



Comparison of household's energy prices and income in Austria, Czech Republic and European Union

Thomas Steinberger

Co-operating Universities



Financial support by



Prague and Vienna, 2015

Content

1. Introduction	3
1.1. Topic's relevance	3
1.2. Historical Review	3
1.3. Motivation & approach	3
1.4. Methodology	3
1.5. Literature Review	4
2. Historical development of energy prices and income	4
2.1. Development of energy prices by energy-carrier	4
2.1.1. Electricity	4
2.1.2. Natural Gas	5
2.1.3. Diesel	6
2.1.4. Petroleum	7
2.2. Development of energy prices and income by region	7
2.2.1. Austria	7
2.2.2. Czech Republic	8
2.2.3. EU-Average	8
2.3. Social-economic indicators	9
3. Analysis & Interpretation	10
4. Conclusion	12
5. List of figures	13
6. References	13

1. INTRODUCTION

This paper will give a detailed outline over the development of households' energy prices and income in comparison of Austria, Czech Republic and states of EU-28.

1.1. Topic's relevance

The growing demand for energy services is highly correlated with the growing wealth of world's societies. This issue can be recognized on the skyrocketing prices for energy in Central Europe.

1.2. Historical Review

With the start of industrialization in the 19th century the consumption of energy-services started to rise sharply. To satisfy the growing demand the Central European states had to promote the partnership with countries holding large resources of oil and gas. As time passed these partnerships became bilateral dependencies. On one hand there is the demand for heat, electricity and mobility satisfied. On the other hand this dependency started to limit the states sovereignty, especially during negotiations of prices of crude oil and natural gas. The last stated argument is considered very relevant, especially today. The prices have been increasing continuously over time. And so have the average income in Central Europe.

1.3. Motivation & approach

The crucial question is how energy prices and income have developed relatively over time. This paper aims to find out the impact of energy prices on available income for households of Austria, Czech Republic and states of EU-28 in general.

Therefore series of historical development will be prepared for specific energy carriers in mentioned territories and analyzed by application of classical methodology of comparative analysis under consideration of country-specific influences as purchasing power parity (PPP) and inflation. The future perspectives of energy price developments will be discussed after description and analysis.

1.4. Methodology

Data is researched and drawn together from reliable sources which are compiled in chapter 6 (references). The year 1995 is stated as basic year for historical development, because reliable data is available and the influence of soviet-era (e. g. Inflation) was almost extinct. Data for each year is referred to the base in 1995 matching national currencies per unit of energy. For comparison of absolute price development purchasing power parity is applied and converted to US\$ for a significant arrangement. The timeline is adapted to development of consumer prices by subtracting inflation rates continuously year by year. The European average is dependent on availability of data. Disposable

inflation-data for single states in Europe is summed up by weighting the country's current population for achieving an average European value.

1.5. Literature Review

The paper is based on previous research by Knápek, Haas, Jílková and fellows in [1]. Data for prices mainly is achieved by database-software beyond2020, which is co-funded by the Intelligent Energy Europe (IEE) Programme of the European Commission [2]. Furthermore statistics of OECD [3], Worldbank [4] and European Union [5] contributed to this paper.

By comparing data of different sources inconsistencies may occur. This instance has to be taken in account for analysis.

2. HISTORICAL DEVELOPMENT OF ENERGY PRICES AND INCOME

Series for development divided by energy carrier comparing the three researched regions are achieved and illustrated below. The figures regarding energy prices are generated by using database beyond2020 [2]. Net national disposable income is provided by OECD Statistics [3].

2.1. Development of energy prices by energy-carrier

In following chapters the price-rate of one specific type of energy for each country is presented in a timeline considering PPP and inflation. The EU-Average excludes Bulgaria, Croatia, Cyprus, Latvia, Lithuania, Malta and Romania in due to inconsistent data. While applying pre-euro prices for nations of euro-zone, including Austria, a fixed conversion rate against euro is adopted.

2.1.1. Electricity

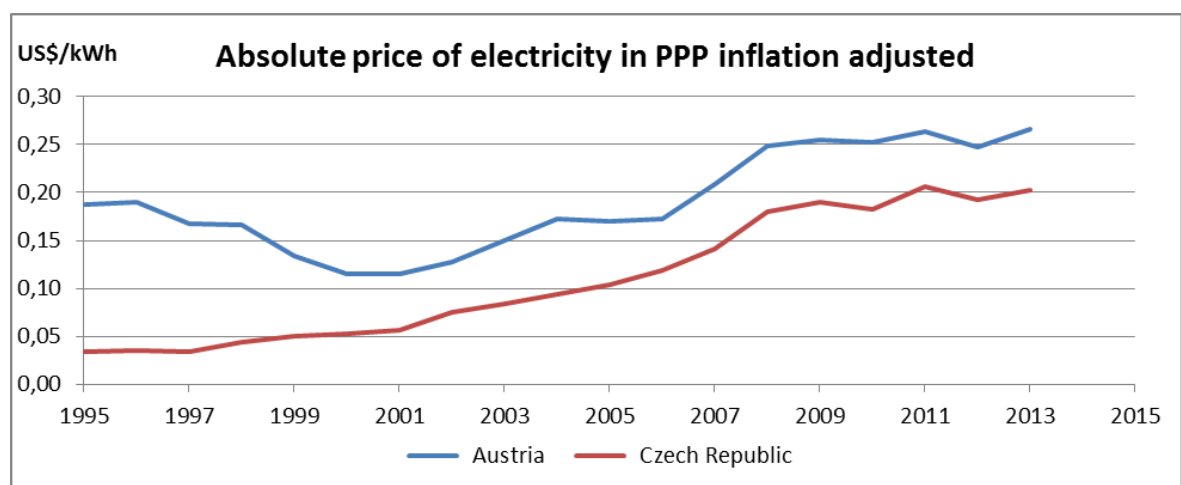


Figure 1: Absolute price of electricity considering PPP and consumer prices

As observable in Figure 1 electricity price is developing quite similar for Austria and Czech Republic from year 2000 on. In Austria the price increased slightly from 0,14 €/MWh in

1995 to 0,21 €/MWh in 2013 (+46 %), while Czech household's prices jumped from a low level of 990 CZK/MWh in 1995 to 4021 CZK/MWh in 2013 (+ 306 %). The relative development is shown in Figure 2.

