

Benchmarking study
of electricity prices
between Belgium and
neighboring countries

March 2015



Agenda

- Objectives and scope of the benchmarking study
- Benchmark methodology
- Results of the benchmarking study
 - Base load profile
 - Peak load profile
- Appendices



Objectives and scope of the benchmarking study

Objectives and scope of the benchmarking study

The **primary objective of the study that Febeliec commissioned at Deloitte** is to obtain an overview of possible differences in prices for electricity purchased on the electricity market by major industrial consumers such as the members of Febeliec in Belgium as compared to their peers in France, The Netherlands and Germany.

- The **primary focus** is on **relative price differences** that exist on the market for Febeliec member profiles using identical, simplified, standardized, load (base load and peak load) and volume profiles (ranging from 100 GWh to 1.000 GWh).
- The **study covers** the actual prices for electricity that can be purchased in the relevant electricity markets in the **period 2013, 2014 and 2015** based on existing legislation and policies.

Benchmark methodology

Benchmark methodology

The relevant electricity price components used in this study are based solely on public data sources.

Market price:

Market prices are based on electricity market quotations (using appropriate combinations of spot & forward prices) as to obtain objective data that is comparable over the different Febeliec members. This pricing approach neutralizes the impact of:

- different sourcing and hedging strategies
- historical long term sourcing contracts concluded under different market conditions

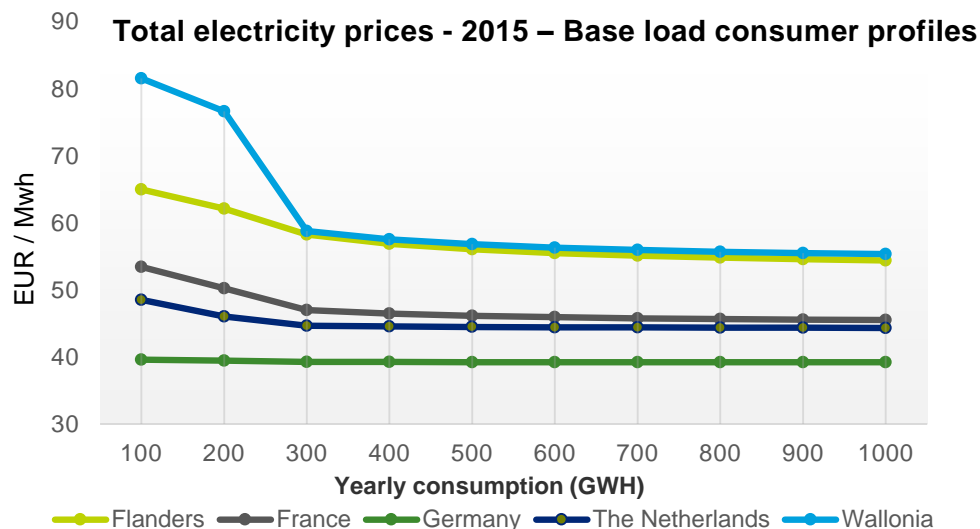
Network costs: Network costs are regulated tariffs applied by the transmission grid operators (TSO'S) for the transport of electricity over the transmission network (excluding distribution).

Electricity taxes: Represent all taxes and other levies that are to be paid on top of the market price and network costs in the different jurisdictions.

Results of the benchmarking study

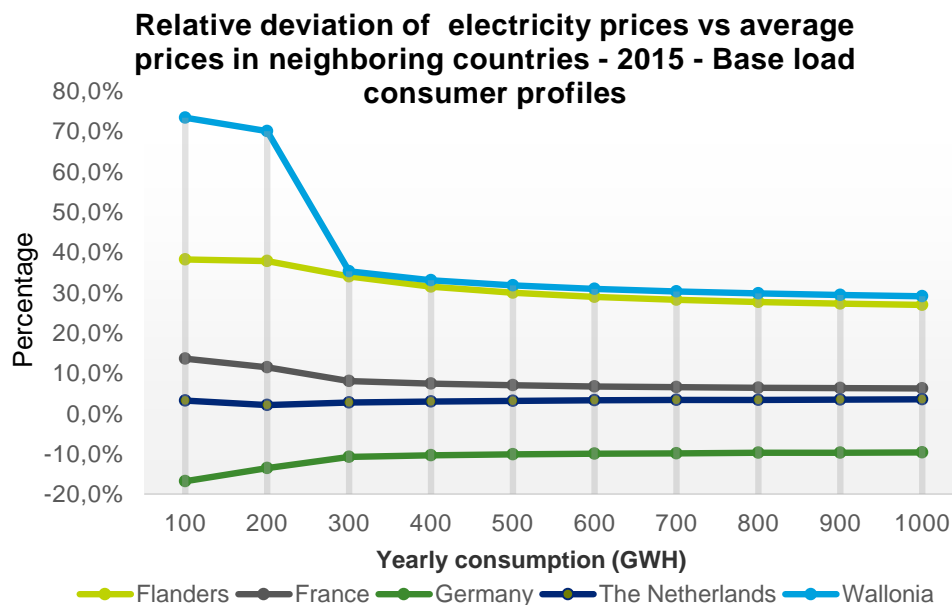
- Benchmark total electricity prices of a base load profile
- Comparative overview of:
 - market prices
 - network costs
 - electricity taxes

Benchmark total electricity prices for a base load profile

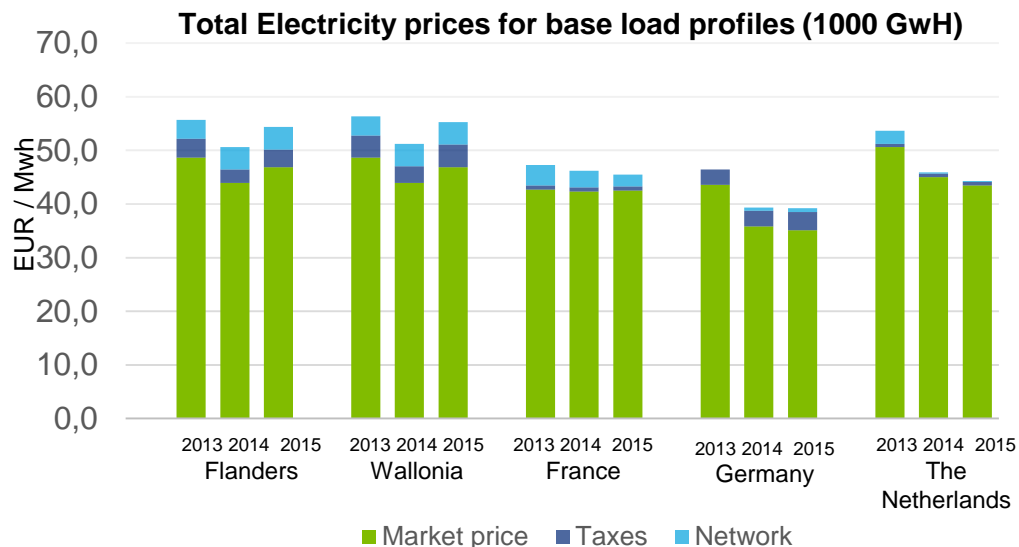
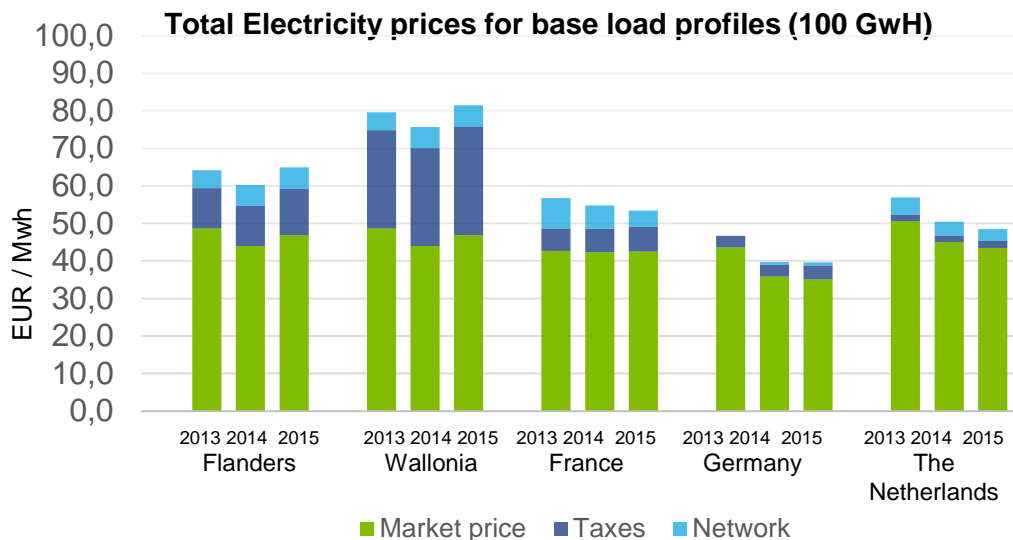


Large industrial base load consumers are facing higher all-in prices for electricity purchased in Belgium versus in its neighboring countries.

