

POWER DISTRIBUTION IN EUROPE

FACTS & FIGURES

€400 billion

of investment by 2020

2,400

electricity distribution companies

260 million

connected customers

Electricity distribution is the 'final mile' in the delivery of electricity: the link between the transmission system and electricity customers.

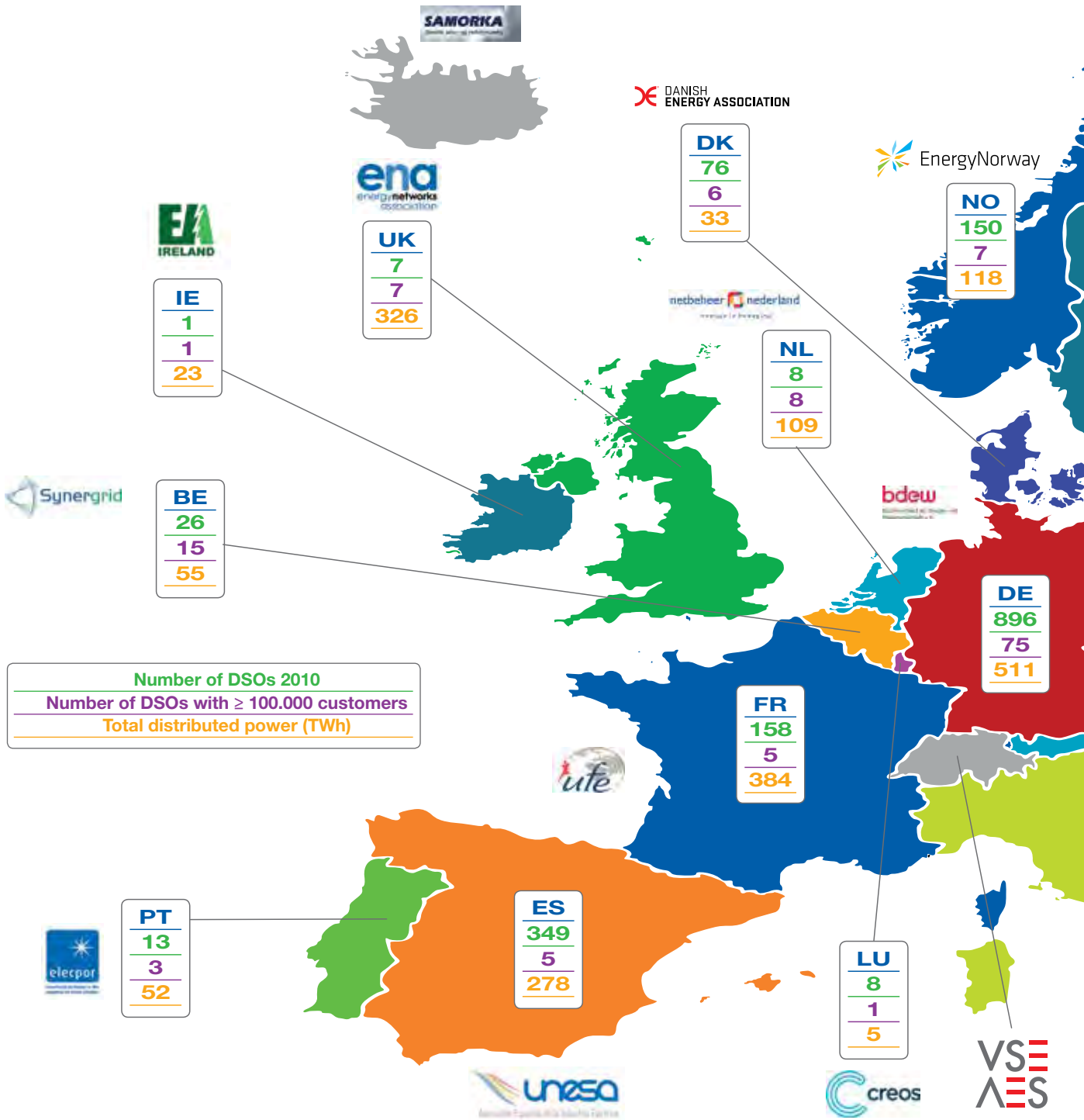
2,400 electricity distribution companies

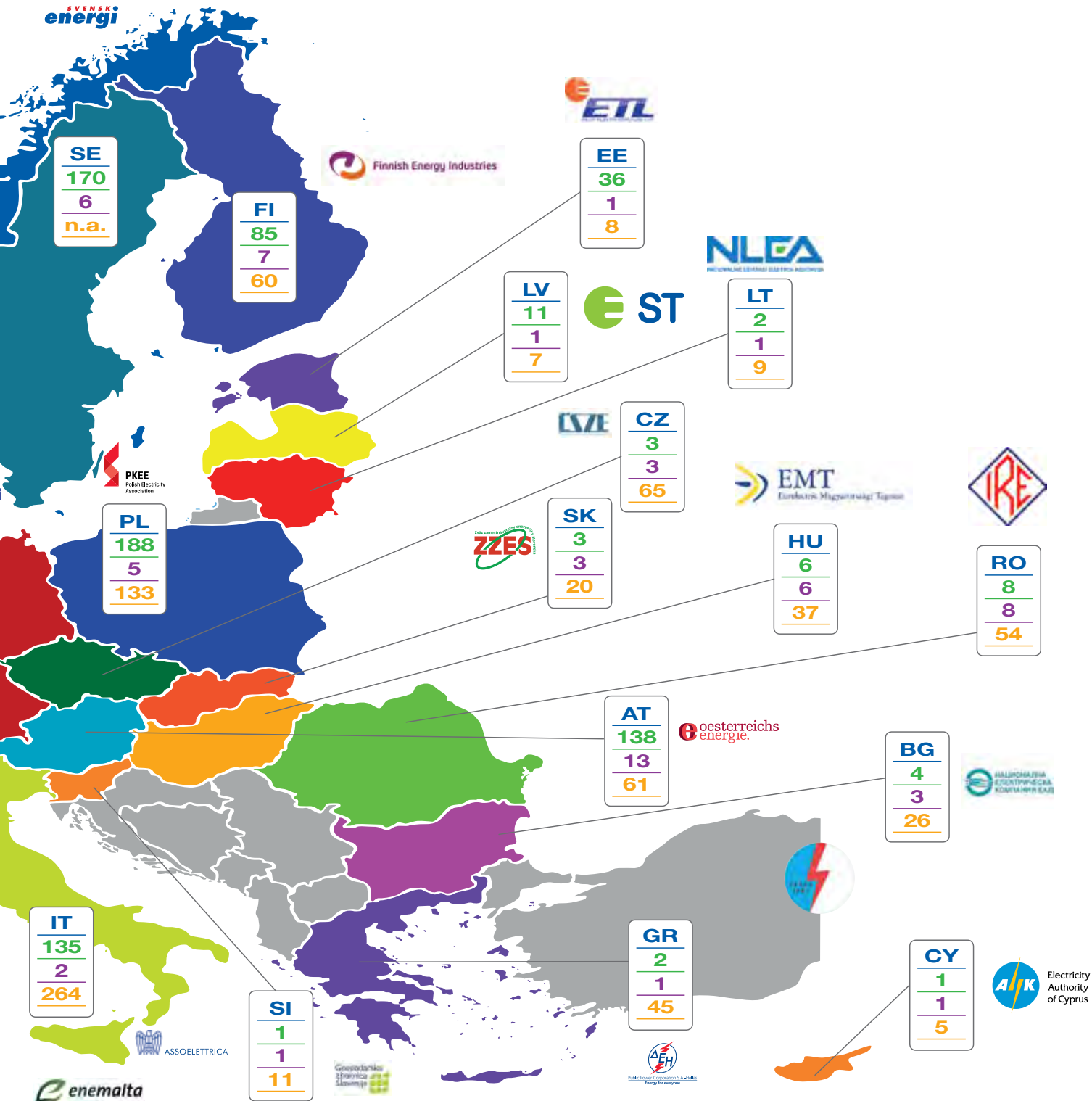
260 million connected customers, of which **99%** residential customers and small businesses

240,000 people employed¹

2,700 TWh a year¹

¹ Estimation based on data available for 25 EU countries and Norway.





POWER DISTRIBUTION IN EUROPE

FACTS & FIGURES

Power distribution in Europe

DIVERSE

The electricity distribution business across Europe is very diverse. It varies in the number and size of operational areas, the number of customers, network characteristics as well as ownership structure. Models used to review tariffs and allowed revenues need to reflect this diversity to allow valid comparisons to be made.