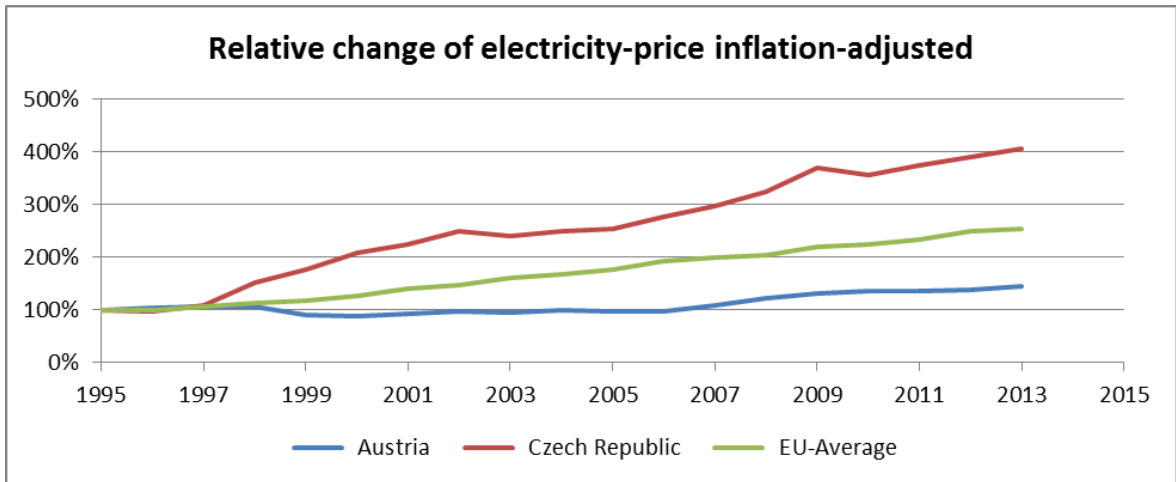


Figure 2: Relative change of total electricity price inflation adjusted

In national currency Austria's electricity price is slightly increasing from 2006 on. Still the price for Czech households is growing disproportionate and converging to Austria's considering PPP.

2.1.2. Natural Gas

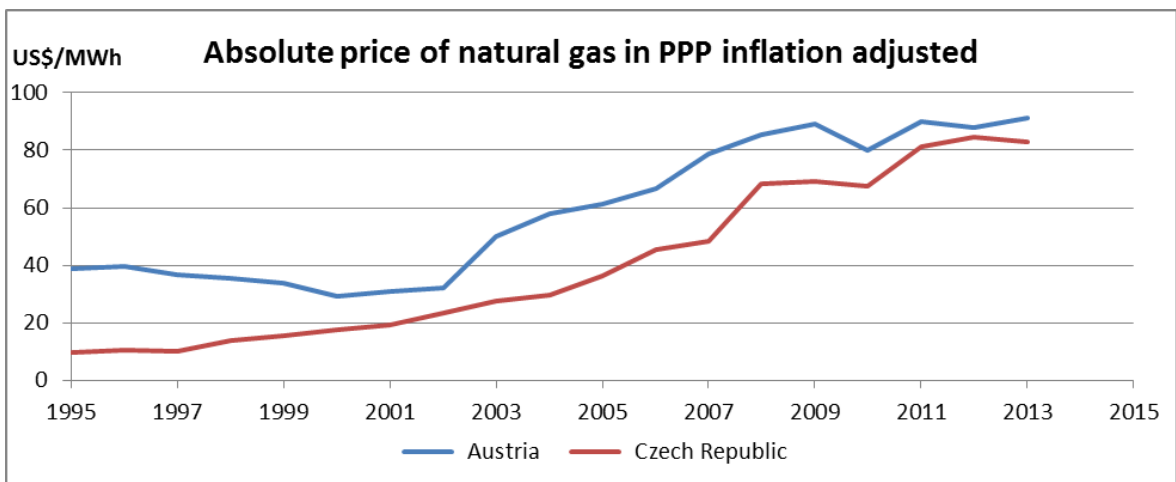


Figure 3: Absolute price of natural gas considering PPP and consumer prices

The price for natural gas in Austria increased from 29 €/MWh to 70 €/MWh (+141 %), while in Czech Republic it raised from 268 CZK/MWh to 1642 CZK/MWh (+473 %).