- For 2015, we observe total prices ranging from **39 EUR/MWh** in Germany to **65 EUR/MWh** in Flanders and up to **82 EUR/MWh** in Wallonia.
- Results show a difference in electricity price of approximately **7 to 9 EUR/MWh** for industrial consumers in Flanders and **8 to 24 EUR/MWh** in Wallonia compared to the average of the electricity prices of the countries in the scope of the study.
- All-in electricity prices are between **27%** (for 1000 GWh in Flanders) and **73%** (for 100 GWh in Wallonia) higher than the average of the neighboring countries in the benchmark scope.
- For a 100 GWh base load consumer this represents an electricity cost difference of **0,7 MEUR** in Flanders and **2,4 MEUR** per year in Wallonia (compared to the average of the countries in the study).
- For a 1000 GWh base load consumer this represents an electricity cost difference of **6,6 MEUR** in Flanders and **7,6 MEUR** per year in Wallonia (compared to the average of the countries in the scope).



Benchmark total electricity prices for a base load profile

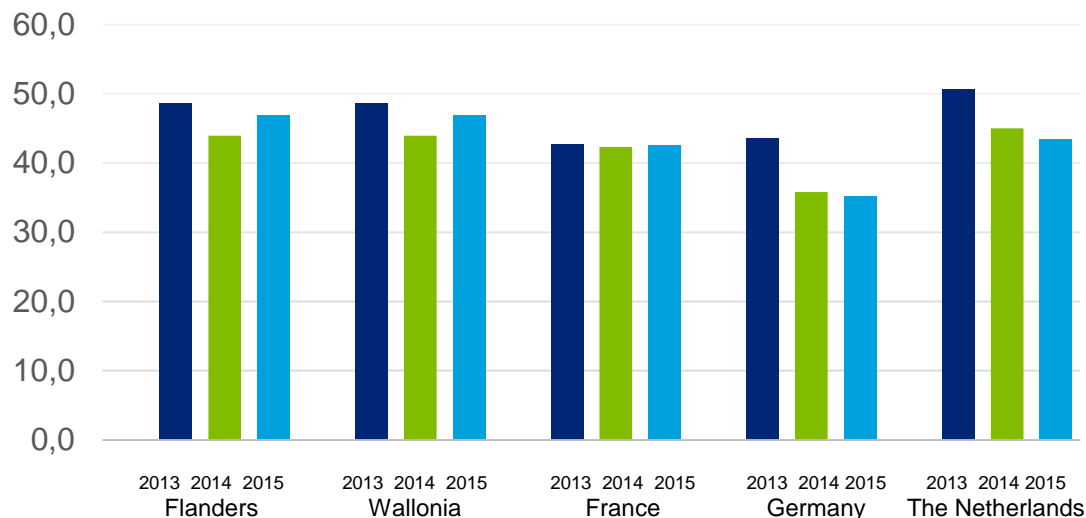


- The total **electricity prices have increased in Flanders and Wallonia in 2015 compared to 2014**.
In both Flanders and Wallonia electricity commodity prices and taxes have increased while network cost stabilized compared to 2014.
- The observed price difference with the other countries is essentially driven by a combination of the following elements:
 - **An increase in 2015 of electricity prices (energy component) in Flanders & Wallonia** while the prices on average decreased in the other jurisdictions included in the study.
 - **Important discounts on network costs in France(*), Germany and the Netherlands of up to 90% of the standard tariffs.**
 - **Substantially higher electricity taxes in Flanders and Wallonia** compared to the neighboring countries

(*) The 50% discount on grid tariffs in France is taken into account for the price benchmark of the base load consumer profile as of 1/8/2014

Comparative overview of market prices Base load profiles

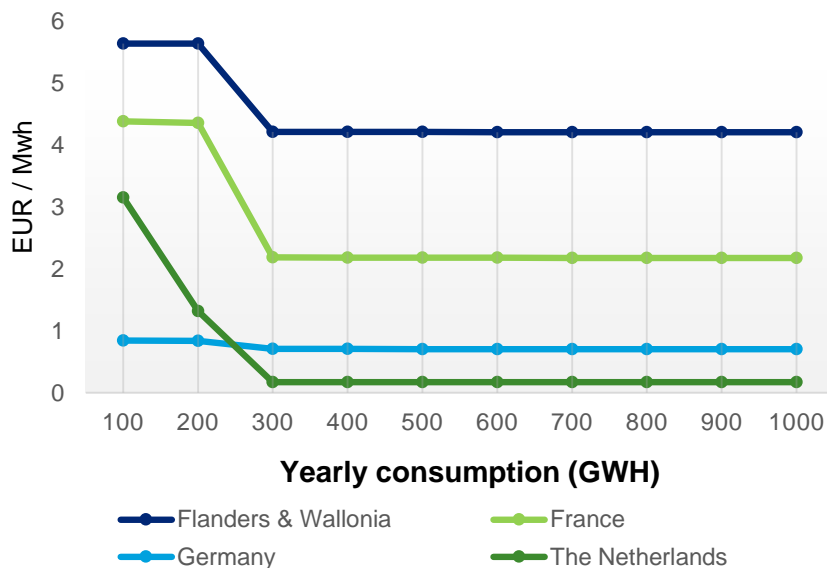
Wholesale electricity prices for base load profiles (energy component)



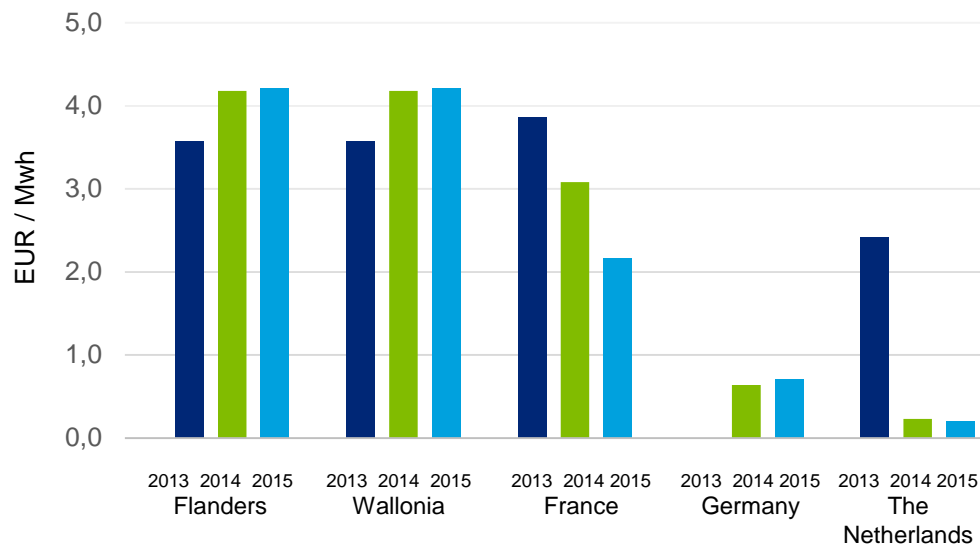
- **In France**, industrial consumers have access to **electricity at regulated prices** for their base load consumption based on access to historical French nuclear generation capacity (La Loi Nome / ARENH).
- **The wholesale electricity prices in Germany** have decreased substantially below the market prices in the other countries in the benchmarking scope.
- For 2015 **Belgian market prices are higher** than the average of the countries in the scope.

