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Accompanying the document

**REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE
COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE
COMMITTEE OF THE REGIONS**

Energy prices and costs in Europe

{ COM(2016) 769 final }

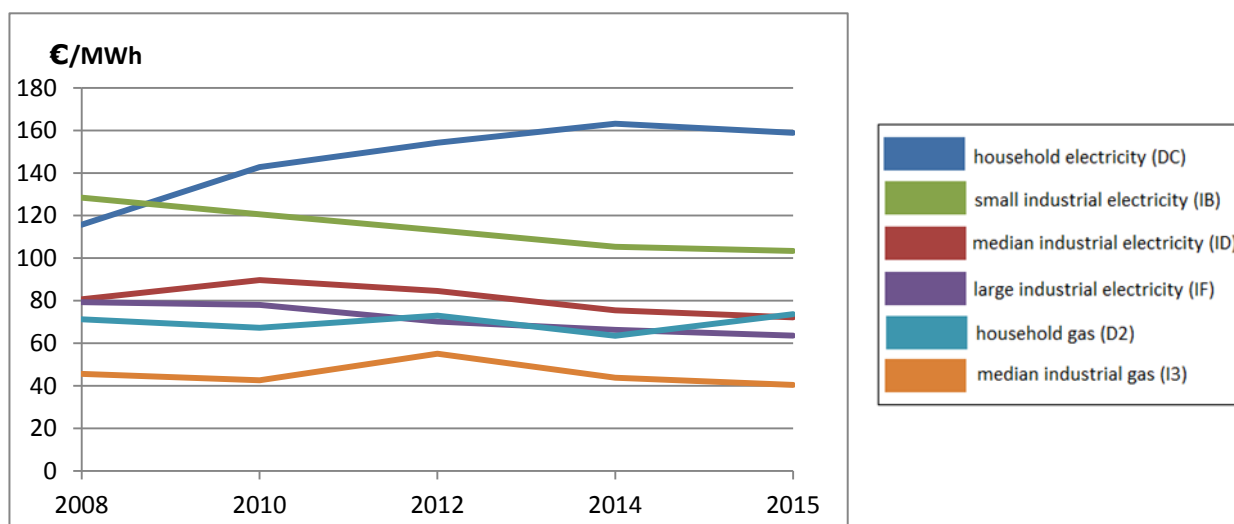
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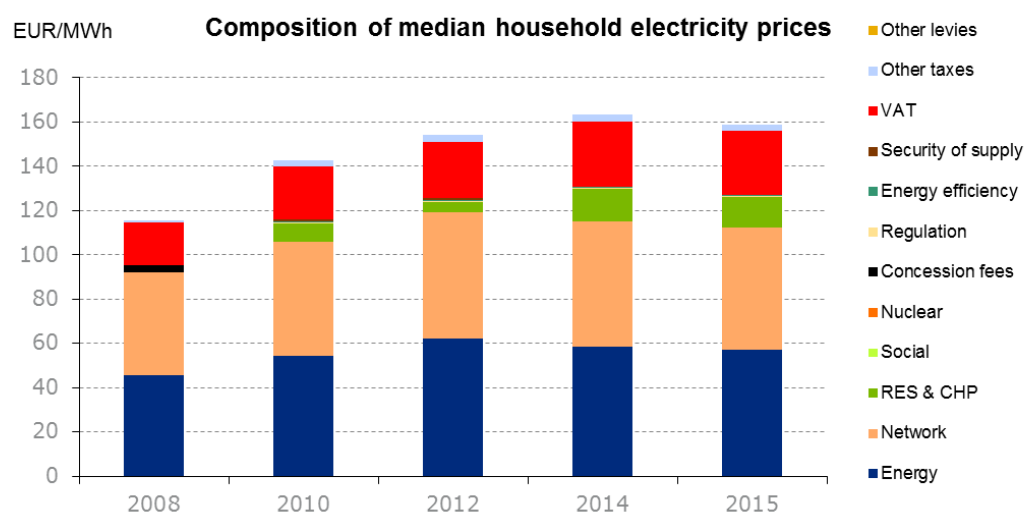
Slovenia

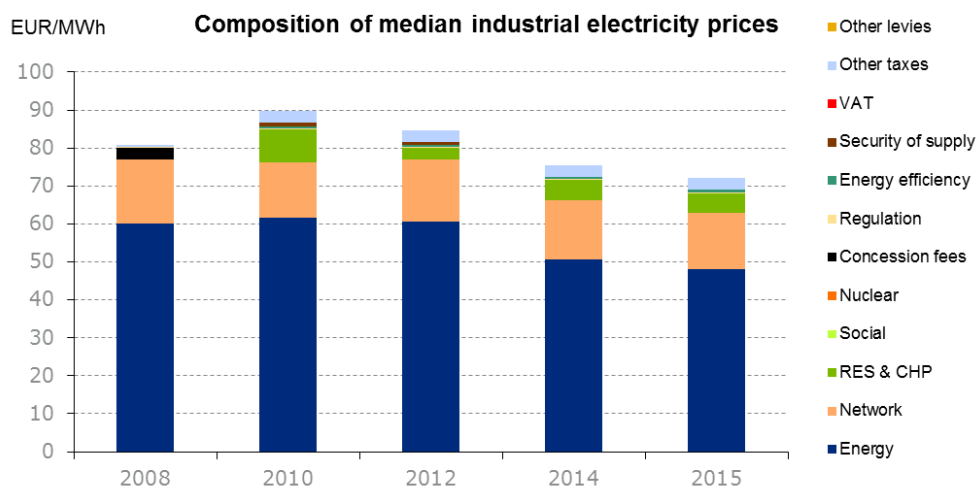


Evolution of electricity and natural gas prices

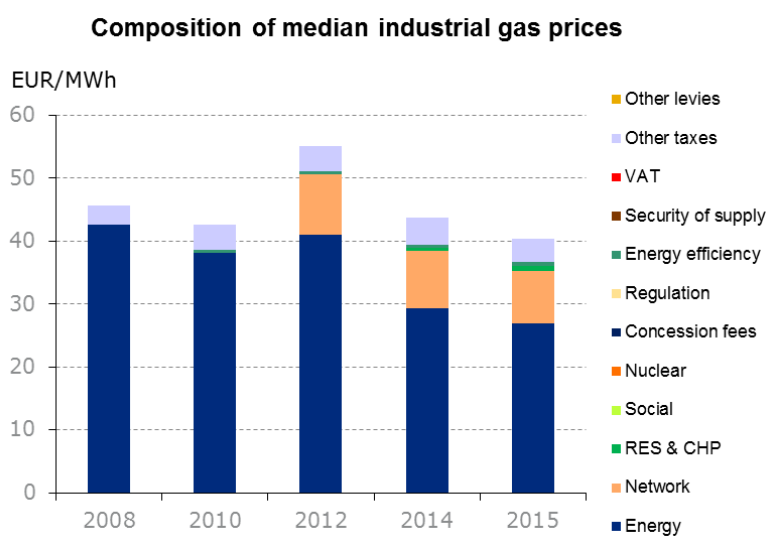
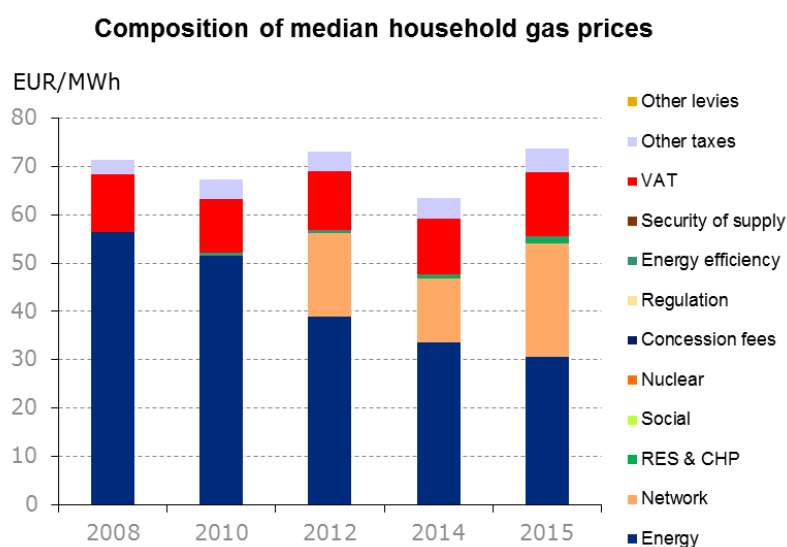


