YEARLY STATISTICS & ADEQUACY RETROSPECT 2014

EUROPEAN ELECTRICITY SYSTEM DATA

European Network of
Transmission System Operators
for Electricity

entsoe

YEARLY STATISTICS & ADEQUACY RETROSPECT 2014

EUROPEAN ELECTRICITY SYSTEM DATA

CONTENT

1. GENERAL INTRODUCTION

1.1. REPORT'S BACKGROUND

Yearly Statistics and Adequacy Retrospect 2014 (YS&AR 2014) is the third edition of the integrated report, which replaced the separate Statistical Yearbook and the System Adequacy Retrospect reports. The YS&AR 2014 report includes information from both reports combined, thus reducing redundant information in different timeframes and providing more transparency on the information from the associated Transmission System Operators (TSOs).

This revised report structure will also reduce the total volume of the report, not by excluding any information but instead making more data available via Excel downloads instead of printed tables. We hope that this will increase the usability of our product for customers. Merging the two reports will increase the coherence of data with different perspectives; however, some exceptions exist and are explained in the next paragraph.

The YS&AR report aims to provide stakeholders in the European electricity market with an overview of the retrospect data and figures regarding the power systems of member Transmission System Operators (TSOs), as well as ENTSO-E as a whole. The report provides information about energy balance, power balance at reference points with a focus on adequacy, and cross-border exchanges and network components.

The report was prepared with the support of the Data Expert Group directly under the supervision of the ENTSO-E Board. The glossary of terms used in this report can be found online at **https://www.entsoe.eu/data/data-portal/glossary**.

1.2. ABOUT THE DATA

Statistical and adequacy data is regularly delivered by member TSO statistical data correspondents (STCs). The data is stored in the ENTSO-E statistical database, most of which can be accessed directly through web-based queries (except for power balance data) or via reports published on the website **https://www.entsoe.eu** (for example, all data used in the YS&AR is available as Excel attachments to the report).

The data collection process for the YS&AR 2014 took place in July and August 2015, and the final check by the STCs was done in December 2015. It is expected that the data are consolidated and final.

Formally, the data and figures in this report should represent the entire system in each country and should be consistent with other (national) statistics; however, differences can occur (e. g., from gross and net values, representivity, or geographical specifics). For more info, please refer to **'Specific National Considerations'** and Methodology Chapter 3.1. In parallel activities related to data harmonisation processes, data definitions (e. g., EMR), and IT tools are still being worked on within ENTSO-E working groups, which will lead to the creation of a central database containing all the information. The adequacy section also includes the area of Ukraine synchronously connected with the ENTSO-E system, referred to as Ukraine West (UA_W), while the statistical section presents ENTSO-E member countries only. In ENTSO-E reports (in YS&AR as well) the country code GB represents England, Scotland and Wales only, while the code NI describes Northern Ireland separately

Data used in this report are net data, which means that energy generation and information about net generating capacity (NGC) excludes auxiliaries. In addition, consumption and load data exclude pumping. A precise energy/power balance description is described in Methodology Chapter 3.1.

1.3. DATA DIFFERENCES FOR TRANSPARENCY AND FOR STATISTICS AND ADEQUACY REPORTS

Since January 2015, following EU regulation EC 543/2013, it is mandatory for member states to submit fundamental information related to electricity generation, load, outages, transmission, and balancing for publication through the ENTSO-E Transparency Platform **(https://transparency.entsoe.eu)**. The way the data is collected, put together, and presented on the transparency platform follows the rules set in the regulations and bidding zone principles. Additionally, the data is collected near or close to real time. The data used in the ENTSO-E statistical and adequacy reports follows different rules and is based on a country view and is often related to processes for settlements. Therefore, differences can occur between the different publications, although ENTSO-E does its utmost to align definitions, time frames, and national considerations in composing the data in all its publications.

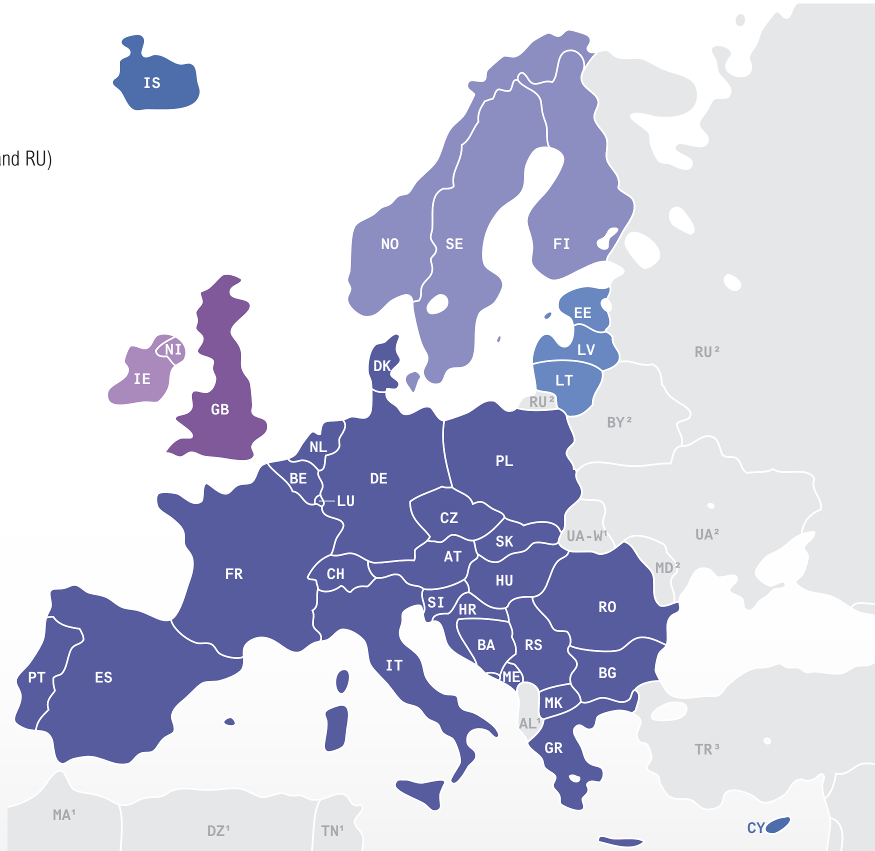
1.4. ABOUT ENTSO-E

ENTSO-E, the European Network of Transmission System Operators, represents electricity transmission system operators (TSOs) from 35 countries across Europe, including 41 members and one observer member. ENTSO-E was established and given legal mandates by the EU's Third Legislative Package for the Internal Energy Market (IEM) in 2009, which aims at further liberalising the gas and electricity markets in the EU.

The role of transmission system operators has considerably evolved with the Third Energy Package. Due to unbundling and the liberalisation of the energy market, the transmission system has become the meeting place where the various players interact. The importance of the work of TSOs and of ENTSO-E's work products for a well-functioning market, a reliable system and the success of energy policy keeps growing.

- Continental European synchronous area
- Baltic synchronous area (Synchronous with BY and RU)
- Nordic synchronous area
- British synchronous area
- Irish synchronous area
- Isolated systems of Cyprus and Iceland

[1] synchronous with the continental European system
[2] synchronous with the Baltic system
[3] permanently synchronised with the Continental Europe area since April 2015



ENTSO-E OBJECTIVES

ENTSO-E members share the objective of completing the internal energy market and ensuring its optimal functioning, and of supporting the ambitious European energy and climate agenda. One of the important issues on today's agenda is the integration of a high degree of renewables in Europe's energy system, the development of the correspondingly needed system flexibility, and a much more customer-centric approach compared to the past. ENTSO-E is committed to develop the most suitable responses to the challenge of a changing power system while maintaining security of supply. Innovation, a market-based approach, customer focus, stakeholder focus, security of supply, flexibility, regional cooperation and sustainability are key to ENTSO-E's agenda.

ENTSO-E contributes to the achievement of these objectives through:

- the drafting of network codes – the rules of the game of the internal energy market – and contributing to their implementation;
- policy proposals based on the European system viewpoint;
- strengthened and focused regional cooperation in markets, planning and operation, most recently through the Regional Security Coordination Initiatives (RSCIs);
- technical cooperation between TSOs;
- the publication of Summer and Winter Outlook reports for short term system adequacy along with annual Scenario Outlook & Adequacy Forecast reports providing a pan-EU overview on longer term system adequacy;
- the development of pan-European 10-year network development plans (TYNDPs);
- the coordination of research and development plans, innovation activities and the participation in research programmes like Horizon 2020.

Through these deliverables, ENTSO-E is contributing to get the world's largest integrated electricity market from promise to practice. This market is decisive for Europe's economy, sustainability and security of supply.

ENTSO-E is aware that such important tasks go hand in hand with a strong interaction with European institutions, ACER, and indeed also with market participants and stakeholders. Transparency is therefore a key principle for ENTSO-E, and requires constant listening, learning and improvement, in the interest of society at large.

2. EXECUTIVE SUMMARY

Due to the fast development of small renewable generation units mainly connected to low voltage levels, and sometimes inside customers' sites (PV panels for example), an increasing portion of consumption and generation data is not available for direct measurement by TSOs or Distribution System Operators (DSOs).

This raises an important risk of lack of visibility and accuracy on the national and European consolidated data of energy balances. For this report and, more generally, statistical consolidation of energy figures, representivity of data collected is an increasing issue for TSOs in charge of energy balance analysis and forecasting, and methods for 'scaling' data are used to represent a total volume to be directly comparable throughout the systems. This situation underlines the critical necessity of improving the legitimacy for TSOs to collect these data from distribution networks, which requires comprehensive cooperation with DSOs whenever possible and reinforcement of the regulatory and legislative framework where necessary.

2.1. ENTSO-E ENERGY AND POWER RESULTS

In 2014, the overall electricity consumption in the ENTSO-E power system[1] demonstrates a stronger negative trend than in the past. Decreasing by 2.1 % in comparison with 2013 and 2.9 % in comparison with 2012. The highest consumption of 3,365 TWh was reached in 2010. Figure 2.1.1 displays details of the evolution of energy.

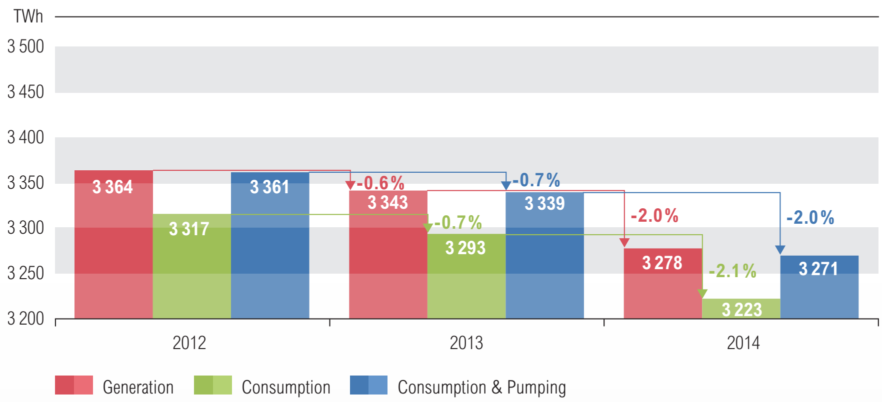


Figure 2.1.1: Energy evolution

[1] As mentioned in the "General Introduction" all analysis in the report includes Ukraine West, a non-ENTSO-E system operated synchronously with Continental Europe aera, while for statistical information in the excel attachments Ukraine West is excluded.

In addition, 2014 showed again the importance of interconnection capacity between areas. Total imports were raised by 9.3 % and the total exports by 9.7 % (in comparison with 2013), showing that more electricity was transported outside the ENTSO-E area (increasing by 61.8 % in comparison with 2013). For more details, see Figures 2.1.2 and 2.1.3.

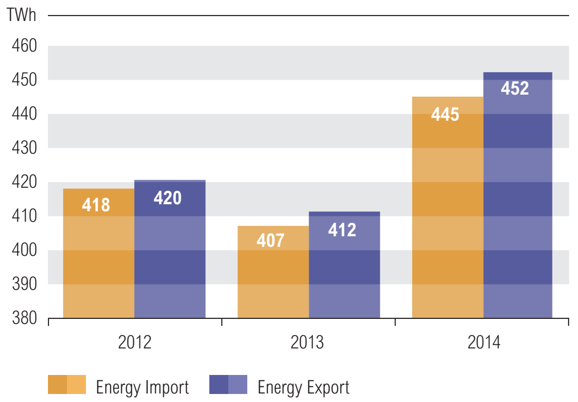


Figure 2.1.2: Import and export evolution

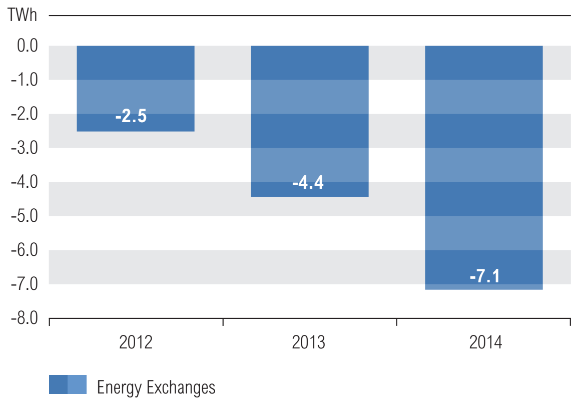


Figure 2.1.3: Exchange balance evolution (negative values mean export, positive values mean import)

The NGC increased again, and raised the level above 1,000 GW. The increase from 2013 to 2014 by 10 GW (0.9 %) was not as large as from 2011 to 2012 which was 43 GW being the largest increase since start of ENTSO-E data collection, and a large part of the increase was due to the growth of renewable resources. In December 2013, there was a 7.6 GW lack to cross the level of 1,000 GW. On the other hand, the unavailable capacity (UC) registered in 12 reference points also had a year-by-year increase of 13.6 GW on average (-6.6 GW – +35.7 GW depending on reference point). In other words, the NGC increase was of the same order of magnitude as the reported UC (based on the average value of UC from 12 reference points). This is because increasing power comes from renewable energy sources (RES), large percentages of which are often unavailable. Both parameters are presented in Figures 2.1.4 and 2.1.5.

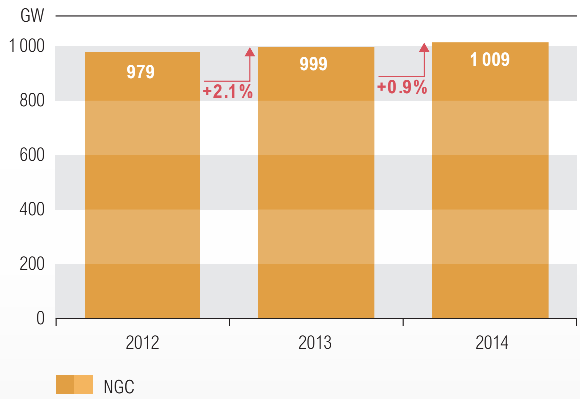


Figure 2.1.4:
Net generating capacity evolution per categories

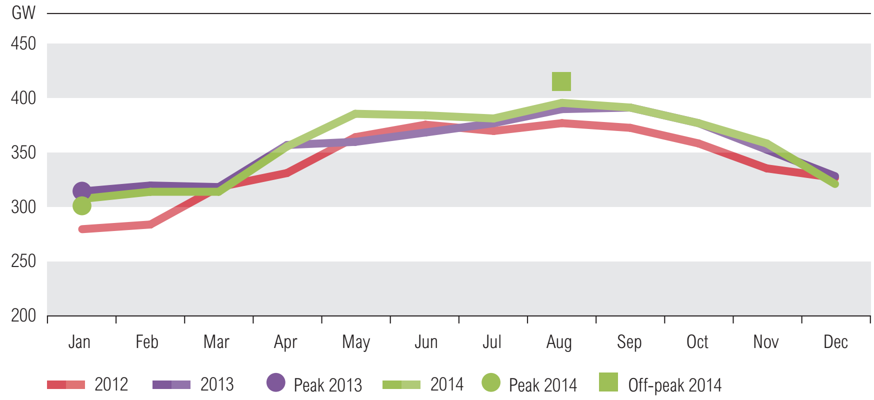


Figure 2.1.5: Unavailable capacity evolution (ENTSO-E peak 2013 marks the date of ENTSO-E peak load 2013, which took place on 17 January at 7 pm.)

The integration of large amounts of RES, the completion of the IEM, as well as new storage technologies, demand-side response, and evolving policies require revised adequacy assessment methodologies. As in the previous edition of YS&AR, besides the standard 12 reference points referred to on the 3rd Wednesday at 11:00 am, an additional reference point was introduced, representing the time of the ENTSO-E peak load in 2014. This reference point was chosen to assess generation adequacy at one of the most stressed moments during the year. The YS&AR 2014 report also includes a 14th reference point representing ENTSO-E's lowest load. The same approach was applied to evaluate the associated effects on the security of supply at a Pan-European level. However, with the development of the energy generation mix, which means more fluctuating renewables in the system and less conventional fossil fuel generation, critical situations may occur in the future at different times than at peak demand. Therefore, ENTSO-E is working to improve its existing adequacy methodology with a special emphasis on hourly assessment of adequacy, harmonised inputs, system flexibility, and interconnection assessments ("ENTSO-E Target Methodology for Adequacy Assessment", "Scenario Outlook and Adequacy Forecast Evolutions" and "Seasonal Outlook Report Evolutions") ENTSO-E published the final version of the three consultation documents together with the answers to the comments from stakeholders on the ENTSO-E website on 14 November 2014.[1)]

Recalculated data is presented below according to the representivity factor. This table is also available in the Excel attachment 'YS&AR 2014 table no.1'. The country comments/representivity provided by STC can be found in the Excel attachment as well as in the proper chapters.

