

Shallow Geothermal Energy Development: A European perspective

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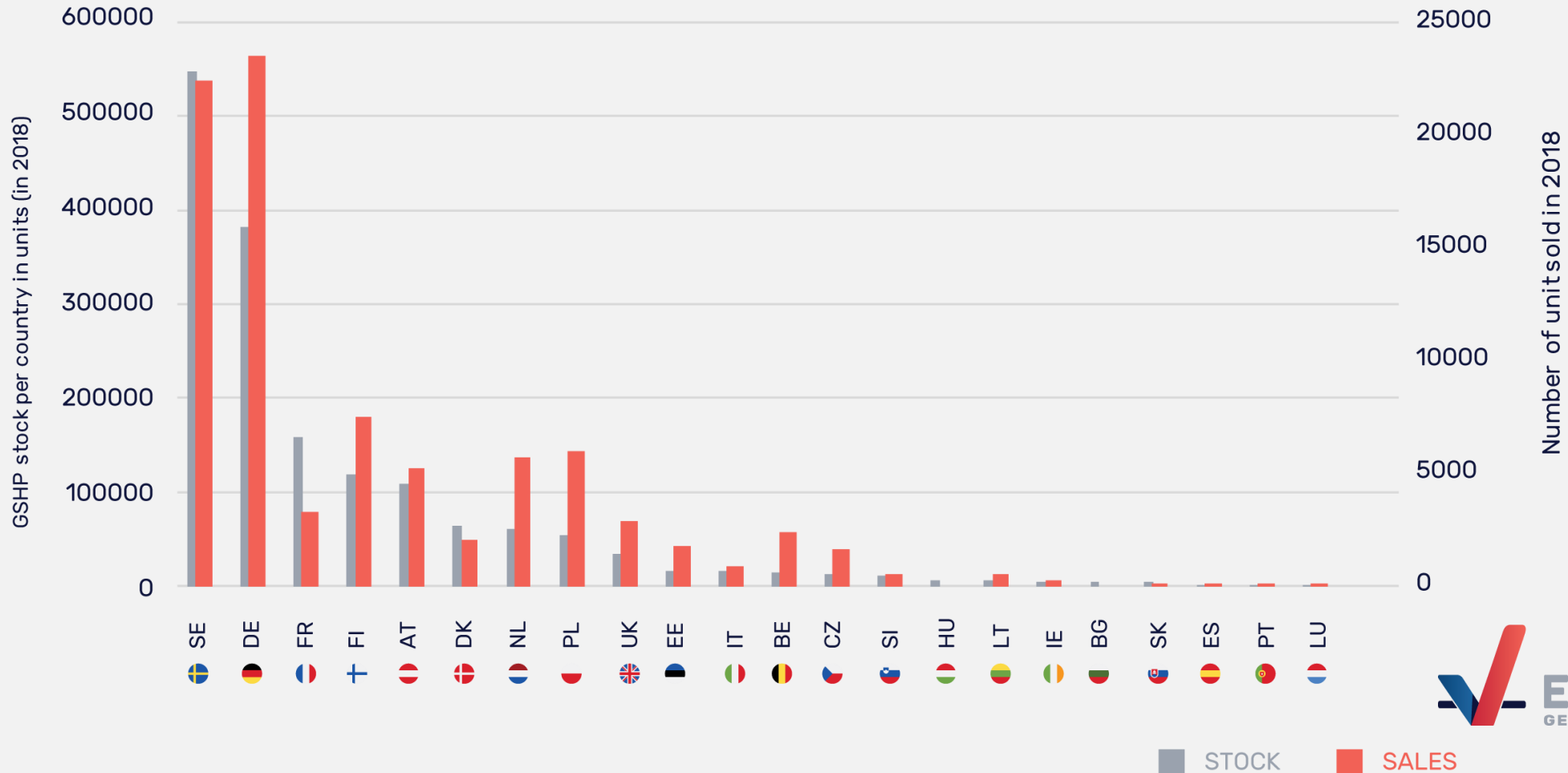
Philippe Dumas – Secretary General