Composition of electricity prices



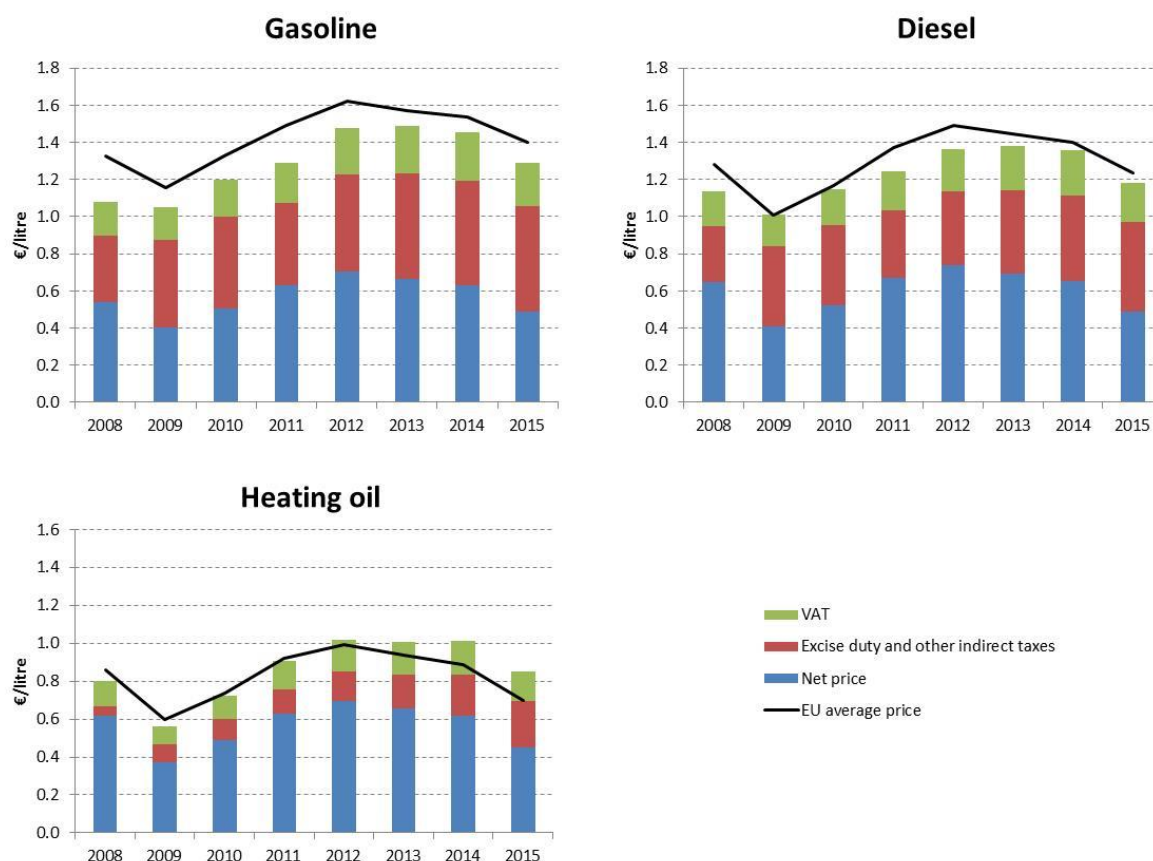


Composition of gas prices¹

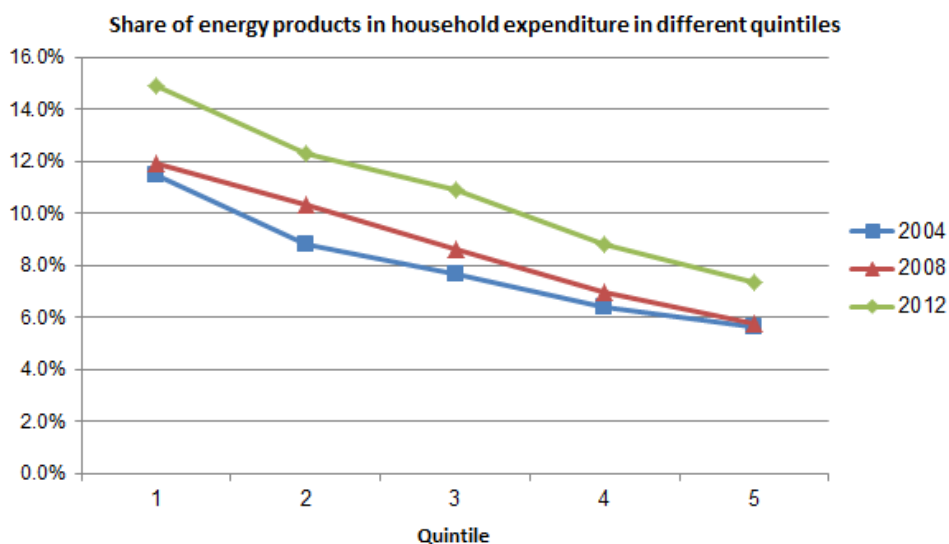


¹ Combined energy and network component for the years 2008 and 2010

Oil products prices

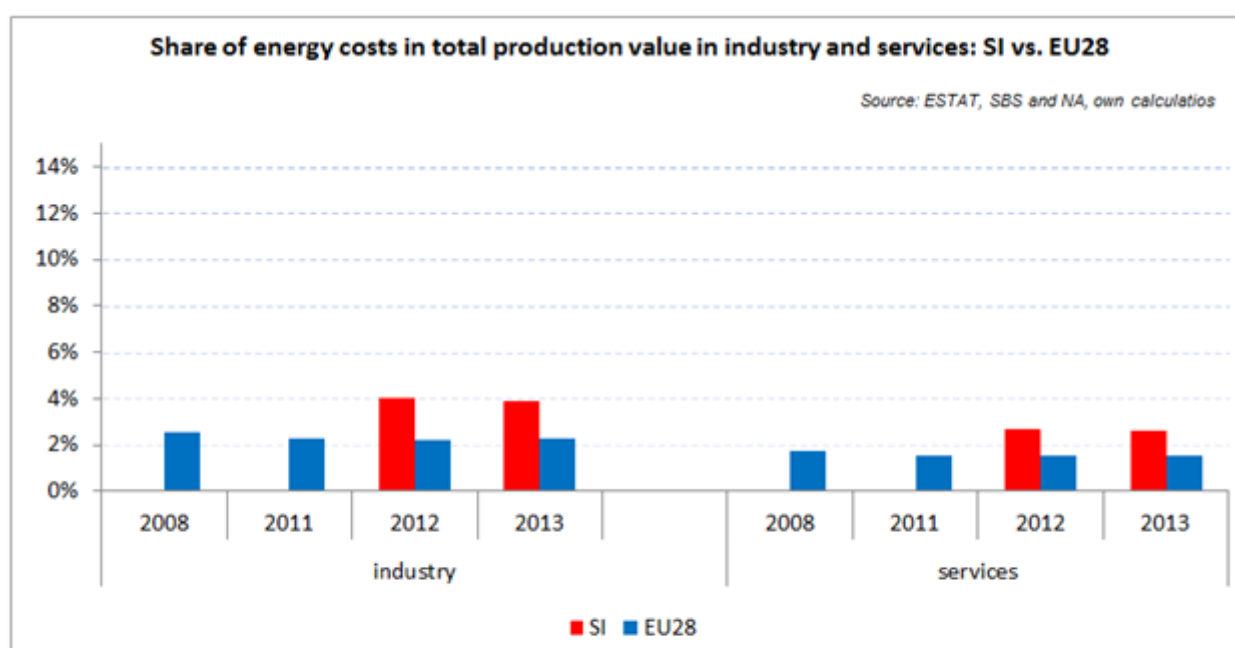


Energy in Households budgets



In Slovenia the share of energy in total household expenditure rose measurably between 2004 (blue line) and 2012 (green line): in the case of the poorest households (Quintile 1) it went up from 11.5% to 14.9%, while in the case of households with middle income (Quintile 3) it rose from 7.6% to 10.9%.

Energy costs shares in total production costs



Notes

Data for Malta, Poland, Slovenia (prior to 2012) and Ireland (after 2012) is not available

Data for 2009 and 2010 is incomplete and not reported

Industry defined as NACE Rev.2 Section C (Manufacturing)

Services defined as NACE Rev. 2 Sections G - U

Electricity and gas prices – Breakdown by price element

Electricity Households (DC)	EUR/kWh
Energy and supply	0.064200
Day-ahead market	
Ancillary services	
Total energy component	0.064200
Distribution	0.037900
Transmission	0.012900
Total network component	0.050800
Nuclear sector	0.000200
Special tax on electricity consumption	0.009300
Deficit annuity	0.016200
Capacity payments	0.005400
Specific compensation for renewable energy	0.038700
VAT	0.040100
Financing for the NRA	0.000100
Island compensation	0.003900
Financing of system and market operators	0.000100
Energy security and generation adequacy	0.002000
Other costs	
Total taxes & levies component	0.116000
Total price	0.231000

Electricity Industry (ID)	EUR/kWh
	2015
Energy and supply	0.054100
Day-ahead market	
Ancillary services	
Total energy component	0.054100
Distribution	0.010500
Transmission	0.003600

Total network component	0.014100
Nuclear sector	0.000100
Special tax on electricity consumption	0.004700
Deficit annuity	0.004500
Capacity payments	0.005400
Specific compensation for renewable energy	0.010800
VAT	0.000000
Financing for the NRA	0.000100
Island compensation	0.001100
Financing of system and market operators	0.000100
Energy security and generation adequacy	0.002000
Other costs	
Total taxes & levies component	0.028800
Total price	0.097000

Natural Gas Households (D2)	EUR/kWh
Energy and supply	0.031772
Total energy component	0.031772
Conduction	0.030115
Capacity reserve	0.000420
Total network component	0.030535
VAT	0.013576
Hydrocarbons tax	0.002340
Total taxes & levies component	0.015916
Total price	0.078223

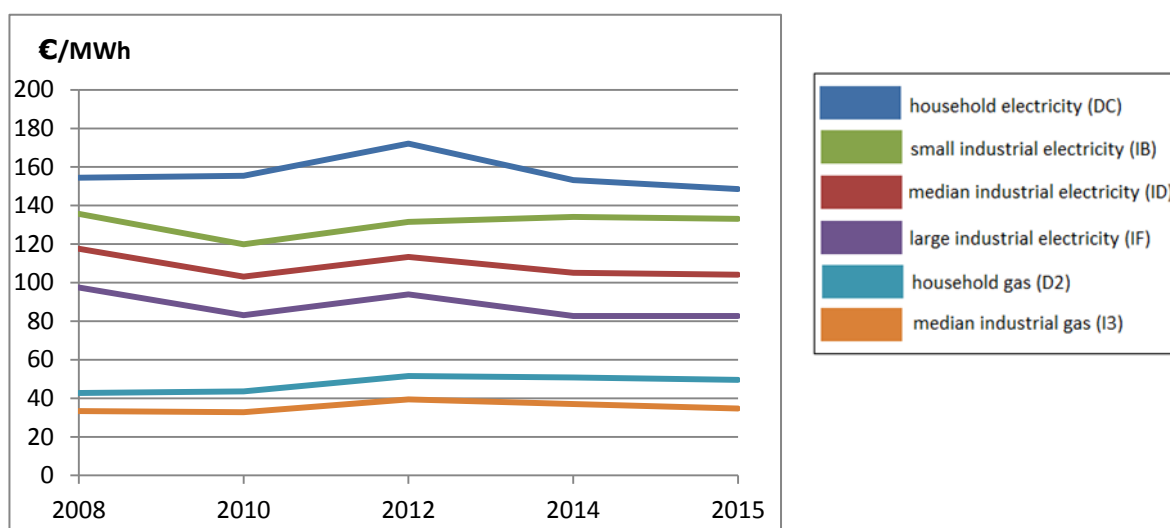
Natural gas Industry (I3)	EUR/kWh
	2015
Energy and supply	0.030487

Total energy component	0.030487
Conduction	0.003169
Capacity reserve	0.000420
Total network component	0.003589
VAT	0.000000
Hydrocarbons tax	0.000540
Total taxes & levies component	0.000540
Total price	0.034616