1) https://www.entsoe.eu/news-events/announcements/announcements-archive/Pages/News/ENTSO-E-Assessment-of-the-Adequacy-Methodology-Consultation-is-Released-.aspx

2.2. YEARLY ENERGY DATA PER COUNTRY IN 2014 [GWh]

Country	Comments	Representativity different than 100%	**Nuclear**	**Fossil**	of which lignite	of which coal	of which gas energy	of which oil	of which mixed fuels	of which other fossil fuels	**RES (except of hydro)**	of which wind	of which solar
AT			**0**	**13 232**	0	2 953	5 161	597	0	4 520	**6 495**	3 640	351
BA			**0**	**8 723**	8 723	0	0	0	0	0	**0**	0	0
BE			**32 093**	**22 388**	0	4 018	18 334	36	0	0	**11 773**	4 437	2 834
BG			**14 708**	**19 582**	15 587	2 432	1 563	0	0	0	**2 669**	1 313	1 229
CH			**26 370**	**2 092**	0	0	0	0	0	2 092	**1 863**	90	544
CY	Yes		**0**	**4 013**	0	0	0	4 013	0	0	**180**	180	0
CZ	Yes		**28 636**	**41 656**	32 577	4 562	4 361	45	0	111	**6 767**	470	2 094
DE	Yes		**91 799**	**317 247**	148 769	114 824	37 227	1 434	14 993	0	**128 721**	55 484	34 961
DK			**0**	**14 603**	0	10 803	3 751	49	0	0	**15 963**	13 061	596
EE			**0**	**9 582**	0	0	0	0	0	9 582	**1 282**	575	0
ES			**54 709**	**99 600**	4 547	39 365	46 541	9 147	0	0	**68 914**	51 027	13 158
FI			**22 645**	**16 542**	0	7 835	5 286	206	3 215	0	**12 227**	1 107	0
FR			**415 857**	**25 833**	0	8 359	14 267	3 206	0	0	**30 479**	17 085	5 941
GB		Yes	**59 891**	**212 174**	0	114 108	98 051	14	0	0	**29 005**	29 005	0
GR			**0**	**29 048**	22 708	0	6 339	1	0	0	**8 048**	3 009	3 557
HR			**0**	**2 927**	0	2 137	444	0	346	0	**929**	730	35
HU			**14 649**	**8 888**	5 549	632	2 663	44	0	0	**2 300**	632	7
IE			**0**	**18 210**	2 559	3 934	11 635	18	0	64	**5 356**	5 116	0
IS			**0**	**0**	0	0	0	0	0	0	**4 905**	8	0
IT			**0**	**159 997**	0	35 236	93 288	17 340	11 333	2 800	**48 905**	15 068	23 306
LT			**0**	**1 932**	0	0	1 060	0	654	218	**1 047**	636	73
LU	Yes		**0**	**1 420**	0	0	1 420	0	0	0	**190**	79	61
LV			**0**	**2 243**	0	0	1 678	0	565	0	**756**	126	0
ME			**0**	**1 323**	1 323	0	0	0	0	0	**0**	0	0
MK			**0**	**3 707**	3 517	0	190	0	0	0	**42**	42	0
NI	Yes		**0**	**6 445**	0	2 064	3 836	3	542	0	**1 541**	1 447	0
NL			**4 091**	**80 399**	0	0	0	0	0	80 399	**11 646**	5 808	86
NO	Yes		**0**	**3 475**	0	0	3 475	0	0	0	**2 216**	2 216	0
PL	Yes		**0**	**128 402**	49 564	67 061	3 173	0	0	8 604	**14 455**	7 276	4
PT			**0**	**17 727**	0	11 068	6 320	139	0	200	**15 076**	11 812	571
RO	Yes		**10 740**	**23 021**	13 316	2 512	2 719	0	4 474	0	**8 260**	6 138	1 616
RS			**0**	**25 361**	25 298	0	63	0	0	0	**0**	0	0
SE			**62 185**	**3 484**	0	524	853	125	1 982	0	**21 318**	11 475	0
SI			**6 060**	**3 303**	2 778	457	6	0	0	62	**475**	4	227
SK			**14 457**	**4 605**	1 690	981	1 718	216	0	0	**1 727**	6	476
ENTSO-E			**858 890**	**1 333 186**	**338 505**	**435 866**	**375 423**	**36 633**	**38 104**	**108 652**	**465 531**	**249 102**	**91 727**
UA_W			**0**	**8 605**	0	0	0	0	8 605	0	**18**	0	18
Sum			**858 890**	**1 341 791**	**338 505**	**435 866**	**375 423**	**36 633**	**46 709**	**108 652**	**465 549**	**249 102**	**91 745**

Recalculated data is presented below according to the representativity factor. This table is also available in the excel attachment 'YS&AR 2014 table no.1'. Country comments/representativity provided by STC can be found in the excel attachment.

of which biomass	of which other RES	Hydro	of which renewable hydro	of which other hydro	Non-identifiable	Total generation	of which physical import	of which physical export	Exchange balance	Pump	Consumption	Annual average temperature [°C]	Country
2 504	0	44 728	40 902	3 826	652	65 109	26 711	17 437	9 274	5 466	68 917	n. a.	AT
0	0	5 747	5 747	0	0	14 470	3 163	5 998	-2 835	0	11 635	n. a.	BA
4 502	0	1 432	266	1 166	0	67 686	21 698	4 190	17 508	1 562	83 632	10.9	BE
127	0	4 698	4 169	529	0	41 657	4 323	13 746	-9 423	812	31 422	13.1	BG
886	343	39 308	36 953	2 355	0	69 633	28 116	32 439	-4 323	2 355	62 955	10.0	CH
0	0	0	0	0	0	4 193	0	0	0	0	4 193	19.5	CY
1 840	2 363	2 984	1 933	1 051	0	80 043	11 832	28 138	-16 306	1 350	62 387	9.4	CZ
36 800	1 476	24 098	16 663	7 435	0	561 865	38 881	74 590	-35 709	8 004	518 152	10.3	DE
2 306	0	16	16	0	0	30 582	12 785	9 801	2 984	0	33 566	10.0	DK
707	0	27	27	0	0	10 891	3 712	6 530	-2 818	0	8 073	6.7	EE
4 729	0	42 389	38 460	3 929	1 241	266 853	12 308	15 716	-3 408	5 328	258 117	17.1	ES
11 120	0	13 240	13 240	0	794	65 448	21 966	3 858	18 108	0	83 556	n. a.	FI
5 869	1 583	68 017	62 476	5 541	0	540 187	8 006	75 231	-67 225	7 916	465 046	13.2	FR
0	0	8 818	5 900	2 918	0	309 888	23 169	3 704	19 465	3 873	325 480	11.3	GB
207	1 275	4 607	701	3 906	0	41 704	9 462	642	8 820	187	50 337	16.9	GR
50	114	8 326	8 326	0	0	12 182	10 905	6 228	4 677	168	16 691	15.0	HR
1 661	0	294	294	0	0	26 131	19 079	5 690	13 389	0	39 520	12.7	HU
0	240	975	700	275	0	24 541	2 813	672	2 141	502	26 180	10.6	IE
0	4 897	12 777	12 777	0	0	17 682	0	0	0	0	17 682	5.2	IS
4 978	5 553	58 031	54 976	3 055	0	266 933	46 756	3 008	43 748	2 253	308 428	n. a.	IT
338	0	1 075	394	681	0	4 054	8 521	898	7 623	961	10 716	8.6	LT
50	0	1 162	91	1 071	72	2 844	6 971	2 052	4 919	1 501	6 262	10.8	LU
292	338	2 056	2 056	0	0	5 055	5 338	3 023	2 315	0	7 370	n. a.	LV
0	0	1 686	0	1 686	0	3 009	3 884	3 638	246	0	3 255	15.0	ME
0	0	1 136	0	1 136	0	4 885	5 598	2 637	2 961	0	7 846	n. a.	MK
58	36	11	2	9	0	7 997	1 613	314	1 299	0	9 296	9.4	NI
5 752	0	82	82	0	0	96 218	32 853	17 899	14 954	0	111 172	11.7	NL
0	0	136 636	136 636	0	0	142 327	6 347	21 932	-15 585	1 637	125 105	3.3	NO
6 751	424	2 712	2 152	560	0	145 569	13 509	11 342	2 167	833	146 903	9.8	PL
2 693	0	16 170	15 310	860	0	48 973	7 247	6 343	904	1 079	48 798	16.8	PT
506	0	18 646	18 646	0	0	60 667	1 363	8 493	-7 130	251	53 286	10.9	RO
0	0	11 472	10 858	614	0	36 833	7 325	5 044	2 281	902	38 212	13.8	RS
9 843	0	64 202	64 202	0	0	151 189	16 148	32 513	-16 365	0	134 824	n. a.	SE
148	96	6 319	6 046	273	123	16 280	7 254	9 946	-2 692	363	13 225	12.6	SI
899	346	4 514	4 269	245	79	25 382	12 963	11 862	1 101	334	26 149	11.2	SK
105 616	19 084	608 392	565 270	43 121	2 961	3268 961	442 620	445 554	-2 935	47 637	3218 390		ENTSO-E
0	0	103	103	0	0	8 726	2 589	6 803	-4 214	0	4 512	10.1	UA_W
105 616	19 084	608 495	565 373	43 121	2 961	3277 687	445 209	452 357	-7 149	47 637	3222 902		Sum

2.3. NET GENERATING CAPACITY AS OF 31 DECEMBER 2014 PER COUNTRY [MW]

Country	Comments (see annex)	**NGC Nuclear**	**NGC fossil fuels**	of which lignite	of which hard coal	of which gas	of which oil	of which mixed fuels	**NGC hydraulic power**
AT	Yes	**–**	**7 243**	–	1 171	4 888	334	436	**13 569**
BA		**–**	**1 578**	1 578	–	–	–	–	**2 060**
BE		**5 926**	**6 639**	–	410	6 019	210	–	**1 425**
BG		**2 000**	**6 585**	4 199	1 548	838	–	–	**3 191**
CH	Yes	**3 333**	**502**	–		–	–	502	**13 828**
CY	Yes	**–**	**1 478**	–	–	–	1 478	–	**–**
CZ		**4 040**	**12 054**	–	–	2 023	–	10 031	**2 261**
DE		**12 068**	**85 800**	21 245	28 005	27 712	4 143	4 696	**10 708**
DK		**–**	**8 913**	–	4 923	3 087	859	44	**9**
EE	Yes	**–**	**2 400**	–	–	241	12	250	**8**
ES		**7 573**	**45 177**	1 056	9 970	31 508	2 644	–	**19 388**
FI		**2 752**	**8 703**	–	3 445	1 824	1 738	1 696	**3 234**
FR		**63 130**	**23 735**	–	4 507	10 341	8 887	–	**25 416**
GB		**9 779**	**50 236**	–	19 429	28 688	2 119	–	**3 971**
GR		**–**	**10 056**	4 456	–	4 902	698	–	**3 237**
HR		**–**	**1 770**	–	325	496	320	629	**2 112**
HU		**1 890**	**6 095**	731	168	4 786	410	–	**57**
IE	Yes	**–**	**6 156**	346	855	3 805	1 138	12	**530**
IS		**–**	**63**	–	–	–	63	–	**1 860**
IT		**–**	**68 027**	–	8 700	49 023	6 697	3 607	**22 098**
LT	Yes	**–**	**2 620**		–	579	–	2 041	**1 026**
LU		**–**	**495**	–	–	495	–	–	**1 334**
LV		**–**	**1 138**	–	–	1 031	–	107	**1 579**
ME		**–**	**220**	220	–	–	–	–	**660**
MK		**–**	**1 157**	718	–	250	189	–	**36**
NI		**–**	**5 904**	–	3 836	2 064	4	–	**12**
NL		**492**	**27 729**	–	7 270	19 590	–	869	**38**
NO	Yes	**–**	**1 078**	–	–	930	–	148	**31 080**
PL	Yes	**–**	**29 098**	8 519	17 309	944	–	–	**2 354**
PT		**–**	**6 960**	–	1 756	4 702	71	–	**5 692**
RO	Yes	**1 300**	**9 324**	4 097	1 083	1 999	–	2 145	**6 309**
RS		**–**	**5 549**	5 238	–	–	311	–	**2 990**
SE		**9 528**	**5 285**	–	225	879	3 622	559	**16 155**
SI	Yes	**696**	**1 214**	553	222	84	–	355	**1 245**
SK		**1 940**	**2 692**	568	440	1 076	195	413	**2 536**
ENTSO-E		**124 507**	**450 980**	**52 956**	**115 157**	**213 728**	**35 947**	**28 127**	**199 472**
UA_W		**–**	**2 552**	–	–	–	–	2 552	**31**
Total		**124 507**	**453 532**	**52 956**	**115 157**	**213 728**	**35 947**	**30 679**	**199 503**

Pure national data with the representivity factor is presented below. This NGC data represents statistics and may differ from the NGC provided for the adequacy section (see 1.2 for more information). This table is also available in the Excel attachment 'YS&AR 2014 table no.1'. Country comments can be found in the Excel attachment.

of which renewable hydro	**NGC renewables**	of which wind	of which solar	of which biomass	**NGC other sources**	**NGC Total Sum**	Representativity index	Country
13 569	**3 413**	2 110	589	512	**–**	**24 225**	100	AT
1 620	**–**	–	–	–	**–**	**3 638**	100	BA
117	**6 115**	1 939	2 986	1 190	**–**	**20 105**	100	BE
2 327	**1 787**	701	1 039	47	**–**	**13 563**	100	BG
12 445	**1 091**	60	756	275	**245**	**18 998**	100	CH
–	**144**	144	–	–	**–**	**1 622**	96	CY
1 090	**2 339**	278	2 061	–	**–**	**20 694**	100	CZ
4 358	**81 487**	36 561	37 981	6 359	**–**	**190 063**	100	DE
9	**6 111**	4 897	606	608	**–**	**15 033**	100	DK
8	**403**	301	–	101	**–**	**2 811**	100	EE
16 937	**30 874**	22 775	6 803	1 280	**758**	**103 770**	100	ES
3 234	**2 589**	504	–	2 085	**40**	**17 318**	100	FI
23 704	**16 138**	9 262	5 296	1 580	**–**	**128 419**	100	FR
1 074	**8 915**	7 778	–	1 137	**–**	**72 901**	80	GB
220	**4 144**	1 662	2 436	47	**99**	**17 536**	100	GR
2 112	**411**	340	34	8	**–**	**4 293**	100	HR
57	**532**	329	6	197	**–**	**8 574**	100	HU
238	**2 289**	2 265	–	24	**230**	**9 205**	100	IE
1 860	**665**	2	–	–	**–**	**2 588**	100	IS
–	**31 636**	8 683	18 609	3 576	**–**	**121 761**	100	IT
126	**435**	288	69	78	**10**	**4 091**	100	LT
38	**177**	57	109	11	**21**	**2 027**	98	LU
1 579	**–**	74	–	88	**–**	**2 717**	100	LV
10	**–**	–	–	–	**–**	**880**	100	ME
36	**–**	–	539	–	**–**	**1 193**	100	MK
12	**1 550**	1 447	–	43	**–**	**7 466**	100	NI
38	**4 274**	2 874	1 000	400	**680**	**33 213**	100	NL
31 080	**888**	856		32	**–**	**33 046**	100	NO
941	**4 548**	3 753	23	624	**–**	**36 000**	100	PL
5 692	**5 176**	4 540	396	240	**–**	**17 828**	100	PT
6 309	**4 181**	2 944	1 143	94	**0**	**21 114**	100	RO
2 370	**–**	–	–	–	**–**	**8 539**	100	RS
16 155	**8 581**	5 420	79	3 082	**–**	**39 549**	100	SE
1 065	**302**	2	260	40	**–**	**3 456**	100	SI
1 619	**908**	3	531	254	**–**	**8 076**	100	SK
150 430	**231 194**	**122 846**	**82 820**	**23 757**	**2 083**	**1 008 235**		**ENTSO-E**
31	**25**	7	18	25	**–**	**2 608**	100	UA_W
150 461	**231 219**	**122 853**	**82 838**	**23 782**	**2 083**	**1 010 843**		**Total**

2.4. TIE LINES

Figure 2.4.1 presents a simplified diagram of the tie lines (cross frontier) in the ENTSO-E areas as of 31 December 2014. This diagram is also available in high resolution in 'YS&AR 2014 table no.1' and in high resolution as an external file in the YS&AR 2014 background data.

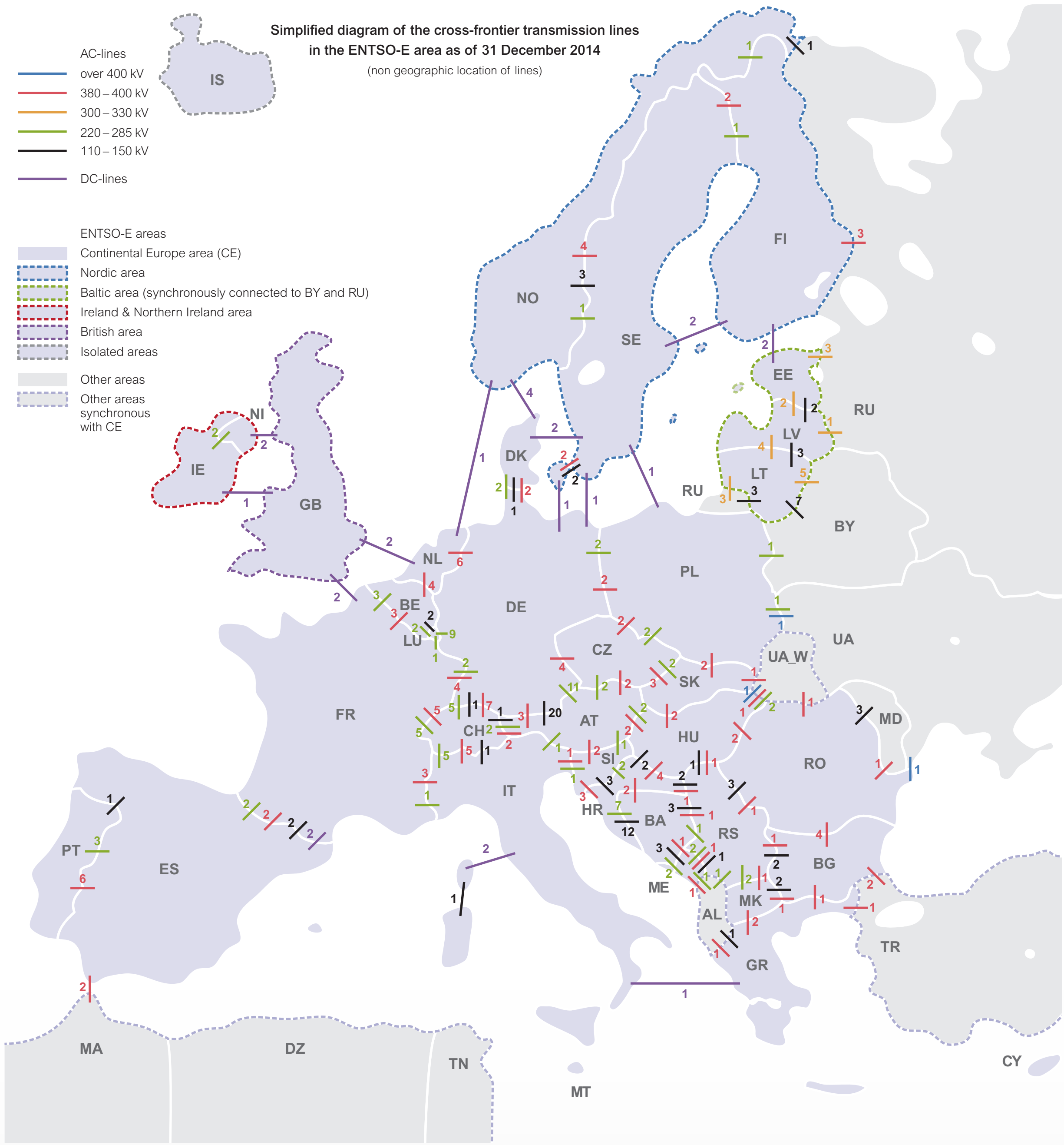


Figure 2.4.1: Tie lines

3. ADEQUACY RETROSPECT

3.1. METHODOLOGY

3.1.1. COHERENCY OF THE DATA

ENTSO-E provides coherent data in the YS&AR report; however, some inconsistencies may occur in the report, especially between classic statistical data and data used for adequacy analysis. The ENTSO-E Data Expert Group identified the main reasons for possible differences in the data as follows:

1. Geographical specifics, which concern differences between data referring to the whole country or to the interconnected system only (power balance and adequacy analysis). Remarks about this topic, provided by statistical data correspondents are available in **'Specific National Considerations'**. Therefore, the NGC uses in power balance/adequacy analysis may differ from the NGC described for the entire country.

2. The representivity factor describes the percentage data available for TSO. A part of the data coming from certain sources (e.g., industry or from auto producers) may not be available for TSOs; therefore, the TSO can provide a representivity factor, calculated on the basis of historical relations between TSO data and data from official national statistics.

   a. In the case of energy, the representivity factor refers to energy generation data per (sub)category. This factor does not refer to energy consumption because consumption is calculated by ENTSO-E from energy generation, according the following formula:

      Consumption = Net Energy Generation + Import - Export - Pumping Energy, where net generation is recalculated by the representivity factor.

   b. In the case of power, the representivity factor refers to both NGC and load. Load is provided by the correspondent separately and is not calculated from NGC.

   In **'Specific National Considerations'** information about representivity can be found as well. It is worth noting that **all data presented in this report are recalculated data** to describe 100% of each country (according to geographical specifics described by the statistical correspondents **except for power balance (NGC and load) and peak load data for Germany.** 'It was requested by Germany to use pure national data as provided by the National Data Correspondent'. As mentioned in Chapter 1.2, data in this report are net data, while official statistics in some countries refer to gross data.

