

## Trade and electro-intensity of the surface refinement and heat treatment industry in Germany and in the EU

Update and re-evaluation of the study on behalf of the Industrieverband  
Härtetechnik e.V. (IHT) and the Zentralverband Oberflächentechnik e.V. (ZVO)



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## Introduction

- The European Commission announced a further step towards its forthcoming review of the State Aid Guidelines for Environmental Protection and Energy (EEAG)
- These guidelines, that were first adopted in 2014, are a major tool for the Commission to manage how its 27 Member States will finance their energy transition towards a decarbonised energy system by 2050, while still guaranteeing security of supply.
- According to the former EEAG guidelines, businesses can in future benefit from **aid-compliant relief** from the **costs of promoting the expansion of renewable energies**, if their **competitive position** would be compromised due to their **trade or electro-intensity** in view of the cost of the expansion of renewable energies.

## Criteria for EEAG guidelines

So far, in order to take advantage of the **relief**, companies must

- belong to one of the 68 ex ante identified sectors listed in Annex 3 of the Directive and demonstrate an electro-cost intensity of at least 20 %. Identical risks exist, in terms of competitiveness, in sectors which demonstrate
  - a **trade intensity**  $\geq 10\%$  and an **electro-intensity**  $\geq 10\%$  at an EU level,
  - a low **trade intensity**, though of at least 4 % where there is a markedly higher **electro-intensity**  $\geq 80\%$  or
  - a very high **trade intensity**  $\geq 80\%$  alongside a low **electro-intensity** of  $\geq 7\%$
- or if they are one of the 152 likewise **ex ante identified** sectors (sectors with a trade intensity with third countries of greater than 4% at EU level), which are listed the Directive in Annex 5, and also have an electro-cost intensity (proportion of electricity costs based on the full surcharge rate within gross value added) of at least 20 % on a company level.

## The problem

- When interpreting the **lists**, it should be noted that there are substantial gaps in the data even at the four-digit (economic sector) level for some sectors, where it is **impossible to simply calculate** – using official data alone – **the proportion of electricity costs to gross value added** and that of the **trade intensity with third countries** at EU level.
- The **lack** of a sufficiently detailed, official data basis alone should not be an **exclusion criterion** for consideration as a sector **eligible for relief**.
- The present study attempts, against this background for the electro-intensive sectors “**surface refinement and heat treatment**” (NACE 25.61) as well as “**contract hardening plant**” (NACE 25.61 21), to empirically determine the indicators required in the EEAG guidelines from data scattered over several locations, and through recourse to information from the companies and from the **Industrieverband Härtetechnik e.V. (IHT)**.
- The **examination period** covers the years from 2010 to 2018.

# Trade intensity

## Definition: Trade intensity of a sector

- The **trade intensity** is defined as the ratio of the sum of exports and imports (trade volume) to the entire supply in the domestic market, i.e. the sum of production plus imports.

$$\text{Trade intensity} = \frac{\text{Import value} + \text{Export value}}{\text{Production value} + \text{Import value}}$$

- In principle, the trade intensity indicator may be calculated on the basis of monetary aggregates or, if sufficient statistical information is available, using physical quantity variables.
- The trade intensity can have a value between nil (no external trade) and one (no domestic production).
- It may be determined entirely empirically for a Member State or for the EU as a whole.

# Germany: Calculation of the trade intensity possible for the sector “surface refinement and heat treatment” (NACE 25.61) only

in € mil. (production, export) and in % (trade intensity)

	2010	2012	2014	2016	2018	Ø 2010- 2018
Production	5669	6378	7114	7485	8195	7047
Import <sup>1)</sup>						
Export	1330	1546	1985	2077	2301	1868
Trade-Intensity	23,5	24,2	27,9	27,8	28,1	<b>26,3</b>

Source: DESTATIS, FS4R31 and FS4R411, <sup>1)</sup> Import data not available.

However, due to the **lack** of official information relating to imports, this calculation of trade intensity is **incomplete** and only represents an export quota.

## Germany: Trade intensity NACE 25.61

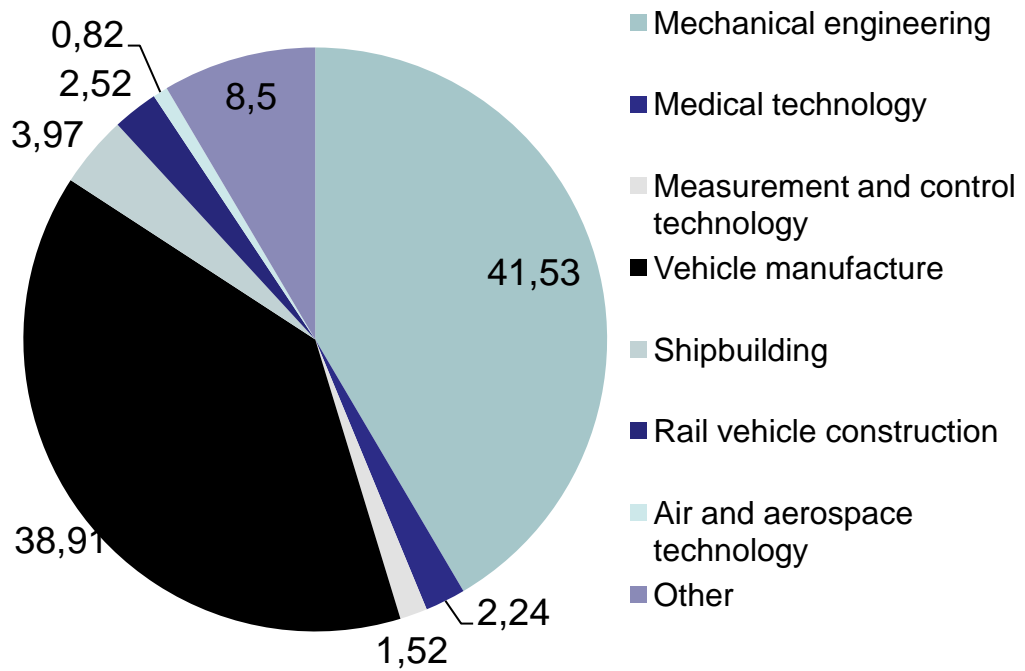
- It is assumed that the trade intensity of the **overall sector** NACE 25.61, i.e. contract hardening plant, results in a trade intensity of 26.3% (Ø 2010-2018).
- Because, as a result of the **refining** or service nature of the industry, import data is missing, the **trade intensity** corresponds to the **export rate**. Data on imports would further increase the trade intensity.
- The **trade intensity** or export rate (of the sector NACE 25.61) with **EU third countries** was – according to the official surveys (Specialist Series 4 Number 4.1.1) – on average 10.2% for the years 2010 to 2018 (16.2% with EU Member States).