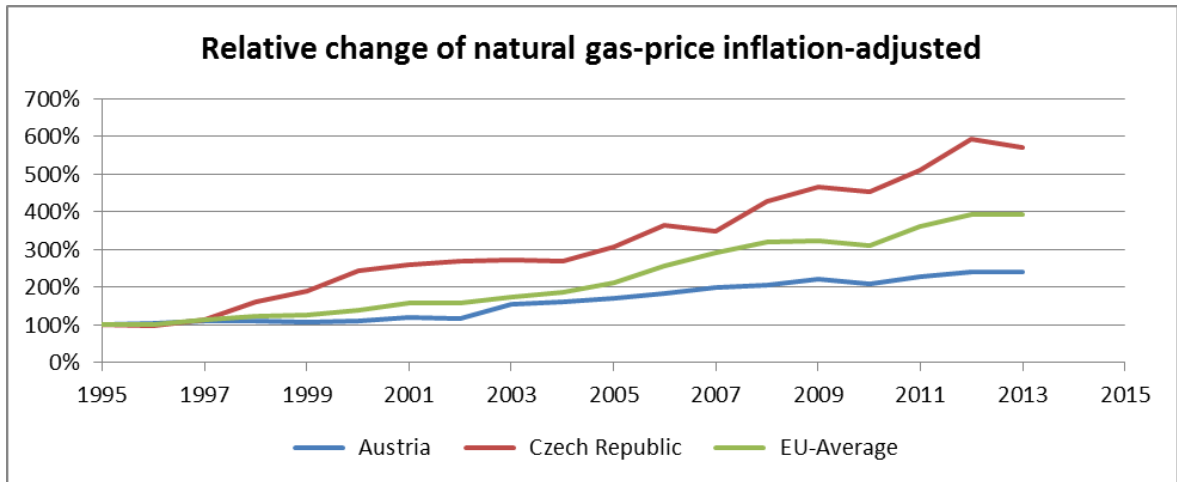


Figure 4: Relative change of total natural gas price inflation adjusted

2.1.3. Diesel

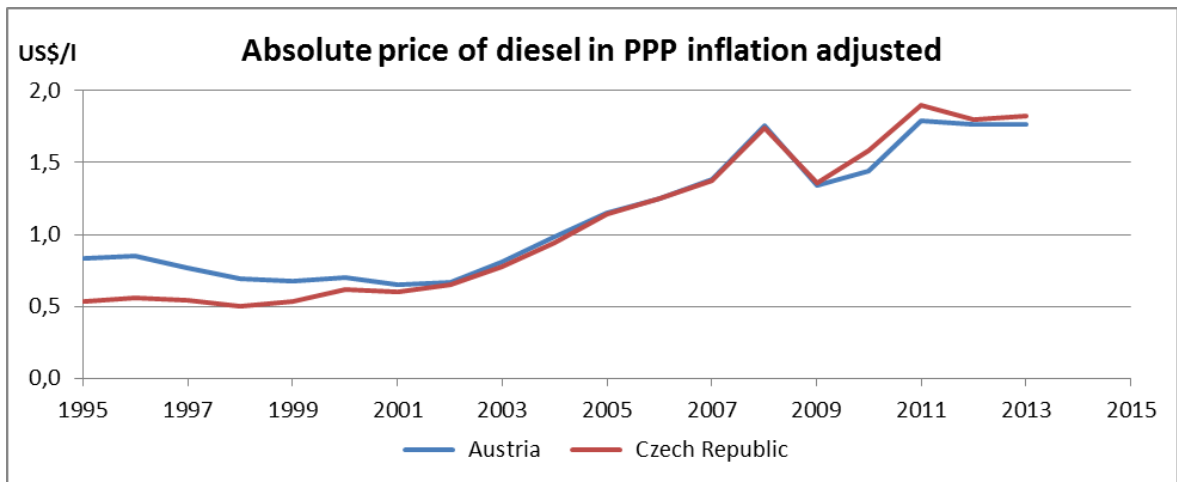


Figure 5: Absolute price of diesel considering PPP and consumer prices

The price for one liter of automotive diesel developed from 0,63 €/l to 1,36 €/l in Austria (+116 %) and from 15,65 CZK/l to 36,14 CZK/l in Czech Republic (+131 %).