Shallow geothermal // European Market - 2018

State of Play in 2018

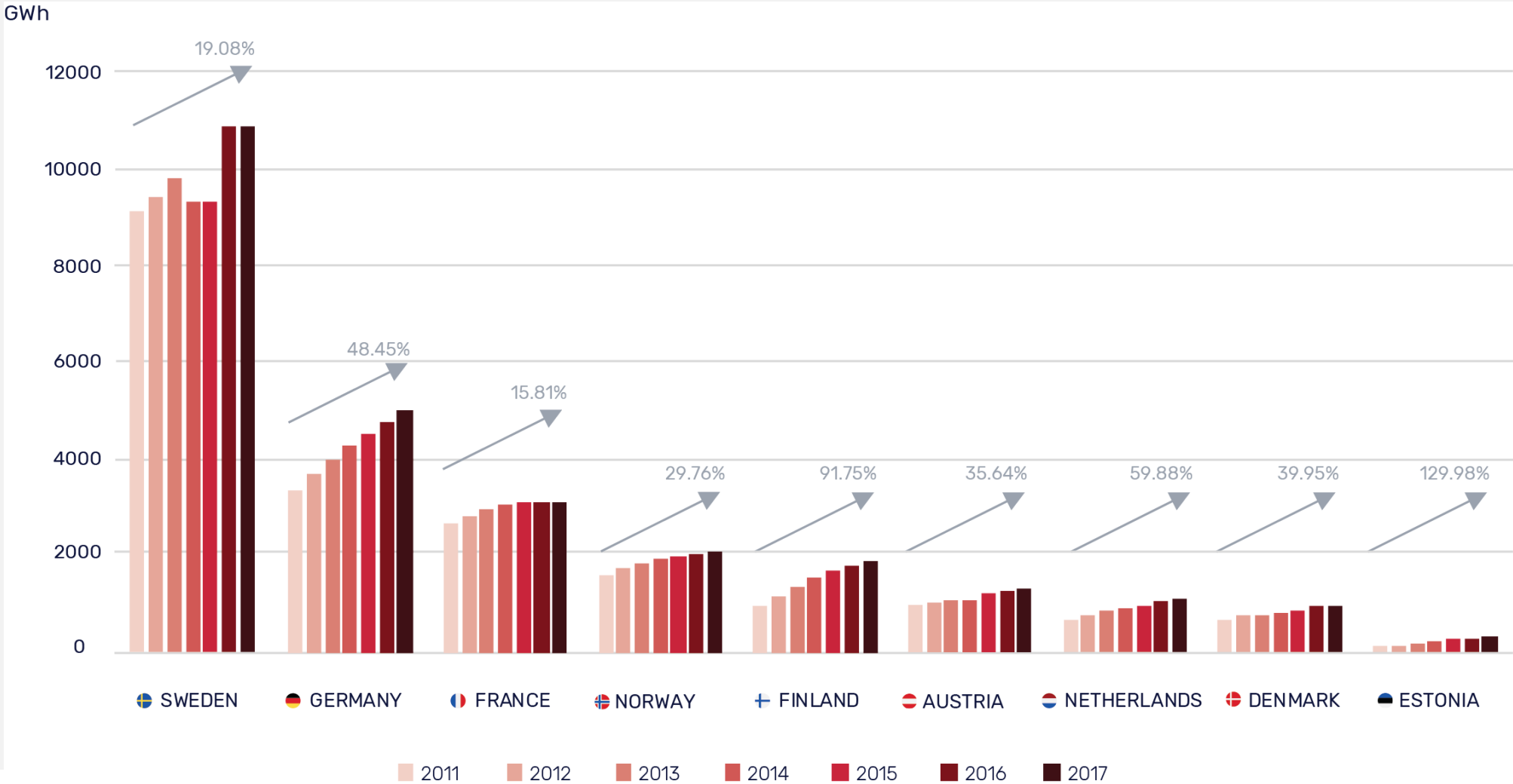
- Total Installed Capacity in Europe: ca.23.000 MWth
- More than 1.9 million units installed