Comparative overview of network costs Base load profiles

Network cost – 2015 Base load consumer profile

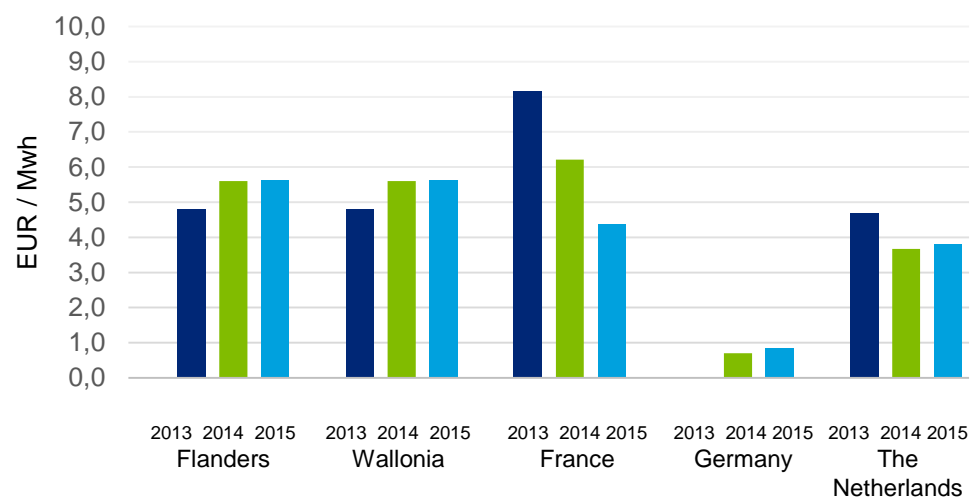


Network costs for base load profiles (1000 GWh)



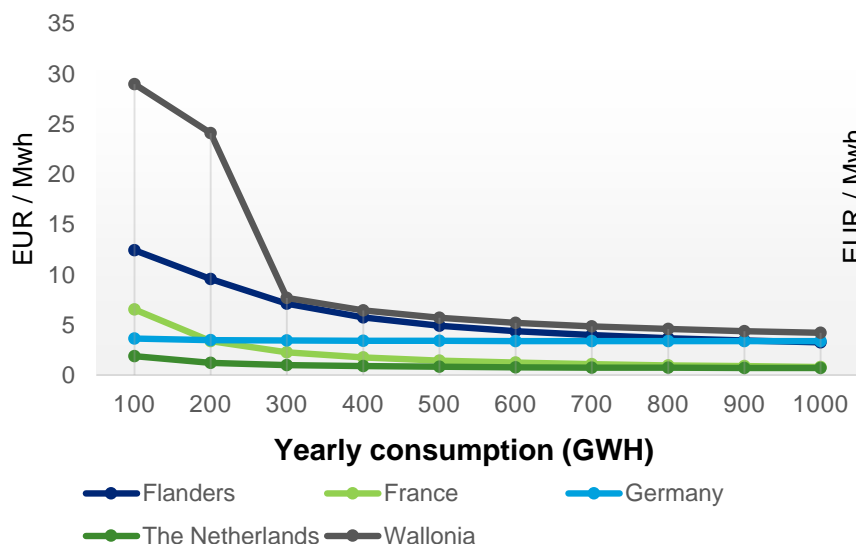
- In **France** a 50% discount on network costs is introduced for major base load consumers (> 8000 hours a year) as of 1/8/2014.
- In **Germany** the prior full exemption of grid costs for base load industrial consumers was replaced as of 2014 by an individualized discount (approval of regulator required) of up to 90% on standard tariffs for a base load consumer (> 8.000 hours a year).
- As of 2014 major **Dutch** industrial base load consumers can benefit from a **discount scheme up to 90%** on the standard tariffs.
- In **Belgium** network tariffs remained stable in 2015 compared to 2014.

Network costs for base load profiles (100 GWh)

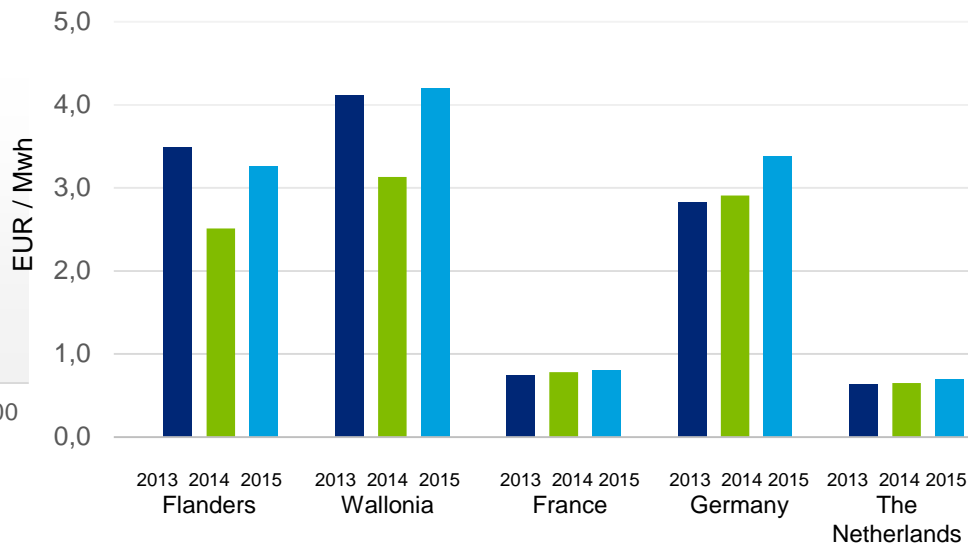


Comparative overview of electricity taxes Base load profiles

Electricity Taxes- 2015- Base load profile

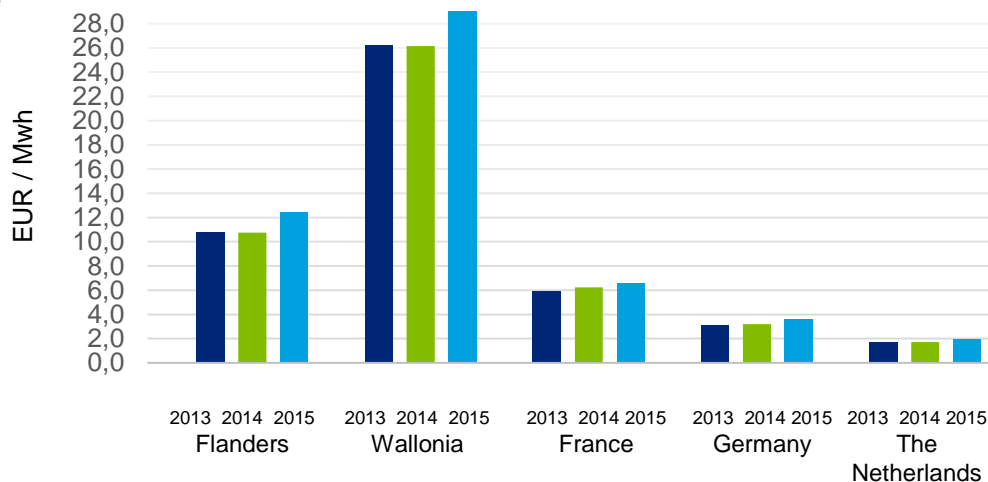


Electricity taxes for base load profiles (1000 GWh)



