ENTSOG Summer Supply Outlook 2016

Executive Summary

As part of its obligation under Art.8(3)(f) of Regulation (EC) 715/2009, ENTSOG has undertaken an assessment of the European gas network to analyse whether gas infrastructures enable to meet both demand and injection needs during Summer 2016. The conclusions are:

The European gas network is sufficiently robust in most parts of Europe to enable:

- **Planned maintenance in order to ensure infrastructure reliability on the long term**
- **At least 90% stock level in preparation of the upcoming Winter**
- **Some flexibility in network users' supply strategy**
- **Supply to Ukraine with volumes of gas comparable to last summer**

The report also highlights:

- **Due to the high storage level at the end of the winter compared to the last year, the supply flexibility is expected to be on a higher level.**

The actual supply mix and storage level on 30 September 2016 will depend on market behaviour and global factors.

Introduction

This edition builds on previous Summer Supply Outlooks as well as on the TYNDP 2015. The report aims to assess the ability of the European gas network to provide sufficient flexibility to shippers during their storage injection season.

The summer months provide shippers the opportunity to refill storage in anticipation of the winter months ahead. The level of injection targeted by shippers varies from one country to the other and from time to time due to climatic, price and legal parameters.

Modelling has been used to confirm the ability of the European gas network to provide flexibility of injection under different scenarios around a Reference Case targeting 90 percent storage level by 30 September 2016.

These additional scenarios cover alternative injection targets.

Like the previous edition and in order to take into account the latest development since the beginning of the Summer, the modelling takes as a starting point the actual storage level on 1 April 2016.

Additional linearization curves have been provided by GSE Members. Their use in the model enables a better consideration of the reduction of injection capacity when a storage reaches a high stock level.

Assumptions and results of the modelling

The modelling tool for the Summer Supply Outlook is the same as the one used in the TYNDP and the Winter Supply Outlook. It is mostly handled at country level and takes into account the existing gas infrastructure[1] and the infrastructure planned to be commissioned during the upcoming summer (see Annex A for details).

The Summer Supply Outlook 2016 considers seasonal specificities and short term trends. In any case actual injection and supply mix will result from shippers' decision.

> Reference Case

Supply under the Reference Case has been defined essentially based on the actual data of the last 3 Summers.

The overall "Summer injection" is defined as the quantity of gas necessary to reach an aggregated 90% stock level on 30 September 2016 starting from actual stock level on 1 April 2016 (Source: GSE AGSI platform).

The repartition of injection and supply along the summer months result from the modelling and the following assumptions (further detailed in Annex A and B):

- The monthly gas demand forecast by TSOs

[1] Technical capacities are updated by TSOs. For the OPAL pipeline a partial availability taking into account the current exemption is considered.

- Exports towards Ukraine, Kaliningrad and Turkey[2]
- The monthly national gas production forecast by TSOs
- The overall Summer injection as defined above

The flexibility given to the model for the definition of the supply patterns derives from the supply mix of the last 3 Summers (See Annex A-Methodology).

Based on these assumptions, modelling has been used in order to check if any physical congestion or overdependence on an import source may limit the injection.

The Summer Supply Outlook takes into account the actual storage inventory level per country as of 1 April 2016[3] as initial situation. As shown in the map below the storage inventory levels differ from country to country.

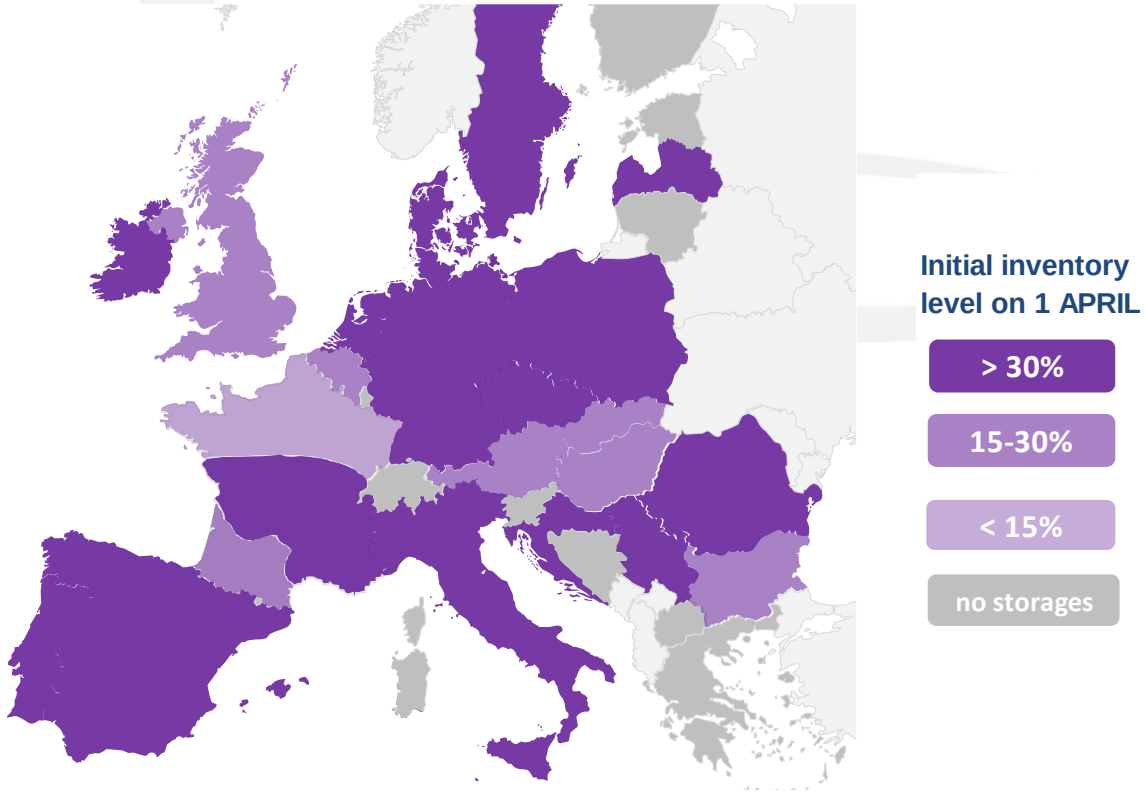

Figure 1: Actual storage inventory levels on 1 April 2016

In terms of absolute volumes in gas storages, the largest volumes are in Germany, Italy and the Netherlands.

The simulations show that a 90% stock level may be achieved by 30 September 2016 in all the balancing zones.

[2] The exports for Ukraine, Kaliningrad and Turkey were assumed to be on the Summer 2015 level.

[3] The initial storage level on 1 April 2016 for each country is based on the information on the AGSI platform and SSO websites captured on 1 April 2016. For some countries, such as Italy and Hungary, this initial level includes strategic stocks.

Figure 2 shows the evolution of the stock level per country as a result of the model.

	01/04/2016 *	01/05/2016	01/06/2016	01/07/2016	01/08/2016	01/09/2016	30/09/2016
AT	22%	22%	31%	50%	70%	90%	90%
BE	18%	18%	30%	42%	61%	78%	90%
BG	27%	40%	54%	67%	79%	85%	90%
HR	44%	44%	53%	61%	70%	81%	90%
CZd	88%	88%	88%	88%	89%	90%	90%
CZ	24%	24%	35%	49%	64%	79%	90%
DK	39%	39%	49%	59%	70%	80%	90%
FRn	13%	13%	28%	42%	56%	76%	90%
FRs	35%	35%	42%	54%	67%	81%	90%
FRt	25%	27%	38%	51%	64%	80%	90%
DE	48%	48%	55%	65%	75%	86%	90%
HU	17%	26%	39%	52%	64%	77%	90%
IE	35%	35%	40%	51%	67%	83%	90%
IT	39%	40%	50%	60%	70%	82%	90%
LV	30%	35%	44%	55%	67%	80%	90%
NL	33%	42%	51%	60%	70%	81%	90%
PL	33%	33%	39%	51%	67%	81%	90%
PT	31%	43%	56%	68%	76%	89%	90%
RO	35%	39%	52%	64%	73%	82%	90%
RS	35%	38%	49%	59%	69%	80%	90%
SK	25%	25%	37%	50%	62%	79%	90%
ES	52%	52%	61%	69%	75%	84%	90%
SE	35%	35%	35%	35%	68%	90%	90%
UK	25%	25%	33%	49%	67%	83%	90%

Figure 2 - Storage Evolution Reference Case [4] * (April is the actual stock level from GSE AGSI platform)

Figure 3 shows the breakdown of transported gas for each month (average daily values for each month including exports to Kaliningrad, Turkey and Ukraine) for the Reference Case:

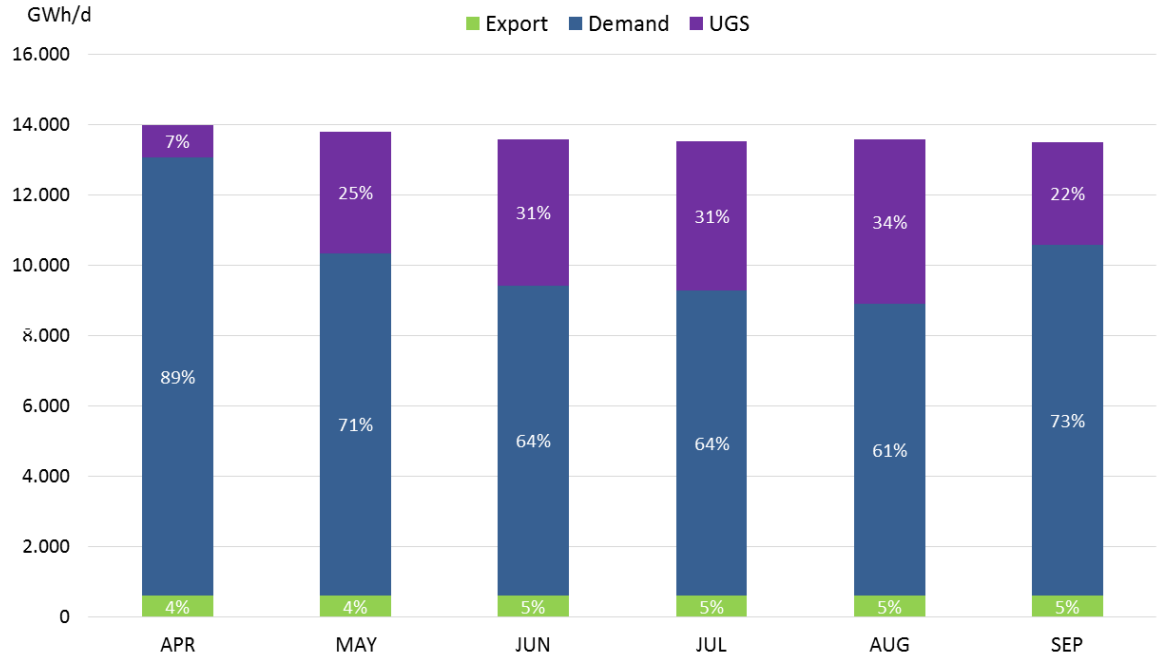

Figure 3 - Transported gas

[4] CZd corresponds to SPP Storage Dolni Bojanovice

Figure 4 shows the level and composition of supply for each month for the Reference case:

