

CH Boilers

Ecodesign and Energy Label

Preparatory Review Study

Task 2 (DRAFT)

Market Analysis



DRAFT INTERIM REPORT

Review study Commission Regulation (EU) No. 813/2013 [Ecodesign] and
Commission Delegated Regulation No. (EU) No. 811/2013 (Energy Label)

Prepared by

VHK in collaboration with

BRG Building Solutions, London (UK)

The information and views set out in this study are those of the author(s) and
do not necessarily reflect the official opinion of the European Commission

Content

1. Intro
2. Generic economic data (Eurostat)
3. Market & stock data (BRG)
4. Prices & rates
5. Market actors & costs
6. Evaluation and outlook

Intro: study goals

- Update (MEErP) in → see chapters hereafter & methodology slide
- Review (Art. 7 of regulations) →

ED appropriate

- for GHG refrigerants, CO, HC, PM?
- for energy efficiency, NOx, sound power?
- for biofuel (gas/oil)?
- In view of PEF and 3rd party certification?

EL assessment

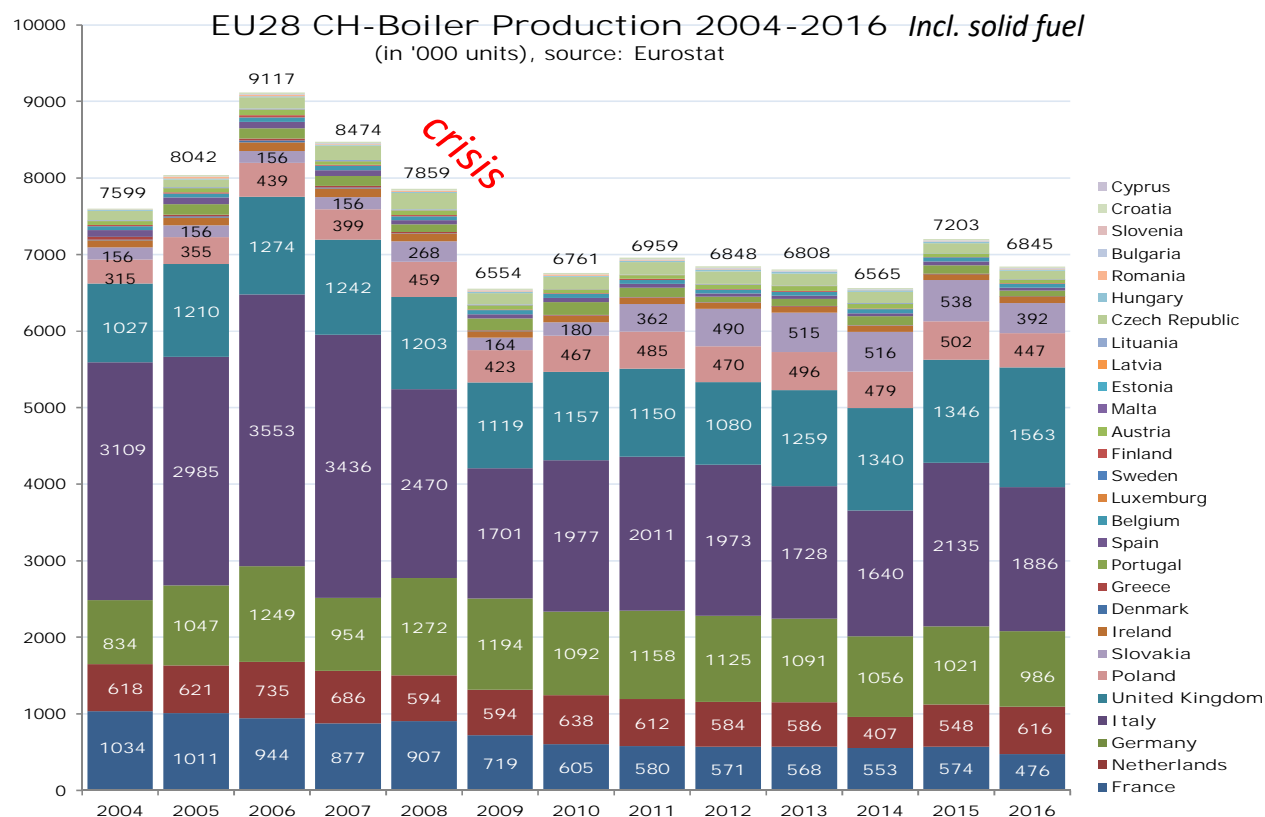
- shift in market share
- if package label appropriate
- If having other heating efficiency than the standard season is OK
- If PFHRD should be included

- Evaluate (REFIT). Did the regulations work as they were supposed to and was there no significant negative impact?

**Boiler production EU 2016: 6.44 m gas/oil @ €5.1bn +
0.44 m heat pump @ €1.6bn + € 0.2bn other=
6.9m @ €6.9bn (in manufacturer selling prices msp)**