European market Overview: 2018



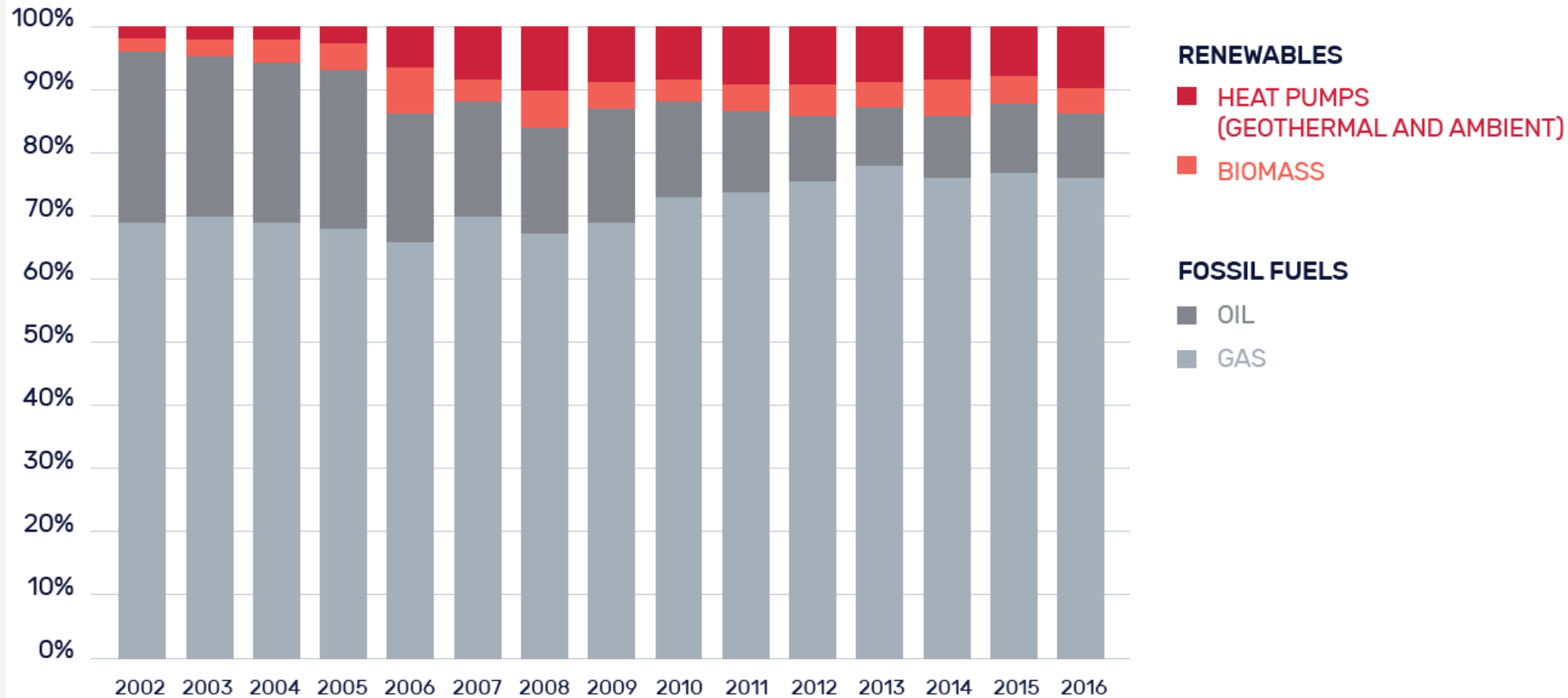
STOCK SALES

Market Overview: growth 2011-2017 (production)