RELIABLE

Despite this diversity, European distribution system operators (DSOs) generally provide a very **high level of reliability and quality of supply** to their customers. However, DSOs are facing an increasing challenge of integrating **rising shares of decentralised and variable generation and new loads such as electric vehicles** into their networks. **Considerable investments in distribution networks**, including smart grids and smart meters, will be needed to accommodate these challenges and to replace the current ageing infrastructure while maintaining the high quality of service.

NEUTRAL

DSOs will play a key **role as neutral facilitators of tomorrow's more decentralised energy system**. 14 countries have already undertaken or are planning the mandatory roll-out of smart meters to at least 80% of customers. DSOs already operate the traditional meters in most European countries, and will be responsible for deploying smart meters in 16 European countries.

Electricity distribution business – key characteristics

DSOs have **two main functions**: they act as system operators and as neutral market facilitators.

1. **System operators**: DSOs secure a reliable flow of electricity through their network to their customers. They constantly develop and maintain their networks to ensure that the networks operate efficiently and with **high levels of system security, reliability and quality**.
2. **Market facilitators**: DSOs are also required to provide non-discriminatory access to their networks for other system users, like power generators or service providers. They will increasingly move beyond their traditional role of “building and connecting” towards “connecting and managing”. In many countries, DSOs also **own and manage metering infrastructure, organise supplier switching, or act as an information hub** by storing and providing metering data.

Electricity distribution is a natural monopoly. DSOs are therefore fully regulated companies: their allowed revenue is determined by national regulatory authorities.

DSOs that are part of a vertically integrated company are obliged to comply with conditions of legal, functional and accounting unbundling as laid down in the Third Energy Package.³ This applies to more than 190 DSOs with 100,000 and more end users.

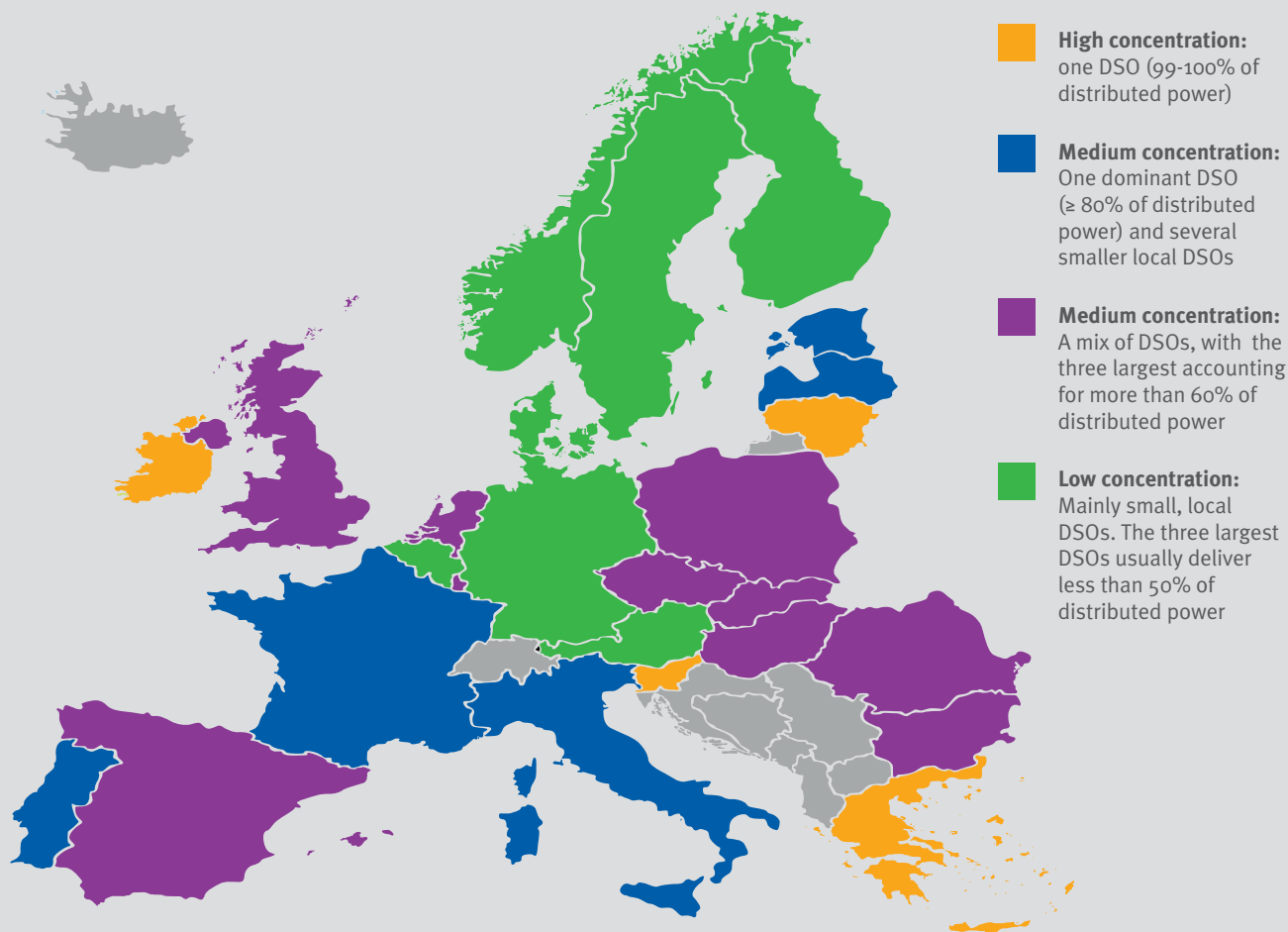
DSOs serving less than 100,000 connected customers can be exempted from the requirements of both legal and functional unbundling. In order to find other economies of scale, such small DSOs often integrate horizontally with other activities, such as distribution of water, gas or heat.

Unbundling applies to the more than

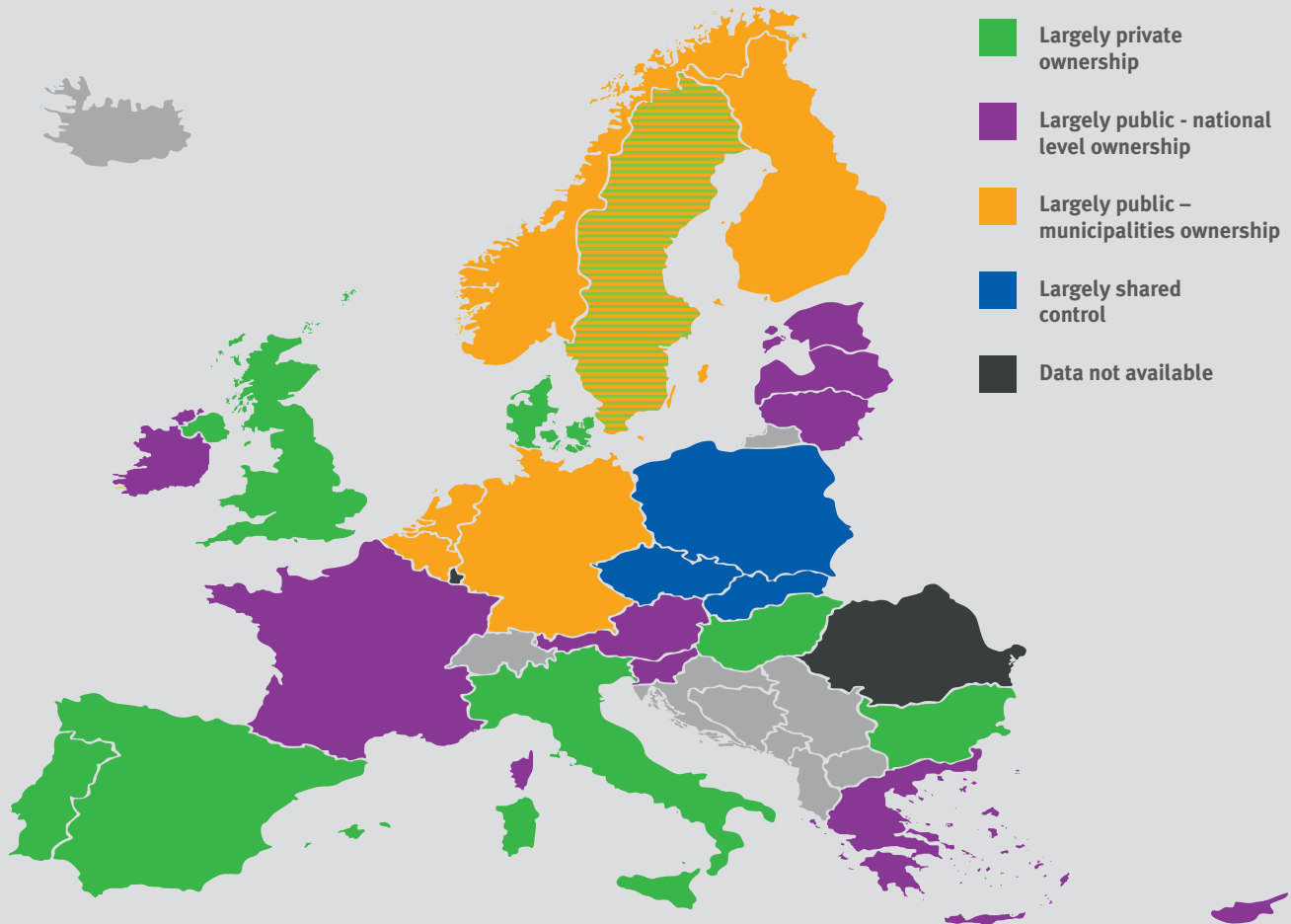
190 DSOs
with **100,000**
and more end users

