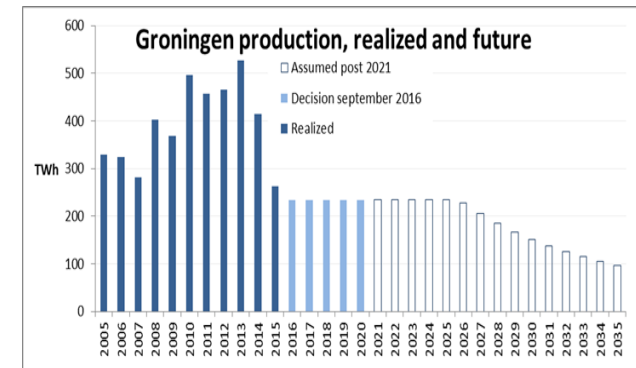
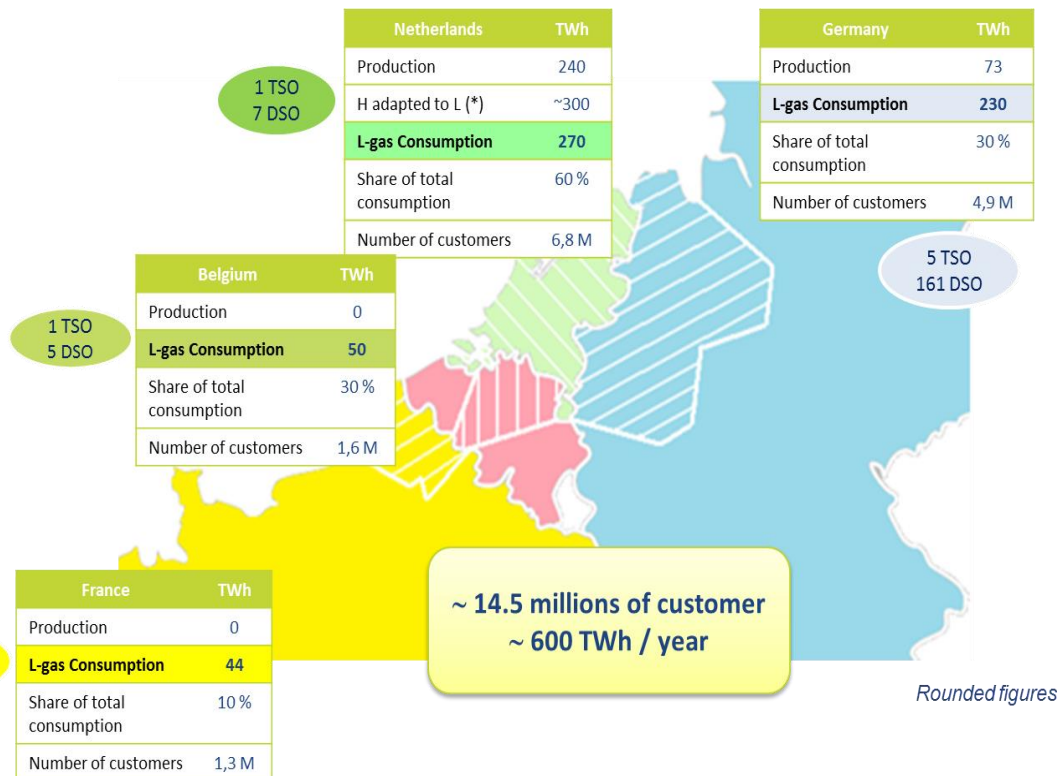


Adaptation L to H



Netherlands, Germany, Belgium and France markets are partly supplied with L-gas.