3.1.2. ENERGY BALANCE

The energy balance structure can be found below. This structure is common for both the adequacy section of the report and the statistical information, which is presented in the Excel attachments (in the yearly perspective, based on monthly data).[1)]

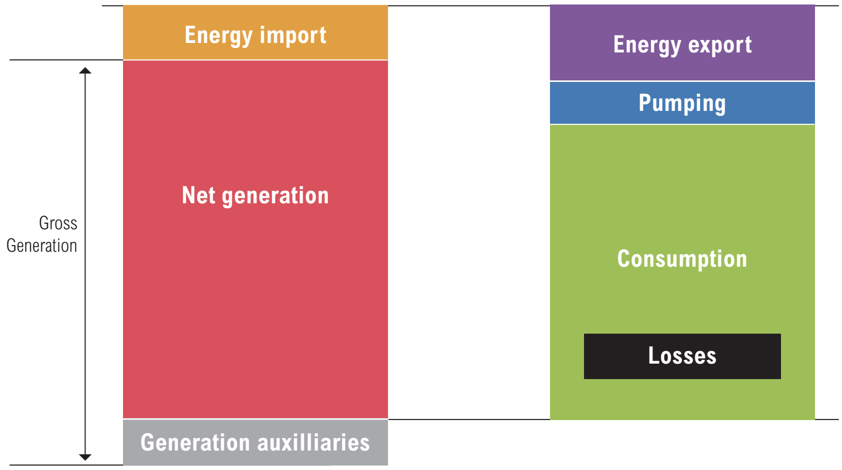


Figure 3.1.1: Energy balance

For energy analysis, data for Y-1 was collected. For some countries, data regarding year Y-1 could still have been provisional when collected in year Y. Data regarding year Y-2 sometimes differs from the data published in Y-1 because it has been updated in the meantime. Therefore, correspondents are invited to validate and update (if needed) the energy values for Y-2 when entering the values for Y-1.

3.1.3. POWER BALANCE

This subchapter describes the methodology for system adequacy analysis used by ENTSO-E in the adequacy chapter of the YS&AR report. The system adequacy of a power system pertains to the ability of a power system to supply the load in all the steady states in which the power system may exist, considering standard conditions. System adequacy is analysed here mainly through generation adequacy, whereby the generation adequacy of a power system is an assessment of the ability of the generation to match the consumption of the power system. The figure below shows the relationships between the quantities used in power balance analysis.[2)]

The generation adequacy retrospect in the power system is assessed through the **remaining capacity (RC) value**, which is the part of the **NGC** left in the

[1) 2)] All definitions of terms are located in the ENTSO-E Glossary via the EMR tool. More information can be found in Chapter 1.1.

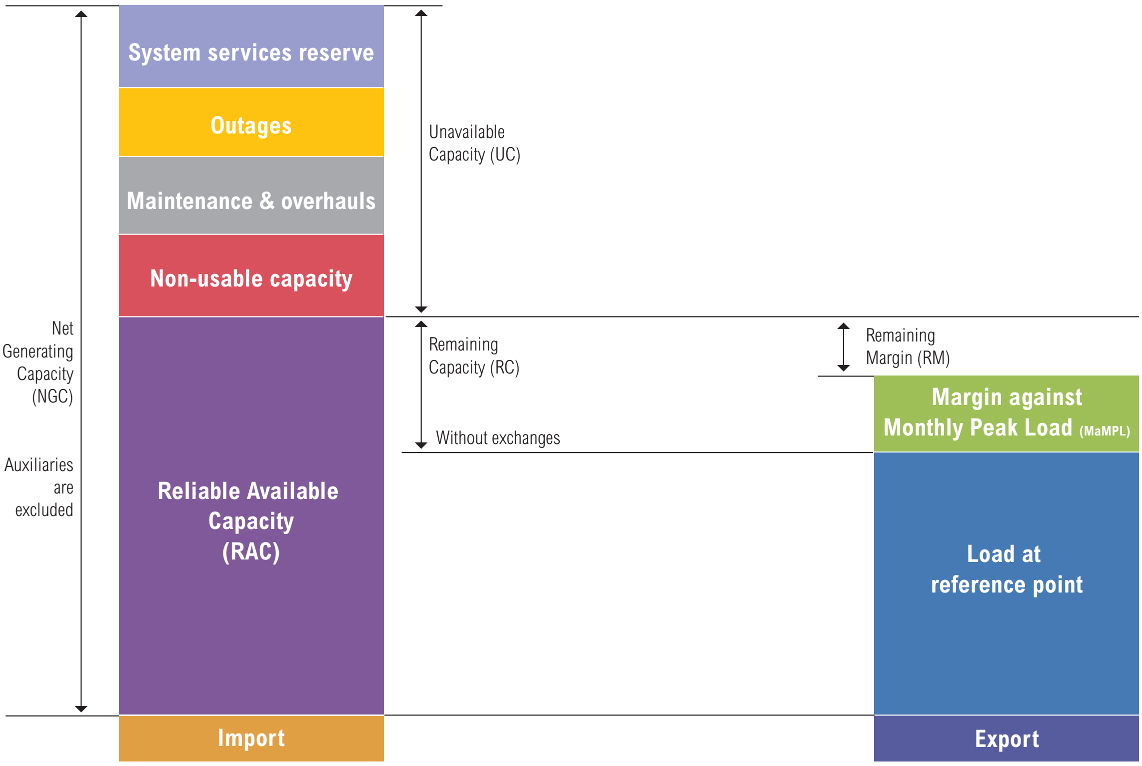


Figure 3.1.2: Energy balance in 2014

power system after the **load** at a **reference point** has been covered. When the RC without exchanges is positive, the power system had enough internal generating capacity left to cover its load; when it is negative, the power system had to cover its load with the help of imports. Considering the definition of the remaining margin (RM), the generation adequacy retrospective assessment is then extended monthly. When the RM without exchanges is positive, the power system had enough internal generating capacity left to cover its load at any time during the month. When the RM without exchanges is negative, the power system may have had to rely on imports to cover its monthly peak load.

Generation adequacy is assessed for each individual country and for the whole ENTSO-E. In the case of negative RC in individual countries, the power balance is still achieved when the RC of the respective regional block or ENTSO-E is positive, and the interconnection capacities are sufficient to cope with the necessary exchanges.

The power data collected for each country is synchronous at each reference point (date and time the power data is collected) and can therefore be aggregated. In order to compare the evolution of the results, similar reference points are specified for each month and from one report to another. Times in the studies are expressed in Central European Time (CET = UTC[1] + 1) in winter and Central European Summer Time (CEST = UTC + 2) in summer. A single monthly reference point is defined in the Adequacy Retrospect Sec-

1) UTC is the international designation for Universal Coordinated Time.

tion: the 3rd Wednesday of each month at the 11 th hour (from 10:00 CEST to 11:00 CEST) in summer and (10:00 CET to 11:00 CET) in winter. Data collected for the hour H is the average value[1)] from the hour H-1 to the hour H.

This year's edition includes data for two additional reference points, which represent the date when ENTSO-E's peak load and lowest load took place. These reference points were set based on the date of the ENSO-E peak load and lowest load, calculated from national hourly load data delivered by correspondents for monthly statistics. The ENTSO-E peak load in 2014 took place on Wednesday, 29 January, while the lowest ENTSO-E load occurred on Sunday, 17 August of that same year. The idea of introducing a reference point representing the ENTSO-E peak load was to analyse more stressed moments in the system operation perspective, than just the standard reference points on 3rd Wednesday, 11:00 am. Since ENTSO-E does not collect all elements of the power balance, there is no possibility to find ENTSO-E's lowest level of RC, which is expected to be critical in the power balance point perspective. Therefore, the power balance for the moment of the ENTSO-E peak load appears to be optimal, considering the available data. On the other hand, a reference point representing the lowest ENTSO-E load may present a moment with a very high level of RC. Implementation of the new transparency platform is an additional chance to look for new, more interesting reference points (e.g., the hour with the highest wind generation during the reporting year).

3.2. ENERGY BALANCE

3.2.1. ENTSO-E DATA SUMMARY

Compared to 2012 and 2013, both energy consumption and generation have more strongly decreased in 2014 by 2.0 % and 2.1 %, respectively. Energy exchanged for imports and exports have significantly increased both, showing that the cross-area capacity between areas is increasingly being used and that more energy is exported to the perimeter areas from the ENTSO-E (61.8 %), again showing the growth of ENTSO-E as a net exporter. Regarding the generation mix, RES was the only type of generation that has increased its share (4.0 %), whereas nuclear generation stayed stable. A significant drop of 'not clearly identifiable energy sources generation' is noticeable, probably due to the preparations for the transparency legislation. All details can be found in Table 3.2.1.1.[2)]

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1) When possible, power data used in the retrospect power balance is based on the hourly average values of the actual metering at every reference point.

2) As mentioned in Paragraph 1.2, values of 'total' or 'sum' represent ENTSO-E, including the Ukraine West system.

TWh	2012	2013	2014	Change 2014 to 2013	
				Absolute value	%
Total generation	**3 363.9**	**3 343.1**	**3 277.7**	**- 65.4**	**- 2.0%**
Fossil fuels generation	1 542.9	1 438.1	1 341.8	-96.3	-6.7%
Nuclear generation	862.8	857.4	858.9	1.5	0.2%
Non-renewable hydro generation	70.0	44.9	43.1	-1.8	-3.9%
RES generation (incl. renewable hydro)	878.1	991.4	1 030.9	39.6	4.0%
Not clearly identifiable energy sources generation	10.1	11.3	3.0	-8.4	-73.9%
Energy exchanges	**- 2.5**	**- 4.4**	**- 7.1**	**-2.7**	**61.8%**
Energy import	417.9	407.1	445.2	38.1	9.4%
Energy export	420.5	411.5	452.4	40.8	9.9%
Pumping	**44.8**	**45.8**	**47.6**	**1.8**	**4.0%**
Consumption	**3 316.6**	**3 292.9**	**3 222.9**	**- 69.9**	**- 2.1%**

Table 3.2.1.1: ENTSO-E energy balance summary

The energy balance below (see Figure 3.2.1.1) displays the relationship between demand and supply as observed in 2014.

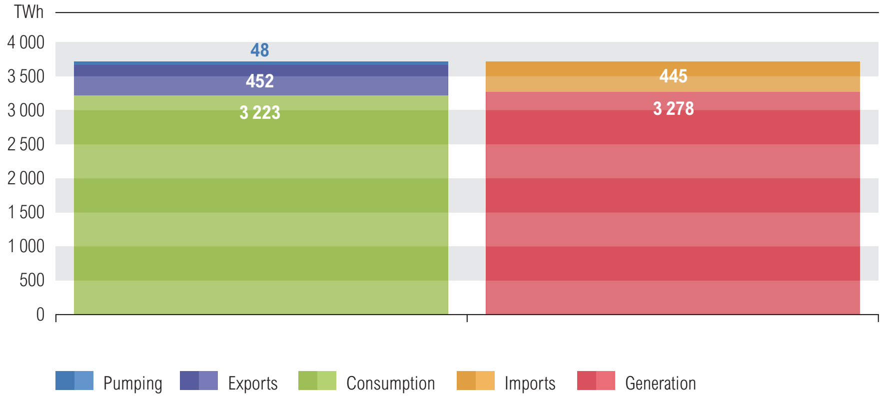


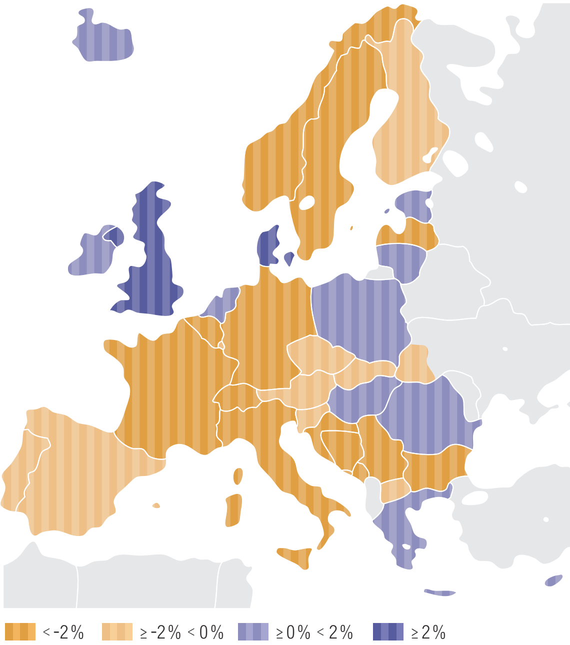
Figure 3.2.1.1: Energy balance in 2014

3.2.2. ENERGY CONSUMPTION

3.2.2.1. ENTSO-E OVERVIEW

In 2014, the consumption of electricity maintained its downward trend that began in 2010 and accounts for a cumulative decrease of nearly 137 TWh, which is 4 % below 2010 values. Compared to 2013, the decrease was 2.1 %. Looking at the country details, 22 out of the 36 countries decreased their consumption in the last year. Map 3.2.2.1.1 shows the variations of each country for 2013 compared to 2012.

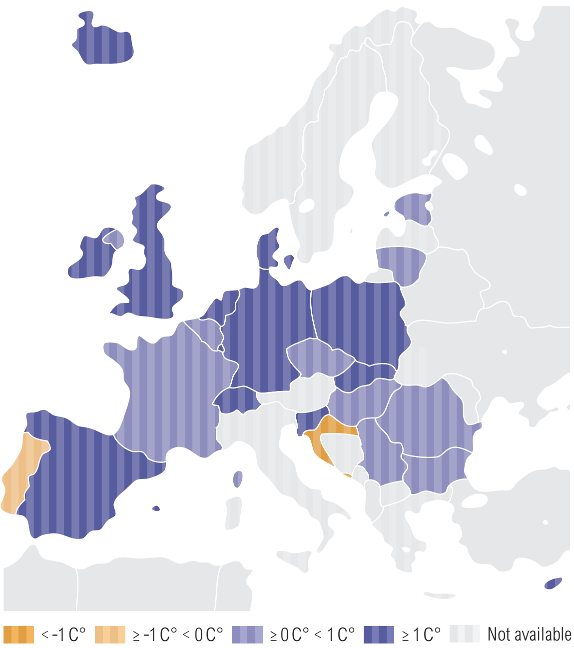
During 2014, the average annual temperatures in most of the ENTSO-E countries were higher than in 2013 (see Map 3.2.2.1.2 below). The temperature peaks ranged between 2.5 % in Great Britain and -2.0 % in Croatia. The average absolute temperature differed by 1.0 %.



Data related to the map Used formula: $(Cons_{2014} - Cons_{2013}) / Cons_{2013}$

AT	-1.0%	IS	0.2%
BA	-3.2%	IT	-3.2%
BE	-2.9%	LT	1.3%
BG	-3.5%	LU	0.0%
CH	-2.9%	LV	-3.8%
CY	0.5%	ME	-9.0%
CZ	-0.6%	MK	-0.3%
DE	-2.3%	NI	4.8%
DK	7.1%	NL	0.5%
EE	0.3%	NO	-3.2%
ES	-1.1%	PL	1.0%
FI	-0.4%	PT	-0.7%
FR	-6.1%	RO	1.9%
GB	5.3%	RS	-3.1%
GR	1.5%	SE	-3.5%
HR	-2.4%	SI	-0.3%
HU	1.3%	SK	-1.9%
IE	0.4%	UA_W	-0.5%

Map 3.2.2.1.1:
Consumption changes per country in 2014



Data related to the map Used formula: $Temp_{2014} - Temp_{2013}$

AT	n.a.	IS	1.2 °C
BA	n.a.	IT	n.a.
BE	0.1 °C	LT	0.7 °C
BG	0.3 °C	LU	1.8 °C
CH	1.3 °C	LV	n.a.
CY	0 °C	ME	n.a.
CZ	0.6 °C	MK	n.a.
DE	1.6 °C	NI	0.6 °C
DK	1.6 °C	NL	1.9 °C
EE	0.1 °C	NO	n.a.
ES	1.1 °C	PL	1.3 °C
FI	n.a.	PT	-0.6 °C
FR	0.9 °C	RO	0.1 °C
GB	2.5 °C	RS	0.1 °C
GR	n.a.	SE	n.a.
HR	-2 °C	SI	1 °C
HU	0.9 °C	SK	1 °C
IE	1.1 °C	UA_W	n.a.

Map 3.2.2.1.2:
Temperature changes per country in 2014

3.2.2.2. NATIONAL COMMENTS ON CONSUMPTION

NO – Norway

Pumping energy includes other electricity consumption.

3.2.3. ENERGY GENERATION

3.2.3.1. ENTSO-E OVERVIEW

Generally, energy generation in the ENTSO-E system was higher than energy consumption. This again leads to the fact of exports to non-ENTSO-E neighbouring countries (Albania, Belarus, Morocco, Russia, Turkey, Ukraine, and the Republic of Moldova), which are quite small compared to the ENTSO-E system. Overall energy generation in 2014 decreased 2.0 % compared to 2013. Figure 3.2.3.1.1 shows how energy sources have been changing since 2012.

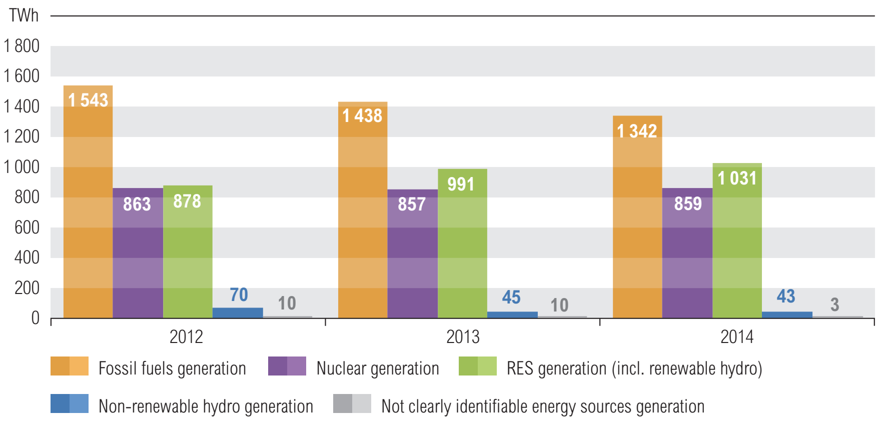


Figure 3.2.3.1.1: Generation category evolution

When looking at generation mixes in 2013 and 2014 (Figures 3.2.3.1.2 and 3.2.3.1.3), the high increase of renewable generation in 2013 (to 2012) by 12 % stagnated, and amounts in 2014 were 1.9 %. Nuclear generation was stable (0.4 %), and generation by fossil fuels decreased by 2.1 %. The shares of the not clearly identifiable category decreased by 0.2 %.

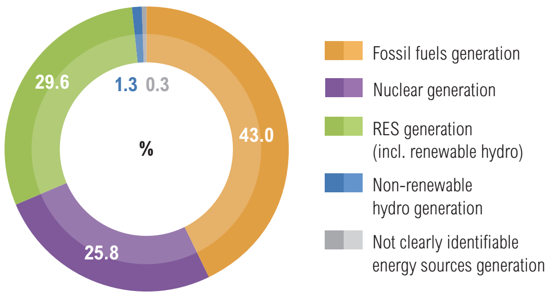


Figure 3.2.3.1.2: Generation mix in 2013

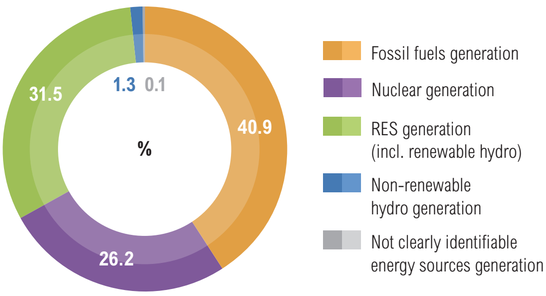
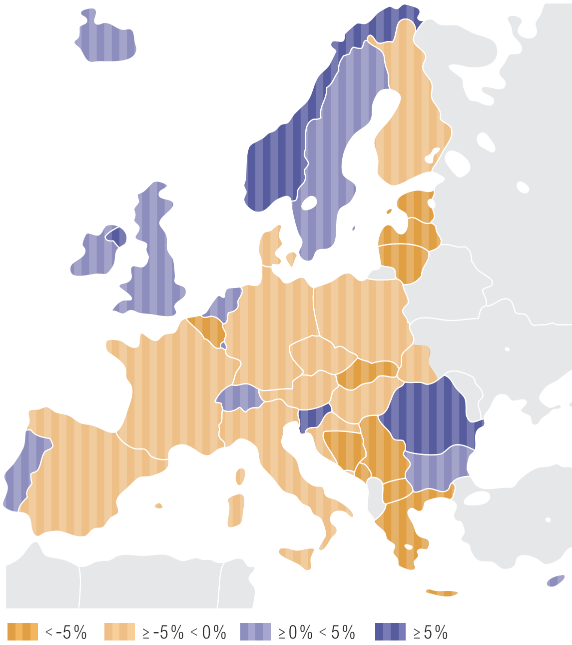


Figure 3.2.3.1.3: Generation mix in 2014

The overall decrease of generation (2.0 %) at the ENTSO-E level, was the effect of 22 out of 36 areas decreasing by an average amount of 7.2 % with a peak of 22.9 % in Montenegro, and 14 out of 36 showing an increase of generation in their areas, which amounts to an average of 4.2 % with a peak in Romania of 11.3 %, as shown in Map 3.2.3.1.1 below. However, by showing the degree of total generation in the ENTSO-E area, the effects of market prices and usage of cross-area capacity is observable.