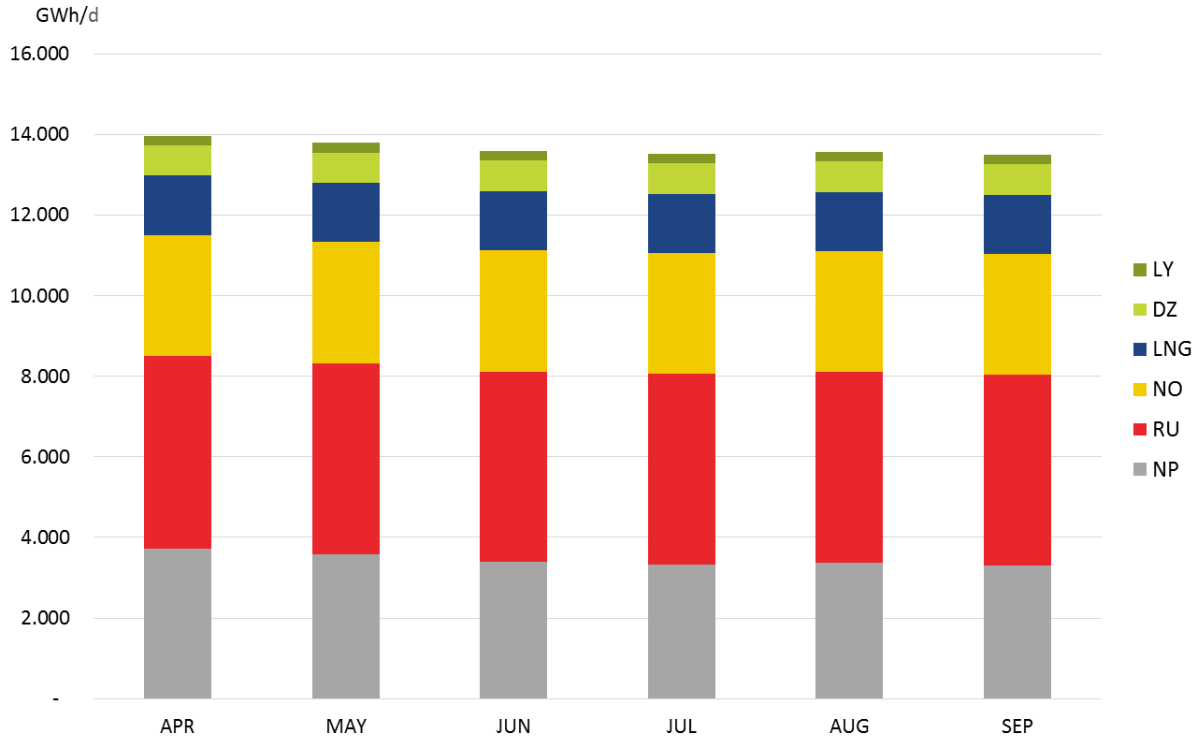

Figure 4 – Monthly supply level

> Sensitivity-analysis – Alternative injection targets

Given the uncertainty on the level of stock at the end of the season resulting from the behaviour of market participants, two alternative targeted levels of storage have been considered: 80 and 100% on 30 September 2016.

The definition of the monthly injection and supply is following the same rules than for the Reference Case. The assumptions for the demand, export and indigenous productions are kept on the exact same level as in the Reference Case.

Figure 5 provides the daily aggregated stock level evolution curve as resulting from the modelling of Summer Supply Outlook 2016 (actual injection curve will derive from shippers' behaviour) and actual aggregated curves of last three summers:

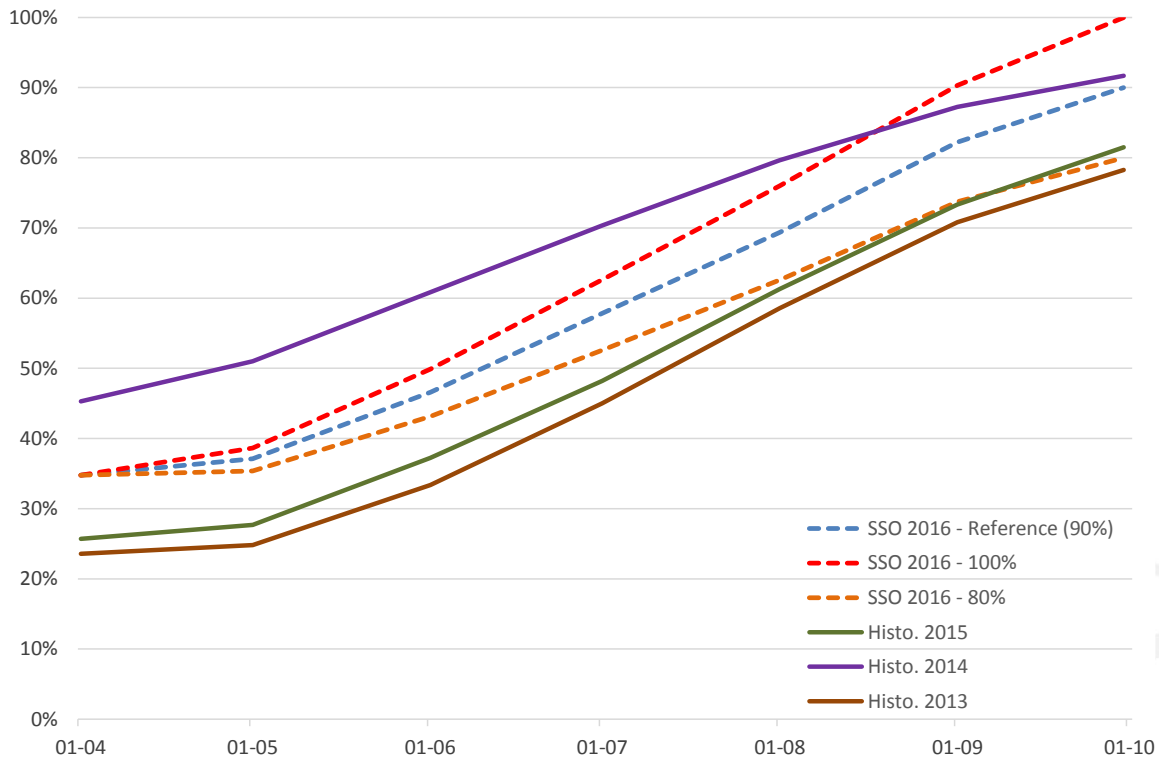

Figure 5 - Stock level development curve

The simulation shows that a 100% stock level is achievable by 30 September 2016 in almost all of the countries. Residual limitations have been identified for Bulgaria (96%) as a consequence of the reduced injection capacity at high stock levels. Nevertheless, for many operators the injection season continues in October enabling a full injection if decided so by market players.

Given the supply constraints detailed in Annex A, the different injection targets are reached through fluctuation of the supply levels. Some additional flexibility has been considered for LNG to be able to reach the 100% stock level target.

As shown in figure 6, the flexibility of the European transmission system is high enough to allow for different supply patterns while reaching 80% stock level at the end of September 2016. On the other side, reaching a 100% storage level would imply an increase in the LNG imports while the other supply sources would reach the maximum deliverability set.

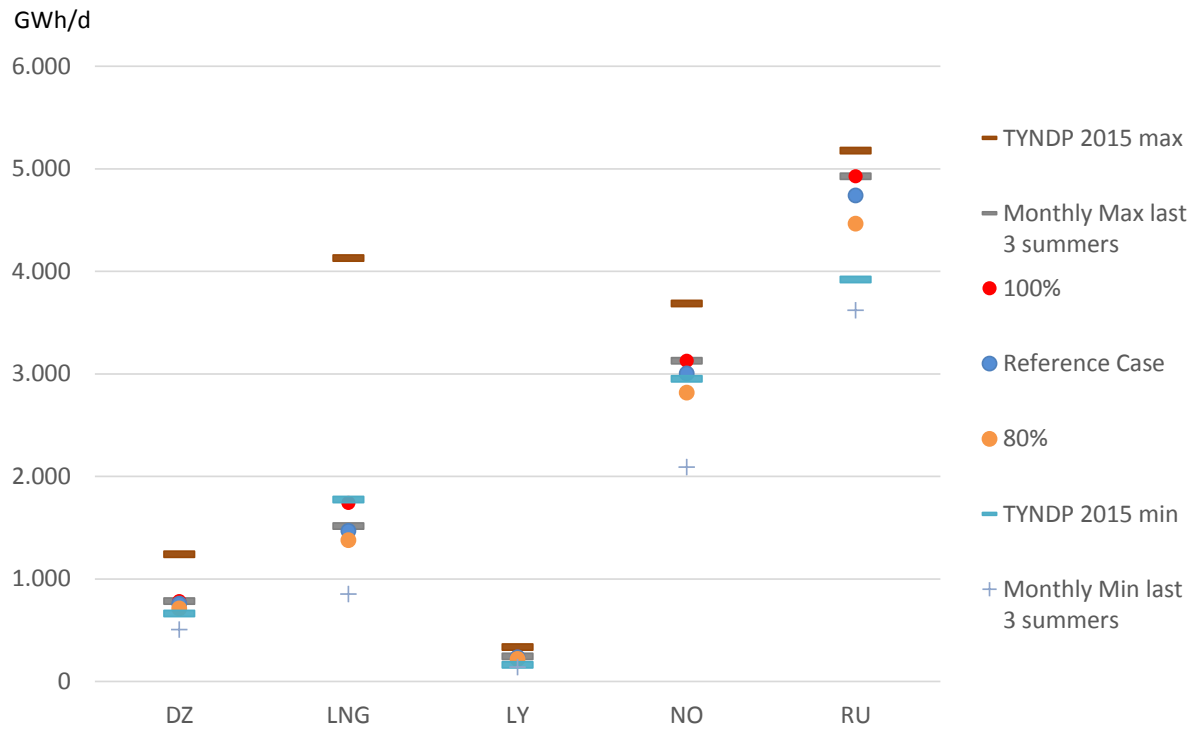

Figure 6 - Fluctuation of the supply patterns in the sensitivity analysis on the stock level [5]

Figure 7 shows the difference between the supply shares in the Reference and the two alternative stock level targets (on a daily average basis).

