AUSTRIAN ENERGY AGENCY

Energy Efficiency Policies and Measures in Austria

ODYSSEE – MURE 2010

Monitoring of EU and national energy efficiency targets

Austrian Energy Agency

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1 Executive Summary

In 2010 Austria's primary energy consumption amounted to 34.7 Mtoe – a 38.2% increase compared to 1990. Austria's final energy consumption has increased by 45.2% in the period from 1990 to 2010, accounting for 27.5 Mtoe in 2010. Main driver for the increase is a rise in final energy consumption by 76.5% in the transport sector over this period. Final consumption also rose significantly in the industry sector (+43.9%) and residential sector (+17.9%). Final consumption of households, which is adjusted for climatic influences, increased by 9.9%.

In 2010, the transport sector had a share of 32% in final energy consumption, followed by industry (30%), private household (25%), services (11%) and agriculture (2%). Since 1998, the mobility sector has consumed more energy than the industry sector; and since 2000, the mobility sector has consumed more energy than the household sector.

In Austria fossil fuels are the main energy source: oil is number one with a share of 37% of gross domestic consumption, followed by gas (25%) and coal (10%). The obligation to add more biofuels to fossil fuels and the increased generation of district heating from biomass have resulted in a record high use of renewable energy sources in Austria. Renewable energy sources account for 31% gross domestic consumption, with biomass being the most important renewable energy source (41%), followed by hydro power (36%). Other renewable energy sources include solar, wind and geothermal energy with a share of 5%. Austria has adopted a policy that rules out the use of nuclear energy in its energy mix.

Electricity consumption continues to rise. In 2010 national electricity consumption amounted to 60.339 GWh, an increase by 42.5% compared with 1990. In Austria electricity is produced with hydro power (57%), followed by natural gas (21%), and coal (7%). The share of wind energy amounts to 3%.

In the period from 1990 to 2005, energy consumption showed a similar upwards trend as the GDP in real terms. After 2005, energy consumption declined despite an increase in GDP and remained stable from 2007 to 2008. From 2008 to 2009, the GDP as well as energy consumption decreased significantly as a result of the economic crisis.

The global economic and financial downturn in 2009 has drastically affected Austria too. In 2009, the GDP decreased by 4% compared to the previous year, while the value added of industry dropped by 10.5%. Significant declines were also recorded, among others, for the value added of construction (-10%), primary metals industries (-17%) and transport equipment (-32 %). Production of steel fell by 25%, production of cement

decreased by 12% and production of paper by 8%. Domestic primary energy production recorded a negative growth of -2%. The reduction of traffic performance of freight transport (tkm) was 5% in 2009.

For 2010, the last year of the period under review, a recovery was expressed by the again increased amount of fuel consumed in the transport sector (mainly freight transport on road), the increased demand for electricity, as well as the rise in industrial production of energy-intensive products (steel).

The energy intensities (climate corrected) do not show very substantial changes in the period 1990-2010: Primary energy intensity fell by 10.7%, while final energy intensity decreased by 6.6%.

Overall energy efficiency was calculated only from 1996 as no earlier data of the production index for industry is available. All efficiency indicators are measured as a three-year moving average. The overall efficiency indicator improved by 15.1% between 1996 and 2010. Most of the efficiency improvements were achieved in the households (22.9%) and transport (19.5%) sectors. In the industry sector (7.4%), a significant decrease in energy efficiency can be observed from 2007: In the three-year period from 2007 to 2010, efficiency in industry decreased by 9%. The reason for this negative development is the weak economic situation in 2009.

In general, it can be stated that improvements in energy efficiency have been offset or even exceeded by higher levels of activity. For example, the transport performance of passenger transport in cars has risen by about 31%. The transport performance of freight transport (road + rail + river) has almost doubled (+87%). The stock of cars increased by 58% and freight traffic on road (tkm) increased by 107% between 1990 and 2010. Thus, the enhanced engine technology of vehicles is offset by an increase in transport performance and new technical features such as air conditioning. Furthermore, the stock of permanently occupied dwellings (+ 25%), the average size of dwellings (+ 18%) and the saturation rate of electrical household appliances (dish-washers: + 199%, dryers: + 779%) counteract the positive effects of more efficient buildings.

Austria's total greenhouse gas emissions (excluding land-use change and forestry) amounted to 84.6 million tonnes of CO_2 e in 2010, which is 8.2% above the 1990 levels. Compared to 2009, emissions increased by 6.1%, mainly caused by the recovery after the weak economic situation in 2009. The trend is dominated by the trend of the most important sector – the energy sector. The main driving force for the trend was a 60% increase in emissions caused by transport.

The Austrian government assumes that fuel tourism (see also chapter 3.5.2.1), with vehicles from neighbouring countries taking advantage of the comparatively lower tax rate for transport fuels, accounts for much of this increase in the transport sector. A study commissioned by the Federal Ministry of Agriculture, Forestry, Environment and Water Management has shown that net fuel tourism accounted for roughly 25% to 30% of total diesel and petrol sold in Austria in recent years.

Emissions in 2010 were 15.8 million tonnes of CO_2 e above the annual mean value of the Kyoto target stipulated for 2008-2012. When considering emissions trading as well as Joint Implementation and Clean Development Mechanism (JI/CDM) projects and the afforestation/deforestation balance, the deviation from the target is around 6.2 million tonnes of CO_2 e. Consequently, Austria still needs to implement considerable measures to meet its Kyoto obligation to reduce GHG emissions by 13% compared to 1990 levels by 2008 to 2012. In 2010, emissions were 8.2% above the levels of 1990.

2 The Background to Energy Efficiency

2.1 Overall economic context

Chart 2.1 shows the long-term trends of the main macroeconomic indicators GDP, private consumption and value added of industry.

In 2010, Austria's GDP at constant prices amounted to 243 thousand million EC00. The average growth rate of the GDP has been around 2.1% per year since 1990, with the years of highest growth being 1998 (3.8%) and 2007 (3.7%). The average growth rate in the 1980s was slightly higher with 2.3%.

In 2009, the global economy suffered a shrinkage for the first time in many decades, caused by the international financial crisis. The Austrian economy did not escape the downward trend and experienced a negative growth rate of -3.8% in 2009. This was the biggest decrease in GDP in a year-on-year comparison since 1976. As a small open economy, Austria had entered a deep recession caused primarily by falling exports, reflecting the collapse of world trade and shrinking investment.

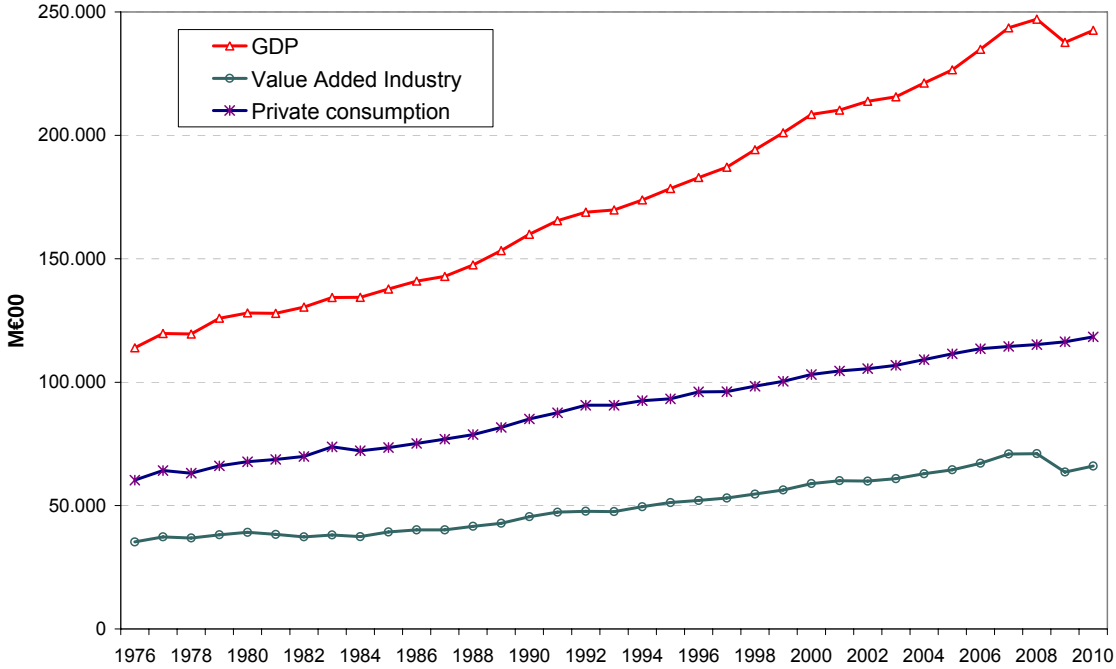
In 2010, the world economy had overcome the cyclical downturn. The Austrian economy, led by a dynamic export growth, recovered modestly with a GDP growth rate of 2.1%. However, the fiscal consolidation in the euro area and weak competitiveness of the southern European economies began to weigh on aggregate demand since 2011.

A similar development as for the total economy was observed in the industry sector: After an recession from 1991-1993, value added at constant market prices increased by an average growth rate of around 2.7% per year in the period 1994-2008. The record growth rate was recorded in 2007 with 5.6%. In 2009, industry had to face a significant recession with a decrease of the value added at a rate of -10.5%. The collapse in the prices for raw materials and weak demand for some time has depressed the general price level. In 2010, the value added has grown again at 3.8% compared to 2009. a. In the year 2007 growth stood at 4.3%. The average growth rate of value added in industry for the entire period 1990-2010 was 1.9%, compared to a mean growth rate of 1.6% in the 1980s.

The private consumption of households (at constant prices, in national currency) saw an average annual growth of 1.7% per year in the period from 1990 to 2010, with the 2010 growth rate (1.7%) corresponding with the average. In the recession (2009), private consumption rose by 1.0%.

Chart 2.1: Macroeconomic development (prices of 2000)

Source: ODYSSEE



2.2 Energy consumption trends: by fuel and by sector

Final energy consumption (climate corrected) rose by 41.2% in the period from 1990 to 2010. Chart 2.2 displays the steady growth trend until 2008. In the period 1990 – 2008 the mean annual growth of total final consumption was 2.1%. In the recession year 2009, total final energy consumption decreased by 5.0%. At 9.5%, the largest reduction for the year 2009 is observed for residential, tertiary and agricultural consumption,.

Chart 2.3 displays the market share of the different energy sources in 1990 and 2010 (final consumption which is not climate corrected). Oil products decreased slightly, from 41.3% in 1990 to 38.0% in 2010. The share of electricity in final consumption edged down from 19.2% in 1990 to 18.9% in 2007. The share of natural gas increased slightly from 14.4% to 16.7%. The drop of coal has continued with a share of 4.5% of the final consumption in 2010 compared to 10.1% in 1990. The share of renewable energy sources for final energy consumption (mainly wood) grew from 11.5% to 14.5%, whereas the share of heat increased to reach 7.4% in 2010 compared to 3.5% in 1990.

Chart 2.2: Final energy consumption by sector: 1990 – 2010. The figures for residential consumption are adjusted for climatic influences.

Source: ODYSSEE

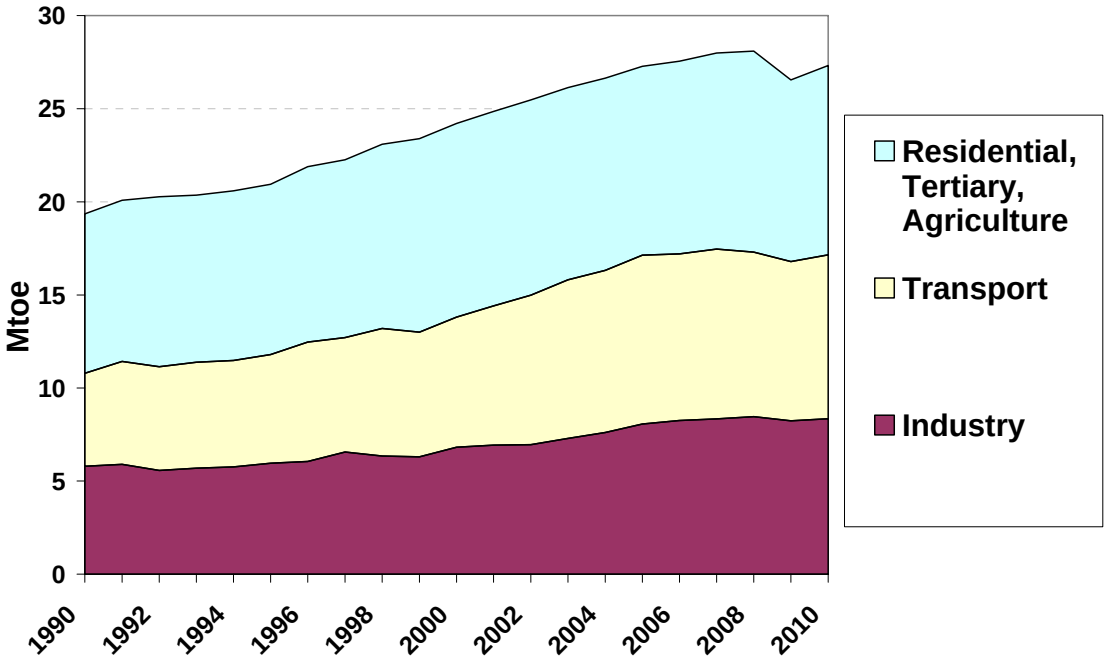
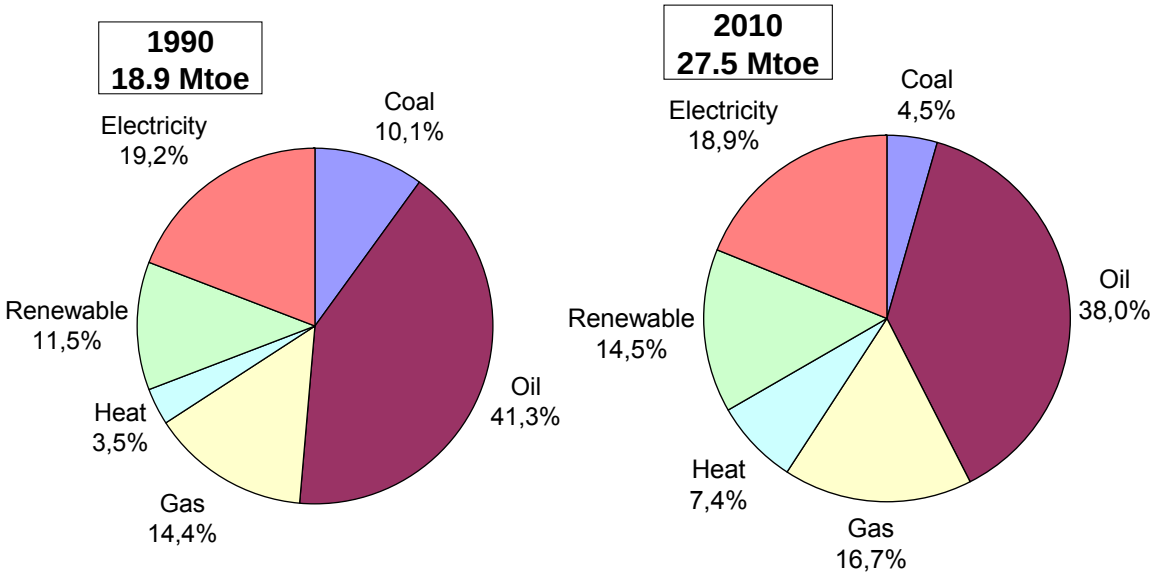