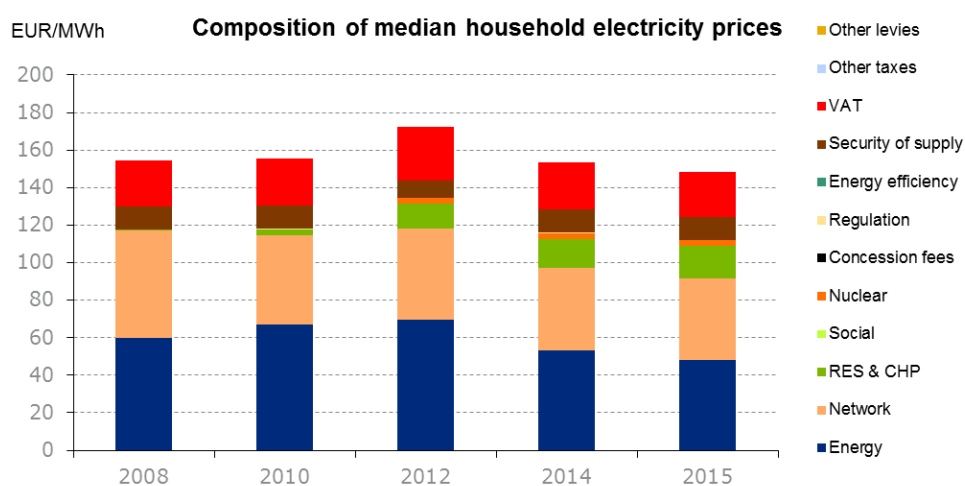
Slovakia

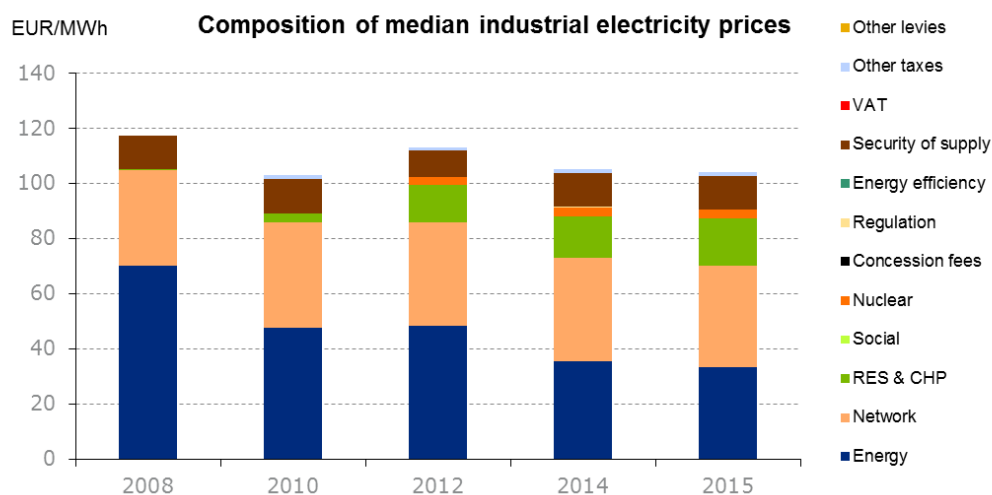


Evolution of electricity and natural gas prices

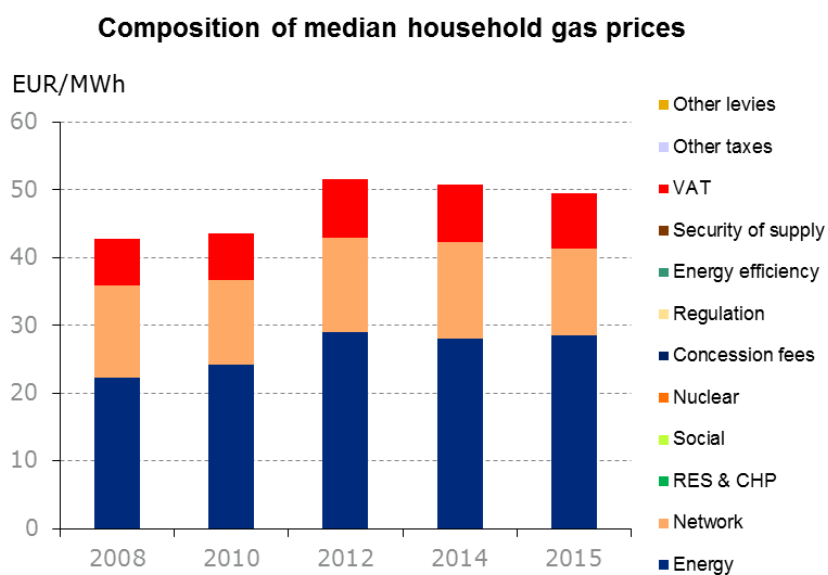
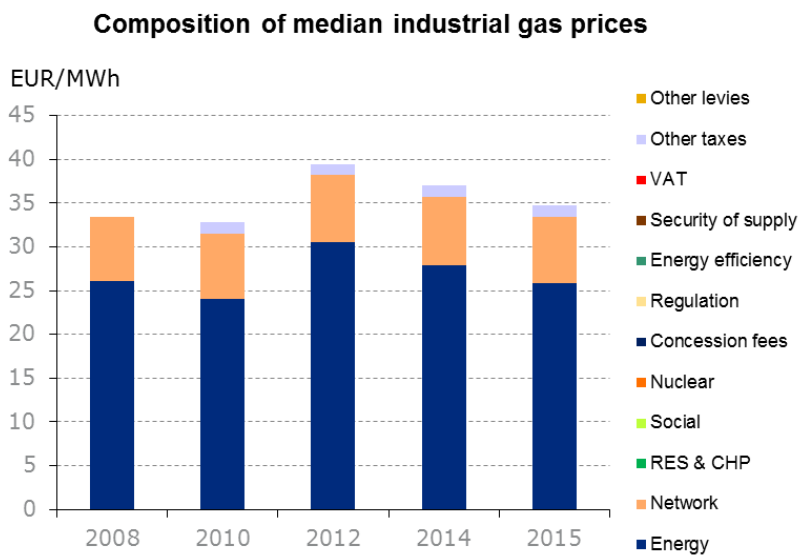


Composition of electricity prices

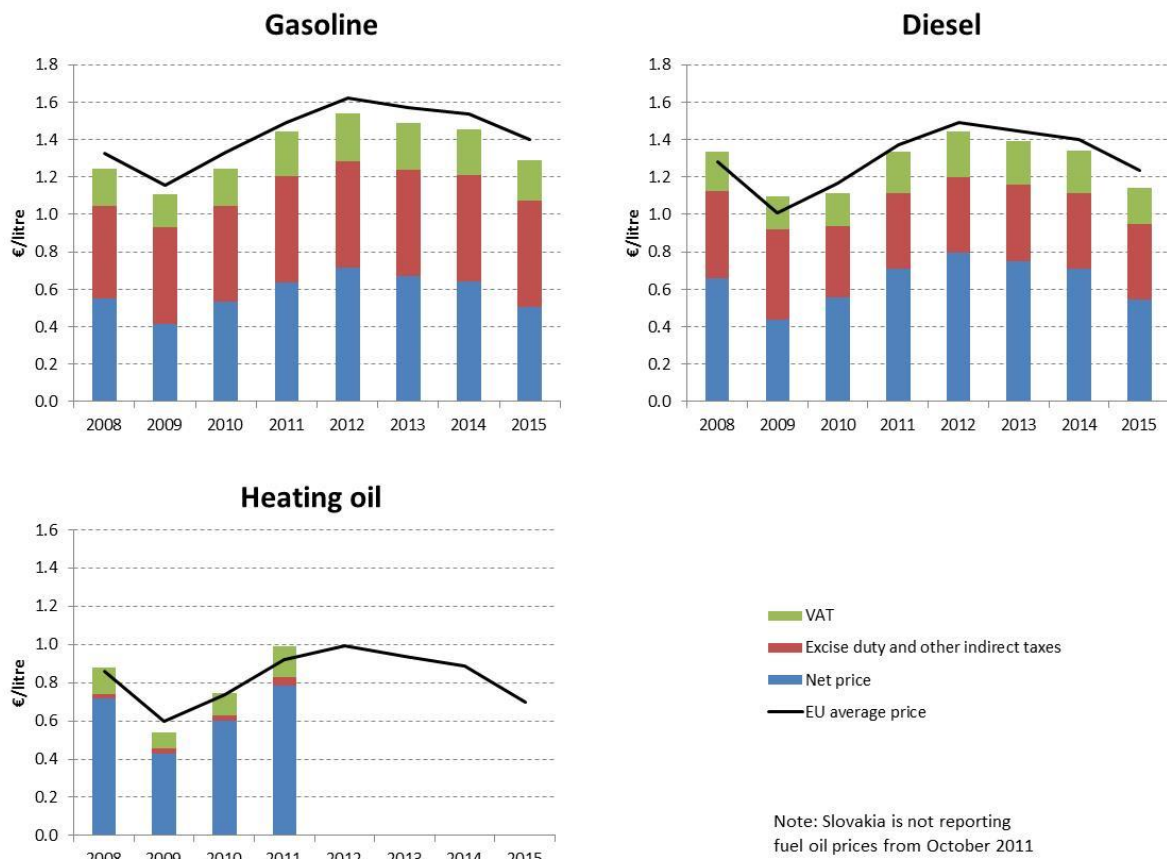




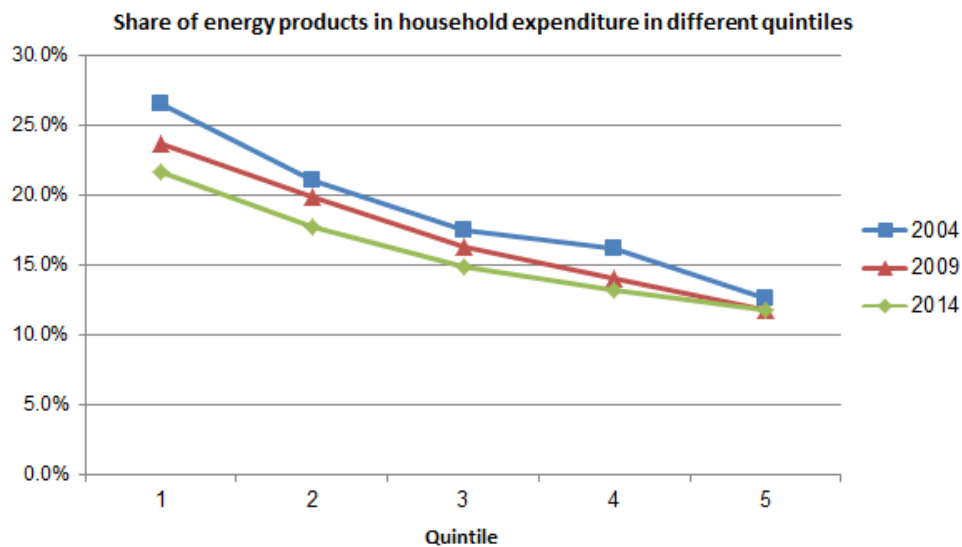
Composition of gas prices



Oil products prices

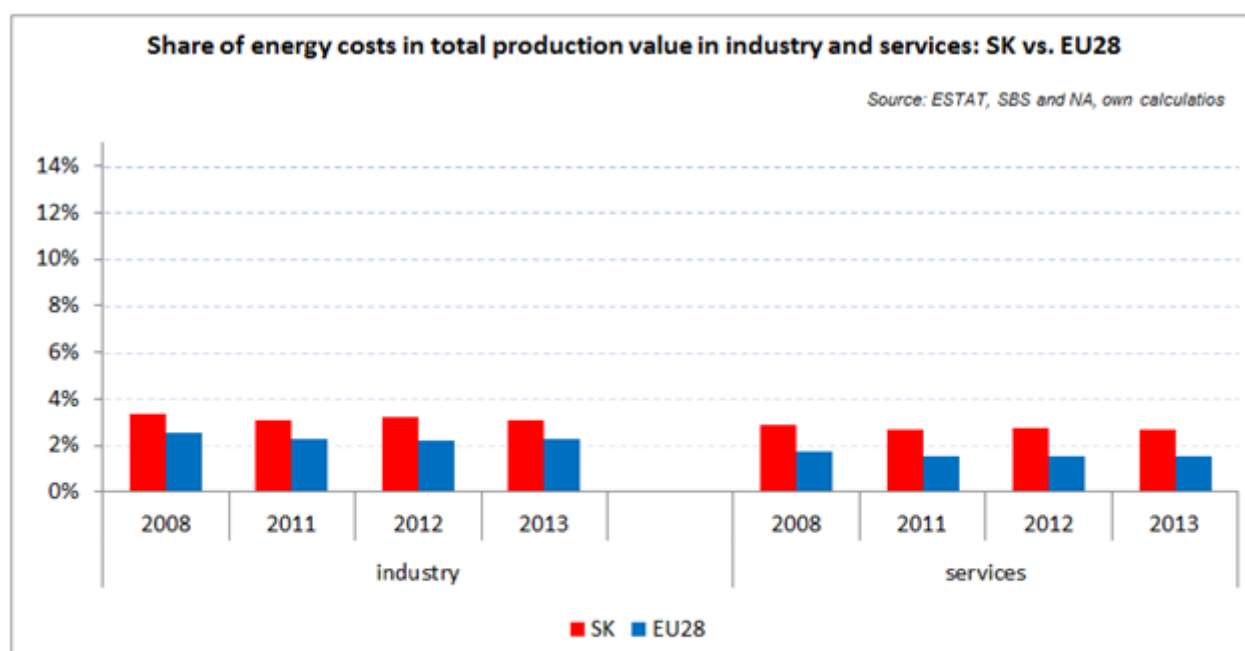


Energy in Households budgets



In Slovakia the share of energy in total household expenditure, being the highest in EU comparison, decreased significantly between 2004 (blue line) and 2014 (green line). In the case of the poorest households (Quintile 1) it went down from 26.5% to 21.7%, while in the case of households with middle income (Quintile 3) it decreased from 17.5% to 14.8%.

Energy costs shares in total production costs



Notes

Data for Malta, Poland, Slovenia (prior to 2012) and Ireland (after 2012) is not available

Data for 2009 and 2010 is incomplete and not reported

Industry defined as NACE Rev.2 Section C (Manufacturing)

Services defined as NACE Rev. 2 Sections G - U

Electricity and gas prices – Breakdown by price element

Band DC	EUR/kWh 2015
Energy and supply	0.048100
Total energy component	0.048100
network	0.043500
Total network component	0.043500
Support for RES and CHP combined	0.000000
promotion of production from domestic coal	0.004400
market operator	0.000300
RES promotion	0.014300
Support for combined heat and power (CHP)	0.002800
national nuclear fund	0.003200
ancillary services tariff	0.007700
VAT	0.024200
Total taxes & levies component	0.056900
Total price	0.148500

Band ID	EUR/kWh 2015
Energy and supply	0.033400
Total energy component	0.033400
network	0.036700
Total network component	0.036700
Support for RES and CHP combined	0.000000
promotion of production from domestic coal	0.004400
market operator	0.000300
RES promotion	0.014300
Support for combined heat and power (CHP)	0.002800
national nuclear fund	0.003200
ancillary services tariff	0.007700
VAT	0.000000
excise tax	0.001300
Total taxes & levies component	0.034000
Total price	0.104100