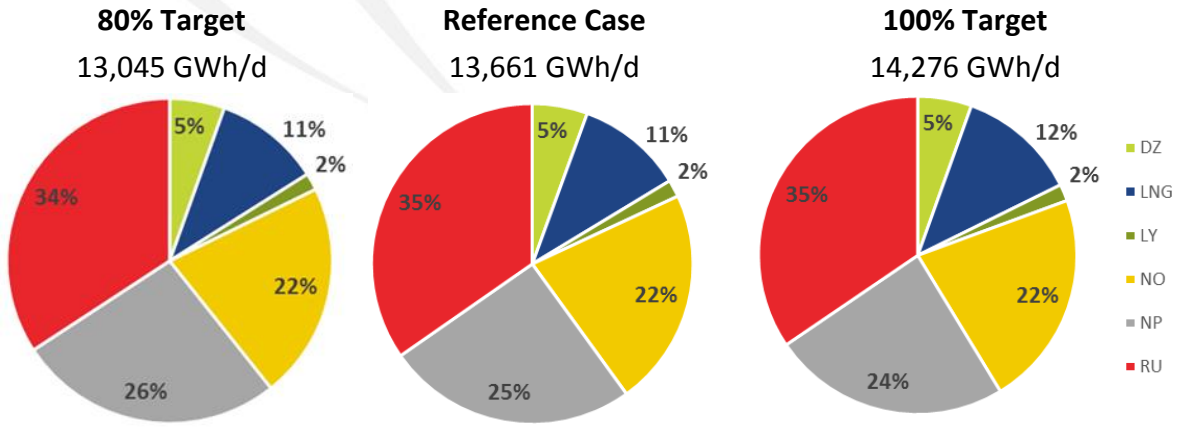

Figure 7 - Summer supply average share on a daily basis

[5] TYNDP 2015 figures refer to seasonal min/max for year 2015

Conclusion

According to the ENTSOG modelling and supply assumptions, this Summer Supply Outlook confirms the ability of the European gas network to enable shippers to reach at least a 90% stock level in underground gas storage by the end of the Summer 2016 while ensuring the proper maintenance of the system. Actual storage level will depend on shippers' decision and the deliverability of supply sources.

Please note that the supply assumptions and the integrated flow patterns used in this report are hypothetical and have been designed for the purposes of this Summer Supply Outlook.

Legal Notice

ENTSOG has prepared this Summer Supply Outlook 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 and from stakeholders together with its own assumptions on the usage of the gas transmission system. While ENTSOG has not sought to mislead any person as to the contents of this document, readers should rely on their own information (and not on the information contained in this document) when determining their respective commercial positions. ENTSOG accepts no liability for any loss or damage incurred as a result of relying upon or using the information contained in this document.

Annex A – Methodology

Modelling tool

Modelling has been carried out using the ENTSOG NeMo Tool based on linear programming of flows. The network and market topology used in this report is similar to the one used in ENTSOG TYNDP 2015, as well as the use of temporal optimization.

The following elements are part of the modelling:

- Definition of 6 temporal periods, each of one representing one of the months from April to September
- Temporal optimization means the optimization of the summer as a whole period in a single simulation. This implies that the model anticipates an event, adapting the flows in the previous months and mitigating its impact.
- Use of linearization curves, as provided by GSE Members, to consider the reduction of injection capacity when the stock level increases.

Modelling enables the identification of potential capacity and supply limitations preventing to reach the targeted stock level in each European storage by 30 September 2016, if any.
The different parameters are defined as below:

- Demand

  Average monthly demand forecast provided by TSOs

- Injection

  The total quantity of gas to be injected from 1 April to 30 September 2016, is defined as the difference between:
  - the sum of the working volume of all European UGS times the targeted stock level
  - the sum of the stock level of European UGS on 1 April 2016 (source: GSE AGSI platform)

  This quantity will be split per month by the model on the basis of the temporal optimization, considering the limits set by the linearization of the injection curves.

Figure A shows the average injectability curve. Default values are used in case specific country profiles are not available, calculated based on the WGV-weighted average of the provided ones. The detail of the curves defined at country level is included in Annex B.

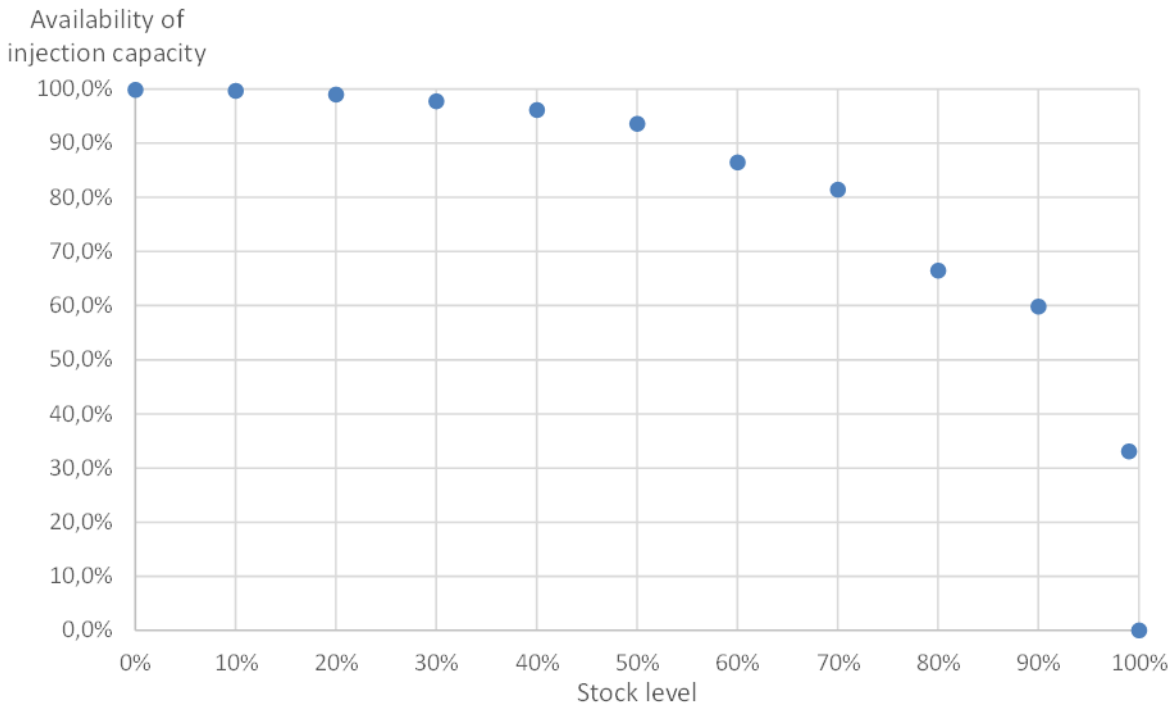

Figure A – Injectability. Average curve.

> Supply constraints

- Minimum supply per source

The minimum supply per source, on daily average, is set as the minimum monthly average supply of the last 18 summer months (April to September for years 2013, 2014 and 2015) for each supply source. The detailed figures are included in Annex B.

- Maximum supply per source

The maximum supply per source, on daily average, is set as the maximum monthly average supply of the last 18 summer months (April to September for years 2013, 2014 and 2015) for each supply source. The detailed figures are included in Annex B.

- Use of Supplies

Modelling is handled as to ensure use of the different supply sources pro-rata of their maximum.

For LNG the model can access additional flexibility only once all sources have reached their maximum. This way, the access to higher levels than this maximum for LNG will imply it will only be used by the model when it is necessary to avoid demand disruptions.

Summary of Summer Supply Outlook 2016 assumptions

Demand and production	Average monthly forecast provided by TSOs
Monthly injection	> European aggregated injection over the Summer: quantity necessary to reach injection target (80%, 90% or 100%) on 30 September 2016 > Monthly injection (aggregated and per Zone) is a result of the modelling
Overall supply	Sum of demand and injection for the whole summer
Supply shares	Supply shares is a result of the modelling
Import routes	Split between import routes is a result of the modelling
Cross-border capacity	Firm technical capacity as provided by TSOs taking into account reduction due to maintenance
Reverse-flow towards Ukraine	298 GWh/d (Average over previous summer)
Exports towards Turkey	274 GWh/d (Average over previous summer)
Exports towards Kaliningrad	44 GWh/d (Average over previous summer)

Annex B – Data for Summer Supply Outlook 2016

Minimum and Maximum supply per source

GWh/d	Minimum	Maximum	Additional Flex
Algeria	507	783	No
LNG	854	1.515	Yes*
Libya	140	243	No
Norway	2.090	3.129	No
Russia	3.621	4.927	No

* The overall LNG supply including the additional flexibility reaches 1.743 GWh/d in the 100% sensitivity analysis for the whole summer period.

Average monthly production forecast

GWh/d	April	May	June	July	August	September
AT	36,3	33,8	38,5	34,8	35,1	33,5
BG	1,2	1,2	1,2	1,2	1,2	1,2
CH	0,0	0,0	0,0	0,0	0,0	0,0
CZ	4,5	4,5	4,5	4,5	4,5	4,5
DEg	235	225	228	218	215	219
DEn	8,8	8,8	8,8	8,8	8,8	8,8
ES	2,4	2,4	2,4	2,4	2,4	2,4
FI	0,3	0,2	0,2	0,2	0,2	0,2
FRn	0,0	0,0	0,0	0,0	0,0	0,0
FRs	0,0	0,0	0,0	0,0	0,0	0,0
FRt	0,0	0,0	0,0	0,0	0,0	0,0
HR	38,8	38,8	38,8	38,8	38,8	38,8
HU	50,5	50,5	50,5	50,5	50,5	50,5
DK	115,0	115,0	115,0	115,0	115,0	115,0
IE	58,4	48,3	48,3	103,1	104,1	104,1
IT	204,4	204,1	204,4	203,8	203,8	204,4
LU	0,0	0,0	0,0	0,0	0,0	0,0
NL	1.500	1.382	1.265	1.282	1.351	1.308
PL	74	74	74	74	74	74
RO	300	293	293	296	296	293
RS	0,0	0,0	0,0	0,0	0,0	0,0
SE	1,8	1,8	1,8	1,8	1,8	1,8
SI	0,0	0,0	0,0	0,0	0,0	0,0
SK	2,5	2,4	2,2	2,2	2,1	2,1
UK	1.090	1.103	1.014	889	872	840
Total	**3.724**	**3.588**	**3.391**	**3.327**	**3.376**	**3.301**