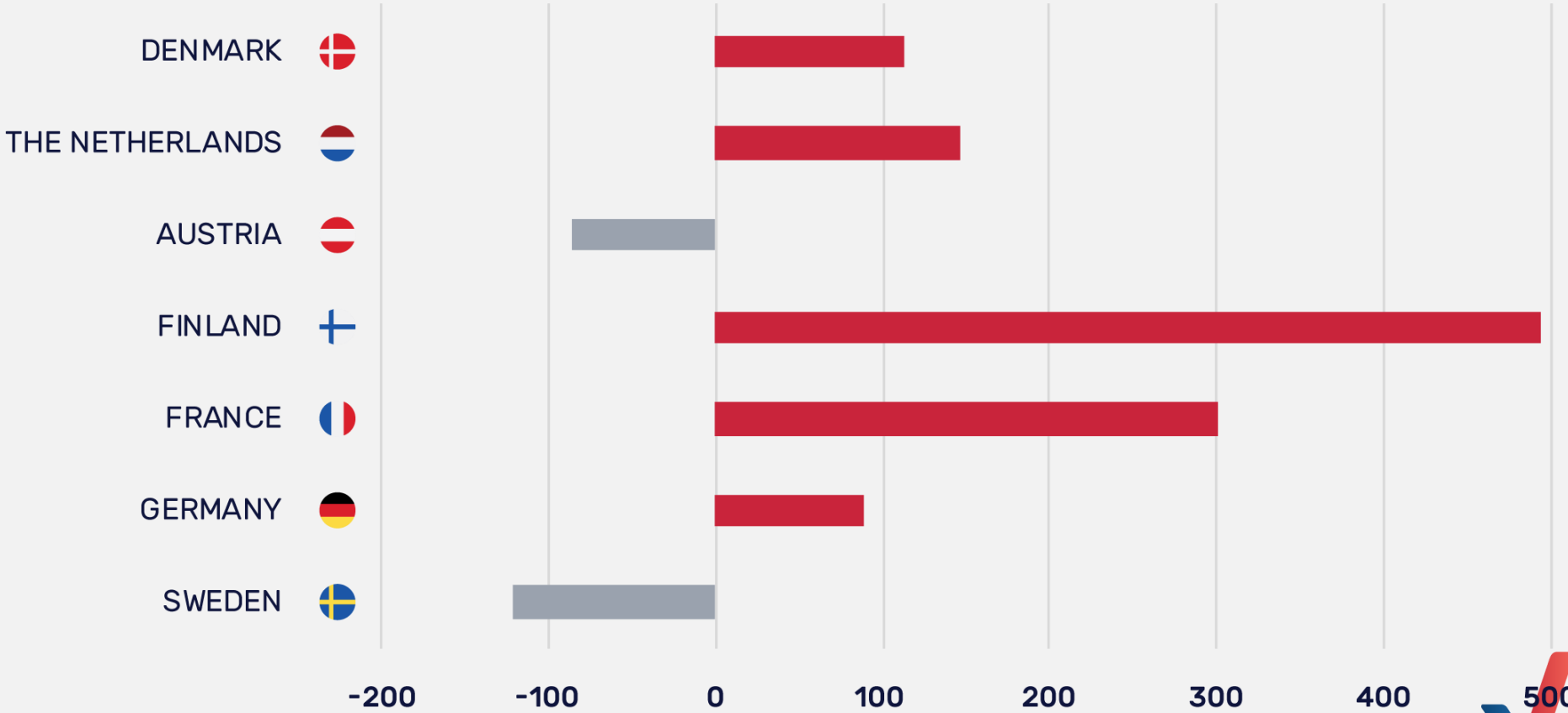


Market Overview

Market for heating appliances in Germany, 2002-2016 (adapted from Bundesverband Wärmepumpe e.V., 2018)



Market overview: Gap to NREAP-2020 objective on shallow geothermal



Largest borehole heat exchangers fields in Europe

Country	City, Name	No. BHE	Depth BHE (m)	Total BHE (m)	Year
RO	Magurele near Bucharest, ELI-NP	1080	125	135000	2015
CH	Zurich, FGZ Wohnquartier Friesenberg	500	250	125000	constr.
CH	Zurich, ETH-Campus Hönggerberg	425	200	85000	constr.
FI	?, Shopping centre			50000	constr.
CH	Wallisellen, Richti-Areal	220	225	49500	2012
SE	Karlstad, Campus Karlstad	204	240	48240	2014
NO	Lørenskog, Nye Ahus hospital	228	200	45600	
FI	Sipoo, SOK Logistics Centre	150	300	45000	2012
SE	Lund, IKDC / Chemical Inst.	165	230	37950	
CH	Basel, Novartis Campus	170	220	37400	2012
NO	Oslo, office/flats Nydalen	180	200	36000	
SE	Stockholm Saltsjöbaden, flats	156	230	35880	
SE	Stockholm, office Skanska Lustgården	144	230	33120	2014
CH	Rotkreuz, Suurstoffi	220	150	33000	2014
NO	Bergen, Sartor	162	200	32400	2014
DE	Lübeck, IKEA Dänischburg	215	150	32250	2013

The EU regulatory framework to 2030



General framework

- National binding targets replaced by EU level targets and a Governance framework:
 - 40% greenhouse gas reduction (possibly reviewed to up to 55%)
 - 32% renewable energy
 - 32.5% improvement in energy efficiency
- Member States define in 2019 their contribution in National Energy and Climate Plans that must amount to the EU targets
- Nearly linear deployment at the EU level from 2020-2030