Chart 2.3: Final energy consumption by energy: 1990 and 2010

Source: ODYSSEE

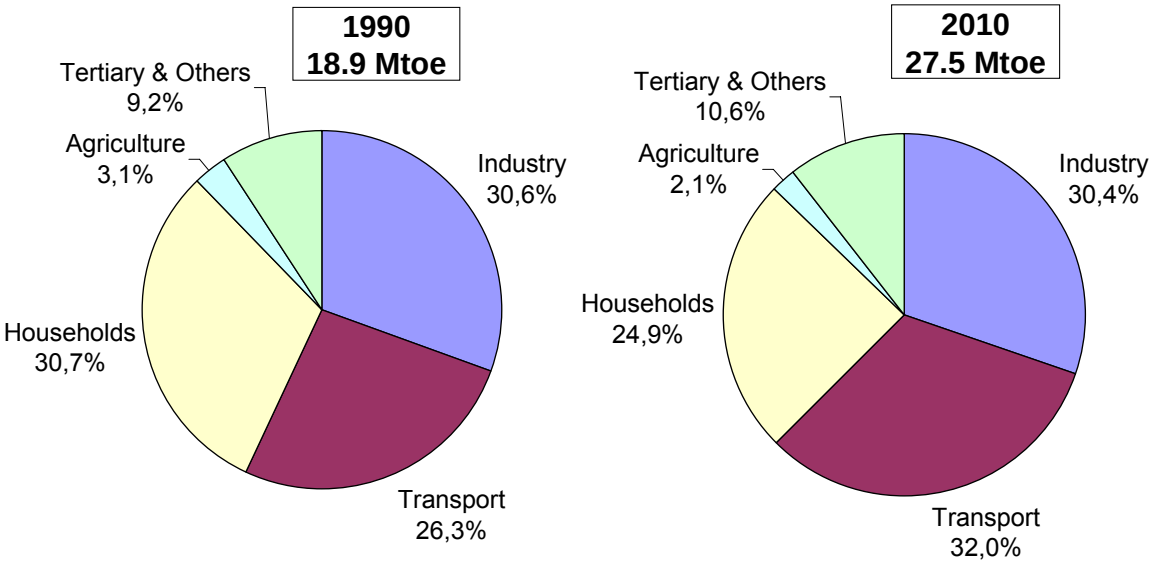


Final energy consumption in absolute terms (not adjusted for climatic influences) increased in all sectors except agriculture in the period from 1990 to 2010. The agricultural sector shows a reduction of -2.1%, whereas final energy consumption for transport purposes rose by 76.5% within the same time period. The industrial sector showed a rise in final energy consumption by 43.9% and the residential sector by 17.9%. As regards the tertiary sector, an increase by 66.3% can be observed.

As regards the distribution of final energy consumption by sector (non energy uses excluded – see Chart 2.4), the most important feature in the period under consideration has been the increase of the transport sector (from 27.2% to 35.0%). The share of the tertiary sector (including service but excluding agriculture) also rose slightly (from 9.2% to 10.6%), whereas all the other sectors had lower shares in 2010 than in 1990. The residential sector dropped from 30.7% to 24.9% and the industrial sector decreased from 30.6% to 30.4%. The share of the agricultural sector in final energy consumption decreased at a low level from 3.1% in 1990 to 2.1% in 2010.

Chart 2.4: Final energy consumption by sector: 1990 and 2010

Source: ODYSSEE



2.3 The policy background to energy efficiency

Austria's energy policy is simultaneously conducted at two levels, the federal level and level of Austria's nine federal provinces. The federal constitution allocates responsibilities either to the federal level (e.g. taxation, metering and emergency supply) or to the joint federal and province level (e.g. energy supply, energy conservation and subsidies). Energy policy is formulated and implemented in close co-operation with the social partner organisations, which represent important groups of society (employers, employees, agriculture).

2.3.1 Institutions accountable for energy related policies

The main energy policy making is taking place at the federal level in a number of government ministries and institutions. The **Federal Ministry of Economy, Family and Youth** is the main government institution responsible for energy matters at the federal level. The **Federal Ministry of Agriculture, Forestry, Environment and Water Management** is responsible for environmental protection, including climate change and emissions from combustion. The **Federal Ministry of Transport, Innovation and Technology** is responsible for transport policy and energy R&D. The **Federal Ministry of Finance** is responsible for setting energy taxes.

At the regional level, the **governments of the nine federal provinces** have responsibility for policy making, setting subsidy levels, and implementing regulatory control of energy companies.

The **E-Control Commission** is the federal regulator for electricity and gas in Austria. The E-Control GmbH is a government-owned company providing advice on regulation to the commission. The **Austrian Energy Agency** was established by the federal government and states to promote clean energy use in Austria. Besides the Austrian Energy Agency, which acts as a national energy agency, regional institutions performing the tasks of an energy agency exist in all Austrian federal provinces. This corresponds to the important role the federal provinces play in energy policy. In some federal provinces these institutions are incorporated into the administration, in others energy agencies have been formed as legal bodies.

The energy institute for Austrian businesses was initiated by the Austrian chamber of commerce and established in 2008.

More than 40 Austrian organisations offer energy efficiency information services for consumers. The most prominent of these is the Austrian Energy Agency. Many organisations are active only at the state or municipal levels. Austrian utilities also run

information campaigns to encourage responsible energy use. The most important nation-wide campaign is klima:aktiv (see Chapter 4.3), which is the Austrian government's climate change information and grant programme.

2.3.2 National energy policies

2.3.2.1 Policies regarding energy efficiency

A range of measures is available to the Austrian government in the area of energy efficiency policy, including regulatory measures (such as minimum efficiency standards or energy taxation rules); research, technological development and demonstration, and promotion of market penetration; dissemination of information to energy consumers; and subsidies for the implementation of energy-saving measures.

The relationship between national, state, utility and other energy efficiency programmes is mainly complementary. The various programmes complement each other either geographically (support for energy efficiency measures in households in the context of housing improvement and housing promotion in all federal provinces) or regarding the target group. State support is granted to households, while the Kommunalkredit (a special-purpose bank) supports thermal improvement of commercial and office buildings through low-interest loans under the Environmental Support Programme.

According to the **Energy Service Directive – ESD** (directive 2006/32/EC), Austria is obliged to achieve energy savings of 9% by 2016 based on the average energy end use of 2001-2005.

In order to implement the requirements from Directive 2006/32/EC

- voluntary agreements to support energy savings with energy suppliers, distributors and trading associations and
- an agreement between the federal state and the provincial governments concerning issues on energy efficiency competence were negotiated and concluded in November 2009.

For more details about national developments under the EU Energy Service Directive see chapter 5.

For more details on the **national energy efficiency action plan (NEEAP)** see chapter 5.2.

Austria revised its **energy strategy** in April 2009, following the establishment of a new government. One of the goals of this strategy is to limit Austria´s final energy consumption for the year 2020 to the 2005 level, which is 1,100 PJ.

An overview of the sectoral goals is given in Table 2.1.

Table 2.1: Sectoral goals of the Austrian energy strategy, as set in April 2009.

Source: www.energiestrategie.at

	2005	**Goals**	**2020**
	PJ	%	PJ
Buildings	337	-10%	303
Households, Tertiarry, Agriculture and small-scale consumption	206	+10%	227
Energy intensive industry	178	+15%	227
Transport	385	-5%	366
	1106		**1100**

The key points of the Austrian Energy Strategy were presented in March 2010 by the Federal Ministry of Economic Affairs and the Ministry of Environment.

Austria's energy strategy is founded on three principles:

- Security of energy supply
- Energy efficiency
- Renewable energies

On the basis of these principles, Austria's energy strategy is primarily directed at enhancing energy efficiency at every level where energy is supplied and consumed. The new strategy foresees rewards for environmentally friendly behaviour, but also penalties for environmentally unfriendly activities.

2.3.2.2 Policies regarding renewable energy sources (RES)

Austria is among the leading nations in Europe in terms of renewable energy supply. Austria's energy policy aims to increase the use of renewable energy sources, and in particular biomass for heating, electricity generation, and transport fuel purposes through direct and consumer financial support, as well as tax exemptions, in support of its Climate Change Strategy. There has also been a rapid increase of wind power during the last years. As of October 2012, 656 wind energy plants in Austria with a total capacity of 1.084 MW supply power to the national grid. These systems generate

approximately 2.1 billion kWh of clean electricity and thus meet the needs of 600,000 households. In addition, there is an ongoing programme for the use of solar energy for heating purposes in passive houses as well as some use of solar photovoltaics.

The government, which came into office in January 2007, has set very ambitious targets to increase the share of renewable energy in total primary energy consumption, from 21.3% then to 45% by 2020. However, in the new government programme, which was introduced after new elections in December 2008, there are no concrete goals defined. According to the EU directive 2009/28/EC Austria is obliged to increase the share of renewable energy sources in gross final energy consumption from about 24% (2005) to 34% by 2020, including 10 % biofuels. This directive entered into force in June 2009.

Austria submitted its National Renewable Energy Action Plan (NREAP) to the European Commission in June, 2010. The NREAP was developed within the framework of the Austrian Energy Strategy 2010, a joint effort between the Federal Ministry of Economy, Family and Youth (BMWFJ) and the Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMFLUW).

In order to comply with the 34% target, Austria aims at stabilizing its final energy consumption at 2005 levels by the year 2020. This goal has been made explicit in the Austrian Energy Strategy 2010. This implies a reduction in final energy consumption of 13% in comparison to a reference scenario with current demand growth trends.

In order to achieve the trajectory of the efficiency scenario outlined in the NREAP and the Austrian Energy Strategy 2010, the following reductions in energy consumption in the three main areas of energy use are expected, as compared to the trends of the reference scenario: 22 % for transport, 12 % for heating and cooling, 5 % for electricity.

That is, Austria will be relying on synergies between energy efficiency and RES energy policies and measures in order to achieve its RES target of 34% of gross final energy consumption by 2020.

Two major legal sources are of interest in the renewable energy context:

- the Austrian Federal Act on the provision of green electricity ‘Ökostromgesetz‘ (see Chapter 2.3.4.1).
- and the European Bio-fuel Directive which was implemented in Austria in 2004 (see Chapter 2.3.6.2).

2.3.3 Climate protection strategies

According to the individual greenhouse gas reduction targets, which were proposed by the European Commission in early 2008 and which will replace the targets set under the Kyoto protocol after they have expired in 2012, Austria has to reach a GHG emission target of -16% by 2020 relative to 2005.

Austria's climate policy is based on two documents: the Climate Change Strategy and the National Allocation Plan (NAP), regulating the allocation of emissions to the trading sectors in Austria. Both documents have been prepared as a joint effort by the relevant ministries, regional authorities and non-governmental organisations. This work was co-ordinated by the Federal Ministry of Agriculture, Forestry, Environment and Water Management, the ministry responsible for co-ordinating climate change policy in Austria. Most of the Austrian federal provinces have adopted their own regional climate change programmes, taking into account specific regional circumstances, needs and areas of competence.

The **Austrian Climate Strategy**, first released in 2002, was adopted by the Council of Ministers following its evaluation and revision in 2007. Its aim is to ensure that the greenhouse gas reduction targets set out in the Kyoto Protocol (-13% of greenhouse gas emissions for the first commitment period 2008-2012, compared to 1990) are met.

The overall breakdown of planned emissions reductions under the strategy by sector in Austria is for a 42% purchase of emission allowances and credits abroad; 32% from the non-trading sectors; and 26% from the trading sectors under the European Union Emissions Trading Scheme (EU-ETS). For domestic action alone, non-trading sectors are expected to cover 58% of reductions, while trading sectors under the EU-ETS are expected to cover 42%.

Jurisdiction in Austria is distributed among the federal government, the federal provinces and the municipalities. Hence, there are many climate change programmes at regional level in addition to the national climate strategy.

In 2007, the **Climate and Energy fund** was set up with an endowment of 500 million euros for the period 2007-2011 to support the implementation of the Austrian Climate Strategy. Starting with 2012, the fund will be endowed with 150 million euros annually until 2013. The Fund provides subsidies to promote innovative projects, e.g. renewable energy supply. Until May 2012, more than 21,000 projects within 96 R&D support programmes have been subsidised by the fund

The planned Federal **Climate Protection Act** (*Bundesklimaschutzgesetz*), which is currently being assessed, will be a major contribution to the effective implementation and evaluation of additional measures.

2.3.4 Industry

In Austria all federal provinces offer **subsidised consultancy to SMEs** in the field of waste-, ecology- and energy management. These regional programmes are mostly organised by the provincial chambers of commerce and provincial governments. Each province has set up a pool of energy consultants which are qualified and accepted for conducting energy checks.

The programmes consist of the following elements:

- Benchmarking (comparison of energy indicators at company level);
- Best Practice (concrete examples of realised measures);
- Energy audits (incl. energy analysis, energy management to identify concrete measures).

The national programme “klima:aktiv energy efficient companies” co-operates with these regional programmes and offer training courses for the energy consultants. The programme develops benchmarking databases for a lot of sectors, offers trainings for the ISO 50001, provides the auditors with detailed energy audit guides and tools for different technologies (pumps, fans, compressed air, steam systems and cooling systems), Furthermore branch-studies are compiled and conferences and workshops are organized. The stakeholders such as the chamber of commerce and industrial branch associations but also the federal provinces play an important role in this programmes. European programmes such as Bess, Motor Challenge or EINSTEIN are also being referred to. The goal of the programme is to achieve annual savings in electricity and process heat use of 50 GWh of annual energy savings, equivalent to 20,000 tonnes CO_2 e per annum.

Energy intensive industry has carried out a **JI/CDM programme** for the allocation of CO_2 emissions within the emissions trading scheme. This scheme is seen as a major instrument to trigger further energy efficiency improvements (and CO_2 reductions) within the energy-intensive industry. For more details on the programme for JI and CDM see chapter 4.1.3.

In most of the federal provinces, companies can apply for **subsidies** for energy efficiency measures from public funds. Subsidies can also be obtained from the Federal Government. They are available for a wide range of energy efficiency

measures, e.g. for measures listed within energy concepts prepared for chosen branches, for thermal insulation of hotels and homes and for the installation of heat recovery systems. Subsidies granted by the Federal provinces are restricted to small and medium-sized enterprises in many cases.

A **klima:aktiv programme for voluntary agreements** exists in the industrial and SME sectors, under which the goal is to achieve annual savings in electricity and process heat use of 50 GWh of annual energy savings, equivalent to 20 000 tonnes CO_2 e per annum. This is to be achieved through co-operation between the states in training energy advisors, including the development of new advice tools and information campaigns. The programme focuses on introducing energy management systems, particularly in the food industry, and on increasing the efficiency of motors for pumps, ventilators and compressors in industrial companies.

The targets of **energy institute for Austrian businesses**, which was founded in 2008, are:

- Enforcing energy audits for industry
- Accepted standards for energy audits in enterprises
- Standardised monitoring for measuring energy efficiency improvements
- Development of innovative funding mechanisms for energy efficiency measures

Concrete activities cover, amongst others:

- Advanced trainings for energy auditors
- Set-up of a network of energy auditors, implementing potential energy savings
- A SME-initiative: 3.400 grants for energy audits by qualified energy auditors, 675,- euros
- A programme to transfer research results on sustainable development/ production options to SMEs

2.3.4.1 Green Electricity Act

In 2002, the Green Electricity Act (Ökostromgesetz) was adopted to transpose the EU-Renewables Directive into national law, implementing for the first time a nationwide consistently feed-in system for electricity from RES. In the year 2010, the act (and subsequent amendments) triggered in the production of green electricity output by 5.9 TWh. This corresponds to approximately 10.7% of overall public electricity supply in Austria.

The latest amendment, Green Electricity Act 2012 (Ökostromgesetz 2012, ÖSG 2012) was passed by the National Assembly in July 2011. The new regulations for green electricity apply as of 1 January 2012. The new act raises the annual increase in the total subsidies amount (cap) for new green electricity generation facilities from EUR 21 million to EUR 50 million (with an annual degression of one million euros over a period of ten years to bring the increase down to EUR 40 million) and introduces fixed quotas for the various renewable electricity technologies.