**2004: 7.4m
@ €6.9bn ***

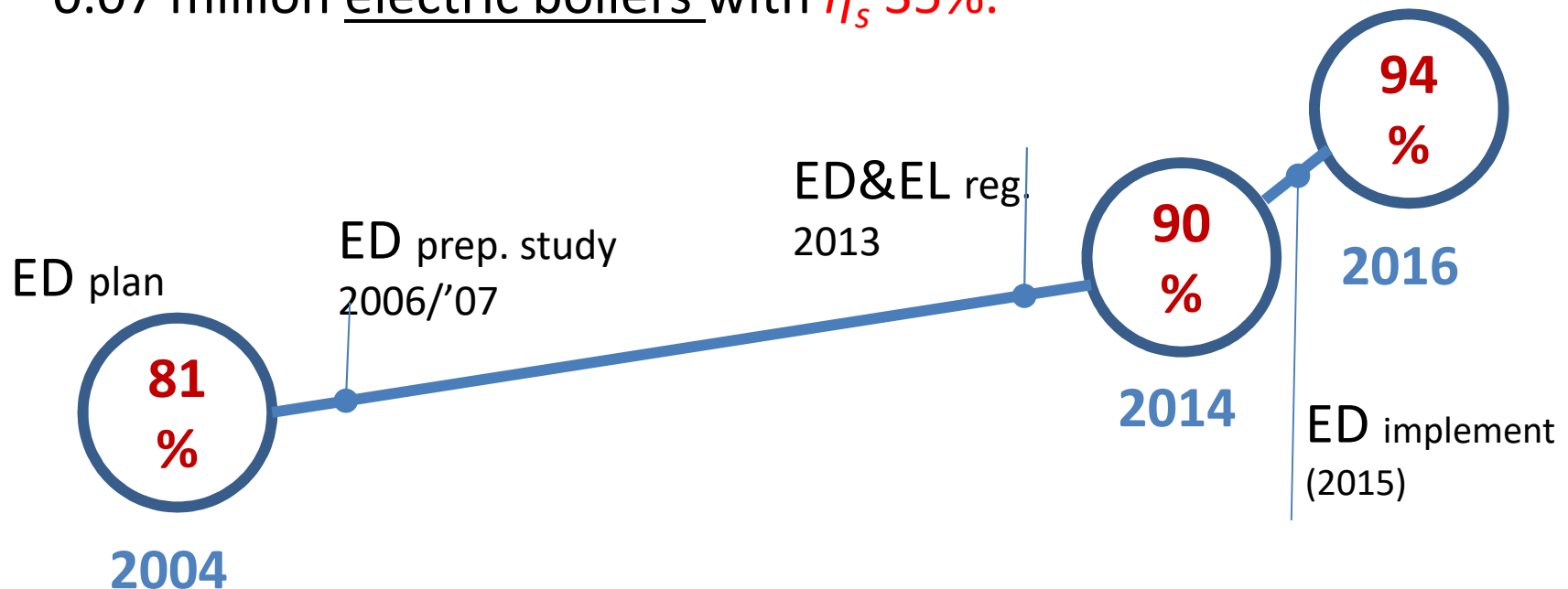
**=inflation corrected*



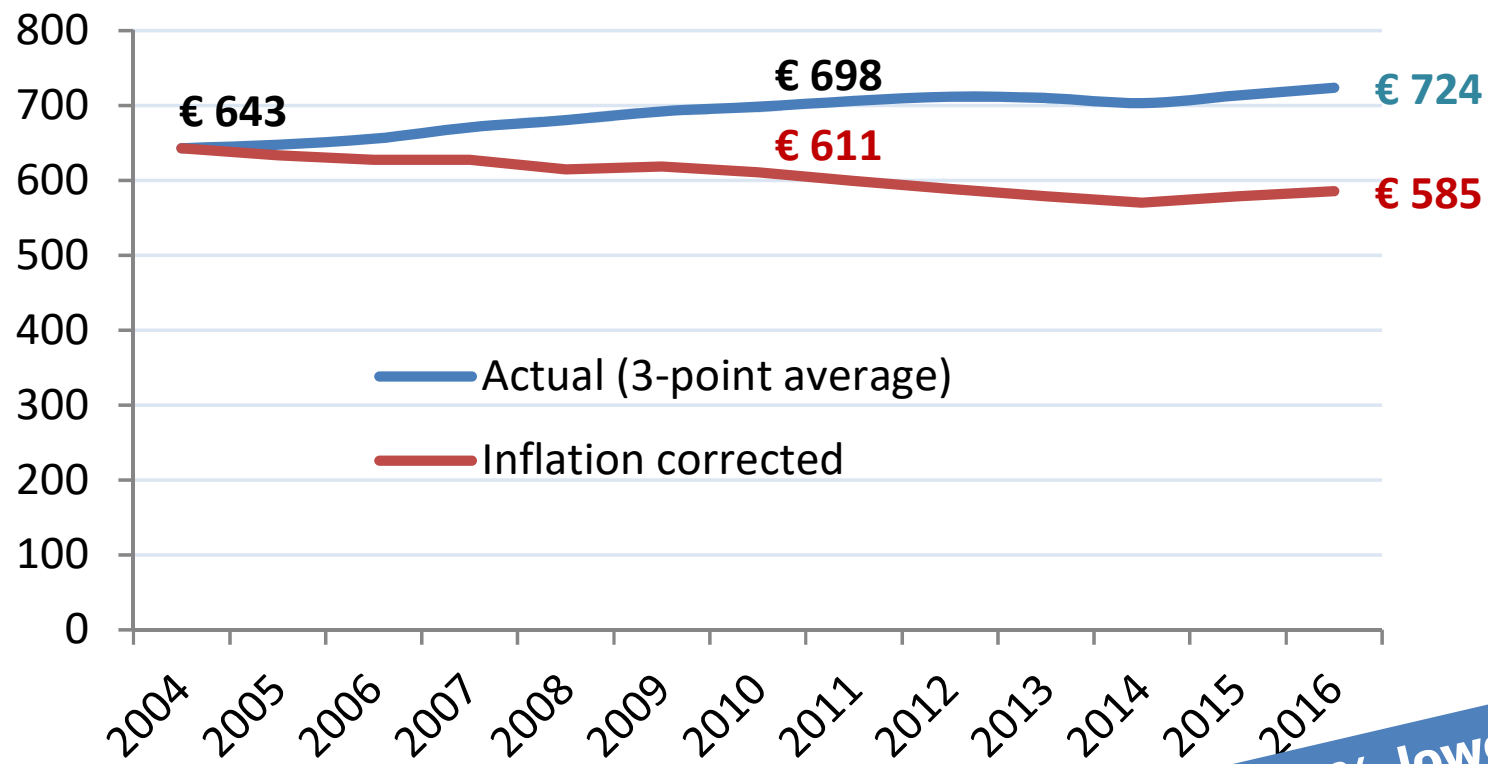
93% from 7 countries: IT, UK, DE, NL, FR, PL, SK

Seasonal boiler efficiency of sales

- 4.9 million are condensing gas/oil (gas 4.75 & oil 0.15) with average seasonal space heating efficiency η_s 93%,
- 0.6 million non-condensing gas/oil with η_s 75%,
- 0.26 million are air-to-water heat pumps with η_s 145%,
- 0.06 million are ground-source heat pumps with η_s 158%
- 0.07 million electric boilers with η_s 35%.