Energy Performance of Buildings

- Strong focus on deployment of EVs and smart technologies
- Objective of decarbonisation of the building stock by mid-century
- The use of renewable energy is factored in the performance of a building (notably onsite renewable energy use)

Energy Efficiency Directive

- 32,5% indicative EU wide target for energy efficiency
- **Article 7:** Annual energy saving obligation of 0.8% (in line with the previous obligation as it includes fewer flexibilities)
 - Up to 30% of “additional” RES energy produced in a building can be excluded from the calculation of the savings
- Primary Energy Factor in EED fixed at 2.1

Renewable Energy Directive

- 32% Binding target for renewable energy at the EU level
- Objective to increase the share of renewables in heating & cooling by 1.3 percentage point/year nationally
 - Member States must set policies to strive to this objective, but it is not binding to achieve it
 - Exemptions in high achieving Member States, and flexibilities when justifiable (e.g. disperse habitat...)

Renewable Energy Directive

Article 15

- Minimum level of renewable energy in buildings “when technically, practically and economically feasible” according to the cost-efficiency assessment defined in EPBD
 - Not clear whether an improvement or a step back from previous texts
- RES heating and cooling to be included in the planning of city infrastructure
- Member States to provide consumers with information on RES alternatives for heating and cooling

Renewable Energy Directive

Renewable energy from heat pumps

- Ambient energy: means naturally occurring thermal energy and energy accumulated in the environment with constrained boundaries, which can be stored in the ambient air excluding exhaust air or in surface water or in sewage water;
- Geothermal energy: means ***energy stored in the form of heat*** beneath the surface of solid earth.

Renewable Energy Directive

Renewable energy from heat pumps

- Article 7.3: Ambient and geothermal energy used for heating and cooling by means of heat pumps and district cooling systems shall be taken into account
 - **Delegated act** for a methodology on accounting for renewable cooling
 - **Revision of the Annex VII** on the calculating the RES energy from heat pumps
 - **Shall include minimum SPF**

Ecodesign

Table 9. Heat pump – Test conditions for Low temperature (35°C) applications (source: EN 14825:2018)

Test Condition	Part Load Ratio in %			Outdoor heat exchanger				Indoor heat exchanger			
				Inlet dry (wet) bulb or liquid temperature °C				Fixed outlet °C	Variable outlet**** return/supply temperature °C		
	A	W	C	Outdoor air	Exhaust air	Water* ****	Brine *****		All climates	A	W
A	88	n/a	61	-7(-8)	20(12)	10/*	0/*	30/35	29/34	n/a	25/30
B	54	100	37	2(1)	20(12)	10/*	0/*	30/35	25/30	30/35	22/27
C	35	64	24	7(6)	20(12)	10/*	0/*	30/35	22/27	26/31	20/25
D	15	29	11	12(11)	20(12)	10/*	0/*	30/35	19/24	21/26	19/24
E	$(TOL - 16) / (T_{designh} - 16)$			<i>TOL</i>	20(12)	10/*	0/*	30/35	**	**	**
F	$(T_{biv} - 16) / (T_{designh} - 16)$			<i>T_{biv}</i>	20(12)	10/*	0/*	30/35	***	***	***
G	n/a	n/a	82	-15	20(12)	10/*	0/*	30/35	n/a	n/a	27/32

Ecodesign

4.11.9.1 Climate dependent brine temperatures

The TC 113/WG10 is currently (summer 2018) discussing, together with TC 113/WG 7, the introduction of climate dependent brine temperatures, similar to outdoor temperatures. After careful analysis of brine temperatures in various locations across the EU, for both vertical (borehole) and horizontal (slinky coil) ground collectors, average temperatures for the three climate zones have been suggested.

Table 45. Suggested brine temperatures for three climate conditions

Climate Zone	Average temperature	brine	Proposed value (rounded and/or harmonised with current conditions)
Average	6.19 °C		5 °C
Warmer	8.97 °C		10 °C
Colder	1.88 °C		0 °C (present standard rating condition)

The WGs will decide later on, on amending the standard, plus related standards (like EN 14825).



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