2.3.4.2 Smart metering systems

See chapter 4.1.1.

2.3.5 Households

2.3.5.1 Subsidies

There are many programmes in Austria which aim to improve energy efficiency by granting subsidies for suitable measures. These subsidies have usually been designed as a contribution towards investment costs or as a loan with reduced interest rates:

- Subsidies can be obtained by private households or housing companies for various measures which increase energy efficiency in the context of room heating in the housing sector.
- Subsidies for improving the standard of insulation of a residential building's exterior can be obtained from public funds in each of the Austrian federal provinces. The respective pre-requisitions vary, e.g. the energy standards of the refurbished building or the thickness of the wall insulation has to meet fixed values. Often, the family income must not exceed a given amount. Some federal provinces offer subsidies from public funds for improvements in the heating system, such as the replacement of a boiler for example. In addition, a few utilities subsidise the installation of gas fired condensing boilers.
- With regard to the construction of new buildings, the federal provinces grant subsidies, e.g. if the specific heat energy demand is lower than a fixed value. In some cases, the extent of the financial support depends on the extent to which the referring pre-conditions are met.
- For purchasing energy efficient electrical appliances subsidies can be obtained from some regional electrical utilities. These subsidies are granted to all customers of the respective utility, regardless of whether the customer is the owner of a private household, an enterprise or a public institution.

- At the federal level, a number of measures for energy efficiency in the residential sector are promoted via the klima:aktiv programme of the Austrian federal government. A contracting initiative for buildings owned or used by the federal republic is extending support to sectors which are not covered by other programmes such as university buildings, schools, penal institutions, museums and other historic buildings, and some military buildings. A similar initiative covers energetic improvement of commercial sector buildings.

The **new housing subsidisation scheme** was taken into force in early 2009 as part of the 15a Agreement on energy savings of the federal government with the federal provinces concerning initiatives to reduce greenhouse gas emissions in the building sector. The new 15a Agreement is not confined to the housing subsidisation scheme but also provides for initiatives in the domains of building law, public buildings and accompanying federal instruments.

Residential buildings

In future, housing subsidies will be paid out in accordance with new criteria intended to make a major contribution to the achievement of the Austrian climate targets as of 2009. Starting in 2012, houses built with housing subsidy monies have to meet the following heating standards: 36 kWh/m_2 per year for buildings with a surface/volume ratio ≥ 0,8, and 20 kWh/m_2 per year for buildings with a surface/volume ratio ≤ 0,2. Between this limits the heating standards are interpolated linearly.

There are special subsidies for several successful regional standards, e.g. regarding low energy or passive houses, or klima:aktiv standards (for a description of the klima:aktiv programme see chapter 4.3).

Starting in 2010, the following limits were set for comprehensive energetic renovations: 75 kWh/m^2 per year for buildings with a surface/volume ratio ≥ 0,8, and 35 kWh/m^2 per year for buildings with a surface/volume ratio ≤ 0,2. Between this limits the heating standards are interpolated linearly.

Public buildings

Starting in 2012, houses built with housing subsidy monies have to meet the following standards: 12 kWh/m^2 per year for buildings with a surface/volume ratio ≥ 0,8, and 7 kWh/m^2 per year for buildings with a surface/volume ratio ≤ 0,2. Between this limits the heating standards are interpolated linearly.

Starting in 2010, the following limits are set for comprehensive energetic renovations: 25 kWh/m^2 per year for buildings with a surface/volume ratio ≥ 0,8, and 12 kWh/m^2 per

year for buildings with a surface/volume ratio ≤ 0,2. Between this limits it is necessary to interpolate linearly (Article 13).

In addition, an agreement was reached on the use of innovative, climate-friendly heating and water heating systems as a pre-requisite for the payment of subsidies (in particular, renewable energies and district heating through co-generation plants). Subsidies for new buildings will gradually be phased out for oil-fired heating systems, which means that new buildings constructed with oil-fired heating systems will no longer receive subsidisation. The various federal Provinces have been given flexible transition periods to implement this change.

Subsidies for individual component refurbishments

Starting in 2009, the following limits were set for subsidies for individual component refurbishments, both concerning residential and public buildings.

Table 2.2: Minimum U-value requirements for subsidies for individual component refurbishments, as set in 2009.

Source: Vereinbarung gemäß Art. 15a B-VG zwischen dem Bund und den Ländern über Maßnahmen im Gebäudesektor zum Zweck der Reduktion des Ausstoßes an Treibhausgasen. August 2009.
http://www.ris.bka.gv.at/Dokumente/Lgbl/LGBL_BU_20090811_64/LGBL_BU_20090811_64.pdf

	U-values
	W/m²K
Window replacement (frame plus glass):	1.35
Window replacement (only glass)	1.10
Exterior wall	0.25
Top ceiling, Roof	0.20
Cellar Ceiling	0.35

2.3.5.2 Technical framework – Building Codes

As it is the case with housing subsidies, the responsibility for the building regulations also lies with the nine Austrian provincial authorities. The nine building codes differ in general and in detail, particularly with regard to regulations for new buildings or new parts of existing buildings. There are energy-related regulations for existing buildings within the scope of building codes with respect to the renewing of construction units (e.g. the replacement of windows), to building extensions (e.g. roof extensions) and to the modernisation or replacement of the heating system. As regards heating systems,

there are some regulations concerning the efficiency of boilers and the emission limits of some air pollutants (e.g. CO, NO_x, total suspended particles).

All federal provinces have defined individual limits for the U-values, although there is a general convention to harmonise these U-values (the above mentioned “15a Agreement” (see http://umwelt.lebensministerium.at/article/articleview/71851/1/7781/ for more details in English). This agreement fixes the upper level of the U-values but allows the provinces to set up their own U-value requirements within these limits.

The implementation of the EU Directive on the Energy Performance of Buildings required regulations at both the federal government and the state levels. The federal Energy Performance Certificate Presentation Law was published in April 2012. It mandates that the energy performance certificate is presented upon a change in the ownership or tenancy of a dwelling. The certificate is based on the state-level regulations. Furthermore, some provinces have implemented energy performance requirements for buildings within the scope of building codes in the form of the heating energy demand (in kWh/m²a) or the LEK-values (non-dimensional). All federal provinces have specified exactly in which cases the energy performance has to be calculated for reconstructed or extended buildings. For more details on the certification of buildings, see chapter 4.1.1.

Regarding the renovation of buildings it was agreed in the **new 15a Agreement**, which was taken into force in early 2009, that buildings constructed between 1945 and 1980 that have not yet been renovated to date will be refurbished as far as possible to achieve better thermal insulation. In addition, clear incentives are to be put in place for comprehensive renovations to optimise energy use.

Moreover, specific heating requirement targets (alternatively expressed as a minimum reduction figure) have been set for the first time for building renovations intended to optimise energy use. The building standard code also provides for thermal insulation specifications for the renovation of individual building parts. When replacing heating systems, the focus should be on "innovative climate-friendly systems”, especially on systems using renewable energy sources. When replacing oil- and gas-fired heating systems, only systems using modern condensing technology are subsidised if they are combined with solar heating and the building shell is checked for areas where thermal insulation can be improved. The use of renewable energy source for room heating and water heating not only benefits the economy but also helps to ensure the security of fuel supply, while at the same time making people less dependent on expensive, imported fossil fuels.

Other measures concern the building code, which was, in 2011, amended by heat insulation guideline no. 6 of the Austrian Institute of Construction Engineering in all federal provinces, with provisions made for revising and improving the building regulations in 5-year intervals (the guideline can be downloaded in German at http://www.oib.or.at/RL6_061011.pdf).

Public buildings will be erected and renovated in line with the subsidisation standards for housing. These go beyond the requirements of the building standard code both in terms of building shell (insulation) and in the choice of energy systems. In addition, the Federal Government will implement supporting measures in the area of construction.

2.3.5.3 Programmes and initiatives

In April 2012, the Austrian federal Government launched a support programme for thermal refurbishment. Subsidies in the amount of 70 million euros each were earmarked for the private residential building and 30 million euros for the corporate sector for the insulation of the outer shells of buildings and the purchase of new boilers and windows.

Depending on the energy saving effect, this programme can pay for up to 35 per cent of the investment costs of companies, while residential house building is supported with 20 percent, or a maximum amount of 5,000 euros. The conversion of existing heating systems in residential buildings is subsidised with 1,500 euros at most. If insulating material from renewable resources or material with an ecolabel is used, an additional maximum subsidy of 500 euros can be granted. Furthermore, the thermal refurbishment of listed buildings is subsidised. Specific prerequisites apply in this field.

The thermal refurbishment subsidies available from the federal government can be combined with subsidies of the federal provinces.

Several renovation initiatives exist at the level of the Austrian federal provinces. Nevertheless, the Federal Ministry of Agriculture, Forestry, Environment and Water Management has launched several programmes for the implementation of the Austrian climate strategy at federal level.

The initiative klima:aktiv includes several programmes aiming at different target groups of the households sector (see chapter 4.3). The klima:aktiv building standard exists for residential and office buildings, for new buildings and also for renovations. The basic criteria were formulated in the year 2011. They constitute entry into klima:aktiv building in all categories. Specific klima:aktiv standards have been available since the end of 2011 for hotels, schools, nursery schools and nursing homes to enable even more

targeted promotion in the sector of service buildings. All criteria catalogues are structured along the lines of a 1,000 point system which is used to assess the buildings and declare their compliance. Around 240,000 m^2 in the residential building sector and over 180,000 m^2 in the service building sector have already been built in compliance with the klima:aktiv standard. There are already over 820 flagship projects in the sector of sustainability available for viewing in the building database at www.klimaaktiv-gebaut.at.

2.3.6 Transport

At a national level, the main efforts to improve energy efficiency in transport are directed at setting a suitable framework for a sustainable transport system as well as supporting innovation through research and demonstration projects.

2.3.6.1 Financial framework

Taxes on fuels and on the purchase of vehicles as well as road pricing are the main factors to influence the financial framework for motorised transport. Transport fuel taxation in Austria is low, compared to taxation in neighbouring countries, thus leading to fuel tourism (see chapter 3.5.2.1). Taxes for fuel with a minimum share of biogenic materials (4.6% for petrol and 6.6% for diesel) and a maximum sulphur content (10 mg/kg for petrol and diesel) are 7% lower than taxes for other fuel standards. A road pricing for trucks was introduced in the beginning of 2004.

In 1992, a tax on the standardised fuel consumption of vehicles (**Normverbrauchs-abgabe/NoVA**) was introduced. The NoVA has to be paid when a vehicle is registered for the first time in Austria (registration tax). As the tax burden is progressively linked to fuel consumption of the vehicle, NoVA is an incentive to buy more efficient cars regardless of the expected mileage. In 2008 the NoVa system was improved by a bonus-malus system where cars with relative low CO2-emissions get tax breaks and cars with higher CO2-emissions have to pay a higher NoVA. In 2010 the new system was tightened and on 1 March 2011 the number of different tax classes was increased. This means that vehicles with CO_2 emissions of more than 160 g/km have to pay an additional NoVA of 25 euros per exceeded gram. Vehicles with CO_2 emissions of more than 180 g/km have to pay an additional NoVA of 50 euros per exceeded gram and vehicles with CO_2 emissions of more than 220 g/km have to pay an additional NoVA of 75 euros per exceeded gram. If the car exhausts less than 120 g/km, a bonus of 300 euros will be paid out. Furthermore, a bonus of 500 euros is due when the vehicle has an alternative propulsion system (hybrid, gas, electric etc.). From 1 January 2013 the

limits of the NoVa which are valid from 1 March 2011 (160, 180 and 220 g CO_2 /km) will be reduced to 150, 170 and 210 g CO_2 /km.

Another tax instrument for the promotion of energy efficiency is the **"engine-related insurance" tax** (motorbezogene Versicherungssteuer; annual vehicle tax) which favours vehicles with lower horse-power and, therefore, lower fuel consumption, contributing to the improvement of energy efficiency.

2.3.6.2 Technical framework – EU Biofuels Directive

The main focus of the national policy lies on the implementation of the European standards for emission standards, biofuels ("Biofuel Directive") and the energy efficiency information for cars (Consumer Information Directive).

The **EU Biofuels Directive** provides indicative targets for the use of biofuels in the transport sector. In November 2004, the directive was transposed into Austrian law through an amendment to the Fuel Ordinance. This amendment stipulates that all companies that put fuels in circulation must, from 1 October 2005, replace 2.5% of the total energy quantity put in circulation with biofuels. From 2007, this percentage increased to 4.3%, and in 2008, the target of 5.75% has been achieved, two years in advance with respect to the EU deadline. The latest amendment of the Fuel Ordinance, which defines the maximum share of biodiesel as of 7%, took place in 2009.

The use of biofuels is done in Austria primarily through blending of biodiesel with diesel (since October 2005) and blending of bioethanol with petrol (since October 2007).

In 2011, 609,919 tons of biodiesel were added to Austria's automotive fuels, 83% of which was biodiesel and 17% bioethanol. Additionally, 16,731 tons of vegetable oil were used for agricultural vehicles and also trucks. Within 2011, the use of biofuels in the transport sector had a share of 6.75%, which significantly exceeds the target of 5.75%.

Together with the amendment to the Fuel Ordinance, the Mineral Oil Act has been revised to provide for tax concessions for fuels with a biofuel share of at least 6.6% for diesel and 4.6% for petrol. To be able to profit from the tax concessions, the fuel must also be sulphur-free (less than 10 mg sulphur per kg of fuel). The use of pure biofuels is completely exempt from tax.

2.3.6.3 Programmes and initiatives

There are several RTD strategy programmes managed by the Ministry for Transport, Innovation and Technology (BMVIT). The ongoing umbrella programme “Intelligent Transport Systems and Services plus – IV2Splus” operates as a continuation of the successful forerunner programme IV2S (2002 - 2006), but goes beyond IV2S in significant aspects and establishes new core areas of content. In general the programme focuses on expanding excellence in research and development through stronger international embedding of successfully established national R&D competences, with the goal of increased integration of these competences into international, industrial, value-creation chains.

The following program lines are currently carried out:

- A3plus – Alternative Propulsion Systems and Fuels
- I2V – Intermodality and Interoperability of Transport Systems
- ways2go – Innovation and Technology for Evolving Mobility Needs
- Impuls – Basic Research for Innovations in Transport
- IV2Splus Trans-National – research cooperation and innovation networks

For details in English please visit http://www.bmvit.gv.at/en/innovation/mobility/index.html.

The “klima:aktiv” programme of the Federal Ministry of Agriculture, Forestry, Environment and Water Management promotes energy efficiency and climate protection in all sectors. Transport is covered by the “klima:aktiv mobil” programme. The programmes include, for example, Eco-driving, mobility management in companies, mobility centres, etc.

