entsog

european network
of transmission system operators
for gas

European Ten Year Network Development Plan

2010 - 2019

23 December 2009
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Foreword

It gives us great pleasure to welcome you to the inaugural European Ten Year Network Development Plan 2010-2019 of the European Network for Transmission System Operators for Gas (ENTSOG). In producing this plan, ENTSOG begins its important role in the development of the internal market for natural gas and the sound evolution of the transmission network in Europe as foreseen by the recently approved Third Energy Package.

We publish this plan amid the context of a world which is rapidly changing the way in which it sources, transports and uses its primary energy. Natural gas, however, plays an increasingly important role in the energy mix of the EU and a number of priorities must be dealt with in the coming years.

Firstly, declining indigenous production and increasing demand means the transmission network must be able to accept and transport new and ever more diverse sources of gas from its delivery point to where it is needed.

Second, as Europe pushes hard to embrace cleaner forms of energy, natural gas will be key to Europe replacing older, carbon intensive forms of electricity generation. Not only will gas power stations fill much of this generation deficit directly and relatively quickly, but it will also provide the necessary backup for the periods when renewables such as wind turbines are not able to generate.

Finally, we sincerely hope that you find the Plan both interesting and informative and that it will promote further communication between stakeholders and transmission operators. We therefore welcome all views on this Plan and look forward to significant dialogue during 2010 under which we can improve this document, making it ever more valuable to all of us.

Jacques Laurelut
GTE President & GTE+ Transition Manager

Stephan Kamphues
ENTSOG President

Brussels, December 2009

Executive Summary

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In 2008 GTE+, the interim organisation set up to facilitate the goals of the Third Energy Package, began the process of developing the first European Ten Year Network Development Plan with its Capacity Development Report (CDR). The CDR served as a basis for the stakeholder dialogue to discuss European demand and supply scenarios.

In July 2009 the Demand Scenarios vs. Capacity Report (DSCR) was developed comparing demand scenarios against capacity development. The stakeholder dialogue was used to discuss the next step, the development and inclusion of supply scenarios to produce this European Ten Year Network Development Plan 2010-2019 of the European Network for Transmission System Operators for Gas (ENTSOG), comparing supply and demand scenarios against capacity development.

This plan provides the first pan European view of supply, demand and capacity development from the perspective of Europe's gas transmission network operators.

An ENTSOG Peak Day Demand Scenario and an ENTSOG Potential Supply Scenario (which covers existing capacities, capacities for which the final investment decision has been taken and in addition capacities of mature projects) were developed, showing the following main results in the time range from 2010 to 2019:

- An increase of European pipeline import capacities of 19%
- An increase of European entry capacity from LNG terminals of 47%
- A decrease of European indigeneous national production deliverability of 24%
- An increase of European storage deliverability of 34%
- An increase of the European aggregated peak day demand scenario of 12%
- An increase of an indicative measure for the development of interconnection capacities within Europe of 11%
- An increase of the sum of the aggregated figures for pipeline import capacity, LNG import capacity, national production deliverability scenarios and storage deliverability scenarios of 17%

ENTSOG would like to stress that a number of TSOs were not yet able to revise their demand scenarios in the light of the economic downturn.

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A model was introduced to conduct a potential demand and supply scenario vs. capacity analysis. For most countries this analysis shows adequated interconnection and entry capacities to cover the peak day demand. Amongst others, a potential demand vs. entry capacity shortcoming is identified from 2014 in the region Denmark / Sweden.

As well as the peak day scenarios, an ENTSOG Annual Demand Scenario and an ENTSOG Potential Supply Scenario were developed showing the following main results in the time range from 2010 to 2019:

- An increase of European potential pipeline import and an increase of European potential import via LNG terminals as in the ENTSOG Peak Day Potential Supply Scenario (infrastructure-based scenario).
- A decrease of European indigeneous production of 32%
- An increase of the overall European annual potential supply scenario of 8% over the whole period; with an initial increase to 680 bn Nm^3/year in 2015 and a subsequent decrease to 656 bn Nm^3/year.
- An increase of the ENTSOG Annual Demand Scenario by 14%
- A decrease of the "headroom" (difference between the ENTSOG Annual Potential Supply Scenario and the ENTSOG Annual Demand Scenario) from 88 in 2010 to 62 bn Nm^3/year in 2019.

ENTSOG would like to point out that the Annual Potential Supply Scenario is infrastructure-based – whether gas is available "upstream" is not taken into account. Futhermore, the Potential Supply Scenario is based on existing infrastructure, projected infrastructure with final investment decision taken and mature projects as informed by the respective national TSOs (this includes notably Nord Stream and LNG terminal projects).

Moreover, an annual envelope scenario was developed which includes in addition well-known pipeline import projects based on publicly available annual capacity data at face value. This results in an increase of overall potential supplies including well-known pipeline projects by 25% from 608 bn Nm^3 in 2010 to 760 bn Nm^3/year in 2019. Taking this into account, the "headroom" would increase from 88 bn Nm^3/year to 166 bn Nm^3/year.

European stakeholders are welcome to comment on this plan and to participate in the 2010 stakeholder dialogue to prepare the second ENTSOG European Ten Year Network Development Plan 2011 - 2020.

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1. Introduction

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Background

The objective of this ENTSOG European Ten Year Network Development Plan 2010-2019 (TYNDP) is to describe the foreseen developments of the European gas transmission capacities whilst analysing the ability of the European gas transmission network to meet the requirements of the European Gas Market.

Three project phases were defined to reach this objective:

- A Capacity Development Report (CDR) until November 2008
- A Demand Scenarios vs. Capacity Report (DSCR) until July 2009
- A European Ten Year Network Development Plan until December 2009

A stakeholder dialogue was conducted from November 2008 to December 2009 as an integral part of the development of the TYNDP.

In 2009, three stakeholder workshops have been conducted to present results and to seek input from market participants to the development of the required scenarios on gas demand and supply.

This TYNDP is the result of the third and last phase of the project. It contains an update of both DSCR and CDR and includes supply scenarios in addition to the capacity development and demand scenarios provided in the previous project phases.

Participating TSOs

This report has been developed based on inputs received from 58 TSOs or ministries of 33 European countries. In the table below their names are listed without the legal form together with abbreviations of their names that are used for space saving purposes in some tables of this document. In addition, the countries of their head offices and the respective country codes used in this document are listed. The country codes are based on ISO 3166.

Country	Country Code	TSO	TSO Abbr.
Albania	AL	Ministry of Economy, Trade and Energy	
Austria	AT	BOG GmbH	BOG GmbH
		OMV Gas GmbH	OMV Gas GmbH
		Tauern Gas Pipeline	TGL
		Nabucco Gas Pipeline International	Nabucco
Belgium	BE	Fluxys	Fluxys
Bosnia and Herzegovina	BA	BH-Gas Sarajevo	BH-Gas
		Gaspromet Pale	Gaspromet
Bulgaria	BG	Bulgartransgaz	Bulgartransgaz
Croatia	HR	Plinacro	Plinacro
Czech Republic	CZ	RWE Transgas Net	RWE TGN
Denmark	DK	Energinet.dk	Energinet.dk
Finland	FI	Gasum Oy	Gasum Oy
France	FR	GRTgaz	GRTgaz
		TIGF	TIGF
Germany	DE	Concord Power NORDAL	
		DONG Energy Pipelines	DEP
		E.ON Gastransport	EGT
		E.ON Ruhrgas Nord Stream Anbindungsleitungsgesellschaft	
		ENI Gas Transport Deutschland	ENI GTD
		EWE NETZ	EWE NETZ
		Gasunie Deutschland	GasunieD
		Gaz de France Deutschland Transport	GDFDT
		ONTRAS - VNG Gastransport	Ontras
		OPAL NEL TRANSPORT	
		Statoil Deutschland Transport	SDT
		Thyssengas	Thyssengas
		WINGAS TRANSPORT	WGT
Greece	GR	DESFA	DESFA
Hungary	HU	FGSZ FöldGázSZállító	FGSZ
Ireland	IE	Gaslink	Gaslink
Italy	IT	Snam Rete Gas	SRG
Latvia	LV	Latvijas Gaze	Latvijas Gaze
Lithuania	LT	Lietuvos Dujos	Lietuvos Dujos
Luxemburg	LU	CREOS	CREOS
Macedonia	MK	Gama	Gama
Montenegro	ME	Ministry for Economic Development	
Netherlands	NL	Gas Transport Services	GTS
		BBL Company	BBL
Norway	NO	Gassco	Gassco
Poland	PL	Gaz-System	Gaz-System
Portugal	PT	REN Gasodutos	REN Gasodutos
Romania	RO	Transgaz	Transgaz
Serbia	RS	JP Srbijagas	Srbijagas
Slovakia	SK	Eustream	eustream

Country	Country Code	TSO	TSO Abbr.
Slovenia	SI	Geoplin plinovodi	Geoplin
Spain	ES	Enagás	Enagás
Sweden	SE	Swedegas	Swedegas
Switzerland	CH	ENI Gas Transmission International	ENI GTI
		Swissgas	Swissgas
United Kingdom	UK	Interconnector UK	IUK
		National Grid	NG
		Premier Transmission	Premier Transmission
UNMIK	UNMIK	Ministry of Energy and Mining	
Projects		Nabucco	
		Poseidon Pipeline	
		Trans Adriatic Pipeline	
		White Stream	

Note that although the ISO 3166 code for the United Kingdom is "GB", it was felt more appropriate to use "UK". Where necessary the code "NI" is used to define Northern Ireland.

Country codes

In order to save space in the tables provided in this document, two-digit country codes were used. The participating TSOs' country codes are shown in the above table. In addition, the following country codes as defined in ISO 3166 are used in this document:

Country	Country Code
Algeria	DZ
Belarus	BY
Estonia	EE
Libya	LY
Morocco	MA
Russia	RU
Tunisia	TN
Turkey	TK
Ukraine	UA

Units, Rounding

Deliverability and peak day demand figures in the general tables of this document are given in Mio. Nm^3/day. Annual figures are given in billion (or bn) Nm^3/year and billion (or bn) kWh/year.

As defined in the EASEE-gas CBP 2003-001/01, the volume unit for the gas is the m^3 at 0° C and 1.01325 bar (in this document denoted as Nm^3) and the unit of the Gross Calorific Value (GCV) is the kWh/Nm^3 with a combustion reference temperature of 25 °C.

The figures were rounded to zero decimals for capacity figures larger than 1 and to one decimal for capacity figures between 0 and 1.

Document Structure

The TYNDP is composed of this main document and two attachments.

The main document describes in **chapter 2** ENTSOG Peak Day Potential Supply and Demand scenarios and in **chapter 3**, ENTSOG Annual Potential Supply and Demand scenarios. These are then compared to demand and supply scenarios of other international bodies in **chapter 4**.

Chapter 5 describes the status of a number of projects that received Trans-European Networks for Energy (TEN-E) funding.

Chapter 6 summarises the relevant gas transmission projects in the European Energy Programme for Recovery and the GTE+ Reverse Flow study developed in this context.

Chapter 7 provides an outline of capacity developments since publication of the two preceding reports CDR and DSCR described above.

Chapter 8 presents an overview of current national publications on supply, demand and capacity development

Chapter 9 provides a summary describes the way forward.

In **Attachment A** a description of capacity development, investment projects as well as demand and supply scenarios is provided on a country by country basis. This is followed by a description of a number of investment projects covering several countries.

Attachment B provides details of a European peak day analysis. This analysis includes the derivation of cross-border capacities, a description of the European peak day analysis methodology and a European capacity usage scenario developed under application of this methodology.

2. ENTSOG Peak Day Scenarios

© Image courtesy of SNAM Rete Gas

In this chapter an ENTSOG Peak Day Potential Supply Scenario and an ENTSOG Peak Day Demand Scenario is developed based on the capacity development, demand and supply scenarios as provided by the ministries or TSOs in Attachment A.

In addition to the capacity development based on existing capacities and projects for which the final investment decision has been taken, the following additional entry capacities and deliverabilities are included in the figures given below.

More detailed information on the assumptions used at country level to derive this data can be found in Attachment A.

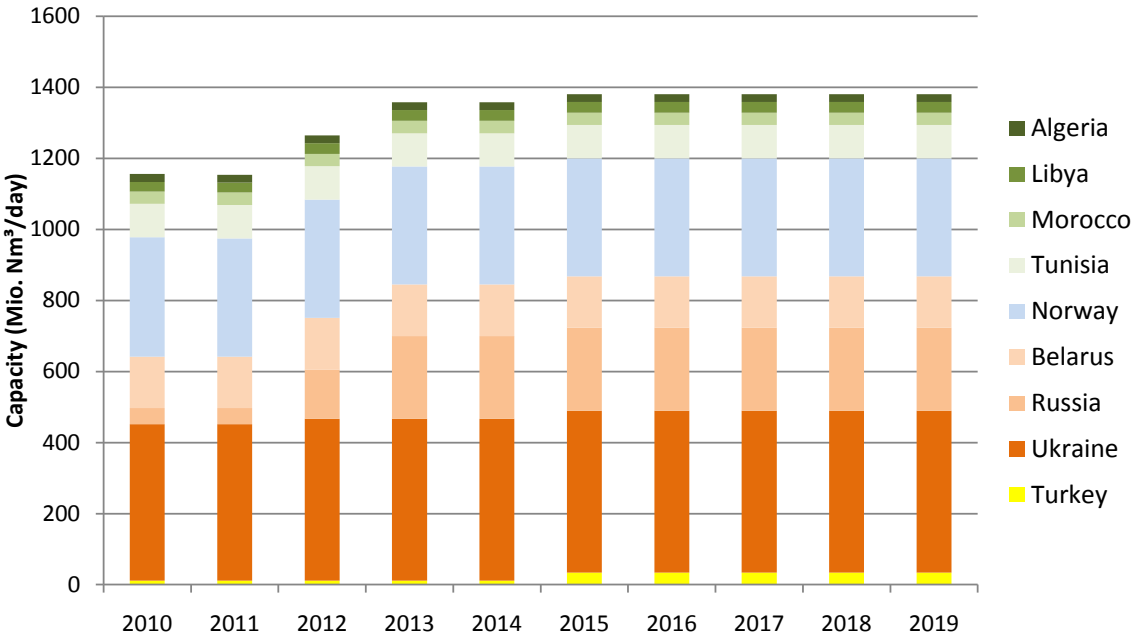
Additional Capacities and Deliverabilities Based on Assumptions for Mature Project

Mio. Nm^3/day	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
France, LNG	0	0	0	0	0	54	54	59	59	59
France, Storage	0	0	0	0	0	25	28	42	40	40
Germany, Import (Nord Stream)	0	0	94	188	188	188	188	188	188	188
Netherlands, Storage	0	0	0	0	40	40	40	40	40	40
Italy, LNG	0	0	0	15	15	15	15	15	15	15
UK, Storage	0	0	0	0	14	40	84-85	94	100	104

The following diagram shows **the development of the pipeline import capacity part of the ENTSOG Peak Day Potential Supply Scenario**.