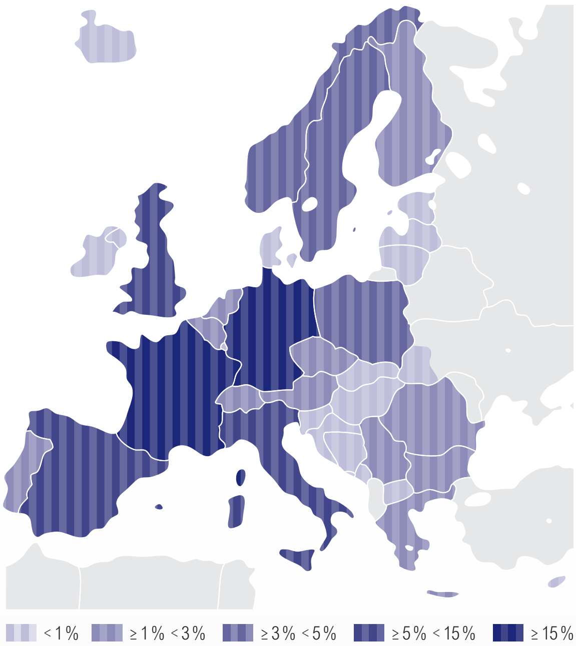


Data related to the map Used formula: $(Gen_{2014} - Gen_{2013}) / Gen_{2013}$

AT	-3.9%	IS	0.2%
BA	-7.9%	IT	-4.2%
BE	-13.6%	LT	-7.8%
BG	4.7%	LU	3.2%
CH	1.9%	LV	-19.8%
CY	0.5%	ME	-22.9%
CZ	-1.0%	MK	-10.3%
DE	-1.7%	NI	8.1%
DK	-4.4%	NL	4.3%
EE	-6.5%	NO	6.0%
ES	-2.5%	PL	-3.5%
FI	-4.0%	PT	2.4%
FR	-1.9%	RO	11.3%
GB	3.3%	RS	-14.7%
GR	-12.2%	SE	1.0%
HR	-4.5%	SI	9.8%
HU	-3.8%	SK	-6.0%
IE	0.5%	UA_W	-1.8%

Map 3.2.3.1.1: Generation changes per country in 2014

Regarding the share of generation, the four countries with the highest contributions, still being Germany, France, Italy, and Spain with a total of 49.8%, account for close to half of the total ENTSO-E generation in 2014 (Map 3.2.3.1.2).



Data related to the map Used formula: Gen_{2014} / Gen_{2014} (ENTSO-E)

AT	2.0%	IS	0.5%
BA	0.4%	IT	8.1%
BE	2.1%	LT	0.1%
BG	1.3%	LU	0.1%
CH	2.1%	LV	0.2%
CY	0.1%	ME	0.1%
CZ	2.4%	MK	0.1%
DE	17.1%	NI	0.2%
DK	0.9%	NL	2.9%
EE	0.3%	NO	4.3%
ES	8.1%	PL	4.4%
FI	2.0%	PT	1.5%
FR	16.5%	RO	1.9%
GB	9.5%	RS	1.1%
GR	1.3%	SE	4.6%
HR	0.4%	SI	0.5%
HU	0.8%	SK	0.8%
IE	0.7%	UA_W	0.3%

Map 3.2.3.1.2:
Share of each country in total generation in 2014

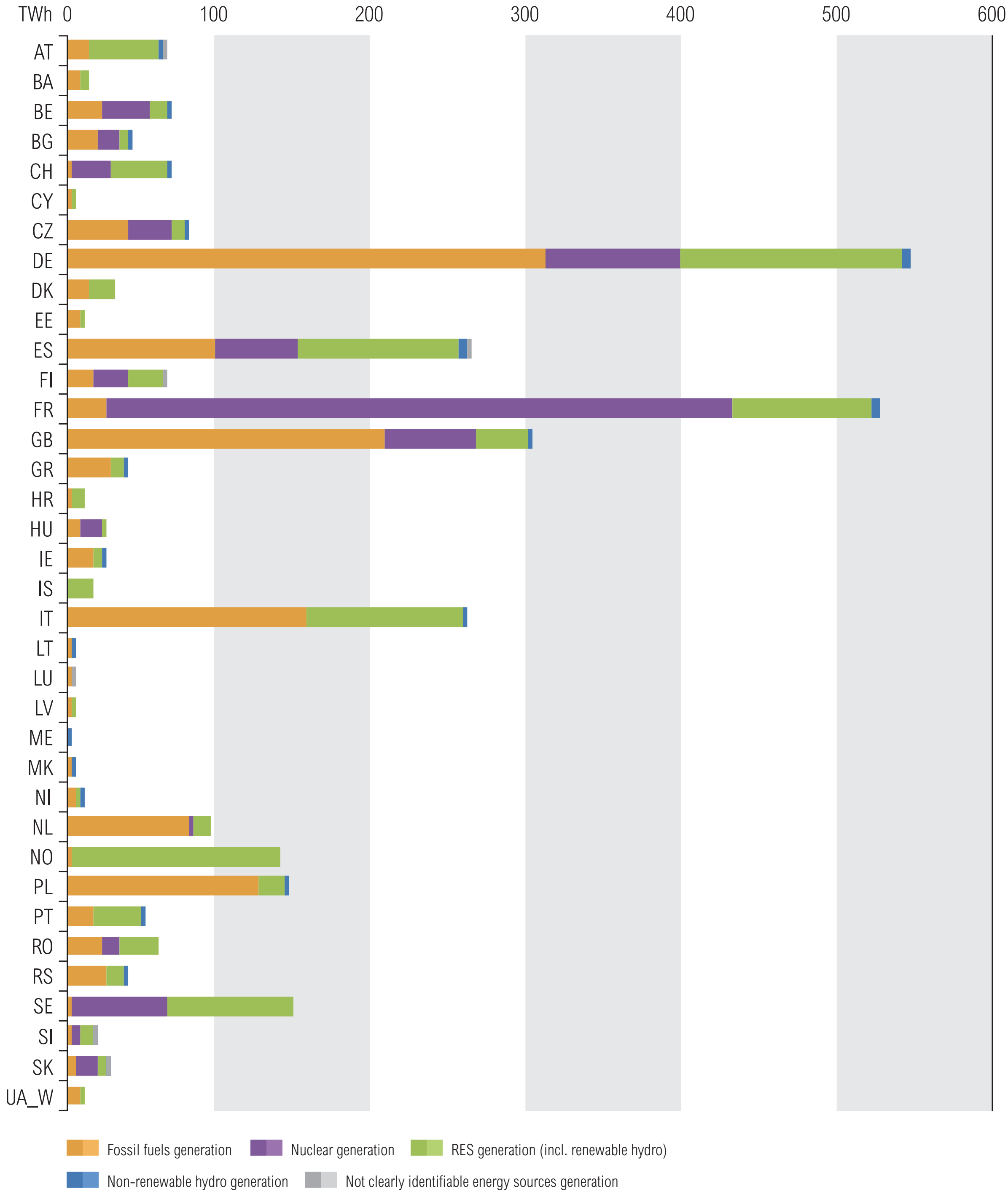


Figure 3.2.3.1.4: Generation mix per country in 2014 (absolute values)

Figures 3.2.3.1.4 and 3.2.3.1.5 show the share of the different individual fuel types as part of the total generation of each country.

Figure 3.2.3.1.5: Generation mix per country in 2014 (percentage values)

3.2.3.2. FOSSIL FUELS GENERATION

As shown in Figure 3.2.3.2.1, the general trend of reduction of generation from fossil fuels progressed in 2014 and averages -6.7 % (-96.3 TWh). The use of lignite increased slightly by 2.7 %, whereas all others decreased as fuels for generating electricity (Gas 5.1 %, hard coal 6.9 %, oil 9.9 %, mixed fuels 9.5 %, and other fossil fuels 28.8 %), as shown in Table 3.2.3.2.1.

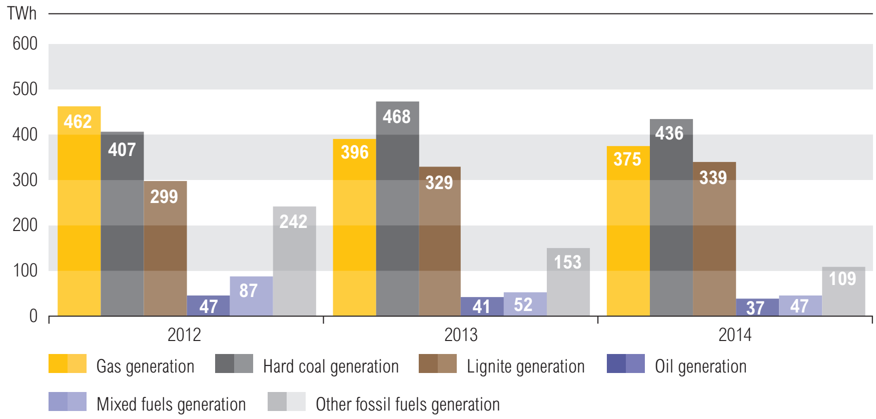


Figure 3.2.3.2.1: Fossil fuels generation evolution per source

Generation	Total Fossil fuels	of which: Lignite	Hard coal	Gas	Oil	Mixed fuels	Other fossil fuels
%	- 6.7	2.7	- 6.9	- 5.1	- 9.9	- 9.5	- 28.8
TWh	- 96.3	9.0	- 32.3	- 20.2	- 4.0	- 4.9	- 43.9

Table 3.2.3.2.1: Fossil fuels generation changes per source

The share of different types of fossil fuels in 2014 is depicted in Figure 3.2.3.2.2, where hard coal is highlighted, exceeding natural gas and lignite and losing market share with a coverage of just under one-third of the total generation (33.4 % in 2013). Lignite also increased its share, positioning not far from gas, which is now only 2.8 percentage points ahead.

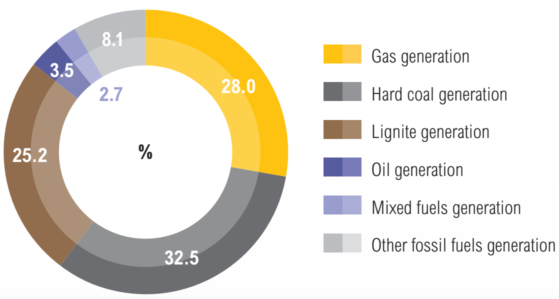
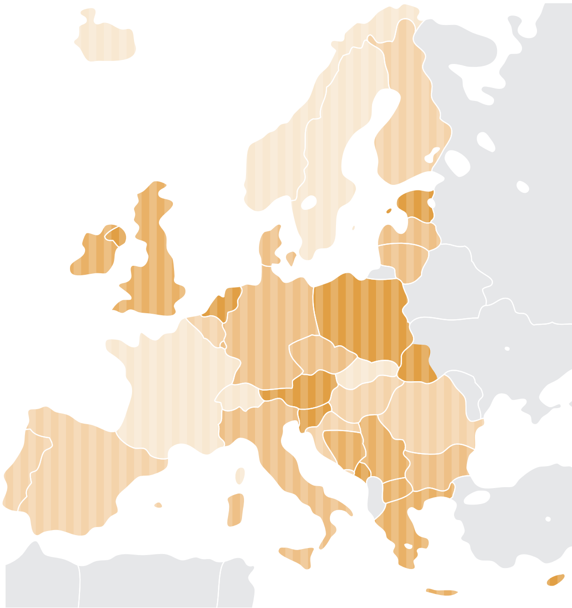


Figure 3.2.3.2.2: Fossil fuels generation mix in 2014

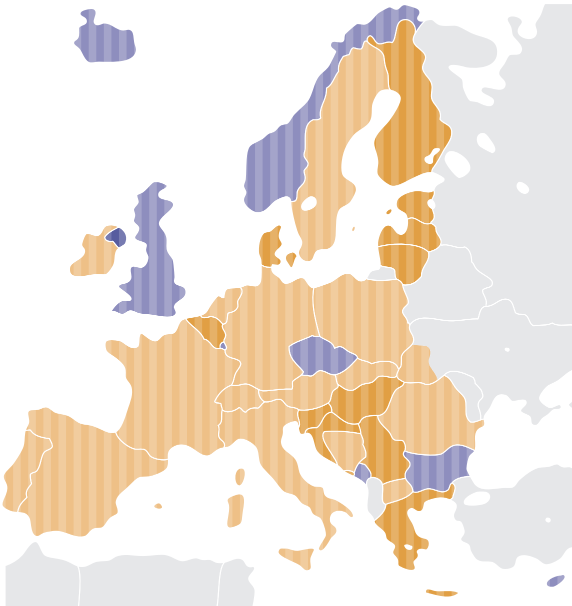
Map 3.2.3.2.1 shows the relative importance of fossil fuels in the total generation of each country in 2014, with values between 0 % and 98.6 %.



Map 3.2.3.2.1:
Share of fossil fuels in the total generation of each country in 2014

Data related to the map Used formula: $Fossil_{2014} / Gen_{2014}$

AT	20.3%	IS	0.0%
BA	60.3%	IT	59.9%
BE	33.1%	LT	47.7%
BG	47.0%	LU	49.9%
CH	3.0%	LV	44.4%
CY	95.7%	ME	44.0%
CZ	52.0%	MK	75.9%
DE	56.5%	NI	80.6%
DK	47.8%	NL	83.6%
EE	88.0%	NO	2.4%
ES	37.3%	PL	88.2%
FI	25.3%	PT	36.2%
FR	4.8%	RO	37.9%
GB	68.5%	RS	68.9%
GR	69.7%	SE	2.3%
HR	24.0%	SI	20.3%
HU	34.0%	SK	18.1%
IE	74.2%	UA_W	98.6%



Map 3.2.3.2.2:
Fossil fuels generation changes 2013/2014 as the part of total generation 2013 per country

Data related to the map Used formula: $(Fossil_{2014} - Fossil_{2013}) / Gen_{2013}$

AT	-1.0%	IS	0.0%
BA	-0.1%	IT	-2.4%
BE	-5.8%	LT	-9.7%
BG	1.3%	LU	3.0%
CH	-0.2%	LV	-8.7%
CY	1.7%	ME	0.3%
CZ	0.1%	MK	-6.9%
DE	-3.3%	NI	6.2%
DK	-12.6%	NL	2.9%
EE	-8.1%	NO	0.1%
ES	-1.9%	PL	-4.9%
FI	-5.6%	PT	-1.2%
FR	-3.4%	RO	-1.1%
GB	0.7%	RS	-15.7%
GR	-13.3%	SE	-1.0%
HR	-9.1%	SI	-7.3%
HU	-8.2%	SK	-1.2%
IE	-1.9%	UA_W	-1.7%

As seen in Map 3.2.3.2.2, three-quarters of ENTSO-E countries (75%) contributed to the decrease of fossil fuel as part of their generation in 2014.[1)]

1) To avoid misunderstanding concerning the maps, which show the percentage increase/decrease of generation (mainly fluctuations in generation in countries where the share of each primary fuel is very small), and to avoid underlining only big systems on the map with changes in absolute value, these maps show the increase/decrease of generation as a part of the total generation in each country.

3.2.3.3. NUCLEAR GENERATION

ENTSO-E nuclear generation (see Figure 3.2.3.3.1 below) stayed almost stable compared to 2013 but broke the trend that has been observed in the last years, increasing by 0.2 % (2.1 TWh).

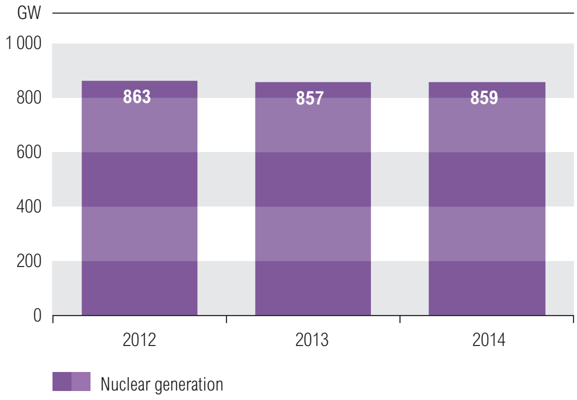
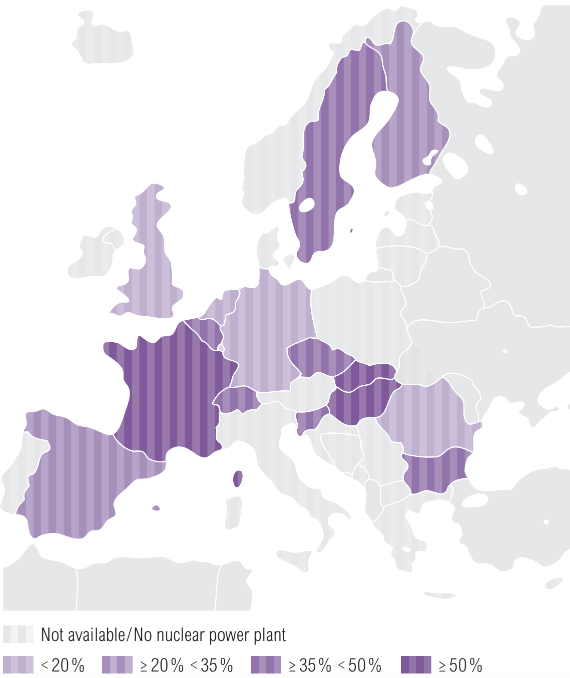


Figure 3.2.3.3.1: Nuclear generation evolution

The importance of a nuclear source as part of each ENTSO-E country's generation in 2014 is depicted in Map 3.2.3.3.1.

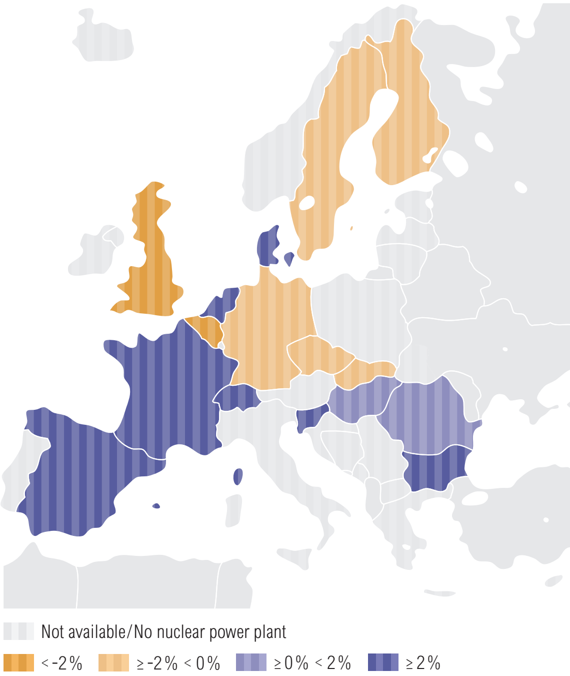


Map 3.2.3.3.1:
Share of nuclear in the total generation of each country in 2014

Data related to the map Used formula: $Nucl_{2014}/Gen_{2014}$

AT	n. a.	IS	n. a.
BA	n. a.	IT	n. a.
BE	47.4 %	LT	n. a.
BG	35.3 %	LU	n. a.
CH	37.9 %	LV	n. a.
CY	n. a.	ME	n. a.
CZ	35.8 %	MK	n. a.
DE	16.3 %	NI	n. a.
DK	n. a.	NL	4.3 %
EE	n. a.	NO	n. a.
ES	20.5 %	PL	n. a.
FI	34.6 %	PT	n. a.
FR	77.0 %	RO	17.7 %
GB	19.3 %	RS	n. a.
GR	n. a.	SE	41.1 %
HR	n. a.	SI	37.2 %
HU	56.1 %	SK	57.0 %
IE	n. a.	UA_W	n. a.