3 Overall Assessment of Energy Efficiency Trends

3.1 Overall trends in energy intensity

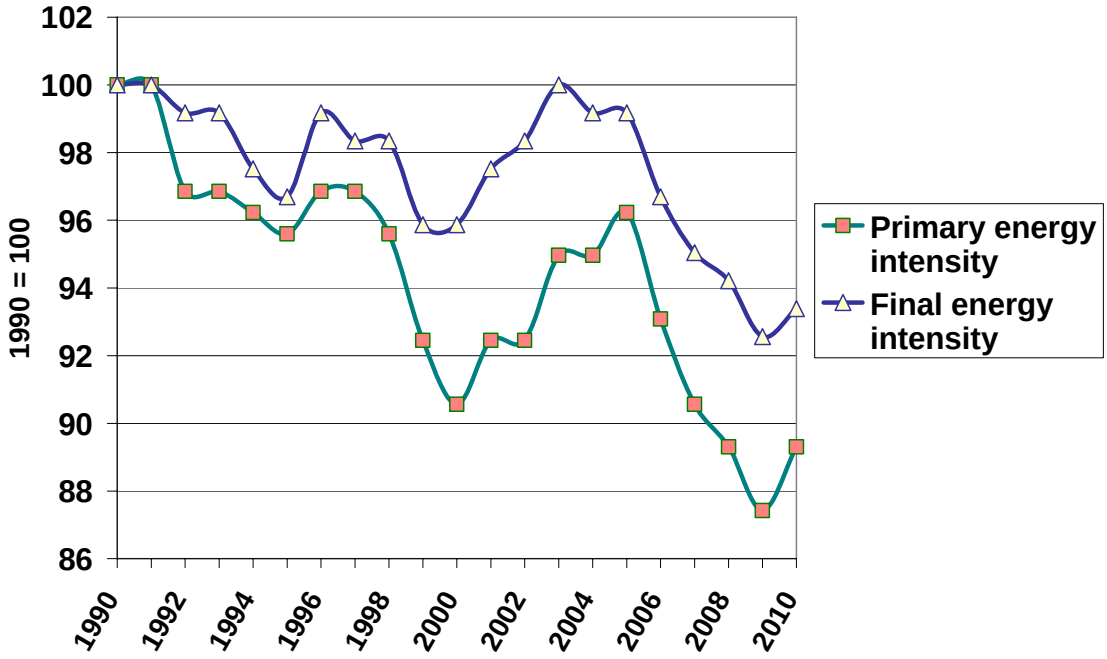
Energy intensity is defined as the amount of energy required to produce some functional output. It is calculated as units of energy per unit of GDP. High energy intensities indicate a high price or cost of converting energy into GDP. GDP measured in constant prices is used to remove the influence of inflation. All indicators are calculated with climate corrections to adjust energy efficiency indicators for the influence of climate variations.

The climate corrected primary energy intensity of the Austrian economy decreased during the period from 1990 to 2010 by 10.7%, while the climate corrected final energy intensity decreased by 6.6% in the same period. Both primary and final energy intensity fluctuated, reaching lows in the recession year 2009 (see Chart 3.1).

In 2010, primary energy intensity amounted to 0.142 koe/EC00 and final energy intensity was 0.113 koe/EC00.

Chart 3.1: Index of primary and final energy intensity of the Austrian economy (climate corrected)

Source: ODYSSEE

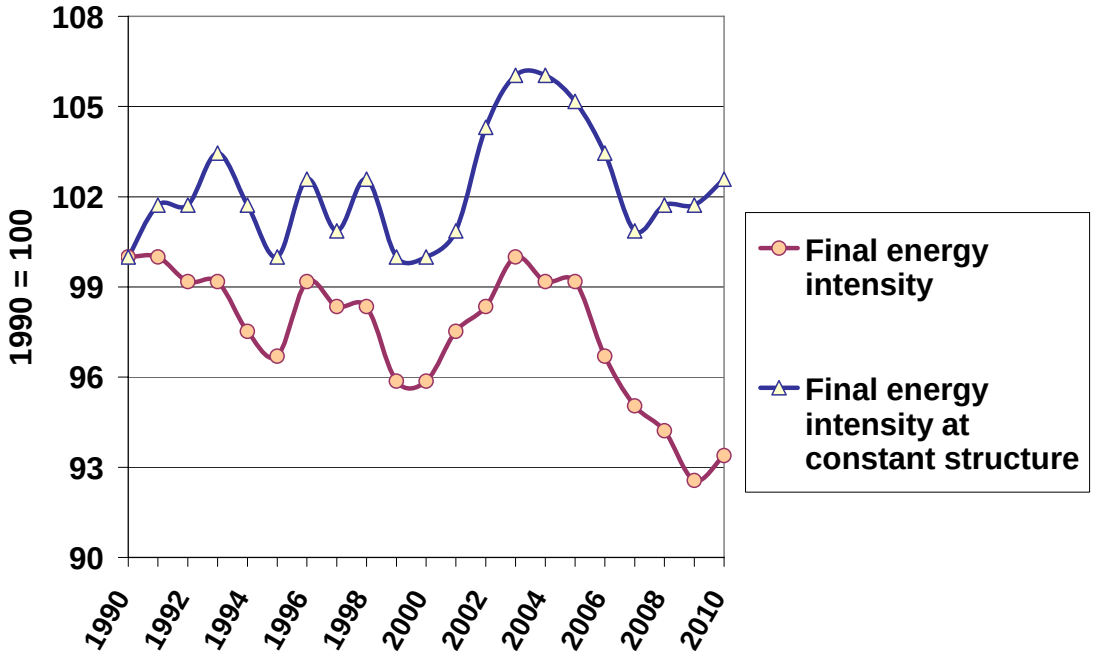


The shift in the structure of Austria's economy towards less energy intensive sectors contributed to a decrease in final energy intensity during the first half of the 1990s. It can be stated, however, that structural changes did not significantly influence final energy intensity – the development of both graphs is more or less parallel, with the exception of the recession years 2008 and 2009 (Chart 3.2).

It can be observed that between 2000 and 2003 Austria has been one of the countries developing a more energy intensive structure. However, since 2003 energy intensity has shown a strong decrease, a trend which was partly reverted in recent years.

Chart 3.2: Final energy intensity (structural effect)

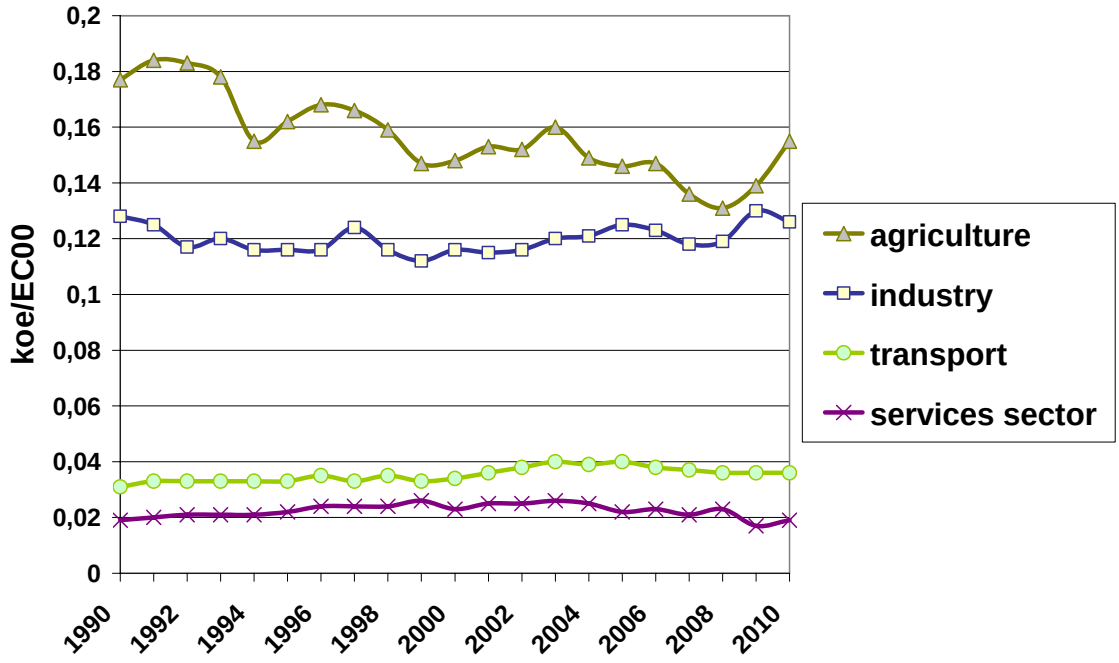
Source: ODYSSEE



Energy intensity is measured differently in the various sectors. Energy consumption is related to the value added of agriculture, industry and the services sector, while energy intensity for the transport sector is measured by the ratio of final energy usage to total GDP. This means that energy intensity for transport is underrepresented in comparison to the other sectors. Chart 3.3 shows that final energy intensity in industry fluctuated and was slightly lower (-1.6%) at the end of the period observed compared to the beginning. The development of final energy consumption of the transport sector increased more or less steadily over the period under consideration (+16.1%). Intensity in the services sector showed the identical value in 1990 and 2010. Energy intensity of agriculture fluctuated and decreased by 12.4% over the period under review.

Chart 3.3: Energy intensity in selected sectors from 1990 to 20107

Source: ODYSSEE



3.2 Industry

3.2.1 Energy consumption trends of industry

Almost one half of the energy consumption of the manufacturing sector in Austria can be attributed to two sectors: steel and paper industry. In 2010, steel industry has held its dominance as the largest energy consuming branch of manufacturing with a share of 25%, which is the same value as in 1990. The share of paper industry slightly increased from 21% in 1990 to 22% in 2010. The share of the non-metallic minerals industry (mostly cement, including glass industry) remained at the same level in 1990 and in 2010 (13%). Chemicals rose from 10% to 11% in the period under observation and machinery increased from 5% in 1990 to 7% in 2010. However, the largest increase is observed for the share of wood industry which increased from 3% in 1990 to 8% in 2010.

Chart 3.4: Energy consumption shares of branches of manufacturing: 1990 and 2010

Source: ODYSSEE

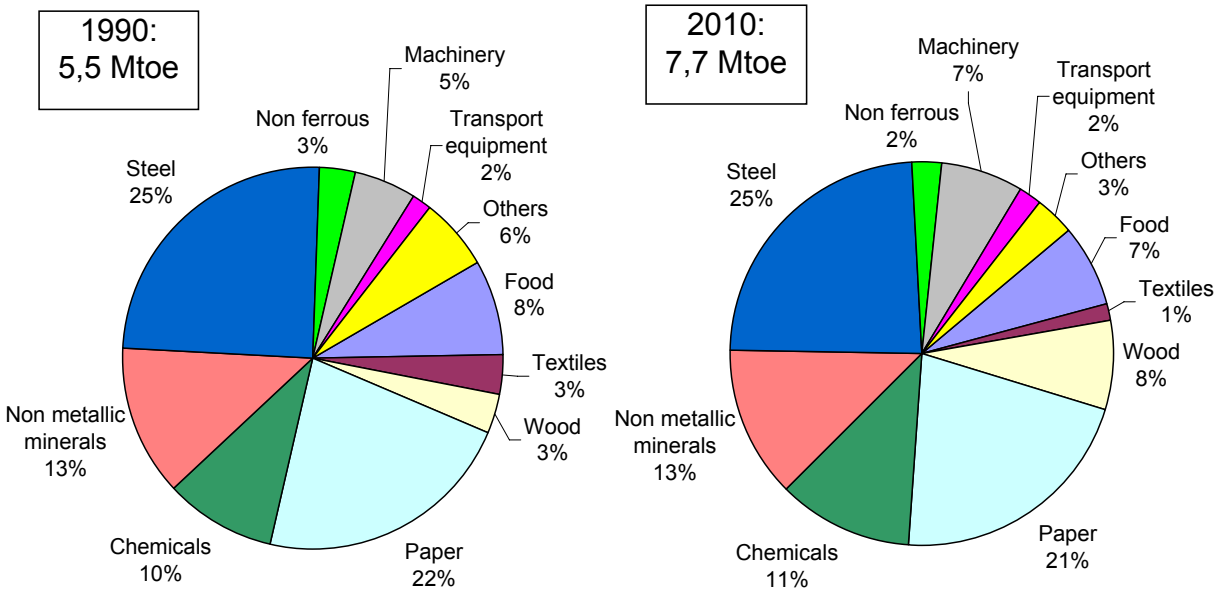


Chart 3.5 shows the development of energy consumption in the manufacturing sector as well as in construction and mining. Chart 3.6 illustrates the development of energy consumption in the manufacturing branches.

Chart 3.5: Energy consumption in manufacturing as well as in construction and mining: 1990 - 2010

Source: ODYSSEE

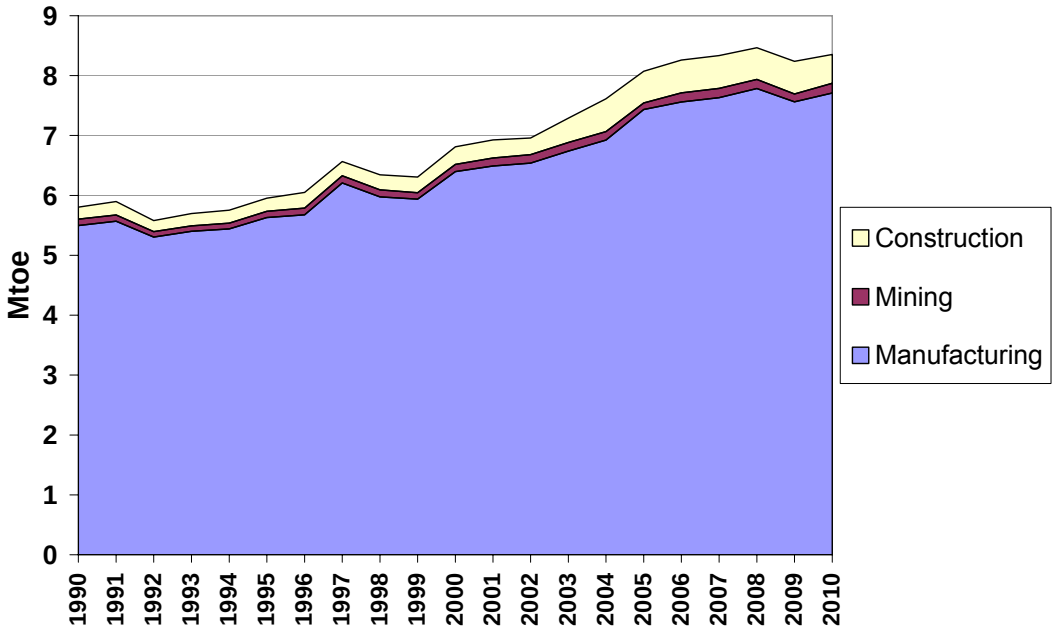
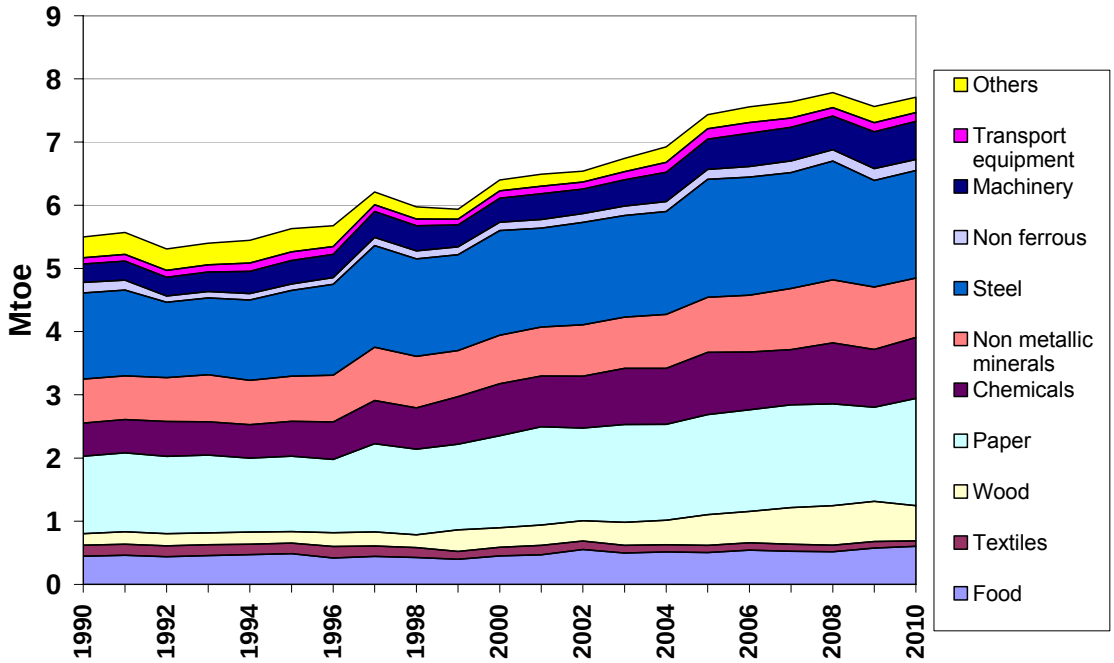


Chart 3.6: Energy consumption in the branches of manufacturing: 1990 - 2010

Source: ODYSSEE



3.2.2 Energy intensity of industry

Energy intensity of industry declined in Austria from 0.128 koe/€2000 in 1990 to 0.126 koe/€2000 in 2010 (Chart 3.7). The highest value was observed in 2009 with 0.130 koe/€2000. For the manufacturing sector (i.e. industry minus mining and construction), the energy intensity declined from 0.1720 koe/EC00 in 1990 to 0.1418 koe/EC00 in 2007 (Chart 3.8).