Average monthly demand forecast

GWh/d	April			May			June			July			August			September		
	Final	Power	Total	Final	Power	Total	Final	Power	Total	Final	Power	Total	Final	Power	Total	Final	Power	Total
AT	215	0	**215**	169	0	**169**	134	0	**134**	137	0	**137**	135	0	**135**	173	0	**173**
BA	4	0	**4**	2	0	**2**	2	0	**2**	2	0	**2**	2	0	**2**	2	0	**2**
BEh	202	111	**314**	175	95	**270**	151	107	**258**	134	107	**242**	136	113	**249**	159	143	**302**
BEl	111	0	**111**	86	0	**86**	66	0	**66**	53	0	**53**	58	0	**58**	72	0	**72**
BGn	58	25	**83**	53	17	**70**	51	16	**67**	46	14	**61**	45	15	**59**	41	16	**56**
CH	90	0	**90**	60	0	**60**	40	0	**40**	35	0	**35**	35	0	**35**	60	0	**60**
CZ	224	5	**229**	145	3	**148**	112	3	**115**	81	3	**84**	98	3	**101**	135	3	**138**
DEg	1.109	243	**1.353**	847	186	**1.032**	815	179	**994**	824	181	**1.005**	812	178	**990**	937	206	**1.143**
DEn	1.109	243	**1.353**	813	178	**992**	723	159	**882**	688	151	**839**	675	148	**823**	886	194	**1.080**
DK	80	0	**80**	61	0	**61**	51	0	**51**	32	0	**32**	41	0	**41**	54	0	**54**
EE	15	0	**15**	10	0	**10**	7	0	**7**	7	0	**7**	7	0	**7**	8	0	**8**
ES	719	142	**861**	633	155	**789**	588	153	**741**	565	198	**763**	527	197	**723**	624	211	**835**
FI	93	18	**110**	64	4	**68**	64	4	**68**	64	4	**68**	62	4	**66**	65	4	**70**
FRn	714	36	**751**	502	36	**539**	385	36	**421**	341	36	**377**	302	36	**338**	418	36	**454**
FRs	273	19	**292**	191	19	**210**	145	19	**164**	128	19	**147**	113	19	**132**	158	19	**177**
FRt	69	0	**69**	55	0	**55**	39	0	**39**	36	0	**36**	31	0	**31**	41	0	**41**
GR	38	47	**86**	32	52	**84**	32	76	**108**	31	72	**104**	27	89	**117**	34	63	**97**
HR	55	11	**66**	42	5	**47**	39	3	**42**	38	7	**45**	37	5	**42**	43	6	**49**
HU	230	20	**250**	137	10	**147**	120	12	**132**	125	29	**154**	121	27	**148**	140	25	**165**
IE	66	67	**134**	52	56	**108**	43	78	**120**	32	64	**97**	37	55	**92**	43	66	**109**
IT	1.112	480	**1.592**	822	455	**1.278**	765	504	**1.269**	788	689	**1.477**	617	544	**1.162**	853	671	**1.524**
LT	57	0	**57**	50	0	**50**	49	0	**49**	29	1	**30**	29	1	**30**	50	1	**51**
LU	25	0	**25**	20	0	**20**	15	0	**15**	14	0	**14**	13	0	**13**	20	0	**20**
LV	68	0	**68**	37	0	**37**	29	0	**29**	29	0	**29**	29	0	**29**	37	0	**37**
MK	5	0	**5**	1	0	**1**	1	0	**1**	1	0	**1**	1	0	**1**	1	0	**1**
NL	819	123	**942**	669	112	**781**	556	127	**683**	499	118	**617**	501	123	**624**	596	145	**741**
PL	436	0	**436**	358	0	**358**	303	0	**303**	282	0	**282**	300	0	**300**	352	0	**352**
PT	111	5	**116**	107	13	**120**	104	28	**132**	105	60	**165**	95	50	**146**	107	64	**171**
RO	266	19	**284**	149	16	**166**	157	30	**187**	181	65	**246**	176	62	**238**	174	56	**230**
RS	33	0	**33**	33	0	**33**	33	0	**33**	33	0	**33**	33	0	**33**	33	0	**33**
SE	21	3	**24**	18	1	**20**	17	1	**18**	17	1	**18**	18	1	**19**	19	2	**21**
SI	23	0	**23**	18	0	**18**	17	0	**17**	16	0	**16**	15	0	**15**	18	0	**18**
SK	131	4	**135**	68	3	**71**	65	3	**69**	58	3	**61**	58	3	**62**	69	4	**73**
UK	1.593	661	**2.253**	1.089	740	**1.829**	788	753	**1.541**	683	723	**1.407**	684	740	**1.424**	840	766	**1.606**
Total	**10.176**	**2.283**	**12.458**	**7.568**	**2.159**	**9.727**	**6.507**	**2.290**	**8.797**	**6.134**	**2.548**	**8.682**	**5.869**	**2.414**	**8.283**	**7.261**	**2.701**	**9.963**

Note: Final demand includes Residential, Commercial and Industrial.

Linearization curves (data provided by GSE)

	Injection availability when working gas volume is at xx% level											
	100%	99%	90%	80%	70%	60%	50%	40%	30%	20%	10%	0%
AT	0%	16%	71%	79%	85%	90%	94%	96%	97%	98%	100%	100%
BE	0%	37%	50%	50%	100%	100%	100%	100%	100%	100%	100%	100%
BG	0%	6%	56%	56%	100%	100%	100%	100%	100%	100%	100%	100%
HR	0%	33%	60%	66%	81%	86%	94%	96%	98%	99%	100%	100%
CZd	0%	4%	40%	45%	70%	75%	97%	100%	100%	100%	100%	100%
CZ	0%	33%	60%	66%	81%	86%	94%	96%	98%	99%	100%	100%
DK	0%	33%	60%	66%	81%	86%	94%	96%	98%	99%	100%	100%
FRn	0%	60%	63%	71%	85%	86%	87%	88%	92%	97%	100%	100%
FRs	0%	53%	56%	59%	61%	64%	67%	70%	78%	91%	98%	100%
FRt	0%	76%	82%	90%	97%	100%	100%	100%	100%	100%	100%	100%
DE	0%	36%	54%	65%	76%	86%	94%	96%	97%	98%	98%	100%
HU	0%	64%	67%	70%	73%	73%	88%	100%	100%	100%	100%	100%
IE	0%	33%	60%	66%	81%	86%	94%	96%	98%	99%	100%	100%
IT	0%	5%	54%	62%	73%	82%	92%	97%	100%	100%	100%	100%
LV	0%	33%	60%	66%	81%	86%	94%	96%	98%	99%	100%	100%
NL	0%	47%	66%	71%	82%	86%	92%	94%	96%	98%	99%	100%
PL	0%	33%	60%	66%	81%	86%	94%	96%	98%	99%	100%	100%
PT	0%	10%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
RO	0%	33%	60%	66%	81%	86%	94%	96%	98%	99%	100%	100%
RS	0%	33%	60%	66%	81%	86%	94%	96%	98%	99%	100%	100%
SK	0%	33%	60%	66%	81%	86%	94%	96%	98%	99%	100%	100%
ES	0%	9%	85%	90%	90%	90%	95%	100%	100%	100%	100%	100%
SE	0%	33%	60%	66%	81%	86%	94%	96%	98%	99%	100%	100%
UK	0%	33%	60%	66%	81%	86%	94%	96%	98%	99%	100%	100%

Note: default average values are used in case specific country profiles are not available.

ENTSOG Summer Review 2015

Executive Summary

ENTSOG has completed the review of the European gas supply and demand picture for Summer 2015 (April to September). The seasonal Reviews aim at a deeper comprehension of the development of the demand and supply in the previous seasons and the identification of trends that cannot be captured at national or regional level. They also help to build experience and a solid background for the assumptions considered in the Summer Outlook. Such knowledge is also factored:

- in the recurrent TYNDP process in order to ensure consistence and continuous improvement of ENTSOG reports,
- in the ongoing R&D plan.

The key findings of this review are:

- **Seasonal Gas demand in Europe was very similar (-0.5%) to the one from previous summer.**
- **There has been a significant decrease in European indigenous production (-15%) for the second consecutive year.**
- **The low stock levels in the UGS at the beginning of the summer were compensated with higher injections along the season.**

Detailed data for the cross-border flows is available on the Transparency Platform[1].

Stakeholders' comments on this seasonal analysis are welcome and would enable ENTSOG to improve its knowledge of seasonal and market dynamics influencing the use of infrastructure. Comments would serve as basis for the R&D plan and be beneficial to the quality of further reports.

[1] Transparency Platform: https://transparency.entsog.eu/

Introduction

This review, as part of the ENTSOG Annual Work Program 2016, is published on a voluntary basis and aims at providing an overview of the demand and supply balance during Summer 2015. The report brings transparency on the internal analysis carried out by ENTSOG for the purpose of developing the seasonal Supply Outlooks and the Union-wide TYDNP, as well as for the ongoing R&D plan.

The report aims to provide an overview of European trends that could not be captured at national level or regional level and to build experience for future reports. This report should not be seen as a direct review of previous Seasonal Outlooks as outlooks do not aim to provide a forecast but to better explore infrastructure resilience.

Regarding European dynamics, the report highlights the wide heterogeneity of national demand profiles and supply sources. These differences are linked among others to physical rationales such as climate, demand breakdown or producing field flexibility for example.

Seasonal Overview

Some occurrences on the European gas market caused fluctuations in the supply and demand balance during the summer period, April to September 2015. The major ones were:

- Centrica Storage Ltd announced reductions to the maximum space available at the Rough storage facility in the UK, this reduced the overall capacity from about 3.3 Bcm to between 2.6 and 2.9 Bcm (March 2015)
- Decision from the national authorities on final production cap of 30 Bcm in 2015 (from 42 Bcm in 2014) for the Netherland's Groningen field (June 2015) [2]
- Summer maintenance season on a number of pipelines including Norway's pipeline system, the Interconnector and the Nord Stream Pipeline (June to August 2015)
- Unplanned outages at the Norwegian continental shelf and Troll gas field (September 2015)

Market Overview

Some general gas related topics and information came up or were noticeable. Major ones were:

- Norwegian and Russian gas supplies into EU hit record highs (July and August 2015 respectively)
- The average prices from the main hubs remained at low levels due to the high LNG supply available and the oil bearish sentiment (September 2015)

[2] https://www.government.nl/latest/news/2015/06/23/groningen-gas-extraction-further-reduced-to-30-billion-cubic-metres-in-2015

Gas Prices at European hubs

The following two graphs show the evolution of gas prices in Europe during Summer 2015:

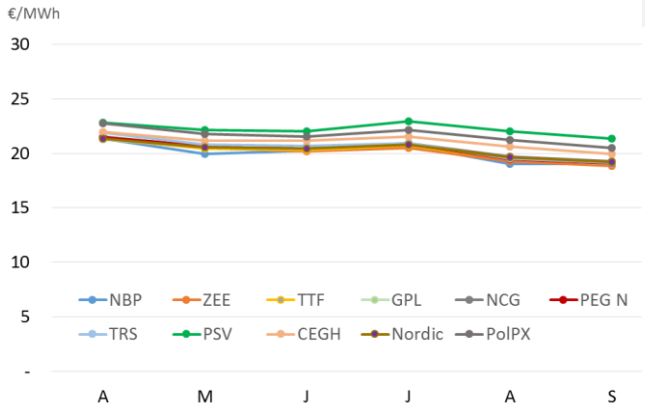

Figure 1 - Month-ahead average price at European Hubs (€/MWh)

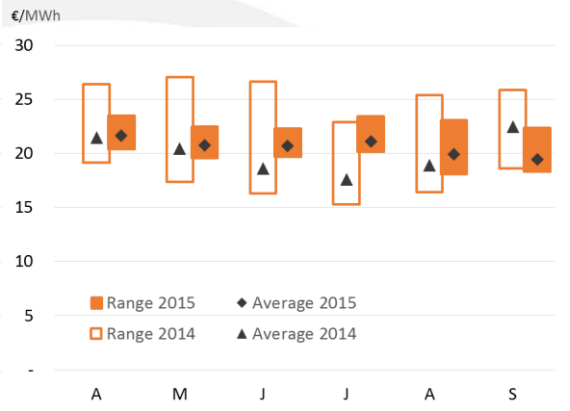

Figure 2 – Ranges and averages of the month-ahead hub prices (€/MWh)

Figure 1 shows the evolution of the month-ahead summer average prices at different European gas hubs and figure 2 shows the maximum range and average of the month-ahead summer price for the last two summers over all the European hubs (source Bloomberg).