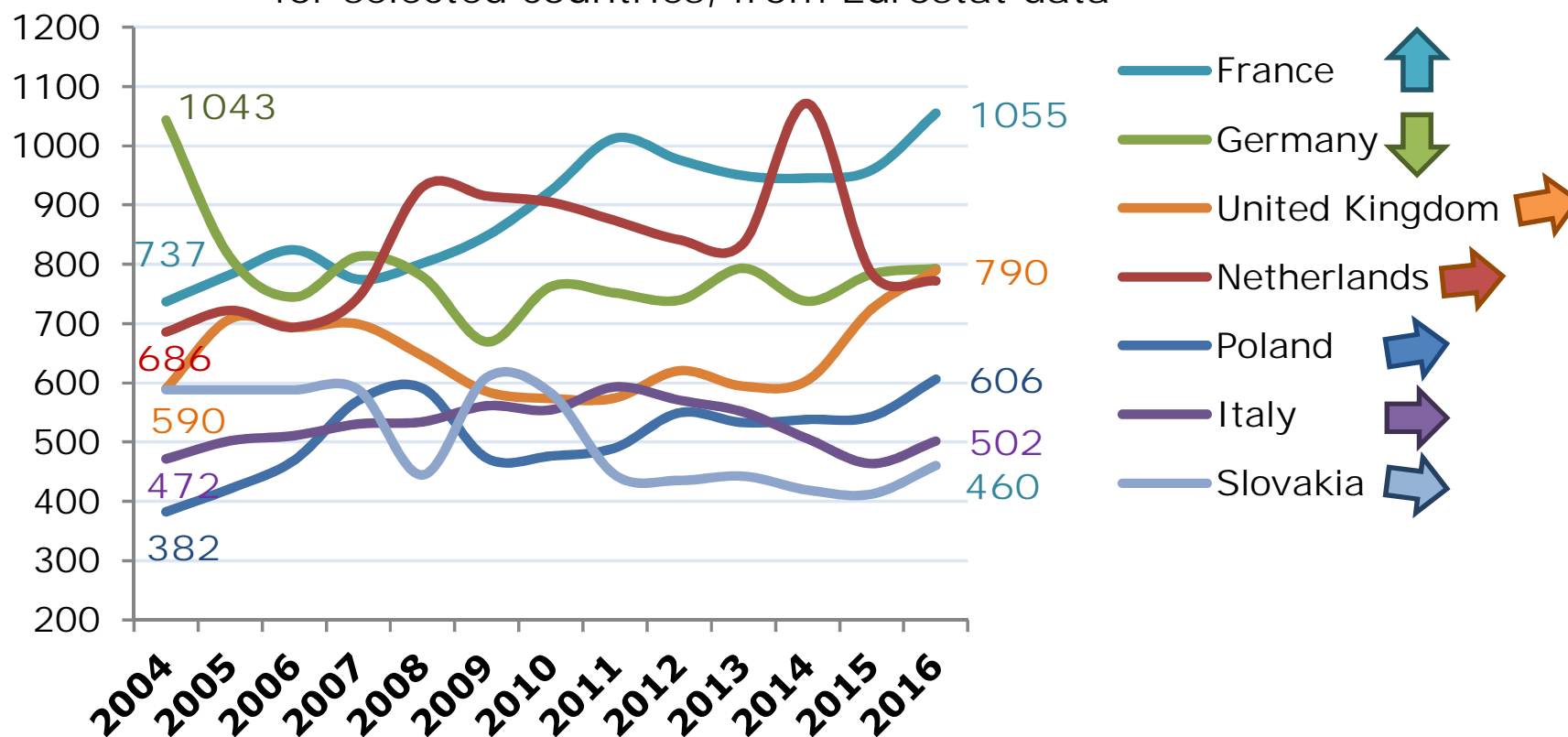


Average gas/oil boiler msp 2004-2016 (euros/unit)



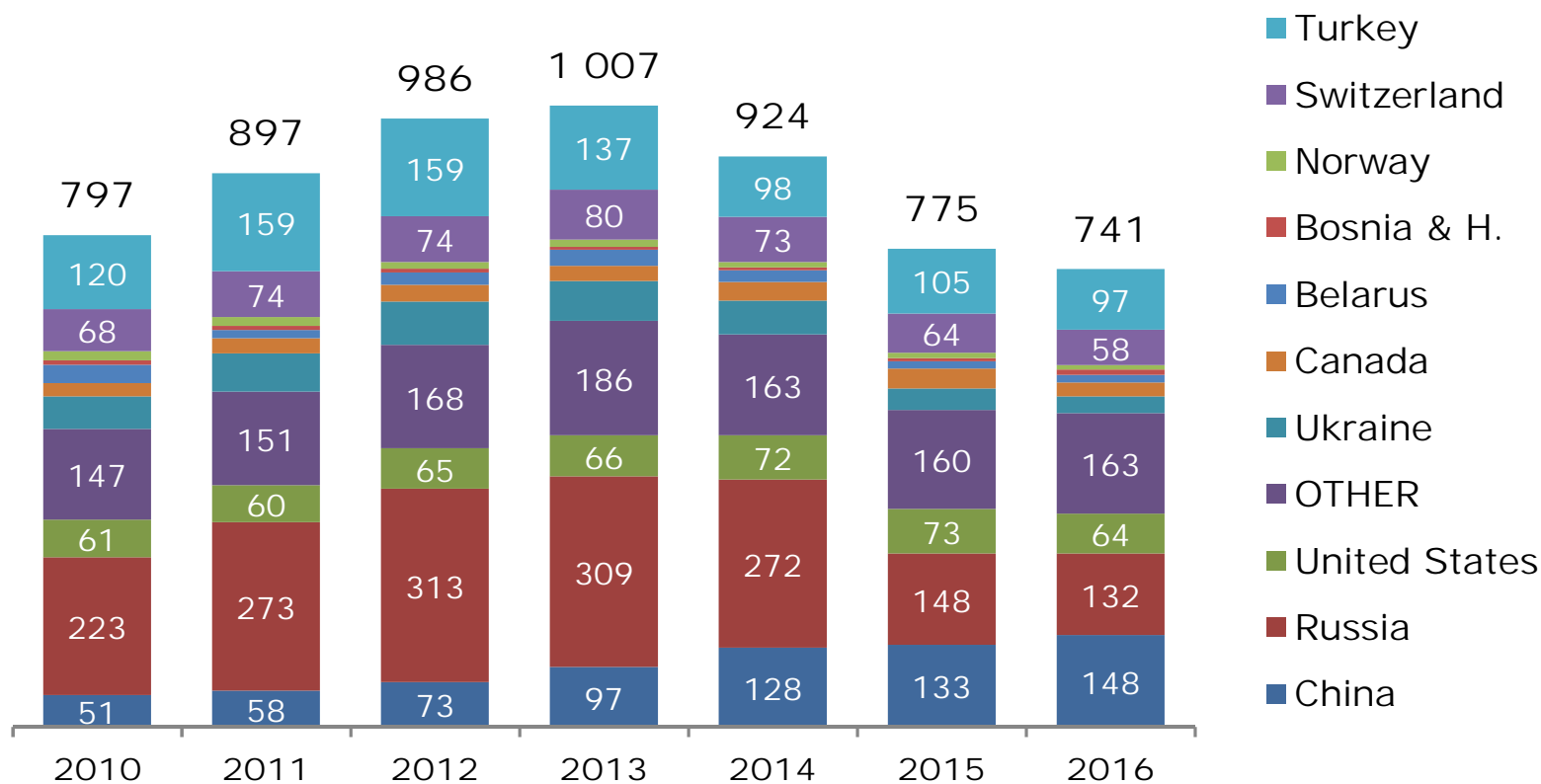
€ 724 / gas/oil boiler: 9% lower than 2004
€ 3600 / heat pump boiler; x2 in 2004

CH-boiler uncorrected prices 2004-2016
(in euros/unit)
for selected countries, from Eurostat data