It can be seen that energy intensity fluctuated and followed the combustibles intensity, whereas electricity intensity remained quite stable over the period. This indicates an improvement in fuel and electricity efficiency as well as a substitution of fuels by electricity. Many industrial processes have been changed to run on electricity. Therefore, it is most remarkable that industry is the only sector (besides agriculture) where electricity intensity is (slightly) declining.

Chart 3.7: Energy intensity of industry

Source: ODYSSEE

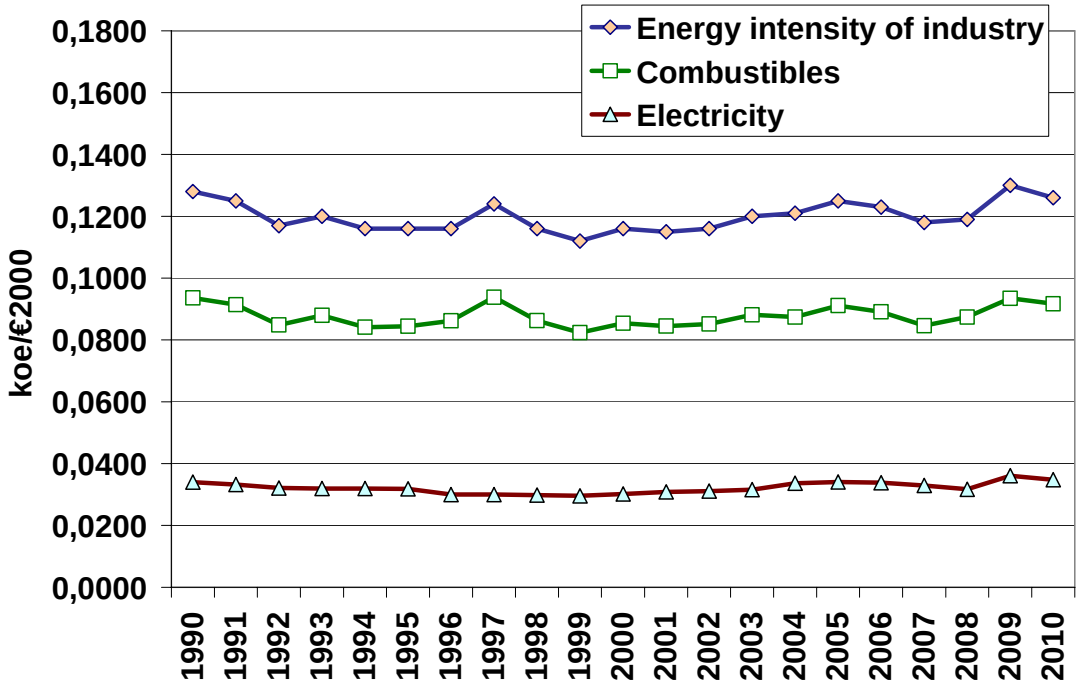


Chart 3.8: Energy intensity of manufacturing sectors

Source: ODYSSEE

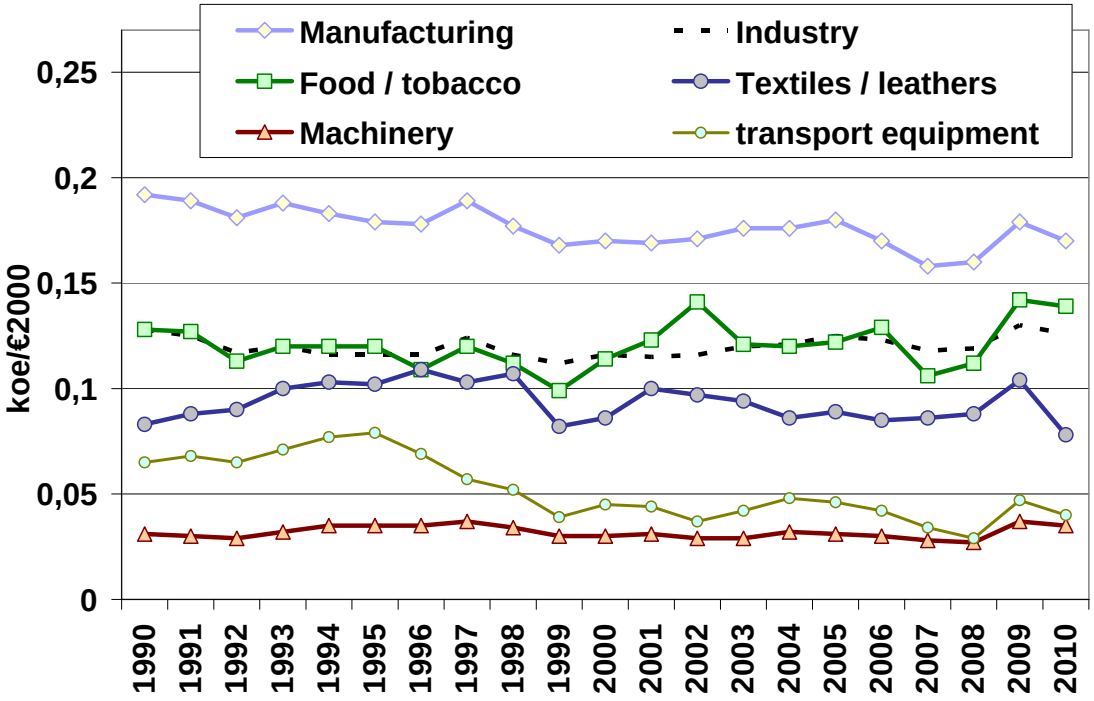


Chart 3.8 shows the development of energy intensity in the sectors with below average intensities. Machinery, which has the lowest energy intensity, was still able to improve on this figure (13% from 1990 to 2010). The food and tobacco industry intensity fluctuated and was 9% higher in 2010 than in 1990. Textile industry remained relatively stable (-6%). Transport equipment shows the largest decrease of intensity with a reduction by 38% in the period under review. Energy intensity of total manufacturing is 11% lower in 2010 than in 1990.

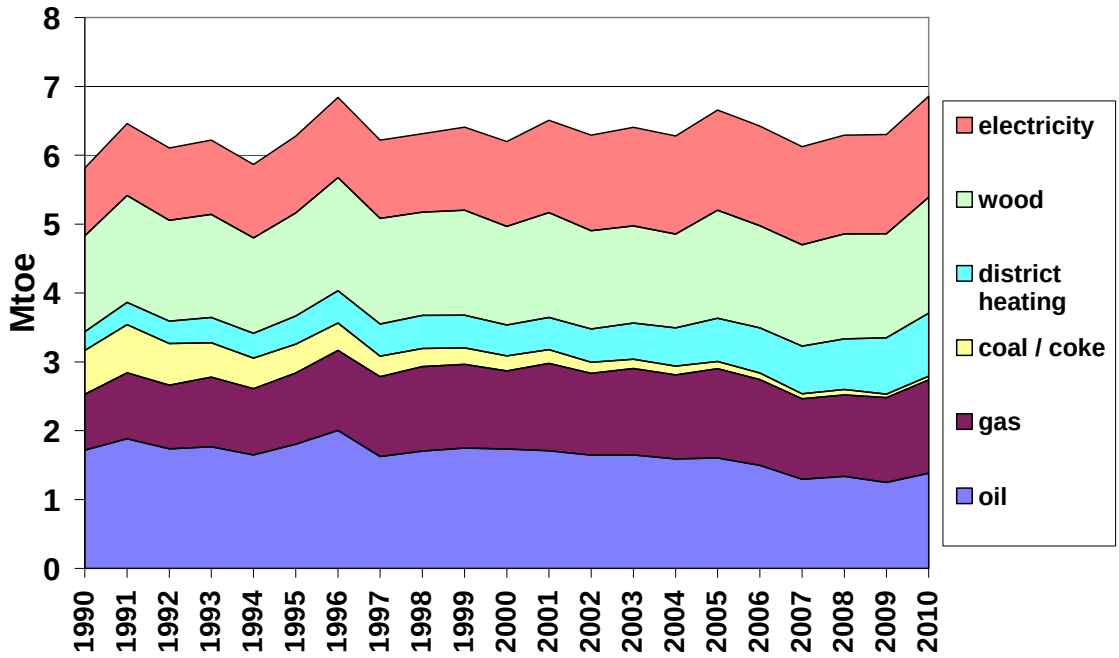
3.3 Households

3.3.1 Energy consumption trends of households

The structure of residential energy consumption in Austria underwent several changes between 1990 and 2010. Chart 3.9 shows the development of the different fuel types in absolute terms. The corresponding figures are listed in Table 3.1.

Chart 3.9: Total residential energy demand by fuel type from 1990 to 2010

Source: Statistics Austria



Energy consumption in the residential sector (without climate corrections) amounted to 6.86 Mtoe in 2010, which was an increase by 17.9% compared to 1990 (5.82 Mtoe).

2010 was the first year which overmatched the previous peak of energy consumption of households which was reached in 2003 (6.41 Mtoe).

The most significant change in the period 1990-2010 is the increase in district heating by 233%, the increase in natural gas consumption by 67% and the decrease in coal and coke by 91%. Electricity increased by 49%, while a decrease by 19% can be observed for oil. The consumption of wood increased by 21% over the period under consideration.

Table 3.1: Residential energy demand by fuel type: 1990 and 2010

Source: Statistics Austria

Consumption	**1990**	**2010**	**Change 1990-2010**
	Mtoe	**Mtoe**	**%**
Oil	1,72	1,38	-19,4%
Gas	0,81	1,35	+66,7%
Coal / coke	0,64	0,06	-91,4%
Electricity	0,99	1,47	+48,9%
District heating	0,27	0,91	+233,2%
Wood	1,39	1,69	+21,1%
Total	5,82	6,86	+17,9%

The associated shares of the various fuel types in residential energy demand for the years 1990 and 2010 are displayed in Chart 3.10. Major changes include the decrease in the share of coal and coke (by 93%) and in the share of oil (-32%) as well as the increase in the share of district heating (+183%) and in gas (+41%). The shares of electricity (+26%) and wood (+3%) show minor changes.

Chart 3.10: Percentage of residential energy demand by fuel type: 1990 and 2010

Source: Statistics Austria

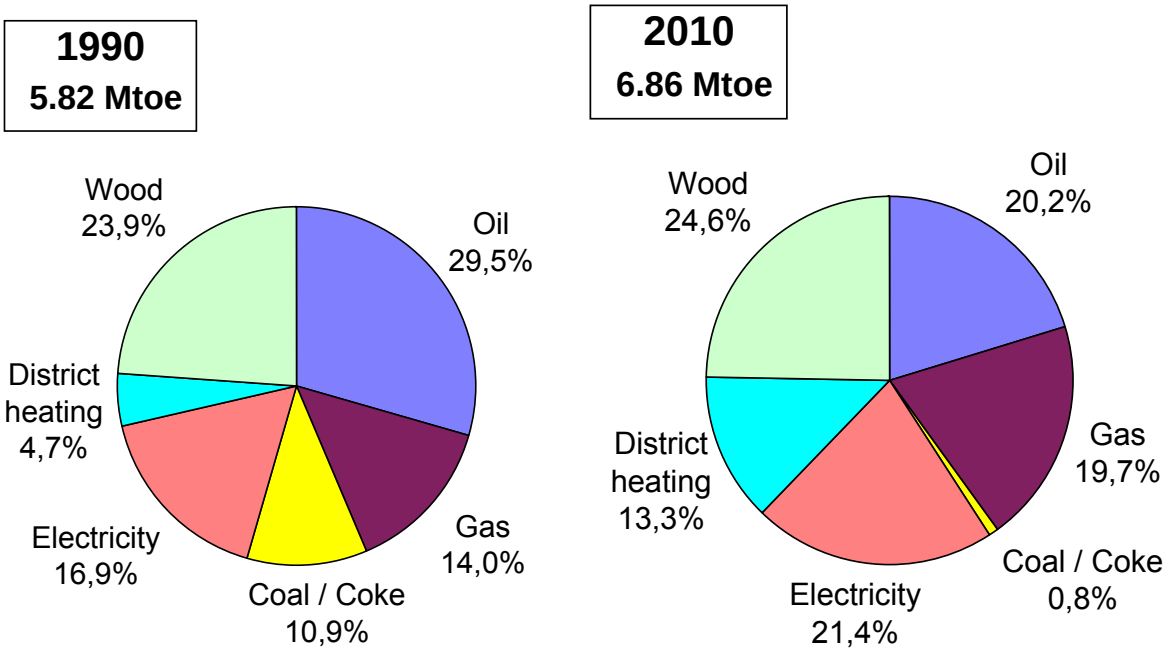
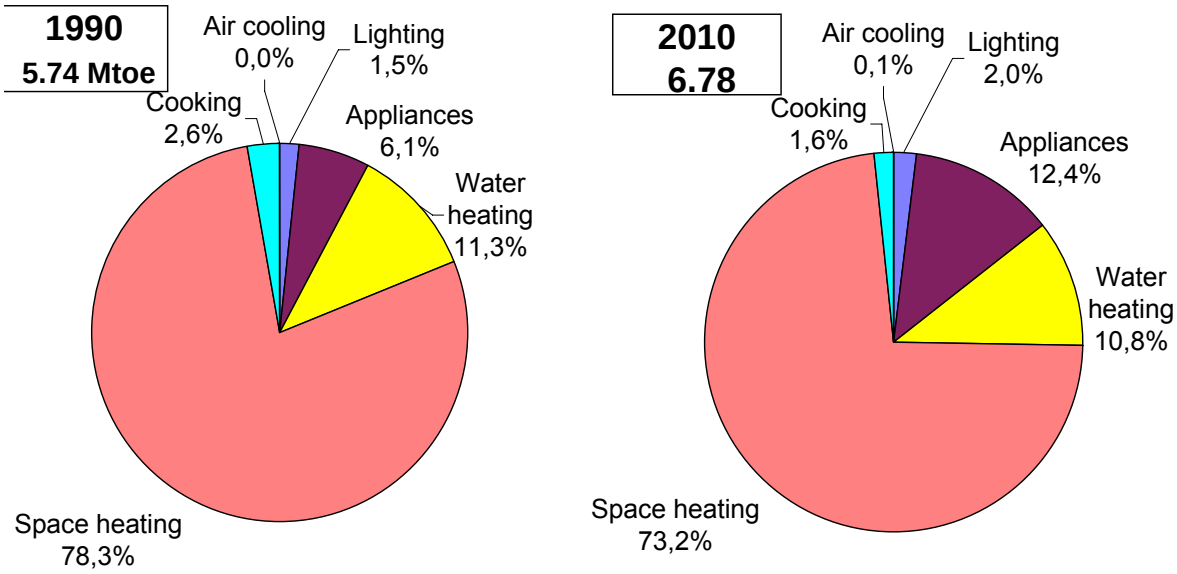


Chart 3.11 shows the change in the shares of different types of end-use in energy consumption in the household sector between 1990 and 2010. The share of space heating (climate corrected), which is by far the most important end use, fell from 78% in 1990 to 73% in 2010, mainly due to better insulation. However, this effect is weakened by larger surface areas and higher room temperatures. The share of electric appliances doubled from 6% to 12% in the period under consideration. In this context, the effect of the growing saturation rate of major household appliances exceeds the effects of more efficient appliances by far.