Please note that for the import capacity from Norway the figures in the row "Applied" in Attachment B.2 have been used. Please refer to the comment in chapter B.4.22 with respect to the import capacity from Belarus to Poland.

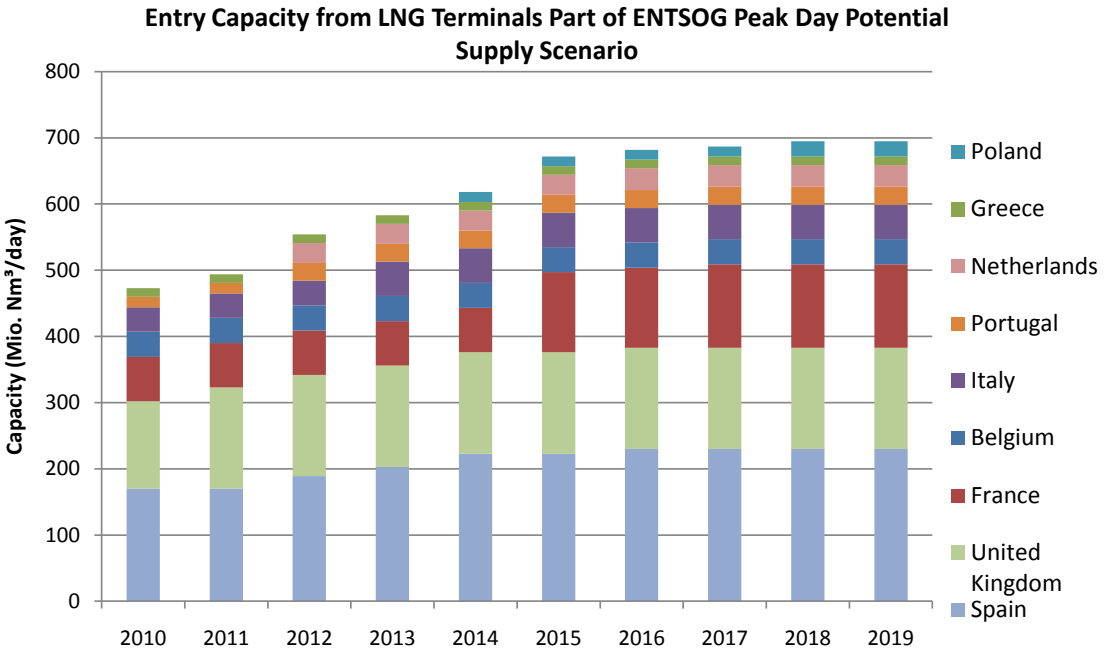
Pipeline Import Capacity Part of ENTSOG Peak Day Potential Supply



Pipeline Import Capacity Part of ENTSOG Peak Day Potential Supply Scenario										
Mio. Nm³/day	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Algeria	22	22	22	22	22	22	22	22	22	22
Libya	27	28	30	30	30	30	30	30	30	30
Morocco	35	35	35	35	35	35	35	35	35	35
Tunisia	94	94	94	94	94	94	94	94	94	94
Norway	336	333	333	332	332	332	332	332	332	332
Belarus	145	145	145	145	145	145	145	145	145	145
Russia	45	45	139	233	233	233	233	233	233	233
Turkey	11	11	11	11	11	34	34	34	34	34
Ukraine	441	441	456	456	456	456	456	456	456	456
Total	**1,156**	**1,154**	**1,265**	**1,358**	**1,358**	**1,381**	**1,381**	**1,381**	**1,381**	**1,381**
Percentage to 2010	100	100	109	117	117	119	119	119	119	119

The pipeline import capacity part of the ENTSOG Peak Day Potential Supply Scenario rises from 1,156 Mio. Nm³/day to 1,381 Mio. Nm³/day. This represents an increase of 19%.

The following diagram shows **the development of the entry capacity from LNG Terminals part of the ENTSOG Peak Day Potential Supply Scenario, by importing country**.



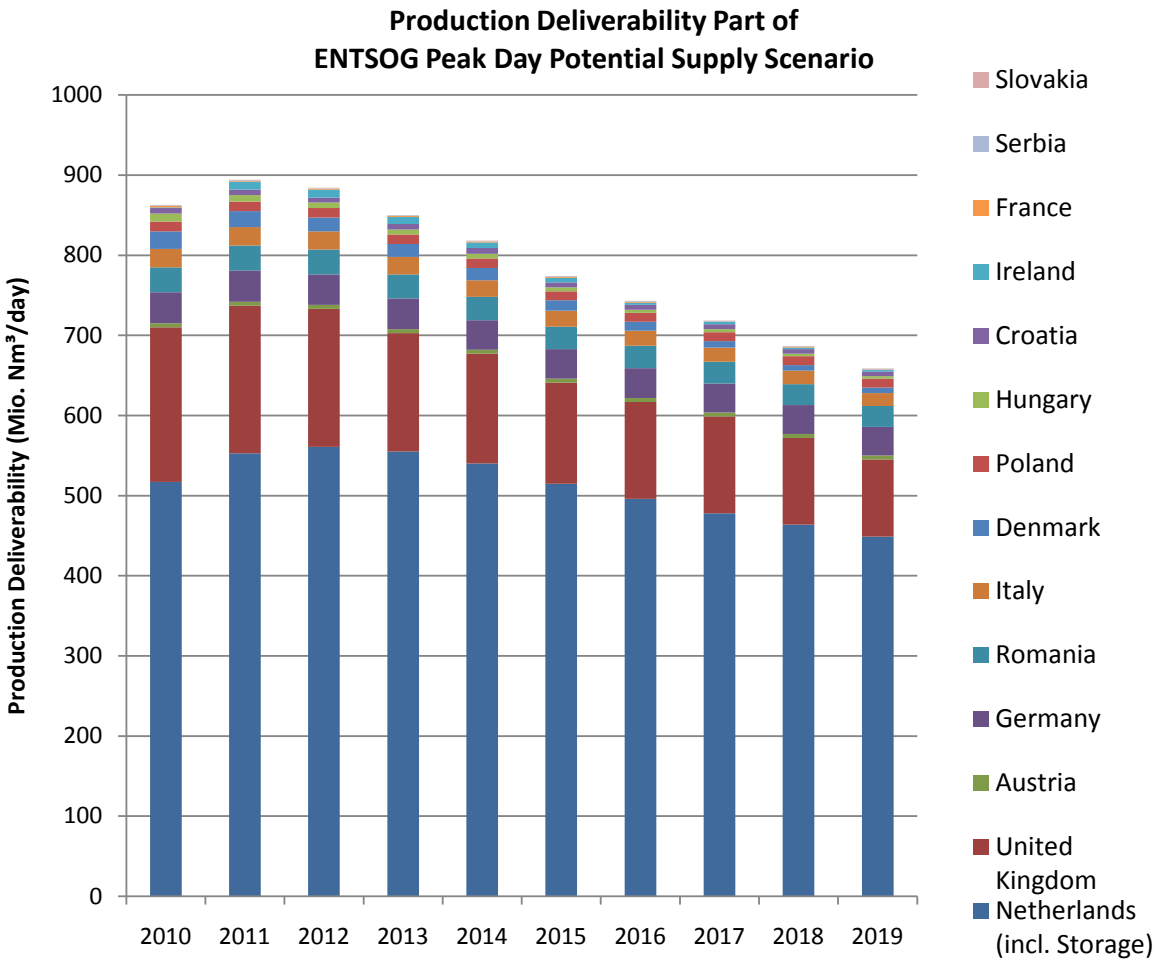
Entry Capacity from LNG Terminals Part of ENTSOG Peak Day Potential Supply Scenario										
Mio. Nm³/day	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Belgium	38	38	38	38	38	38	38	38	38	38
France	67	67	67	67	67	121	121	126	126	126
Greece	13	13	13	13	13	13	13	13	13	13
Italy	37	37	37	52	52	52	52	52	52	52
Netherlands	0	0	30	30	30	30	33	33	33	33
Poland	0	0	0	0	15	15	15	15	23	23
Portugal	16	16	27	27	27	27	27	27	27	27
Spain	170	170	189	203	223	223	230	230	230	230
United Kingdom	132	153	153	153	153	153	153	153	153	153
Total	**473**	**494**	**554**	**583**	**618**	**672**	**682**	**687**	**695**	**695**
Percentage to 2010	100	104	117	123	131	142	144	145	147	147

The entry capacity from LNG part of the ENTSOG Peak Day Potential Supply Scenario rises from 473Mio. Nm³/day to 695 Mio. Nm³/day. This represents an increase of 47%.

ENTSOG would like to stress that this part of the ENTSOG Peak Day Potential Supply Scenario is based on the information received from the respective TSOs.

Please refer to the investment database of Gas LNG Europe (http://www.gie.eu.com/maps_data/GLE/database/index.html) for extended information on LNG projects in the different project stages.

The following diagram shows **the indigenous production deliverability part of the ENTSOG Peak Day Potential Supply Scenario by country**.



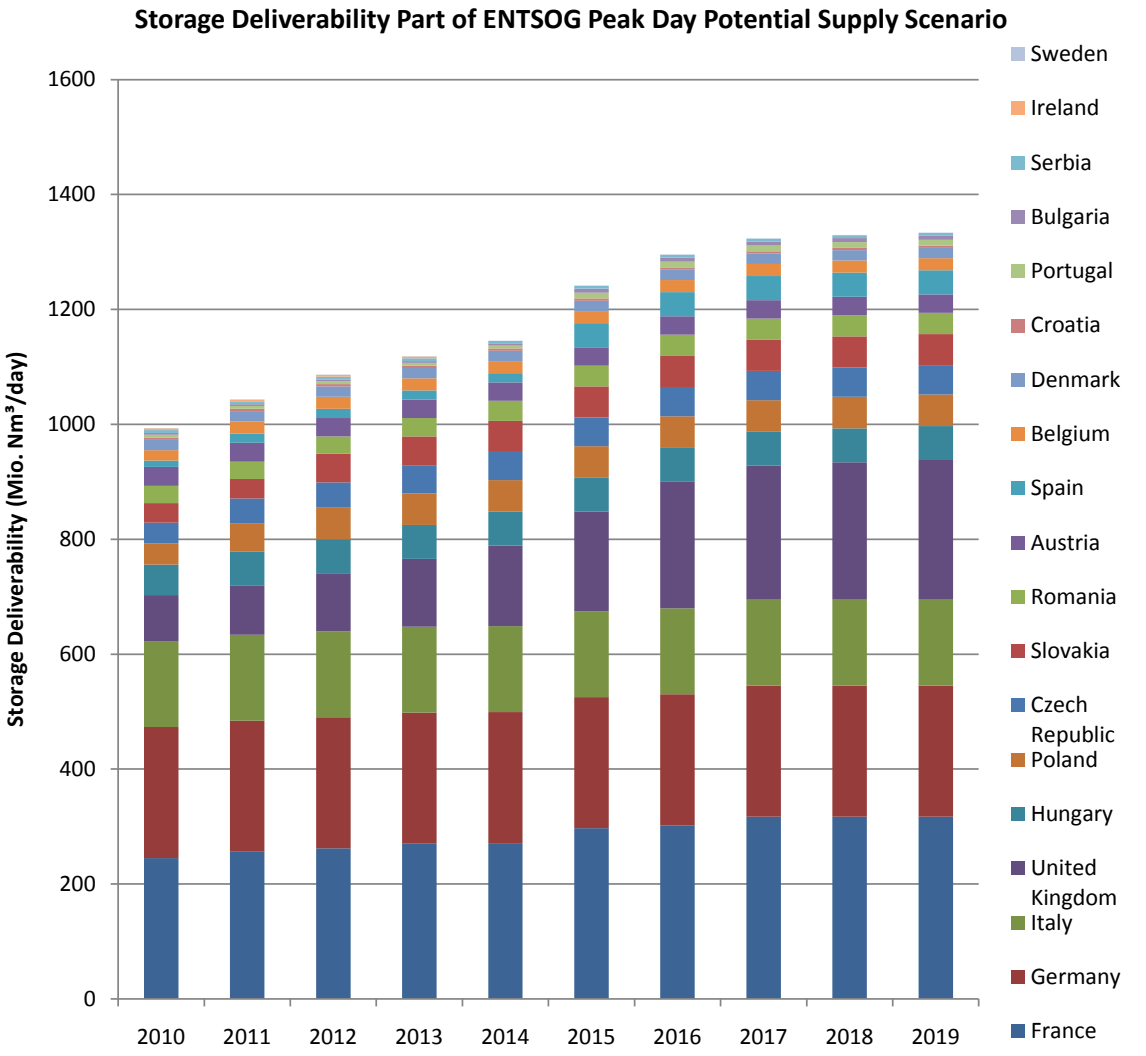
Notes:

- Netherlands: Combined figures for national production and storage deliverability were made available by GTS. These are included in this table (and not in the table on storage deliverability scenarios).

The production deliverability part of the ENTSOG Peak Day Potential Supply Scenario decreases from 863 Mio. Nm^3/day to 659 Mio. Nm^3/day. This represents a decrease of 24%.

Production Deliverability Part of ENTSOG Peak Day Potential Supply Scenario										
Mio. Nm^3/day	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Austria	5	5	5	5	5	5	5	5	5	5
Croatia	7	7	6	7	7	6	6	6	6	6
Denmark	22	20	17	16	15	13	11	8	7	7
France	2	1	1	1	1	1	1	0.4	0.4	0.4
Germany	39	39	38	38	37	37	37	36	36	36
Hungary	10	8	7	6	6	5	4	4	3	3
Ireland	0.6	10	10	9	7	6	3	3	2	2
Italy	23	23	23	22	21	20	19	18	17	16
Netherlands (incl. storage)	517	553	561	555	540	515	496	478	464	449
Poland	12	12	12	12	12	11	11	11	11	11
Romania	31	31	31	30	29	28	28	27	26	26
Serbia	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Slovakia	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
United Kingdom	193	184	172	148	137	126	121	121	108	96
Total	**863**	**894**	**884**	**850**	**818**	**774**	**743**	**719**	**687**	**659**
Percentage to 2010	100	104	102	98	95	90	86	83	80	76

The following diagram shows **the storage deliverability part of the ENTSOG Peak Day Potential Supply Scenario by country**.