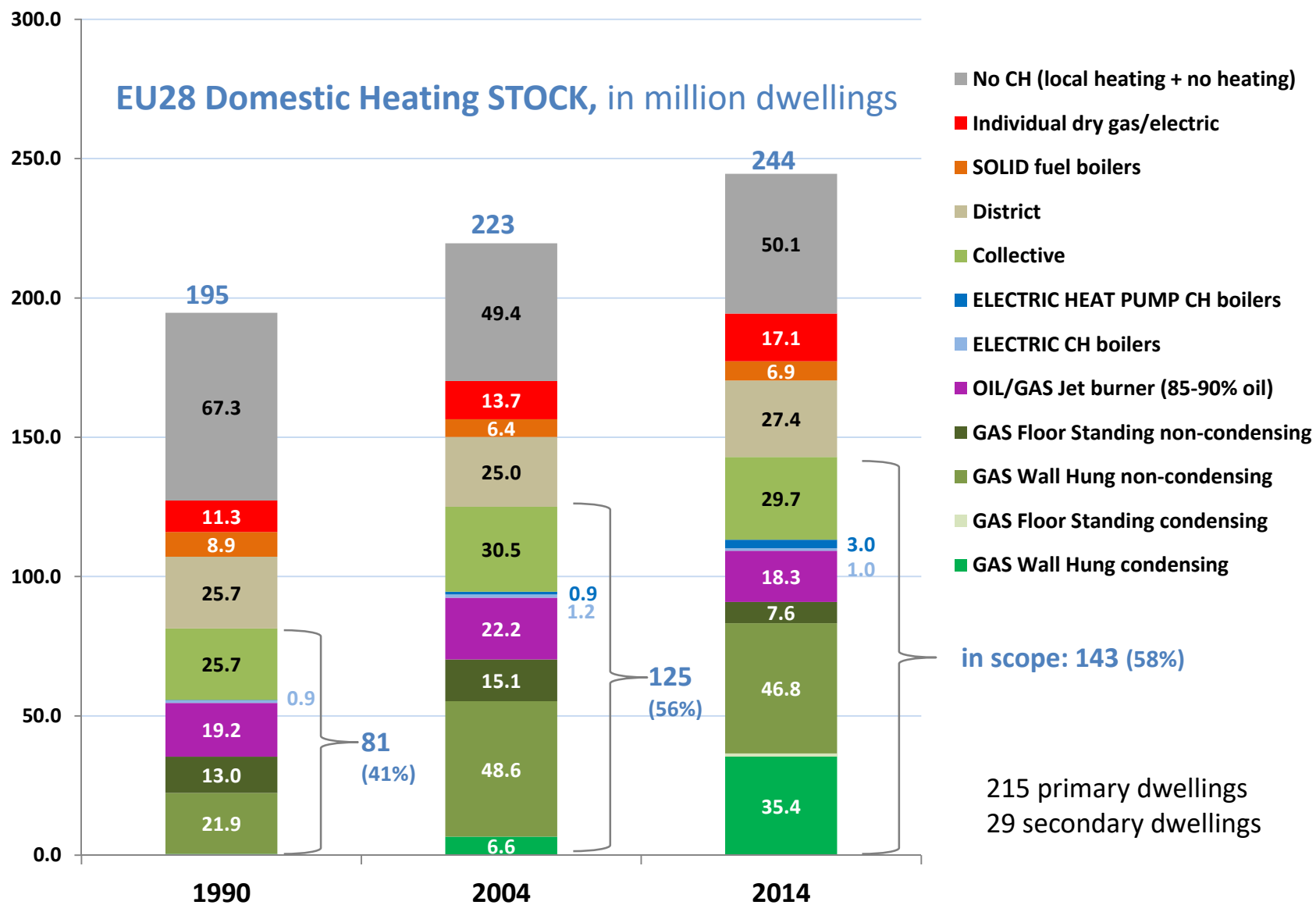
EU 2016 gas/oil boiler export € 741 m

Russia decreasing, China increasing



Turkey increasing

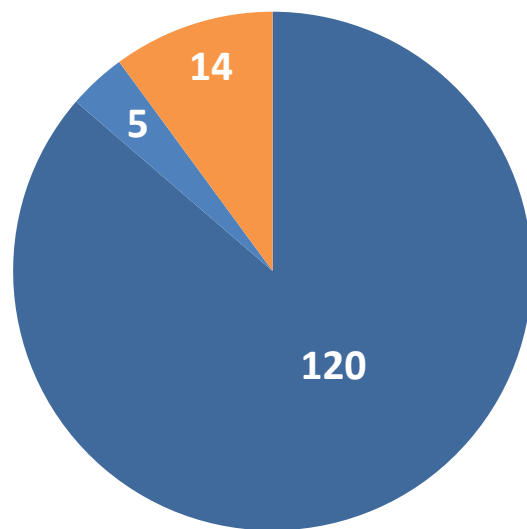




2004 vs 2014 in scope: gas 70→77%, oil 22→ 15%, heat pump 0.4→1.2%, collective 14→12%, dry 6→7%, no or local 22→21%

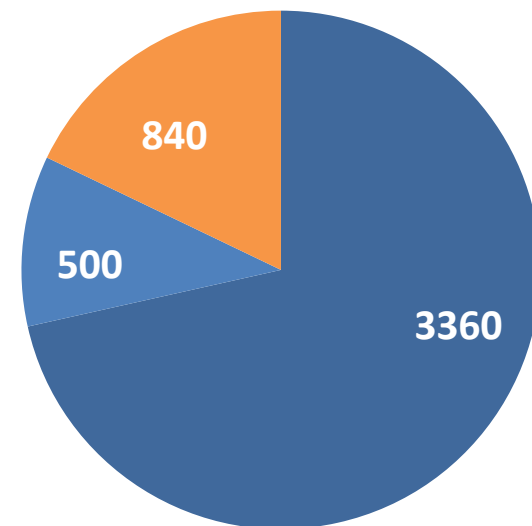
EU Boiler stock 2014 (<400 kW)

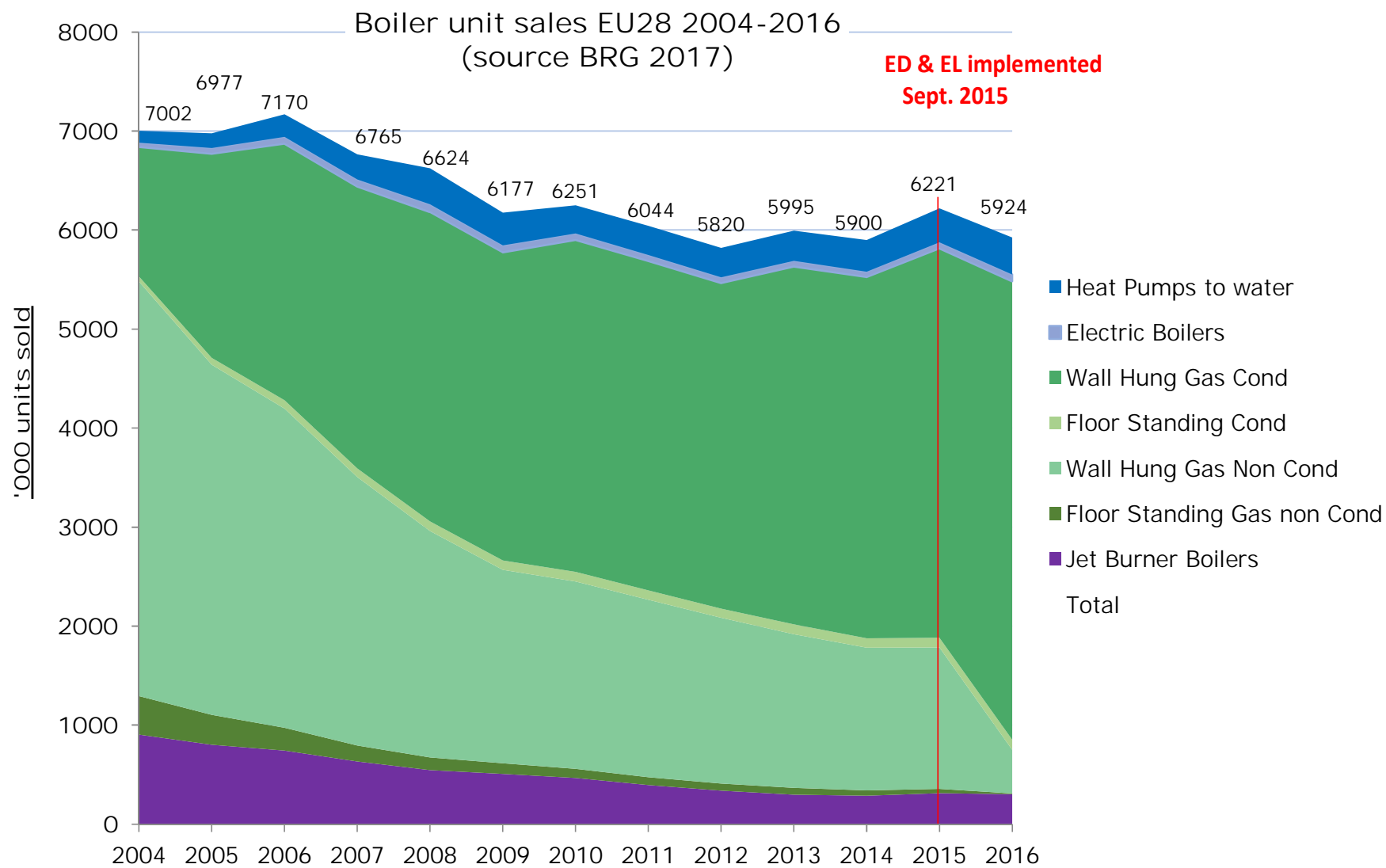
**Million units installed
(total 139 m)**