Band D2	EUR/kWh
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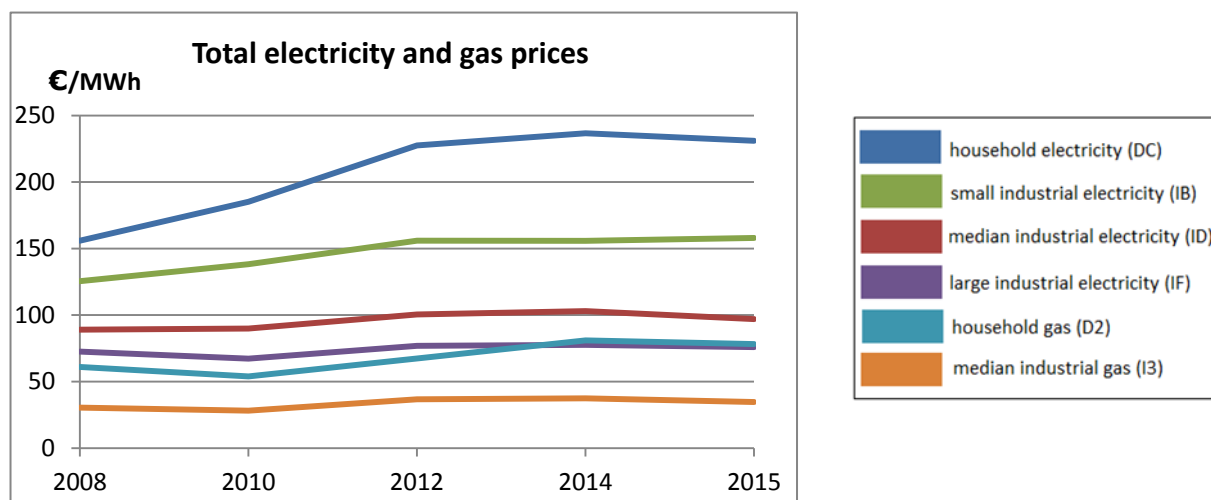
	2015
Energy and supply	0.028497
Total energy component	0.028497
network	0.012832
Total network component	0.012832
VAT	0.008269
Total taxes & levies component	0.008269
Total price	0.049599

Band I3	EUR/kWh 2015
Energy and supply	0.025817
Total energy component	0.025817
network	0.007628
Total network component	0.007628
VAT	0.000000
excise tax	0.001296
Total taxes & levies component	0.001296
Total price	0.034741

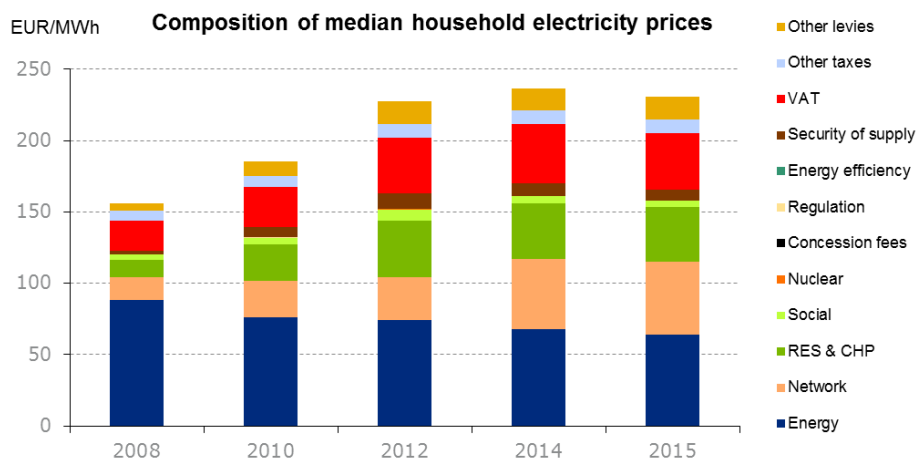
Spain

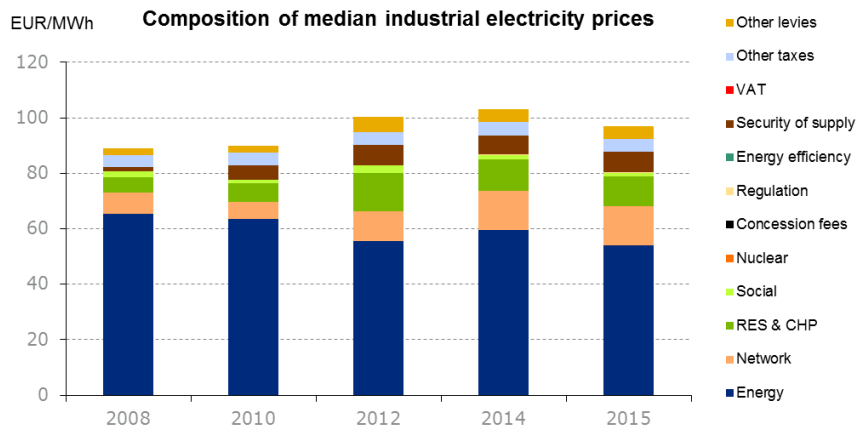


Evolution of electricity and natural gas prices



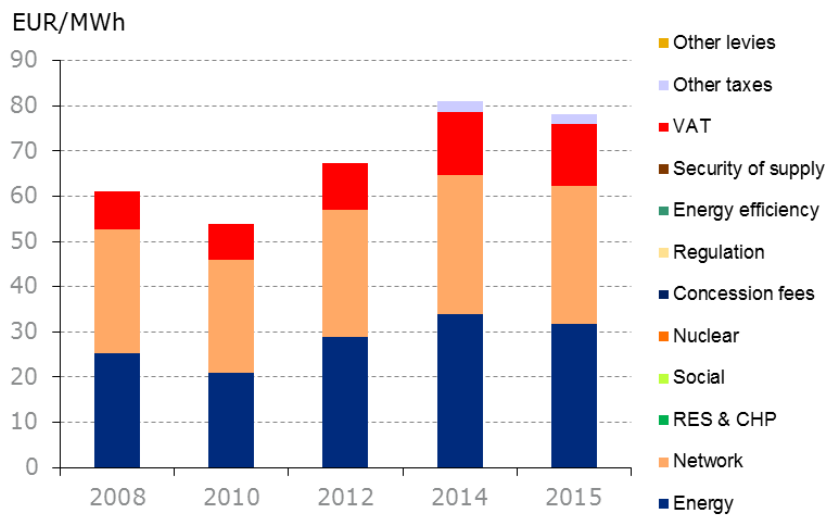
Composition of electricity prices



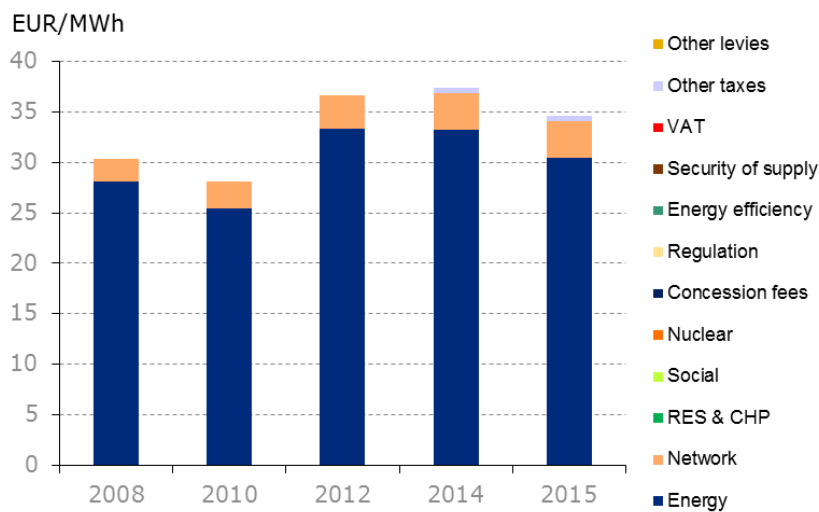


Composition of gas prices

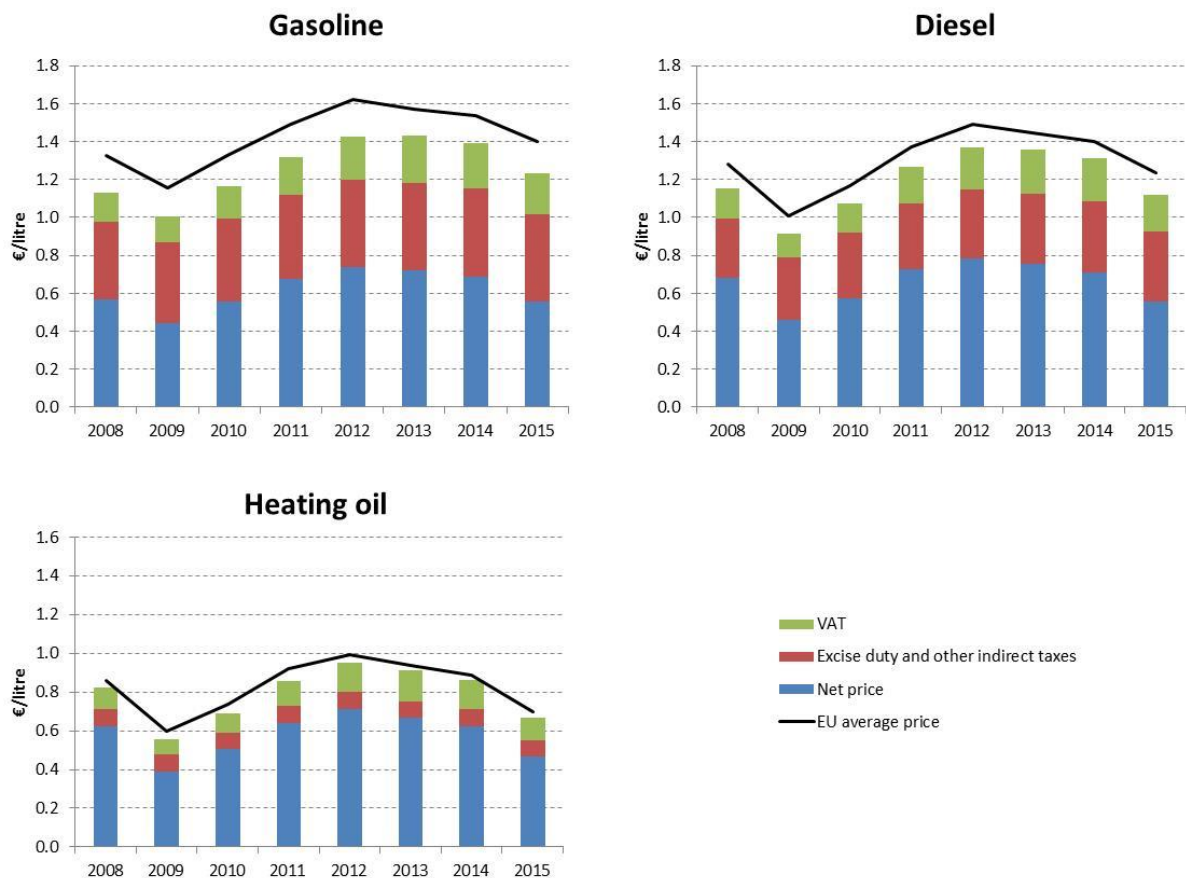
Composition of median household gas prices



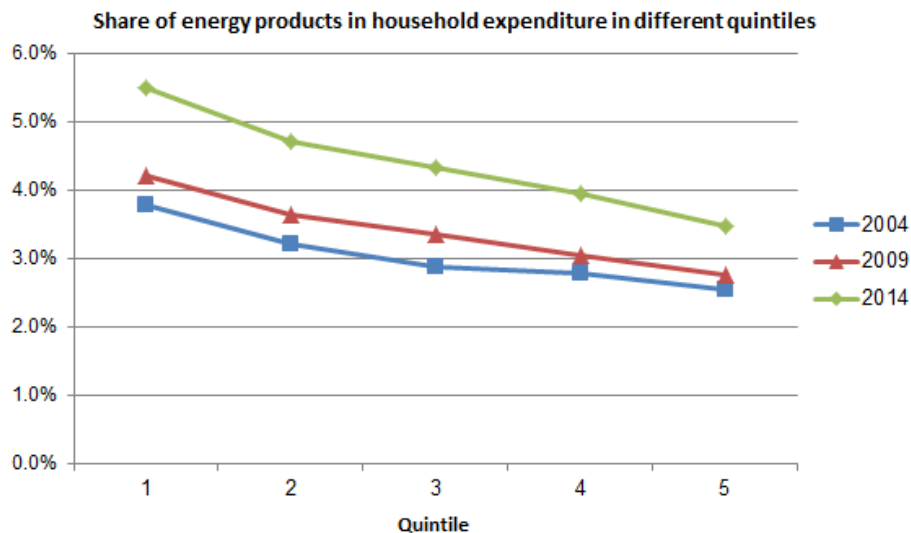
Composition of median industrial gas prices