The average price over all hubs was slightly higher in 2015, except for September, showing a stable decreasing trend different to the one seen in the previous summer. The price range was constantly smaller than the one in summer 2014. The price convergence between the different European hubs continued with Italian PSV, Polish PolPX and Austrian CEGH remaining slightly above the other hubs. All European hubs showed a similar trend, meaning that they are basically reacting in the same direction when facing gas-related events.

Demand

> European seasonal gas demand

Total gas demand was 1,598 TWh in Summer 2015, very similar (-0.5%) to the one in the previous summer.

The average demand levels in May, July, August and September were very close to those from the previous summer. April experienced significant differences, especially in the maximum level reached, probably because of the more volatile temperatures during this month. The maximum daily demand was 25% higher in April 2015 than in April 2014.

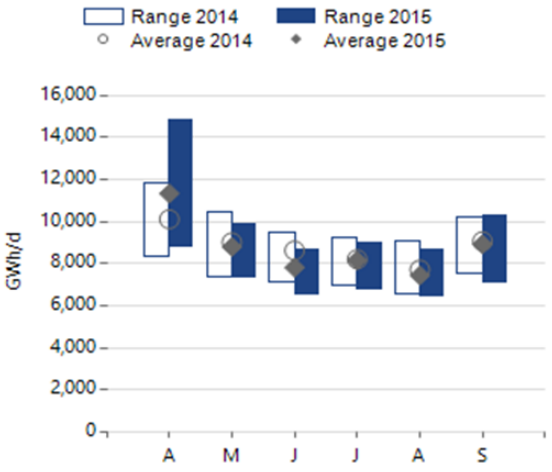

Figure 3 – Total gas demand

Figures 4 and 5 show the demand range and average on a monthly basis when split into Residential, Commercial and Industrial or Power Generation sectors, for the countries where

the demand breakdown is available.

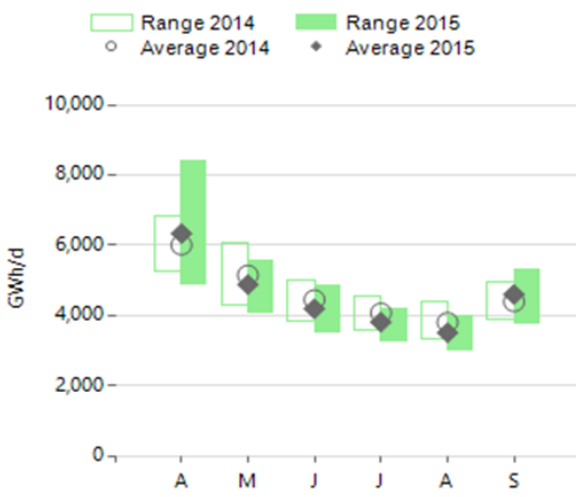

Figure 4 - Residential, Commercial and Industrial (*)

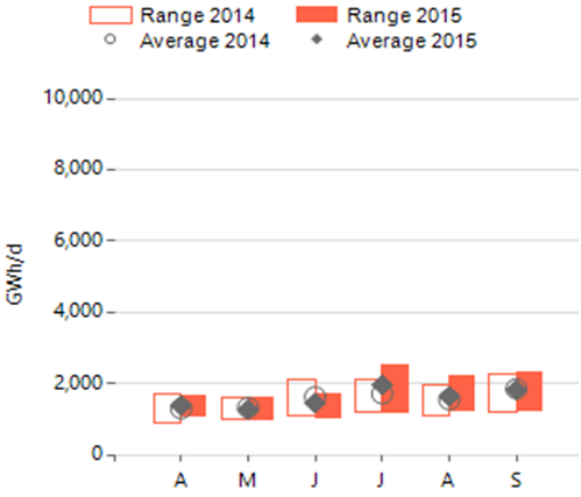

Figure 5 - Power Generation gas demand (*)

(*) These graphs use data from the countries for which demand breakdown is available (Belgium, Switzerland, Estonia, Spain, Finland, France, Greece, Croatia, Hungary, Ireland, Italy, Lithuania, Luxembourg, Netherlands, Portugal, Sweden, Slovakia, Slovenia, and United Kingdom).

> Electricity power generation from gas (TWhe)

The generation of electricity from gas has followed a significant (-28%) fall since Summer 2011.

This decrease follows both the increasing generation from RES source and the stable market preference for coal generation to the detriment of gas.

The data shows the decline in the thermal gap (the volume of power generation coming from fossil fuels) from 2011, but it looks to be stabilized during the last three summers, with 2015 marking first signs of recovery for gas to power consumption in some EU countries.

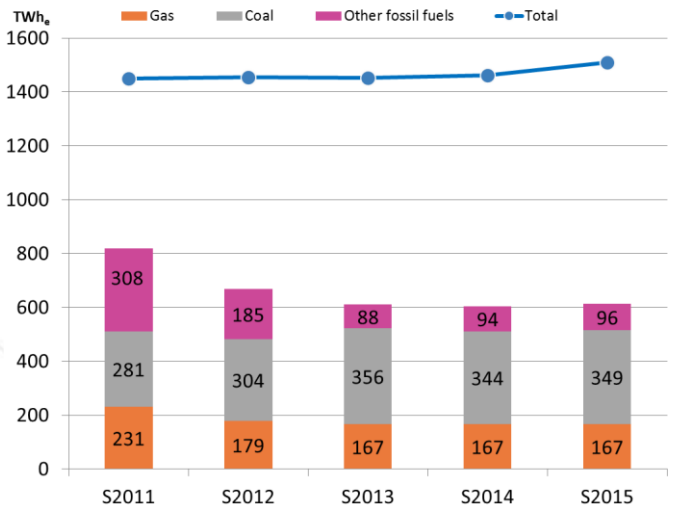

Figure 6 - Gas and coal in the electricity mix Summers 2011 - 2015

Source: own elaboration based on data provided by ENTSO-E

In absolute terms, the electricity produced from gas was 167 TWh in Summer 2015, representing 11% of the generation mix.

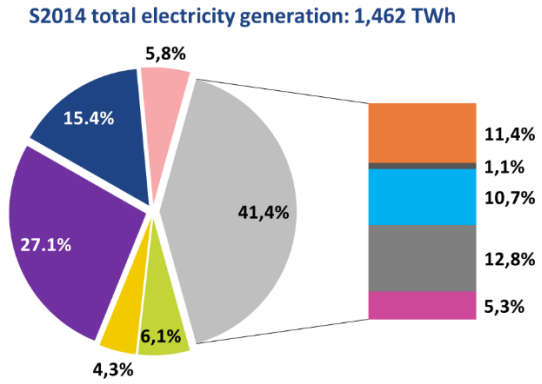

Figure 7 - Summer 2014 Electricity generation mix

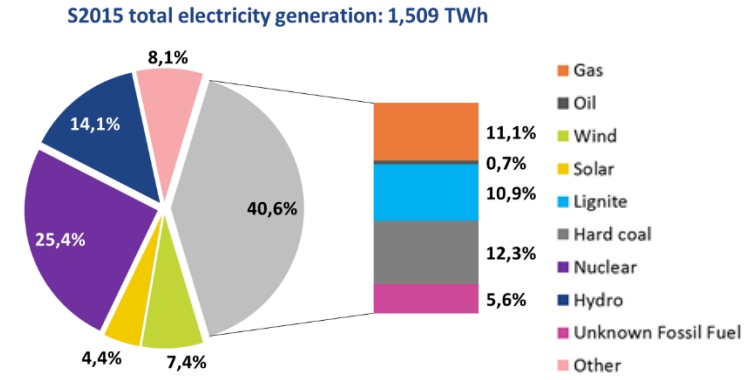

Figure 8 - Summer 2015 Electricity generation mix

As shown in the graphs above, the increase in Solar and Wind and Other sources resulted in a decrease of Hydro, Nuclear and a small decrease of the fossil fuels segment from 41.4% to 40.6%.

> Summer demand evolution 2011-2015

In summer 2010 the demand reached 1,945 TWh (not shown in the graph). Since then the demand has decreased for five years in a row, being the accumulative decrease since 2010 of 18%. The decrease rate from Summer 2014 to Summer 2015 was on a significant lower level than the previous ones.

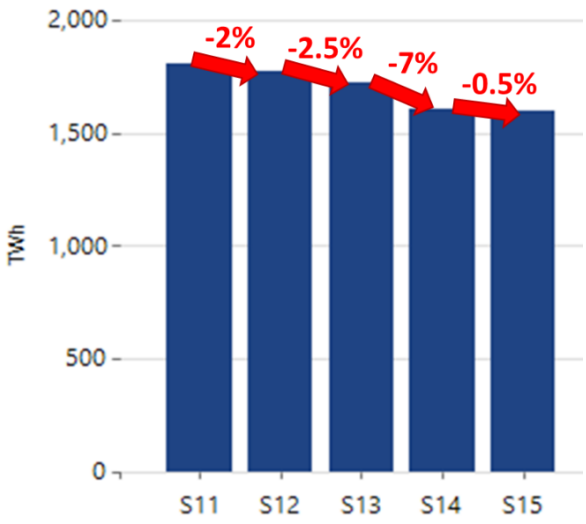

Figure 9 - Total consumption Summer 2011-2015 [3]

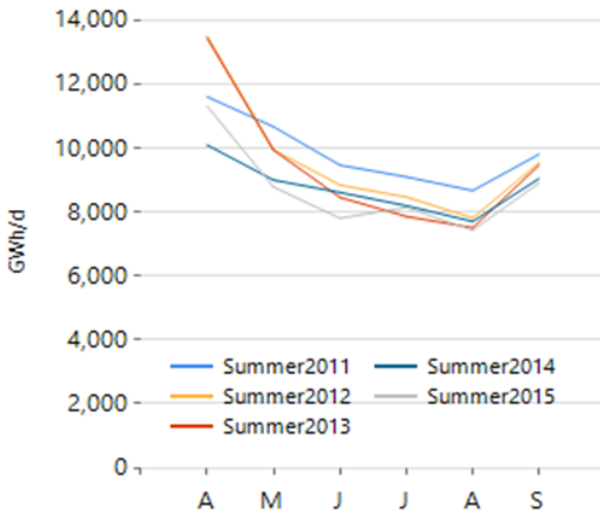

Figure 10 - Demand. Monthly average. Summer 2011-2015

[3] Please note, that the Summer demand from Summer 2014 in the UK has been updated compared to the previous edition.