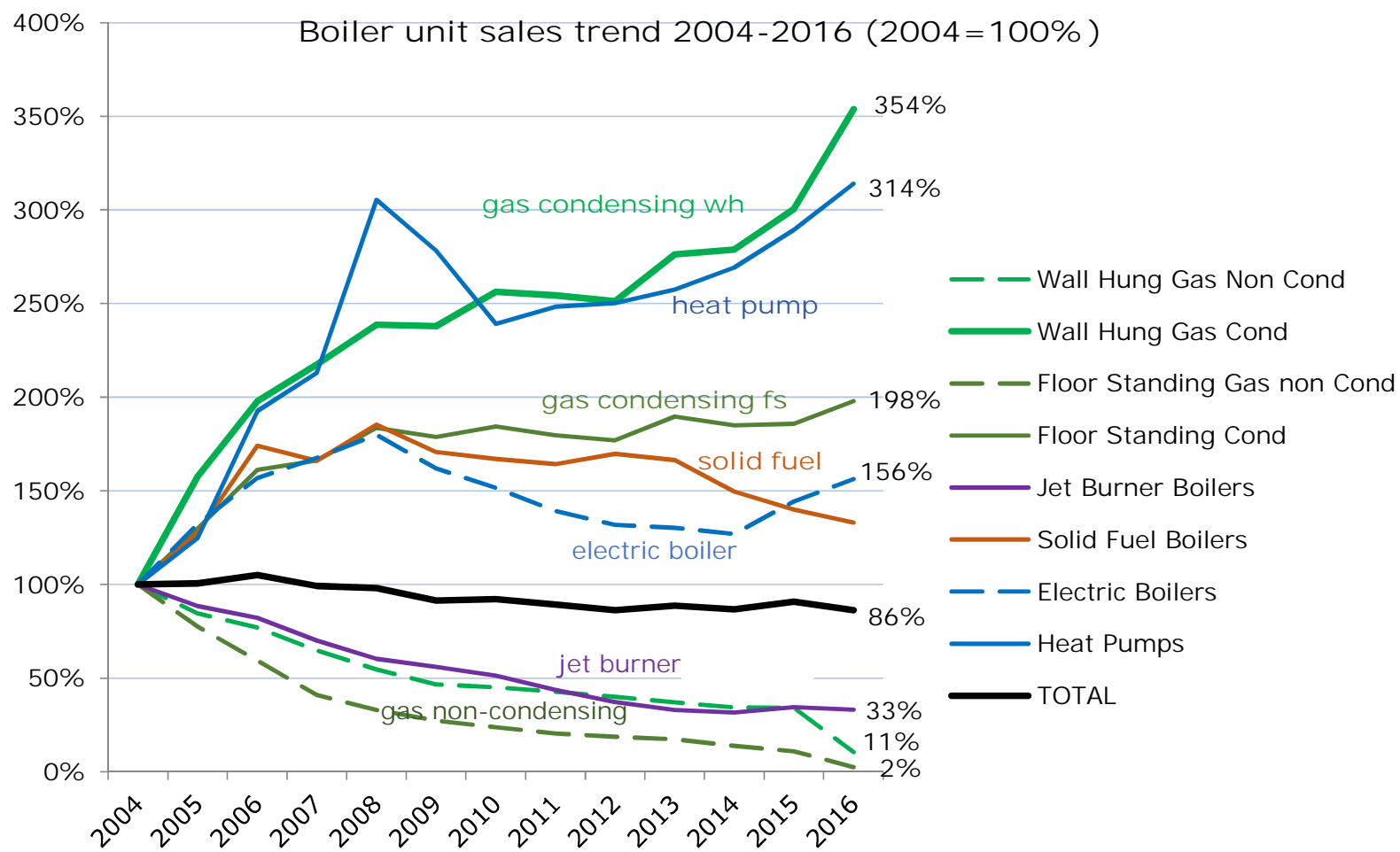
- residential individual
(120 m dwellings)
- residential collective
(30 m dwellings)
- non-residential