Oil products prices

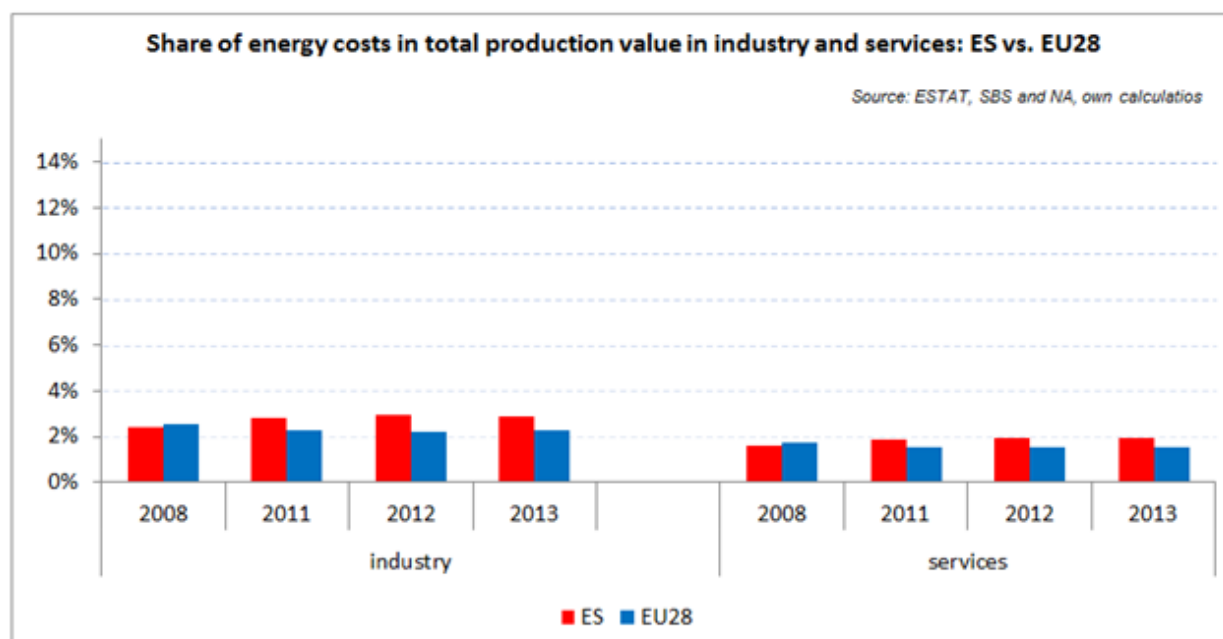


Energy in Households budgets



Between 2004 (blue line) and 2014 (green line) the share of energy in total household expenditure rose by 1-1.7% in all income quintiles in Spain. In the case of the poorest households (Quintile 1) it went up from 3.8% to 5.5%, whereas for households with middle income (Quintile 3) it rose from 2.9% to 4.3%.

Energy costs shares in total production costs



Notes

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Services defined as NACE Rev. 2 Sections G - U

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Electricity Households (DC)	EUR/kWh
Energy and supply	0.064200
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Ancillary services	
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Distribution	0.037900
Transmission	0.012900
Total network component	0.050800
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Deficit annuity	0.016200
Capacity payments	0.005400
Specific compensation for renewable energy	0.038700
VAT	0.040100
Financing for the NRA	0.000100
Island compensation	0.003900
Financing of system and market operators	0.000100
Energy security and generation adequacy	0.002000
Other costs	
Total taxes & levies component	0.116000
Total price	0.231000

Electricity Industry (ID)	EUR/kWh
	2015
Energy and supply	0.054100
Day-ahead market	
Ancillary services	
Total energy component	0.054100
Distribution	0.010500
Transmission	0.003600

Total network component	0.014100
Nuclear sector	0.000100
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Deficit annuity	0.004500
Capacity payments	0.005400
Specific compensation for renewable energy	0.010800
VAT	0.000000
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Island compensation	0.001100
Financing of system and market operators	0.000100
Energy security and generation adequacy	0.002000
Other costs	
Total taxes & levies component	0.028800
Total price	0.097000

Natural Gas Households (D2)	EUR/kWh
Energy and supply	0.031772
Total energy component	0.031772
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Total price	0.078223

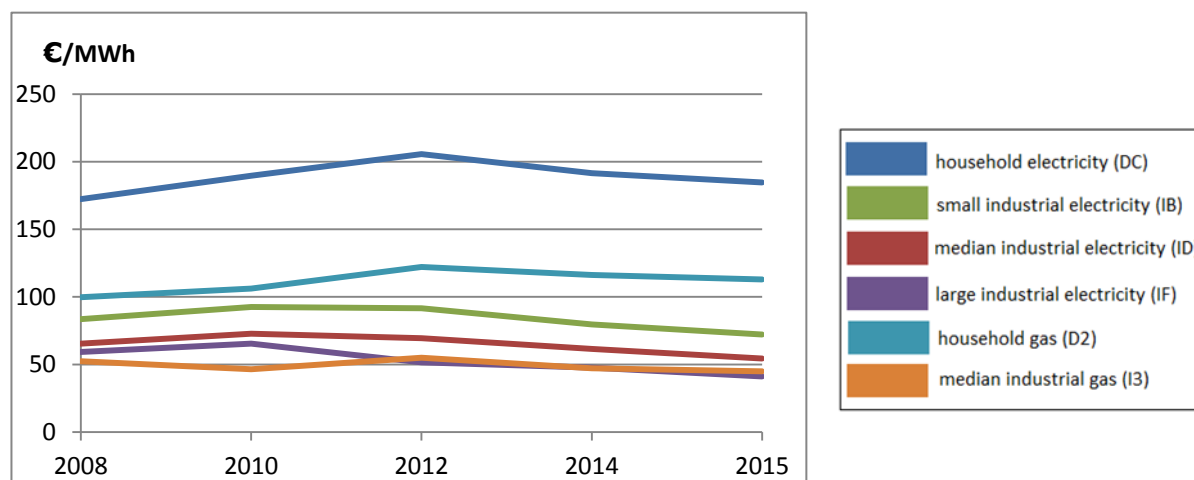
Natural gas Industry (I3)	EUR/kWh
	2015
Energy and supply	0.030487

Total energy component	0.030487
Conduction	0.003169
Capacity reserve	0.000420
Total network component	0.003589
VAT	0.000000
Hydrocarbons tax	0.000540
Total taxes & levies component	0.000540
Total price	0.034616

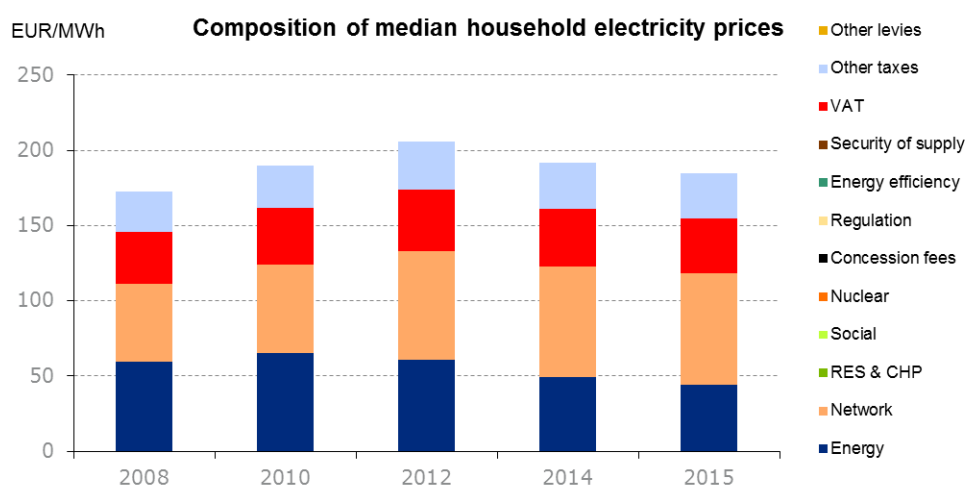
Sweden



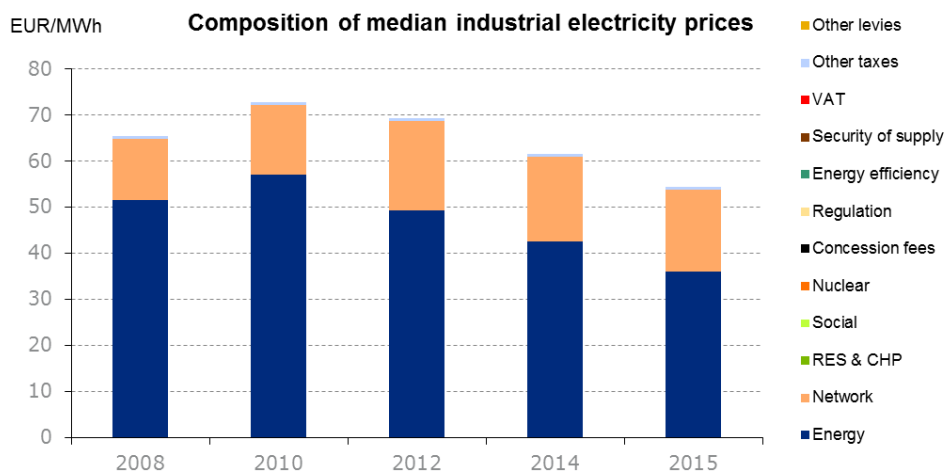
Evolution of electricity and natural gas prices



Composition of electricity prices²

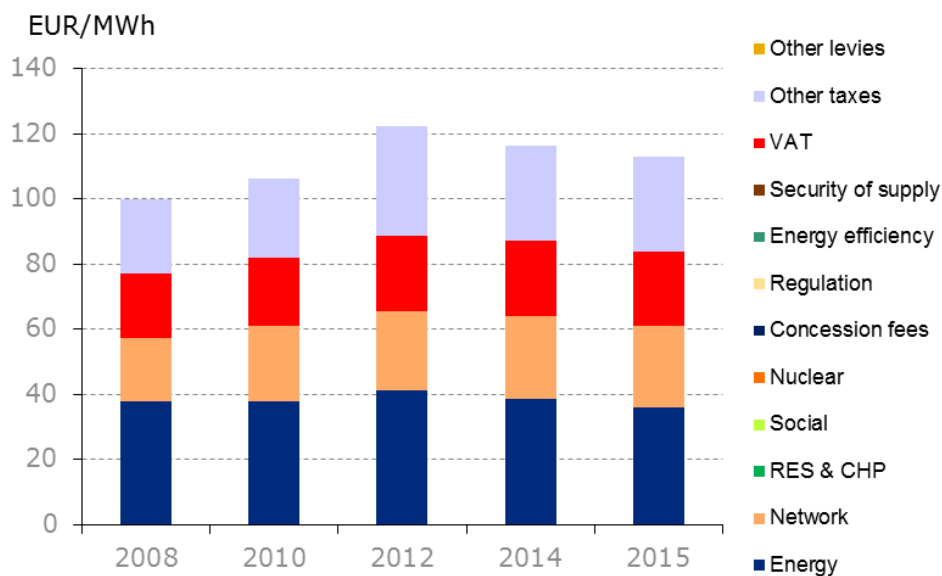


² It is to be noted that Sweden applies a Nuclear Capacity tax. This tax is not allocated to the nuclear sub-component of the taxes & levies main component, as the sub-component contains only costs elements that support the nuclear sector.