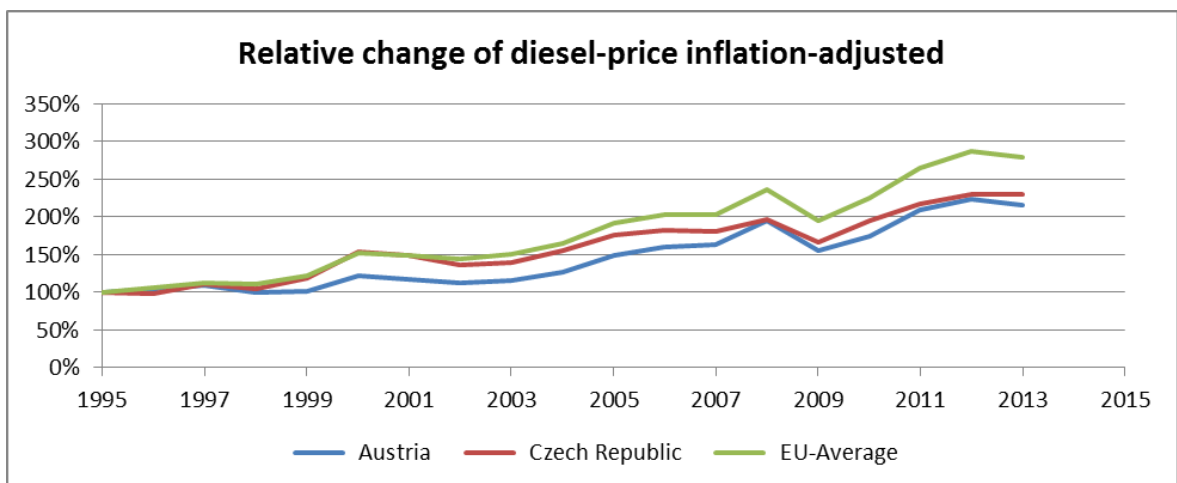


Figure 6: Relative change of total diesel price inflation adjusted

2.1.4. Petroleum

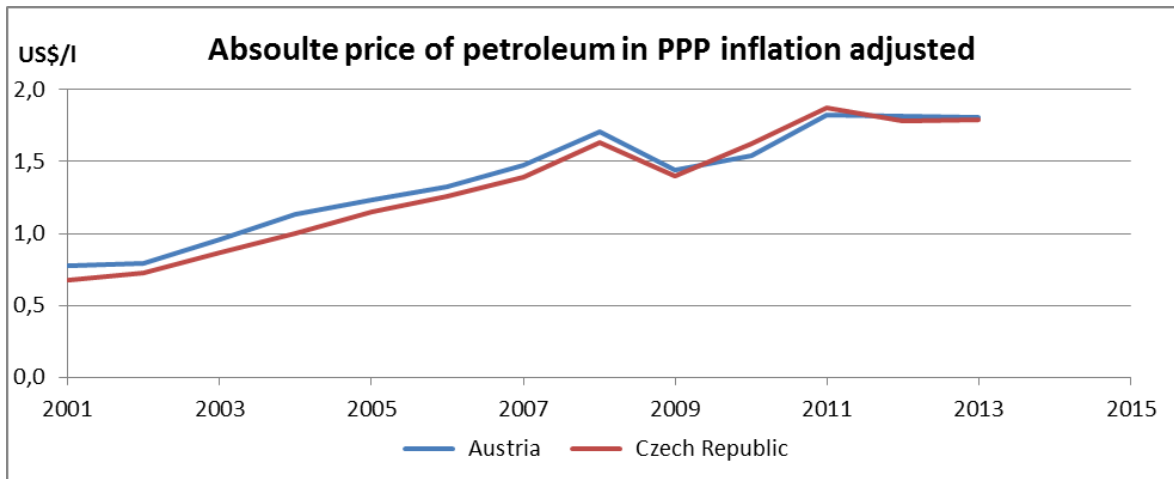


Figure 7: Absolute price of petroleum considering PPP and consumer prices

Due to a lag of data the timeline of petroleum price-development is researched from 2001 to 2013. In this period the price for Austrian households climbed from 0,89 €/l to 1,39 €/l (+56 %), while Czech households registered a similar increase from 27,0 CZK/l to 35,5 CZK/l (+31 %). The correlation of diesel and petroleum prices is recognizable in Figure 6 and Figure 7, at which the price of diesel increased more acute in the same period (see growth rates). European average arranges in the same scope.

2.2. Development of energy prices and income by region

In this chapter the change of energy prices (same data as chapter 2.1) and net national disposable income per capital (p.c.) for Austria and Czech Republic will be revealed for each analyzed region. Both indicators are adjusted to inflation. Net national disposable income maybe derived from national GDP (Gross Domestic Product) by subtracting indirect taxes and considering depreciation of capital as conducted by statistics of OECD [3].

2.2.1. Austria

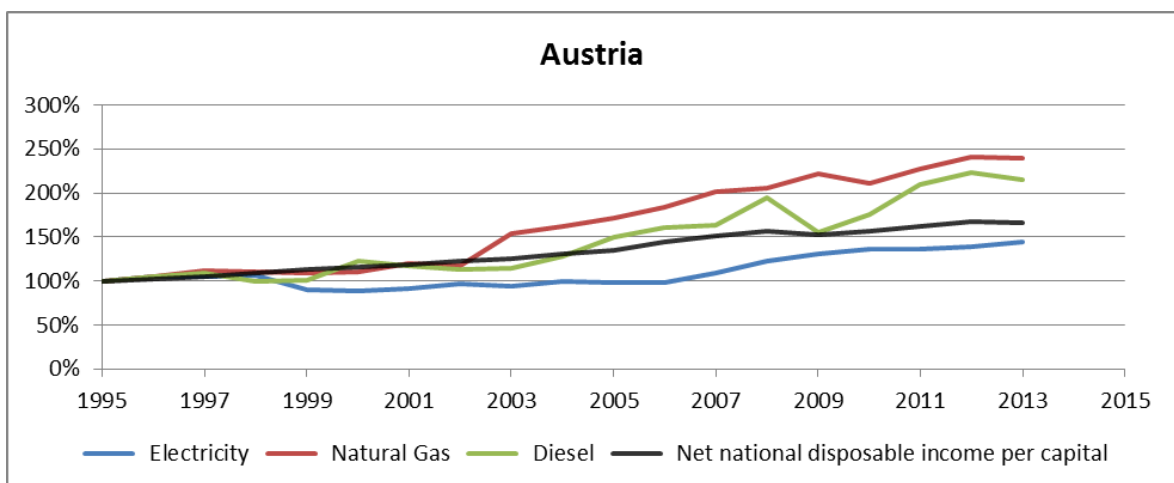


Figure 8: Relative change of energy price and income inflation adjusted – AUS

The net national disposable income [3] rose continuously from 146 billion € (18,3 k€ p.c.) to 261 billion € (30,8 k€ p.c.) in a close range to prices' development, what accounts an inflation-adjusted growth of 166 %.