**Million kW installed
(total 3.94 TW)**

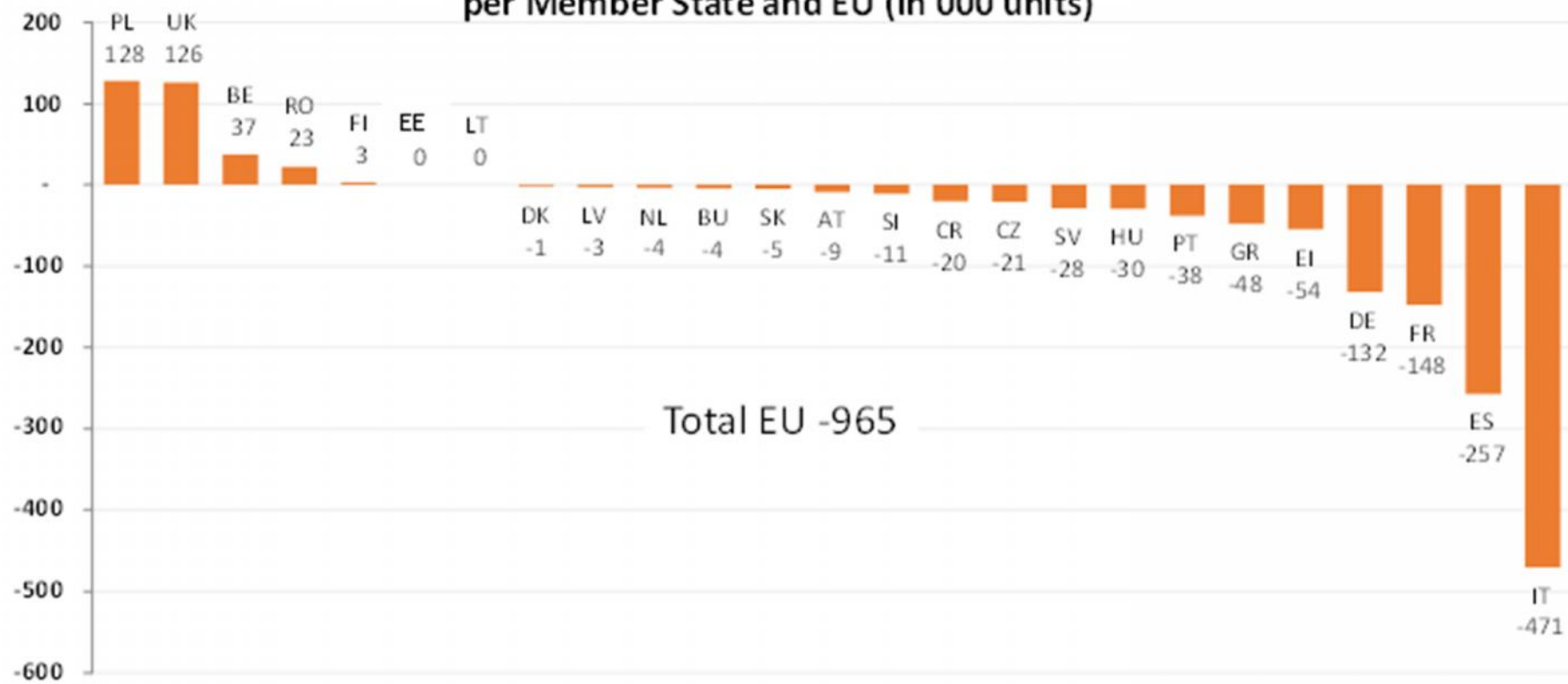


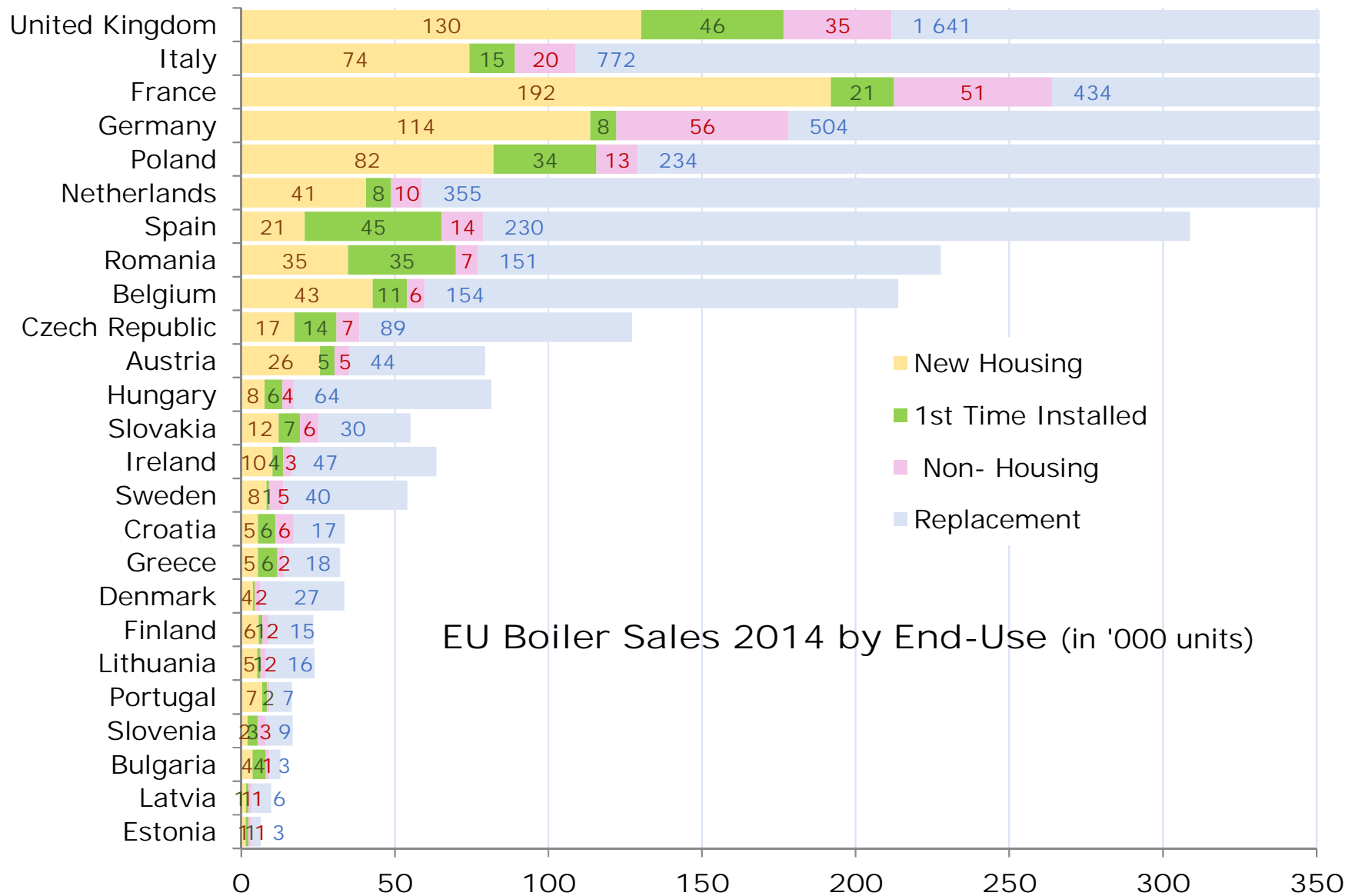


EU 2016 5.93m boiler sales: gas 5.2m, 0.37m heat pump, 0.3m oil, <0.1m elec boilers.



**Increase/decrease in total boiler sales 2014 vs. 2004
per Member State and EU (in 000 units)**





Market segmentation by end-use

<i>End-use</i>	2004	2014	<i>difference</i>
<i>New Housing</i>	1.58	0.85	-0.73
<i>1st time users</i>	1.05	0.28	-0.77
<i>Non-housing</i>	0.28	0.26	-0.02
<i>Replacement</i>	4.36	4.90	0.54
	7.26	6.30	-0.96

- New Housing: Gas condensing 64% and heat pump boilers 18% of
- Non-condensing: Still $\frac{1}{4}$ of First Time Installation and Replacement in 2014
- Non Housing: Includes floorstanding 16%, oil jet burner 10%, solid fuel 9% and heat pump boilers 10%.
- Replacement 78% in 2014, 60% in 2004
- New housing and First-time users biggest losers : -46% and -73%

Technical market segmentation

- Room-sealed (86%), gas-fired (95%) condensing (71%) combi boiler (71%) with a fan-assisted premix burner type (68%), electronic ignition (99.9%) and steel or aluminium heat exchanger (>70%) is the dominant type (60-70%).
- Switch from conventional (59% in 2004) to fan-assisted premix and low NOx burners (78% of total in 2014) → much improved emission control
- Approx. 93% of all oil/gas boilers now have a hot water functionality, either as combi or with an external cylinder.
- Average capacity residential gas/oil boiler 27 kW; heat pump 10.3 kW.
- Average product life: 24 years. *(DE, NO, DK try to force it down, e.g. ban boilers >30 years and/or oil-fired, but legally difficult)*

Heat pumps

- Outside air → Water 212 k units (avg. 10.1 kW)
- Ground source → 81 k units (avg. 10.9 kW)
- Exhaust air → Water 19 k units (to revisit in Task 4)

Total: 312 k electric units , avg. 10.3 kW

Estimate: 6 k gas-fired (GAHP) units

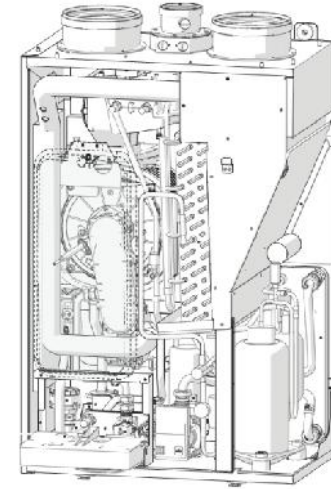
Heat pump sales 2004-2014: Ground source stable at 77-81 k.
Outside-air 900% growth from 24 to 212k