Notes:

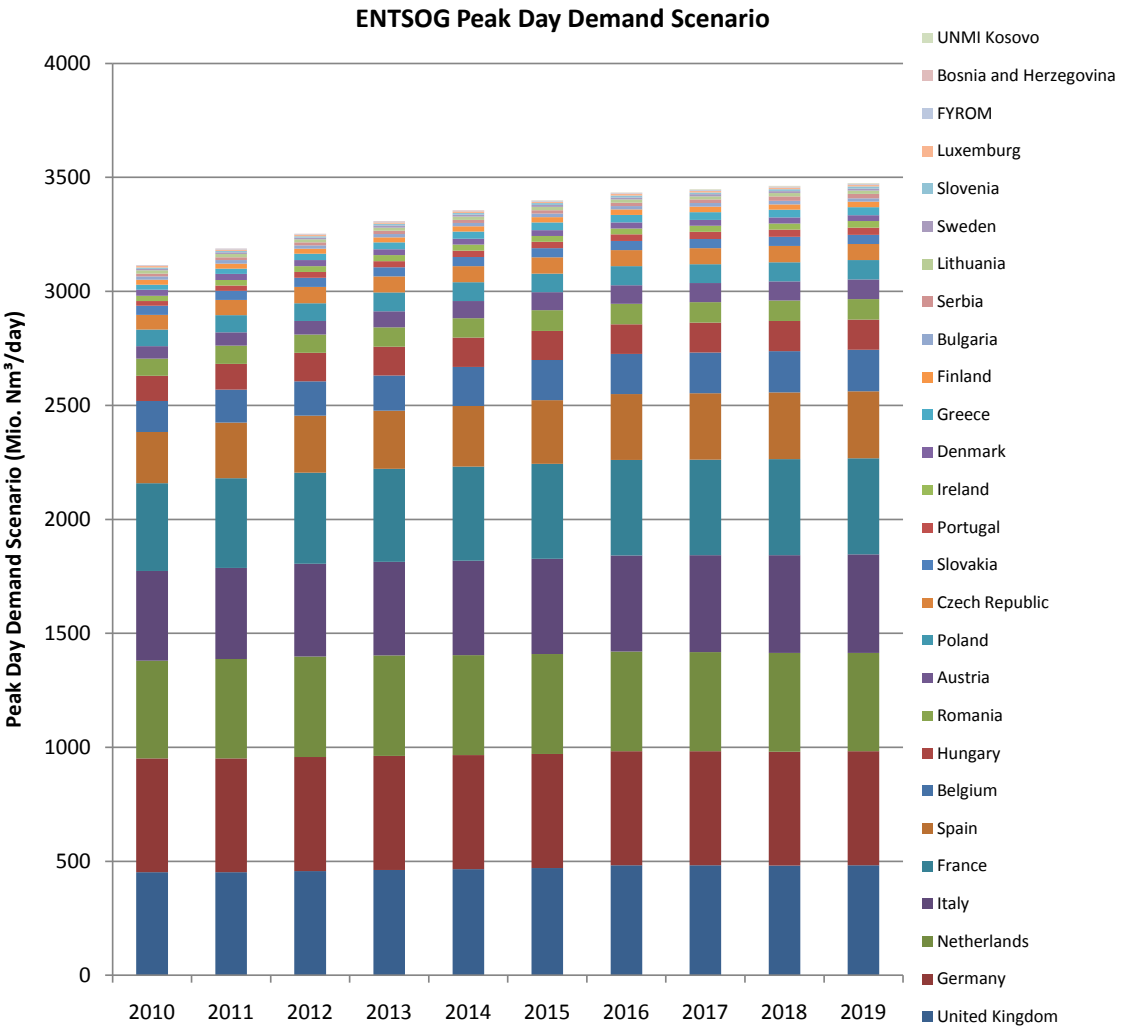
- Netherlands: GTS provided aggregated scenarios for national production and storage deliverability. These figures were used in the national production overview above and are not included here.

The storage deliverability part of the ENTSOG Peak Day Potential Supply Scenario rises from 993 Mio. Nm^3/day to 1,333 Mio. Nm^3/day. This represents an increase of 34%.

ENTSOG would like to stress that this part is based on the information received from the respective national ministries or TSOs. Please refer to the investment database of Gas Storage Europe (http://www.gie.eu.com/maps_data/GSE/database/index.html) for extended information on storage projects in the different project stages.

Storage Deliverability Part of ENTSOG Peak Day Potential Supply Scenario										
Mio. Nm³/day	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Austria	33	33	32	32	32	32	32	32	32	32
Belgium	18	21	21	21	21	21	21	21	21	21
Bulgaria	3	3	3	3	3	7	7	7	7	7
Croatia	4	4	4	4	4	4	4	4	4	4
Czech Rep	36	43	44	48	49	50	51	51	51	51
Denmark	18	18	18	18	18	18	18	18	18	18
France	245	256	262	270	271	297	302	317	317	317
Germany	228	228	228	228	228	228	228	228	228	228
Hungary	53	59	59	59	59	59	59	59	59	59
Ireland	3	3	3	3	0	0	0	0	0	0
Italy	150	150	150	150	150	150	150	150	150	150
Poland	37	49	55	55	55	55	55	55	55	55
Portugal	5	5	5	5	5	10	10	10	10	10
Romania	30	30	30	32	35	36	37	37	37	37
Serbia	5	5	5	5	5	5	5	5	5	5
Slovakia	34	34	50	51	54	54	54	54	54	54
Spain	11	16	16	16	16	42	42	42	42	42
Sweden	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
United Kingdom	80	86	101	118	140	173	220	233	239	243
Total	**993**	**1,043**	**1,086**	**1,118**	**1,145**	**1,241**	**1,295**	**1,323**	**1,329**	**1,333**
Percentage to 2010	100	105	109	113	115	125	130	133	134	134

The following diagram shows **the ENTSOG Peak Day Demand Scenario (sum of scenarios given by TSOs in Attachment A)**.



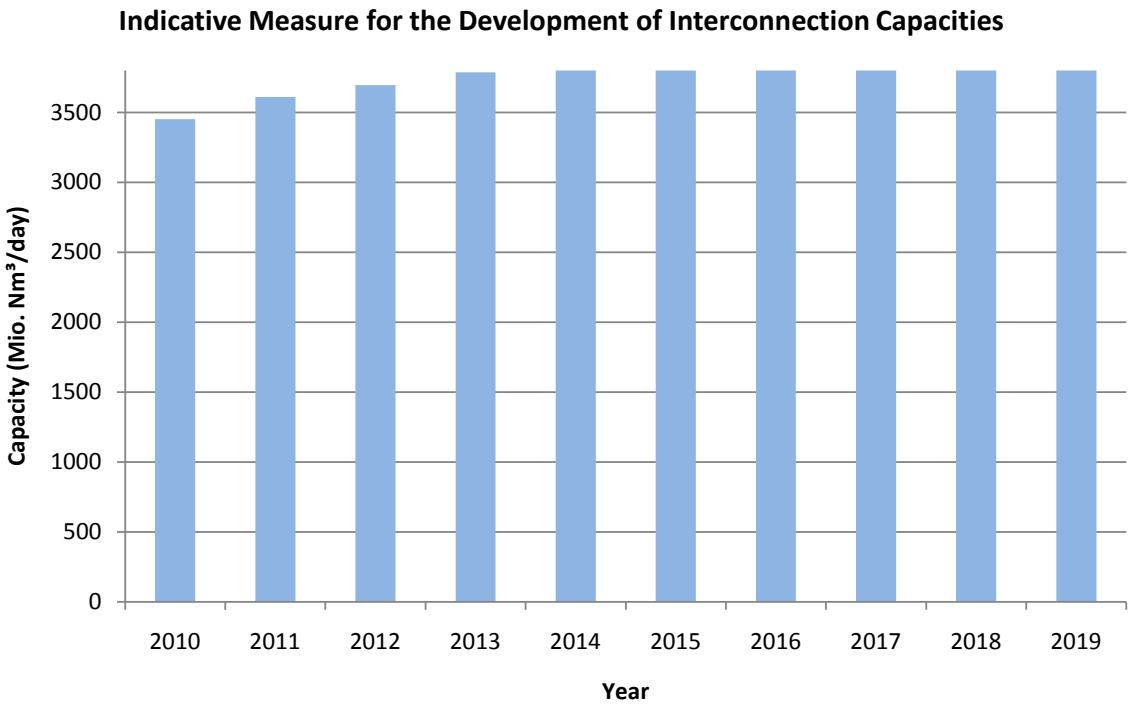
Notes:

- Lithuania: Constant extrapolation for the years 2011 to 2019 based on the 2010 value of 14 Mio. Nm^3/day

The ENTSOG Peak Day Demand Scenario rises from 3,115 Mio. Nm^3/day to 3,475 Mio. Nm^3/day. This represents an increase of 12%.

ENTSOG Peak Day Demand Scenario										
Mio. Nm^3/day	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Austria	55	58	59	71	76	79	81	83	84	86
Belgium	136	144	150	154	172	176	177	179	181	182
Bosnia and Herzegovina	1	1	1	2	2	2	2	2	2	2
Bulgaria	15	15	15	15	15	15	15	15	15	15
Czech Republic	65	66	71	71	71	71	71	71	71	71
Denmark	26	26	26	26	26	26	26	26	26	26
Finland	22	22	22	22	22	24	24	24	24	24
France	385	393	400	408	412	417	419	419	421	421
FYROM	2	3	3	3	3	3	3	3	3	3
Germany	500	500	500	500	500	500	500	500	500	500
Greece	22	24	28	30	32	33	33	34	34	35
Hungary	111	113	126	126	128	128	130	131	132	132
Ireland	23	25	26	26	26	26	26	27	27	28
Italy	394	400	407	411	414	418	422	425	429	433
Lithuania	14	14	14	14	14	14	14	14	14	14
Luxemburg	7	7	7	7	7	7	7	7	7	7
Netherlands	428	435	441	441	439	438	437	435	433	431
Poland	72	76	78	82	82	82	83	83	84	85
Portugal	21	23	26	27	28	28	29	31	32	32
Romania	75	80	80	85	85	90	90	90	90	90
Serbia	12	13	13	14	14	15	15	16	20	20
Slovakia	40	40	40	40	40	40	40	40	40	40
Slovenia	6	6	6	7	7	8	8	8	8	9
Spain	224	245	250	255	266	279	288	291	293	294
Sweden	7	7	7	9	9	9	9	9	9	9
United Kingdom	452	452	457	462	466	471	483	483	481	483
UNMI Kosovo	0	0	0	0	0	0.1	0.2	2	3	3
Total	**3,115**	**3,188**	**3,253**	**3,308**	**3,356**	**3,399**	**3,432**	**3,448**	**3,463**	**3,475**
Percentage to 2010	100	102	104	106	108	109	110	111	111	112

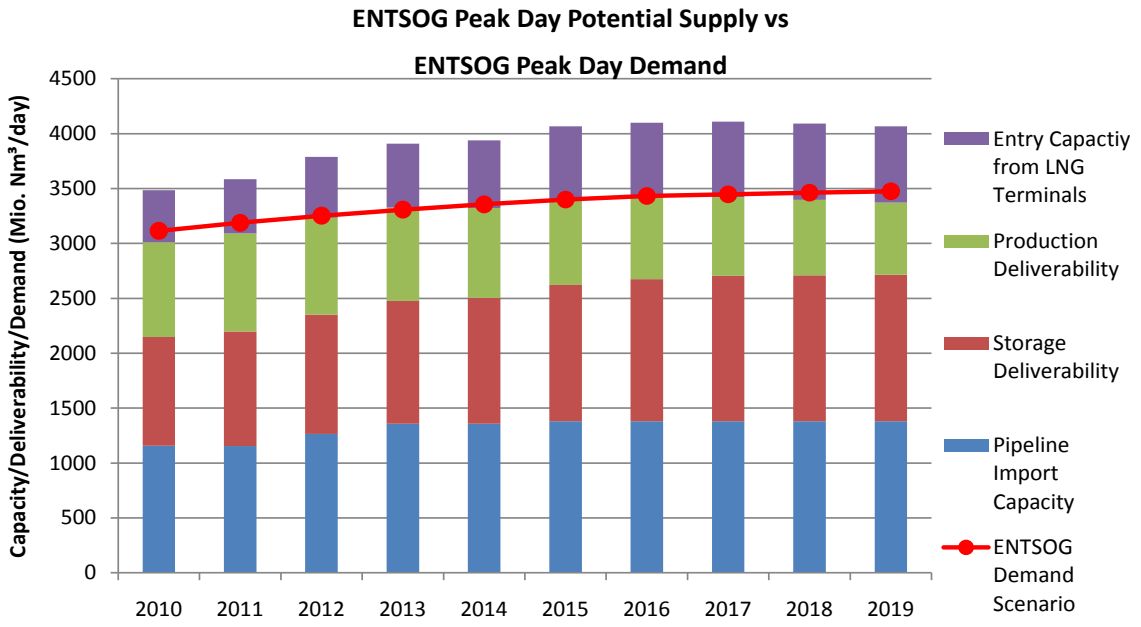
- **An indicative measure for the development of the capacities within Europe** was derived by calculating the sum of the non-confidential entry and exit capacity figures for internal interconnection points. The result is shown in the following diagram.



Indicative Measure for the development of interconnection capacities within Europe										
Mio. Nm³/day	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Total	**3,451**	**3,610**	**3,694**	**3,787**	**3,811**	**3,822**	**3,826**	**3,826**	**3,830**	**3,830**
Percentage to 2010	100	105	107	110	110	111	111	111	111	111

The indicative measure for the development of interconnection capacities within Europe rises from 3,451 Mio. Nm³/day to 3,830 Mio. Nm³/day. This represents an increase of 11%.

The following diagram shows **the ENTSOG Peak Day Potential Supply Scenario vs the ENTSOG Peak Day Demand Scenario.**



ENTSOG Peak Day Potential Supply Scenario vs ENTSOG Peak Day Demand Scenario										
Mio. Nm³/day	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Pipeline Import	1,156	1,154	1,265	1,358	1,358	1,381	1,381	1,381	1,381	1,381
Storage	993	1,043	1,086	1,118	1,145	1,241	1,295	1,323	1,329	1,333
Production	863	894	884	850	818	774	743	719	687	659
LNG	473	494	554	583	618	672	682	687	695	695
Sum	**3,485**	**3,585**	**3,789**	**3,909**	**3,939**	**4,068**	**4,101**	**4,110**	**4,092**	**4,068**
Percentage to 2010	100	103	109	112	113	117	118	118	117	117
ENTSOG Peak Day Demand Scenario	3,115	3,188	3,253	3,308	3,356	3,399	3,432	3,448	3,463	3,475

The ENTSOG Peak Day Potential Supply Scenario rises from 3,485 Mio. Nm³/day in 2010 to 4,068 Mio. Nm³/day in 2019. This represents an increase of 17%.
As described above, the ENTSOG Demand Scenario rises from 3,115 Mio. Nm³/day in 2010 to 3,475 Mio. Nm³/day in 2019.

On the aggregated level, the ENTSOG Peak Day Potential Supply Scenario is larger than the ENTSOG Peak Day Demand Scenario for all of the years 2010 to 2019, the headroom increases from 370 Mio. Nm³/day to 593 Mio. Nm³/day.