# Germany: Trade intensity of „Contract hardening plants” based on customer structure

- The foreign trade statistics do not distinguish between hardened and non-hardened products → generally no foreign trade for contract-hardening-plant products
- **Contract hardening plants** constitute an outsourced production process
- → Calculation of the **trade intensity** on the basis of customer structure (upstream and/or downstream sectors) and their trade intensities (calculated according to EUROSTAT)
- This approach is also transferable to a **European level**

**Customer structure: contract hardening plants, average 2010-2018, Germany, proportion in %**



Source: IHT

# Germany: Empirical results - Trade intensity of „contract hardening plants” (extra-EU and intra-EU) based on customer structure

Average 2010-2018

Sectors	Production (in € mil.)	Import (in € mil.)	Export (in € mil.)	Trade intensity	Customer structure (in %)
Mechanical engineering	164.747	73.038	166.819	100,87	41,53
Medical technology	3.087	3.110	6.719	158,60	2,24
Measurement and control technology	21.304	15.479	28.707	120,13	1,52
Vehicle manufacture	146.142	85.243	192.729	120,13	38,91
Shipbuilding	1.808	338	1.114	67,64	3,97
Rail vehicle construction	4.563	1.887	3.563	84,50	2,52
Air and aerospace technology	16.492	25.462	39.046	153,76	0,82
Other	182.011	159.091	172.416	97,19	8,50

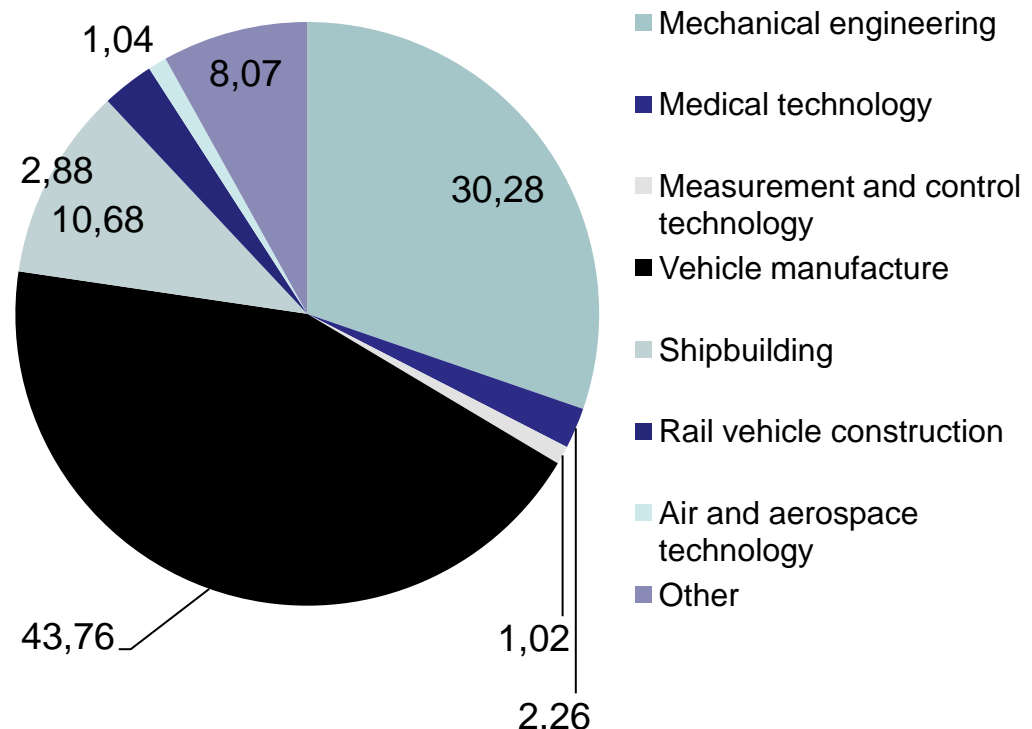
**Weighted trade intensity: 108.3**

# EU: Trade intensity of “contract hardening plants” (extra-EU) based on customer structure

Average 2010 to 2018

- The exact **customer structure** of contract hardening plant in the EU is **not known**
- A new structure can be calculated based on the **customer structure** for Germany as well as the **economic structures** in the EU and Germany
- A new **calculation** for contract hardening plants' intensity of trade can be made based on the **new** structure and on the trade intensities of the sectors in the EU with third countries

**Customer structure: contract hardening plants in the EU, average 2010-2018, proportion in %**



Source: own calculations based on Eurostat, IHT

# EU: Empirical results - Trade intensity of “contract hardening plant” based on customer structure

Average 2010-2018

Sectors	Production (in € mil.)	Import (in € mil.)	Export (in € mil.)	Trade intensity	Customer structure (in %)
Mechanical engineering	473.849	97.574	240.435	102,12	18,98
Medical technology	12.300	6.370	11.982	274,40	0,29
Measurement and control technology	56.676	27.681	38.579	144,74	10,85
Vehicle manufacture	648.530	64.528	177.381	45,16	50,34
Shipbuilding	19.188	1.958	4.460	38,46	1,39
Rail vehicle construction	20.604	1.401	4.124	30,90	0,37
Air and aerospace technology	82.866	58.151	86.894	267,99	0,14
Other	681.747	313.399	215.678	67,88	17,64

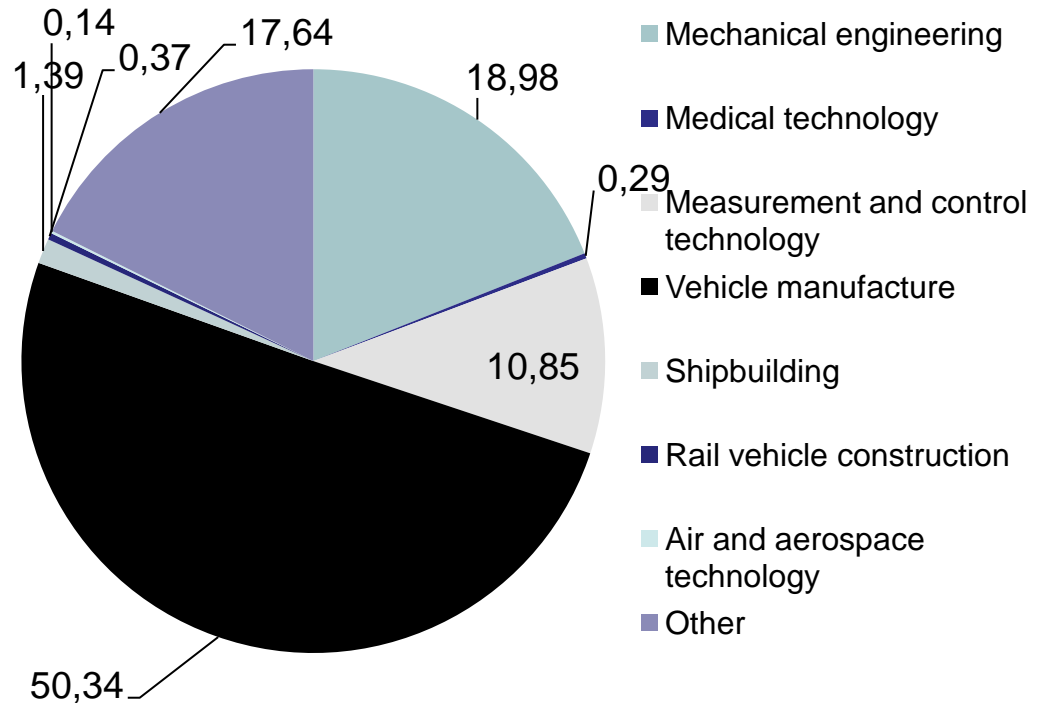
**Weighted trade intensity: 71.63**

# EU: Trade intensity of “surface refinement and heat treatment” based on customer structure

Average 2010 to 2018

- The exact **customer structure** of Sector 25.61 in the EU is **not known**
- A new structure can be calculated based on the **customer structure** for Germany as well as the **economic structures** in the EU and Germany
- A new calculation for the **weighted intensity of trade of the “surface refinement and heat treatment” sector** can be made based on the **new** structure and on the trade intensities of the sectors in the EU with third countries