By sector, for those countries where the gas demand breakdown is available, Residential, Commercial and Industrial consumption decreased (-2.0%) during Summer 2015. As shown below, demand for power generation increased (+2.9%) after a slight decrease in year 2014.

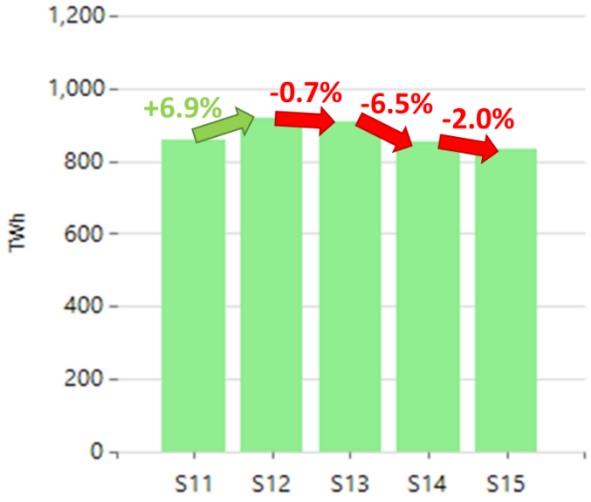

Figure 11 - Residential, commercial and industrial consumption. Summer 2011-2015 (*)

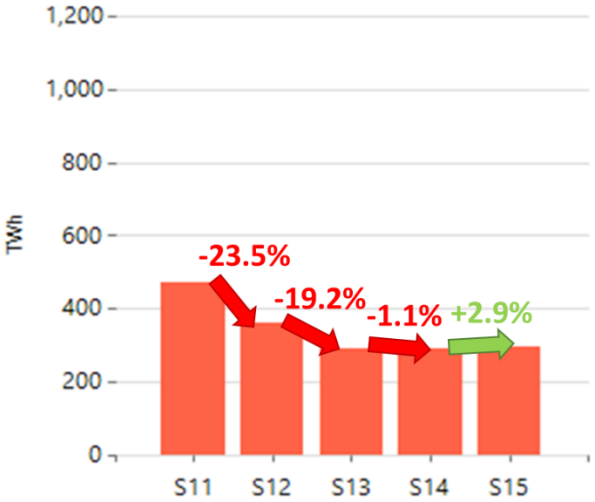

Figure 12 - Gas consumption for power generation. Summer 2011-2015 (*)

(*) These graphs use data from the countries for which demand breakdown is available (Belgium, Switzerland, Estonia, Spain, Finland, France, Greece, Croatia, Hungary, Ireland, Italy, Lithuania, Luxembourg, Netherlands, Portugal, Sweden, Slovakia, Slovenia, and United Kingdom).

> Country detail

The evolution of gas demand compared to previous summer was geographically heterogeneous with significant variations in both directions. Bulgaria, Germany, Italy, Lithuania, and Slovakia were the countries with the higher rate of gas demand increase. The countries where the rate of demand decrease was more significant are Croatia, FYROM, Luxemburg, Portugal, the Netherlands and United Kingdom.

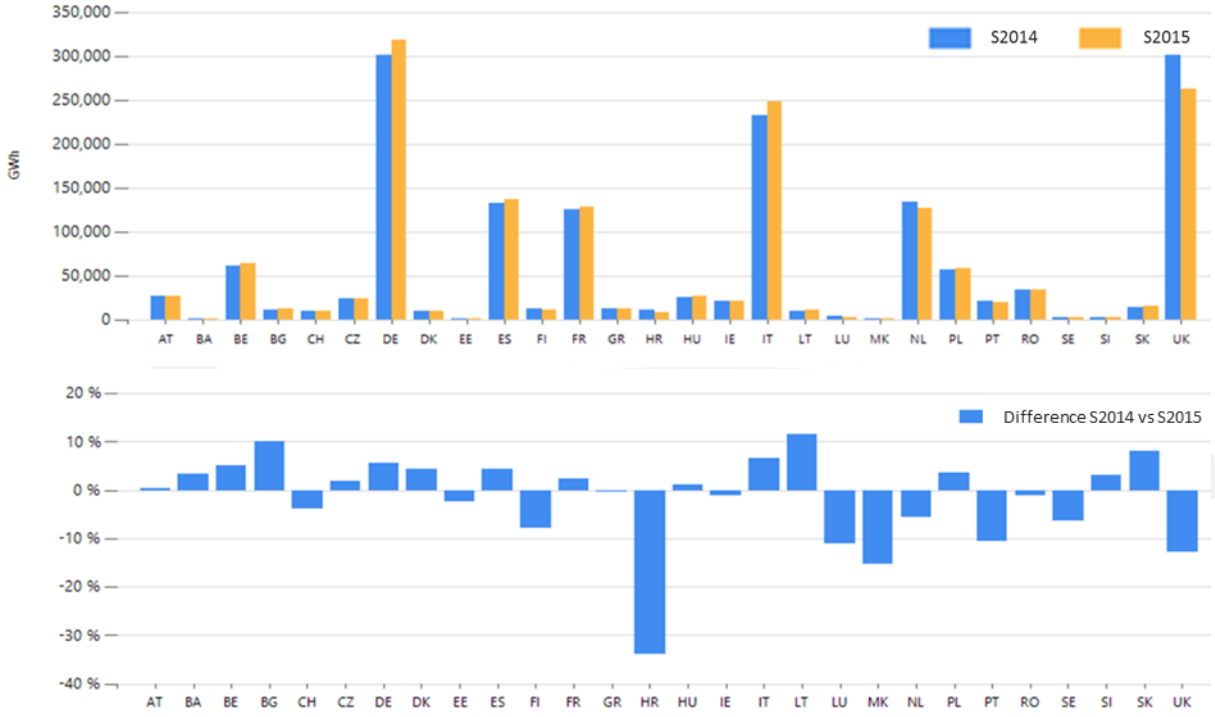

Figure 13 – Summer total gas demand. Country detail [4]

[4] No data available for Latvia (LV)

> Seasonal modulation

The pattern followed by summer demand is linked to the climatic conditions between April and September.

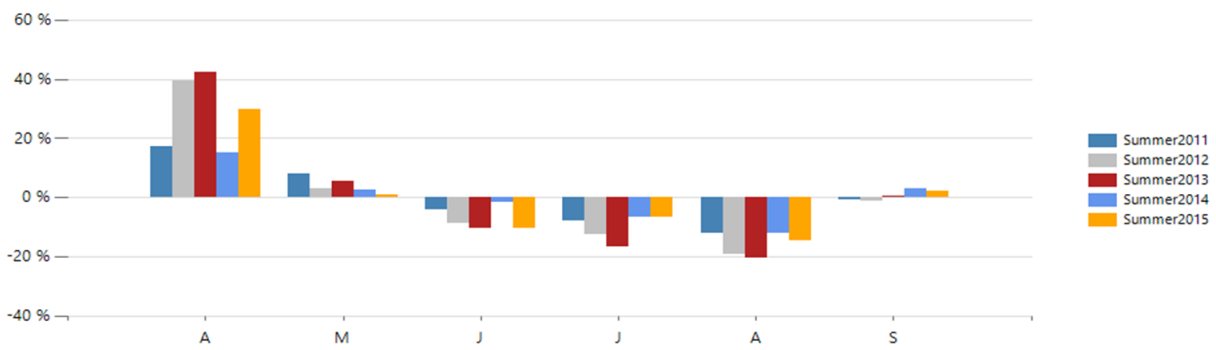

Figure 14 - Summer modulation 2011-2015

The graph above shows the deviation of the monthly average demand from the summer average for each of the last five summers:

- April has been regularly the month with the highest demand
- The gas demand in June, July and August has been systematically lower than the average
- September gas demand has been very close to the summer average during the last five years.

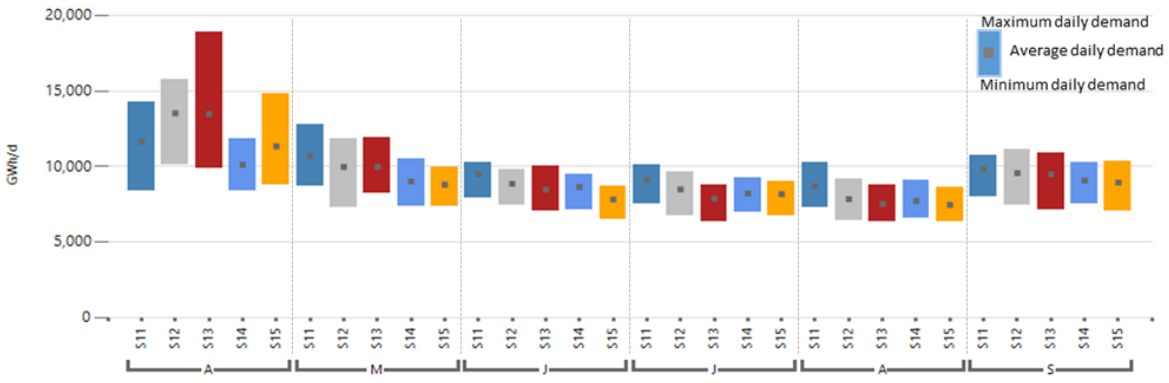

Figure 15 - Monthly demand: average and ranges

Figure 15 shows the monthly variation between the maximum and the minimum daily demand. Comparing the evolution of the daily average per month there has been a gradual decrease in the summer gas demand, since 2009 (not shown in the graph). The trend followed in the last years continued decreasing between 2014 and 2015, except for the month of April, probably due to the different weather conditions of this month during the different years.

Supply

> European seasonal gas supply

Figure 16 shows the evolution of the aggregated gas supply in Europe during the Summer 2015.