³ Articles 26 and 32 of Directive 2009/72/EC

The number and size of DSOs varies significantly across European countries.



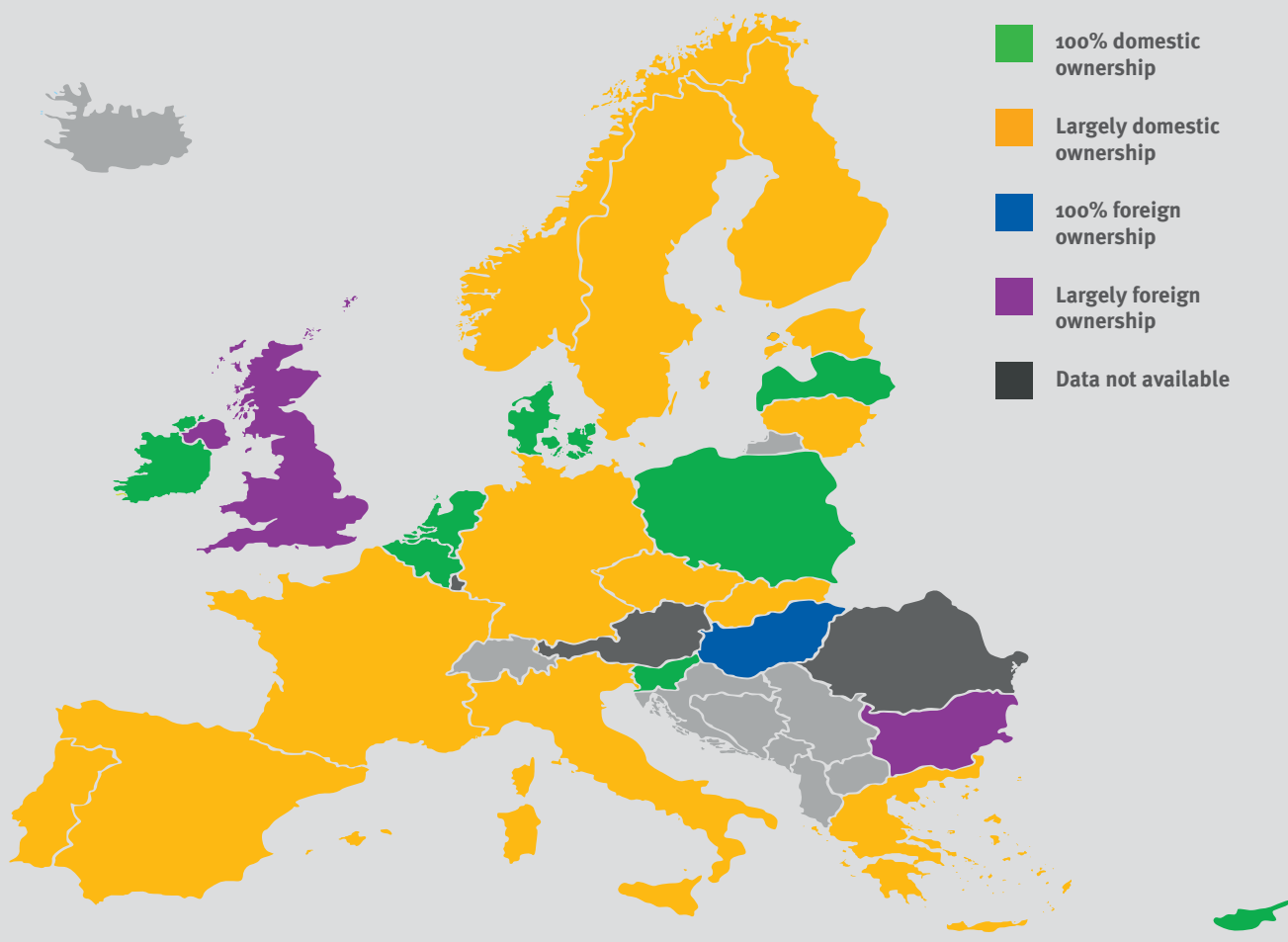
DSOs can be either fully public or fully privatised.
In addition, various forms of public-private-partnership exist.⁴



This diversity is due to the historical organisation of distribution and differences in the role of local/national authorities. Most DSOs own the network and are granted an operation licence by local or national public authorities. In some countries, like France or Germany, DSOs are granted concession contracts to operate the network for a certain amount of time while the public authorities remain the owner in the long term. In these cases, DSOs are in charge of operation and maintenance as well as capital investment.

⁴ For each country the percentage of each type of ownership was calculated by aggregating the kWh distributed by each type of company. Where the DSOs are fully or partly publicly owned, the form of the mother company ownership was considered in the calculation. For Bulgaria, 2012 data were used.

Electricity distribution in Europe is mainly a national business.



Towards smart distribution systems

European networks will require **€600 billion of investment by 2020**. Two thirds of this investment will take place in distribution grids. **The DSO share of overall network investments is estimated to grow** to almost 75% by 2035, and **to 80% by 2050**.⁵

DSO investments include **building** new capacity and **refurbishing and replacing** existing assets as they reach the end of their technical lifetime. Investments are also driven by a changing distribution system, with a greater role for new loads like **electric vehicles**, for distributed generation like rooftop **solar panels**, and for **smart meters**.

As regulated companies, the **DSO investment framework is determined by regulation at the national level**.

Electricity use in transport may only make up a small part of total electricity demand for many years to come, but e-mobility could nevertheless have a big impact on load, in particular if motorists all plug in their vehicles during the peak load time.

Active load management will be needed to avoid network congestions and make use of e-mobility's **potential for smoother network operation**.

Smart grids, including intelligent control systems, will help DSOs become more active and should accompany the expansion of distribution networks.

€400 billion
of distribution network investment by 2020

⁵ European Commission 2011, IEA World Energy Outlook 2012 and European Energy Roadmap 2050.

80%

of EU citizens to be equipped with smart meters by 2020

Towards smart distribution systems

Metering is crucial for establishing data for billing purposes. In most European countries DSOs own the metering assets and are responsible for reading the meter, estimating consumption and validating metering data. Meters also allow DSOs to be informed as quickly as possible about outages and power quality issues.

The EU has called for 80% of citizens to be equipped with smart meters by 2020, subject to a positive national cost-benefit analysis. This corresponds to 200 million smart meters in total.

DSOs will be responsible for the roll-out of smart meters in most countries. They are therefore a **key facilitator of a well-functioning retail market**.