**Customer structure of sector NACE 25.61 in the EU, average 2010-2018, proportion in %**



Source: own calculations using Eurostat, IHT

# EU: Empirical results - Trade intensity of “surface refinement and heat treatment” based on customer structure

Average 2010-2018

Sectors	Production (in €000s)	Import (in €000s)	Export (in €000s)	Trade intensity	Customer structure (in %)
Mechanical engineering	473.849	97.574	240.435	102,12	18,98
Medical technology	12.300	6.370	11.982	274,40	0,29
Measurement and control technology	56.676	27.681	38.579	144,74	10,85
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Other	681.747	313.399	215.678	67,88	17,64

**Weighted trade intensity: 71.61**

Source: Own calculations based on IHT and Eurostat

# **Electro-intensity: Proportion of electricity costs within gross value added**

## Definition: Electro-intensity of a sector

- The electro-intensity criterion is defined in the guidelines as the relationship between the electro-costs (assuming the payment of the full EEG surcharge rate) to gross value added.

$$\text{Trade intensity} = \frac{\text{Import value} + \text{Export value}}{\text{Production value} + \text{Import value}}$$

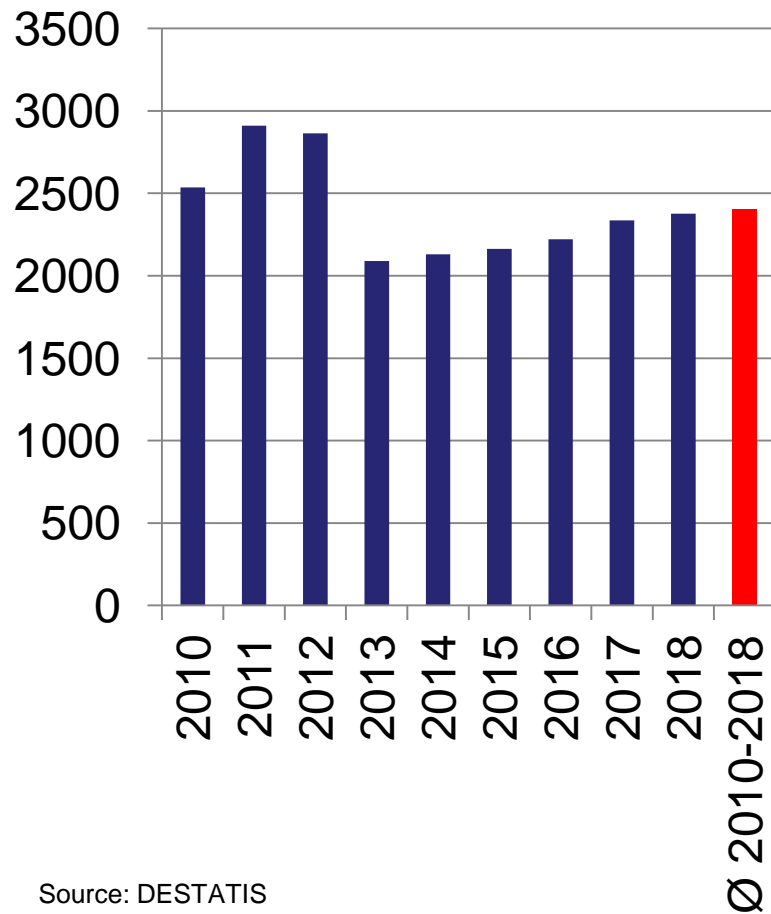
- The payments can, in principle, be limited to 4% of the gross value added (GVA cap)
- For companies whose electro-intensity is higher than 20%, the surcharge payment can be limited to 0.5% of the gross value added (“super GVA cap”)



# Germany: Electricity consumption

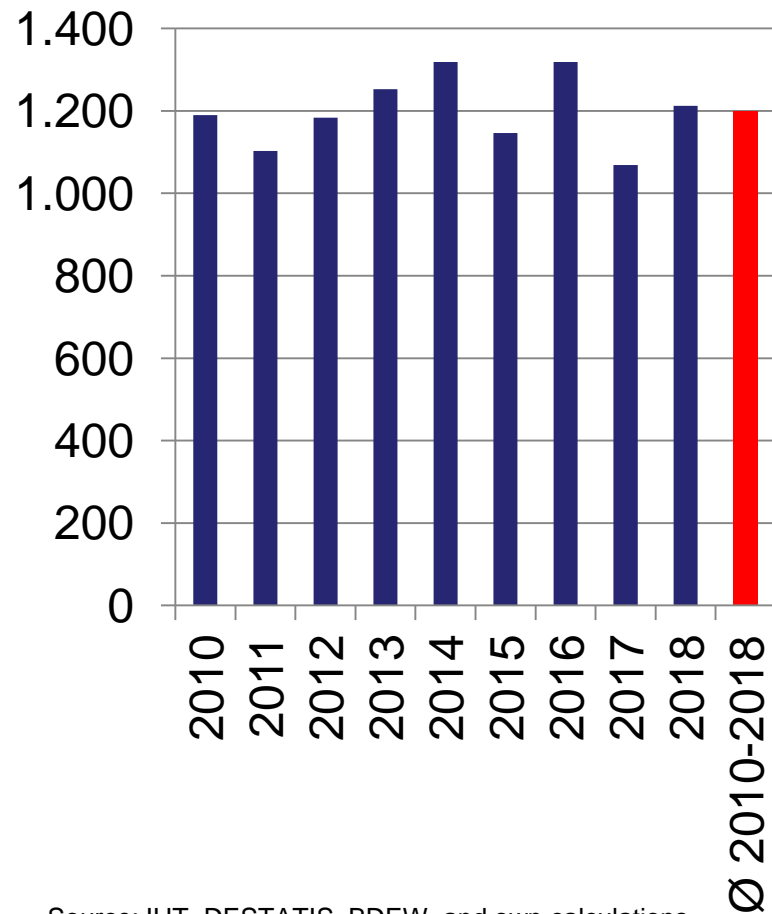
2010 to 2018, average 2010 to 2018, in GWh