Chart 3.11: Energy consumption by types of end-use: 1990 and 2010

Source: ODYSSEE



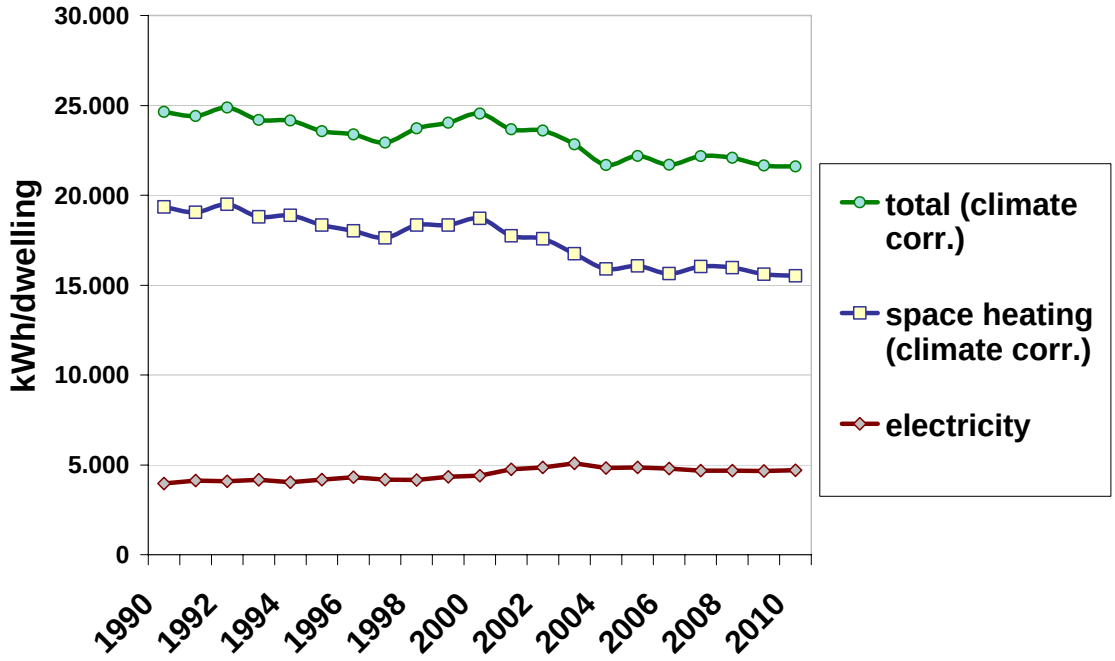
3.3.1.1 Residential energy usage per dwelling

Chart 3.12 illustrates the development of residential energy usage, energy usage for space heating (both climate corrected) and for electricity[1] between 1990 and 2010. There is a reduction in total energy usage per dwelling (-12%). Energy usage for space heating per dwelling decreased even more (- 20%). The usage of space heating decreased due to improved thermal insulation standards, which compensated for the increase in heated floor area. The total energy usage per dwelling amounts to 21,609 kWh in 2010, in 1990 the respective value has been 24,644 kWh. Electricity usage per dwelling increased from 3,960 kWh in 1990 to 4,707 kWh in 2010 (+ 19%).

[1] Electricity consumption per dwelling has been calculated by dividing the total electricity consumption within the residential sector by the number of dwellings. For this reason electricity consumption in context with space heating is included in this graph, too.

Chart 3.12: Development of total energy usage, energy usage for space heating and electricity usage per dwelling in the residential sector from 1990 to 2010

Source: ODYSSEE



3.3.1.2 Renewables for heating

There is a remarkable trend towards renewables, which is partly noticeable in an increase of wood chips and wood pellets consumption. In detail, the usage of biogenic combustibles (mainly wood chips and pellets) in residential plants rose by 1,516% in the period 1990 – 2010. The use of other alternative energies like solar heat and ambient energy increased by 233%. The residential energy consumption of log wood was declining by around 9% in the period under consideration, due to operating stress and more difficult handling in comparison to other fuels.

On the other hand, there is a shift away from most fossil fuels. In the residential sector, a reduction of 82% is observed in the usage of heating oil and a 91% decline in coal use between 1990 and 2010. However, natural gas consumption in the residential sector showed a 67% increase in the period under consideration.

3.3.1.3 CO_2 emissions of the residential sector

Since 1990, direct CO_2 emissions of the households sector have decreased by 2.20 Mt CO_2 or 21.6%. This decrease can be explained by three factors (Chart 3.13): increase in the number of dwellings (quantity effect), climate variations (climatic effect) and CO_2 savings. As a result of the increase in the number of dwellings (+25.3%) emissions grew by 2.71 Mt CO_2 between 1990 and 2010, however, this increase was offset by CO_2 savings (5.86 Mt). The climatic effect contributed 1.00 Mt CO_2 to the decrease in emissions.

CO_2 savings result from energy substitutions (4.21 Mt) and the effect of unit consumption variation (1.66 Mt).

Chart 3.13: Interpretation of CO_2 emissions variations in Austria 1990 - 2010

Source: ODYSSEE

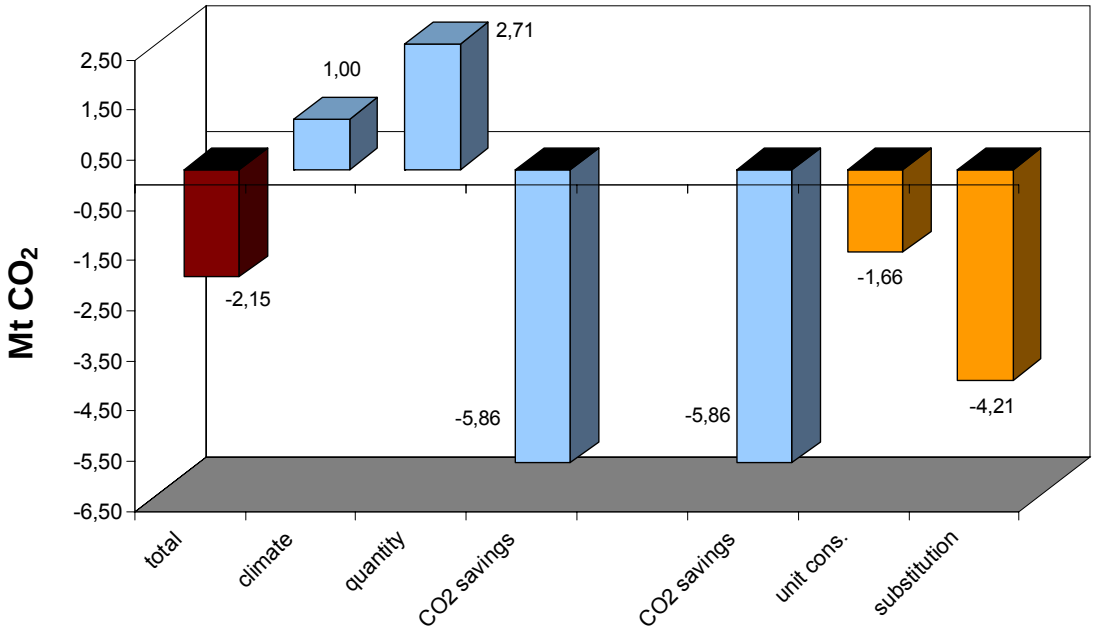
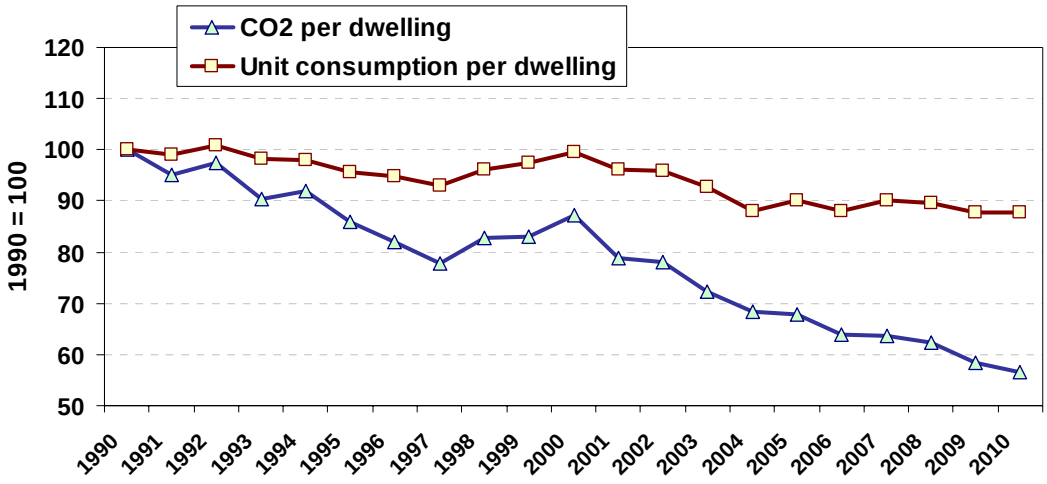


Chart 3.14 shows that both CO_2 emissions per dwelling and unit energy consumption per dwelling decreased from 1990 to 1997, followed by an increase which reached its peak in 2000. A decrease for both factors has been observed since then. Overall CO_2 emissions per dwelling decreased by 43.6% and energy consumption per dwelling decreased by 12.3% in the period under review. This difference shows that most of the reduction in CO_2 emissions per dwelling is due to substitution to fuels with less carbon content.

Chart 3.14: CO_2 emissions and unit consumption for households per dwelling

Source: ODYSSEE



3.4 Services

3.4.1 Energy consumption trends

Chart 3.15 shows the development of energy consumption in the services sector for the period 1990 to 2010. This period saw a 66%-increase in final energy consumption for this sector – from 1.75 Mtoe in 1990 to 2.91 Mtoe in 2010. It is possible to observe a correlation between the number of degree days and final energy consumption in most years, especially for oil and gas consumption. The most significant developments are the increases in natural gas (+ 281%) and district heat (+ 179%). Electricity, which has the largest share of energy consumption in the services sector, increased by 36% over the whole period, starting at 0.78 Mtoe in 1990 and reaching 0.90 Mtoe in 2010. Oil consumption fluctuated rather strongly depending on the number of degree days and decreased by 32% in the period under consideration.

Chart 3.15: Service sector: Energy consumption by fuel type from 1990 to 2010

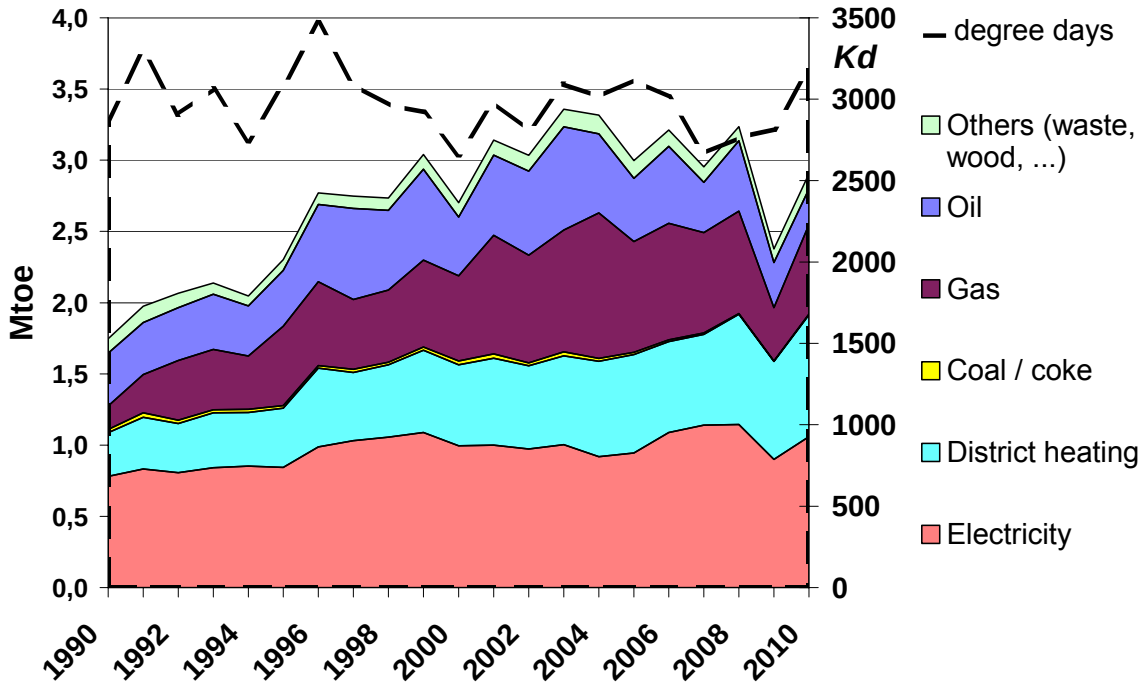
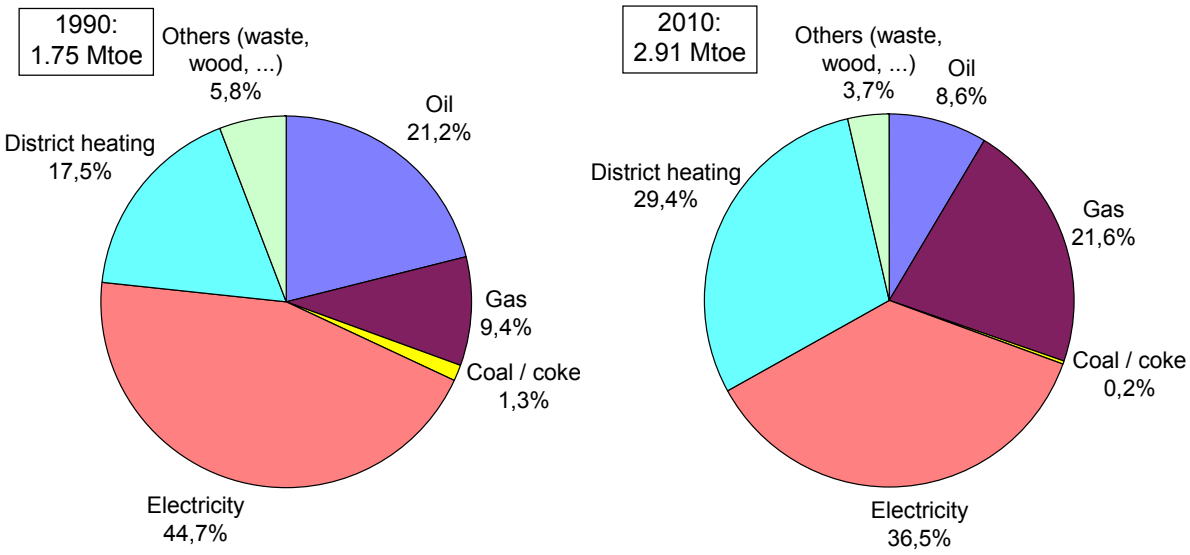


Chart 3.16 illustrates the services sector's final energy consumption by fuel type. In the period from 1990 to 2010 significant shifts between the different fuel types can be observed. Gas more than doubled its share from 9.4% in 1990 to 21.6% in 2010, while the share of oil more than halved from 21.2% in 1990 to 8.6% in 2010. The share of electricity fell from 44.7% in 1990 to 36.5% in 2010, whereas district heating increased from 17.5% in 1990 to 29.4 in 2010. The shares of others (including waste, wood and biofuels) and coal/coke decreased at a low level in the period under consideration.