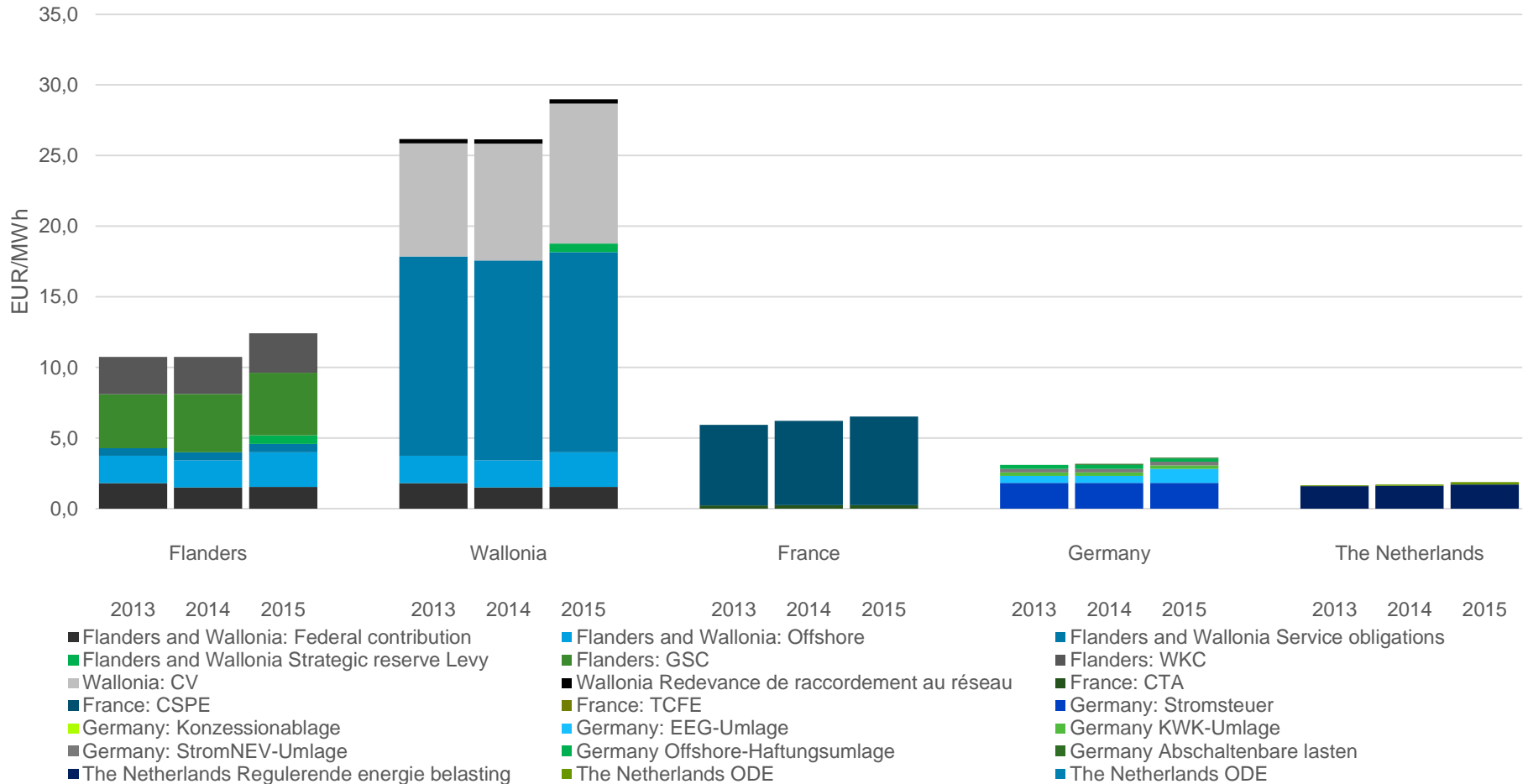
- **In Flanders and Wallonia, taxes are higher** compared to the surrounding countries for major base load consumers. Taxes increase in 2015 due to an additional levy for maintaining a strategic reserve generation capacity and a further increase of levies for the funding of renewable energy policies.
- **In Wallonia, the Service Obligation Levies** create a substantial surplus cost for the medium-high voltage network connections (the 100 and 200 GWh consumption profiles)
- **In The Netherlands industrial consumers benefit from low electricity taxes.**
- **In France electricity taxes are significantly lower** for high volume consumers due to the CSPE cap.

Electricity taxes for base load profiles (100 GWh)



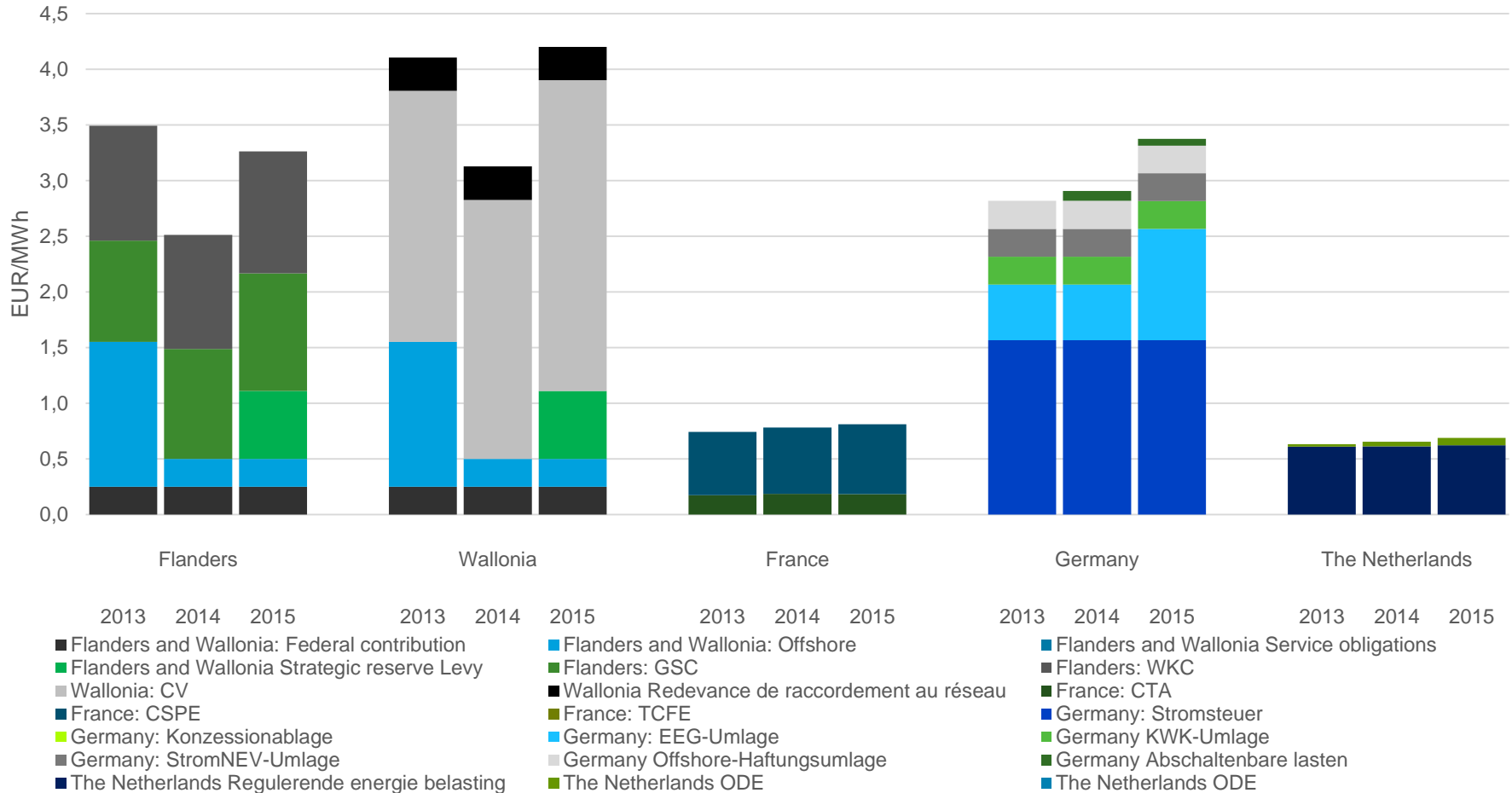
Comparative overview of electricity taxes Base load profiles (100 GWh)

Detailed overview electricity taxes for base load profiles (100 GWh)



Comparative overview of electricity taxes Base load profiles (1000 GWh)

Detailed overview electricity taxes for base load profiles (1000 GWh)

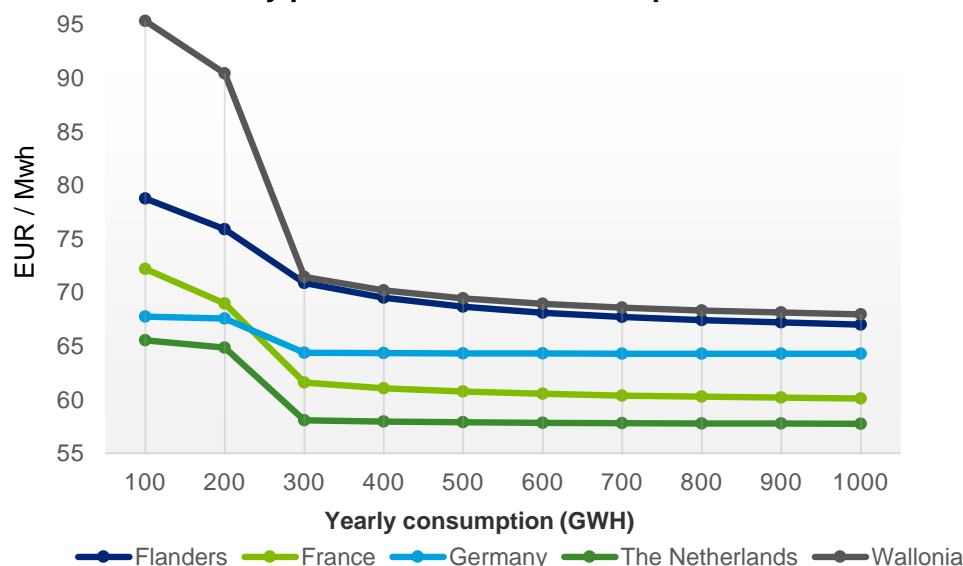


Results of the benchmarking study

- Benchmark total electricity prices of a peak load profile
- Comparative overview of:
 - market price
 - network costs
 - electricity taxes