FR (75k, fastest grower), DE(56k), SV(33k) = 60% HP market
IT (20k), AT (15k), FI(13k) follow

Ground source in SV(25k), DE(16k), FI(11k)

Market other types

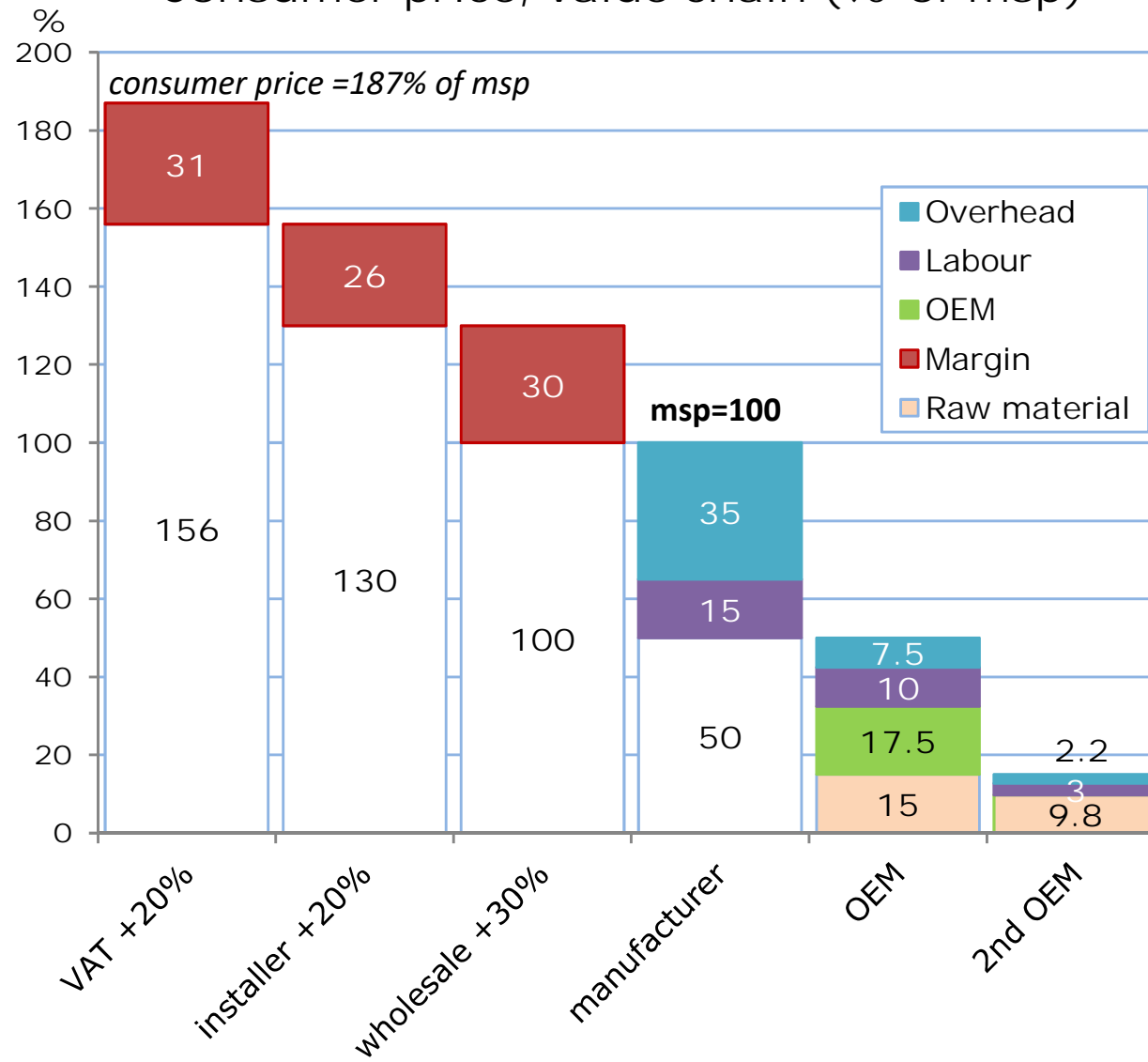
- ➡ • **Micro-CHP: 3.3 k units (prices € 9-20k/unit)**
- ⬆ • **Hybrids: 6.6 k units (prices >€ 4k/unit), 11k in 2016. *Large potential but needs policy support***
- ⬆ • **Passive Flue Heat Recovery Devices (€ 200 possible, Save 31% on hot water energy, payback 5 years): ca. 20 k in 2016. *Large potential but needs policy support***
- ⬇ • **Solar thermal (2014): 2.8 Mm² sold, o/w glazed flat plate 86%, unglazed 4%, vacuum tube 10%.**
 - **Sales now declining (6.6% drop); less subsidies; installer label does not work for solar?**
 - **In 2014: 100 k solar-assisted combi-boilers sold**



Consumer prices boilers

- Financial crisis → lower demand → fierce price competition
- Production shift to low labour costs (Eastern Europe, Turkey, China),
- Higher production volume of condensing boilers and more integrated product design,
- Result: nominal prices of oil/gas boilers almost the same as 10 years ago → inflation corrected prices decreased by 20%, despite the switch to more efficient condensing boilers.
- Over the same period, the market share of the more expensive heat pump boilers –promoted by Ecodesign and related measures-- increased threefold, driving the average boiler price up.
- The end result is an EU average boiler price (all types, including heat pumps and microCHP) of €1825/unit in 2014-2016. In real terms (inflation corrected) this is the same as the €1500 boiler price in 2004.

Consumer price, value chain (% of msp)



Installation and total acquisition costs

Installation costs over the last 10-12 years increased, in the range of 20-30% (inflation corrected) due to:

- extra work on chimneys/flue gas ducts due to the switch from to condensing gas/oil boilers and
- higher installation costs of heat pump boilers.

Current installation costs are estimated at over €2000/unit.

The total acquisition cost of the average boiler is €3850/unit, which is probably 15% more than a decade ago in real terms.

The total EU acquisition cost for all boilers is around €23bn/year, of which €11bn in strict boiler costs and €12bn in labour and auxiliary materials for installation.