**Surface refinement and heat treatment (NACE 2561)**



Source: DESTATIS

**Contract hardening plants (NACE 2561 21)**

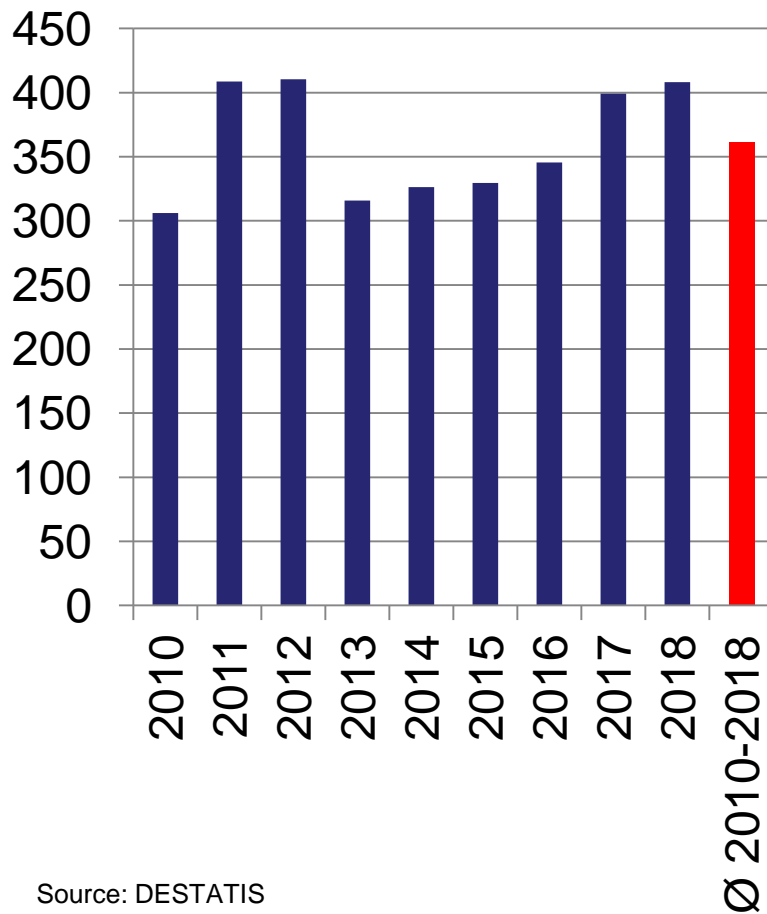


Source: IHT, DESTATIS, BDEW and own calculations

# Germany: Electro-costs

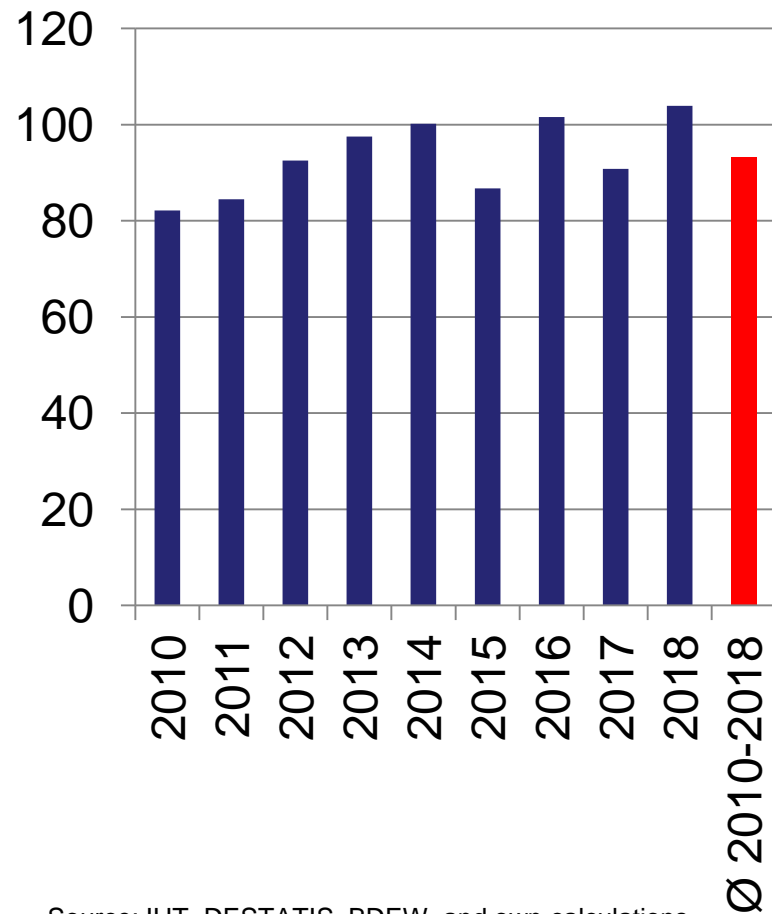
2010 to 2018, average 2010 to 2018, in € mil.