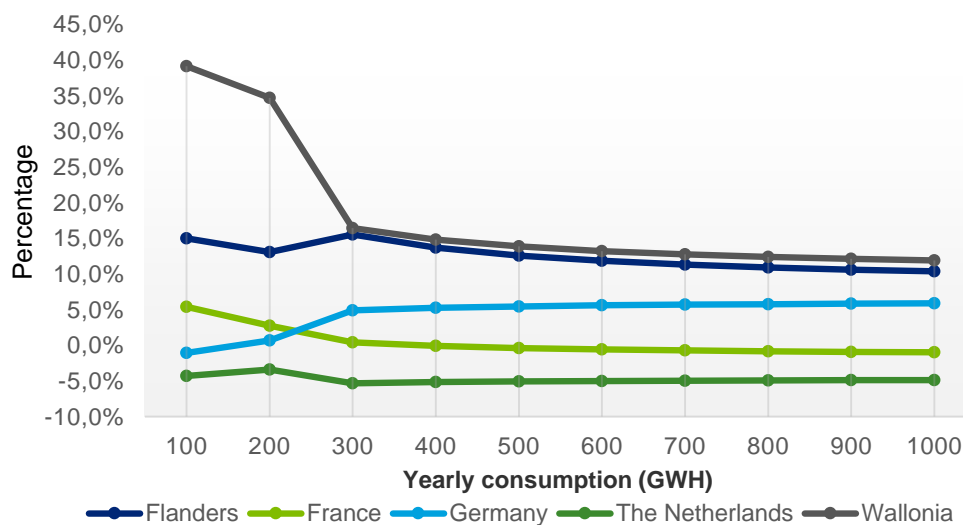
Benchmark total electricity prices for a peak load profile

Total Electricity prices - 2015 - Peak load profiles



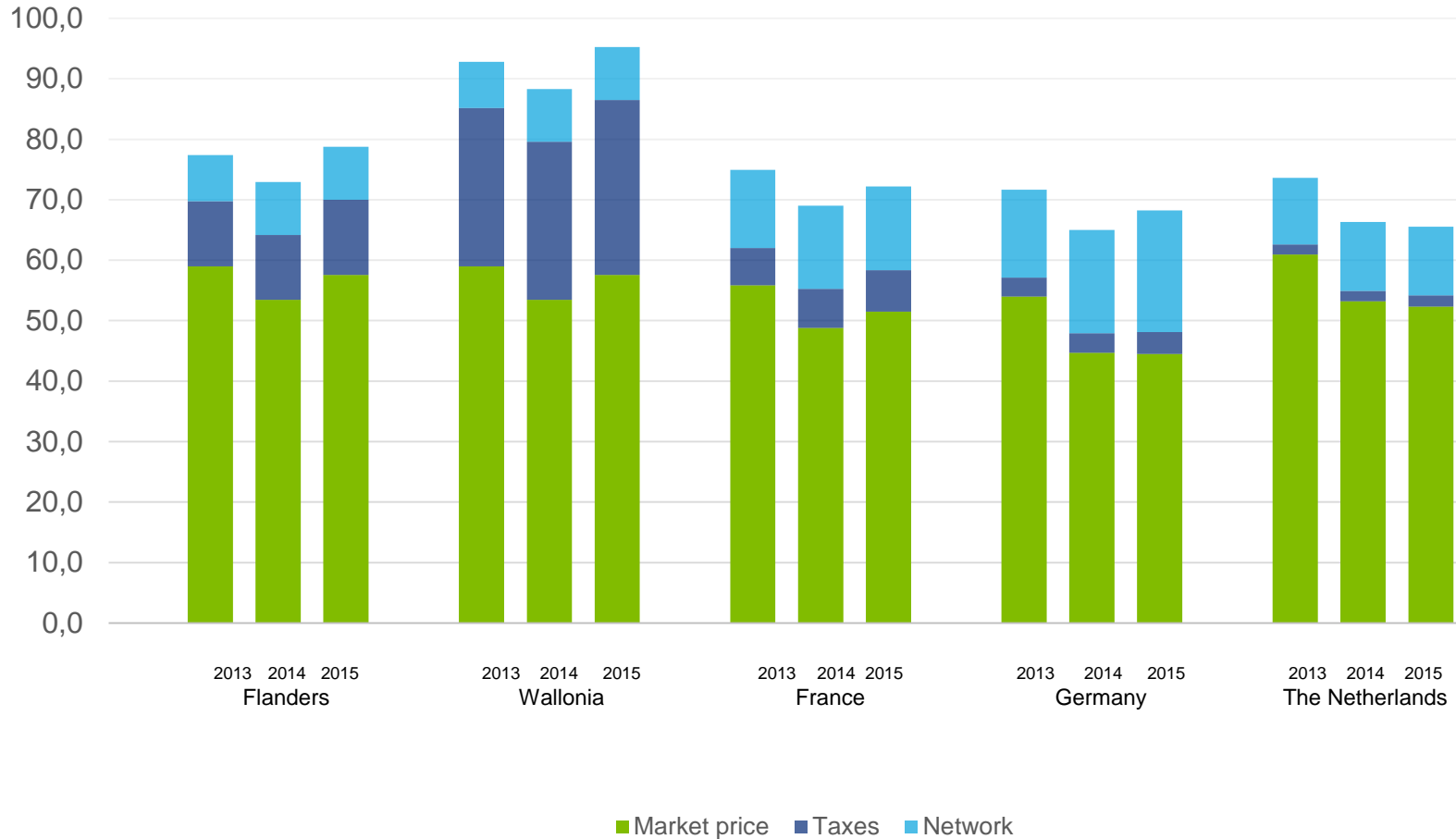
- For 2015 we observe total peak load prices ranging from 58 EUR/MWh (in the Netherlands for a 1000 GWh consumer) to 95 EUR/MWh (in Wallonia for a 100 GWh consumer).
- Total electricity price for peak load consumers in **Wallonia** is 39% higher (for 100 GWh) compared to the average prices for their peers in France, The Netherlands and Germany.
- For a 100 GWh consumer in **Wallonia** this represents a price impact of 2,7 MEUR (compared to the average of the countries in the scope).
- Prices in **Flanders** are 15% higher (for 100 GWh) than the average of the other countries in the benchmark study.
- For a 100 GWh consumer in **Flanders** this represents a price impact of 1,0 MEUR compared to the average of the other countries included in the study.

Relative deviation of electricity prices vs average prices in neighboring countries - 2015 - Peak load profile



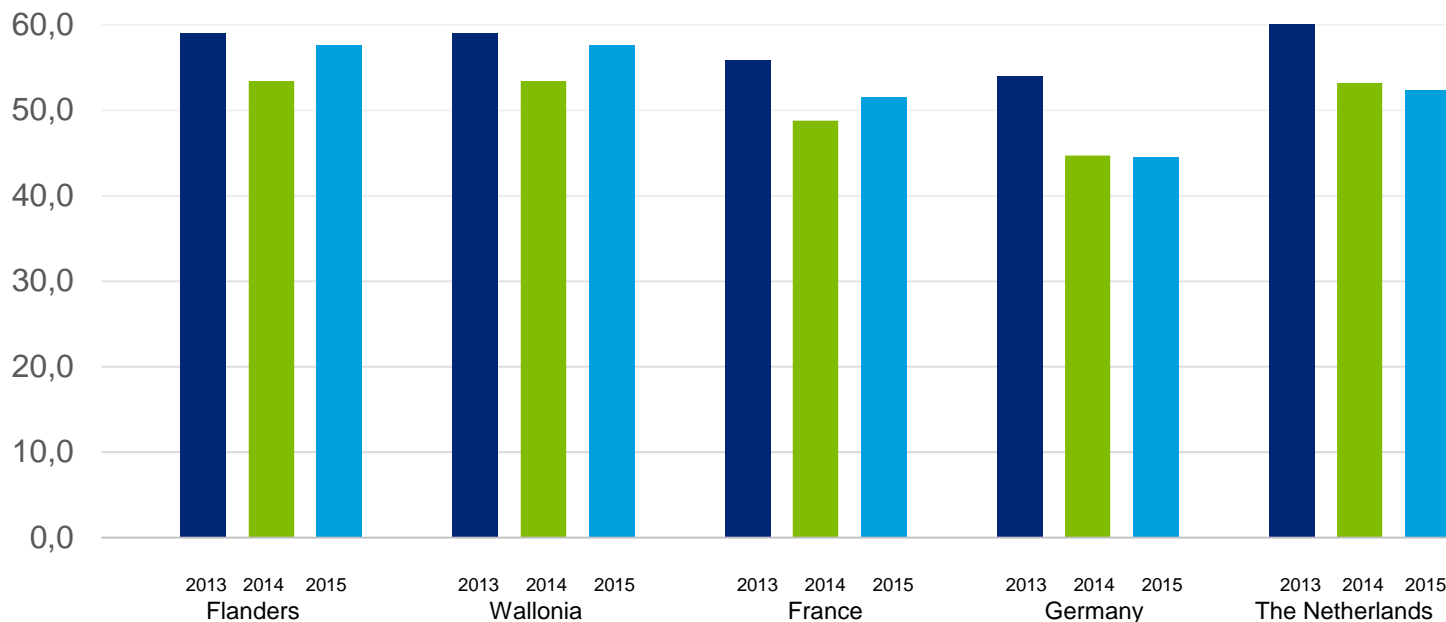
Benchmark total electricity prices for a peak load profile