The changes in nuclear generation from 2013 to 2014 as part of the total generation per country are shown on Map 3.2.3.3.2. Value ranges show large increases in generation between 4.3 % and 77.0 %.



Map 3.2.3.3.2:
Nuclear generation changes 2013 / 2014 as the part of total generation 2013 per country

Data related to the map Used formula: (Nucl 2014 - Nucl 2013) / Gen 2013

AT	n. a.	IS	n. a.
BA	n. a.	IT	n. a.
BE	- 10.9%	LT	n. a.
BG	3.8%	LU	n. a.
CH	2.2%	LV	n. a.
CY	n. a.	ME	n. a.
CZ	- 0.5%	MK	n. a.
DE	- 0.1%	NI	n. a.
DK	n. a.	NL	1.7%
EE	n. a.	NO	n. a.
ES	0.2%	PL	n. a.
FI	- 0.1%	PT	n. a.
FR	2.2%	RO	0.1%
GB	- 2.1%	RS	n. a.
GR	n. a.	SE	- 0.9%
HR	n. a.	SI	7.0%
HU	1.0%	SK	- 0.8%
IE	n. a.	UA_W	n. a.

3.2.3.4. RENEWABLE ENERGY SOURCES GENERATION

In this report, RES comprises wind, solar, biomass (including biogas for some countries), renewable hydro energy, and other renewables, which are sources not mentioned in the subcategories (e. g., geothermal energy or sources not clearly identified). For certain countries, RES values were not properly identified. They were occasionally included in the non-identifiable energy sources, or the RES share in hydro generation was only partially identified or not identified at all.[1] The evolution of the RES subcategories during the last three years and the share of individual RES in the total ENTSO-E RES generation in 2014 are depicted in Figures 3.2.3.4.1 and 3.2.3.4.2, respectively.

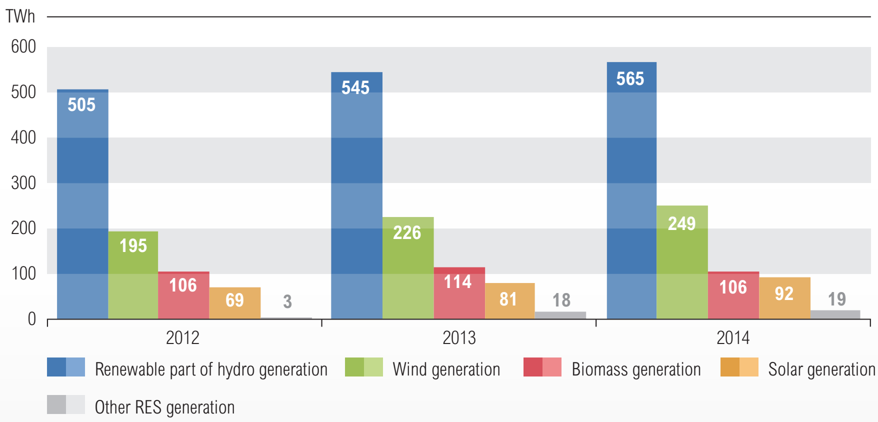


Figure 3.2.3.4.1: Renewable generation evolution

[1] For these countries, the RESs were considered to be zero.

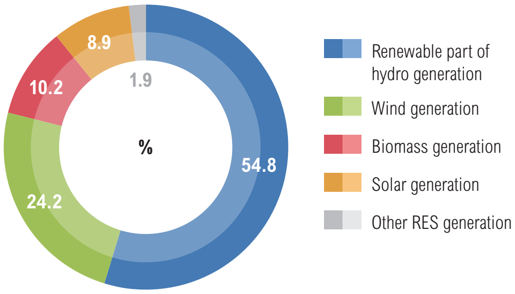


Figure 3.2.3.4.2: Renewable generation mix in 2014

Generation from RES in ENTSO-E increased by as much as 4.0 % (see Table 3.2.1.1) in 2014. All subcategories registered growth, except for biomass (-5.7 %). Increasing rates (13.4 %) of solar generation should be highlighted.

Map 3.2.3.4.1 below shows the share of RES in the total generation of each country in 2014.

Generation	Total Renewable Energy Sources	of which: Wind	Solar	Biomass	R. part of hydro	Other RES
%	4.0	6.1	13.4	-5.7	3.6	7.3
TWh	39.6	14.2	10.8	-6.3	19.5	1.3

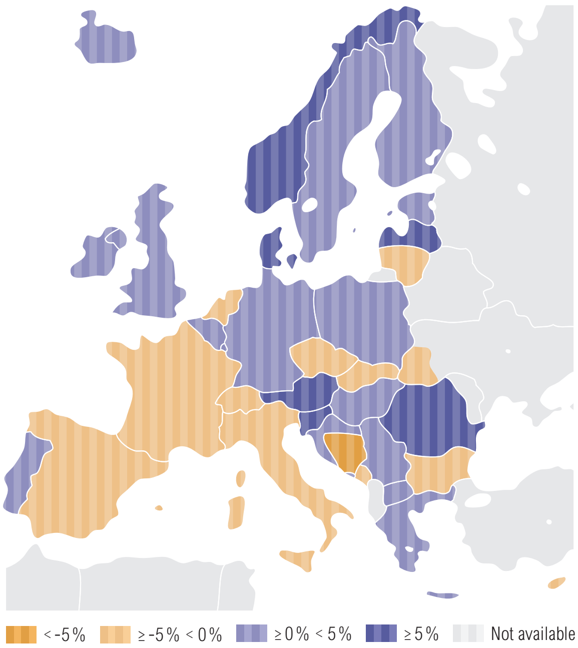
Table 3.2.3.4.1: Renewable generation changes per source

Map 3.2.3.4.1:
Share of renewable in the total generation of each country in 2014

Data related to the map Used formula: RES_{2014} / Gen_{2014}

AT	72.8 %	**IS**	100.0 %
BA	39.7 %	**IT**	38.9 %
BE	17.8 %	**LT**	35.5 %
BG	16.4 %	**LU**	9.9 %
CH	55.7 %	**LV**	55.6 %
CY	4.3 %	**ME**	n.a.
CZ	10.9 %	**MK**	0.9 %
DE	25.9 %	**NI**	19.3 %
DK	52.2 %	**NL**	12.2 %
EE	12.0 %	**NO**	97.6 %
ES	40.2 %	**PL**	11.4 %
FI	38.9 %	**PT**	62.0 %
FR	17.2 %	**RO**	44.4 %
GB	11.3 %	**RS**	29.5 %
GR	21.0 %	**SE**	56.6 %
HR	76.0 %	**SI**	40.1 %
HU	9.9 %	**SK**	23.6 %
IE	24.7 %	**UA_W**	1.4 %

The following Map 3.2.3.4.2 depicts the evolution of RES generation as a part of the total generation per country. As shown, in spite of the overall increase of RES in ENTSO-E, 11 (out of 34) countries lowered their renewable contribution to generation in 2014 when compared to 2013. The increase ranged between 3.2 % (Luxembourg) and 34.2 % (Latvia), and the decrease ranged between 0.1 % (Bulgaria/Ukraine) and 7.8 % (Bosnia Herzegovina).



Data related to the map Used formula: $(RES_{2014} - RES_{2013}) / Gen_{2013}$

AT	6.5%	IS	1.2%
BA	-7.8%	IT	-1.7%
BE	3.3%	LT	-1.3%
BG	-0.1%	LU	0.4%
CH	-0.4%	LV	34.2%
CY	-1.2%	ME	n.a.
CZ	-0.7%	MK	0.8%
DE	1.0%	NI	2.0%
DK	8.3%	NL	-0.4%
EE	1.6%	NO	5.9%
ES	-1.0%	PL	1.4%
FI	1.9%	PT	4.2%
FR	-0.8%	RO	12.3%
GB	4.7%	RS	1.1%
GR	2.1%	SE	2.9%
HR	4.6%	SI	11.9%
HU	3.5%	SK	0.0%
IE	3.1%	UA_W	-0.1%

Map 3.2.3.4.2:
Renewable generation changes 2013 / 2014 as the part of total generation 2013 per country

3.2.3.5. NON-RENEWABLE HYDRO GENERATION

The non-renewable hydro generation category includes hydropower generation that cannot be considered renewable (i.e., predominantly pure pumped storage hydro power plants or non-identifiable hydro), accounted as the difference between the total hydro generation and the renewable hydro generation duly confirmed by correspondents. The renewable part of hydropower generation is included in the RES category (see Paragraph 3.2.3.4 above).

As shown in Figure 3.3.3.5.1, in 2014, the overall hydro generation increased to 608 TWh, showing a growth of 2.9% with an increase of 3.5% from renewable hydro generation and a decrease of 4.4% in the non-renewable part. Total hydro generation was able to keep its upward trend due to the contribution of its renewable part, but this is slowly stabilising.

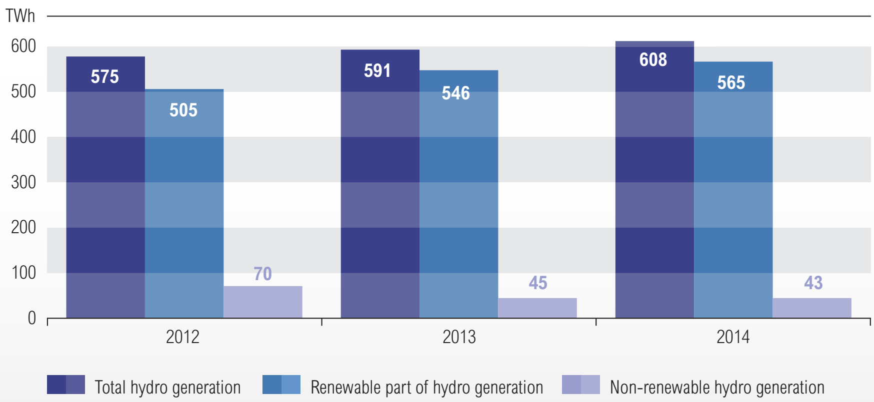


Figure 3.2.3.5.1: Hydro generation evolution

3.2.3.6. NATIONAL COMMENTS ON GENERATION

CY – Cyprus
Generation injected in the transmission system.

CZ – Czech Republic
Category 'of which other renewable' consists mainly of biogas.

DE – Germany
Electricity generation and consumption also comprise shares of generation from the industry's own power stations and feed-in from private generators (total of 12 monthly values). The portion of the net electricity generation relevant to the primary control power is 552.035 TWh.

LU – Luxembourg
For 2014, a decrease of 5.7 % in 'other RES net generation' comes from a waste energy net generation, which was incorrectly filled in for 2013. The energy amount from the waste generation can now be found in the 'Not clearly identifiable energy sources'.

PL – Poland
Biomass generation includes biomass co-fired in conventional thermal units. 'Other renewable' represents biogas. 'Other fossil fuel' represents industry (different types of fossil fuel).

RO – Romania
The NGC development of the wind and solar power plants in 2014 led to a higher energy generation compared to 2013 for these sources. In addition, hydro generation increased due to favourable hydro conditions.

3.2.4. PHYSICAL ENERGY FLOWS

3.2.4.1. ENTSO-E OVERVIEW

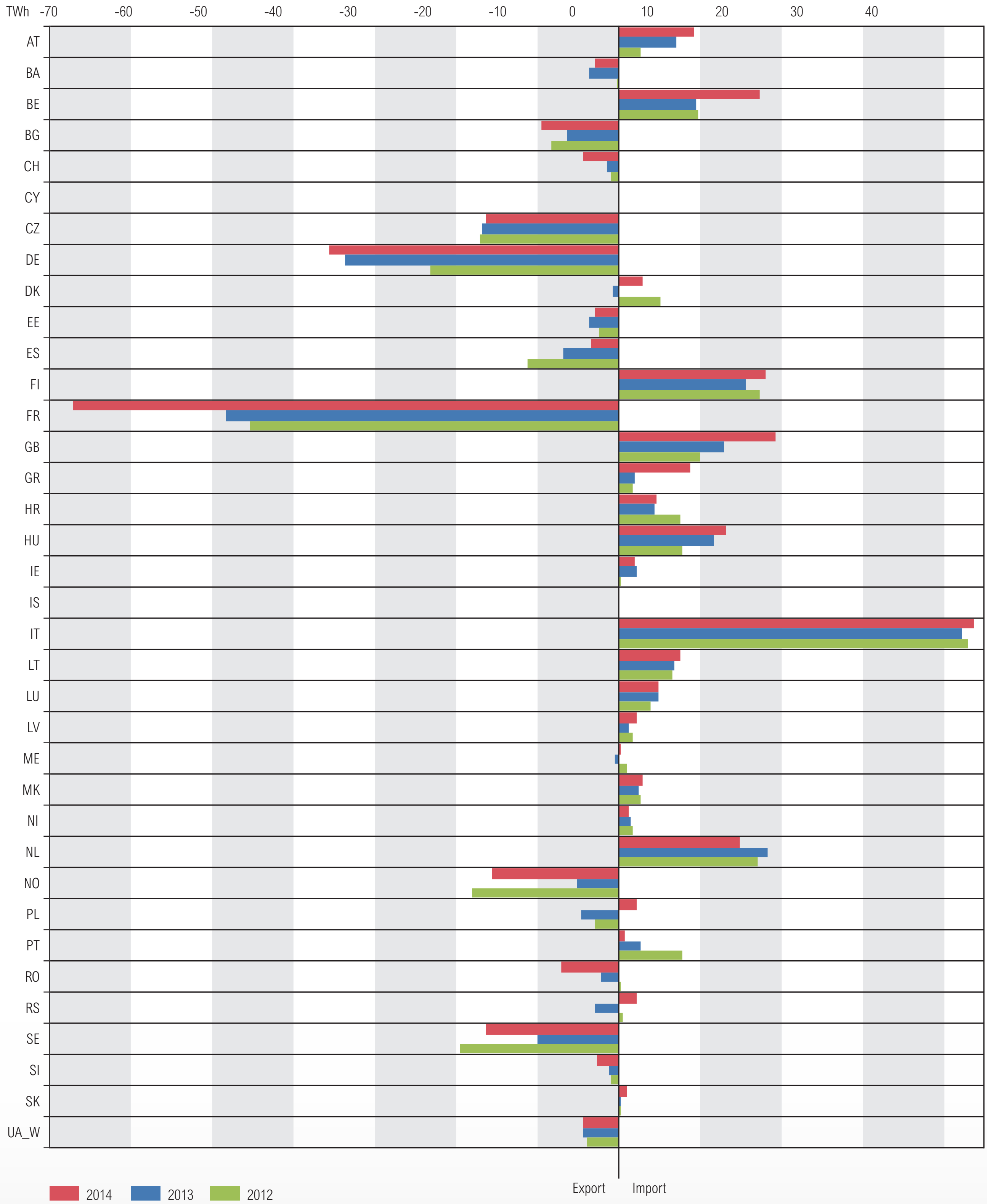


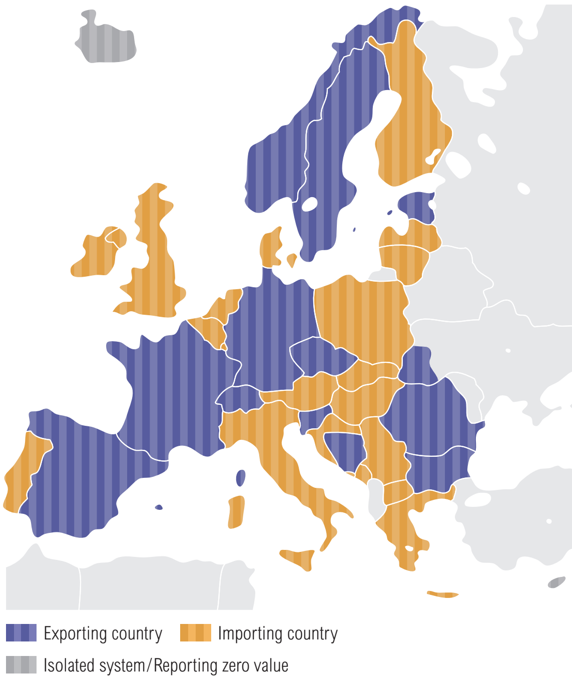
Figure 3.2.4.1.1: Exchanges evolution per country. Cyprus and Iceland are isolated systems – no exchanges.

Exchanges are the physical import and export flows in every interconnection line of a power system. The exchange balance is the difference between the physical import and export flows. The import/export of the overall ENTSO-E perimeter is the sum of the import/export of each ENTSO-E country member. The physical flows are metered at the exact border or at a virtual metering point estimated from the actual one. In 2014, exports and imports were 9.9 % and 9.4 % higher than in previous year at 40.8 TWh and 38.1 TWh, respectively. The overall exchange balance in ENTSO-E resulted in a net exporting system (61.8 %/2.7 TWh) as previously observed in the preceding years.

Figure 3.2.4.1.1 shows the evolution of exchanges per country during the last three years.

An overview of importing/exporting ENTSO-E countries in 2014 is depicted in Map 3.2.4.1.1.

To show the role of imports/exports in ENTSO-E countries, net exchanges per country as part of their consumption are shown in Figures 3.2.4.1.2 and 3.2.4.1.3. Cyprus and Iceland are isolated systems and are not shown in these figures.



Map 3.2.4.1.1:
Net importing / exporting countries in 2014

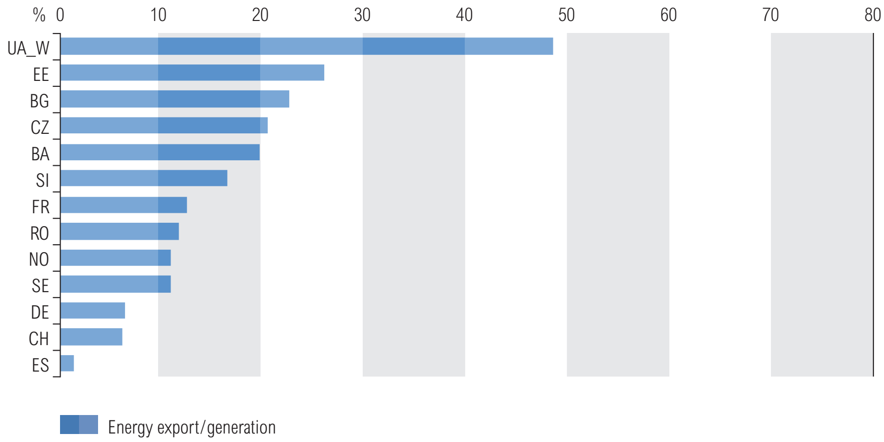


Figure 3.2.4.1.2: Net export as the part of generation per country

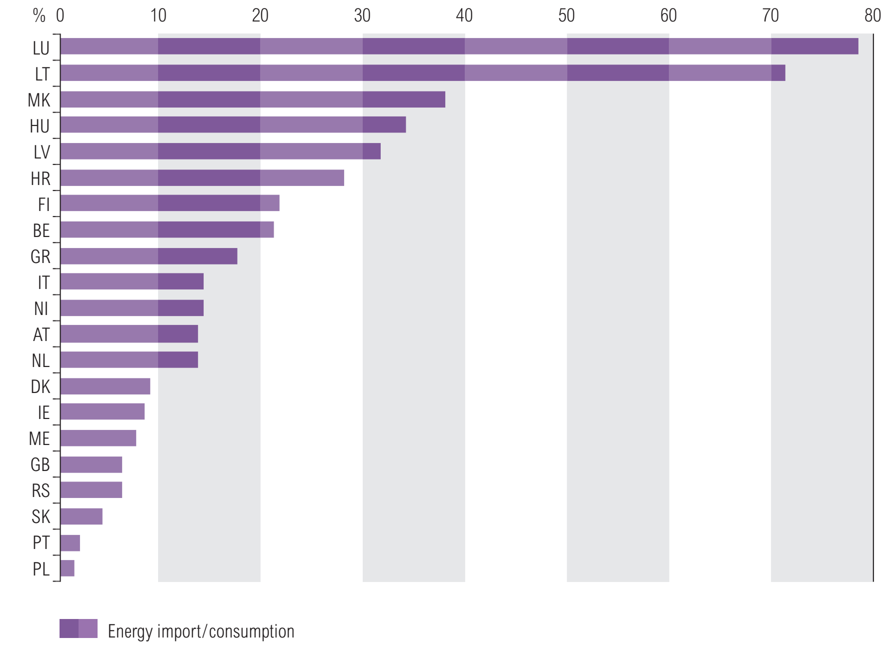


Figure 3.2.4.1.3 Net import as the part of consumption per country

3.2.4.2. NATIONAL COMMENTS ON ENERGY FLOWS

LU – Luxembourg
The exchanges include import/exports from BE, DE, and FR.