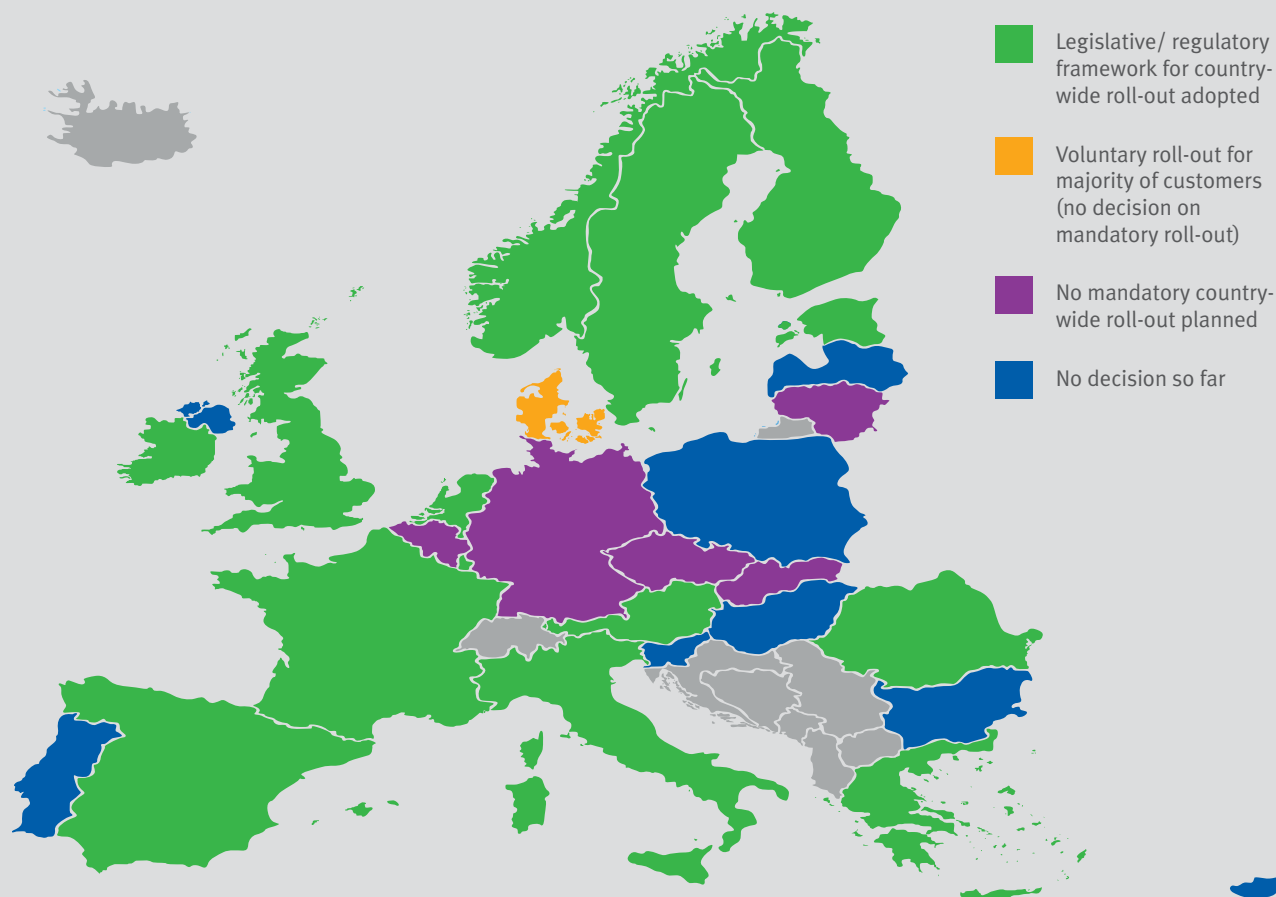
Smart meters bring **benefits** for many electricity system players. They will:

1. Play a key role in empowering **customers** to become active managers of their consumption. They will provide possibilities for energy-aware customers to reduce their bills.
2. Allow **retailers** to introduce new products, to detect fraud and to identify customers who are unable to pay their bills.
3. Help **DSOs** to ensure quality of service (e.g. through detection of faults) and manage connection contracts.

200 million

smart meters by 2020

Smart meters: mandatory for more than 80% of customers in 14 European countries by 2020.⁶

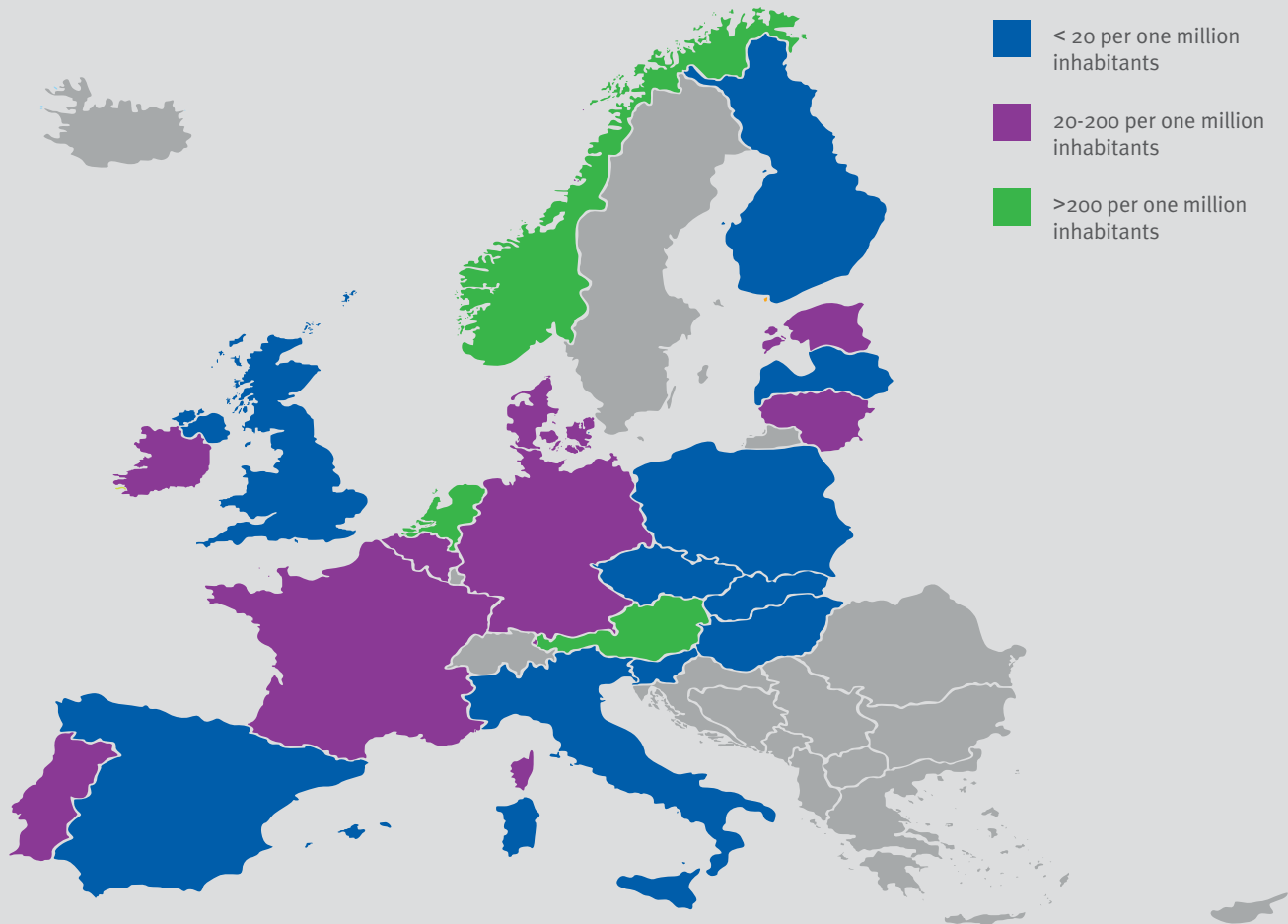


In Italy and Sweden, smart meters have already fully replaced conventional meters. In Germany, a roll-out covering 15% of customers is planned. In Slovakia, a roll-out covering 25-30% of customers is planned.

Following a negative cost-benefit analysis (CBA), three countries (Belgium, Czech Republic and Lithuania) have decided not to proceed with a mandatory nation-wide roll-out. DSOs are sometimes nevertheless going ahead with the smart meter installation based on individual targets (Belgium, Denmark). In seven countries, no roll-out decision has yet been taken.

⁶ The figure represents a snapshot of smart metering CBAs in Europe based on information available in September 2013. Remarks: France has taken a positive roll-out decision but no decision on financing. No decision on mandatory rollout has yet been made in Northern Ireland. Source: EURELECTRIC and European Commission data.