Total Electricity prices for Peak load profiles (100 GWh)



Comparative overview of market prices Peak load profiles

Total Electricity prices for Peak load profiles (energy component)

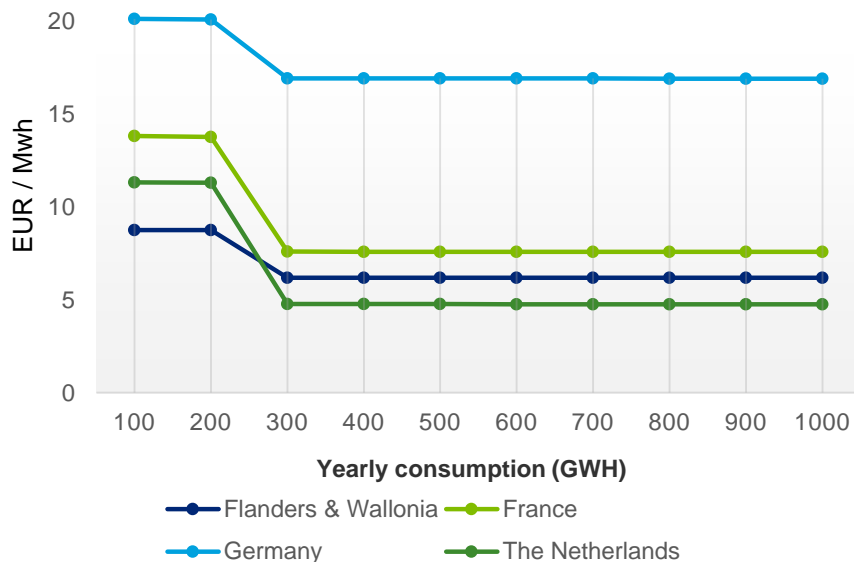


We note that no peak load future prices are available for delivery on the Belgian Market for month and year ahead.

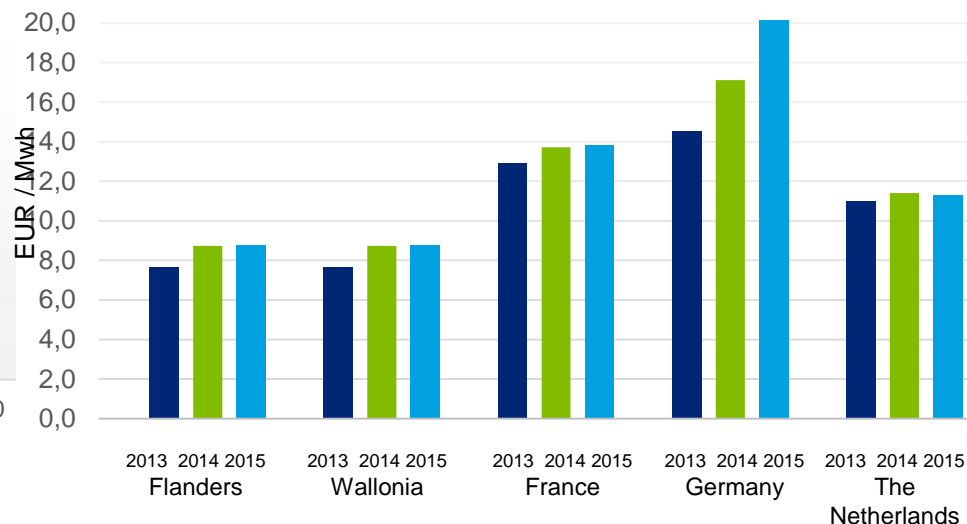
As a proxy for the peak load prices in Flanders and Wallonia the adjusted average of future prices for delivery on the Dutch and French market is used in this study. The adjustment consists of a factor representing the relation between forward base load prices in Belgium compared to the respective base load prices in France and the Netherlands. This factor has been introduced retrospectively as of the 2015 update of the study in order to take into account the diverging electricity price evolutions observed in Belgium compared to the neighboring countries.

Comparative overview of network costs Peak load profiles

Network cost - 2015 - Peak load consumer profiles

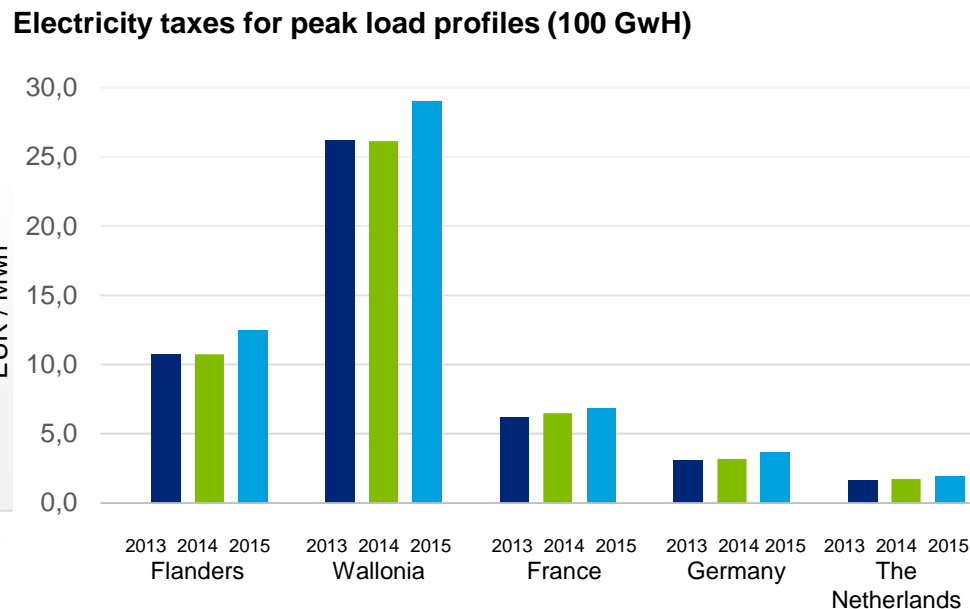
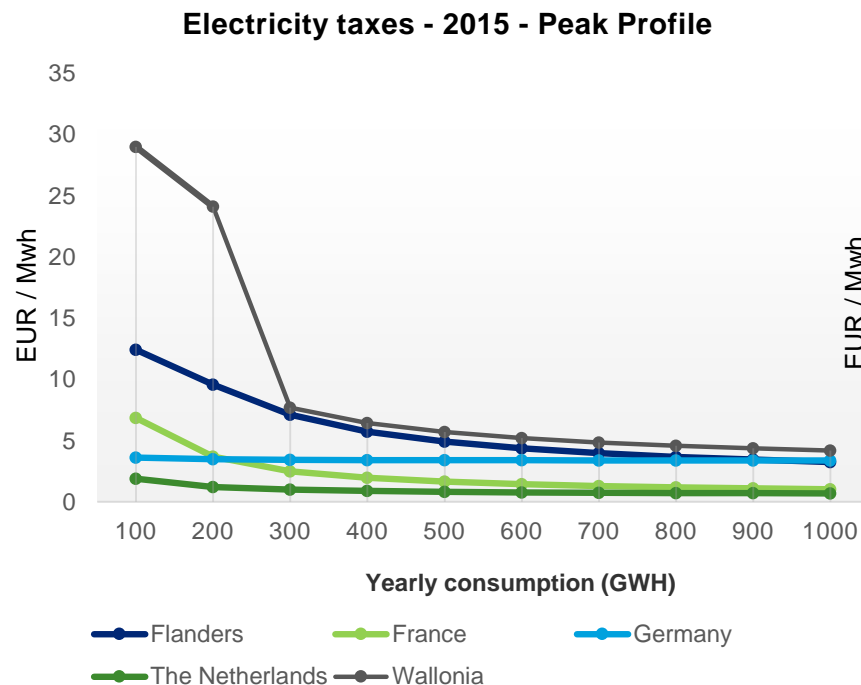


Network costs for peak load profiles (100 GWh)



- Compared to the base load profile, industrial consumers with a peak load do not benefit from discounted network costs **in France, Germany and The Netherlands**. The discounts for base load consumers are explained by the fact that base load consumer contribute positively to the stability of the network.
- Network costs in **Flanders and Wallonia** are 42% lower (for a 100 GWh profile) than the average of the neighboring countries in the scope of the study.