3. ENTSOG Annual Scenarios

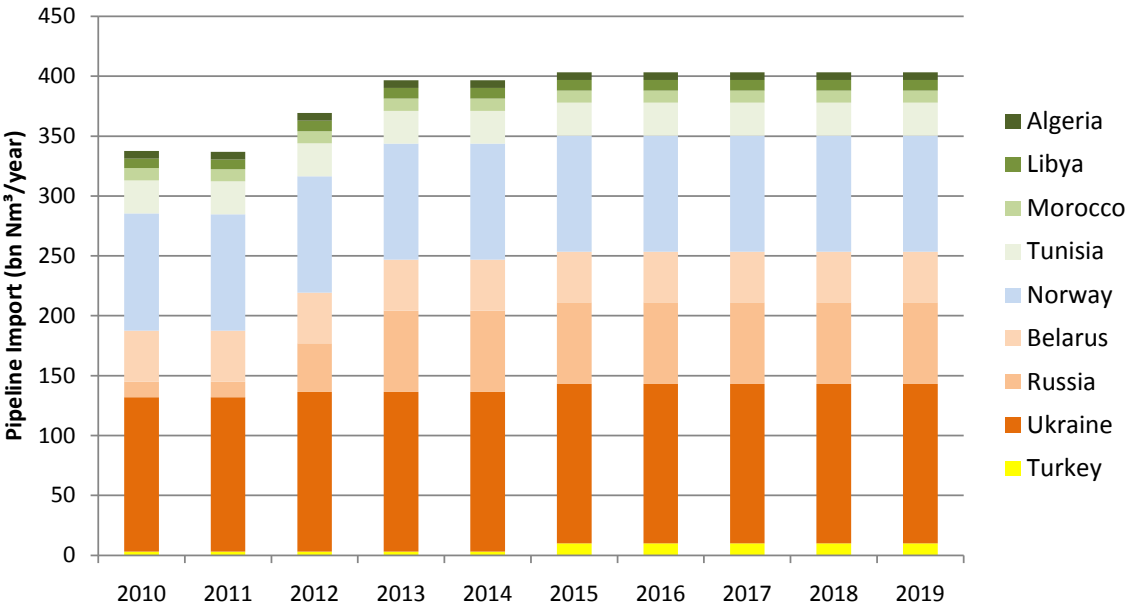
© Image courtesy of OMV Gas

In this chapter, an ENTSOG Annual Potential Supply Scenario and an ENTSOG Annual Demand Scenario are developed.

The following diagram shows **the development of the pipeline import part of the ENTSOG Annual Potential Supply Scenario.**

This is based on converted daily pipeline import supply scenarios provided by TSOs, with an assumed average annual load factor of 0.8. It should be noted that the resulting potential supply scenario is infrastructure based. It shows the projected potential input into the gas system. The availability of gas "upstream" of the European import point is not taken into account.

Pipeline Import Part of ENTSOG Annual Potential Supply Scenario

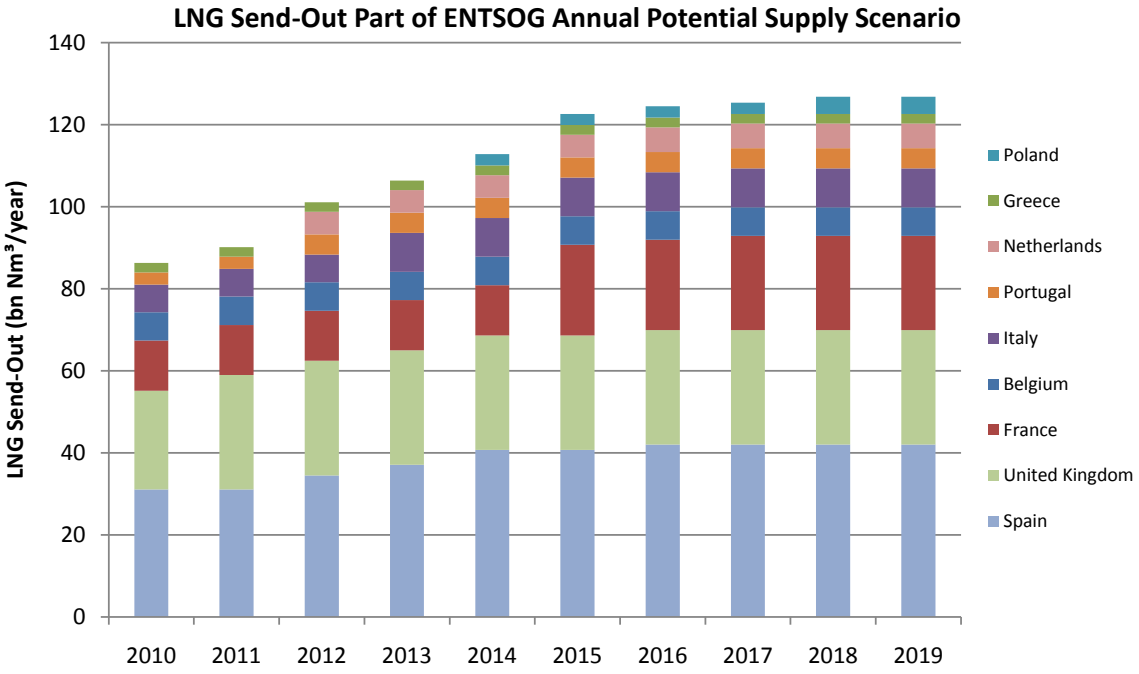


Pipeline Import Part of ENTSOG Annual Potential Supply Scenario										
bn Nm³/year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Algeria	6	6	6	6	6	6	6	6	6	6
Libya	8	8	9	9	9	9	9	9	9	9
Morocco	10	10	10	10	10	10	10	10	10	10
Tunisia	27	27	27	27	27	27	27	27	27	27
Norway	98	97	97	97	97	97	97	97	97	97
Belarus	42	42	42	42	42	42	42	42	42	42
Russia	13	13	41	68	68	68	68	68	68	68
Turkey	3	3	3	3	10	10	10	10	10	10
Ukraine	129	129	133	133	133	133	133	133	133	133
Total	**338**	**337**	**369**	**397**	**397**	**403**	**403**	**403**	**403**	**403**
Percentage to 2010	100	100	109	117	117	119	119	119	119	119

The pipeline import part of the ENTSOG Annual Potential Supply Scenario rises from 338 bn Nm³/year to 403 bn Nm³/year. This represents an increase of 19%.

The following diagram shows **the development of the LNG send-out part of the ENTSOG Annual Potential Supply Scenario.**

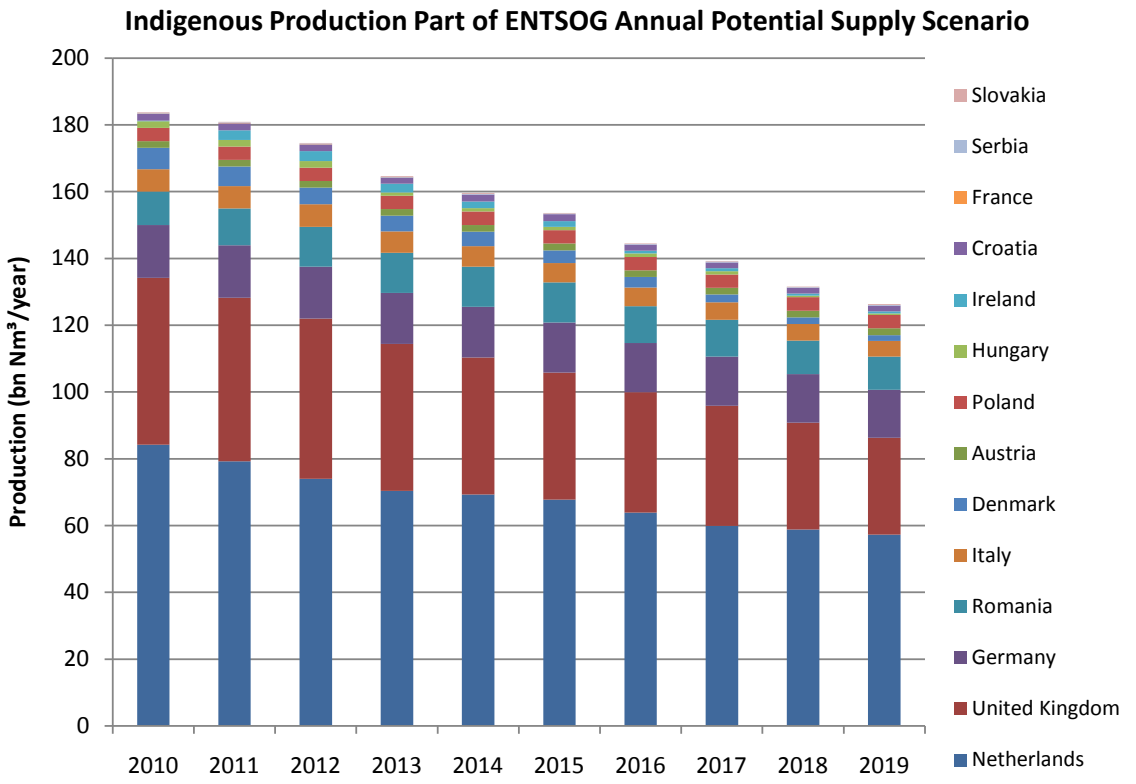
This is based on a conversion of daily LNG send-out capacities provided by TSOs with an assumed average yearly load factor of 0.5.



LNG send-out part of ENTSOG Annual Potential Supply Scenario										
bn Nm³/year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Belgium	7	7	7	7	7	7	7	7	7	7
France	12	12	12	12	12	22	22	23	23	23
Greece	2	2	2	2	2	2	2	2	2	2
Italy	7	7	7	9	9	9	9	9	9	9
Netherlands	0	0	5	5	5	5	6	6	6	6
Poland	0	0	0	0	3	3	3	3	4	4
Portugal	3	3	5	5	5	5	5	5	5	5
Spain	31	31	34	37	41	41	42	42	42	42
United Kingdom	24	28	28	28	28	28	28	28	28	28
Total	**86**	**90**	**101**	**106**	**113**	**123**	**124**	**125**	**127**	**127**
Percentage to 2010	100	104	117	123	131	142	144	145	147	147

The LNG send-out part of the ENTSOG Annual Potential Supply Scenario rises from 86 bn Nm³/year to 127 bn Nm³/year which represents an increase of 47%.

The following diagram shows **the annual European indigenous production scenario based on the individual contributions of TSOs**, which forms part of the ENTSOG Annual Potential Supply Scenario.



Notes:

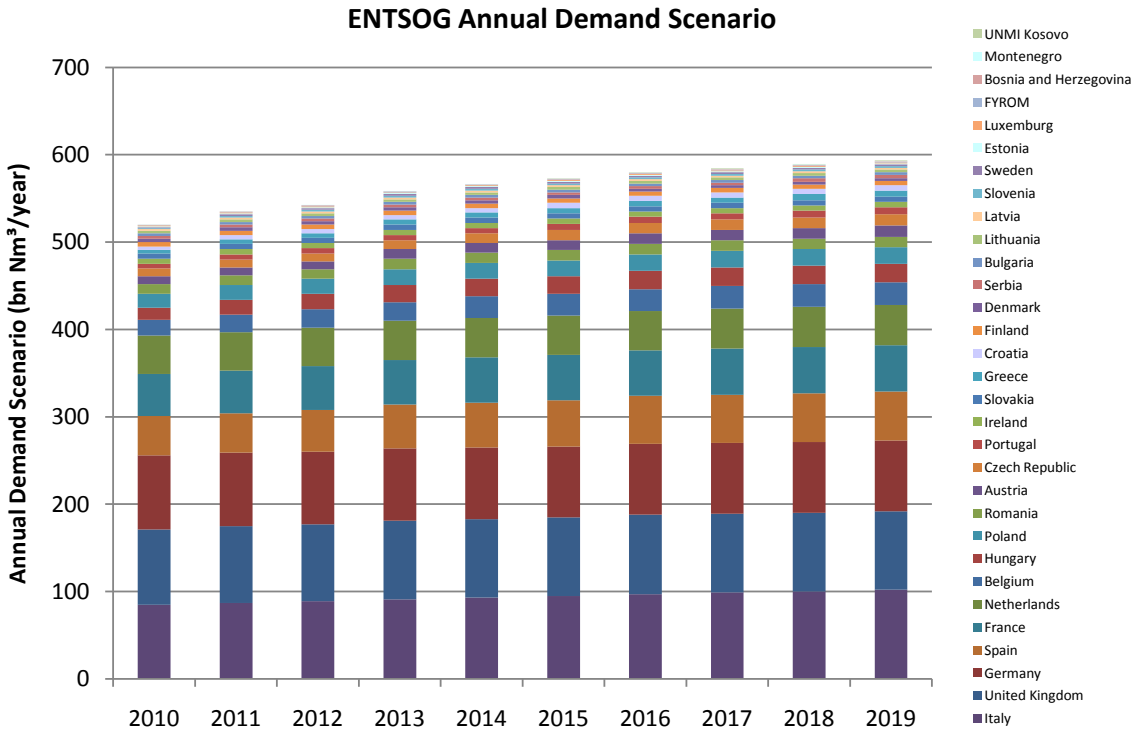
- For Croatia, Denmark, Ireland and Serbia, no annual data was provided. A replacement value was derived from daily supply scenarios with an annual load factor of 0.8.
- For Netherlands and Germany, production data were provided in energy units. They were converted to volume units with assumed average gross calorific values of 10 kwh/Nm^3 (DE) and 10.5 kwh/Nm^3 (NL).

The European indigenous production part of the ENTSOG Annual Potential Supply Scenario decreases from 184 bn Nm^3/year to 126 bn Nm^3/year. This represents a decrease of 32%.

Indigenous Production Part of ENTSOG Annual Potential Supply Scenario										
bn Nm^3/year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Austria	2	2	2	2	2	2	2	2	2	2
Croatia	2	2	2	2	2	2	2	2	2	2
Denmark	6	6	5	5	4	4	3	2	2	2
France	0.06	0.06	0.05	0.05	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Germany	16	16	16	15	15	15	15	15	15	14
Hungary	2	2	2	1	1	1	1	1	0.5	0.5
Ireland	0,2	3	3	3	2	2	0,9	0,9	0,6	0,6
Italy	7	7	7	6	6	6	6	5	5	5
Netherlands	84	79	74	70	69	68	64	60	59	57
Poland	4	4	4	4	4	4	4	4	4	4
Romania	10	11	12	12	12	12	11	11	10	10
Serbia	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Slovakia	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
United Kingdom	50	49	48	44	41	38	36	36	32	29
Total	**184**	**181**	**175**	**165**	**160**	**154**	**144**	**139**	**132**	**126**
Percentage to 2010	100	98	95	90	87	84	78	76	72	68

The following diagram shows **the ENTSOG Annual Demand Scenario (sum of scenarios given by TSOs in Attachment A).**

For countries where no annual capacity figure was provided, replacement values were derived as described in the notes below.