E-mobility: Over 25,000 public charging points exist in Europe.⁷



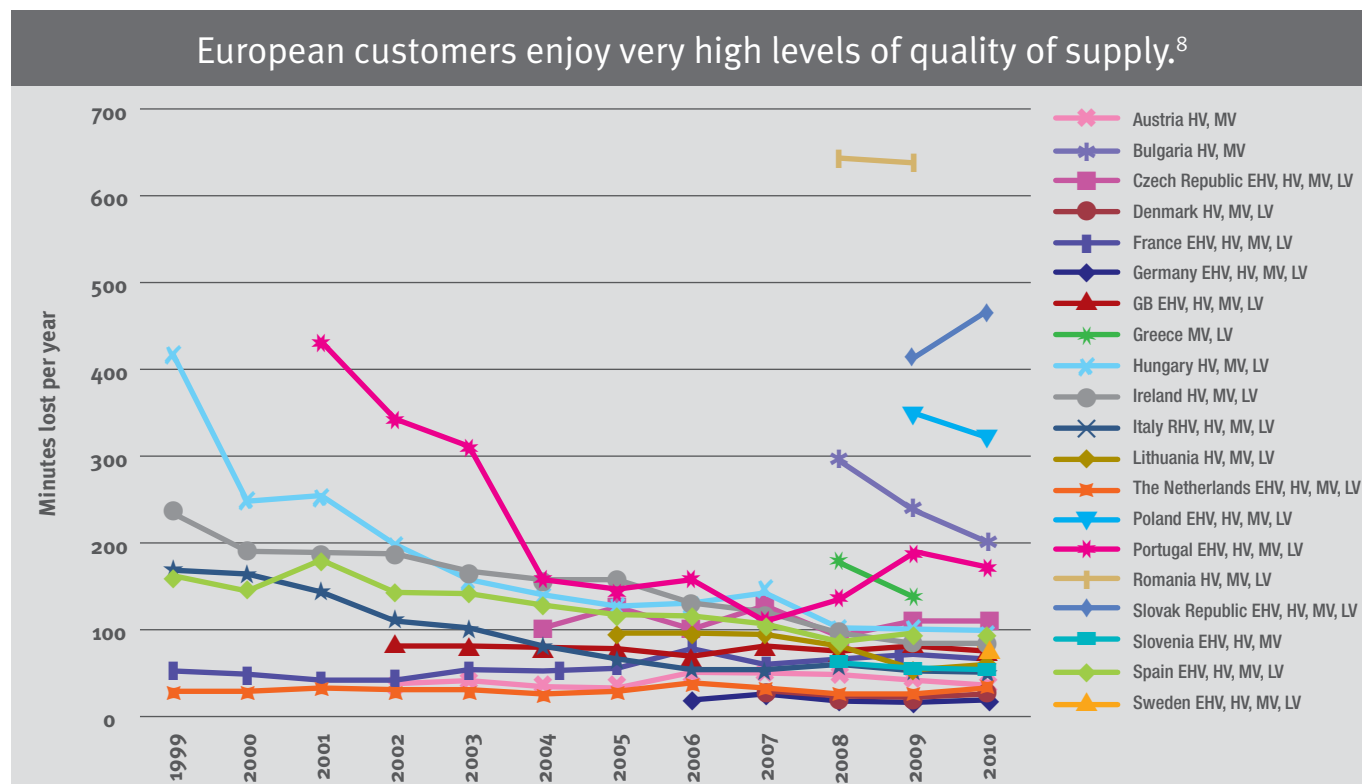
More than **30,000 additional charging points are due to be commissioned in the near future**. Investment in such e-mobility infrastructure can be recovered either from the e-mobility customer or integrated in the grid tariffs, thus socialising the costs between all grid users. In the long run, customers will determine the success of e-mobility and the most cost-efficient solution.

⁷ Data from November 2012 based on latest available information from EURELECTRIC members & EURELECTRIC report “Facilitating e-mobility”.

Quality of supply

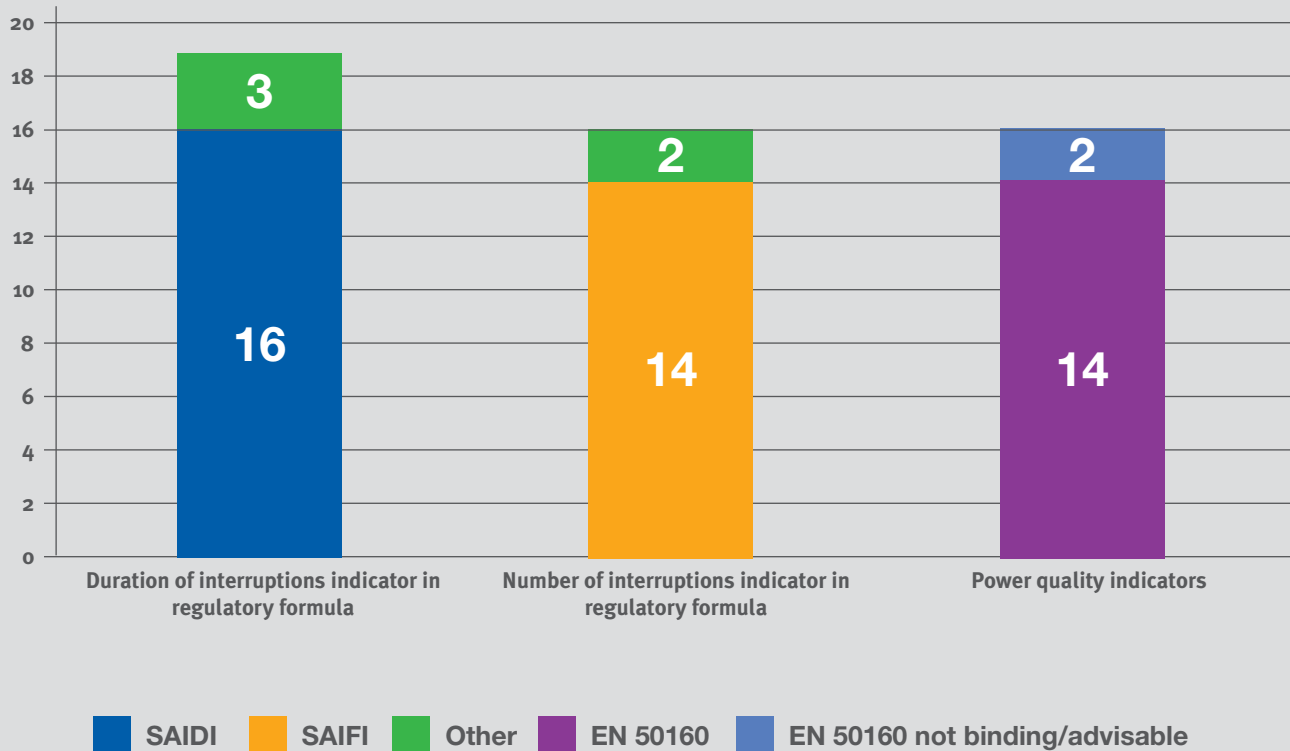
DSOs are tasked with finding the **most affordable and efficient way of delivering energy**. They also have to ensure **quality of service**, including continuity of supply and power quality. These technical performance requirements are laid out in national law, standards and grid codes.

The number and duration of interruptions in European networks is generally low, ranging from about 15 minutes to 400 minutes a year.



⁸ The graph captures unplanned long interruptions excluding exceptional events; minutes lost per year (1999 - 2010). The voltage level in the figures (EHV, HV, MV, LV) refers to where accidents occur – transmission and distribution networks are not included here. Source: 5th CEER Benchmarking Report on the Quality of Electricity Supply 2011

In more than half of EU countries, DSO revenues are linked to their performance on continuity of supply & power quality.



Continuity of supply indicators are monitored and often included in the regulatory formula for DSOs. Examples are SAIDI (average duration of interruptions per customer per year), **SAIFI** (average number of interruptions per customer per year) or indicators like the **number and duration of interruptions**.

In addition, regulation also often includes power quality indicators. **European standard EN 50160, for instance**, specifies voltage ranges to be respected in order to maintain an undisturbed operation of all connected devices. Application of this standard by DSOs has ensured consistently high or steadily increasing power quality levels in Europe.