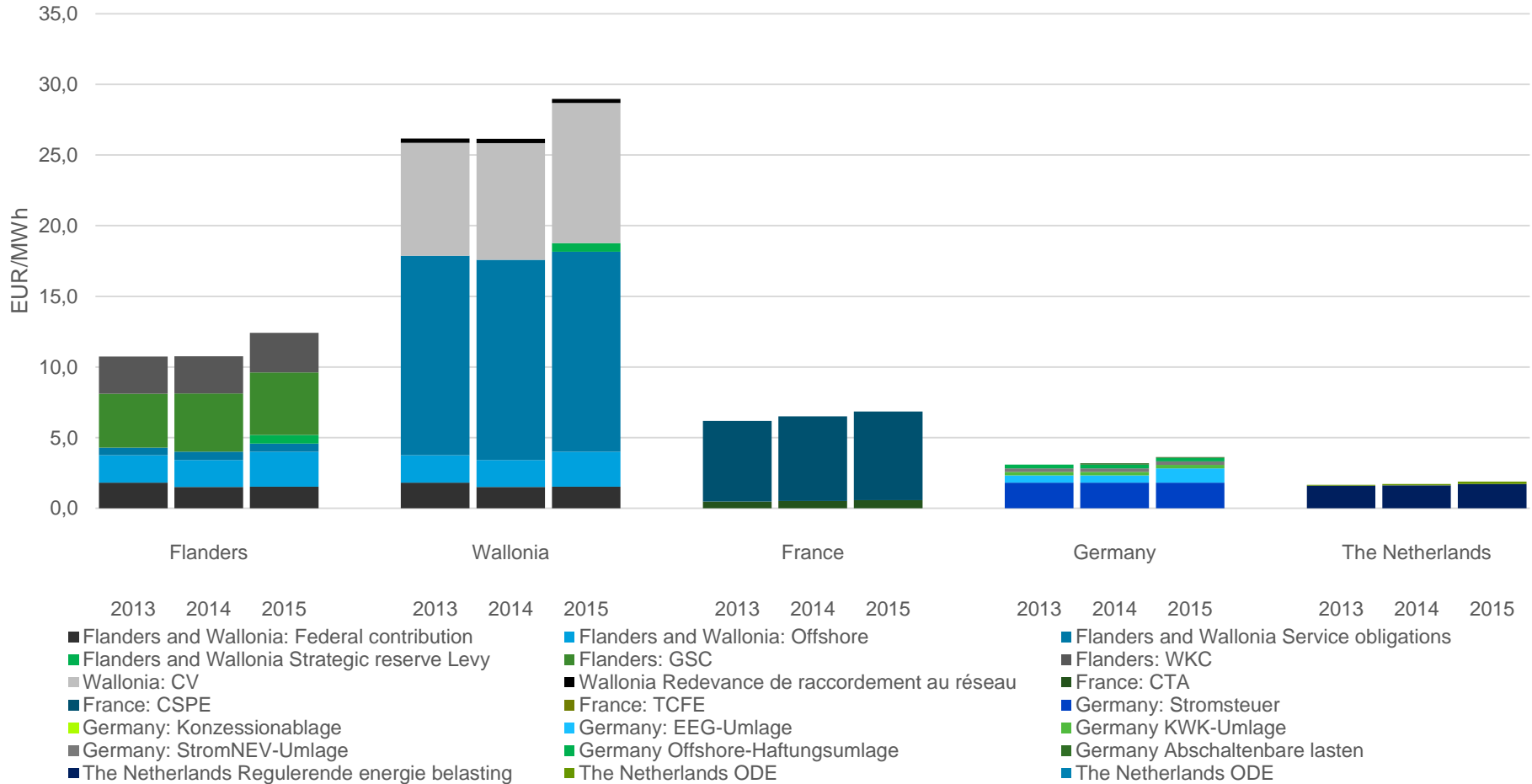
Comparative overview of electricity taxes Peak load profiles



- Most taxes only depend on the total (yearly) energy consumptions. Therefore no material difference exists between taxes for base load and peak load profiles. Only a slight difference is observed when comparing the taxes paid by base load and peak load consumers. This difference is related to the French CTA contribution that is function of the network costs that in turn depend on the subscribed capacity.
- Observations on taxes for peak load profiles are therefore similar to those for base load consumers.

Comparative overview of electricity taxes Peak load profiles (100 GWh)

Detailed overview electricity taxes for peak load profiles (100 GWh)



Appendices

Benchmark methodology

Market prices

The market prices are consistently calculated in accordance with the following assumptions, validated and approved by Febeliec

Use of market quotations:

- Market prices for 2013 and 2014 are calculated on a combination of spot and forward market prices whereby prices for Year N are determined as follows:
 - 50% of the total market price is determined as the average of the (end of day) market prices for year ahead forwards over the period 1/1/N-1 to 31/12/N-1.
 - 35% of the total market price is determined as the average of the (end of day) market prices for month ahead forwards over the period 1/12/N-1 to 30/11/N
 - 15% of the total market price is determined as the average of the (end of) day ahead spot price for the period 31/12/N-1 to 30/12/N
- Market prices for 2015 are calculated as the average of the (end of day) market prices for year ahead forwards over the period 1/1/2014 to 31/12/2014.
- The following sources for market prices were used for the different jurisdictions:
 - Flanders and Wallonia: Belpex (day ahead) and Endex (month ahead and year ahead). As no peak load future prices are available for delivery on the Belgian Market a proxy is used consisting of the adjusted average of future prices for delivery on the Dutch and French market. The adjustment consists of a factor representing the relation between forward base load prices in Belgium compared to the respective base load prices in France and the Netherlands.
 - Netherlands: APX (day ahead) and Endex (month ahead and year ahead).
 - France: Powernext day ahead spot prices and EEX future prices (month and year ahead).
 - Germany: Epex day ahead spot prices and EEX future prices (month and year ahead).

Benchmark methodology

Market prices

Use of regulated prices in France

- The market prices for France have been determined taking into account both spot prices and the applicable regulated rates (based on “la Nouvelle Organisation du marché de l’électricité (La Loi NOME) and “L’Accès Régulé à l’Électricité Nucléaire Historique” (La Loi ARENH).
- Industrial consumers in France have access to regulated wholesale electricity prices for their base load consumption volumes (with a max threshold). In practice this means that the percentage of the power that can be sourced at such regulated tariffs heavily depends on the consumption profile of the consumer. Full base load profiles or profiles will benefit the most. For peak load profiles, the benefit is rather limited.
- In this study, market prices in France have been determined using the following combination of regulated and market prices:
 - For a base load profile: 95% ARENH rates and 5% market quotations
 - For a peak load profile: 15% ARENH rates and 85% market quotations
- ARENH rates amount to 42 EUR/MWH for 2013, 2014 and 2015. In this study an increase of 0,5 EUR/MWH is added as a margin for the supplier.
- Market prices are determined as described in the previous slide.

Benchmark methodology

Network costs

- Network costs relate to the regulated tariffs applied by the transmission grid operators (TSO's) for the transport of electricity over the transmission network. In order to determine benchmark rates, the following assumptions have been included as validated and approved by Febeliec:
 - *A connection with ≥ 70 KV (no connection to the distribution network);*
 - *The subscribed capacity of the connection point was determined by adding a 10% contingency to the theoretical peak power levels;*
 - *The total energy taken off the grid on a yearly basis.*
- Only fixed connection costs are included for one meter per access point. No additional fee or one-off costs are included for connection equipment (e.g. transformers, switches, ...).
- For Belgium (where network losses are billed by the supplier), a fee equal to 1% of the market price is added to the network tariff in order to ensure comparable rates with other countries in scope where network losses are part of the network tariff.
- No seasonal rates are applied.
- For Germany we used the average of the rates of all 4 TSO's active on the German territory.
- For Germany and the Netherlands it is assumed that the base load profiles exceed the 8.000 hours (grid use) minimum threshold required to get a full discount of 90% on the network costs.
- The reduction in grid tariffs in France for certain energy intensive base load consumers is included as of 1/8/2014 in the benchmark study and for the full year in 2015. We note however that tariffs in France are only approved up to 1/8/2015.