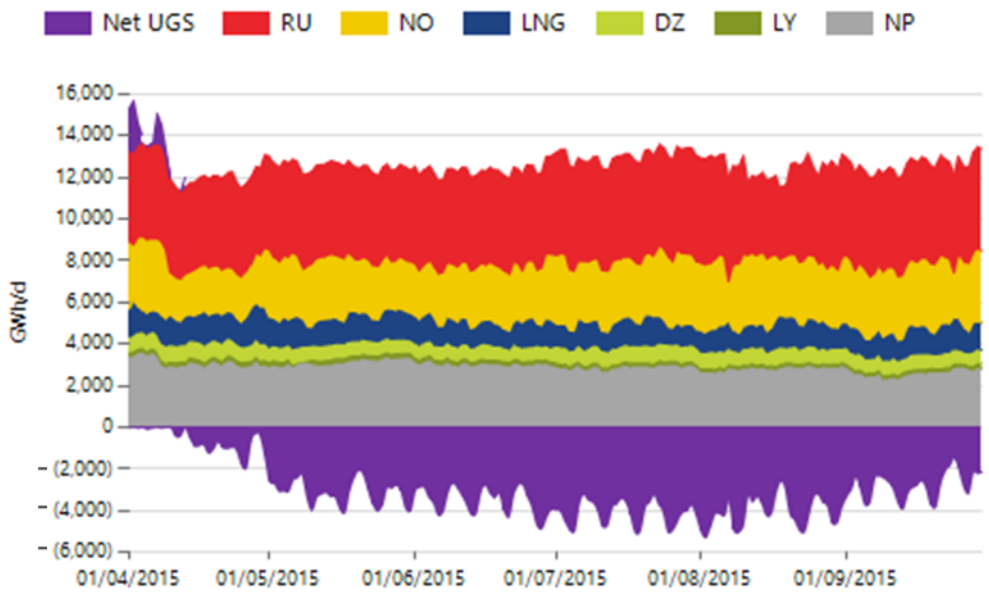

Figure 16 - Summer 2015 supply profile

The next graphs give an overview of Imports and National production supply shares during the summers 2015 and 2014 in both absolute and relative terms.

The total summer supply in 2015 was 2,305 TWh.

Figure 17 shows the seasonal supplies by source for the last two summers in absolute figures. The decrease in the production of the Groningen field due to the cap was the most noticeable reason for the decrease seen in the national production (-15%).

Imports from Norway performed a considerable increase of (+18%), as did imports from Russia (+11%). There was also a slight increase in Algerian imports (+6%) and LNG (+8%).

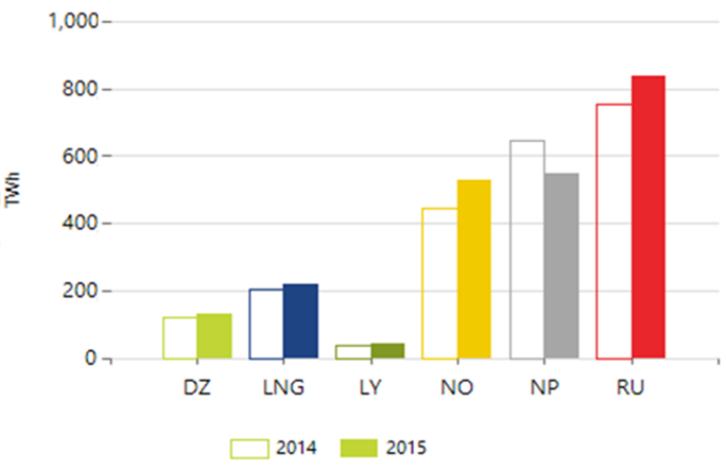

Figure 17 - Seasonal supply

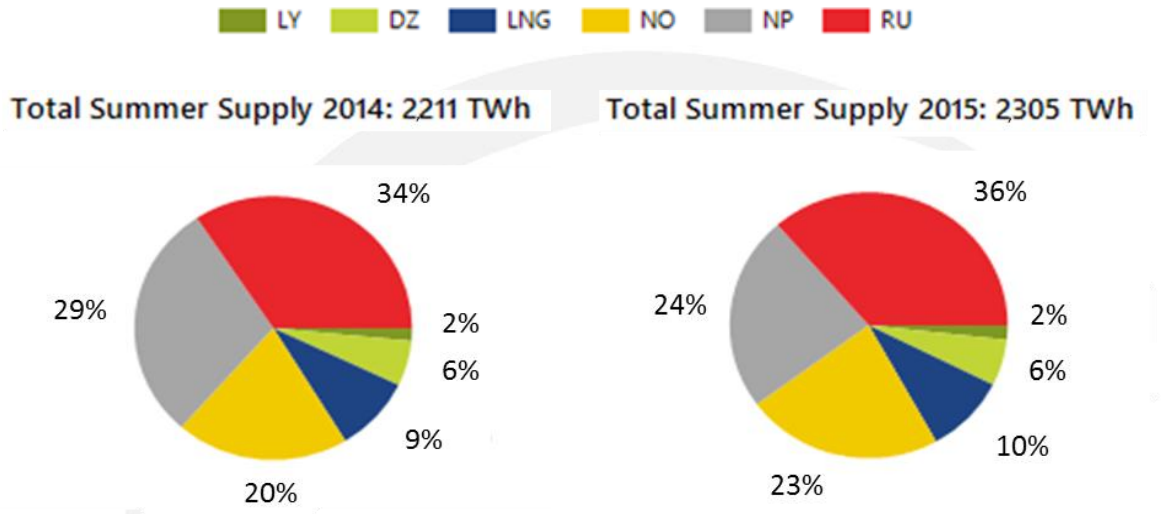

Figure 18 - Supply shares. Summer 2014

Figure 19 - Supply shares. Summer 2015

Indigenous production decreased notably for second year in a row. This decrease was mostly compensated by Russian and Norwegian gas. North African gas and LNG remained at similar levels to the ones from 2014.

> Supply modulation

The following graphs illustrate for national production and each import supply source per month, the average flow and the monthly and seasonal range (between the lowest and highest daily flow of each month and for the whole summer).

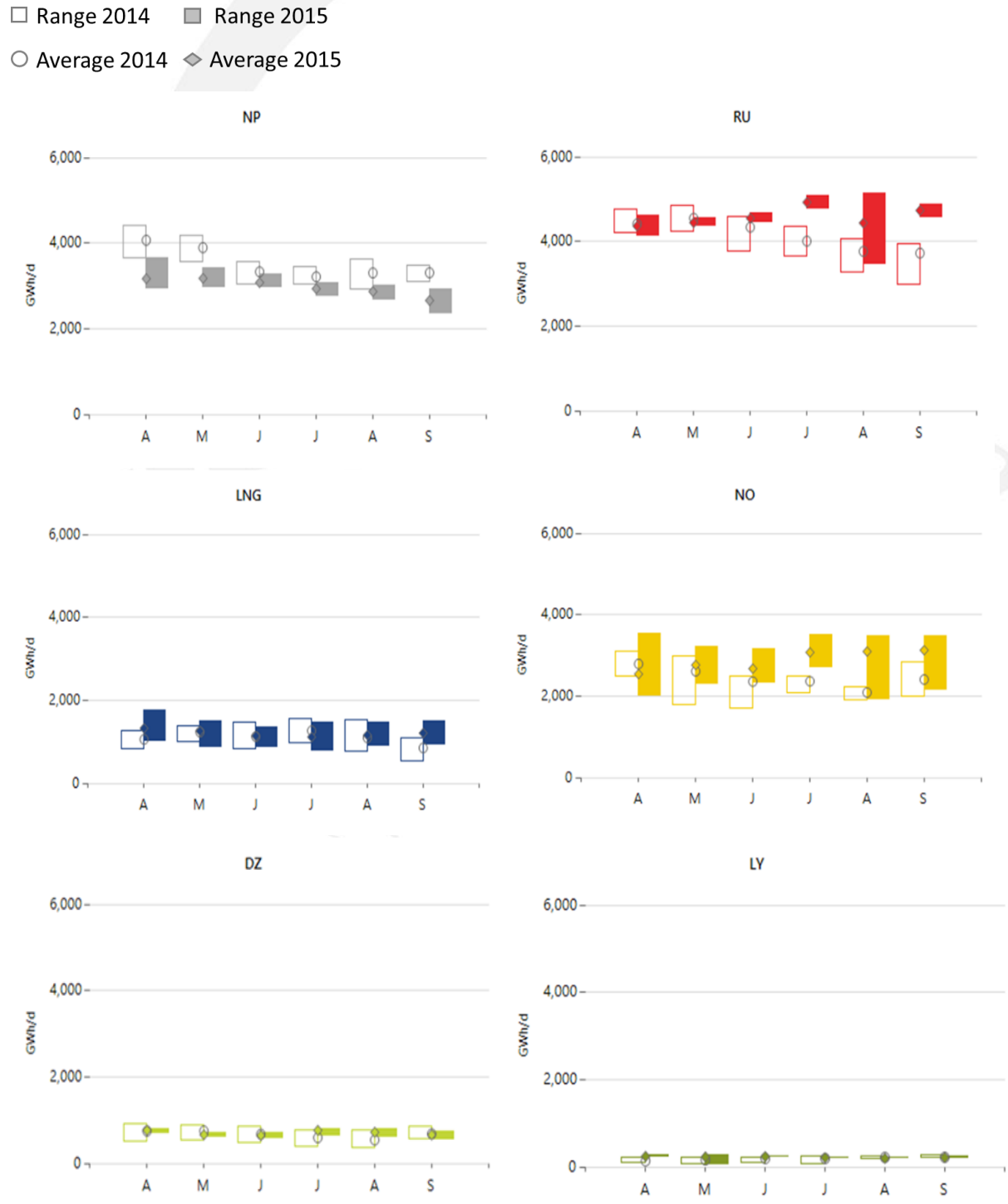

Figure 20 - Supply modulation

> Summer supply evolution 2011-2015

The following graphs show the evolution of the different supply sources both in absolute and relative terms during the last five summers.