Notes:

- Estonia: PRIMES data used. Energy units converted with 10 kWh/Nm³
- France: consolidated figures from GRTgaz and TIGF
- Latvia: PRIMES data used. Energy units converted with 10 kWh/Nm³
- Lithuania: Extrapolation by using a constant value

ENTSOG would like to stress that a number of TSOs were not yet able to revise their demand scenarios in the light of the economic downturn.

The ENTSOG Annual Demand Scenario rises from 520 bn Nm³/year to 594 bn Nm³/year. This represents an increase of 14%.

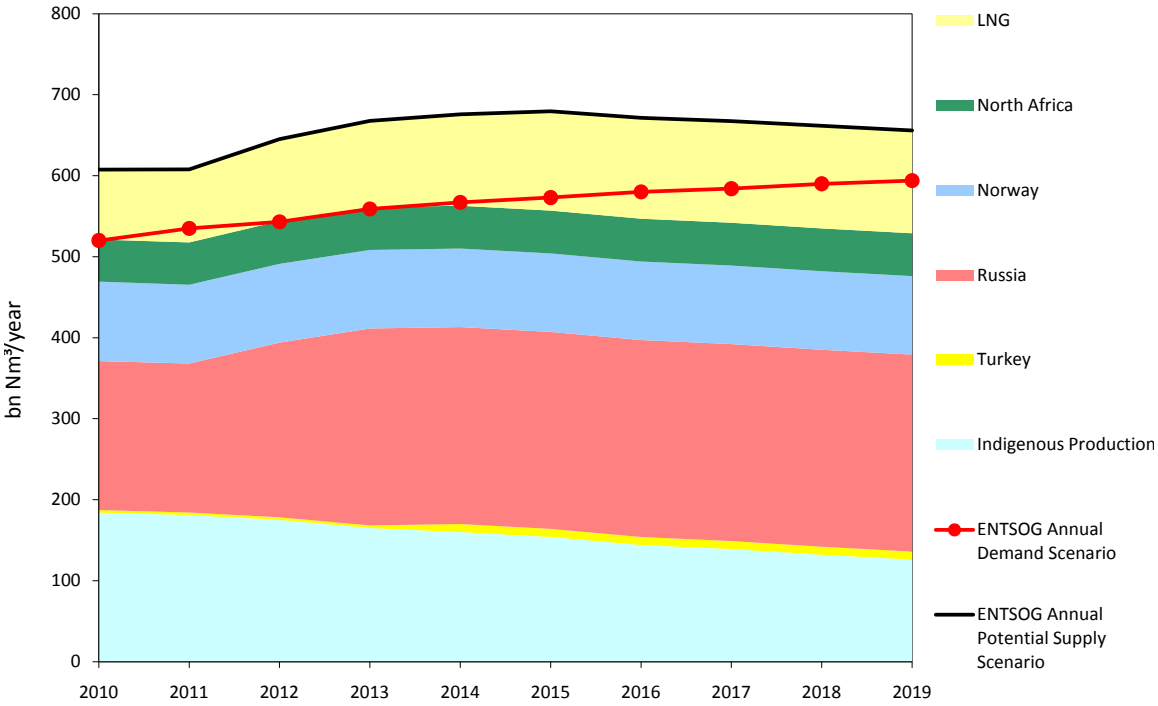
ENTSOG Annual Demand Scenario										
bn Nm^3/year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Austria	9	9	9	11	11	11	12	12	12	13
Belgium	18	20	21	21	25	25	25	26	26	26
Bosnia and Herzegovina	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6
Bulgaria	3	3	3	3	3	3	3	3	3	3
Croatia	4	5	5	5	5	6	6	6	6	6
Czech Republic	9	9	9	10	11	12	12	12	12	13
Denmark	4	4	4	4	4	4	3	3	3	3
Estonia	1	1	1	1	1	1	1	1	1	1
Finland	5	5	5	5	5	5	5	5	5	5
FYROM	0.4	0.5	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8
France	48	49	50	51	52	52	52	53	53	53
Germany	85	84	83	83	82	81	81	81	81	81
Greece	4	5	5	6	6	6	6	6	7	7
Hungary	14	17	18	20	20	20	21	21	21	21
Ireland	6	6	6	6	6	6	6	6	6	6
Italy	85	87	89	91	93	95	97	99	100	102
Latvia	2	2	2	2	2	2	2	2	2	2
Lithuania	3	3	3	3	3	3	3	3	3	3
Luxemburg	1	1	1	1	1	1	1	1	1	1
Montenegro	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5
Netherlands	44	44	44	45	45	45	45	46	46	46
Poland	16	17	17	18	18	18	19	19	19	19
Portugal	5	6	6	6	6	7	7	7	8	8
Romaina	11	11	11	12	12	12	12	12	12	12
Serbia	3	3	3	3	3	3	3	3	4	4
Slovakia	6	6	6	6	6	6	6	6	6	6
Slovenia	1	2	2	2	2	2	2	2	2	2
Spain	45	45	48	50	51	53	55	55	56	56
Sweden	1	2	2	2	2	2	2	2	2	2
UK	86	88	88	90	90	90	91	90	90	90
UNMI Kosovo	0	0	0	0	0	0.02	0.04	0.5	0.6	0.6
Total	**520**	**535**	**543**	**559**	**567**	**573**	**580**	**584**	**590**	**594**
Percentage to 2010	100	103	104	108	109	110	112	112	113	114

European Annual Supply vs. Demand Scenarios

In the chart below, **the ENTSOG Annual Potential Supply Scenario is compared with the ENTSOG Annual Demand Scenario.**

It should be noted, again, that these are infrastructure-based supply scenarios – whether gas is available "upstream" of the European import point is not taken into account. Pipeline supplies have been grouped by origin regions.

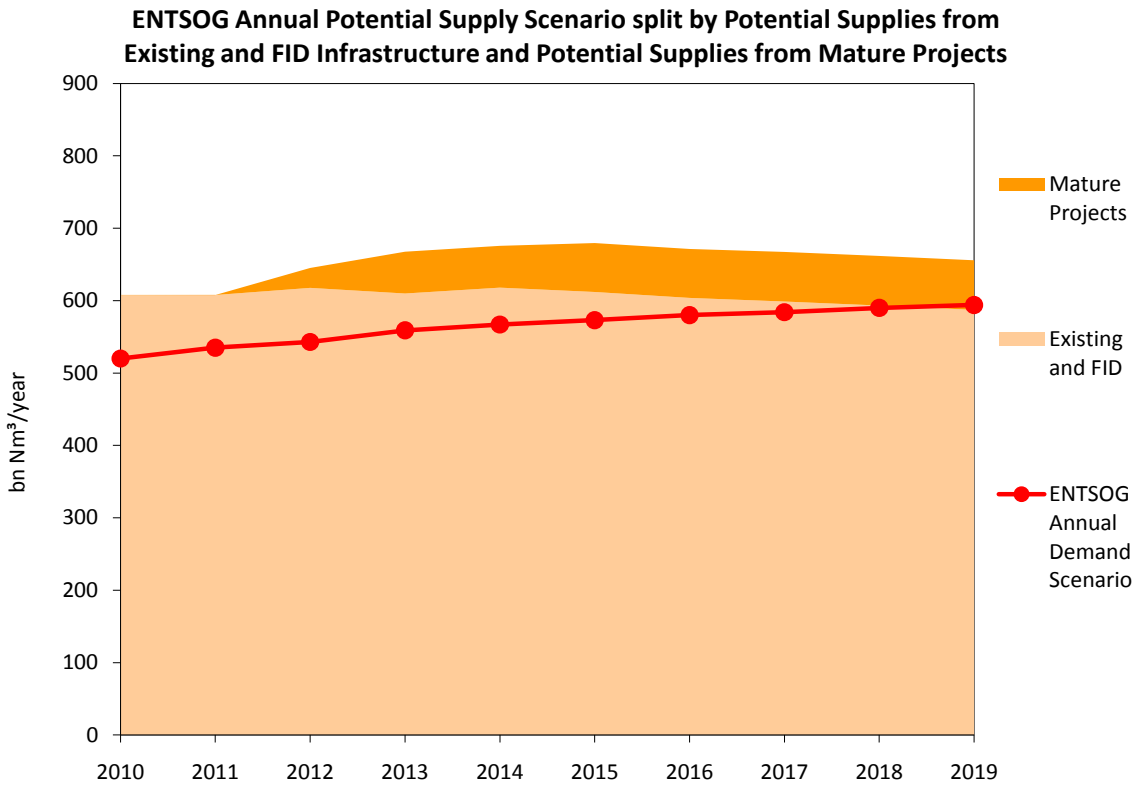
ENTSOG Annual Potential Supply Scenario vs ENTSOG Annual Demand Scenario



ENTSOG Annual Potential Supply Scenario vs ENTSOG Annual Demand Scenario										
bn Nm³/year	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
ENTSOG Demand Scenario	520	535	543	559	567	573	580	584	590	594
ENTSOG Potential Supply Scenario	608	608	645	668	676	680	671	667	662	656
Headroom	88	73	102	109	109	107	91	83	72	62

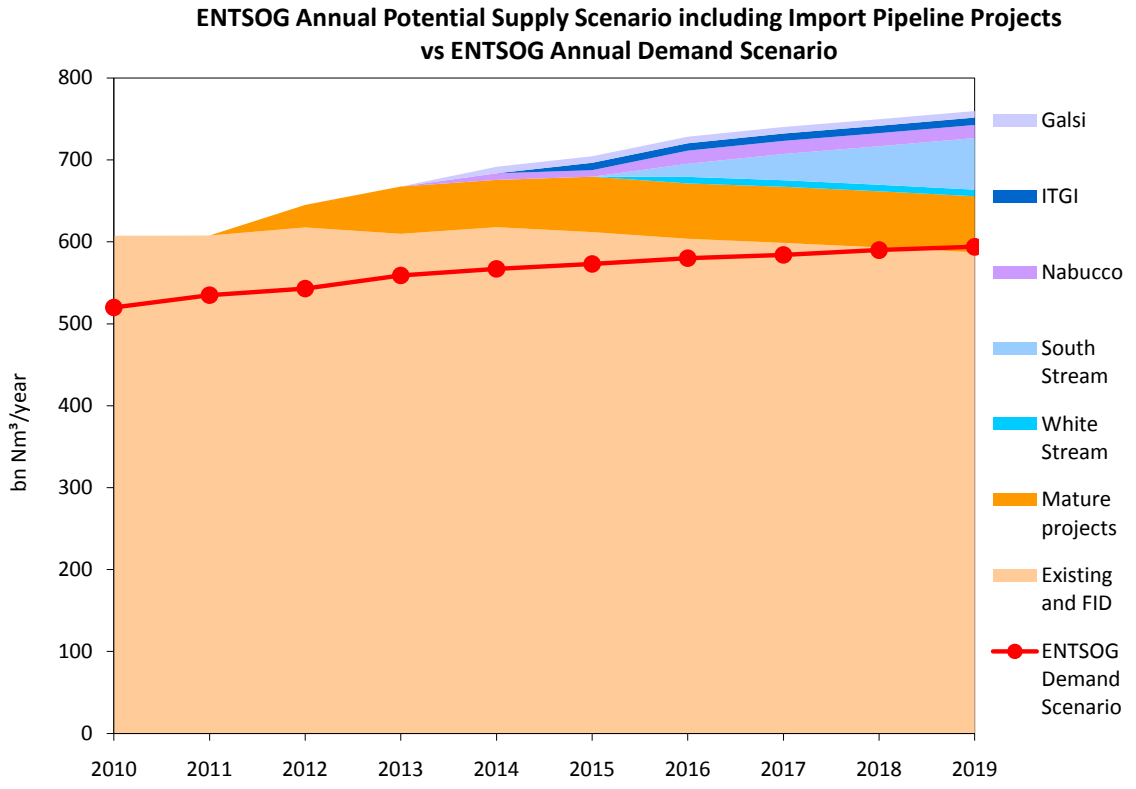
The ENTSOG Annual Potential Supply Scenario first rises from 608 bn Nm³/year in 2010 to 680 bn Nm³/year in 2015, and decreases again to 656 bn Nm³/year in 2019 which represents an overall increase of 8%. In relation to the ENTSOG Demand Scenario, therefore, the "headroom" increases from 88 bn Nm³/year in 2010 to 109 bn Nm³/year in 2013 and 2014, and decreases again to 62 bn Nm³/year in 2019.

- The following chart shows **a split of the ENTSOG Annual Potential Supply Scenario** into one element based on **existing infrastructure** and **projected infrastructure** with final investment decisions taken and another element based on **mature projects** as informed by the respective national TSOs and listed at the beginning of chapter 2 of this document (notably Nord Stream and LNG terminal projects). **This is compared to the ENTSOG Annual Demand Scenario.**



- The following chart consists of **the previous chart with additional publicly known pipeline import projects.**

These were included in alphabetical order, with the yearly capacity data that was provided by the project sponsors either directly for this report, or on their publicly accessible internet publications.



Pipeline Import Projects										
bn Nm³/year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Galsi	0	0	0	0	8	8	8	8	8	8
ITGI	0	0	0	0	0	9	9	9	9	9
Nabucco	0	0	0	0	8	8	16	16	16	16
South Stream	0	0	0	0	0	0	16	32	47	63
White Stream	0	0	0	0	0	0	8	8	8	8

The annual capacity data for the European pipeline import projects were found at:

- Galsi: www.galsi.it
- ITGI: www.igi-poseidon.com
- Nabucco: www.nabucco-pipeline.com
- South Stream: http://south-stream.info/
- White Stream: www.gueu-whitestream.com

As no build-up schedule was found on the South Stream website, an annual build-up of one fourth of the total annual capacity of 63 bn Nm³/year was assumed.

ENTSOG Annual Potential Supply incl. Pipeline Projects vs Demand Scenario										
bn Nm³/year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Existing and FID Potential Supply Scenario	608	608	618	610	618	612	604	599	593	587
ENTSOG Potential Supply Scenario (incl. mature projects)	608	608	645	668	676	680	671	667	662	656
ENTSOG Potential Supply Scenario incl. pipeline projects	608	608	645	668	692	705	728	740	750	760
ENTSOG Demand Scenario	520	535	543	559	567	573	580	584	590	594
Headroom (potential supply incl. pipeline projects less demand)	88	73	102	109	125	132	148	156	160	166

The ENTSOG Annual Potential Supply Scenario including pipeline projects rises from 608 bn Nm³/year in 2010 to 760 bn Nm³/year in 2019 which is an increase of 25%. In relation to the ENTSOG demand scenario, therefore, the "headroom" increases from 88 bn Nm³/year in 2010 to 166 bn Nm³/year in 2019.