10 million km
of power lines

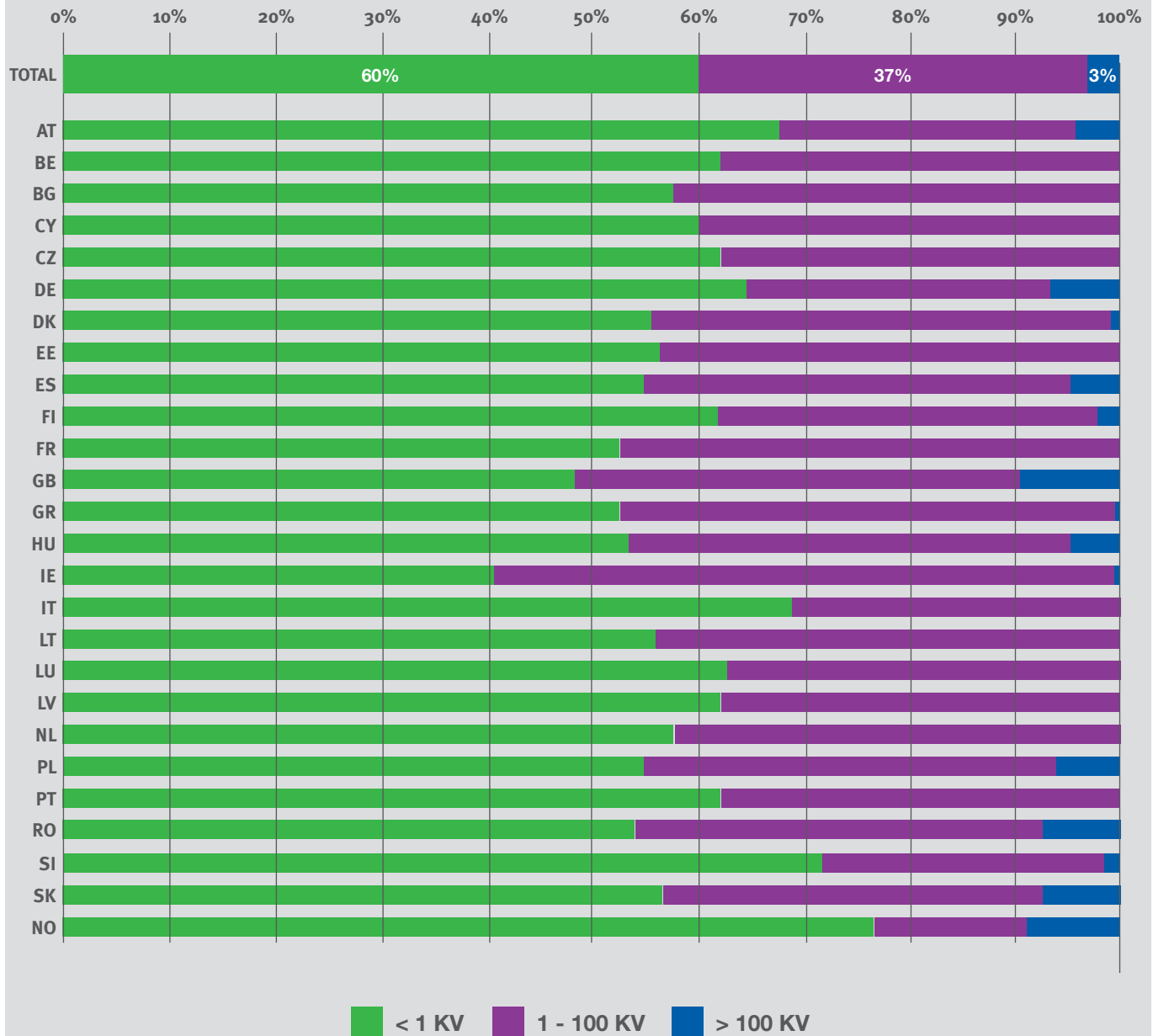
13 times to the moon and back ☾

97% of all power lines in Europe⁹

Around 98-99% of European network customers are connected to the distribution grid. In contrast to their transmission 'highway' counterparts, distribution networks are made up of the smaller roads and paths that deliver electricity to its ultimate point of consumption: Europe's households and businesses. They are linked to transmission systems by around 10,700 inter-connection points. Overall, there are more than 4 million distribution transformers in Europe.

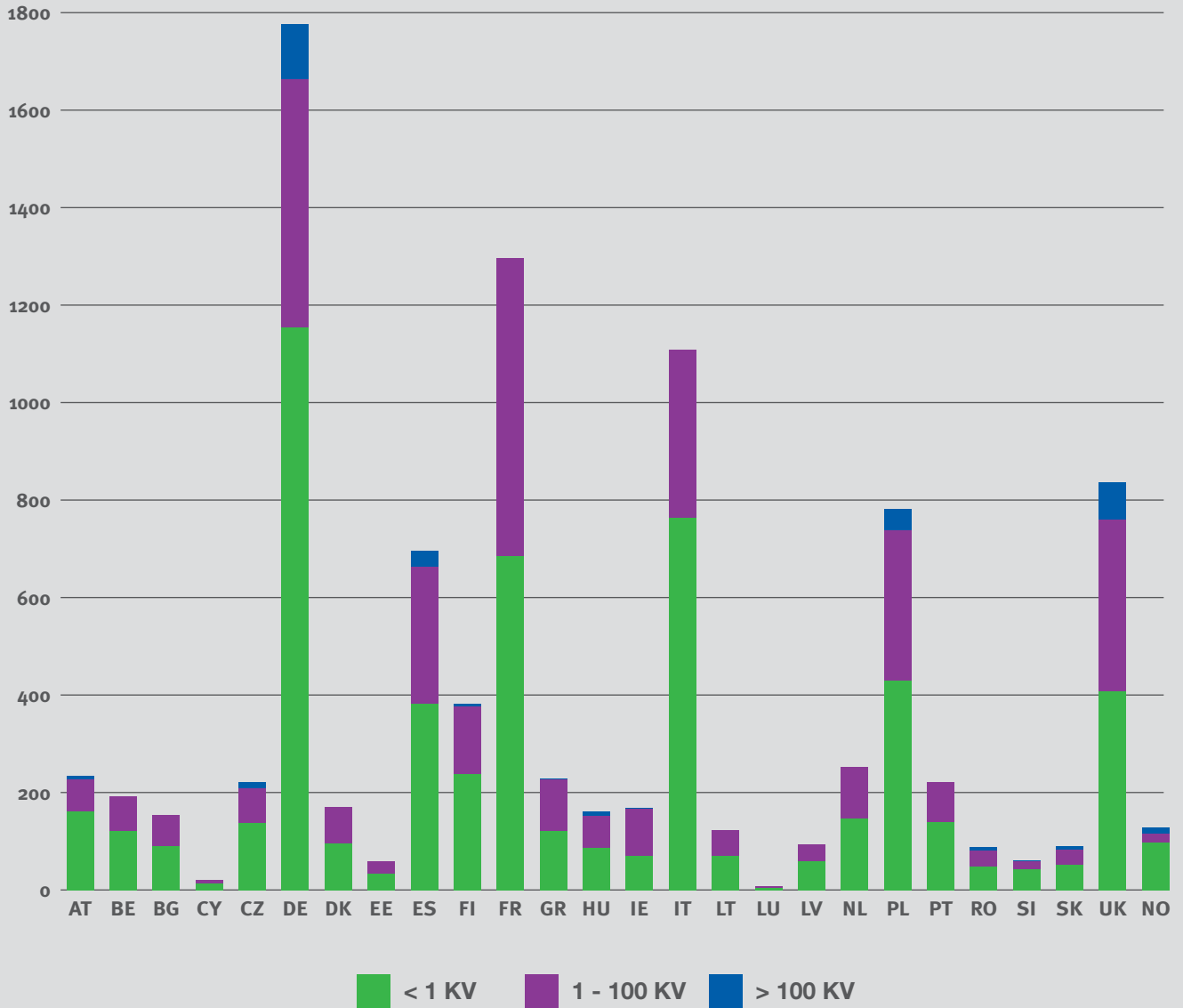
⁹ compared to 298,092 km of European transmission lines (Source: ENTSO-E)

Most distribution lines are low or medium voltage.