2.2.2. Czech Republic

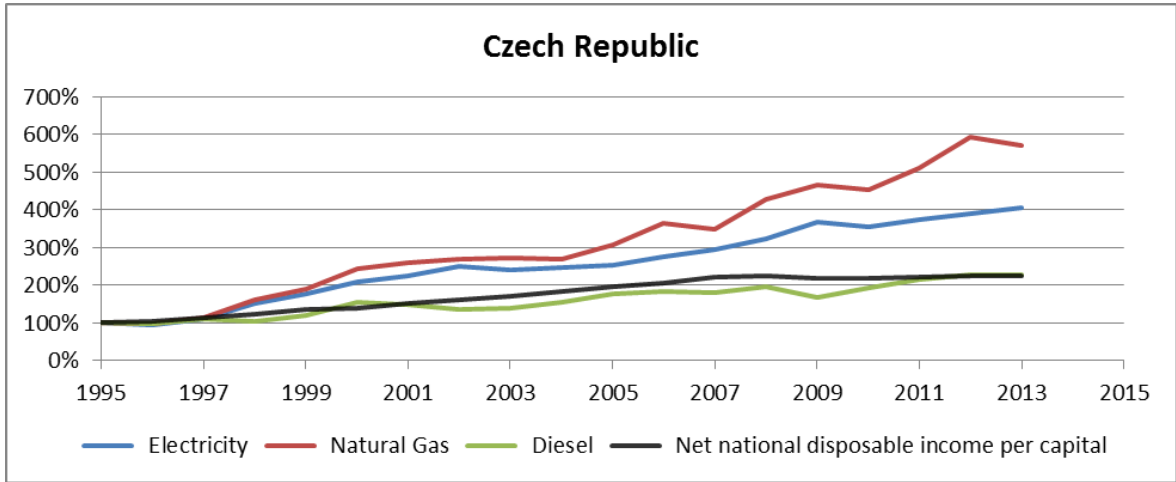


Figure 9: Relative change of energy price and income inflation adjusted – CZ

The net national disposable income [3] developed from 1242 billion CZK (120,2 kCZK p.c.) to 2855 billion CZK (271,4 kCZK p.c.), which leads to a growth of 224 % (inflation-adjusted). The growth of Czech households' net income is, despite stagnation from 2008 on, more intense than Austria's in this period, whereat prices for electricity and gas in Czech Republic develop disproportionate compared to net income.

2.2.3. EU-Average

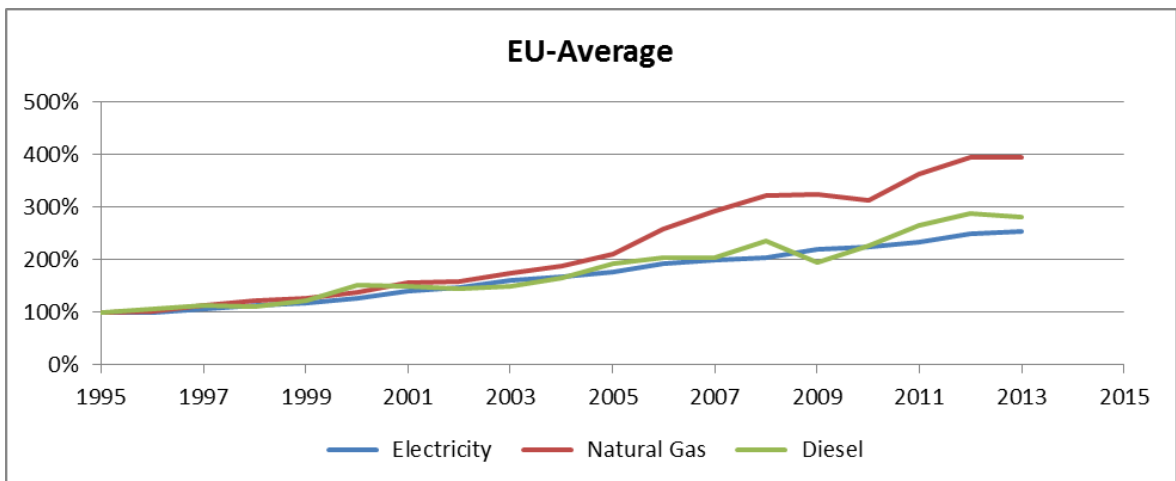


Figure 10: Relative change of energy price inflation adjusted – EU-Average

For comparison of national price increases Figure 10 gives the development of European average calculated without weighting specific countries. Austria's price growth-rates are arranged underneath this average, while price-increase in Czech Republic is more intense except for diesel and fuel in general.

2.3. Social-economic indicators

Energy intensity achieved by Worldbank [4] reflects the effectivity of consuming energy by producing economic value measured in GDP per kilogram oil equivalent. Austria arranges on a high magnitude and proceeds quite constantly whereas Czech Republic is developing proper on a rather low level as figured in Figure 11.

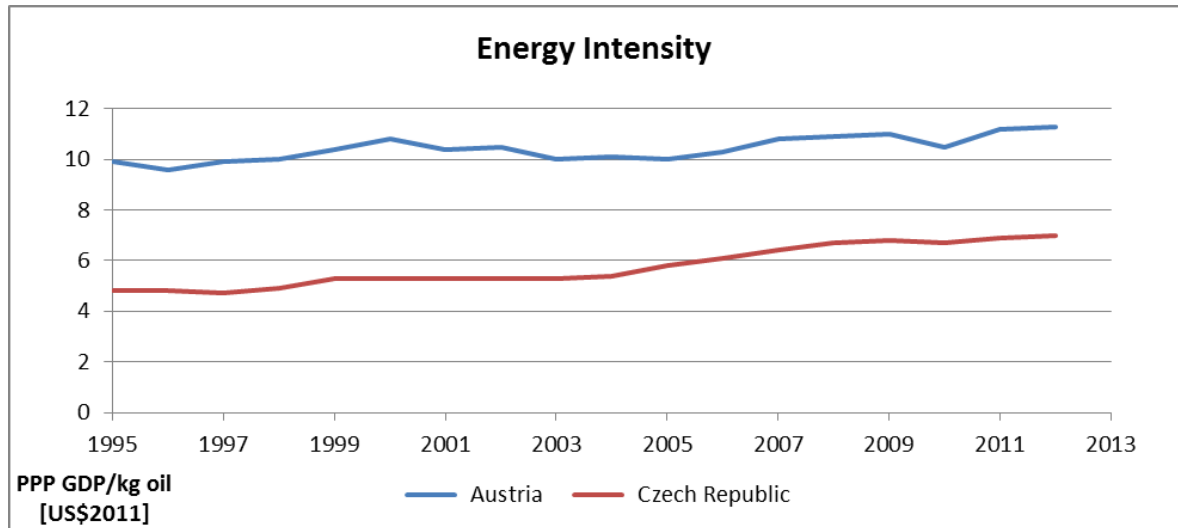


Figure 11: Energy intensity in US\$₂₀₁₁ (GDP) per kg oil-equivalent

For appreciation of GDP-based data Figure 12 reveals the national GDP in US\$. It has to be considered that in given period the population in Austria progressed from 7,95 million to 8,47 million (+ 6,5 %), while Czech Republic's population developed from 10,33 million to 10,52 million (+ 1,8 %).