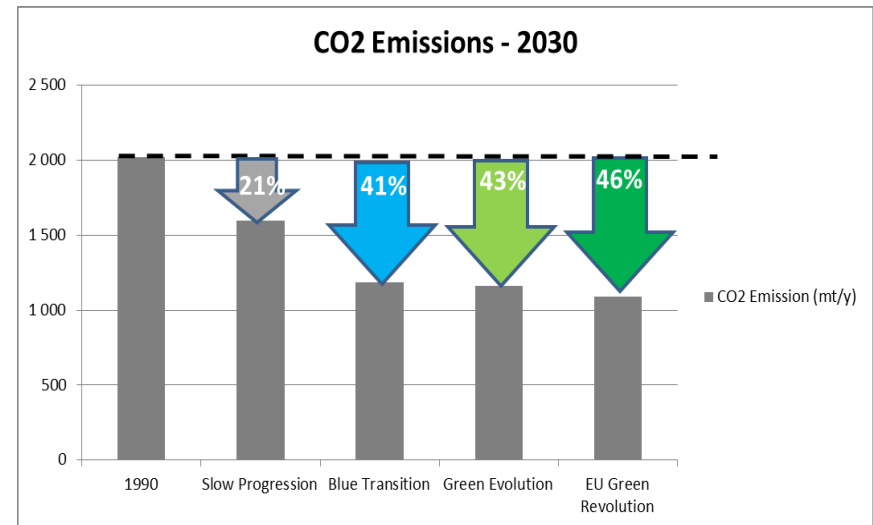
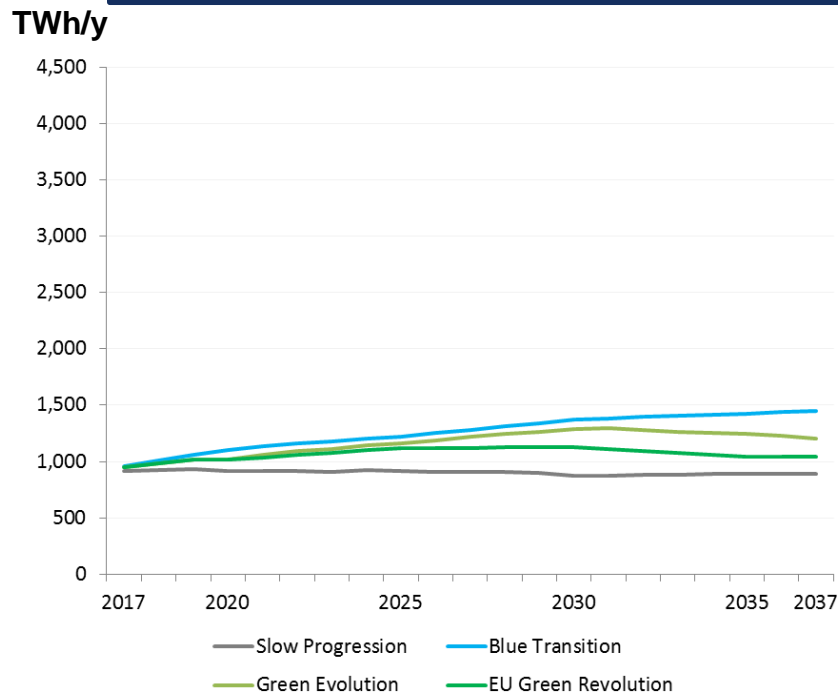
L-gas production is declining (Groningen and Germany)



Starting from 2020, part of the local gas demand in Belgium, France and Germany may not be covered by L-gas exports from the Netherlands, unless replaced with H-gas.