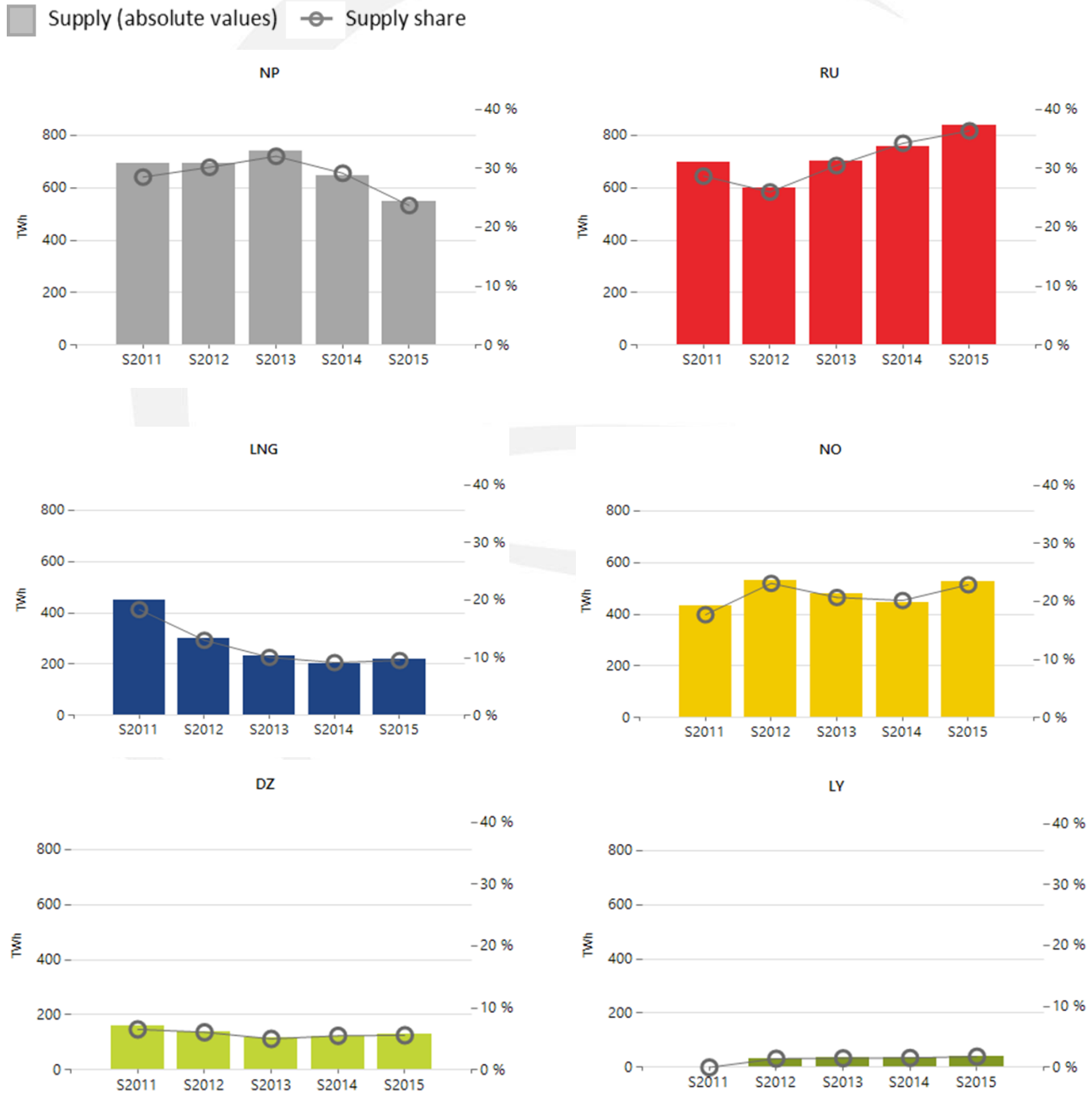

Figure 21 - Evolution of summer gas supplies 2011-2015

Underground Storages

The evolution of the injection season depends on many factors, in particular the willingness of shippers to inject gas and the actual amount of gas available for injection when considering gas demand. The first factor may be linked to price signals such as summer/winter spread unless the national regulatory framework implies some mandatory injection. The second one is linked to climatic and economic consideration having an impact on gas demand.

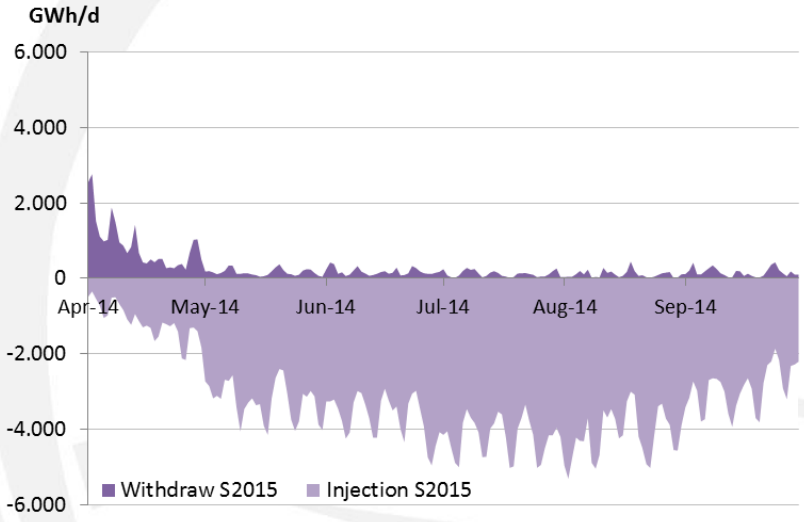

Figure 22 - UGS injection/withdraw profile EU-28 storages.

Figure 23 provides the average injection and the daily range between the lowest and highest injection for the whole Europe for every month of the Summers 2015 and 2014.

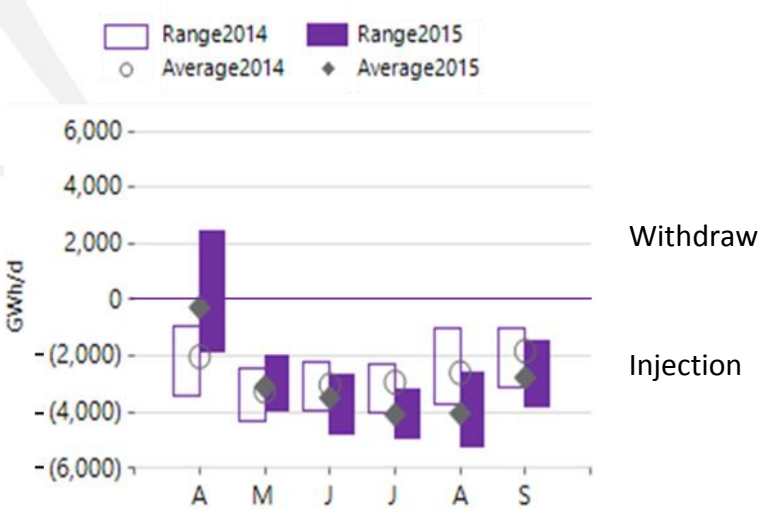

Figure 23 - UGS net injection (negative figures mean positive net injection)

The low injection rate in April and the lower stock level remaining by the end of the previous winter derived in higher injection rates after June.

The next table provides the evolution of the stock level as a percentage of the WGV during summer (source GSE AGSI platform):

Country	1-Apr-14	1-Feb-14	1-Jun-14	1-Jul-14	1-Aug-14	1-Sep-14	30-Sep-14
AT	13%	10%	20%	33%	48%	60%	67%
BE	17%	14%	22%	22%	31%	43%	54%
BG	31%	30%	30%	33%	51%	59%	71%
CZ	21%	22%	35%	52%	67%	86%	96%
DE	29%	28%	36%	45%	57%	67%	75%
DK	25%	18%	31%	42%	56%	70%	81%
FR	17%	21%	31%	43%	60%	76%	85%
ES	58%	60%	61%	62%	63%	69%	74%
HR	49%	47%	54%	65%	77%	84%	90%
HU	23%	21%	24%	28%	33%	39%	48%
IT	35%	42%	54%	65%	76%	86%	94%
LV	34%	25%	21%	37%	54%	75%	87%
NL	10%	22%	40%	56%	75%	87%	98%
PL	47%	43%	49%	61%	75%	88%	95%
PT	51%	48%	53%	49%	42%	50%	47%
SK	20%	15%	21%	32%	47%	61%	71%
UK	19%	18%	28%	49%	69%	88%	86%
EU Total	**26%**	**28%**	**37%**	**48%**	**61%**	**73%**	**81%**

Figure 24 - Stock level (%WGV)

Figure 25 compares the stock level evolution curve of the last five summers (source AGSI).

Having started form a lower level than the previous summers (except for S2013), 26% on the 1st April, the stock level increased enough to reach 81% by the end of September.

For many operators, the injection season continued in October 2015.

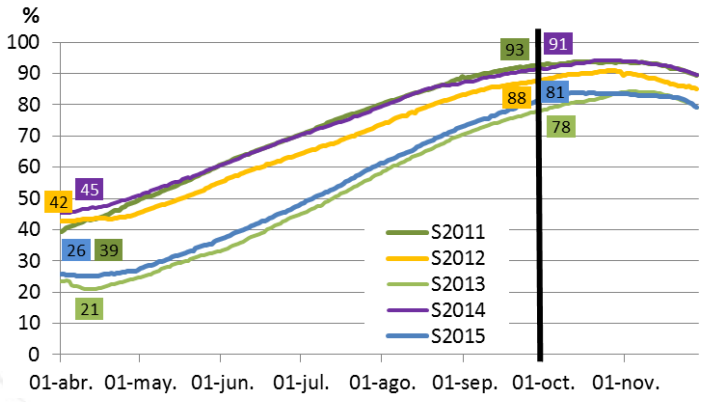

Figure 25 - Evolution of stock level. Summers 2011-2015 (Source AGSI)

	30-sep	maximum stock level	
S2011	93%	94%	16/10/2011
S2012	88%	91%	26/10/2012
S2013	78%	85%	03/11/2013
S2014	92%	94%	23/10/2014
S2015	81%	84%	13/10/2015

Figure 26 - Stock level: 30 Sept vs. max Stock level (Source AGSI)

Figure 26 shows the stock level on the 30th September in comparison with the maximum stock level setting the end of the injection season. The maximum stock level reached in 2015 was the lowest of the last years.

Transported volumes

The overall transported gas at the EU aggregated level is the sum of gas demand, exports and injection for each month.

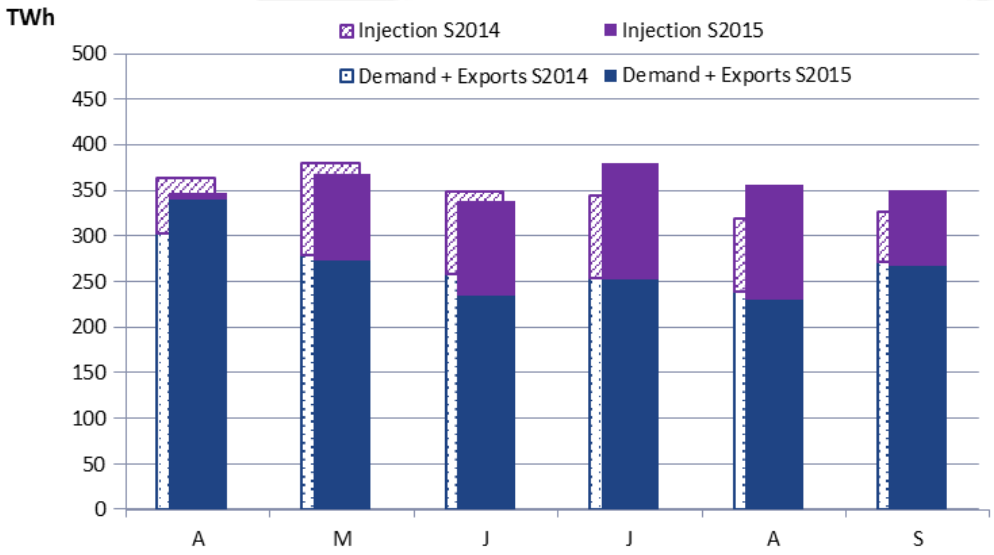

Figure 27 - Transported gas

Figure 27 shows the transported volumes during Summer 2015 in comparison with those of the previous year. Total transported volumes from April to September in 2015 (2,254 TWh) were 3.6% higher compared to the ones of 2014 (2,176 TWh).

The transported volumes during April, May and June were lower than the ones from the previous summer, while they turned to be higher from July to September due to an increase in the UGS injection.