Chart 3.16: Services sector: Percentage of energy consumption by fuel type in 1990 and 2010



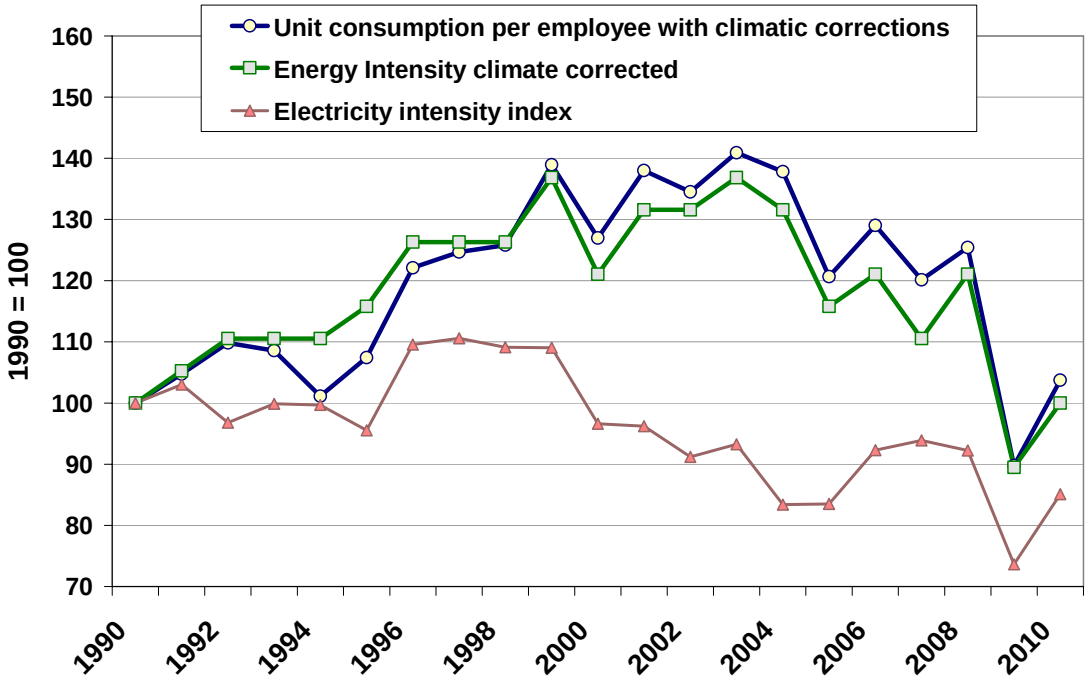
3.4.2 Energy intensity of the services sector

Chart 3.17 shows that energy intensity (adjusted for climatic influences) as well as electricity intensity in the services sector fluctuated over the period from 1990 to 2010. Overall, energy intensity had exactly the same value in 2010 as in 1990, while electricity intensity fell by 14.9% in the period under review. As the number of degree days exerts a strong influence on energy intensity in the services sector, **Fehler! Verweisquelle konnte nicht gefunden werden.** shows the intensity adjusted for climatic influences.

Another important indicator in the services sector is unit consumption per employee (also with climatic corrections). For most years, this indicator is fluctuating parallel to the energy intensity index. The difference of these two figures can be ascribed to a decrease in labour productivity until 1997, followed by an increase in labour productivity. Unit consumption per employee increased by 3.7% in the period under review.

Chart 3.17: Services sector: Development of energy intensity, electricity intensity and unit consumption per employee – index 1990 = 100

Source: ODYSSEE



3.5 Transport

3.5.1 Overall context

Chart 3.18 illustrates that all means of transport have shown an upward trend since 1990. The passenger kilometres travelled by car in Austria increased steadily in the period under consideration (+ 31%), while rail travel increased at a low level (+21%). Travel with buses rose by 24%. Air travel (measured in numbers of passengers) skyrocketed in the period under consideration (+ 216%). With a plus of 48%, the number of air passengers in particular increased considerably in the last eight years (2003 – 2010). However, in the recession year 2009 air transport decreased by 7% compared to the previous year. In comparison, the decrease of car, bus and rail transport from 2008 to 2009 was less than 2%. In 2010, almost all transport modes more or less reached the 2008 levels again.

Chart 3.18: Passenger travel by transport modes

Source: ODYSSEE

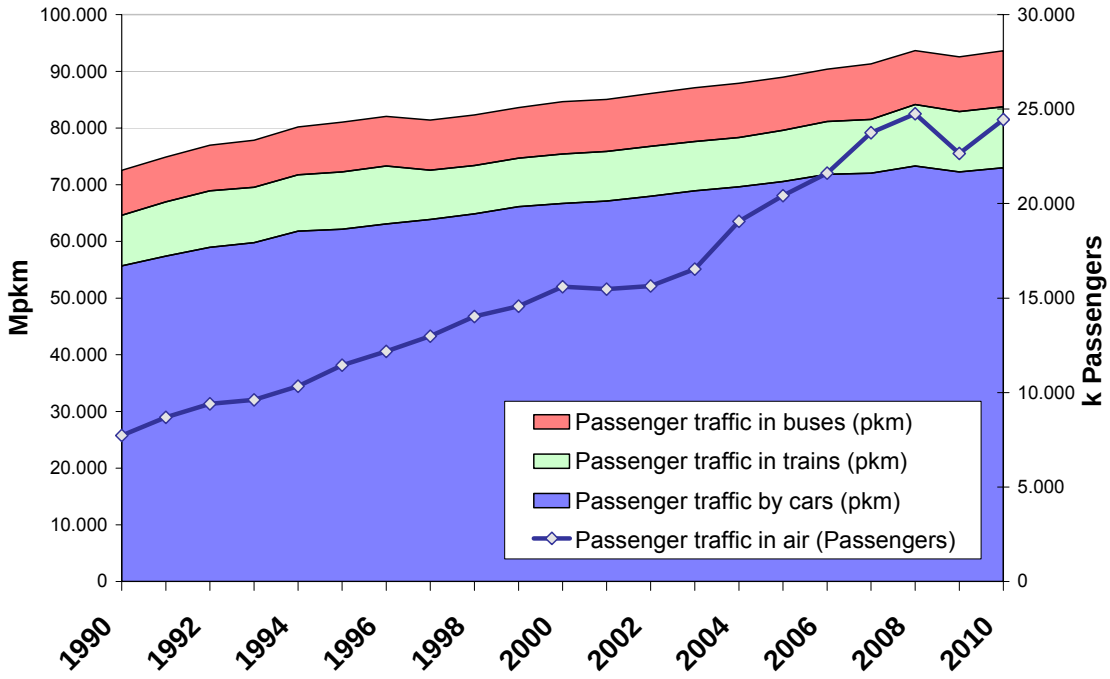


Chart 3.19: Freight traffic by transport mode

Source: ODYSSEE

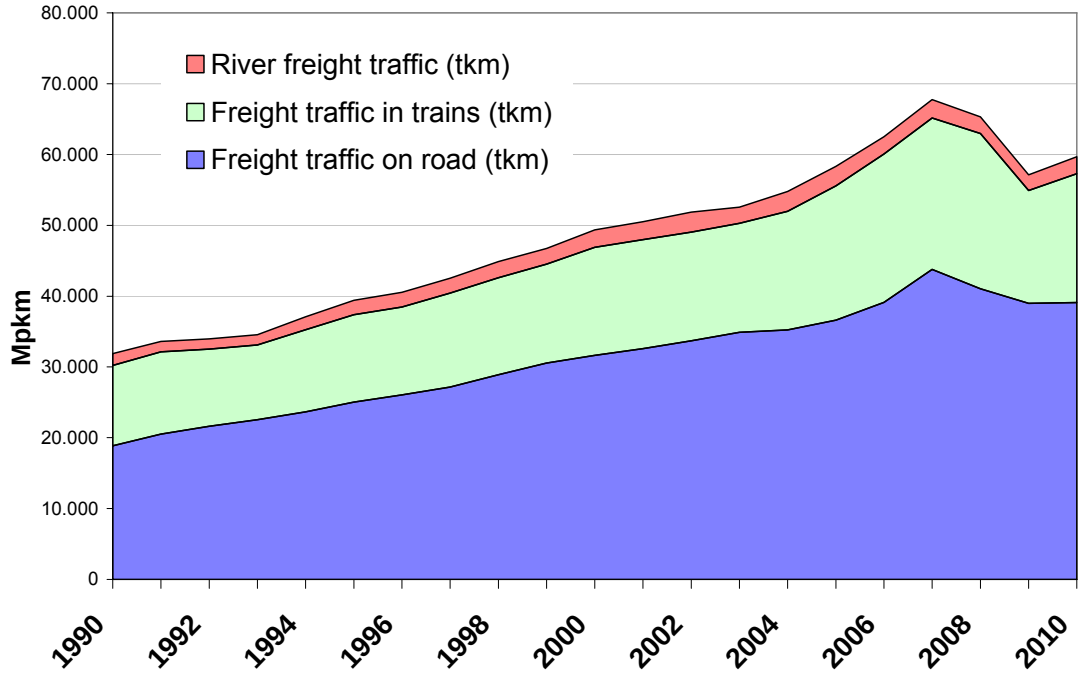


Chart 3.19 shows that freight traffic (measured in tkm) also recorded a large increase over the period of 1990 to 2010. This trend is mainly driven by the growth of road transport (+107%), which by far exceeds the increase in rail freight traffic (+60%). River freight traffic increased by 43% at a significantly lower level compared to the other modes of freight transport. Overall freight transport increased by 87% in the period under review.

However, a peak is observed in the year 2007 for all modes of transport. In 2007, freight transport grew by 113% compared to the 1990 figure. In the two subsequent years marked by economic crisis, freight traffic decreased by 16%. The largest effect of recession is observed for freight transport in trains, which dropped by more than one quarter (26%) between 2007 and 2009. Freight transport on roads decreased by 11% and freight transport on rivers by 16% within the two years of recession. The respective figures are displayed in Table 3.2. In 2010, the last year of the period under review, freight transport continued to show the long-term growth trend.

Table 3.2: Freight traffic by modes of transport: 1990, 2007 (peak year) and 2010

Source: TU-Graz

Consumption	**1990**	**2007 (peak)**	**2010**	**Change 1990-2010**	**Change 1990-2007**	**Change 2007-2009**
	tkm	**tkm**	**tkm**	**%**	**%**	**%**
Road	18,873	43,777	39,083	107,1%	132,0%	-10,9%
Trains	11,349	21,371	18,209	60,4%	88,3%	-25,5%
River	1,663	2,597	2,375	42,8%	56,1%	-14,9%
Total	**31,886**	**67744**	**59,667**	**87,1%**	**112,5%**	**-15,7%**

3.5.2 Energy consumption trends

Over the period from 1990 to 2010 the energy consumption of the transport sector (excluding border trade) rose by 32%. Air transport gained a considerably greater share in this period (from 7% to 12%) at the expense of road transport, which dropped from 88% to 84%. The share of rail transport decreased from 5% to 4%. The share of river transport, however, stayed at the same level in the period under consideration. Air transport takes account domestic consumption as well as consumption of international flights.

Chart 3.20: Transport: Percentage of energy consumption by mode 1990 and 20107

Source: TU-Graz

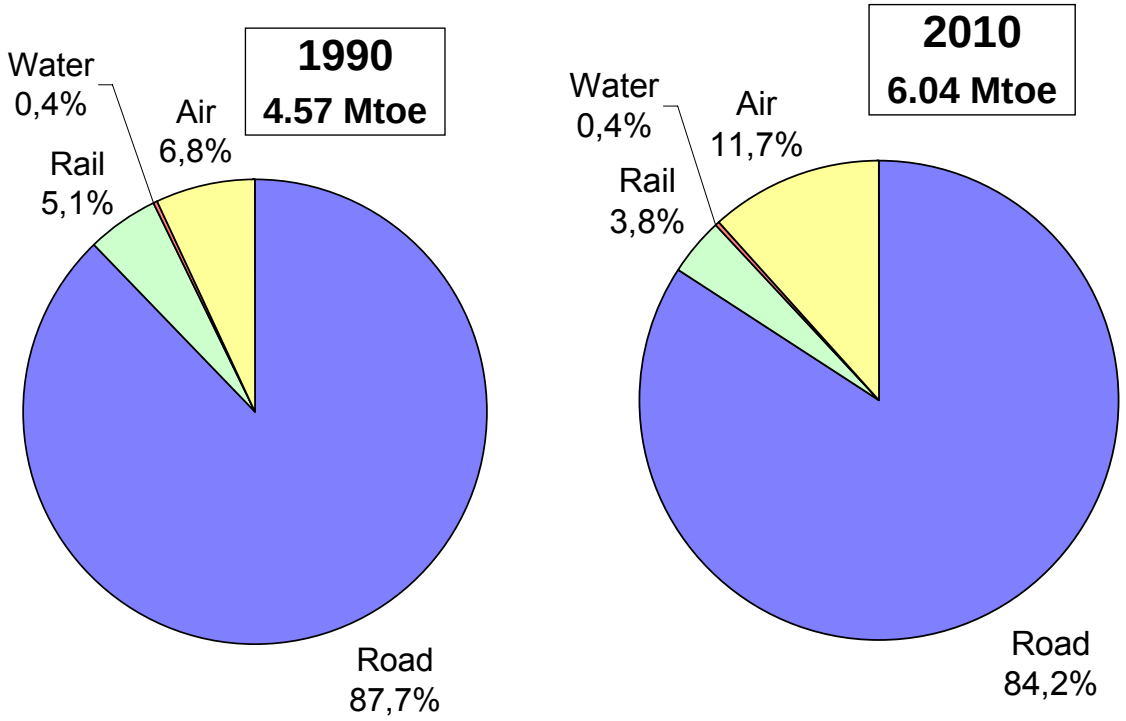


Chart 3.21 shows the development of energy consumption by the modes of transport. The biggest increase can be observed for air transport, which rose by 126%. Road energy consumption increased by 27%, while consumption of rail transport remained relatively stable (-2%). Energy consumption of water transport rose by 29% at a very low level.