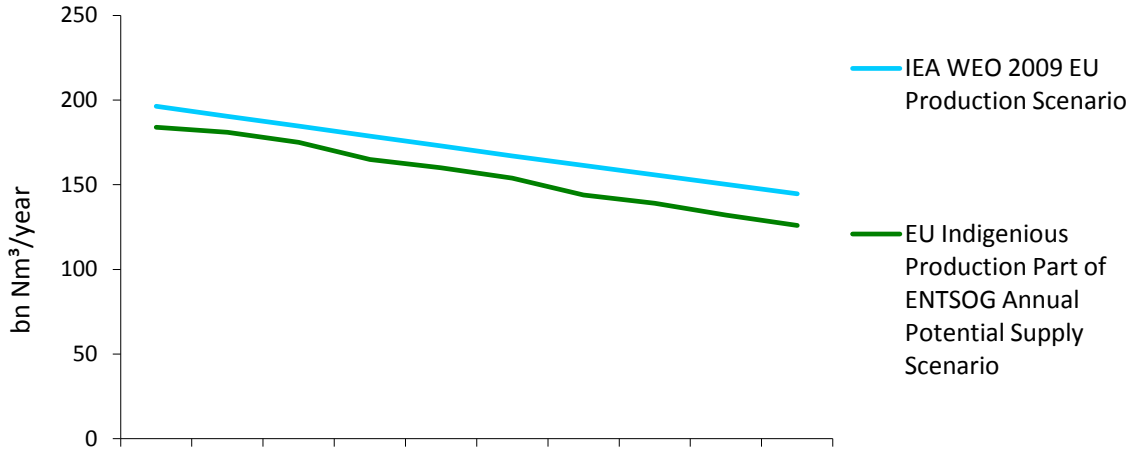
4. Comparison with Scenarios of Other International Bodies

© Image courtesy of SNAM Rete Gas

ENTSOG EU Indigenous Production vs IEA EU Indigenous Production

It is well known that EU indigenous production will decline over the years to come, and therefore, more imports are necessary to cover the projected demand. The chart below shows a comparison of the EU indigenous production part of the ENTSOG Annual Potential Supply Scenario and the EU production forecast which is provided in the *World Energy Outlook 2009 of the IEA* (with linear interpolation applied to missing years).

Comparison of EU Indigenous Production Part of ENTSOG Annual Potential Supply Scenario with IEA EU Indigenous Production Scenario



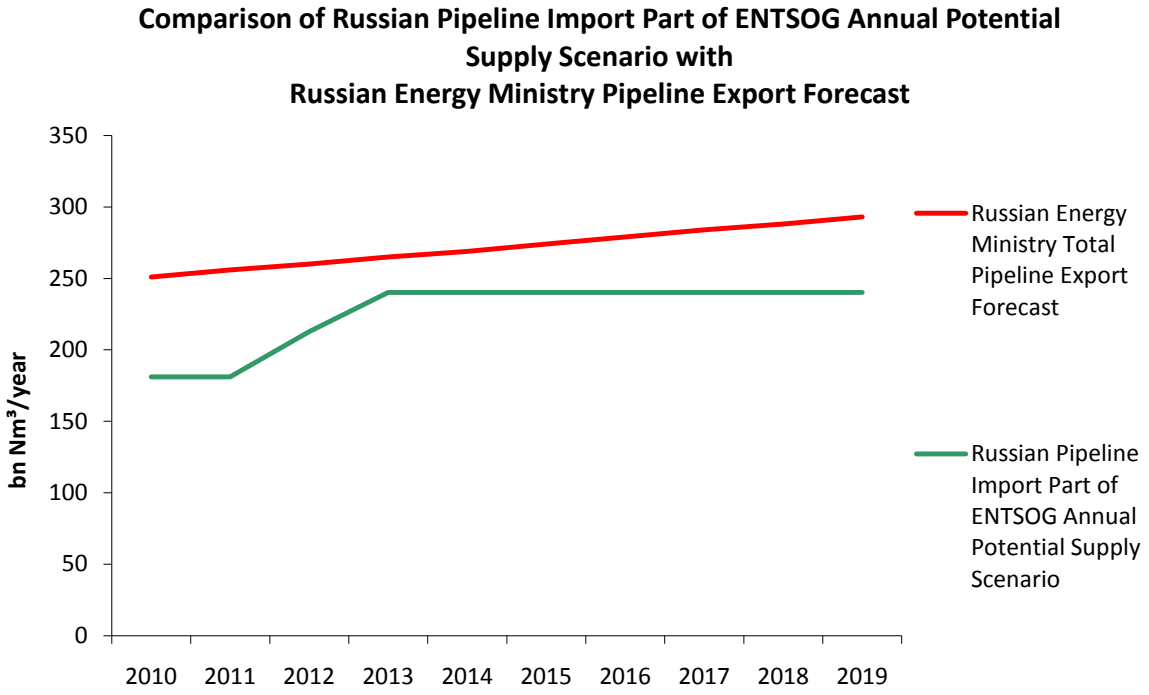
EU Indigenious Production										
bn Nm³/year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
ENTSOG production scenario	184	181	175	165	160	154	144	139	132	126
IEA WEO 2009 EU production	196	191	185	179	173	167	161	156	150	145

The EU indigenous production part of the ENTSOG Annual Supply Scenario decreases by 32% from 184 bn Nm³/year in 2010 to 126 bn Nm³/year in 2019, whereas the IEA WEO 2009 EU Production outlook decreases by 26% from 196 bn Nm³/year in 2010 to 145 bn Nm³/year in the same period.

ENTSOG Potential Russian Pipeline Import Scenario vs. Russian Energy Ministry forecast

Recently the Russian Energy Ministry published the *Russian Energy Strategy until 2030*, which includes production and export forecasts for Russian natural gas.

The total Russian gas exports are foreseen to increase from approximately 250 bn Nm^3/year per year to 320 bn Nm^3/year in 2019. Additionally the share of LNG within these exports is forecast to increase from currently 1% to approximately 9%. Using the total gas exports and LNG share the total Russian pipeline export is derived, which is compared in the chart below to the ENTSOG potential Russian pipeline import. (It should be noted that Russian pipeline exports, of course, do not only go to Europe. Data by destination, however, is not included in the Energy Ministry publication).



ENTSOG Potential Russian Pipeline Import Scenario vs. Russian Energy Ministry Gas Export Forecast										
bn Nm3/year	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
ENTSOG Potential Pipeline Import Russia	184	184	216	244	244	244	244	244	244	244
Russian Energy Ministry Total Gas Pipeline Export Forecast	251	256	260	265	269	274	279	284	288	293

Notes:

- The report of the Russian Energy Ministry provides data in three different time spans. The first data set covering the time span between 2013 and 2015 and the second data set covering the time span between 2020 and 2022 were used. For the chart above, it was assumed that the predicted value will always be reached in the middle of the given time spans.
- Regarding the forecasted values itself, ranges of possible export figures were given. Here the mean value of data range was applied. The values between the years 2014 and 2021 were then linearly interpolated.

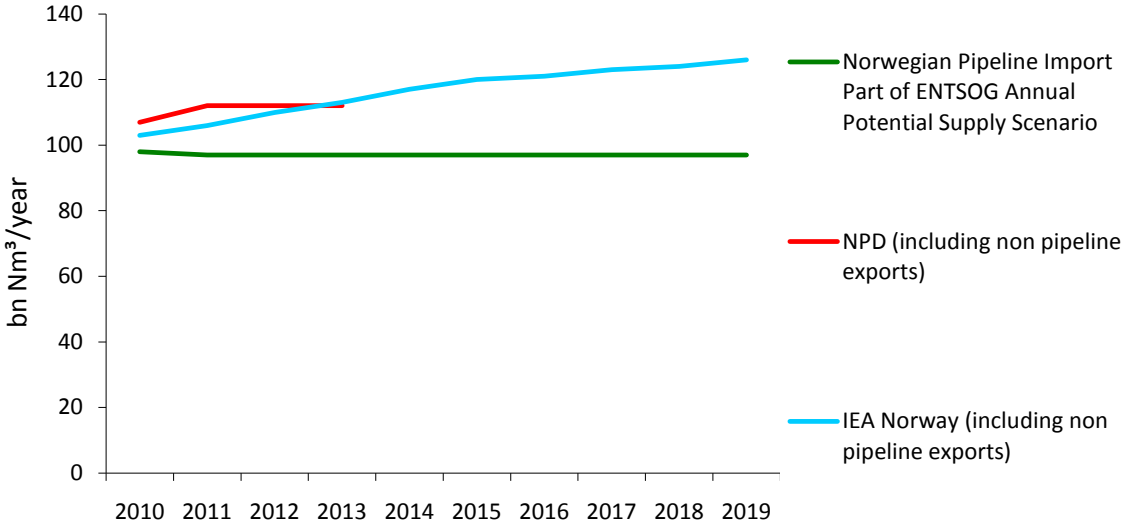
The Russian pipeline import part of the ENTSOG Annual Potential Supply Scenario increases from 184 Nm^3/year in 2010 to 244 Nm^3/year in 2019, which represents an increase of 33 %. In the same period, the Russian Energy Ministry's forecast of total pipeline exports increases from 251 Nm^3/year to 293 Nm^3/year, which represents an increase of 17%.

ENTSOG Potential Supplies vs. Other Sources Norwegian Production

After supplies from Russia, Norwegian gas makes up the most significant forecast pipeline supply to Europe. Norway has invested heavily in building pipeline capacity to European markets and LNG exports are forecast to play a role into the future. The increased flexibility LNG provides can be viewed as good for gas consumers, especially during crisis periods, but it does increase the complexity of forecasting Norwegian supplies.

The chart below shows the Norwegian pipeline import part of the ENTSOG Annual Potential Supply Scenario. This is compared with the EU production forecast which is provided in the *World Energy Outlook 2009 of the IEA*. and the NPD *(Norwegian Petroleum Directorate "Resource Report" (2009)* production forecasts. When viewing these production forecasts it should be considered that they include Norwegian LNG exports, currently from a single plant in the Arctic Circle at "Melkoya". Melkoya has a capacity of 5.75bcm/y, 2.4bcm/y of which has been contracted to the US (http://www.statoil.com/en/NewsAndMedia/News/2002/Pages/AcquiringAccessToUSGasMarket.aspx), though market forces may determine its final destination in a global marketplace.

Comparison of Norwegian Pipeline Import Part of ENTSOG Annual Potential Supply Scenario with NPD and IEA Norwegian Production Scenarios



ENTSOG Potential Pipeline Import Norway vs NPD and IEA Norwegian Production										
bn Nm3/year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
ENTSOG Potential Pipeline Import Norway	98	97	97	97	97	97	97	97	97	97
NPD (including non pipeline exports)	107	112	112	112						
IEA Norway (including non pipeline exports)	103	106	110	113	117	120	121	123	124	126

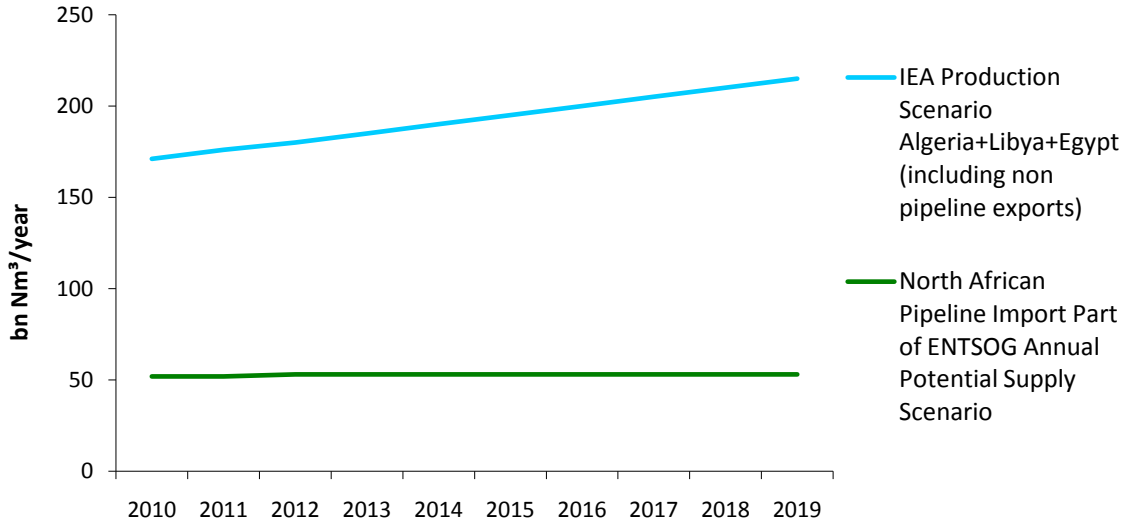
The Norwegian pipeline import part of the ENTSOG Annual Potential Supply Scenario is almost constant (from 98 bn Nm^3/year in 2010 to 97 bn Nm^3/year in 2019), whereas the NPD production forecast rises from 107 Nm^3/year in 2010 to 112 bn Nm^3/year in 2013 and the IEA production forecast rises from 103 bn Nm^3/year in 2010 to 126 bn Nm^3/year in 2019, which represents an increase of 22%.

ENTSOG Potential North African Supplies vs. IEA North African Production

North Africa, besides Russia and Norway, provides gas for Europe via pipelines.

The chart shown hereafter depicts a comparison of the North African pipeline import part of the ENTSOG Annual Potential Supply Scenario and the North African production forecasted by the *IEA World Energy Outlook 2009*. The missing values of the IEA data were interpolated linearly.

Comparison of North African Pipeline Import Part of ENTSOG Annual Potential Supply Scenario with IEA North African Production Scenario



ENTSOG Potential Pipeline Import North Africa vs. IEA North African Production										
bn Nm3/year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
ENTSOG Potential Pipeline Import North Africa	52	52	53	53	53	53	53	53	53	53
IEA Algeria+Lybia+Egypt production (including non pipeline exports)	171	176	180	185	190	195	200	205	210	215

The North African pipeline import part of the ENTSOG Annual Potential Supply Scneario is significantly lower than the IEA forecast for the North African data (52 bn Nm³/year in 2010 and 53 bn Nm³/year in 2019). The IEA production forecast rises from 171 bn Nm³/year in 2010 to 215 bn Nm³/year in 2019.

The reason for the difference is mainly due to the fact that IEA includes in their data also LNG exports from North Africa, which plays a key role for Algeria, Libya and Egypt.