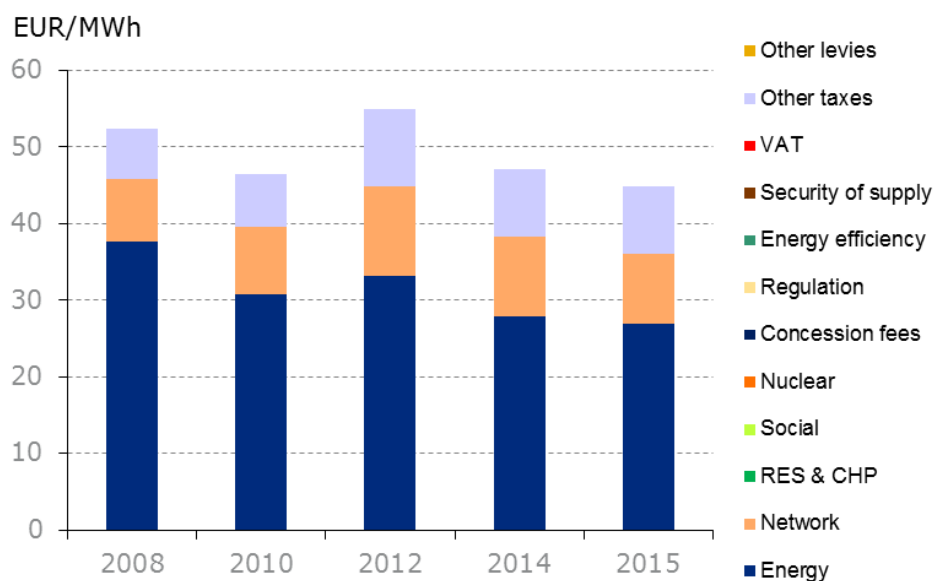


Composition of gas prices

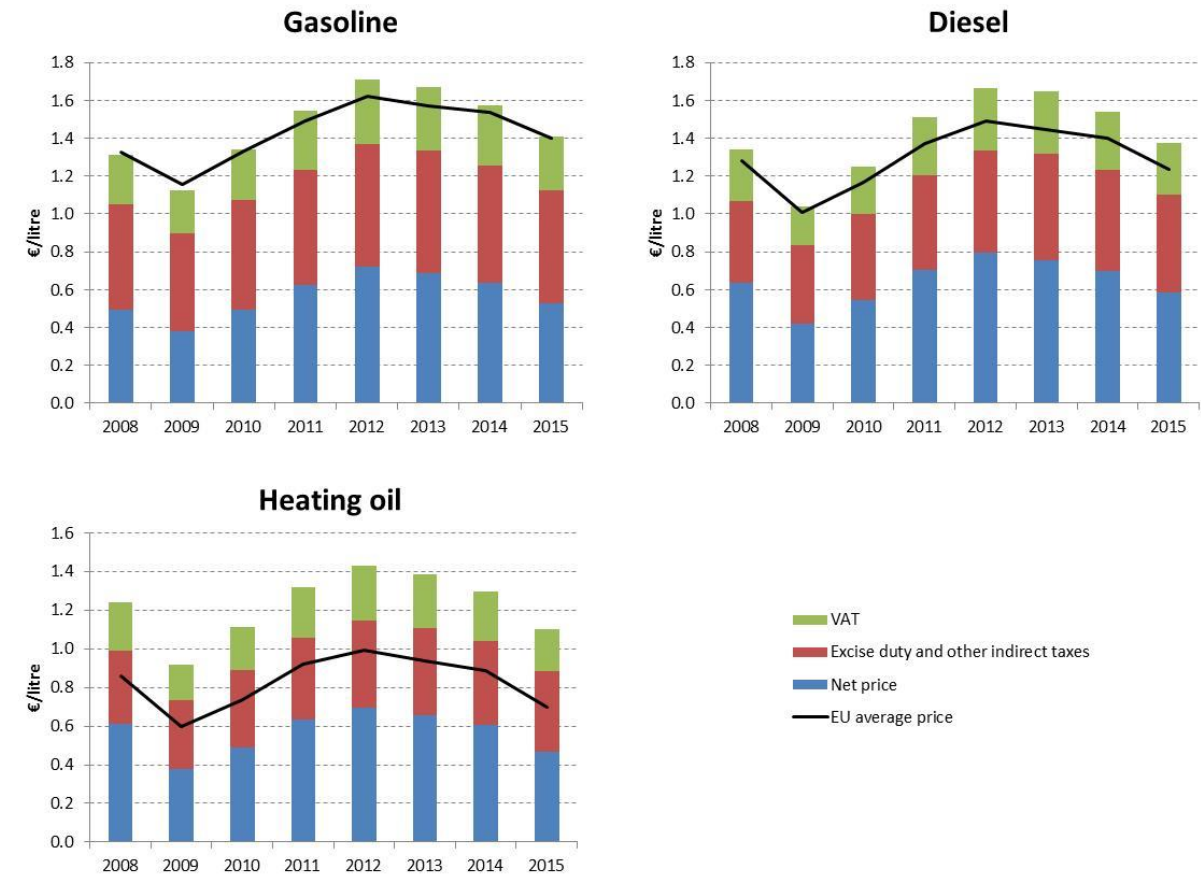
Composition of median household gas prices



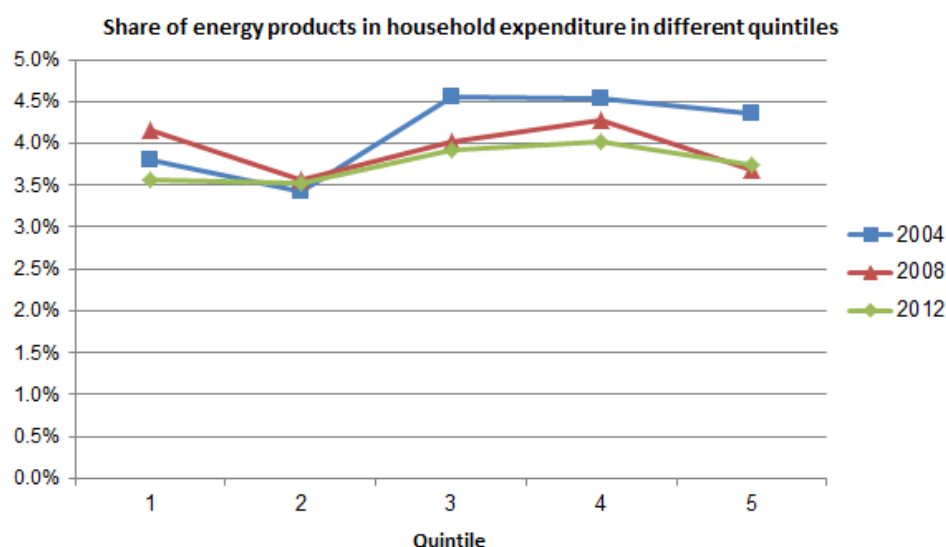
Composition of median industrial gas prices



Oil products prices

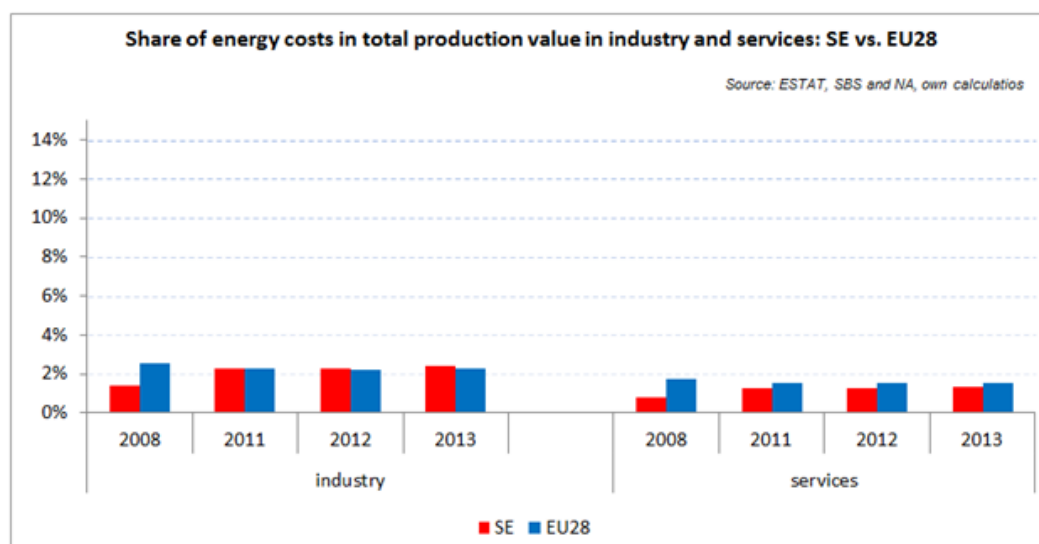


Energy in Households budgets



In Sweden the share of energy in total household expenditure has been low in EU comparison, and between 2004 (blue line) and 2012 (green line), unlike many EU countries, it decreased slightly in most of the income quintiles. In the case of the poorest households (Quintile 1) the energy share slightly went down from 3.8% to 3.6%, while for households with middle income (Quintile 3) it decreased from 4.6% to 3.9%.

Energy costs shares in total production costs



Notes
 Data for Malta, Poland, Slovenia (prior to 2012) and Ireland (after 2012) is not available
 Data for 2009 and 2010 is incomplete and not reported
 Industry defined as NACE Rev.2 Section C (Manufacturing)
 Services defined as NACE Rev. 2 Sections G - U

Breakdown of electricity and natural gas prices by price element

Band DC	EUR/kWh 2015
Energy	0.044006
Total energy component	0.044006
Network	0.074020
Total network component	0.074020
energy taxes	0.029693
VAT	0.036956
Total taxes & levies component	0.066650
Total price	0.184676

Band IB	EUR/kWh 2015
Energy	0.036850
Total energy component	0.036850
Network	0.034713
Total network component	0.034713
energy taxes	0.000534
VAT	0.000000
Total taxes & levies component	0.000534
Total price	0.072097

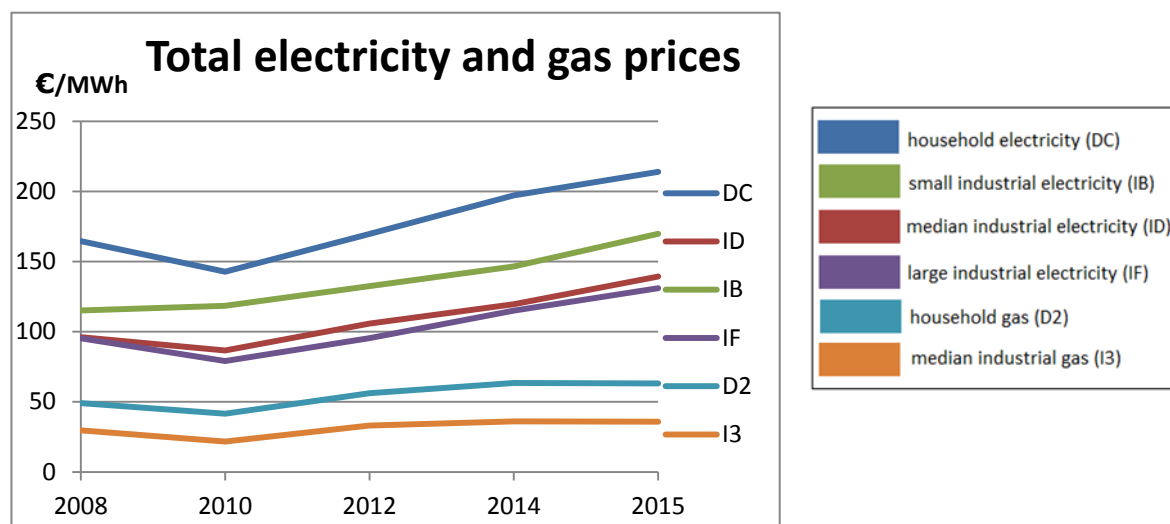
Band D2	EUR/kWh 2015
Energy	0.035888
Total energy component	0.035888
Network	0.025100
Total network component	0.025100
Energy taxes	0.008224
VAT	0.022644
Carbon Tax	0.021042
Total taxes & levies component	0.051910
Total price	0.112899

Band I3	EUR/kWh 2015
Energy	0.026916
Total energy component	0.026916
Network	0.009186
Total network component	0.009186
Energy taxes	0.002457
VAT	0.000000
Carbon Tax	0.006302
Total taxes & levies component	0.008758
Total price	0.044860