Compensation for indirect emissions

Impact on electricity costs

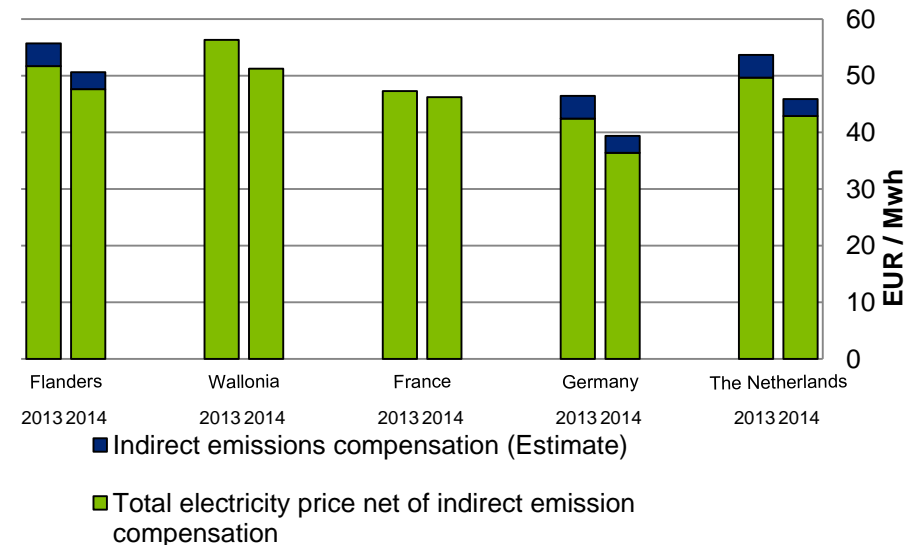
We note that the emission trading scheme (ETS) in the EU has a significant impact on electricity prices. Since the spot commodity market price for electricity is determined by the variable cost of the marginal generation unit (i.e. including the CO₂ cost), the electricity price includes the cost of CO₂ whenever a carbon-emitting plant is marginal. The EU has recognized this effect and the impact it might have on the competitiveness of electricity consumers, and has therefore under certain circumstances allowed for compensation mechanisms at member state level.

Since the start of the 2nd phase (2013-2020) of the ETS in the EU (and although the impact already existed in the first phase in 2008-2012), member states can compensate certain industrial consumers for the impact of indirect emissions. This is only allowed for industrial activities that are at the same time energy intensive and exposed to global competition, and these activities are explicitly listed on the so-called indirect carbon-leakage list. The compensation is however lower than the effective impact of the CO₂ cost on the electricity price, given that it is based on an electricity consumption benchmark of the best performing plants in each sector and this value is then capped at 85% and degressive in time.

For the countries in the scope of the study, Germany, the Netherlands and Flanders have introduced a compensation scheme for carbon leakage activities while Wallonia and France do not provide compensations. The approved schemes need clearance from the European Commission and have to satisfy a certain number of strict criteria. Although the compensation mechanisms in these countries converge largely, it is not possible to calculate the specific impact on the electricity cost for the defined consumer profiles without further and very detailed assumptions. The impact is therefore not included in the results of the benchmark study.

From a high level perspective and for those activities that can benefit from the compensation, the impact of the compensation on the electricity price in Flanders, Germany and the Netherlands can be estimated at approximately 3,5 - 4,5 €/MWh for 2013 and 2,5 - 3,5 €/MWh for 2014.

Impact Indirect emissions compensation on total Electricity price (base load (1000 GWh))



Benchmark methodology

Electricity Taxes

Electricity Taxes relate to all taxes and other levies that are to be paid by the industrial electricity consumer in addition to market price and network costs. In order to determine benchmark rates, the following assumptions have been included which were validated and approved by Febeliec:

- VAT is not applied as it is not considered to be a cost element for these industrial consumers.
- For Flanders we assumed that 85% of the theoretical cost of green certificates (e.g. electricity produced by renewable solar power and cogeneration plants) is charged through by the supplier to the industrial consumer.
- For Flanders and Wallonia regional service obligations are due on 30-70 kV network (and not on 150 kV).
- We note that a political agreement exists for a reduction of the public service obligation tariff in Wallonia. As actual implementation is still pending, the projected tariff reduction is not yet applied in practice and therefore not included in this benchmark study.
- For the CSPE (Contribution au Service Public de l'Electricité) cap in France, we assumed that the 627 kEUR cap is applicable (instead of the 0,5% of the added value cap).
- For The Netherlands it is assumed that an '*Energie akkoord*' is signed
- For Germany we assumed that
 - *A reduced EEG umlage applies with a floor of 1 EUR/MWh (i.e. consumer qualifies as electricity intensive) and,*
 - *That the exemption for the Konzessionabgabe is applicable (i.e. electricity price paid by the consumer is lower than the "Grenzpreise" threshold determined at 128,4 EUR/MWh for 2015).*

Components of Electricity taxes (1/2)

Flanders

In Flanders the following federal and regional taxes and levies are currently applicable:

- The federal contribution which raises money to:
 - Cover the costs related to the CREG (Belgian regulator for energy market)
 - Fund the decommissioning of the Mol-Dessel nuclear site
 - Support policies to reduce greenhouse gases in line with Kyoto
 - Fund public service obligations related to energy deliveries to financially vulnerable consumers
 - Fund a heating premium for an allowance to eligible consumers
- Federal offshore wind contributions (cable and certificates)
- Regional contribution to purchase Green (GSC) and Cogen (WKK) certificates at guaranteed minimum prices
- Regional public service contributions.
- Federal levy for holding and maintaining a strategic generation capacity

Wallonia

In Wallonia the following federal and regional taxes and levies are identified:

- The federal contribution which raises money to:
 - Cover the costs related to the CREG (Belgian regulator for energy market)
 - Fund the decommissioning of the Mol-Dessel nuclear site
 - Support policies to reduce greenhouse gases in line with Kyoto
 - Fund public service obligations related to energy deliveries to financially vulnerable consumers
 - Fund a heating premium for an allowance to eligible consumers
- Federal offshore wind contribution
- Regional contribution to purchase Green certificates (CV)
- Regional contribution to connect to the transport system (Redevance de raccordement au réseau)
- Regional public service contributions
- Federal levy for holding and maintaining a strategic generation capacity

Components of Electricity taxes (2/2)

France

In France the following federal and regional taxes and levies are identified :

- CTA: the “Contribution Tarifaire d’Acheminement”. This contribution depends on the network costs. As the network costs depend on the type of profile, this contribution is different for Base load and Peak load profiles. It is the only component of the taxes that depends on the type of profile.
- CSPE: the “Contribution au Service Public de l’Electricité” has to cover the costs of the public service assignments (development of renewable power generation, of the social electricity tariffs and of the nationwide harmonization of electricity tariffs)
- TCFE: the “Taxe sur la consommation finale d’électricité” replaced the different local taxes that existed before.

Germany

In Germany the following federal and regional taxes and levies are identified:

- Stromsteuer: general tax on energy consumption
- Konzessionablage consists of a concession fee to local authorities (communes) that is due for low and medium high voltage connections.
- EEG-Umlage intends to increase the market penetration of electricity produced from renewable energy in accordance with the Renewable Energy Act
- KWK-Umlage intends to promote electricity produced from combined heat and power (CHP) plants, according to the Combined Heat and Power Act
- StromNEV-Umlage: electricity grid charge compensating the lost revenue from TSOs that need to apply the grid fee exemptions
- Offshore-Haftungsumlage finances the costs relating to Germany's shift from nuclear to green energies
- Umlage Abschaltbare lasten relates to a levy for the costs related interruptibility payments .

The Netherlands

In the Netherlands the following federal and regional taxes and levies are identified:

- The regulerende Energie Belasting (REB) is a tax which intends to improve the rational use of energy.
- The ODE tax (Wet Opslag Duurzame Energie) is a tax that is intended to finance the support for the production of renewable energy.



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