NI – Northern Ireland
Moyle has been running at half capacity for some time due to an ongoing undersea cable fault.

PL – Poland
Year 2014 was the first year (since synchronisation in 1995 with UCPTE) when the Polish system became a net importer.

RO – Romania
Due to market conditions, the 2014 export was higher than the 2013 export.

3.3. POWER BALANCE

3.3.1. ENTSO-E DATA SUMMARY

Unless otherwise stated, all graphs and tables in this chapter refer to the reference point of December for the respective year. Table 3.3.1.1 displays power balance results for December's reference point. While NGC results are representative of the entire year, UC, load, and exchanges fluctuated over the year and strongly depended on the weather, market, and economic conditions at the reference point. Table 3.3.1.1 and Figure 3.3.1.1 must be treated as examples of power balance valid for December 2014, not as typical structures of power balance. Details concerning results in all reference points are presented in Chapters 3.3.4 and 3.3.5.

GW	2012	2013	2014	Change 2014 to 2013	
				Absolute value	%
Net Generating Capacity	**978.6**	**999.1**	**1008.6**	**9.4**	**0.9**
Fossil fuels power	458.4	451.3	446.0	-5.4	-1.2
Nuclear power	125.4	126.3	126.4	0.2	0.1
RES power (incl. renewable hydro)	357.1	385.7	168.8	-217.0	-56.2
Non-renewable hydro power	36.8	35.0	29.9	-5.1	-14.6
Not clearly identifiable energy sources power	0.9	0.8	2.1	1.3	162.8
Unavailable capacity	**327.0**	**327.9**	**327.2**	**-0.6**	**-0.2**
Non-usable capacity	230.5	235.0	237.4	2.4	1.0
Maintenance & overhauls	36.0	39.0	34.0	-5.0	-12.8
Outages	27.6	22.9	25.0	2.2	9.4
System services reserve	32.9	31.0	30.8	-0.2	-0.6
Reliable Available Capacity	**651.6**	**671.3**	**681.4**	**10.1**	**1.5**
Load	**481.3**	**482.1**	**479.3**	**-2.8**	**-0.6**
Remaining Capacity	**170.3**	**189.2**	**202.1**	**12.9**	**6.8**
Exchanges	**-1.1**	**0.8**	**-0.2**	**-1.0**	**-123.2**
Imports	46.1	59.6	62.0	2.4	4.1
Exports	47.2	59.7	62.2	2.5	4.2

Table 3.3.1.1: ENTSO-E power balance summary for December reference point

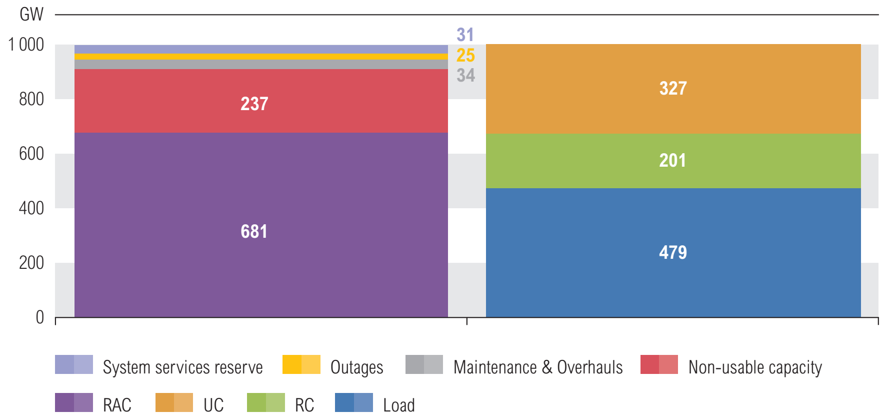


Figure 3.3.1.1: Power balance in December 2014

3.3.2. LOAD

3.3.2.1. ENTSO-E OVERVIEW

The hourly ENTSO-E peak load in 2014 was registered on January 29th at 19:00 and was 522 GW. The real value is higher because German load data was not scaled to represent 100 % of the country. (It was Germany's request to use pure national data as provided by the National Data Correspondent.) The difference in the ENTSO-E peak load to the load in the January reference point (3rd Wednesday, 15th at 11:00) was 31.5 GW. As usual, the minimum load from the reference points took place on August 17th and was 230 GW. Figure 3.3.2.1.1 shows the load at reference points including the 2013 ENTSO-E peak load, and in Table 3.3.2.1.1, the precise data can be found.

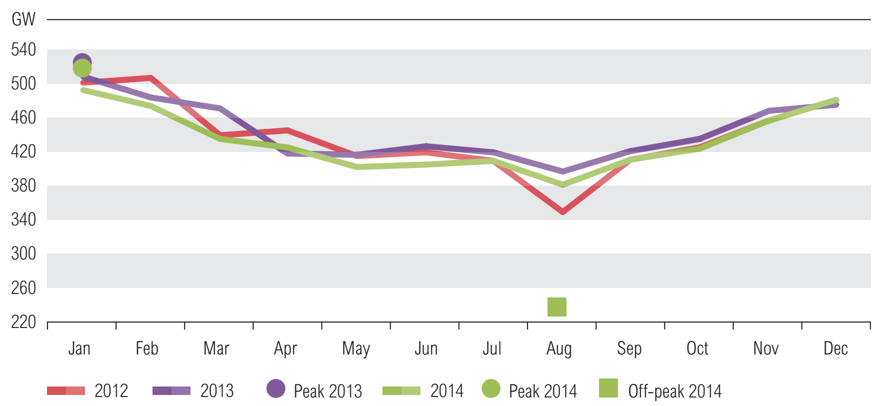


Figure 3.3.2.1.1: Load evolution

GW	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Peak	Off-peak
2012	502	508	440	446	415	419	409	349	411	425	457	481		
2013	515	491	478	425	423	433	426	404	427	443	475	482	529	
2014	490	472	434	422	401	403	407	379	409	421	454	479	522	234

Table 3.3.2.1.1: Load evolution per reference point

3.3.2.2. NATIONAL PEAK LOAD

Table 3.3.2.2.1 presents all information concerning instantaneous peak load per country, including historical peak loads. (This table is also included in an Excel attachment 'YS&AR 2014 table no.1'.) It is necessary to underline that these values should be higher than (or at least the same as) the values pro-

Instantaneous peak load in MW. All data, except for German data, represents 100 % of a country. (Data as of 24.11.2015)

	Instantaneous peak load 2014							
Country	Comments	Representativity factor less than 100%	Date	Weekday	Hour	Value	Daily temp.	Deviation to Normal °C
AT			10.12.2014	Wednesday	17:00	11 471	n.a.	0.0
BA			31.12.2014	Wednesday	17:30	2 266	n.a.	n.a.
BE			04.12.2014	Thursday	18:00	13 201	-0.1	-0.1
BG			31.12.2014	Wednesday	18:08	7 145	-6.4	-6.5
CH	Yes		25.11.2014	Tuesday	12:00	9 302	8.9	0.1
CY	Yes		25.08.2014	Monday	13:30	910	30.0	10.5
CZ			10.12.2014	Wednesday	16:37	10 159	-0.8	-1.2
DE		Yes	03.12.2014	Wednesday	17:45	81 541	-1.7	-2.4
DK			29.01.2014	Wednesday	18:00	6 033	1.8	n.a.
EE			30.01.2014	Thursday	17:00	1 510	-14.1	-9.0
ES			04.02.2014	Tuesday	20:18	38 948	7.8	-1.6
FI	Yes		20.01.2014	Monday	8:00	14 367	0.0	0.0
FR			09.12.2014	Tuesday	19:00	82 588	4.3	-1.4
GB		Yes	30.01.2014	Thursday	19:00	57 951	6.7	-1.9
GR			31.12.2014	Wednesday	18:00	9 092	2.0	10.0
HR			31.12.2014	Wednesday	18:00	2 974	-8.0	-6.0
HU			01.12.2014	Monday	16:45	6 047	0.4	0.4
IE			16.12.2014	Tuesday	18:45	4 613	5.7	5.1
IS			04.12.2014	Thursday	19:00	2 278	5.2	1.0
IT			18.07.2014	Friday	12:00	51 587	0.0	0.0
LT			23.01.2014	Thursday	10:00	1 835	-16.4	10.8
LU			11.12.2014	Thursday	12:00	1 018	4,7	-6,0
LV	Yes		30.01.2014	Thursday	17:00	1 331	-10.0	-4.7
ME			31.12.2014	Wednesday	20:00	638	-1.0	10.0
MK			31.12.2014	Wednesday	18:00	1 507	0.0	0.0
NI			10.12.2014	Wednesday	18:30	1 770	3.0	6.4
NL			26.11.2014	Wednesday	17:30	18 460	4.9	0.4
NO			13.01.2014	Monday	9:00	22 957	0.0	0.0
PL			29.01.2014	Wednesday	17:30	23 776	-8.7	-5.4
PT			04.02.2014	Tuesday	20:30	8 313	11.5	-1.1
RO			03.12.2014	Wednesday	18:00	8 551	1.8	1.2
RS			31.12.2014	Wednesday	18:00	7 399	-8.9	n.a.
SE			13.01.2014	Monday	16:00	24 872	-8.8	4.7
SI			30.01.2014	Thursday	11:45	2 091	-1.2	-2.5
SK			27.11.2014	Thursday	17:00	4 120	1.1	-4.5
UA_W			31.12.2014	Wednesday	18:00	1 145	-12.1	-11.5

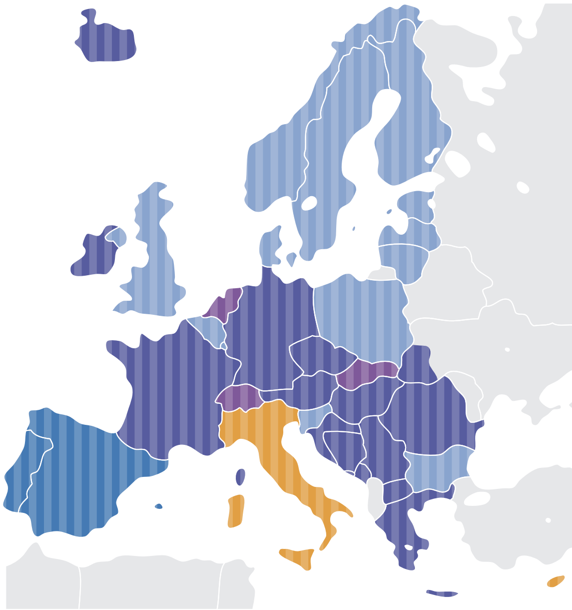
Table 3.3.2.2.1: National instantaneous peak load overview 2014

vided for monthly statistics because the average hourly load is collected in the monthly data.[1] Hourly peak load is also available in the Excel attachment mentioned above. Differences in date and hour of peak (hourly vs instantaneous) could be also found due to the specificity of the load curve and load measures. All data, except for German data, represents 100 % of a country. Representivity factors can be found in the Excel attachment.

Comparisons		Historical instantaneous peak load			
2014 to 2013 [formula: (2014-2013)/2013]	2014 to historic [formula: (2014-historic)/historic]	Date	Weekday	Value	Country
0.0%	-1.2%	07.02.2012	Tuesday	11 613	AT
9.3%	4.3%	31.12.2010	Friday	2 173	BA
-2.0%	-8.3%	10.12.2010	Friday	14 390	BE
5.0%	-14.9%	20.12.1989	Wednesday	8 396	BG
-9.7%	-13.5%	10.12.2010	Friday	10 749	CH
8.3%	-20.7%	03.08.2010	Tuesday	1 148	CY
1.8%	-5.3%	07.02.2012	Tuesday	10 725	CZ
-0.9%	-6.3%	07.02.2012	Tuesday	84 390	DE
-1.7%	-6.3%	24.01.2006	Tuesday	6 436	DK
5.4%	-4.8%	28.01.2010	Thursday	1 587	EE
-3.3%	-14.3%	17.12.2007	Monday	45 450	ES
1.4%	-4.0%	18.02.2011	Friday	14 965	FI
-10.8%	-19.1%	08.02.2012	Wednesday	102 098	FR
-9.7%	-26.1%	17.12.2007	Monday	68 977	GB
3.7%	-12.7%	23.07.2007	Monday	10 414	GR
5.7%	-6.9%	06.02.2012	Monday	3 193	HR
2.1%	-2.2%	29.11.2007	Thursday	6 180	HU
2.0%	-9.4%	21.12.2010	Tuesday	5 090	IE
0.9%	0.9%	06.03.2013	Wednesday	2 258	IS
-4.4%	-9.3%	18.12.2007	Tuesday	56 882	IT
1.4%	-41.8%	18.04.1989	Tuesday	3 153	LT
2,4%	-14,3%	21.09.2011	Wednesday	1 188	LU
-1.0%	-33.4%	21.12.1988	Wednesday	1 997	LV
2.7%	-13.2%	23.01.2011	Sunday	735	ME
-1.3%	-8.2%	31.12.2011	Saturday	1 642	MK
4.3%	-0.4%	22.12.2010	Wednesday	1 777	NI
0.0%	-3.7%	14.12.2011	Wednesday	19 169	NL
-5.1%	-5.1%	23.01.2013	Wednesday	24 180	NO
3.9%	-0.8%	07.02.2012	Tuesday	23 970	PL
-0.1%	-11.6%	11.01.2010	Monday	9 403	PT
2.9%	-16.6%	23.11.1989	Thursday	10 248	RO
6.8%	-3.4%	31.12.2010	Friday	7 656	RS
-7.4%	-7.9%	05.02.2001	Monday	27 000	SE
4.5%	-0.9%	26.01.2006	Thursday	2 110	SI
-1.3%	-7.9%	12.12.1989	Tuesday	4 471	SK
9.3%	-4.3%	03.02.2012	Friday	1 197	UA_W

[1] It is worth noting that the hourly peak load is recalculated based on the representivity factor, while the instantaneous peak load is not, so for countries that provided a representivity factor different than 100 %, the hourly peak may be higher than the instantaneous.

In 2014, the peak load in the different areas of the ENTSO-E system occurred mainly in the winter period (December, January, and February) and in most of the times in the afternoon/evening (between 16:00 h and 20:30). However, some exceptions started to occur more often where the peak load occurs during the summer, such as in Cyprus and Italy (around the afternoon), or even in the winter periods around the morning. Most 'winter' countries registered their peak loads in late November or December of 2014, but only two countries, Denmark and Poland, had a peak load that took place exactly on the 29th of January, which was the ENTSO-E peak load date. Both had their peak at their peaks defeated from the ENTSO-E peak load hour at 18:00 and 17:30, respectively. Map 3.3.2.2.1 displays the month of the peak, and in the table next to it is the time of peak.

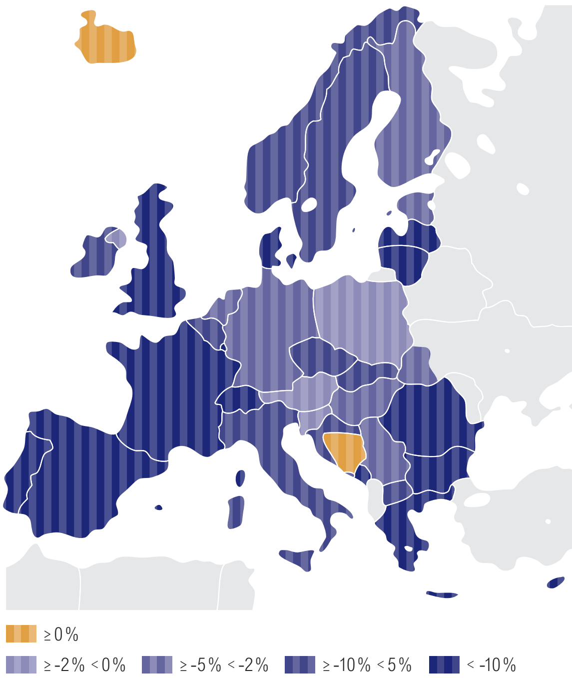


Map 3.3.2.2.1:
Month and time of peak load

Data related to the map Used data: Time of peak load

AT	17:00	IS	19:00
BA	17:30	IT	12:00
BE	18:00	LT	10:00
BG	18:08	LU	12:00
CH	12:00	LV	17:00
CY	13:30	ME	20:00
CZ	16:37	MK	18:00
DE	17:45	NI	18:30
DK	18:00	NL	17:30
EE	17:00	NO	09:00
ES	20:18	PL	17:30
FI	08:00	PT	20:30
FR	19:00	RO	18:00
GB	19:00	RS	18:00
GR	18:00	SE	16:00
HR	18:00	SI	11:45
HU	16:45	SK	17:00
IE	18:45	UA_W	18:00

The average peak load of ENTSO-E countries in 2014 was lower than in 2013 by -1.3 %, although many countries registered a higher peak load than in the previous year. Only Bosnia and Herzegovina and Iceland registered peak growth from the historical peak load, but no countries exceeded their historical load values. Map 3.3.2.2.2 shows the height of this historical peak load in comparison to the load in 2014. As in the previous year, the biggest difference was registered for Lithuania and Latvia, as the result of political changes in the late 80s and early 90s. Their historical peak loads took place in 1989/1988.



Data related to the map Used formula: $(Peak_{2014} - Peak_{historic}) / Peak_{historic}$

AT	- 1,2 %	IS	0,9 %
BA	4,3 %	IT	- 9,2 %
BE	- 8,3 %	LT	- 41,8 %
BG	- 14,9 %	LU	- 14,3 %
CH	- 13,5 %	LV	- 33,4 %
CY	- 20,7 %	ME	- 13,2 %
CZ	- 5,3 %	MK	- 8,2 %
DE	- 3,4 %	NI	- 0,4 %
DK	- 6,3 %	NL	- 3,7 %
EE	- 4,8 %	NO	- 5,1 %
ES	- 14,3 %	PL	- 0,8 %
FI	- 4,0 %	PT	- 11,6 %
FR	- 19,1 %	RO	- 16,6 %
GB	- 16,0 %	RS	- 3,4 %
GR	- 12,7 %	SE	- 7,9 %
HR	- 6,9 %	SI	- 0,9 %
HU	- 2,2 %	SK	- 7,9 %
IE	- 9,4 %	UA_W	- 4,3 %

Map 3.3.2.2.2:
Difference between peak load in 2014 and historical peak load

3.3.2.3. NATIONAL COMMENTS ON LOAD, PEAK LOAD AND CONDITIONS

FI – Finland
One-hour average values and instantaneous values not available.

LV – Latvia
The value for the instantaneous peak load in 2014 is equal to the value for the hourly peak load in 2014 because both values are representing the instantaneous peak load in 2014. The actual value for the hourly peak load in 2014 is 1,316 MW.

CH – Switzerland
Norm is the average over the years 1981 to 2010 in Bern.

3.3.3. NET GENERATING CAPACITY

3.3.3.1. ENTSO-E OVERVIEW

Between January and December, reference points of the year 2014 for NGC increased by 5.9 GW (Table 3.3.3.1.1). Comparison of this result with the increase from December 2013 to December 2014 (16.2 GW) shows that 10.3 GW was commissioned at the turn of 2013 and 2014.

GW		Change December to January	
January	December	Absolute value	%
1 002.7	1 008.6	5.9	0.1%

Table 3.3.3.1.1: NGC evolution in 2014 (January–December)

In detail, the main contributors of the power increase in 2014 (in absolute values) were Germany with a 6.7 GW increase and Spain with a 3.7 GW increase.

Some ENTSO-E countries registered a decrease of NGC; among these countries, Great Britain had the biggest one (2.9 GW of absolute value). The highest percentage decrease took place in Hungary (6.2 %).

The NGC changes per category over the last three years are shown in Figure 3.3.3.1.1. Noticeable growth in 2014 vs 2013 took place for RES only (24.1 GW); however, this increase was not so significant as in the previous year (72.8 GW). The NGC of the rest of the sources was stable in general, with a 9.2 GW decrease of fossil fuels.