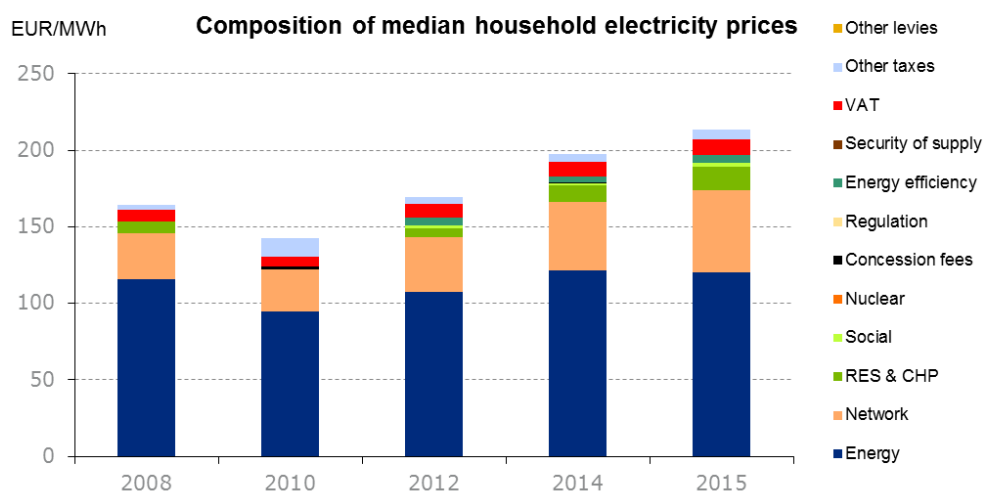
United Kingdom



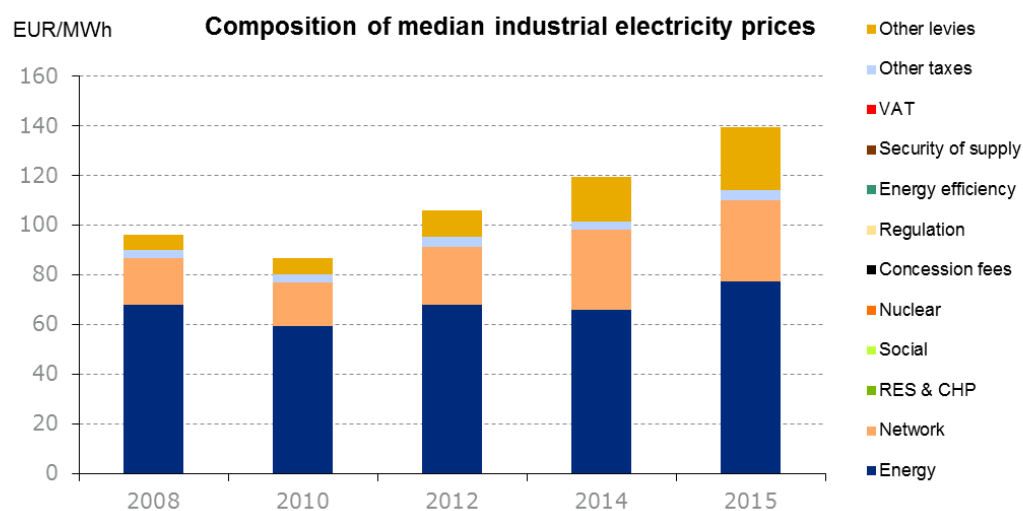
Evolution of electricity and natural gas prices



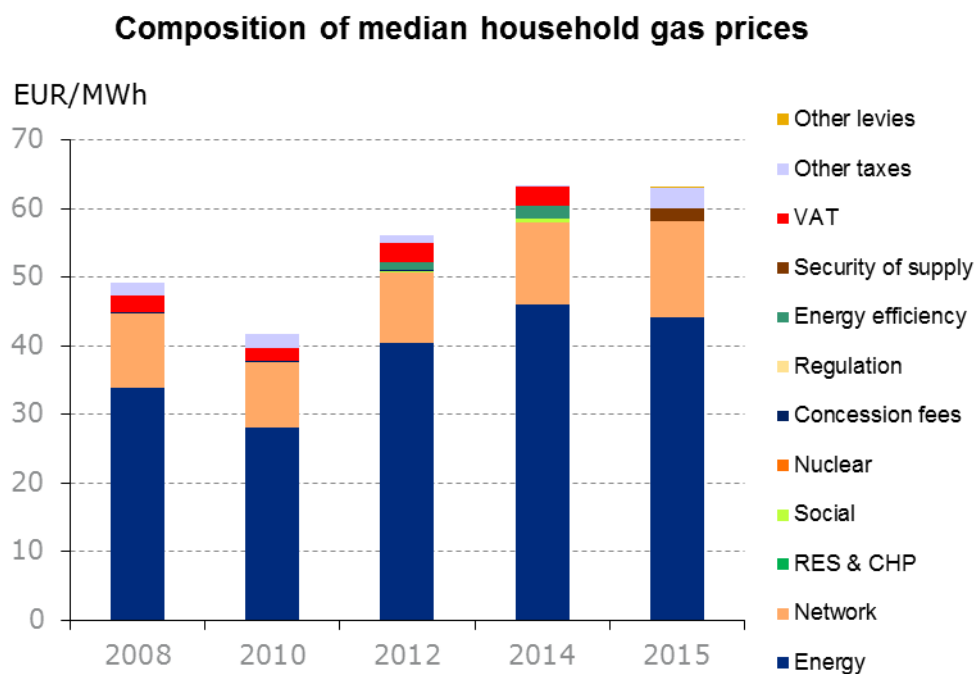
Composition of electricity prices³



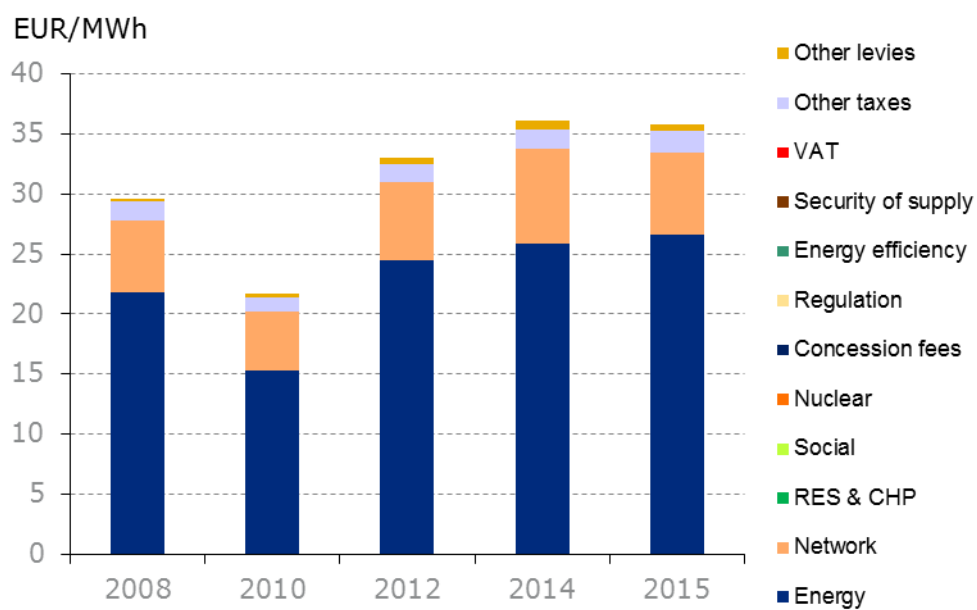
³ The United Kingdom's Warm Home Discount is a redistributive levy. All households pay towards this levy via their gas and electricity bills. All the money collected is recycled back as £140 annual rebates on the electricity bills of eligible low-income and vulnerable households. As such, the net effect of the policy on average dual fuel (gas and electricity) bills is £0. In the current study, only the gross cost is reflected as the rebate only applies to a subset of households. Furthermore, United Kingdom distinguishes EU ETS and Carbon Price Support as taxes on the power generation sector which impact on the wholesale price, from other direct top- up taxes and levies.



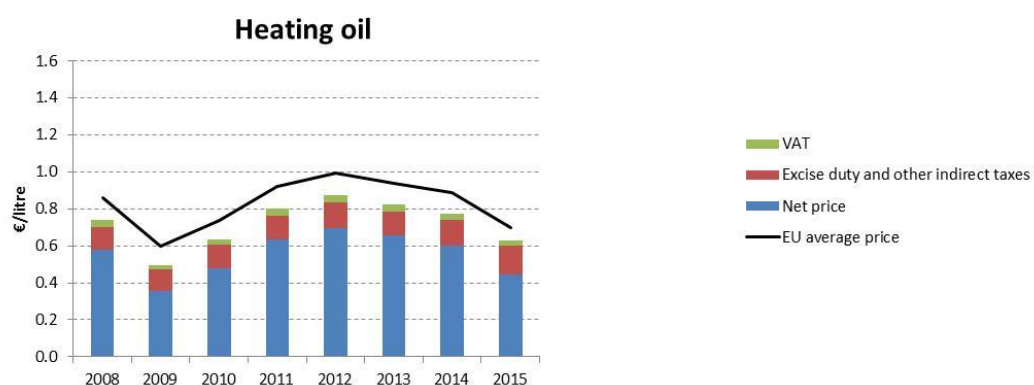
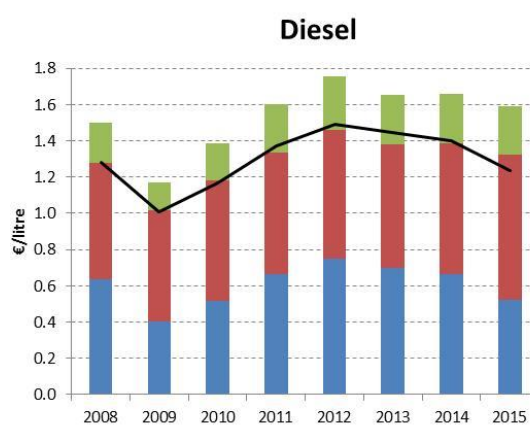
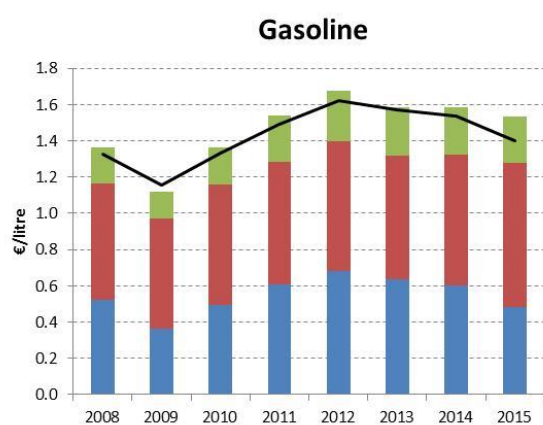
Composition of gas prices



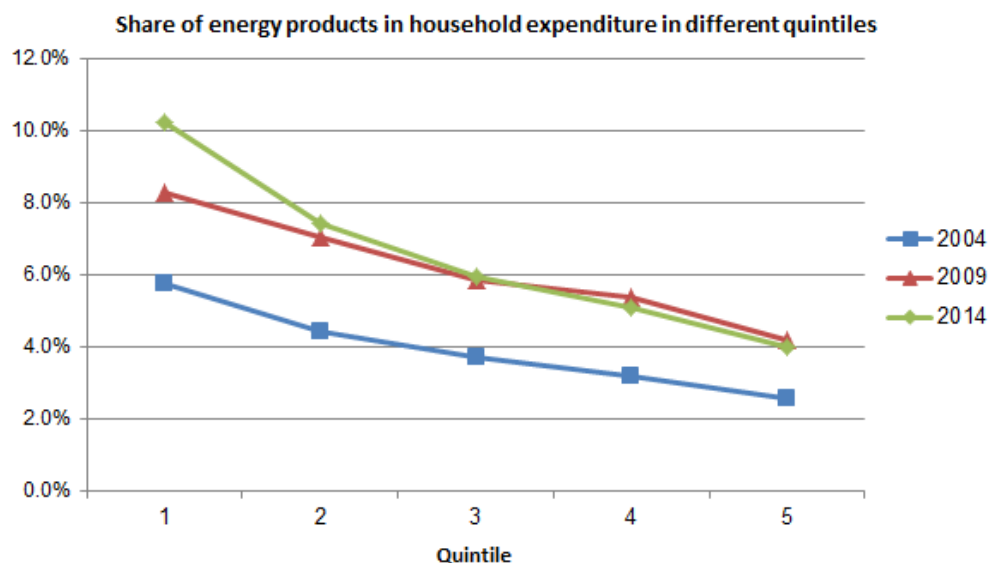
Composition of median industrial gas prices