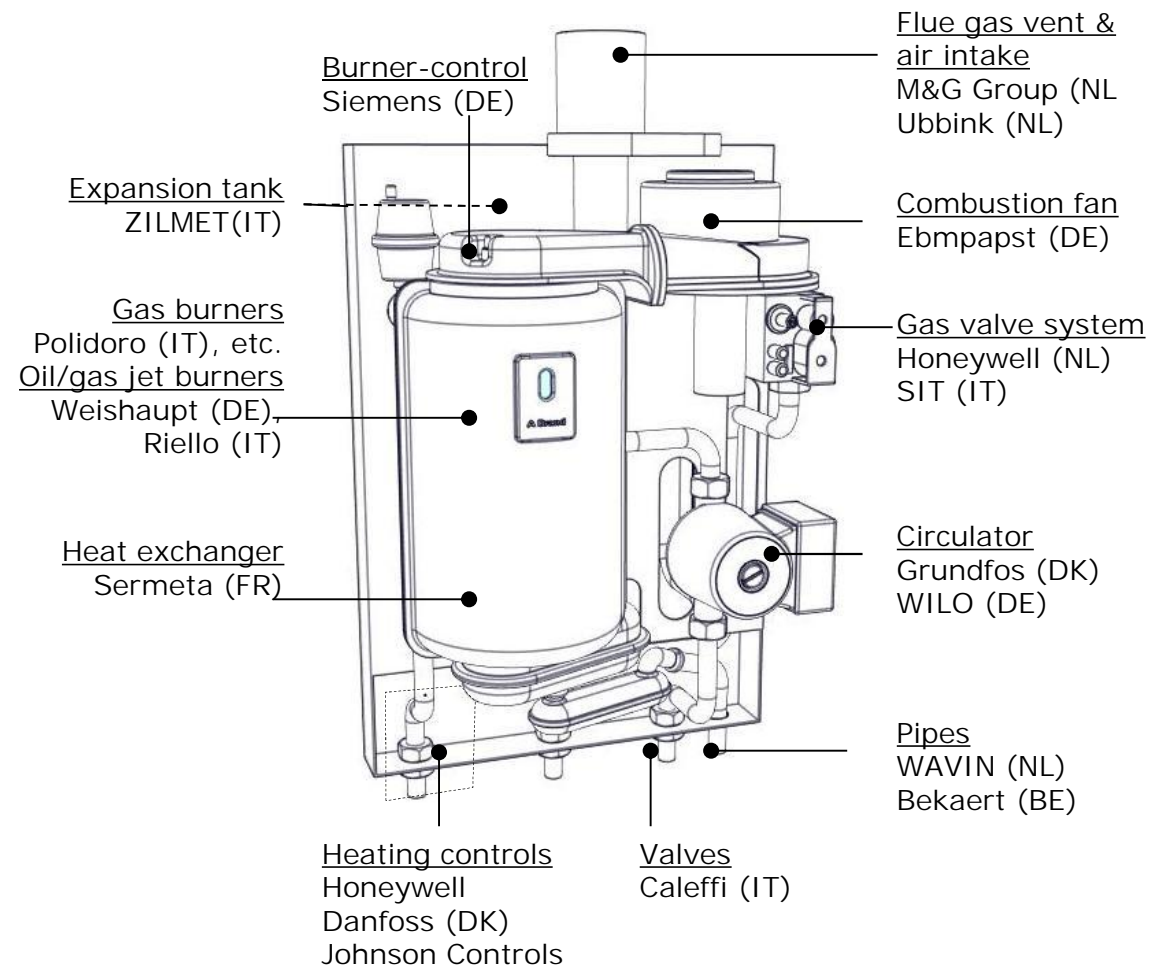
Running costs & rates

- Repair and maintenance costs stable. EU total €23.2 bn (incl. VAT). Maintenance cost is €120 per year for a residential boiler and €16bn/year for EU. Repair costs per year €60/unit and €7.2bn for EU.
- Average EU electricity price in 2016 was around €0.20/kWh for households and €0.114/kWh for non-households. Real (=inflation corrected) increase of 14% for former and 5% for the latter over the last 10 years.
- The average EU gas price in 2016 was around €0.064/kWh for households and €0.030/kWh for non-households. Real decrease of 2% for households and 15% for non-households over the last 10 years.
- For gas heating oil, the October 2017 price was €729/1000 litre (€0.069/kWh GCV). This is 8.6% higher than the price in 2009.
- Energy prices increased considerably less than was expected → More comprehensive Life Cycle Cost (LCC) **calculation** needed in future Tasks.
- The discount rate in LCC calculations will be 4% as indicated in the Better Regulation Toolbox.

Market actors: Boiler Industry

- EU boiler industry: dozen multi-nationals making up 90% of turnover and employment in the sector. Names include Bosch, Vaillant, Viessmann, BDR Thermea, Atlantic, Ariston, etc..
- Most deliver the **full package of HVAC solutions**: boilers but also water heaters, ventilation units, air conditioning, etc. .
- Heat pump boiler manufacturers like NIBE, Daikin Europe and Stiebel are now new significant players in (heat pump) boiler manufacturing.
- 10% of the boiler industry is made up by another dozen of medium-large companies (non-SME, i.e. >250 jobs) , as well as a mix of 40-50 importers.
- Accumulated sector turnover of these end-product suppliers is in the order of €16bn and their employment amounts to 73 000 jobs. Around 80% will relate to boilers in scope.
- Independent SMEs with their own boiler-brand are rare and could not be identified.

Market actors: OEMs



Market actors: Wholesale/distribution

- **Wholesale** is under pressure from not only the financial crisis but also e-commerce. International wholesalers are Ferguson plc (UK), Saint Gobain (FR) and the GC Group (DE). Every country has national wholesalers for plumbing products.
- **Installers**, have suffered relatively little from the financial crisis. Nominal turnover has grown by 37% over the 2004-2015 period. Corrected for inflation this is still +1% per year on average. Possible causes: Extra work related to condensing boilers and heat pumps; more frequent inspection/maintenance, following EPB rules.
- The boiler-related work is estimated to create a **€40bn turnover** for installers, retaining **450 000 installer jobs**. Some 60% of this is boiler installation work and 40% is in boiler repair and maintenance.

Other market actors

- Test laboratories/notified bodies
- Building/boiler inspectors that are not installers (e.g. DE chimney sweeps)
- 15 EU associations from industry sectors & NGOs, national members associations
- Trade fair organisers (ISH, Mostra Convegno), publishers of specialised magazines
- Consumers: owners & users, prospective buyers, including private builders, (social) housing corporations, real estate developers and investors.
- Policy makers

Associations

ehi



EUROPEAN ENGINEERING
INDUSTRIES ASSOCIATION



ECOS



afecor



EBA
European Biogas Association

Evaluation

- The space heating energy efficiency of boilers in the scope of the regulation increased by **14%-points** at the expense of **15% higher acquisition costs** (mainly installation costs).
- A decade ago, when the Ecodesign and Energy Label regulations were prepared, it was expected that energy saving in 2016 could be higher but also at the expense of acquisition costs that were much higher.
- What happened? The 2007 financial crisis ! → construction slump → drastically reducing new housing and 1st time installations where the most efficient boiler solutions could be applied AND the EU austerity policy, resulting in severe reduction of financial incentives for e.g. solar assistance and micro-CHP.
- Only in the last two to three years the heat pump boiler sales recovered to the same level they reached in 2006.

Evaluation

- Still: The switch to condensing boilers has been achieved, although some smaller 'hick-ups' still need attending.
- Heat pumps are back on their way up with healthy growth perspectives. Several innovations in air-source HP boilers → better COP at lower price
- Innovative new products like hybrids (part HP, part gas boiler) have come on the boiler market and further push the A+ market. PFHRDs seem to have come of age.
- Overall, Ecodesign and Energy Label measures worked as an accelerator, and have been operating without 'significant negative impacts'. In many respects the changes induced by Ecodesign and Energy Label regulations helped businesses and consumers to better cope with the potentially very negative impacts of the financial crisis for this sector.
- Having said that, 'good housekeeping' on several parts of the regulations is needed to improve their effectiveness