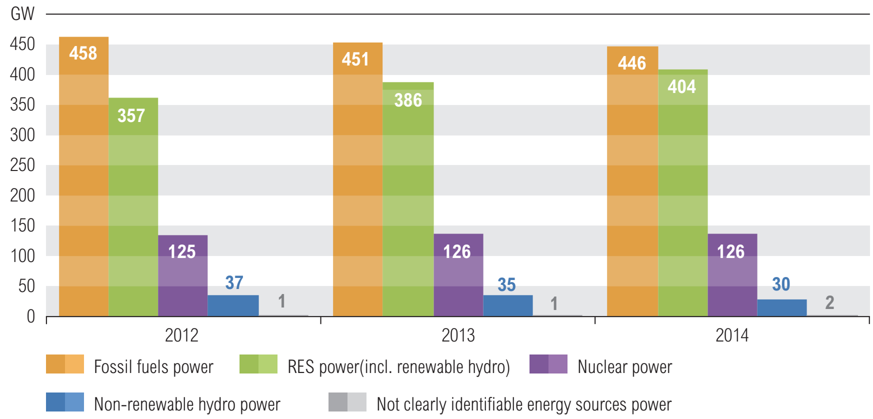


Figure 3.3.3.1.1: NGC category evolution

The share of fossil fuels in the total NGC changed by 5.9 GW. Nuclear and non-renaweble hydro power remained stable. Results are visible in Figures 3.3.2.1.2 and 3.3.2.1.3.

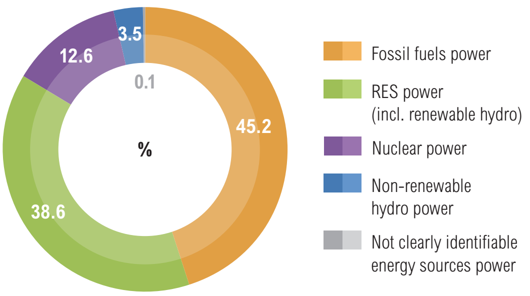


Figure 3.3.3.1.2: NGC mix in 2013

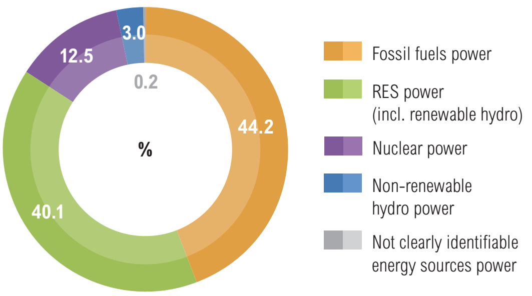


Figure 3.3.3.1.3: NGC mix in 2014

3.3.3.2. FOSSIL FUEL POWER

Fossil fuels in general show a decrease of 5.4 GW. A large shift within the data available is shown by a decrease in Mixed fuels which shows a downfall of 27.3 GW which maybe is caused by the coming into force of the Transparency legislation giving more inside in the fuel mix. Gas, hard coal and lignite show an increase of in total 27.4 GW. Figure 3.3.3.2.1 shows the development of fossil fuels within the space of three years, and Table 3.3.3.2.1 shows precise values concerning changes.

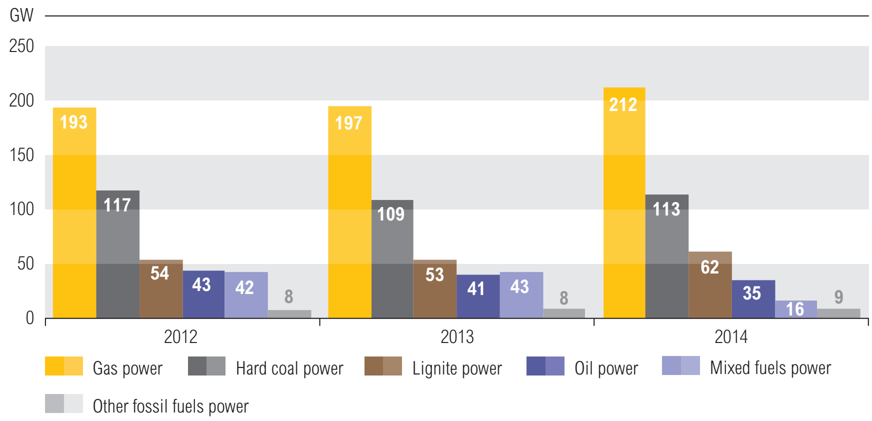


Figure 3.3.3.2.1: Fossil fuels NGC evolution per source

GW	December 2012	December 2013	December 2014	Change 2014 to 2013	
				Absolute value	%
Fossil fuels power	**458.4**	**451.3**	**446.0**	**-5.4**	**-1.2**
Lignite power	53.9	53.5	61.7	8.2	15.3
Hard coal power	117.2	108.6	113.5	4.8	4.4
Gas power	193.5	197.4	211.8	14.4	7.3
Oil power	43.3	40.5	34.7	-5.8	14.4
Mixed fuels power	42.3	43.1	15.7	-27.3	63.5
Other fossil fuels power	8.1	8.2	8.6	0.4	4.4

Table 3.3.3.2.1: Fossil fuels categories evolution

The decrease of fossil fuel power in Great Britain (5.0 GW) had a crucial influence on ENTSO-E results. On the other hand, the highest increases in the NGC of fossil fuels can be attributed to Spain (1.8 GW). Returning to ENTSO-E data, the present share of each category in total NGC is presented in Figure 3.3.3.2.2. No significant changes compared to year 2013 occurred, only gas extended their domination to hard coal.

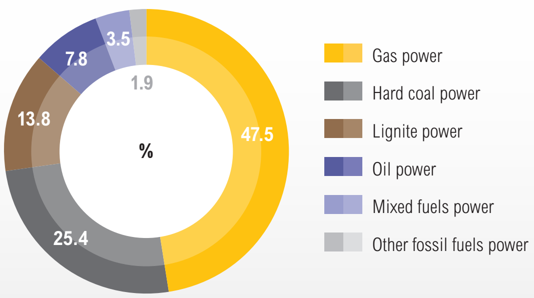


Figure 3.3.3.2.2: Fossil fuels NGC mix in 2014

3.3.3.3. NUCLEAR POWER

NGC of nuclear power was stable compared to year 2013. Countries with the highest installed capacity in ENTSO-E (France, Germany, Great Britain, Sweden, and Spain) reported negligible changes in their share in total NGC with respect to 2013. France still has half of the nuclear power in ENTSO-E. Precise data is displayed in Figure 3.3.3.3.1.

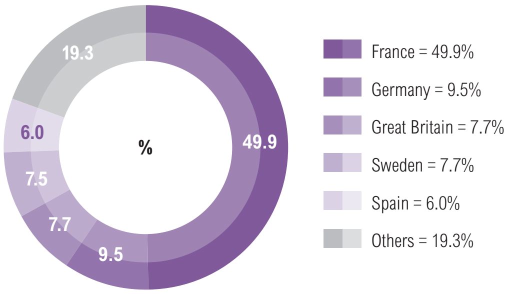


Figure 3.3.3.3.1: The share of nuclear NGC per country as a part of the total nuclear NGC in ENTSO-E

3.3.3.4. RENEWABLE ENERGY SOURCES POWER

As expected, there was again a high increase of NGC within the Renewable (RES) category amounted to 18.4 GW, which corresponds to 4.8 %. All renewable subcategories grew except for the subcategory “biomass”. The dominant RES technologies wind and solar, show an increase over 15.3 GW in total, wind development was slightly more dynamic (8.7 %) than solar (6.9 %). Biomass was the only subcategory with a small decrease of capacity of 0.9 GW. All details referring to the NGC of renewables can be found in Figure 3.3.3.4.1 and in Table 3.3.3.4.1.

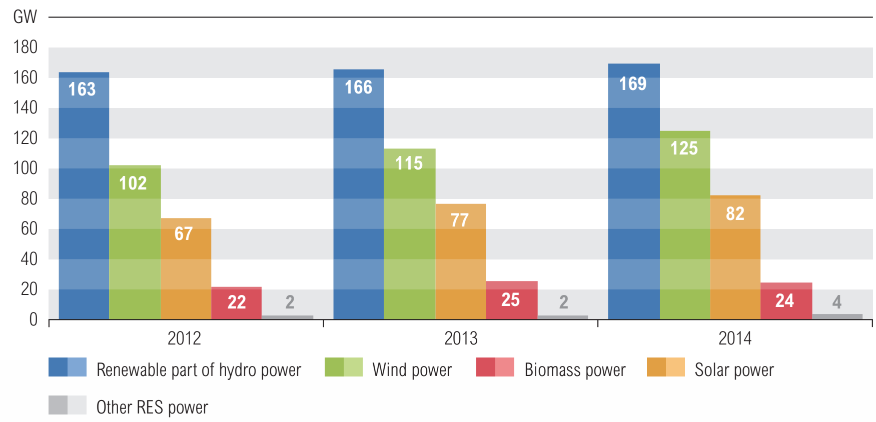


Figure 3.3.3.4.1: Renewable generation NGC evolution per source

All countries, except for the Czech Republic registered an increase of RES NGC. The leading countries in terms of renewable development (increase in 2014 as a part of the total national NGC in 2014) are Slovenia (8.7 %), Romania (5.3 %), Austria (4.6 %) and Ireland (4.2 %). The highest increase in absolute values took place in Germany (4.1 GW).

GW	December 2012	December 2013	December 2014	Change 2014 to 2013	
				Absolute value	%
RES power	**357.1**	**385.7**	**404.2**	**18.4**	**4.8**
Wind power	102.1	115.1	125.2	10.0	8.7
Solar power	67.5	76.9	82.3	5.3	6.9
Biomass power	21.7	25.0	24.1	- 0.9	- 3.5
Renewable part of hydro power	163.5	166.3	168.8	2.5	1.5
Other RES power	2.4	2.3	3.8	1.5	65.5

Table 3.3.3.4.1: Renewable generation evolution

Looking at the structure of renewables NGC presented in Figures 3.3.3.4.2 and 3.3.3.4.3, despite NGC growth of renewable part of hydro in absolute values, its share in total renewables NGC decreased. Nevertheless, renewable part of hydro is still the leader. As previous year more than 30 % of this came from Nordic countries: Norway, Sweden and Finland.

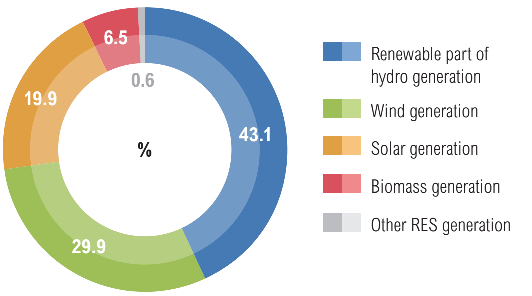


Figure 3.3.3.4.2: Renewable generation NGC mix in 2013

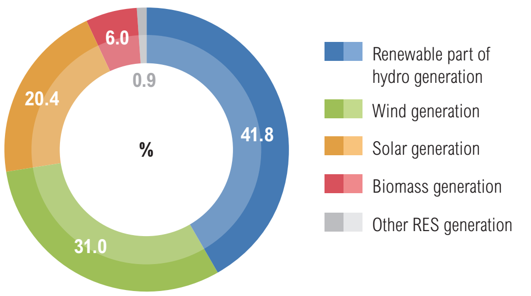


Figure 3.3.3.4.3: Renewable generation NGC mix in 2014

3.3.3.5. NON-RENEWABLE HYDRO POWER

This category represents the hydro element that could not be confirmed as renewable and is calculated as the total hydro minus the renewable hydro.

Since 2012, the structure of the ENTSO-E database has provided the strictly renewable part of hydro, while for previous years, there was a division into run-of-river and renewable part of storage and pump storage. The renewable part of hydro grew, whereas the non-renewable part decreased slightly. The total NGC of hydro power plants remains stable though, as shown in Table 3.3.3.5.1.

GW	December 2012	December 2013	December 2014	Change 2014 to 2013	
				Absolute value	%
Total hydro power	**200.3**	**201.3**	**198.7**	**- 2.6**	**- 1.3**
Renewable part of hydro power	163.5	166.3	168.8	2.5	1.5
Non-renewable hydro power	36.8	35.0	29.9	- 5.1	- 14.6

Table 3.3.3.5.1: Hydro category evolution

3.3.3.6. NATIONAL COMMENTS ON NGC

CZ – Czech Republic
Additional power in September was caused by trial operation of CCGT Pocerady 2.

DE – Germany
The power plant group Kraftwerksgruppe Obere Ill-Lünersee (1.7 GW) is located in Austria and is therefore considered in the Austrian Hydro Power capacity. As it is directly connected to the German TSO TransnetBW, the NGC of this power plant group can be treated as a firm import to Germany.

PL – Poland
'Other renewable' represents biogas. 'Other fossil fuel' represents industry (different types of fossil fuels).

SK – Slovak Republic
The NGC in year 2014 was almost the same as in year 2013.

3.3.4. UNAVAILABLE CAPACITY & RELIABLE AVAILABLE CAPACITY

3.3.4.1. ENTSO-E OVERVIEW

Unavailable capacity refers to the part of the NGC that was not available to the power plant operators due to limitations of the output of power plants. It consists of non-usable capacity, maintenance and overhauls, outages, and system services reserve.

Reliable available capacity (RAC) in a power system is the difference between NGC and UC. The RAC is the element of NGC that is actually available to cover the load at a reference point. Figure 3.3.4.1.1 shows the structure of NGC shared into UC and RAC in 2014.

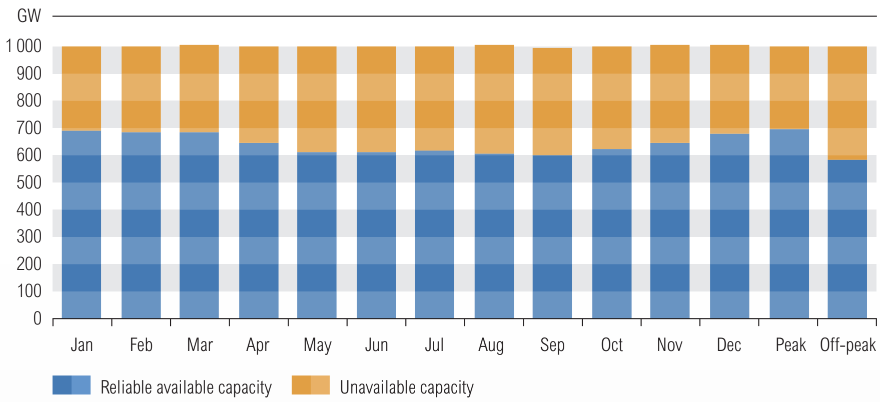


Figure 3.3.4.1.1: RAC overview in 2014 compared to UC

GW	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Peak	Off-peak
2012	279.8	283.7	318.5	330.9	364.7	375.2	369.6	377.3	373.0	358.1	335.1	327.0		
2013	314.5	319.5	318.2	357.8	360.6	368.6	377.7	389.8	390.6	377.5	353.2	327.9	314.1	
2014	314.2	321.4	320.5	361.5	392.1	391.0	387.9	402.4	397.6	384.2	365.2	327.2	308.4	422.7

Table 3.3.4.1.1: UC evolution

As usual, RAC was higher in winter months, which is determined by the load structure within the year. Therefore, the UC must be lower during these months. Table 3.3.4.1.1 presents RAC evolution within the space of the 2014 reference points.

The lower level of UC during the winter months is achieved by adequate planning of maintenance and overhauls. Their levels during the winter were two to three times lower compared to non winter months. On the other hand, the most stable element of UC is the system services reserve, which is required for operation for the whole year. Outages are also stable within the year; their growth is expected due to severe conditions rather than due to the season. The last element of UC with the highest share in total UC is the non-usable capacity. It represents reductions of NGC for different reasons. Foremost among these reasons are the limited availability of the primary energy source (especially in cases of hydro, wind, and solar power plants) and other temporary constraints like mothballing of units, heat extraction for co-generation in combined heat and power (CHP), and test operation. Most of these reasons refer to weather conditions and are generally unpredictable. The structure of UC is presented in Figure 3.3.4.1.2.

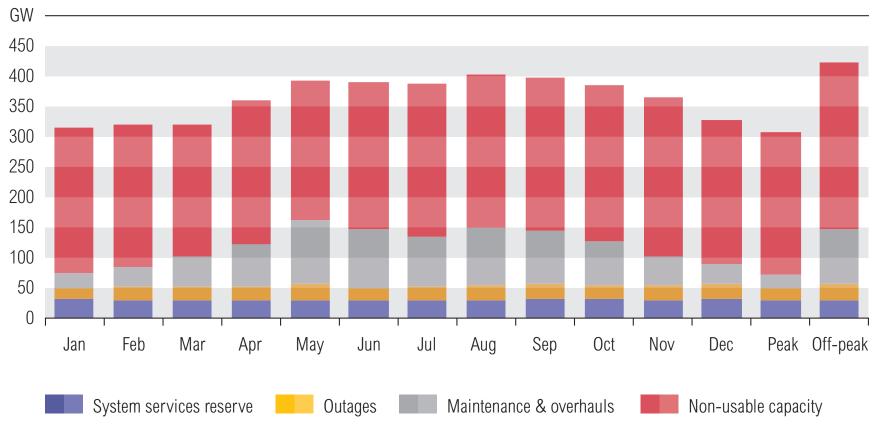


Figure 3.3.4.1.2: UC and its structure overview in 2014

The UC as a part of NGC for the time span of three years is shown in Figure 3.3.4.1.3. The level of UC as a part of NGC in 2014 was more or less similar as in 2013. The UC in reference points representing ENTSO-E peak load in 2014 was only slightly lower than January 2013.

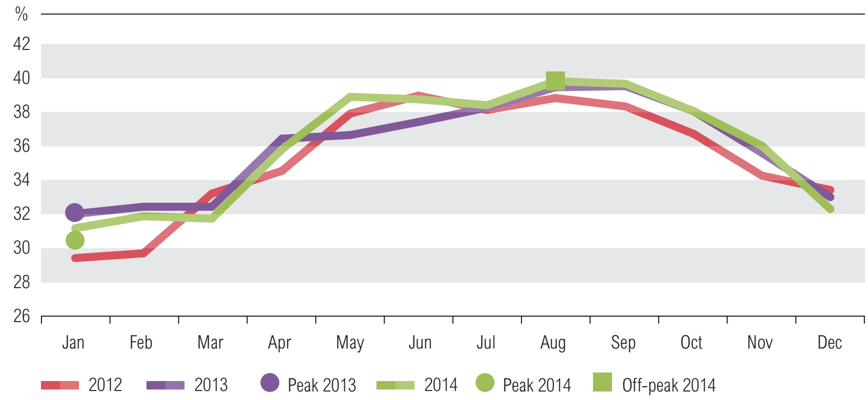


Figure 3.3.4.1.3: UC as a part of NGC evolution

3.3.4.2. NON-USABLE CAPACITY

Non-usable capacity represents the aggregated reductions of NGC due to the following:

- Unintentional temporary limitations for various reasons (e.g., the availability of primary energy sources, including wind and solar, fuel management constraints, and heat supply or environmental and ambient limitations). Limitation of generation output power due to network constraints is also a part of the non-usable capacity.
- Decisions taken by relevant authorities and power plant operators (e.g., test operation, mothballing of units until a possible re-commissioning or final shutdown).

Figure 3.3.4.2.1 compares the monthly evolution of non-usable capacity as a part of NGC in the past three years. The share of non-usable capacity in 2014 reference points was higher than in 2013 except for reference points in March, May, June and December, while when comparing 2014 with 2013, it is found that non-usable capacity in 2013 is higher for all reference points. Such results show, that year by year, more and more part of NGC is not available for TSOs. In November 2014, the highest ever level of non-usable capacity was registered, both in absolute values (252.9 GW) and as a part of NGC (26 %).