Increased use of gas in power generation

Gas for power demand



CO2 emissions in 2030 – overall power demand and gas end-user demand

The increased use of gas in power generation is covered in scenarios



Thank You for Your Attention

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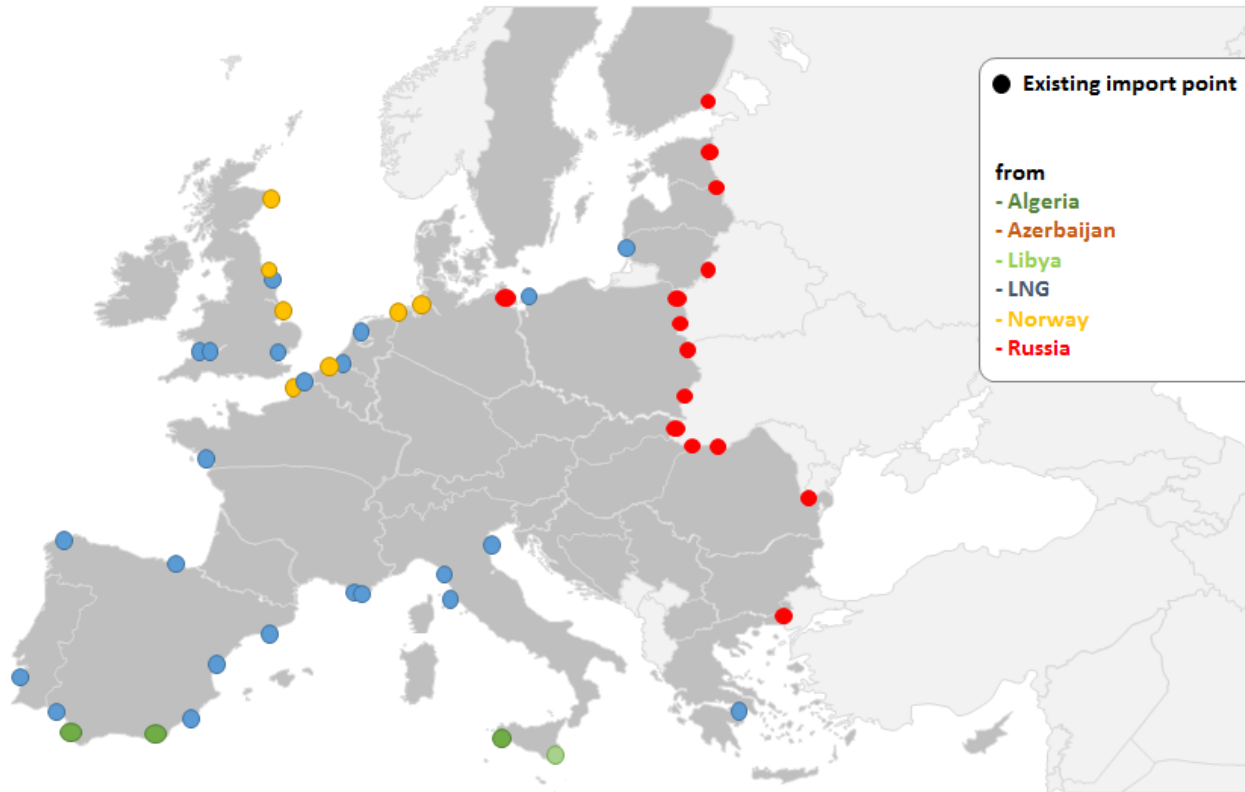
WWW: www.entsog.eu



Back-up



Import points to the EU



Russian supply dependence

CSSD	Green Evolution	Blue Transition
	2017	2017
AT	22%	24%
BA	22%	24%
BEh	21%	23%
BEI	20%	23%
BGn	85%	85%
CH	21%	23%
CY		
CZ	22%	24%
DEg	21%	23%
DEn	21%	23%
DK	21%	23%
EE	21%	23%
ES	21%	23%
FI	100%	100%
FRn	21%	23%
FRs	21%	23%
FRt	21%	23%
GR	21%	23%
HR	21%	23%
HU	22%	24%
IE	21%	23%
IT	21%	23%
LT	21%	23%
LU	21%	23%
LV	21%	23%
MK	85%	85%
MT		
NL	21%	23%
PL	21%	24%
PT	21%	23%
RO	11%	24%
RS	22%	24%
SE	21%	23%
SI	21%	23%
SK	22%	24%
UK	20%	23%

LNG supply dependence

CSSD	Green Evolution	Blue Transition
	2017	2017
AT	1%	4%
BA	0%	3%
BEh	0%	3%
BEI	0%	4%
BGn	0%	3%
CH	1%	4%
CY		
CZ	0%	3%
DEg	0%	3%
DEn	0%	4%
DK	0%	3%
EE	0%	3%
ES	33%	34%
FI	0%	3%
FRn	1%	4%
FRs	32%	34%
FRt	32%	34%
GR	1%	3%
HR	0%	3%
HU	0%	3%
IE	0%	3%
IT	1%	4%
LT	0%	3%
LU	1%	4%
LV	0%	3%
MK	1%	3%
MT		
NL	0%	4%
PL	1%	4%
PT	33%	34%
RO	0%	3%
RS	0%	3%
SE	0%	4%
SI	1%	4%
SK	0%	3%
UK	0%	3%



N-1

for Energy System Wide-CBA

N-1	ENTSOG
AT	188%
BE	261%
BG	43%
CH	140%
CY	0%
CZ	202%
DE	157%
DK	103%
EE	90%
ES	140%
FI	0%
FR	140%
GR	75%
HR	84%
HU	128%
IE	50%
IT	122%
LT	124%
LU	84%
LV	209%
MT	0%
NL	196%
PL	130%
PT	102%
RO	81%
SE	12%
SI	60%
SK	403%
UK	157%