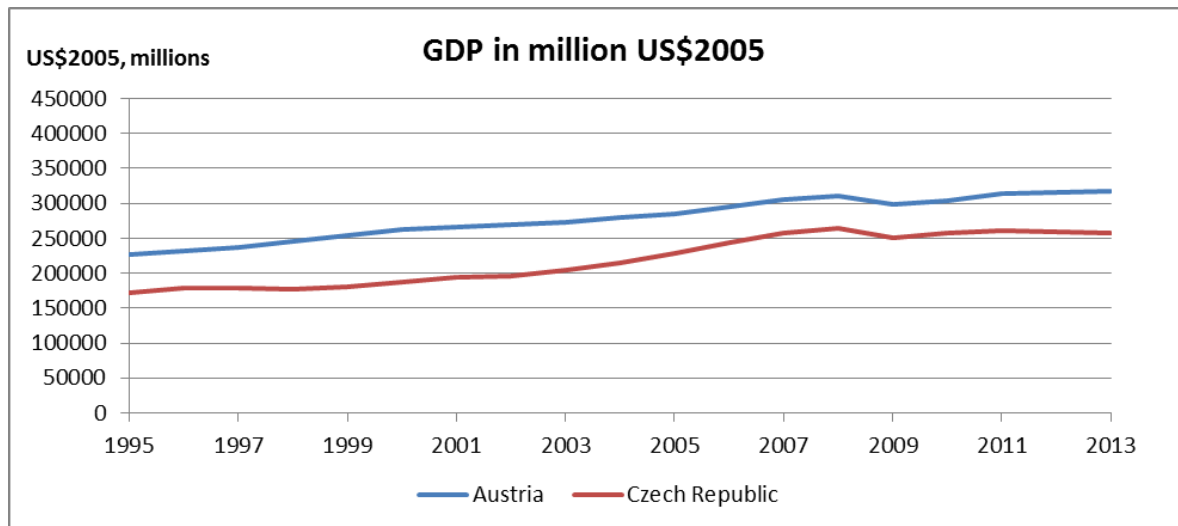


Figure 12: GDP in million US\$, PPP and prices related to 2005

For external primary energy carrier the national current's exchange rate affects national prices. Therefore following figure depicts the exchange rates of Euro, Czech Crown and US Dollar over time.

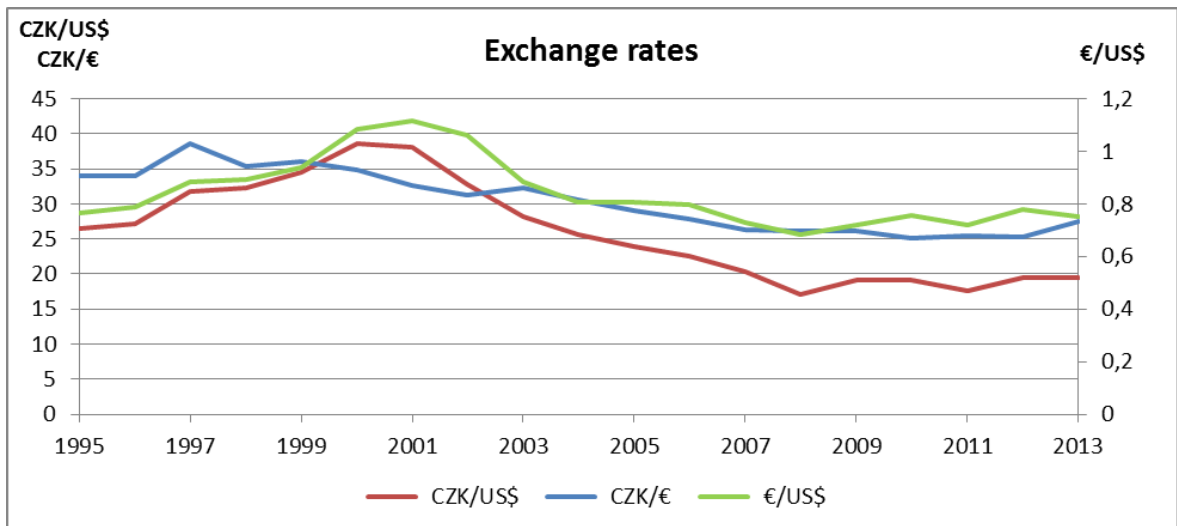


Figure 13: Exchange rates

3. ANALYSIS & INTERPRETATION

Since the energy prices for Czech households are rising significantly the analysis is focusing on the situation in Czech Republic.

The increase of Czech Republic's electricity price, which multiplied four times in analyzed period, is mainly (among others) caused by:

- Cross subsidies for big consumers to disadvantage of private households
- Increase of demand for electricity by economy's fast development from 2000 to 2007 (Figure 12). See [3] for period's average growth: AUS +2,4 % / CZ +4,5 %
- Lifting value added tax from 5 % to 18 % in 1998 [2]
- Construction of new coal-fired power plants
- Ineffective market (reduced competition after entering liberal markets)
- Opening of state-directed economy to liberal markets in early 90's (high inflation)
- Increasing imports (similar situation to Austria)

Austria added an excise tax for electricity in 1996. The share of taxes is significantly higher than in Czech Republic [1].

The situation in the gas market is even more intransparent. Ineffective markets occurred in Czech Republic, especially after privatization of the company Transgas and regional gas distributors. These shares have been purchased mainly by RWE. Additionally the Energy Regulatory office regulated the trade with natural gas. With the end of regulation in April 2007 and access of new suppliers the markets started to liberalize but still couldn't prevent the strong increase of household's prices [1].

Since fuel is traded in US\$ the exchange rate of national currency has a strong influence on household's prices. Referring to Figure 13 (Exchange rates) the increasing rate of CZK affects household's fuel prices in a beneficial way.