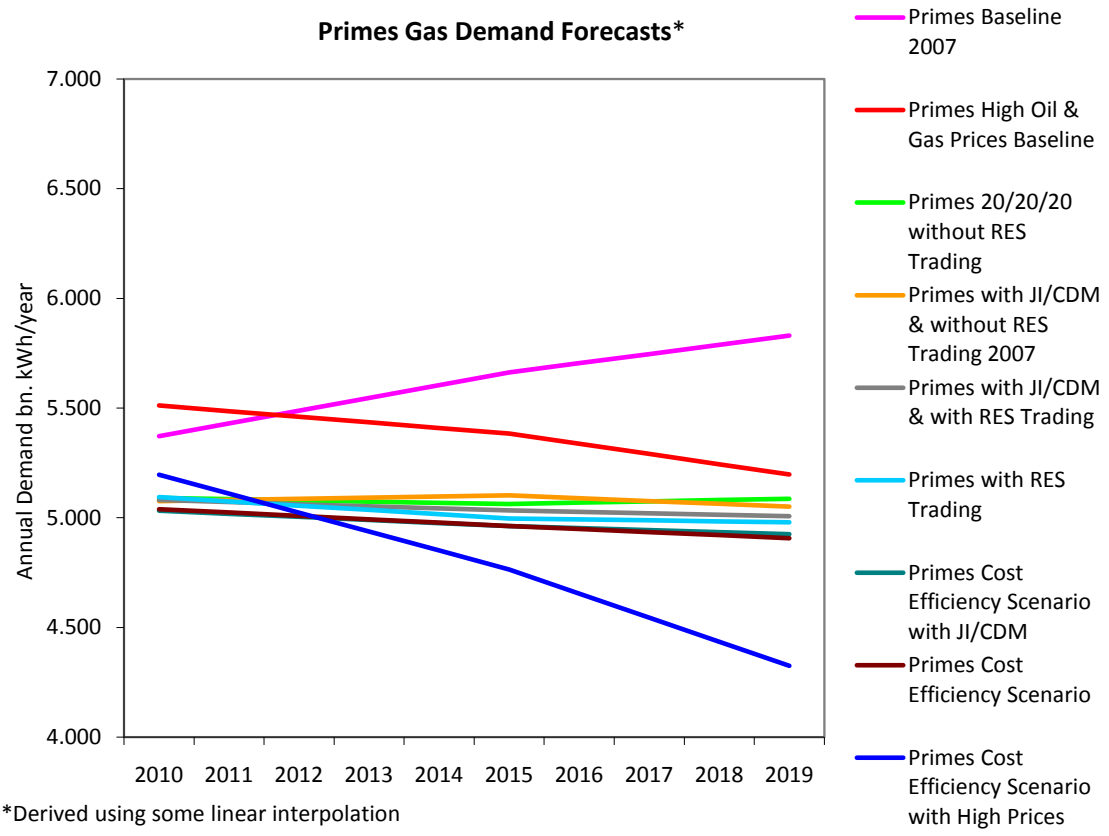
Annual Demand Scenarios

Here, the yearly demand scenarios for the EU27 member states as provided by TSOs are aggregated and compared to EU27 demand scenarios of the EU Commission / Primes, Cedigaz, Eurogas and the International Energy Agency (IEA).

In April 2008 DG TREN published the document "EUROPEAN ENERGY AND TRANSPORT / TRENDS TO 2030 - UPDATE 2007".

In June 2008 P. Capros et al produced a report for DG ENV entitled "Model-based Analysis of the 2008 EU Policy Package on Climate Change and Renewables".

The demand scenarios given in this document were used to derive the following overview of gas demand scenarios. Apart from the scenarios "Primes Baseline 2007" and "Primes High Oil & Gas Prices Baseline" the scenarios shown in the following diagram are all assuming the implementation of the 20/20/20 targets, which are a 20% cut in emissions of greenhouse gases by 2020, compared with 1990 levels; a 20% increase in the share of renewables in the energy mix; and a 20% cut in energy consumption.



*Derived using some linear interpolation

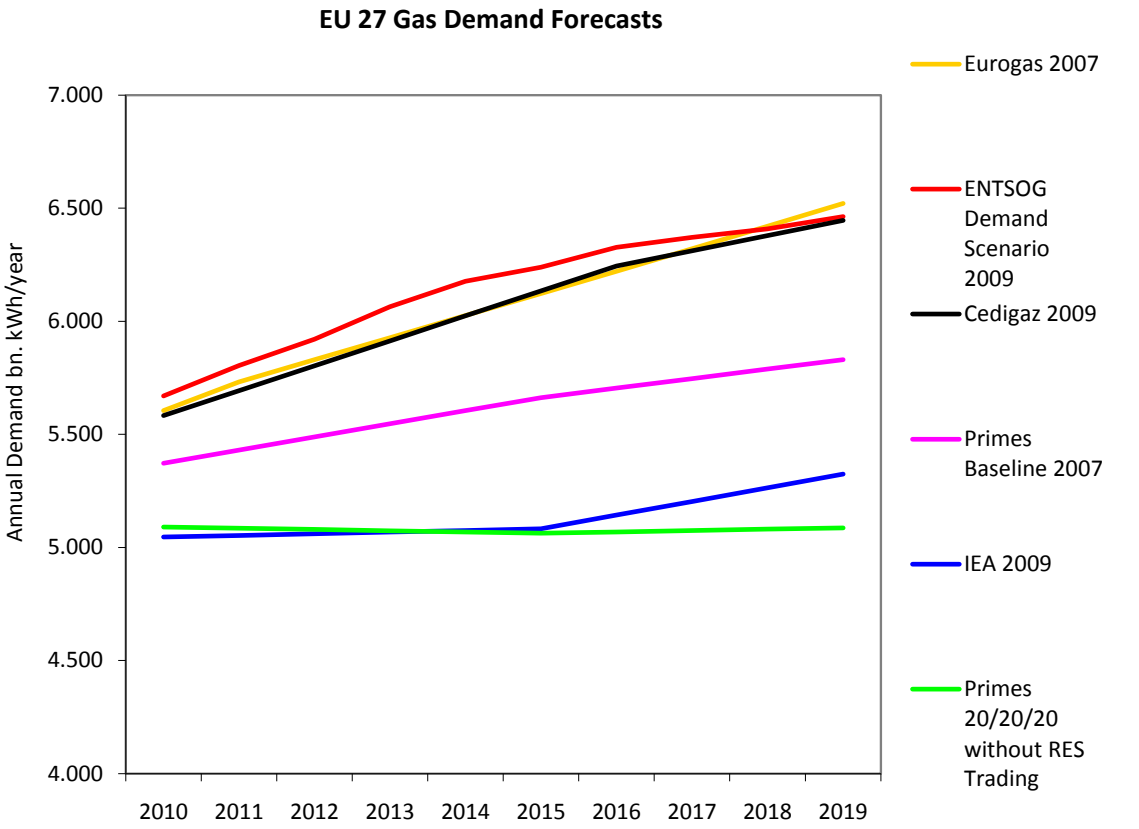
Comparison of ENTSOG 2009 and Other Relevant Demand Scenarios										
bn kWh/year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Primes Baseline 2007	5,372	5,430	5,488	5,546	5,605	5,663	5,705	5,746	5,788	5,830
Primes with JI/CDM & without RES Trading 2007	5,076	5,081	5,086	5,092	5,097	5,102	5,089	5,076	5,064	5,051
Primes High Oil & Gas Prices Baseline	5,512	5,486	5,460	5,435	5,409	5,384	5,337	5,291	5,244	5,198
Primes 20/20/20 without RES Trading	5,090	5,085	5,079	5,074	5,068	5,063	5,069	5,075	5,081	5,087
Primes with RES Trading	5,094	5,075	5,055	5,036	5,016	4,997	4,992	4,988	4,984	4,980
Primes with JI/CDM & with RES Trading	5,081	5,072	5,062	5,052	5,043	5,033	5,026	5,020	5,013	5,006
Primes Cost Efficiency Scenario	5,039	5,024	5,008	4,993	4,978	4,962	4,949	4,935	4,921	4,907
Primes Cost Efficiency Scenario with JI/CDM	5,032	5,018	5,004	4,990	4,976	4,962	4,953	4,943	4,934	4,925
Primes Cost Efficiency Scenario with High Prices	5,196	5,110	5,024	4,937	4,851	4,765	4,655	4,545	4,435	4,325

In almost all of the Primes demand forecasts, EU27 gas demand stays fairly constant or even reduces over the period. The exception to this is the 2007 baseline scenario which forecasts gas demand continuing to increase at the steady rate which was evident before the recent economic downturn, in fitting with when the Primes report was published.

In order to assess the ENTSOG 2009 demand scenario against those of other relevant European bodies, the following overview has been derived using data from the following sources:

- Two Primes scenarios; Primes Baseline 2007 and Primes 20/20/20 without RES Trading (which has the highest 2019 value of the Primes 20/20/20 scenarios)
- EU27 natural gas demand scenario values from Cedigaz
- EU27 natural gas demand scenario values from Eurogas
- EU27 natural gas demand scenario values from the International Energy Agency

The values were converted to Billion kWh/year and interpolated if required. The conversion factors applied were 11.63 Billion kWh/mtoe and 10.83 kWh/Nm^3 respectively.



Comparison of ENTSOG 2009 and Other Relevant Demand Scenarios										
bn kWh/year	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Primes Baseline 2007	5,372	5,430	5,488	5,546	5,605	5,663	5,705	5,746	5,788	5,830
Primes 20/20/20 without RES Trading	5,090	5,085	5,079	5,074	5,068	5,063	5,069	5,075	5,081	5,087
Eurogas 2007	5,605	5,732	5,830	5,928	6,026	6,123	6,221	6,321	6,421	6,521
Cedigaz 2009	5,583	5,693	5,803	5,914	6,024	6,134	6,244	6,312	6,379	6,446
ENTSOG Demand Scenario 2009	5,670	5,805	5,920	6,064	6,177	6,239	6,327	6,371	6,409	6,463
IEA 2009	5,046	5,053	5,061	5,068	5,075	5,082	5,143	5,203	5,264	5,324

The ENTSOG Annual Demand Scenario is amongst the higher scenarios together with the scenarios "Cedigaz 2009" and "Eurogas 2007". The "Primes Baseline 2007" shows a considerably lower demand increase while the "Primes 20/20/20 without RES Trading" shows a fairly constant level. The IEA 2009 scenario shows a clear pick up in annual gas demand in the later years of the period.

ENTSOG would like to stress that a number of TSOs were not yet able to revise their demand scenarios in the light of the economic downturn.

5. Trans-European Networks for Energy (TEN-E)

© Image courtesy of OMV Gas

According to the third European legislative package, the ten year network development plan to be produced by the European Network for Transmission System Operators for Gas (ENTSOG) shall take into account, if appropriate, community aspects of network planning, including the including the guidelines for trans European energy networks in accordance with Decision No 1364/2006/EC of the European Parliament and of the Council.

The objective of the guidelines for trans European energy networks ("TEN-E Guidelines") are to promote the interconnection, interoperability and development of trans-European energy networks and access to such networks in accordance with Community law in force. They define projects of common interest, priority projects and projects for European interest. In Annex I axes for priority projects, including sites of projects of European interest are listed. Annex II contains additional criteria for identifying Projects of common interest and Annex III currently identified projects of common interest.

In order to start building references to TEN-E, a number of projects for which TEN-E funding according to the list of TEN-E financed projects from 1995 to 2007 as published in October 2008 [3] has been received or for which an application for TEN-E funding has been submitted are described below.

[3] http://ec.europa.eu/energy/infrastructure/tent_e/doc/2009_ten_e_financed_projects_1995_2008.pdf accessible via http://ec.europa.eu/energy/infrastructure/tent_e/financial_aid_en.htm.

- **G020/96** – *"The PENTA Main (North-South) pipeline system. Technical feasibility study of alternative routes, including evaluation of costs and environmental impact." and*
  G025/97 – *"The TAG III gas pipeline, from Baumgarten to the Italian border along the routings of TAG I and TAG II. Technical, economical and environmental feasibility study."*

The results of these TEN E funded projects have formed the background for more detailed analysis finally leading to concrete investment decisions to expand the respective pipeline systems. A brief description of these investments as well as the capacity increasing effects of said expansions are described under 2.2.3 "Capacity Development in the Reporting Period, Investment Decisions Taken".

- **Decision 2004-G110/04 from 02.12.2005** – *"Trans Adriatic Pipeline: Feasibility Study for a natural gas pipeline connecting Italy and the South East European energy markets"*
  Decision 2005-G123/05 from 06.12.2006 - *"Trans Adriatic Pipeline (TAP): Basic Engineering, environmental impact assessment, land acquisition and authority approval"*

The Trans Adriatic Pipeline (TAP) is recognized as a Project of Common Interest by Decision No 1364/2006/EC, Annex III 9.25, from 06.09.2006. The Project will provide the link to Europe which is currently missing, by connecting Greece to Italy via Albania and across the Adriatic sea. TAP will enable gas supplies from the Middle East and Caspian Sea regions to reach European markets through the shortest and most efficient, hence economic, transit route. Funding has been received in respect of both the feasibility and basic engineering studies from the European Commission, and the work from those studies has contributed to the front end engineering design (FEED) work which is currently underway. A more detailed description of the TAP Project in included in Attachment A

- **G132/06** – *„Feasibility Study for the Tauern Gas Pipeline – HD-Leitung DN 800 PN 100 bar, Puchkirchen/Haidach – Finkenstein"*

The feasibility study for the Tauern Gas Pipeline (TGL), a new interconnector pipeline project between the natural gas markets of Germany, Austria and Italy with a possible continuation to Slovenia, is partly funded by the European Commission. It covers the examination of the technical, commercial and legal feasibility of this project of common interest. A description of the TGL project is included in Attachment A. The decision on whether the pipeline project goes ahead is scheduled for the second quarter of 2010.

- **G137/07** – *"Etude pour la construction d'un nouveau gazoduc reliant la commune de Opwijk (Brabant Flamand) à Eynatten (Raeren) (frontière allemande)"*

The RTR2 project does not only respond to specific demand for additional transit capacity along the East/West axis but also creates major synergies with projects to reinforce national transport capacity in order to cover demand growth in Belgium and optimize competition on the gas market. The RTR2 project is one of the priority TEN-E projects listed by the European Commission. Indeed, every transit flow supports security of supply and the diversification of sources for both Europe and Belgium. Fluxys' use of the same infrastructure to ensure transit of natural gas to other countries and transport into the Belgian market also creates operational economies of scale to the benefit of both activities.

- **G140/07** – *"GUEU – White Stream Pipeline: technical, economic and environmental study on possible routes for a gas pipeline from resources in Caspian Sea countries to the European Union"*

  The White Stream gas pipeline is a Priority Project among the European Union's Projects of Common Interest. White Stream's gas transmission capacity will be provided by state-of-the-art steel pipeline technology already proven for use in the unique marine environment of the Black Sea. White Stream will branch from the South Caucasus Pipeline about 120 km from the Georgian Shore and will land on the Romanian shore near Constanta after crossing the Black Sea. One of the subsequent stages will include a route landing in Ukraine. Both submarine routes have a maximum depth of over 2000 metres. The nominal diameter of the ultra-deepwater submarine pipeline will be 28-inches for the Romania route and 26-inches for the Ukraine route. Engineering studies have established the technical feasibility of the route directly to the EU without the need for an intermediate compressor station. The first 8 Bcm pipeline, direct to Romania, is planned for completion in 2016. As the White Stream gas pipeline is an integral component of the Southern Corridor to transport gas to Europe from sources in the Caspian region and Central Asia, its wider significance is described further in Attachment A.