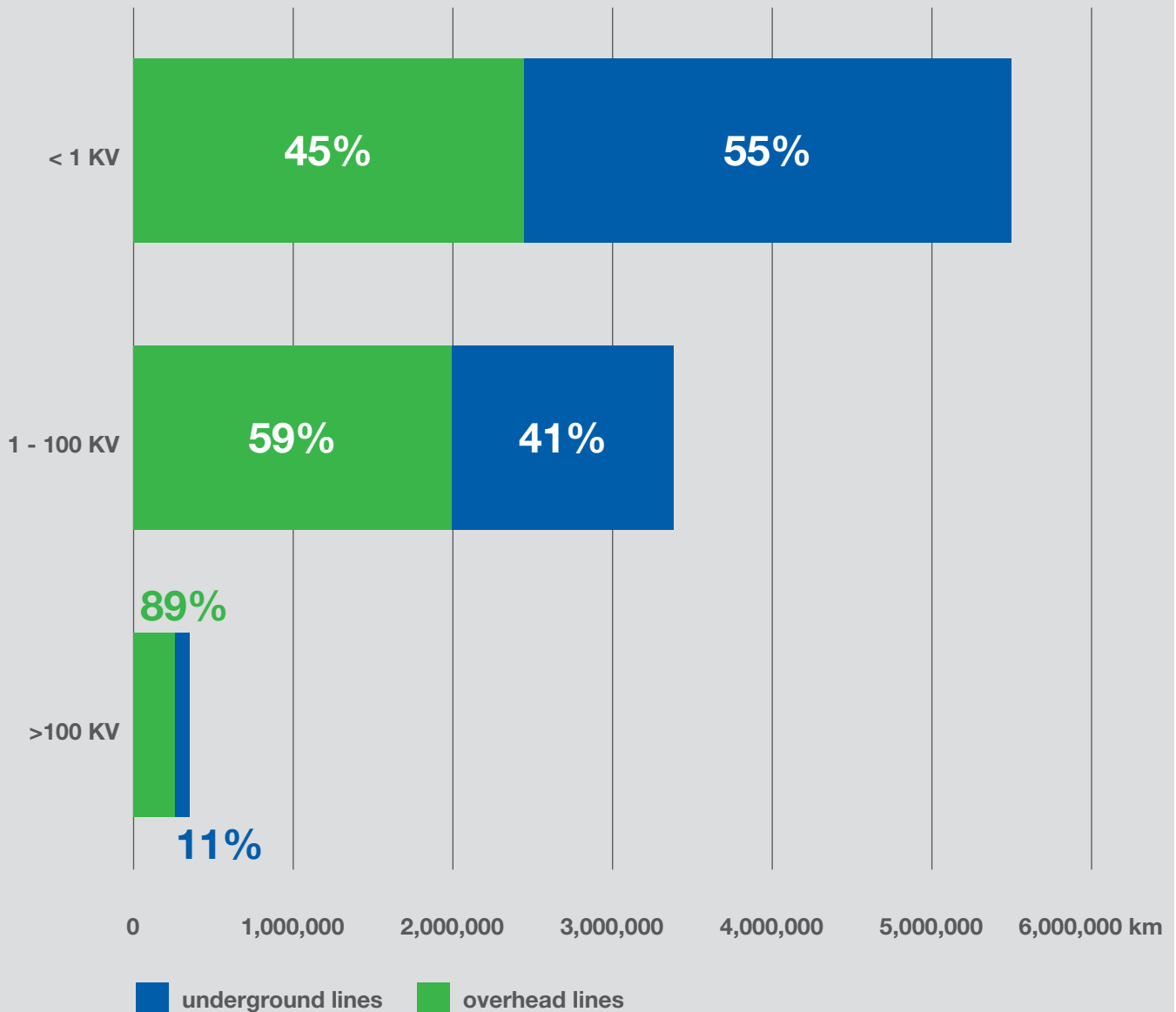


Length of lines per voltage level

thousand km

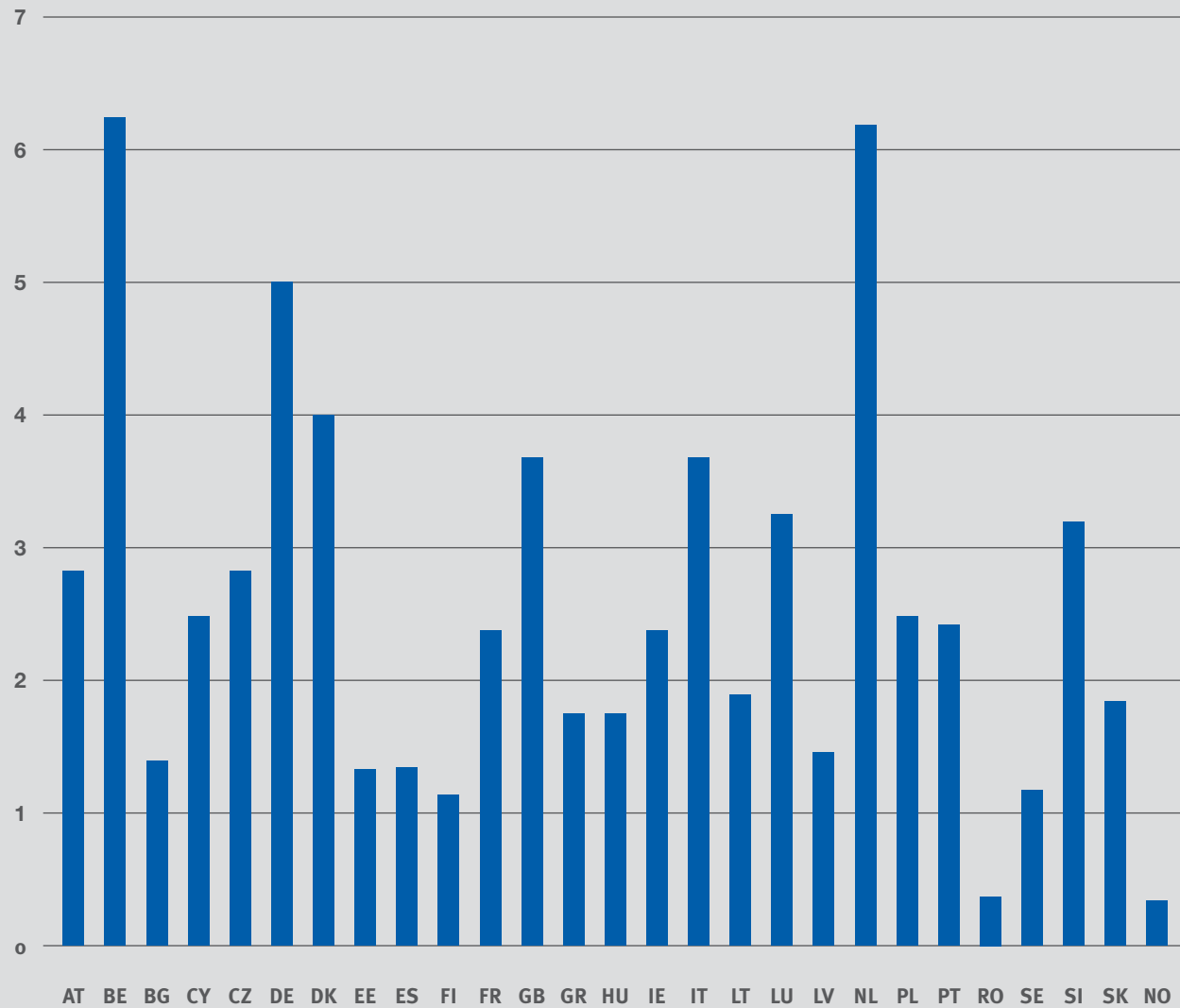


The lower the voltage level, the higher the share of underground lines.



Line density approximately corresponds with population density.

km of lines/km²



General information

Country	Number of DSOs 1997	Number of DSOs 2003	Number of DSOs 2010	Number of DSOs 2011	Number of DSOs with ≥ 100.000 customers	Total Number of Connected Customers	< 1 kV Customers (LV)	1- 100 kV Customers	> 100 kV Customers	Total distributed power (TWh)
AT	137	137	138	138	13	5,870,000	5,700,000	150,000	100	61
BE	36	29	26	24	15	5,243,796	5,178,890	64,906	0	55
BG		8	4	4	3	4,915,497	4,909,374	6,123	0	26
CY			1	1	1	535,050	512,972	646	0	5
CZ	8	8	3	3	3	5,837,119	5,812,727	24,258	134	65
DE	1000	900	896	880	75	49,294,962	n.a.	n.a.	n.a.	511
DK	211	119	76	72	6	3,277,000	n.a.	n.a.	n.a.	33
EE			36		1	652,000	651,000	1,000	0	8
ES	540		349		5	27,786,798	27,682,771	103,630	397	278
FI	115	93	85		7	3,309,146	3,305,268	3,761	117	60
FR			158		5	33,999,393	33,903,690	95,703	0	384
GR			2	2	1	8,195,725	8,184,378	11,347	0	45
HU	6	6	6	6	6	5,527,463	5,520,991	6,334	138	37
IE	1	1	1	1	1	2,237,232	2,235,681	1,545	6	23
IT	200	195	135	144	2	31,423,623	31,331,656	90,949	1,018	264
LT	1	2	2	1	1	1,571,789	1,570,584	1,205	0	9
LU	12	11	8	6	1	n.a.	n.a.	n.a.	n.a.	5
LV			11	11	1	873,856	872,930	926	0	7
NL		10	8	11	8	8,110,000	n.a.	n.a.	n.a.	109
PL	33	27	188	184	5	16,478,000	16,456,000	31,000	300	133
PT	4	1	13	13	3	6,137,611	6,113,839	23,772	0	52
RO	1	8	8		8	2,639,318	2,633,625	5,602	91	54
SE	230	190	170	173	6	5,309,000	5,300,000	9,000	n.a.	n.a.
SI	2	5	1		1	925,275	820,000	105,275	2	11
SK	4	4	3	3	3	2,392,418	2,379,672	12,664	82	20
UK	12	8	7	7	7	30,828,266	n.a.	n.a.	n.a.	326
NO	200	157	150	155	7	n.a.	n.a.	n.a.	n.a.	118