Household's expenditures from Eurostat [5] show the rise of share of energy for Czech Republic from 4,4 % in 1995 to 7,9 % in 2012, while in Austria it developed quite slightly.

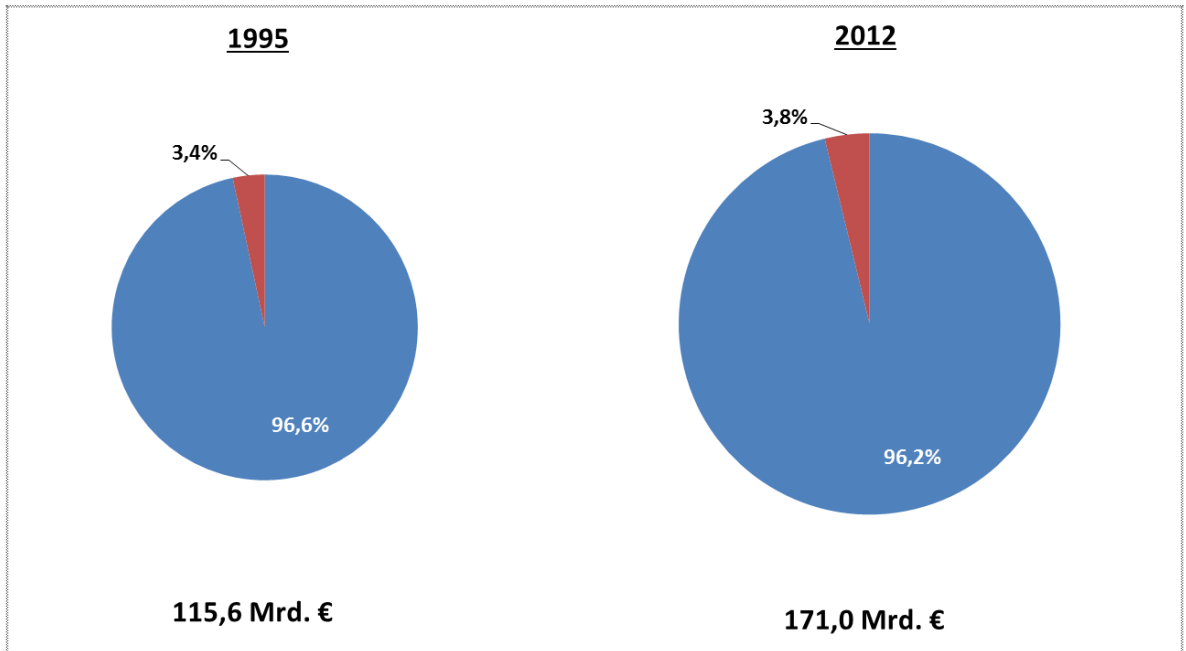


Figure 14: Austrian households's expenditures and share of energy

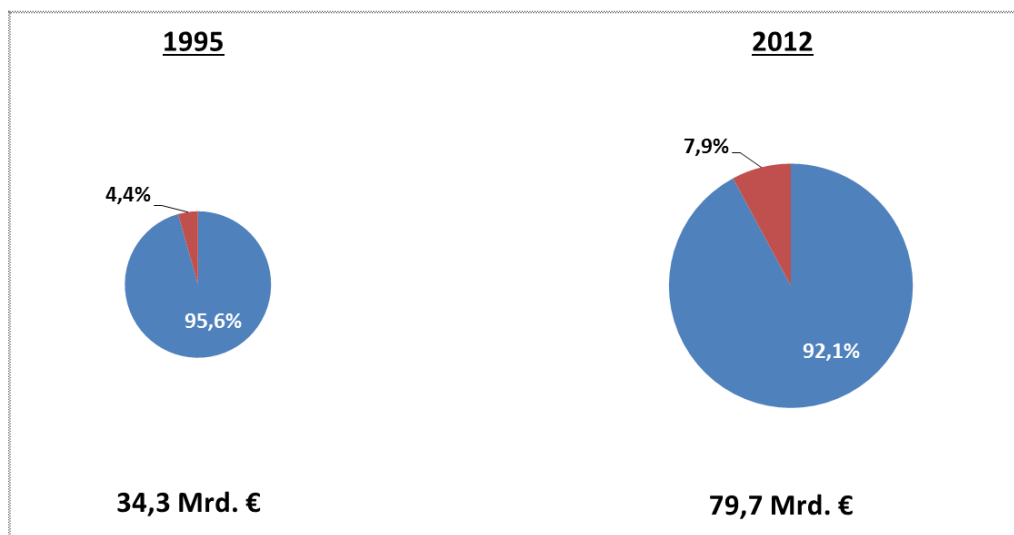


Figure 15: Czech households's expenditures and share of energy

4. CONCLUSION

Drifting prices, especially for gas and electricity in Czech Republic, by comparison of income-subtracted price development is shown in Figure 16 and Figure 17. On similar scale the annual development of energy prices referred to national income is revealed. (in simple words: how fast did energy prices rise annually in relation to income?)