- **G152/08** – *„Baltic Pipe - Gas pipeline from Denmark to Poland – pre-investment studies and authority process"*

  On 19 June 2009, GAZ-SYSTEM received a decision of 17.06.2009 to grant Community financial assistance for this project.

- *"Baltic Pipe - Gas pipeline from Denmark to Poland - Geotechnical offshore survey, environmental monitoring program and onshore gas quality study and receiving terminal in Poland"*

  GAZ-SYSTEM has applied for this project. The application was submitted on 24 April 2009 to the European Commission. GAZ-SYSTEM has applied individually. The Baltic Pipe is considered as an element of the widely understood integration in Baltic region and as a new supply corridor on the route Norwegian Continental Shelf – Scandinavian Market – Eastern Europe. Moreover, the Baltic Pipe can be also considered as a potential source of gas supply for the Danish market (LNG Terminal in Świnoujście). Regardless of the effects of the suspension of the Skanled project, a connection between the Norwegian Continental Shelf and the Danish transmission system is likely to be implemented in the near future. In this context GAZ-SYSTEM intends to carry out necessary actions in order to prepare the Baltic Pipe project to implementation in the future. The above actions will be conducted with the use of funding from the EU provided under the TEN-E budget. Particularly, GAZ-SYSTEM is focused on necessary activities in order to secure the future location of the Baltic Pipe. In case of a market interest in Baltic Pipe capacity, confirmed by relevant contracts, the completion of above activities together with planned extension of the Polish Transmission System is assumed to shorten the time schedule for its implementation in the future and strengthen the diversification potential of the gas markets in Poland, Denmark and Sweden. The Baltic Pipe project complies with initiatives set out in the EU Second Strategic Energy Review (SER II) and goals of EU energy policy.

ENTSOG would be happy to discuss with DG TREN and European stakeholders how best to take into account the TEN-E guidelines in the upcoming Ten Year Network Development Plans.

6. European Energy Programme for Recovery and GTE+ Reverse Flow Study

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European Energy Programme for Recovery

The European Energy Programme for Recovery is a financing instrument for the development of projects in the field of energy in the EU27 that contribute by providing a financial impulse to economic recovery, the security of energy supply and the reduction of greenhouse gas emissions.

It establishes sub-programmes to advance those objectives in the fields of:

- gas and electricity infrastructures;
- offshore wind energy; and
- carbon capture and storage.

The following eligible projects for gas interconnectors are listed in Annex A.1:

- Nabucco
- ITGI – Poseidon
- Skanled, Baltic Pipe
- Liquefied Natural Gas terminal at Polish coast at port of Świnoujście
- Slovakia-Hungary Interconnector (Velky Krtis – Vecsés)
- Gas transmission system in Slovenia between the Austrian Border to Ljubljana (excluding the section Rogatec-Kidričevo)
- Interconnection Bulgaria-Greece (Stara Zagora - Dimitrovgrad-Komotini)
- Romania-Hungary gas interconnector
- Expansion of Gas Storage Capacity in the Czech hub
- Infrastructure and equipment to permit reverse gas flow in the event of short term supply disruption
- Slovakia-Poland interconnection
- Hungary-Croatia interconnection
- Bulgaria-Romania interconnection
- Reinforcement of FR gas network on the Africa-Spain-France axis
- GALSI (Gazoduc Algérie-Italie)
- Gas Interconnection Western Axis Larrau Branch
- Germany-Belgium-United Kingdom pipeline
- France-Belgium connection

European gas transmission system operators provided information on the status of these projects to the EU Commission.

The above mentioned project "Infrastructure and equipment to permit reverse gas flow in the event of short term supply disruption" is meant to support investments in reverse flow capacities in Austria, Bulgaria, Czech Republic, Estonia, Greece, Hungary, Latvia, Lithuania, Poland, Portugal, Romania and Slovakia.

GTE+ Reverse Flow Study

GTE+ launched a reverse flow study in February 2009 following the Russia-Ukraine gas dispute in January 2009 and the resulting need to analyze the necessary reverse gas flow capacities in Europe to boost the resilience of the European gas network.

The study identifies the necessary investments in Europe to technically enable the reversal of gas flows with a view to ensuring a better response to possible gas supply disruptions in the future. The technical and engineering aspects of each national network were analyzed directly by the TSOs involved, while GTE+ provided the necessary coordination.

Furthermore, the study also provides a cost estimate for the identified developments and points to necessary mechanisms for cost recovery and appropriate incentives to be taken into account by individual national authorities. It does not, however, address financing issues related to the investments suggested.

The study was published on 21 July 2009. The revised version of 24 July 2009 can be found under the following link:
http://www.gie.eu.com/adminmod/show.asp?wat=GTEplus Reverse Flow Study_Technical Solutions_FINAL24July.pdf

7. Changes Since 2008

© Image courtesy of OMV Gas

The European Capacity Development Report 2008 (CDR) was published November 2008 to form a basis for the stakeholder dialogue on the European Ten Year Network Development Plan. A Demand Scenarios vs. Capacity Report (DSCR) with updated capacity development information was published in July 2009.

The CDR contains contributions from all EU27 member states except Cyprus, Estonia and Malta as well as Norway, Switzerland and Croatia.

Additional contributions from Energy Community members Albania, Bosnia and Herzegovina, Montenegro, Serbia and UNMIK were included in the DSCR and are also contained in the plan.

ENTSOG would like to thank the respective ministries, TSOs and project sponsors for these contributions and the Energy Community Secretariat for their valuable support in collecting the information from the Energy Community members.

Apart from some error corrections, the DSCR contains a number of capacity increases compared to the CDR. Amongst these are capacity increases in Austria, Belgium, Italy, Lithuania, Netherlands and Poland. Amendments and revisions of capacity developments were conducted for Bulgaria, Croatia, Czech Republic, Germany, Hungary, Luxemburg, Portugal and Slovenia.

Main cross-border capacity increases within the five months after publication of the DSCR are recorded in this plan for Austria, Germany and Slovakia. Amendments were received from Bulgaria and Hungary.

8. Overview of Current Publications

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A number of European TSOs provide Ten Year Network Development Statements or similar documents. Depending on the specific national circumstances, there is a variation on the contents, the responsibility to produce the report and type of distribution of these reports.

The following table is an overview of the main characteristics of these reports. Please note that an entry has been included within the table wherever possible: the lack of an entry may simply indicate that the TSO response was not explicit.

Country	Type	Coverage (Years)	Data*	Publication Interval	Produced by
Albania					
Austria	Mandatory	5	C, D & S	Annually	Other party (AGGM)
Belgium	Voluntary	10	C, D & S	2 years	TSO
Bosnia and Herzegovina					
Bulgaria	Mandatory	3	C, D & S	Annually	TSO (for ministry & NRA)
Croatia					
Czech Republic	Mandatory	10	C	Online update	TSO
Denmark	Mandatory	10	C, D & S	Annually	TSO in co-operation with DSOs and SSOs
Finland					
France	Voluntary	10	C, D & S	Annually	TSO
Germany	Mandatory	3	C	Online update	TSO
Greece	Mandatory	5	C, D		TSO
Hungary	Mandatory	10	C, D & S	Annually	TSO (for Hun. Energy Office)
Ireland	Mandatory	8	C, D & S	Annually	Regulator
Italy	Mandatory	10	C	Annually	TSO
Latvia					
Lithuania	-	-	-	-	-
Luxemburg	Mandatory	3	C	Annually	TSO
Macedonia					
Montenegro					
Netherlands	Mandatory	7	C, D & S	Every 2 Years	TSO
Poland	Mandatory	3 (5)	C, D & S	Annually	TSO (confidential document assessed by NRA in line with National Energy Policy)
Portugal	Mandatory	3	C & D	Every three years	TSO (for ministry)
Republic of Serbia	Mandatory	5	C & D	Every 4 Years	TSO (for ministry)
Romania			C	Annually	TSO (for ministry)
Slovakia	Mandatory	10	C	Daily Upd.	TSO
Slovenia	Mandatory	10	C & D	Every 2 Years	TSO (for ministry)
Spain	Mandatory	10	C & D	Every 4 Years	TSO (for ministry)
Sweden					
UK	Mandatory	10	C, D & S	Annually	TSO
UNMI Kosovo					

* Abbreviations: Capacity (C), Demand (D), Supply (S)

9. Summary / Way Forward

© Image courtesy of SNAM Rete Gas

9.1 Summary

In this ENTSOG European Ten Year Network Development Plan (TYNDP), the European gas transmission capacity development, demand scenarios and supply scenarios are presented country by country based on information received from participating European TSOs and project sponsors.

ENTSOG would like to repeat that the analysis features a number of assumptions, in particular:

- The supply scenarios are based on existing infrastructure, projected infrastructure with final investment decision taken and mature projects as informed by the respective national TSOs
- Concurrent occurence of the peak winter day in all European countries
- Estimation of storage deliverability taking into account possible decreases in deliverability during the winter period because of reductions in storage working gas
- A number of TSOs were not yet able to revise their demand scenarios in the light of the economic downturn.

These assumptions interact with the applied methodology and therefore care should be taken when interpreting the results. Further work needs to be done in dialogue with European stakeholders in refining the assumptions and the methodology.

Peak Day analysis based on "Final Investment Decision Taken"

A peak day analysis solely based on projects for which the final investment decision has been taken ("FID Projects") was carried out. As details of such analysis were already shown in the GTE+ Demand Scenarios vs. Capacity Report (DSCR) published in July 2009, the detailed results were not included in this TYNDP.

Similar to the analysis results shown in the DSCR, a need for additional entry capacity was found in the region Austria, Belgium, Czech Republic, France, Germany, Ireland, Italy, Luxemburg, Netherlands, Switzerland and the United Kingdom for 2018 and 2019 (15 Mio. Nm^3/day in 2018 and 51 Mio. Nm^3/day in 2019). This is about 0.6% and 1.9 % respectively of the aggregated peak day demand scenario figures of this region.

An inclusion of mature projects that increase the entry capacity / deliverability resolves this situation.

Peak day analysis by also taking into account mature projects

An ENTSOG Peak Day Demand Scenario and an ENTSOG Peak Day Potential Supply Scenario (which covers existing capacities, capacities for which the final investment decision has been taken and in addition capacities of mature projects) were developed, showing the following main results in the time range from 2010 to 2019:

- An increase of European pipeline import capacities of 19%
- An increase of European entry capacity from LNG terminals of 47%
- A decrease of European indigeneous national production deliverability of 24%
- An increase of European storage deliverability scenario of 34%
- An increase of the European aggregated peak day demand scenario of 12%
- An increase of an indicative measure for the development of interconnection capacities within Europe of 11%
- An increase of the sum of the aggregated figures for pipeline import capacity, LNG import capacity, national production deliverability scenarios and storage deliverability scenarios of 17%

In order to analyse European internal bottlenecks, a European capacity usage scenario was developed using the demand and potential supply scenarios described above. Demand vs. capacity gaps (negative country net values) were found for the following countries / regions:

- In the region Denmark and Sweden negative country net values were found from 2014 to 2018. According to Energinet.dk, new import capacity is planned in Ellund IP to replace decline in national production from year 2014.
- Negative country net values were found for Hungary (increasing from -2 Mio. Nm^3/day in 2014 to -10 Mio. Nm^3/day 2019), Macedonia (-1 Mio. Nm^3/day from 2010 to 2019 with the exception of -2 Mio. Nm^3/day in 2011), Serbia (-4 Mio. Nm^3/day in 2018 and 2019) and Slovenia (-1 Mio. Nm^3/day in 2019). Additional import or storage projects may fill these capacity gaps.

In addition it should be noted that there are some European areas with a relevant surplus of entry capacity. This means that, provided a right level of cross-border interconnection capacity is in place, those areas could contribute to an increased security and diversification of the supply level in the European gas market.

Annual Scenarios

The ENTSOG Annual Demand Scenario was compared with scenarios from Cedigaz, DG TREN / Primes, Eurogas and IEA. The results show that the ENTSOG scenario is in the upper range of the demand scenarios of this group. With respect to this, ENTSOG would like to point out that a number of TSOs were not yet able to revise their demand scenarios in the light of the economic downturn.

An ENTSOG Annual Potential Supply vs Demand Scenario was developed. For the time span from 2010 to 2019 the following is shown:

- An increase of European potential pipeline import and an increase of European potential import via LNG terminals as in the ENTSOG Peak Day Scenario (infrastructure-based scenario).
- A decrease of European indigeneous production of 32%
- An increase of the overall ENTSOG Annual Potential Supply Scenario of 8% over the whole period; with an initial increase to 680 bn Nm^3/year in 2015 and a subsequent decrease to 656 bn Nm^3/year
- The ENTSOG Annual Demand Scenario increases by 14%
- The "headroom" (difference of potential supplies and ENTSOG Demand Scenario) decreases from 88 bn Nm^3/year in 2010 to 62 bn Nm^3/year in 2019.

ENTSOG would like to point out that the Annual Potential Supply Scenario is infrastructure-based – whether gas is available "upstream" is not taken into account. Futhermore, the potential supply scenario is based on existing infrastructure, projected infrastructure with final investment decision taken and mature projects as informed by the respective national TSOs (This includes notably Nord Stream and LNG terminal projects).

Moreover, additional well-known pipeline import projects were added to the potential supply scenario with publicly available annual capacity data at face value. This results in an increase of overall potential supplies including well-known pipeline projects by 25% from 608 bn Nm^3 in 2010 to 760 bn Nm^3/year in 2019. Taking this into account, "headroom" increases from 88 bn Nm^3/year to 166 bn Nm^3/year.

Comparisons were conducted of the ENTSOG EU indigenous production scenario, as well as potential pipeline supply scenarios from Russia, Norway, and North Africa, with production or export scenarios of other bodies. Comparability is somehow limited, because for example production also goes to other destinations than Europe. However, these comparisons show higher forecasts by other bodies, allowing the conclusion that ENTSOG supply scenarios can at least potentially be covered by commodity.

Further elements

Community aspects of network planning, including the guidelines for trans European energy networks (TEN-E) are included as foreseen in the European Third Legislative Energy Package. References are provided to the European Energy Programme for Recovery and the GTE+ Reverse flow study.

9.2 Way Forward

ENTSOG would like to invite stakeholders for feedback on this TYNDP and the aspects covered in order to assist developing the second European Ten Year Network Development Plan for gas transmission systems by the end of 2010.

ENTSOG would like to use the stakeholder dialogue to also discuss appropriate modelling methods including methods to assess the resilience of the European gas transmission system.

Two stakeholder workshops are foreseen for January and October 2010 to discuss the results of this report and the preparation of the second TYNDP. ENTSOG welcomes the opportunity to talk with European stakeholders either on a bilateral or small group basis to assist preparation for the stakeholder workshop.

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