Oil products prices

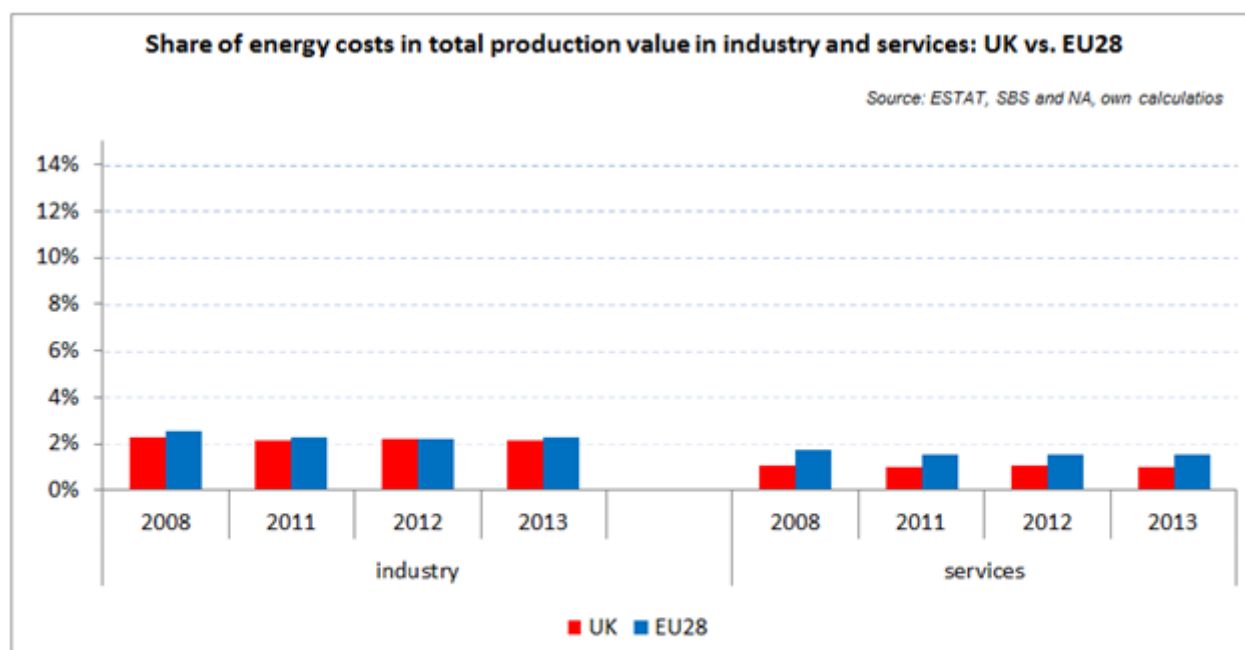


Energy in Households budgets



In the United Kingdom the share of energy in total household expenditure rose from 5.8% to 10.2% between 2004 (blue line) and 2014 (green line) in the case of the poorest households (Quintile 1). In the case of households with middle (Quintile 3) the energy share went up from 3.7% to 5.9%.

Energy costs shares in total production costs



Notes
 Data for Malta, Poland, Slovenia (prior to 2012) and Ireland (after 2012) is not available
 Data for 2009 and 2010 is incomplete and not reported
 Industry defined as NACE Rev.2 Section C (Manufacturing)
 Services defined as NACE Rev. 2 Sections G - U

Electricity and gas prices – Breakdown by price element

Band DC	EUR/kWh 2015
Energy and supply	0.11990
Total energy component	0.11990
Network	0.05375
Total network component	0.05375
VAT	0.01020
Renewables Obligation (RO)	0.01268
Other	
Climate Change Levy (CCL)	
Carbon Price Support	0.00397
Smart Metering	0.00044
EU ETS	0.00234
CERT/ECO	0.00524
Warm Homes Discount support	0.00221
CESP	0.00000
FiTs	0.00317
Total taxes & levies component	0.04024
Total price	0.21389

Band ID	EUR/kWh 2015
Energy and supply	0.07718
Total energy component	0.07718
Network	0.03308
Total network component	0.03308
VAT	0.00000
Renewables Obligation (RO)	
Other	0.02536
Climate Change Levy (CCL)	0.00372
Carbon price floor	
Smart Metering	
Indirect ETS cpst	
CERT/ECO	
Warm Homes Discount support	
CESP	
FiTs	

Total taxes & levies component	0.02908
	0.00000
Total price	0.13933

Band D2	EUR/kWh 2015
Energy and supply	0.04410
Total energy component	0.04410
Network	0.01406
Total network component	0.01406
VAT	0.00303
Carbon price floor	0.00012
Smart Metering	0.00001
Climate Change Levy (CCL)	
Other	
CERT/ECO	0.00179
Warm Homes Discount support	0.00000
Total taxes & levies component	0.00496
	0.00000
Total price	0.06312

Band I3	EUR/MWh 2015
Energy and supply	0.026598777
Total energy component	0.026598777
Network	0.006890875
Total network component	0.006890875
VAT	0
Carbon price floor	
Smart Metering	
Climate Change Levy (CCL)	0.001791627
Other	0.00055127
CERT/ECO	
Warm Homes Discount support	
Total taxes & levies component	0.002342897
Total price	0.035832549

Annex 4 – Literature review of econometric analysis

Drivers of energy prices:

- Cludius, J., Hermann, H., Matthes, F. C., Graichen, V. (2014). The merit order effect of wind and photovoltaic electricity generation in Germany 2008–2016: Estimation and distributional implications. *Energy Economics*, 44, 302–313.
- Cludius, J., Forrest, S., MacGill, I., 2014: Distributional effects of the Australian Renewable Energy Target (RET) through wholesale and retail electricity price impacts; in *Energy Policy*, 71,(2014)40-51; <http://dx.doi.org/10.1016/j.enpol.2014.04.008>
- Sam Forrest, Iain MacGill, Assessing the impact of wind generation on wholesale prices and generator dispatch in the Australian National Electricity Market, *Energy Policy*, Volume 59, August 2013, Pages 120-132, ISSN 0301-4215, <http://dx.doi.org/10.1016/j.enpol.2013.02.026> .
- C.K. Woo, J. Moore, B. Schneiderman, T. Ho, A. Olson, L. Alagappan, K. Chawla, N. Toyama, J. Zarnikau, Merit-order effects of renewable energy and price divergence in California's day-ahead and real-time electricity markets, *Energy Policy*, Volume 92, May 2016, Pages 299-312, ISSN 0301-4215, <http://dx.doi.org/10.1016/j.enpol.2016.02.023> .
- Sensfuß, F. (2015). Analysen zum Merit-Order-Effekt erneuerbarer Energien (Analyses of the merit order effect): Untersuchung im Rahmen des Projekts „Wirkungen des Ausbaus erneuerbarer Energien (ImpRES)“, supported by the Federal Ministry of Economic Affairs and Energy
- Florentina Paraschiv, David Erni, Ralf Pietsch, The impact of renewable energies on EEX day-ahead electricity prices, *Energy Policy*, Volume 73, October 2014, Pages 196-210, ISSN 0301-4215, <http://dx.doi.org/10.1016/j.enpol.2014.05.004>.
- Fagiani, R., Richstein, J.C., Hakvoort, R., De Vries, L.:(2014) : The dynamic impact of carbon reduction and renewable support policies on the electricity sector, *Utilities Policy*, Volume 28, March 2014, Pages 28-41, ISSN 0957-1787, <http://dx.doi.org/10.1016/j.jup.2013.11.004> .
- Fronzel M, Schmidt C, Vance C. (2012): Impact on Electricity Prices and Energy-Intensive Industries. *Intereconomics/Review Of European Economic Policy*, Emission Trading [serial online]. 03/2012;47(2):104-111. Available from: EconLit with Full Text, Ipswich, MA. Accessed April 21, 2016.
- Lise, W, Sijm, J, & Hobbs, B 2010, 'The Impact of the EU ETS on Prices, Profits and Emissions in the Power Sector: Simulation Results with the COMPETES EU20 Model', *Environmental And Resource Economics*, 47, 1, pp. 23-44, EconLit with Full Text, EBSCOhost,
- Alfredo Viskovic*, Vladimir Franki, Vladimir Valenti , Effect of regulation on power-plant operation and investment in the South East Europe Market: An analysis of two cases, in *Utilities Policy* 30 (2014) 8e17, <http://dx.doi.org/10.1016/j.jup.2014.06.001>
- Blanca Moreno, Ana J. López, María Teresa García-Álvarez, The electricity prices in the European Union. The role of renewable energies and regulatory electric market

reforms, *Energy*, Volume 48, Issue 1, December 2012, Pages 307-313, ISSN 0360-5442, <http://dx.doi.org/10.1016/j.energy.2012.06.059> .

Chivu Luminita, Ciutacu Constantin, Ioan-Franc Valeriu, Mateescu Mihaela, Marina Bădileanu, 1st International Conference 'Economic Scientific Research - Theoretical, Empirical and Practical Approaches', ESPERA 2013 The Romanian Energy System Structure and its Impact on the Electricity Spot Market, *Procedia Economics and Finance*, Volume 8, 2014, Pages 453-458, ISSN 2212-5671, [http://dx.doi.org/10.1016/S2212-5671\(14\)00113-0](http://dx.doi.org/10.1016/S2212-5671(14)00113-0) .

Carlo V. Fiorio, Massimo Florio, Electricity prices and public ownership: Evidence from the EU15 over thirty years, *Energy Economics*, Volume 39, September 2013, Pages 222-232, ISSN 0140-9883, <http://dx.doi.org/10.1016/j.eneco.2013.05.005> .

Monika Slabá, Petr Gapko, Andrea Klimešová, Main drivers of natural gas prices in the Czech Republic after the market liberalisation, *Energy Policy*, Volume 52, January 2013, Pages 199-212, ISSN 0301-4215, <http://dx.doi.org/10.1016/j.enpol.2012.08.046>.

P. Hauser, M. Schmidt and D. Möst, "Gas markets in flux: Analysis of components and influences for natural gas pricing in Europe," *2016 13th International Conference on the European Energy Market (EEM)*, Porto, 2016, pp. 1-8.
doi: 10.1109/EEM.2016.7521359

Sebastian Nick, Stefan Thoenes, What drives natural gas prices? — A structural VAR approach, *Energy Economics*, Volume 45, September 2014, Pages 517-527, ISSN 0140-9883, <http://dx.doi.org/10.1016/j.eneco.2014.08.010>.

Methods

Gireesh Shrimali, Joshua Kniefel, Are government policies effective in promoting deployment of renewable electricity resources?, *Energy Policy*, Volume 39, Issue 9, September 2011, Pages 4726-4741, ISSN 0301-4215,
<http://dx.doi.org/10.1016/j.enpol.2011.06.055>.

Nurcan Kilinc-Ata, The evaluation of renewable energy policies across EU countries and US states: An econometric approach, *Energy for Sustainable Development*, Volume 31, April 2016, Pages 83-90, ISSN 0973-0826,
<http://dx.doi.org/10.1016/j.esd.2015.12.006>.

Emanuele Bacchiocchi, Massimo Florio, Giulia Taveggia, Asymmetric effects of electricity regulatory reforms in the EU15 and in the New Member States: Empirical evidence from residential prices 1990–2011, *Utilities Policy*, Volume 35, August 2015, Pages 72-90, ISSN 0957-1787, <http://dx.doi.org/10.1016/j.jup.2015.07.002>.

Hiroaki Nagayama, Electric power sector reform liberalization models and electric power prices in developing countries: An empirical analysis using international panel data, *Energy Economics*, Volume 31, Issue 3, May 2009, Pages 463-472, ISSN 0140-9883,
<http://dx.doi.org/10.1016/j.eneco.2008.12.004>

Luc Eyraud, Benedict Clements, Abdoul Wane, Green investment: Trends and determinants, *Energy Policy*, Volume 60, September 2013, Pages 852-865, ISSN 0301-4215,
<http://dx.doi.org/10.1016/j.enpol.2013.04.039>.

Caitlin Knowles Myers, 2004: Discrimination and neighborhood effects: understanding racial differentials in US housing prices in *Journal of Urban Economics*, 56 (2004) 279-302,
doi:10.1016/j.jue.2004.03.006

Markus Brückner, Antonio Ciccone, 2007: Growth, Democracy, and Civil War, Social Science Research Network, Nov. 2007, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1028221