**Surface refinement and heat treatment (NACE 2561)**



Source: DESTATIS

**Contract hardening plants (NACE 2561 21)**

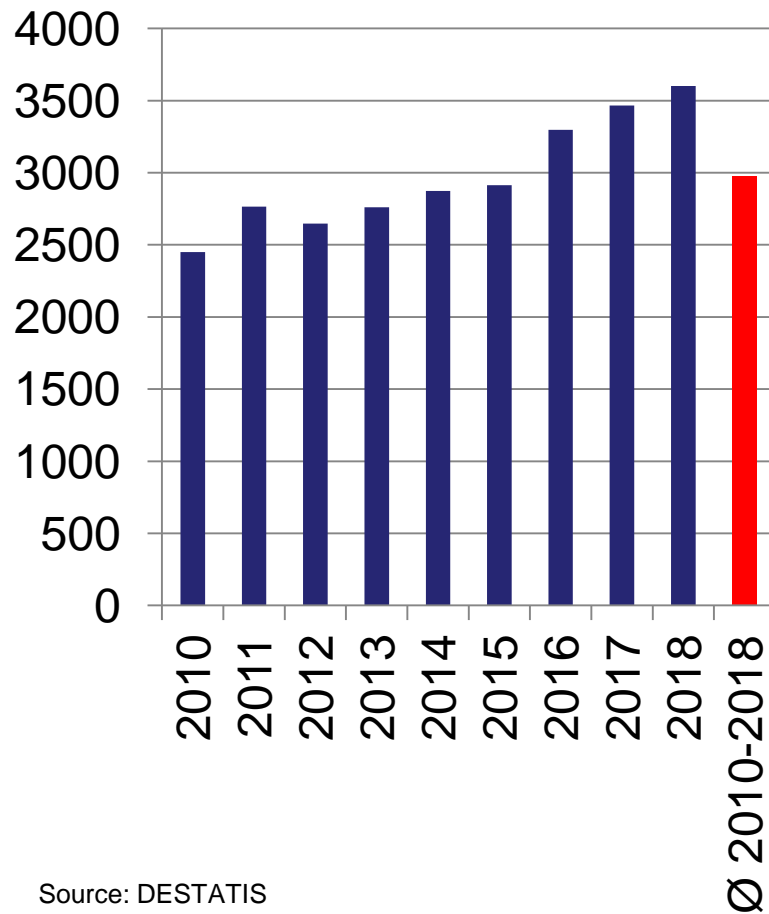


Source: IHT, DESTATIS, BDEW and own calculations

# Germany: Gross value added (at factor cost)

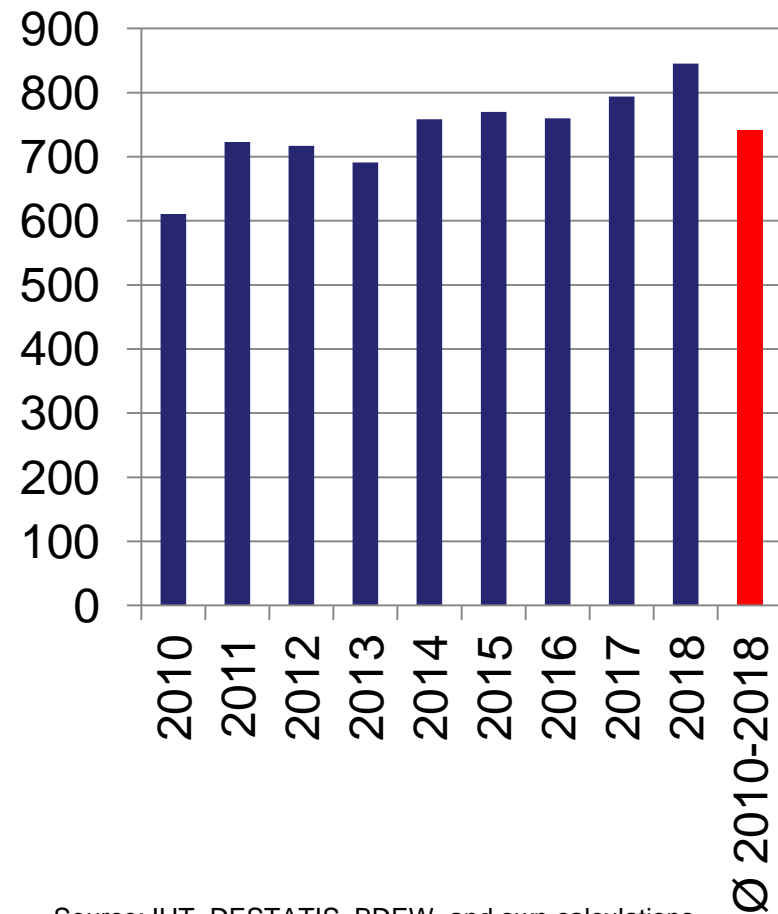
2010 to 2018, average 2010 to 2018, in € mil.

**Surface refinement and heat treatment (NACE 2561)**



Source: DESTATIS

**Contract hardening plants (NACE 2561 21)**

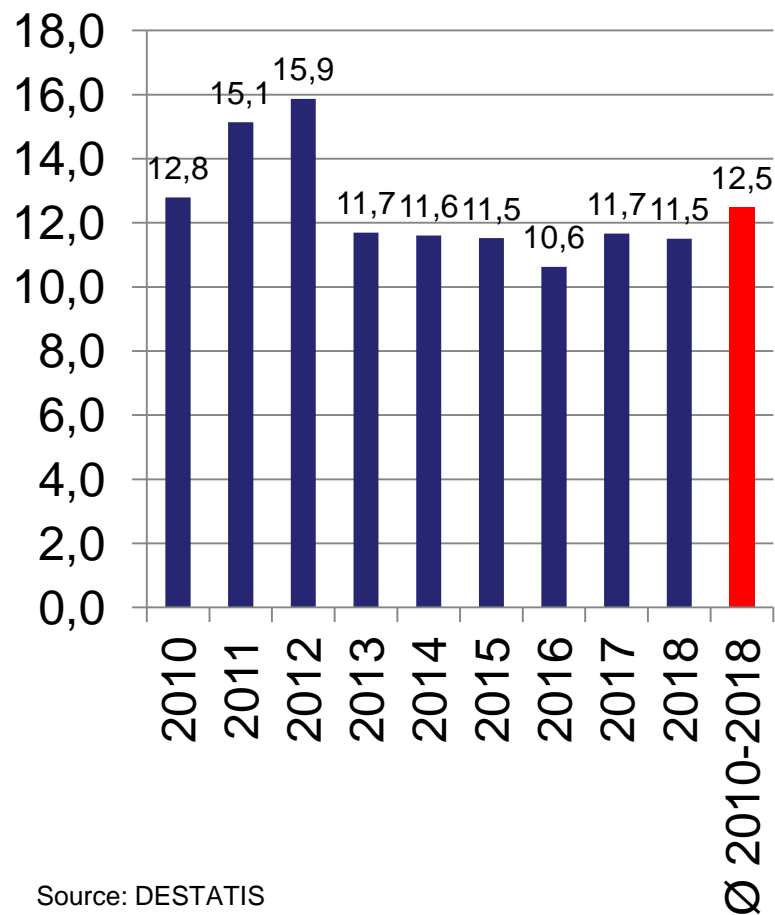


Source: IHT, DESTATIS, BDEW and own calculations

# Germany: Electricity cost share within gross value added at factor cost

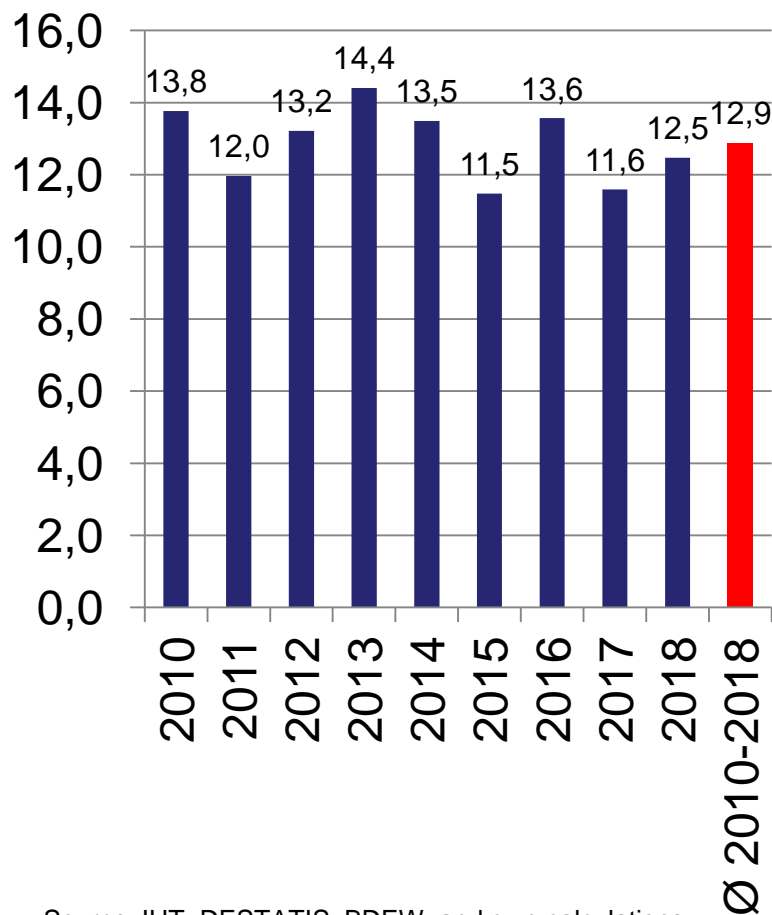
2010 to 2018, average 2010 to 2018, share in %