Distribution Circuit Length

Country	Overall circuit length (km)	> 100 kV (km)	> 100 kV Overhead (km)	> 100 kV Under-ground (km)	1 – 100 kV (km)	1 – 100 kV Overhead (km)	1 – 100 kV Under-ground (km)	LV (< 1 kV) (km)	LV Overhead (km)	LV Under-ground (km)	No. of MV & LV Transformers	Number of DSO-TSO inter-connection points
AT	235,600	9,760	9,200	560	65,550	29,250	36,300	160,300	37,600	122,700	76,800	n.a.
BE	193,165	0	0	0	72,522	7,021	65,501	120,643	52,164	68,480	69,398	544
BG	153,916	114	73	41	64,452	49,651	14,801	89,350	63,533	25,817	48,543	524
CY	22,428	0	0	0	8,788	5,482	3,305	13,640	9,206	4,434	14,774	1,800
CZ	221,441	12,258	12,245	13	71,713	58,734	12,979	137,470	65,764	71,706	3,677	30
DE	1,772,696	113,887	106,869	7,018	506,671	122,226	384,445	1,152,138	143,516	1,008,622	461,900	n.a.
DK	171,819	1,743	1,364	379	73,983	8,629	65,354	96,093	3,961	92,132	71,100	n.a.
EE	60,000	0	0	0	26,000	20,000	6,000	34,000	26,000	8,000	25,000	350
ES	695,427	31,380	30,363	1,017	280,845	203,225	77,620	383,202	241,735	141,467	289,671	776
FI	382,740	6,622	6,438	184	138,153	121,153	17,000	237,966	148,758	89,208	133,570	567
FR	1,293,466	0	0	0	608,053	356,263	251,790	685,413	419,060	266,353	751,000	2,240
GR	229,877	777	569	208	107,691	96,793	9,915	121,409	107,837	13,570	156,061	198
HU	161,954	7,872	7,755	118	66,816	53,887	12,929	87,266	64,039	33,227	59,485	155
IE	167,528	538	402	136	97,790	87,866	9,924	69,200	57,100	12,100	248,588	189
IT	1,105,216	0	0	0	342,600	207,247	135,353	762,616	510,301	252,315	426,559	1,728
LT	123,749	0	0	0	54,017	43,362	10,655	69,732	56,848	12,884	36,308	395
LU*	8,477	0	0	0	3,160	1,115	2,044	5,318	319	4,999	n.a.	n.a.
LV	93,764	0	0	0	34,964	29,434	5,530	58,800	40,640	18,160	28,488	134
NL**	252,634	0	0	0	105,968	n.a.	n.a.	146,666	n.a.	n.a.	n.a.	n.a.
PL	774,141	32,671	32,486	185	305,492	234,732	70,760	435,978	291,671	144,307	250,229	98
PT	222,627	0	0	0	83,256	66,725	16,531	139,371	106,744	32,627	64,458	59
RO*	89,944	6,584	6,332	252	34,665	22,645	12,021	48,695	28,589	20,106	20,736	25
SE	528,606	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	306,019	69,868	236,151	n.a.	n.a.
SI	63,120	811	801	10	16,854	12,189	4,665	45,456	24,655	20,801	16,425	93
SK	91,353	6,743	n.a.	n.a.	32,361	n.a.	n.a.	52,250	n.a.	n.a.	n.a.	n.a.
UK	837,156	75,440	50,462	24,978	352,841	193,102	159,739	408,875	70,276	338,599	665,408	637
NO	128,591	11,062	n.a.	n.a.	18,687	n.a.	n.a.	98,842	n.a.	n.a.	142,651	171
Total	9,952,845	307,200	265,359	35,098	3,555,204	2,030,731	1,385,161	5,867,865	2,491,426	3,038,764	4,060,829	10,713

* Luxembourg: only Creos, Romania: only CEZ

** Cross-border 150 kV lines owned by the DSOs and operated by the TSO are not included

List of Respondents

Country	Data provided by	Data for the whole country
AT	Oesterreichs Energie (industry association)	YES
BE	Synergrid (networks association)	YES
BG	Energy Management Institute on behalf of the following companies: Energo-Pro-Grid AD, CEZ Razpredelenie Bulgaria AD, EVN Bulgaria EP EAD	NO (>99%)
CY	Electricity Authority OF Cyprus (power company)	YES
CZ	ČEZ, a.s. & PRE, a.s. (DSO)	YES
DE	BDEW (industry association)	YES
DK	DanskEnergi (industry association)	YES
EE	Energia (power company)	YES
ES	UNESA (industry association)	YES
FI	Finnish Energy Industries (industry association)	YES
FR	ERDF and Geredis (DSOs)	NO (> 95 %)
GR	HEDNO s.a. (DSO)	YES
HU	ELMŰ Net Ltd. / ÉMÁSZ Net Ltd. (DSOs)	YES
IE	ESB Networks (DSO)	YES
IT	ENEL Distribuzione (DSO)	NO (> 83%)
LT	AB LESTO (DSO)	YES
LU	CREOS (DSO)	NO
LV	Sadales tīkls AS (power company)	YES
NL	Netbeheer Nederland (networks association)	YES
PL	PTPiREE (industry association)	YES
PT	EDP Distribuição, Energia, S.A. and EDA - Electricidade dos Açores, S.A. (DSOs)	YES (excluding only Madeira)
RO	ENEL Romania	NO
SE	Svensk Energi (industry association)	YES
SI	SODO d.o.o.	YES
SK	Východoslovenská energetika a.s. (power company)	YES
UK	ENA (networks association) for Great Britain (England, Wales and Scotland) and Northern Ireland Electricity Ltd. (power company)	YES
NO	Energy Norway (industry association)	YES

This brochure provides facts and figures on the electricity distribution business in Europe. It is based on a survey among EURELECTRIC members and includes responses from both companies and national associations from 28 European countries (see 'List of respondents', p.20). Data from 2011 (2010 where 2011 were not available) have been used unless mentioned otherwise. While every reasonable effort has been made to ensure that the gathered data are correct, EURELECTRIC cannot guarantee the accuracy of the information collected.

Data provided in the brochure are also available on www.eurelectric.org

The Union of the Electricity Industry–EURELECTRIC is the sector association representing the common interests of the electricity industry at pan-European level, plus its affiliates and associates on several other continents.

EURELECTRIC's DSO Committee provides the DSO perspective within EURELECTRIC's overall strategy and activities. It consists of more than 20 high-level distribution executives, who communicate to the European energy scene with a clear and common DSO voice. More than 100 distribution experts are actively involved in the various EURELECTRIC working groups.

EURELECTRIC pursues in all its activities the application of the following sustainable development values:

Economic Development

- ▶ Growth, added-value, efficiency

Environmental Leadership

- ▶ Commitment, innovation, pro-activeness

Social Responsibility

- ▶ Transparency, ethics, accountability



10 million km
of power lines

13 times to the moon and back ☾

200 million
smart meters by 2020

Union of the Electricity Industry - EURELECTRIC aisbl

Boulevard de l'Impératrice, 66 - bte 2
B - 1000 Brussels • Belgium

Tel: +32 2 515 10 00 • Fax: +32 2 515 10 10
twitter.com/EURELECTRIC • www.eurelectric.org