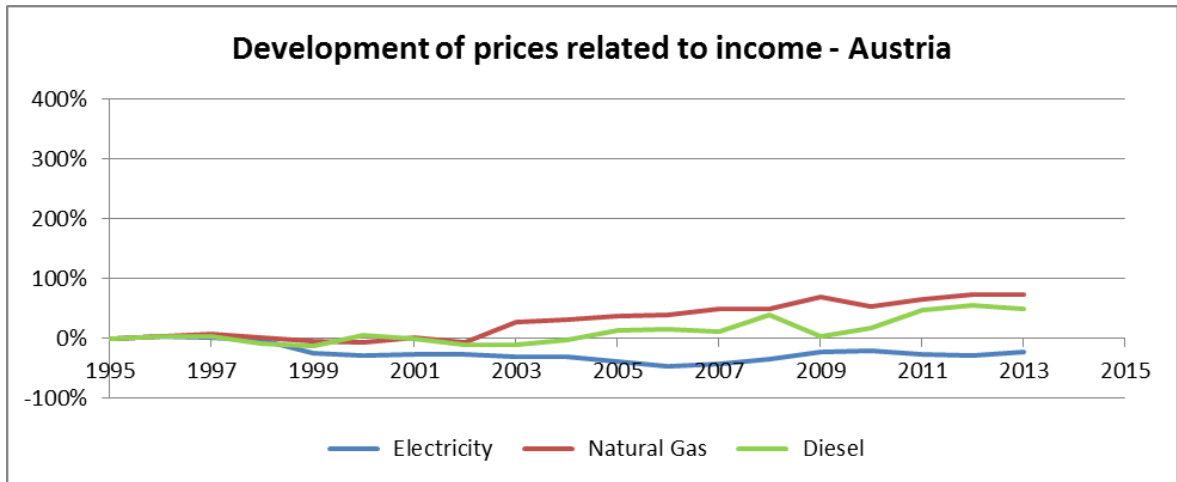


Figure 16: Rated energy prices regarding net disposable income inflation adj. – AUS

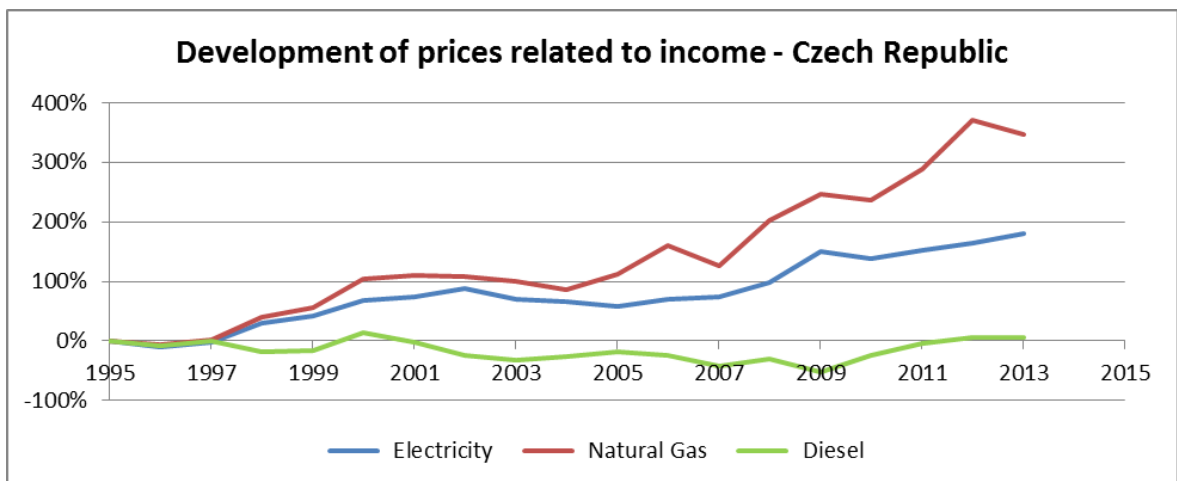


Figure 17: Rated energy prices regarding net disposable income inflation adj. – CZ

Regarding to household's expenditure's energy-share (chapter 3) the figures above show an increasing burden for czech households. With this trend continuing problems for Czech society may occur up to the energy-based wealth in Central Europe. Apparently Austria is just slightly affected, but with considering finiteness of fossil fuels and gas this state may just remain a few more decades without any reaction.

A controversial argument is considered in the fact that analysed data doesn't reflect society's median but average income-household. Thereby the influence of high-income households is weighted more than average households. Low-income households, which are affected most by increasing energy prices are respected least.

5. LIST OF FIGURES

Figure 1: Absolute price of electricity considering PPP and consumer prices	4
Figure 2: Relative change of total electricity price inflation adjusted	5
Figure 3: Absolute price of natural gas considering PPP and consumer prices	5
Figure 4: Relative change of total natural gas price inflation adjusted	6
Figure 5: Absolute price of diesel considering PPP and consumer prices.....	6
Figure 6: Relative change of total diesel price inflation adjusted.....	6
Figure 7: Absolute price of petroleum considering PPP and consumer prices	7
Figure 8: Relative change of energy price and income inflation adjusted – AUS	7
Figure 9: Relative change of energy price and income inflation adjusted – CZ.....	8
Figure 10: Relative change of energy price inflation adjusted – EU-Average.....	8
Figure 11: Energy intensity in US\$ ₂₀₁₁ (GDP) per kg oil-equivalent.....	9
Figure 12: GDP in million US\$, PPP and prices related to 2005.....	9
Figure 13: Exchange rates	10
Figure 14: Austrian households's expenditures and share of energy	11
Figure 15: Czech households's expenditures and share of energy	11
Figure 16: Rated energy prices regarding net disposable income inflation adj. – AUS	12
Figure 17: Rated energy prices regarding net disposable income inflation adj. – CZ.....	12

6. REFERENCES

[1] KNÁPEK, Jaroslav – STREICHER, Wolfgang – VOJÁČEK, Ondřej – JÍLKOVÁ, Jiřina – GEUSS, Erik: Energy for Sustainable Development III; chapter 7. Praha: ALFA NAKLADATELSTVÍ, 2012. ISBN 978-80-87197-54-7

[2] Beyond2020: Intelligent Energy Europe (IEE) Programme of the European Commission. Further information: <http://www.res-policy-beyond2020.eu/>

[3] Statistics of Organization for Economic Co-operation and Development (OECD); online: <http://stats.oecd.org/>

[4] Statistics of Worldbank; online: <http://data.worldbank.org/>

[5] Eurostat; the statistical office of European Union; online: <http://ec.europa.eu/eurostat/data/database>