**Surface refinement and heat treatment (NACE 2561)**



Source: DESTATIS

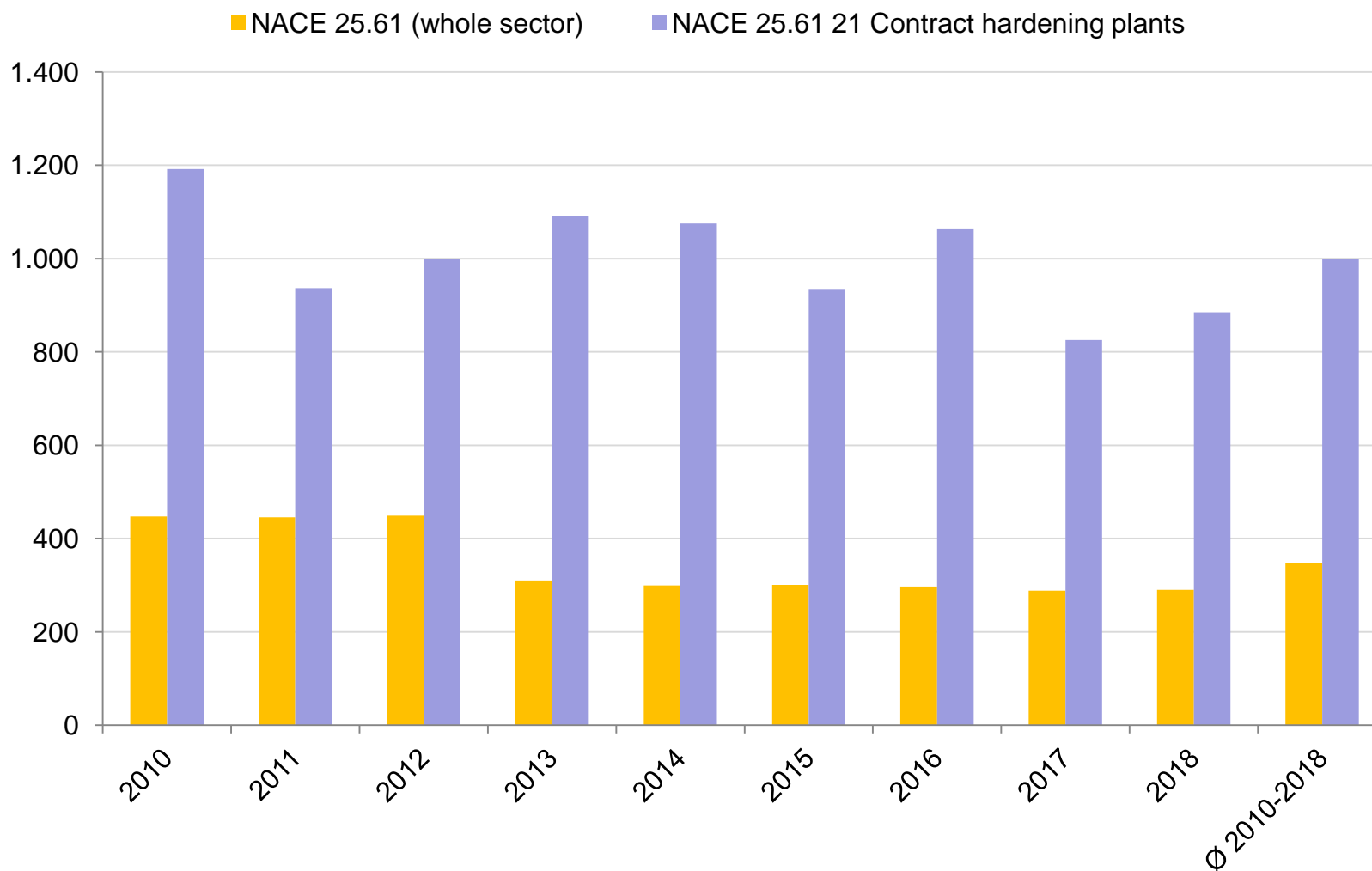
**Contract hardening plants (NACE 2561 21)**



Source: IHT, DESTATIS, BDEW and own calculations

# Germany: Specific electricity consumption of the sectors surface refinement and heat treatment (NACE 25.61) and “contract hardening plants” (NACE 25.61 21)

2010 to 2018, average 2010 to 2018, in kWh/€000s gross production value



## EU: Electro-costs

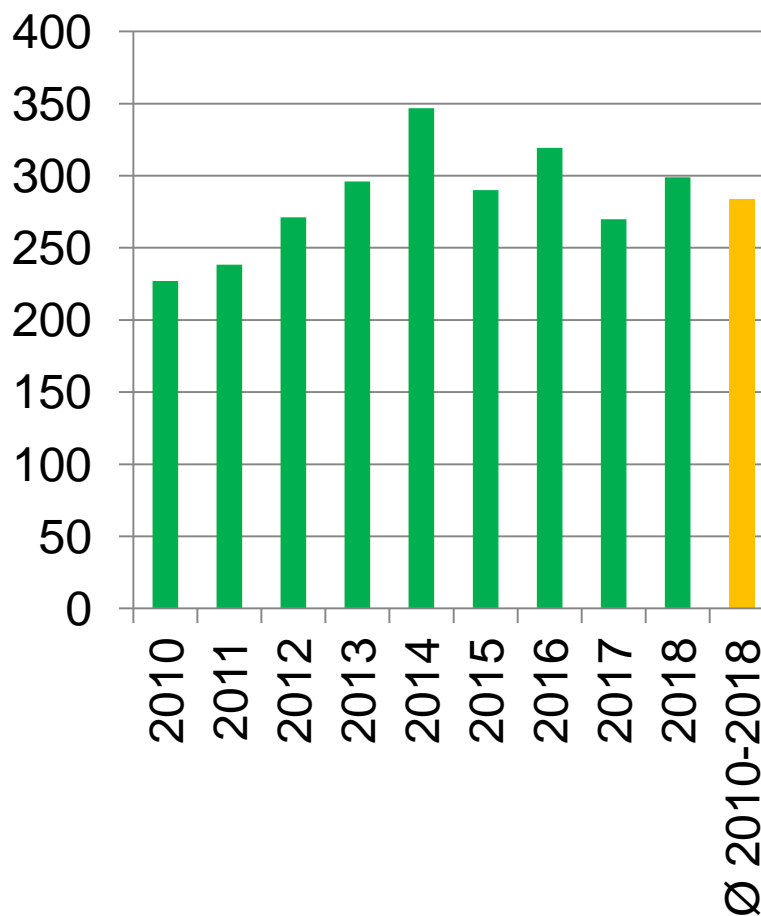
2010 to 2018, average 2010 to 2018, in € mil.