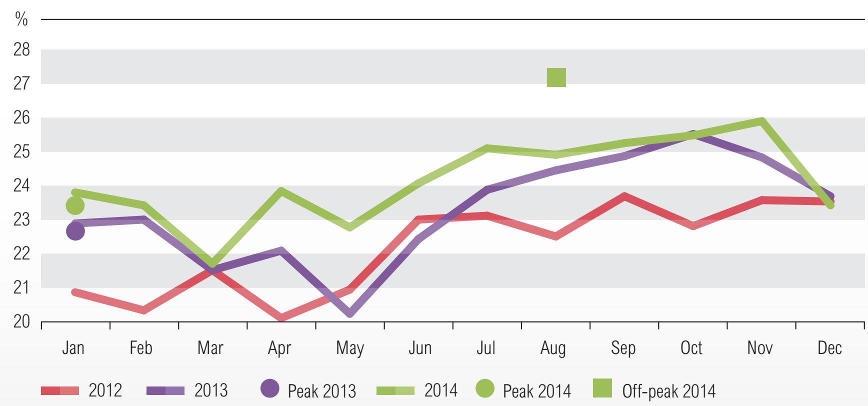


Figure 3.3.4.2.1: Non-usable capacity as a part of NGC evolution

3.3.4.3. SYSTEM SERVICES RESERVE

System services reserve is required to maintain the security of supply according to the operation rules of each TSO. It is necessary for the compensation of real-time imbalances and also for voltage and frequency control. System services reserve consists of the primary control reserve, the secondary control reserve, and a part of the tertiary control reserve available for activation within one hour, excluding longer-term tertiary reserves.

Figure 3.4.4.3.1 shows the system services reserve as part of NGC in the past three years. The share of services reserve was lower in 2014 reference points than in 2012 and 2013.

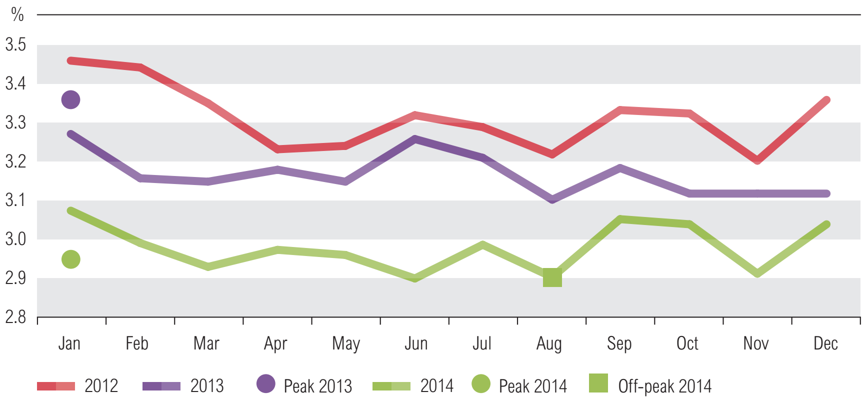


Figure 3.3.4.3.1: System services reserve as a part of NGC evolution

3.3.4.4. MAINTENANCE & OVERHAULS

The maintenance and overhauls subcategory aggregates the scheduled unavailability of the NGC for regular inspections and maintenance. As mentioned at the beginning of the paragraph referring to UC, the level of maintenance and overhauls is determined by the load curve during the year; therefore, in winter, it was 33.3 GW in January (3.4 % of NGC), while in May, it was 101.3 GW (10.3 % of NGC).

3.3.4.5. OUTAGES

In outages, the forced (i.e., not scheduled) unavailability of generating capacity is aggregated. As mentioned at the beginning of the paragraph referring to UC, the level of outages is quite stable in referent points both in absolute values (between 22.5 GW in November and 31.8 GW in April) and as a part of the NGC (between 2.3 % and 3.2 %, respectively).

3.3.4.6. NATIONAL COMMENTS ON UC AND RAC

CZ – Czech Republic
Amount of UC depends mainly on the real photovoltaic generation.

IE – Ireland
Unavailable Capacity from Wind = Wind NGC - Actual Wind at the Reference Point.

NO – Norway
There is a significant amount of non-usable capacity other than maintenance, outages, and reserves. We have not been able to quantify this yet. Therefore, a representivity of ca. 110 % is used for hydro power.

3.3.5. REMAINING CAPACITY & REMAINING MARGIN

3.3.5.1. BASIC INFORMATION

The RC is the part of the NGC left in the system after the load at the reference point has been covered. The RC of a power system is the difference between the RAC and the load. As reference points for the adequacy retrospect are the 3rd Wednesdays, 11:00 of every month (except for the ENTSO-E peak and ENTSO-E off-peak reference points), to extend the results from a unique reference point to a whole month, the margin against monthly peak load (MaMPL) is introduced. It is calculated as the difference in power between the maximum peak load metering over the month and the load at the reference point in this month. For ENTSO-E's peak reference point, MaMPL is expected to be the lowest one. In countries where the peak load occurred at the same time as for ENTSO-E, it should be zero. The RM in a power system is the difference between the RC and the MaMPL. It is the part of the NGC that has not been used to cover the monthly peak load. On the other hand, the negative margin shows the situation that could happen if the monthly peak load occurs at a reference point, meaning that the system would not be balanced due to the lack of RAC (or an excess of UC).

3.3.5.2. ENTSO-E OVERVIEW

As expected, RC was the lowest for the reference point referring to the ENTSO-E peak load. Whole monthly results in the last three years are presented in Table 3.3.5.2.1.

A general overview of the structure of NGC, as the sum of RC, UC, and load is shown in Figure 3.3.5.2.1.

Comparing with 2012 and 2013 in 2014 there were larger differences for RC as the part of NGC. As shown in March, reference point on 3rd Wednesday, a peak was reached with 25 % higher level of RC as a part of NGC. Also at the time of ENTSO-E peak load reference point, when RC as a part of NGC nearly was 20%. Details can be found in Figure 3.3.5.2.2.

GW	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Peak	Off-peak
2012	169.8	163.7	200.0	181.2	180.7	168.8	189.8	245.3	189.1	192.1	185.0	170.3		
2013	159.1	179.7	192.4	205.9	206.5	189.7	189.5	200.7	177.7	178.1	170.5	189.2	140.1	
2014	198.2	210.3	251.5	220.0	210.2	209.0	209.8	224.3	191.2	199.3	188.8	202.1	172.6	348.1

Table 3.3.5.2.1 RC evolution

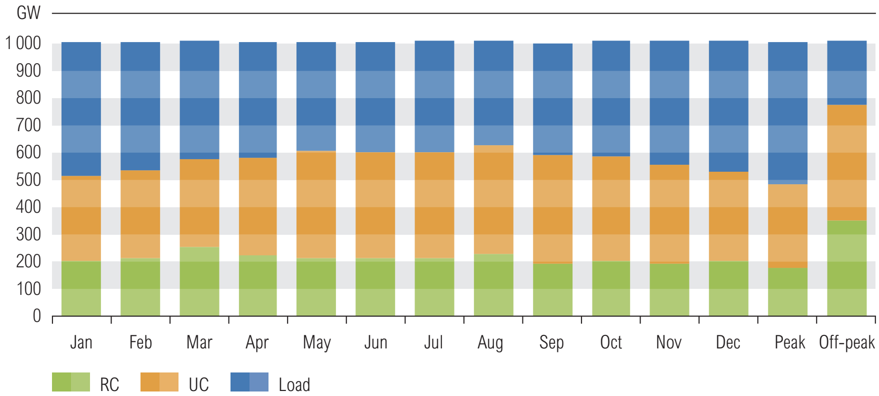


Figure 3.3.5.2.1: RC overview in 2014 compared to UC and load

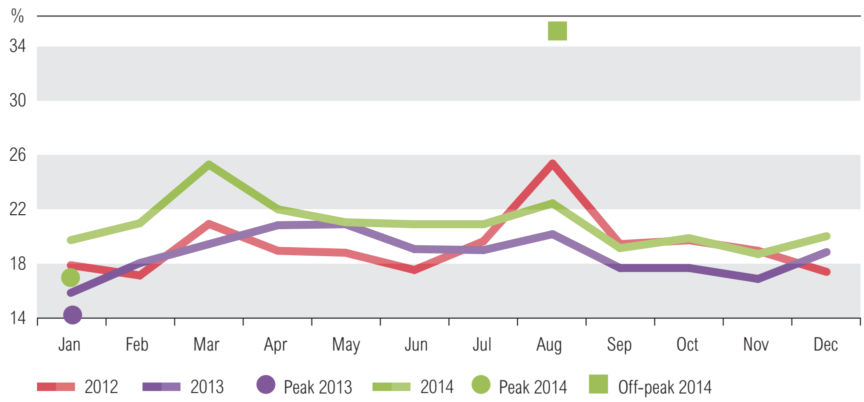


Figure 3.3.5.2.2: RC as a part of NGC evolution

Throughout the year 2014, the total ENTSO-E RM was always positive and higher than 100 GW, which corresponds with 10 % of NGC. This means that the ENTSO-E system, as such, did not rely on imports of electricity from neighbouring countries (Russia, Belarus, Ukraine, the Republic of Moldova, Turkey, and Morocco) and had enough generating capacity to cover its demand at any time during the year. These values were generally not very different from what has been observed in recent years (2012 and 2013). The following table and figures show these results, based on the aggregated values of the different countries. On the other hand, some countries reported a negative RM. More details are presented in the Excel attachment 'YS&AR 2014 table no.1', sheet 'Power'.

GW	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Peak	Off-peak
RC	198.2	210.3	251.5	220.0	210.2	209.0	209.8	224.3	191.2	199.3	188.8	202.1	172.6	348.1
MAMPL	42.4	45.2	55.7	27.9	30.5	30.1	27.9	42.9	31.1	48.5	48.4	54.6	11.4	186.5
RM	155.9	165.1	195.8	192.1	179.7	178.9	181.9	181.4	160.1	150.8	140.5	147.5	161.2	161.6

Table 3.3.5.2.2: RM overview in 2014

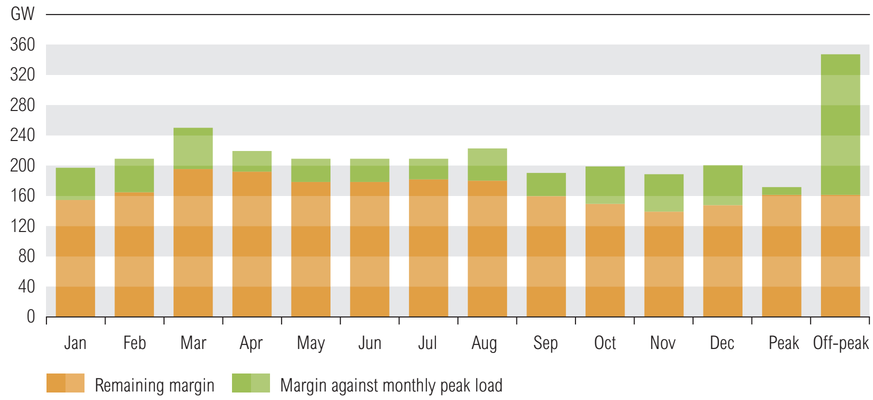


Figure 3.3.5.2.3: RM and MAMPL overview 2014

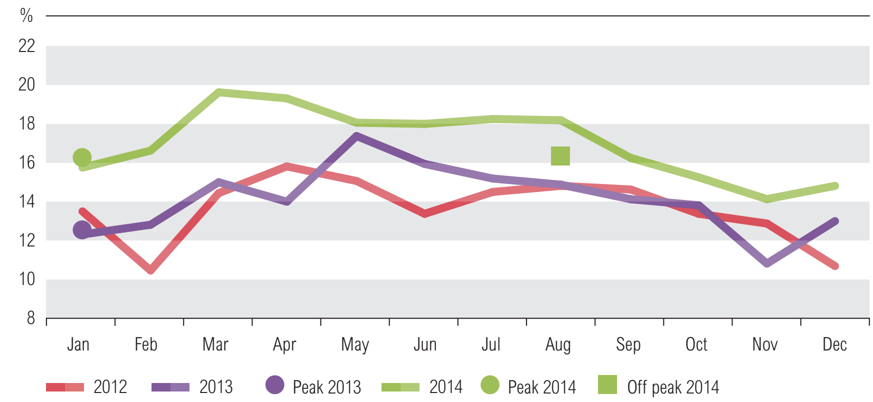


Figure 3.3.5.2.4: RM as a part of NGC evolution

3.3.5.3. NATIONAL RC

Positive national RC means that at reference point, a country covered its load by itself and remaining power might be exported, while negative RC means that national RAC was not enough to cover load at reference point and to balance the system, the import was required. In some situations referred to negative RC, the difference in the energy prices on the market may cause that imports are more economically favorable than increase of national generation and then a part of national NGC is not used due to cost and classified as e.g. non-usable capacity (mothballed).

In the majority of ENTSO-E countries, the RC was positive during the whole year (without considering the influence of exchanges). Only four countries: Belgium, Finland, Latvia and Netherlands reported negative RC. More details in Map 3.3.5.3.1.

Data related to the map Used data: Months with negative RC

BE	FI
November	January
December	January$_{\text{ENTSO-E}}$
January$_{\text{ENTSO-E}}$	May
August$_{\text{ENTSO-E}}$	June
	July
LV	August
November	August$_{\text{ENTSO-E}}$
	September
NL	October
November	November

Map 3.3.5.3.1:
Reference points with negative RC in 2014 (without exchanges)

In normal operation, the system is balanced when the RC that includes exchanges is positive every moment. Map 3.3.5.3.2 shows RC with exchanges as a part of the NGC per country in the ENTSO-E peak load reference point (in January) and Map 3.3.5.3.3 results for the ENTSO-E off-peak reference point. These points represent reference points with the lowest level of RC (in ENTSO-E peak) and the highest RC (in March).

The ENTSO-E average level of RC with exchanges as a part of the NGC on 17 January 2014 at 19:00 (ENTSO-E peak load) was 20.1 %, and the highest result was for Luxembourg (53.4 %), while the lowest was for Czech Republic (2.0 %).[1)] In the ENTSO-E off-peak reference point, the ENTSO-E average level was 38.8 %, and that time, Luxembourg was the leader (83.3 %), while Finland was on the opposite spectrum (6.6 %).

1) As mentioned in Paragraph 1.2 'About the data' some CH data are estimations, and the result of RC with exchanges may not be confirmed as reliable.

Data related to the map Used formula: $(RC + exch)_{ENTSO\text{-}E\ peak} / NGC_{ENTSO\text{-}E\ peak}$

AT	30.5 %	**IS**	12.7 %
BA	20.1 %	**IT**	22.9 %
BE	16.4 %	**LT**	51.2 %
BG	18.1 %	**LU**	53.4 %
CH	13.5 %	**LV**	26.6 %
CY	36.8 %	**ME**	3.9 %
CZ	0.2 %	**MK**	9.4 %
DE	9.5 %	**NI**	24.7 %
DK	12.0 %	**NL**	29.4 %
EE	14.1 %	**NO**	12.6 %
ES	29.3 %	**PL**	11.4 %
FI	12.2 %	**PT**	22.4 %
FR	5.6 %	**RO**	25.8 %
GB	24.7 %	**RS**	16.4 %
GR	25.7 %	**SE**	8.3 %
HR	33.5 %	**SI**	6.8 %
HU	29.6 %	**SK**	19.8 %
IE	30.7 %	**UA_W**	2.7 %

Map 3.3.5.3.2: RC with exchanges as a part of NGC in reference point representing ENTSO-E peak load per country

Data related to the map Used formula: $(RC + exch)_{ENTSO\text{-}E\ off} / NGC_{ENTSO\text{-}E\ off}$

AT	19.4 %	**IS**	20.1 %
BA	49.3 %	**IT**	43.0 %
BE	28.6 %	**LT**	52.8 %
BG	41.7 %	**LU**	83.2 %
CH	42.5 %	**LV**	32.9 %
CY	50.6 %	**ME**	68.0 %
CZ	11.8 %	**MK**	37.5 %
DE	26.5 %	**NI**	44.1 %
DK	33.6 %	**NL**	57.4 %
EE	8.7 %	**NO**	54.5 %
ES	41.0 %	**PL**	25.3 %
FI	6.6 %	**PT**	32.2 %
FR	21.0 %	**RO**	39.9 %
GB	50.4 %	**RS**	45.2 %
GR	48.0 %	**SE**	31.7 %
HR	61.5 %	**SI**	32.5 %
HU	38.9 %	**SK**	26.6 %
IE	55.7 %	**UA_W**	34.8 %

Map 3.3.5.3.3: RC with exchanges as a part of NGC in reference point representing ENTSO-E Off-peak per country

3.3.5.4. NATIONAL COMMENTS ON RC AND RM

CZ – Czech Republic

The amount of RC mainly depends on water levels in hydro storage power plants.

4. ENTSO-E MEMBERS AND STATISTICAL DATA CORRESPONDENTS

4.1. MEMBER COMPANIES

Country		Company	Abbreviation
AT	Austria	Austrian Power Grid AG	APG
		Vorarlberger Übertragungsnetz GmbH	VUEN
BA	Bosnia and Herzegovina	Nezavisni operator sistema u Bosni i Hercegovini	NOS BiH
BE	Belgium	Elia System Operator SA	Elia
BG	Bulgaria	Electroenergien Sistemen Operator EAD	ESO
CH	Switzerland	Swissgrid ag	Swissgrid
CY	Cyprus	Cyprus Transmission System Operator	Cyprus TSO
CZ	Czech Republic	ČEPS a.s.	ČEPS
DE	Germany	TransnetBW GmbH	TransnetBW
		TenneT TSO GmbH	TenneT DE
		Amprion GmbH	Amprion
		50Hertz Transmission GmbH	50Hertz
DK	Denmark	Energinet.dk	Energinet.dk
EE	Estonia	Elering AS	Elering AS
ES	Spain	Red Eléctrica de España S.A.	REE
FI	Finland	Fingrid Oyj	Fingrid
FR	France	Réseau de Transport d'Electricité	RTE
GB [1]	United Kingdom	National Grid Electricity Transmission plc	National Grid
		System Operator for Northern Ireland Ltd	SONI (NI) [2]
		Scottish Hydro Electric Transmission plc	SHE Transmission
		Scottish Power Transmission plc	SPTransmission
GR	Greece	Independent Power Transmission Operator S.A.	IPTO
HR	Croatia	HOPS d.o.o.	HOPS
HU	Hungary	MAVIR Magyar Villamosenergia-ipari Átviteli Rendszerirányító Zártkörűen Működő Részvénytársaság	MAVIR ZRt.
IE	Ireland	EirGrid plc	EirGrid
IS	Iceland	Landsnet hf	Landsnet
IT	Italy	Terna S.p.A. - Rete Elettrica Nazionale	Terna
LT	Lithuania	Litgrid AB	Litgrid
LU	Luxembourg	Creos Luxembourg S.A.	Creos Luxembourg
LV	Latvia	AS Augstsprieguma tīkls	Augstsprieguma tīkls
ME	Montenegro	Crnogorski elektroprenosni sistem AD	Crnogorski elektroprenosni sistem
MK	FYR of Macedonia	Macedonian Transmission System Operator AD	MEPSO
NL	Netherlands	TenneT TSO B.V.	TenneT NL
NO	Norway	Statnett SF	Statnett
PL	Poland	Polskie Sieci Elektroenergetyczne S.A.	PSE
PT	Portugal	Rede Eléctrica Nacional, S.A.	REN
RO	Romania	C.N. Transelectrica S.A.	Transelectrica
RS	Serbia	JP Elektromreža Srbije	EMS
SE	Sweden	Svenska Kraftnät	SVENSKA KRAFTNÄT
SI	Slovenia	ELES, d.o.o.	ELES
SK	Slovak Republic	Slovenská elektrizačná prenosová sústava, a.s.	SEPS

1) The country code GB represents England, Scotland and Wales.

2) The code NI represents Northern Ireland.

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1) The country code GB represents England, Scotland and Wales.

2) The code NI represents Northern Ireland.

3) The code UA_W (Ukraine West) represents the western part of the Ukrainian system called Burshtyn Island. Non-ENTSO-E member.

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YS&AR_2014_Tie-lines_Simplified_diagram_as_of_31.12.2014.png

These files are inside the YS&AR 2014 background data (zip file)

6. GLOSSARY INFORMATION

Terms and their definitions used in the report can be found in the ENTSO-E Glossary, via the EMR tool: **https://emr.entsoe.eu/glossary/**.

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