**Surface refinement and heat treatment (NACE 2561)**



Source: Eurostat and own calculations

**Contract hardening plants (NACE 2561 21)**

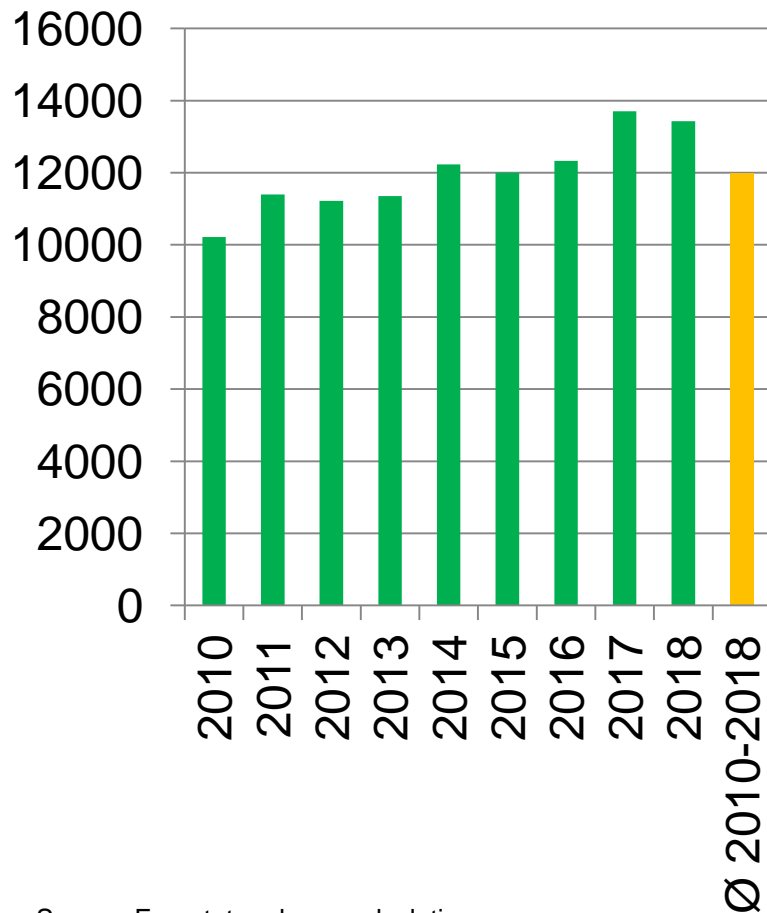


Source: Eurostat and own calculations

# EU: Gross value added at factor cost

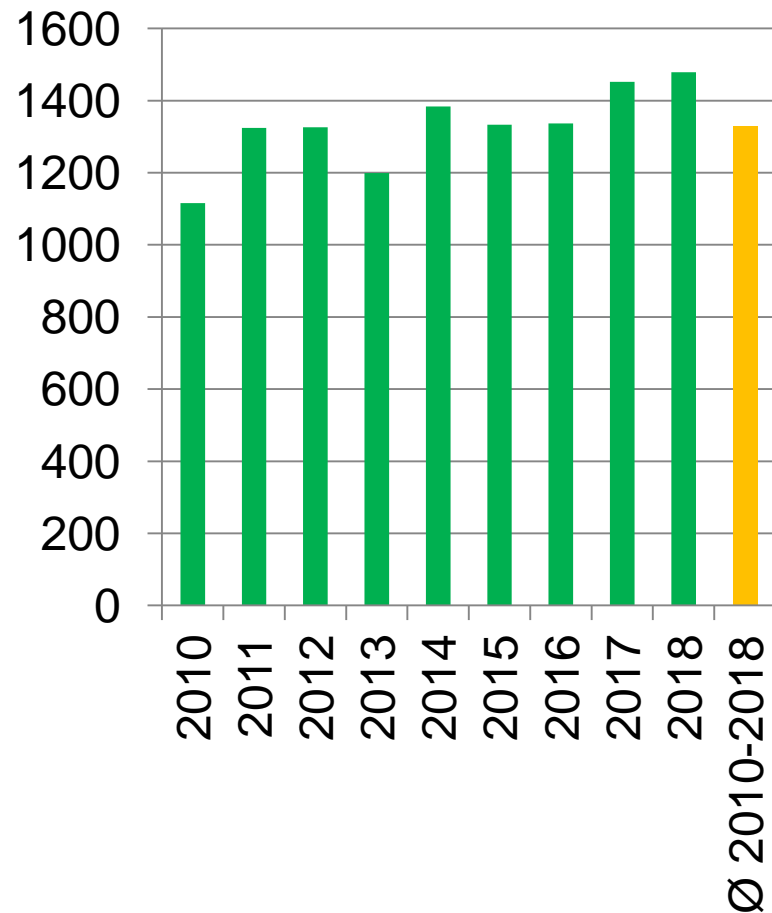
2010 to 2018, average 2010 to 2018, in € mil.

**Surface refinement and heat treatment (NACE 2561)**



Source: Eurostat and own calculations

**Contract hardening plants (NACE 2561 21)**

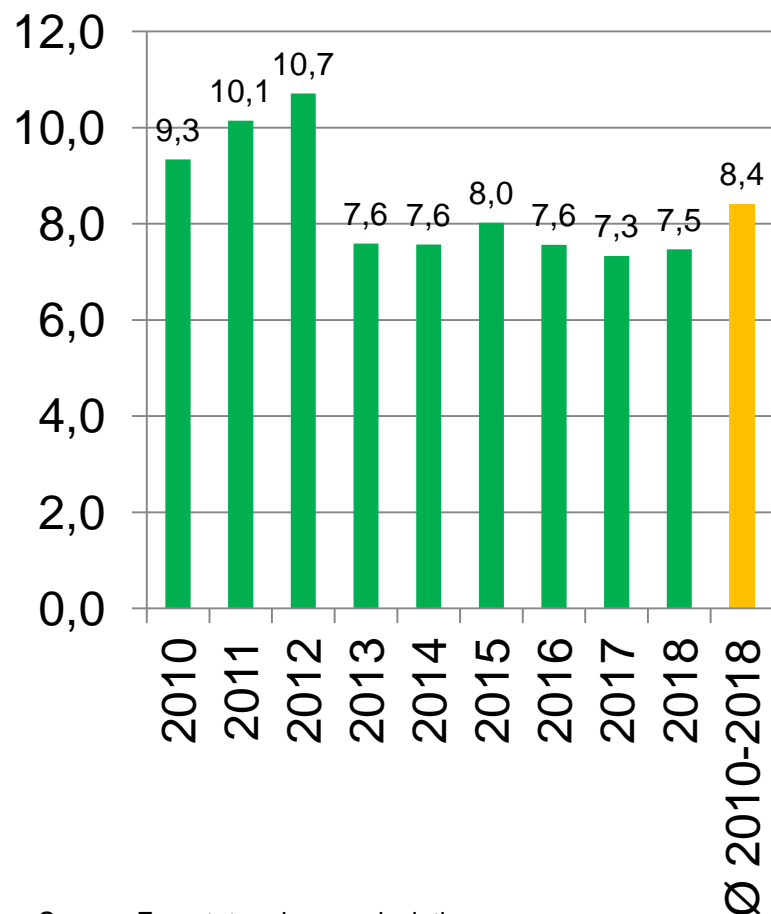


Source: Eurostat and own calculations

# EU: Share of electro-costs within gross value added at factor cost

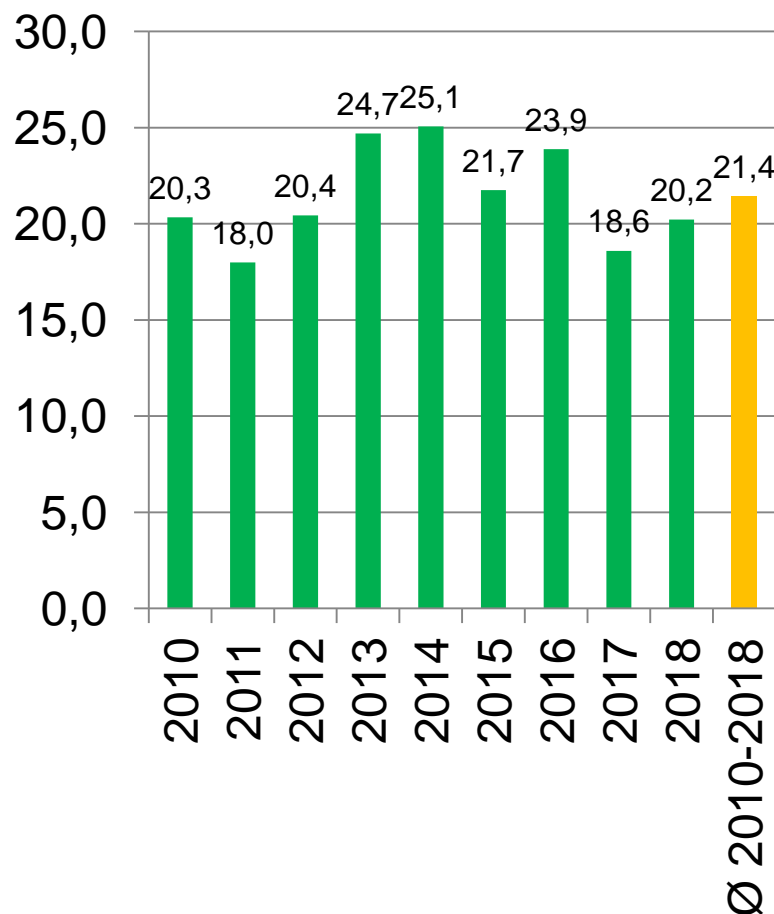
2010 to 2018, average 2010 to 2018, share in %

**Surface refinement and heat treatment (NACE 2561)**



Source: Eurostat and own calculations

**Contract hardening plants (NACE 2561 21)**



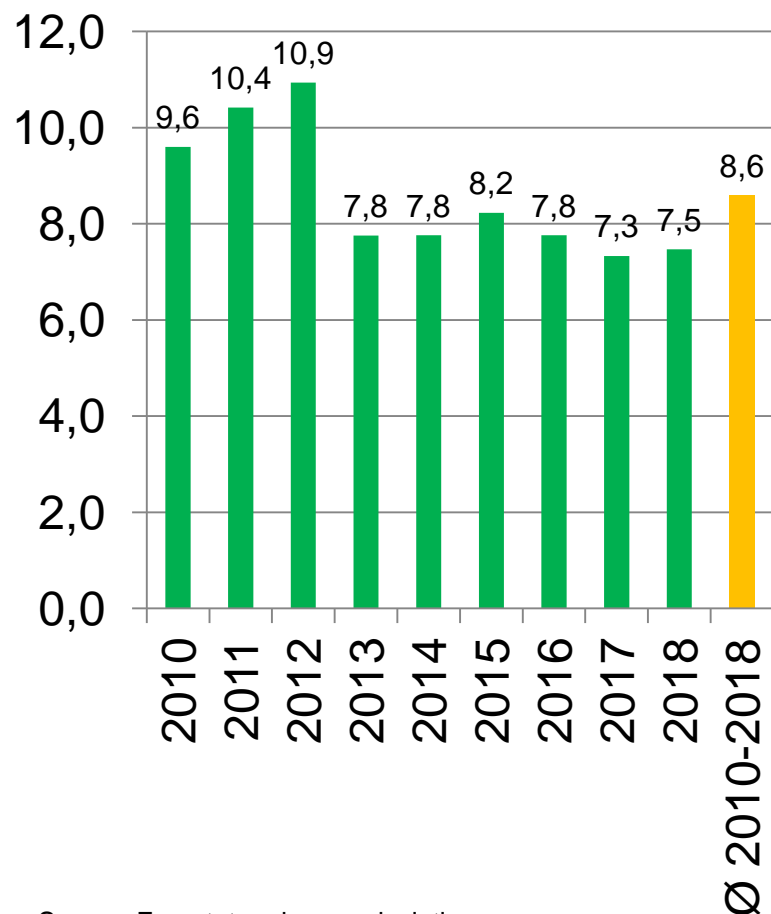
Source: Eurostat and own calculations



# EU: Share of electro-costs within gross value added at factor cost (scenario: around 3% higher electro-efficiency in Germany compared to EU)

2010 to 2018, average 2010 to 2018, share in %

**Surface refinement and heat treatment (NACE 2561)**



Source: Eurostat and own calculations

**Contract hardening plants (NACE 2561 21)**



Source: Eurostat and own calculations

# Conclusion

## Conclusion I: Trade intensity

- In terms of **trade intensity** with third countries at an **EU level**, a value of 71.63% (average 2010-2018) is calculated for the sector “contract hardening plants” (NACE 25.61 21) (i.e. the weighted trade intensity based on **customer structure**).
- At the NACE four-digit level, the “surface refinement and heat treatment” sector (NACE 25.61) has a trade intensity with non-EU Member States of 71.61% (average 2010 to 2018), likewise calculated using the customer structure.

## Conclusion II: Proportion of electricity costs within gross value added

- The **electro-intensity** (proportion of energy costs within gross value added at factor cost) in the “surface refinement and heat treatment” sector in **Germany** reached 12.5 % (average 2010-2018); for “contract hardening plants”, the respective figure was 12.9 %.
- The **proportion of electricity costs within the gross value added** (at factor cost) at **EU level** for the sector “surface refinement and heat treatment” had a total value of 8.4% (average for 2010 to 2018); for the contract hardening plants, the corresponding figure was 21.4% (in each case taking into account the full EEG surcharge for companies from Germany).
- If one **also** takes into account the **superior** (in comparison to the EU average) **electrical efficiency** in the German “surface refinement and heat treatment industry”, the proportion of electricity costs within gross value added increases to 8.6 % for the entire sector (NACE 25.61) (average 2010 to 2018) and to 21.9 % for contract hardening plants.