Chart 3.21: Transport: energy consumption by mode 1990-2010

Source: TU-Graz

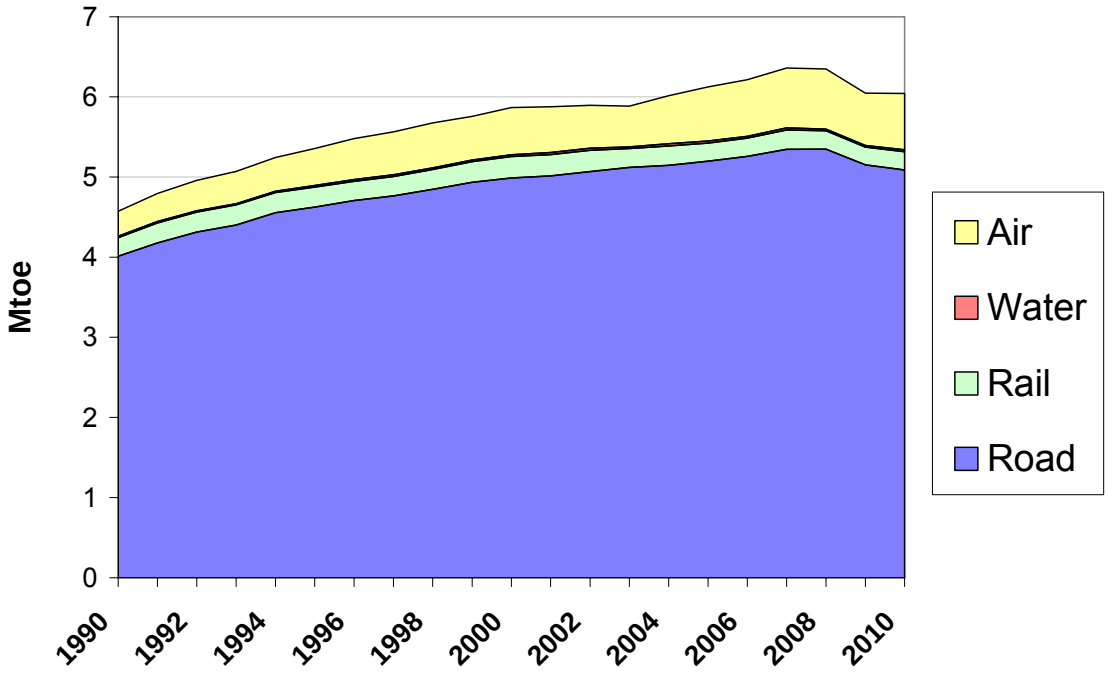
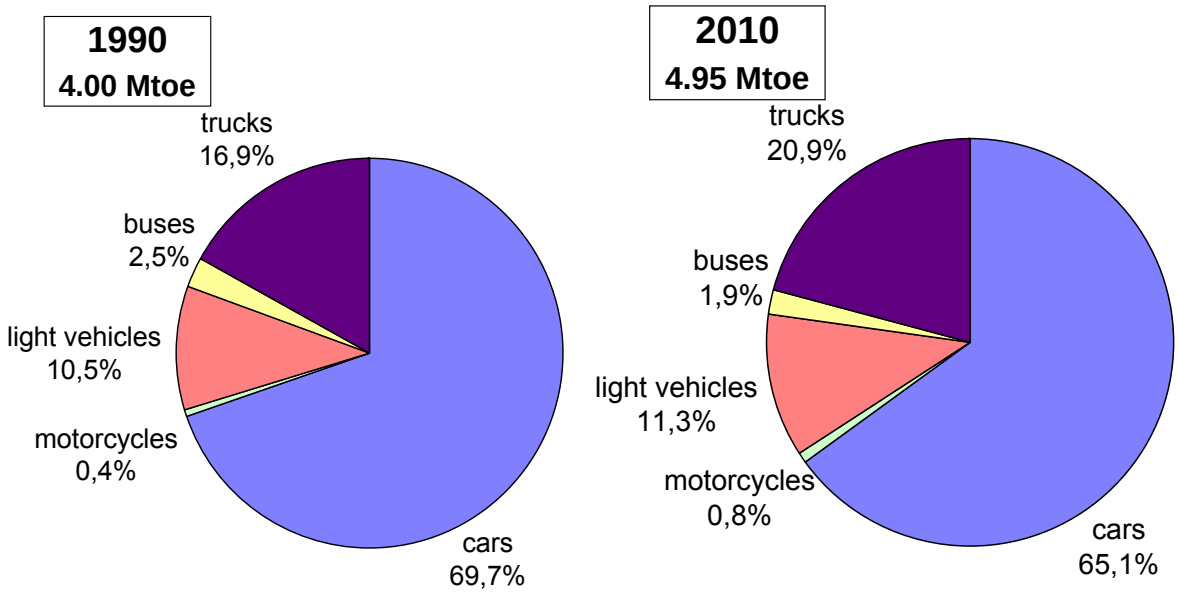


Chart 3.22 shows the share of energy consumption for road transport vehicles for the year 1990 and for the year 2010. While the share of energy consumption by cars decreased in the period under consideration (70% in 1990 and 65% in 2010), the share of trucks increased (from 17% in 1990 to 21% in 2010). The share of light duty vehicles increased slightly (10.5% in 1990 and 11.3% in 2010) The share of motorcycles doubled, while the share of buses decreased, both at a low level.

Chart 3.22: Road transport: Energy consumption by vehicle type

Source: TU-Graz



3.5.2.1 Effects of fuel tourism

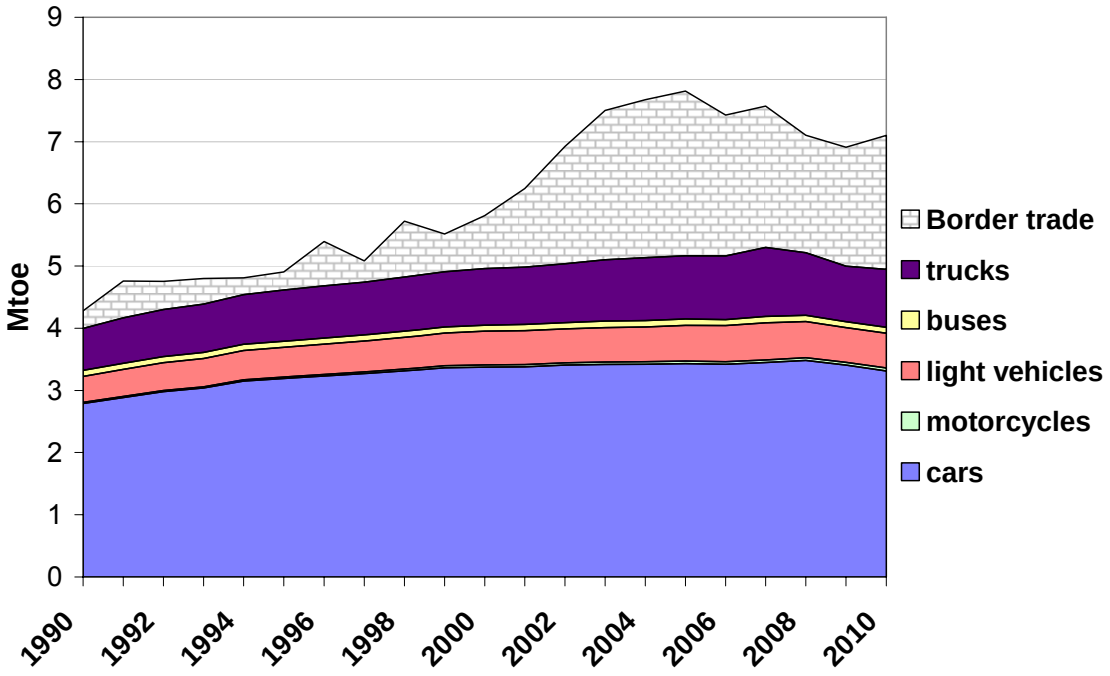
Chart 3.23 shows the development of energy consumption by road transport vehicles, including the amount of border trade, which rose considerably in Austria in recent years. Since the end of the 1990s an increasing discrepancy between total Austrian fuel sales and the computed domestic fuel consumption has become apparent. Fuel is currently somewhat less expensive in Austria than in some neighbouring countries (mainly due to lower excise duties). For this reason, many foreigners cross the border just to purchase fuel at the closest filling station in Austria, which means that to a greater extent fuel is filled up in Austria and consumed abroad. The term 'border trade' also includes fuel purchases on holiday and business trips and cross-border freight traffic. It is estimated that currently 30% of the fuel purchased in Austria for vehicles is due to fuel tourism, more than 80% of which is diesel, of which two thirds are used by heavy goods vehicles. The biggest share is used by German drivers due to many border crossings and a large population living in the border region. The fuel export problem is relevant for climate policy, e.g. the Kyoto commitment, because emissions are allocated according to national fuel sales. For this reason GHG emissions from fuel exports are assigned to Austria in total.

Energy consumption by border trade rose by 663% in the period 1990-2010. The consumption of cars increased by 20% and the consumption of light vehicles by 34%. Consumption of trucks rose by 38% in the overall period under review, with a peak in

2007 which was 64% higher than 1990. Consumption of motorcycles increased by 165% and consumption of buses decreased by 3% (at a very low level).

Chart 3.23: Road transport: Energy consumption by vehicle type and border trade 1990-2010

Source: TU-Graz



3.5.2.2 Renewable energy sources in transport

In 2010 the share of renewable energy used within road transport attained a level of 4.80% (measured by the energy content). Biodiesel, bioethanol and straight vegetable oil (SVO) represent the set of renewable energy carrier, which were mainly distributed by blending them with fossil fuels to an extent of 6.75% (as of 2011) (measured by volume).

Roughly 92% of electricity used for rail transport is produced from RES, 88% comes from hydro power plants and 4% from other renewables.

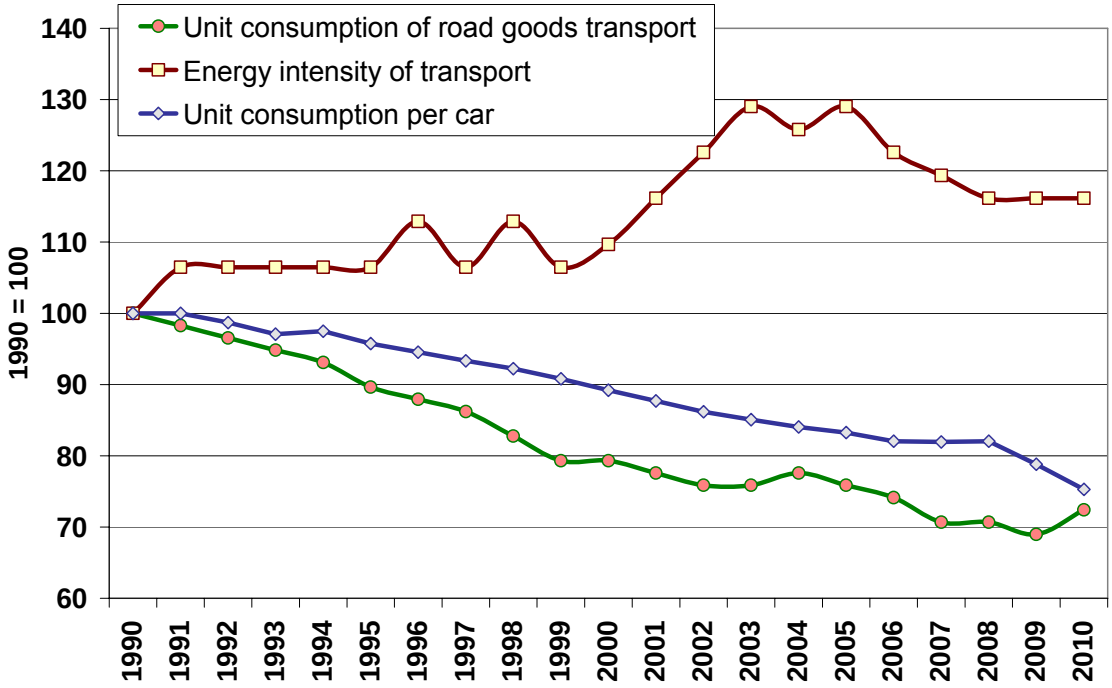
3.5.3 Energy intensity trends/Unit consumption trends

3.5.3.1 Energy intensity in transport

Chart 3.24 shows the indices for energy intensity of transport and unit consumption of road goods transport as well as unit consumption per car. The energy intensity index fluctuated until 1999 and steeply increased since then, peaking in 2003 and 2005 (+ 29% for both years compared to 1990). In 2010 energy intensity of transport was 16% higher than in 1990. Unit consumption of road goods transport decreased by 18% and unit consumption per car decreased steadily in the observed period and was 15% lower in 2010 than in 1990.

Chart 3.24: Energy intensity in transport from 1990 to 2010

Source: ODYSSEE



3.6 Assessment of energy efficiency/savings through ODEX

Energy efficiency indicators can be used to provide an overall perspective of energy efficiency trends by sector. Such global indicators, which combine the trends of indicators by end-use or sub-sector, are also called “aggregate bottom-up energy efficiency indicators”. They represent a better option to evaluate energy efficiency trends at an aggregate level (e.g. overall economy, industry) than the usual energy

intensities, as they are adjusted for structural changes and other factors not related to energy efficiency. This bottom-up approach first looks at the energy efficiency achievements observed for the main types of energy end-use and appliances, and compiles them into an aggregate bottom-up energy efficiency index (each end-use and appliance being weighted based on their weight in total final consumption). It thus provides a substitute indicator to energy intensities (industry and transport) or unit consumption (per dwelling or per square metre) to describe the overall trends by sector.

3.6.1 Total

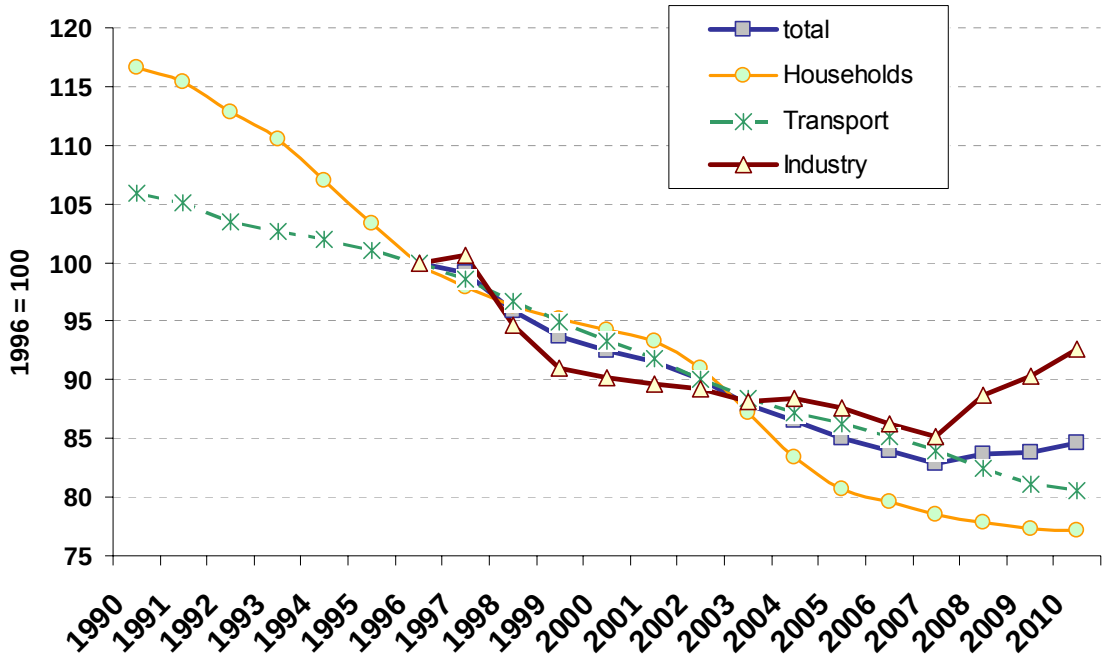
The ODEX indicator for overall energy efficiency (measured as a three-year moving average) was calculated only from 1996 as no earlier data of the production index for industry is available. As shown in Chart 3.25, energy efficiency improved by 15% between 1996 and 2010, which is a mean annual improvement of 1.1%. Most of the efficiency improvements were achieved in the households and transport sectors, which recorded improvements by 23% and 20% respectively within the period from 1996 to 2010.

In the industry sector, which improved by 7% in the period under review, a significant decrease in energy efficiency can be observed from 2007. The calculation method of a three-year moving average also allocates the negative effects of the recession year 2009 to the years 2008 and 2010. According to the index, efficiency in industry decreased by 9%, or 2.5% a year, in the three-year period from 2007 to 2010. In 2010, energy efficiency in industry reached its record low since 1998. The reason for this negative development is the economic crisis. In contrast, the transport and household sectors were improving quite steadily.

Over the whole period, industry displayed a mean annual improvement of 0.5%, while energy efficiency of households showed an annual average growth of 2.0% and transport an annual average growth of 1.3%.

Chart 3.25: Energy efficiency indices by sector from 1990 to 2010 (three years moving average)

Source: ODYSSEE



3.6.2 Overview of main energy efficiency indicators by sector

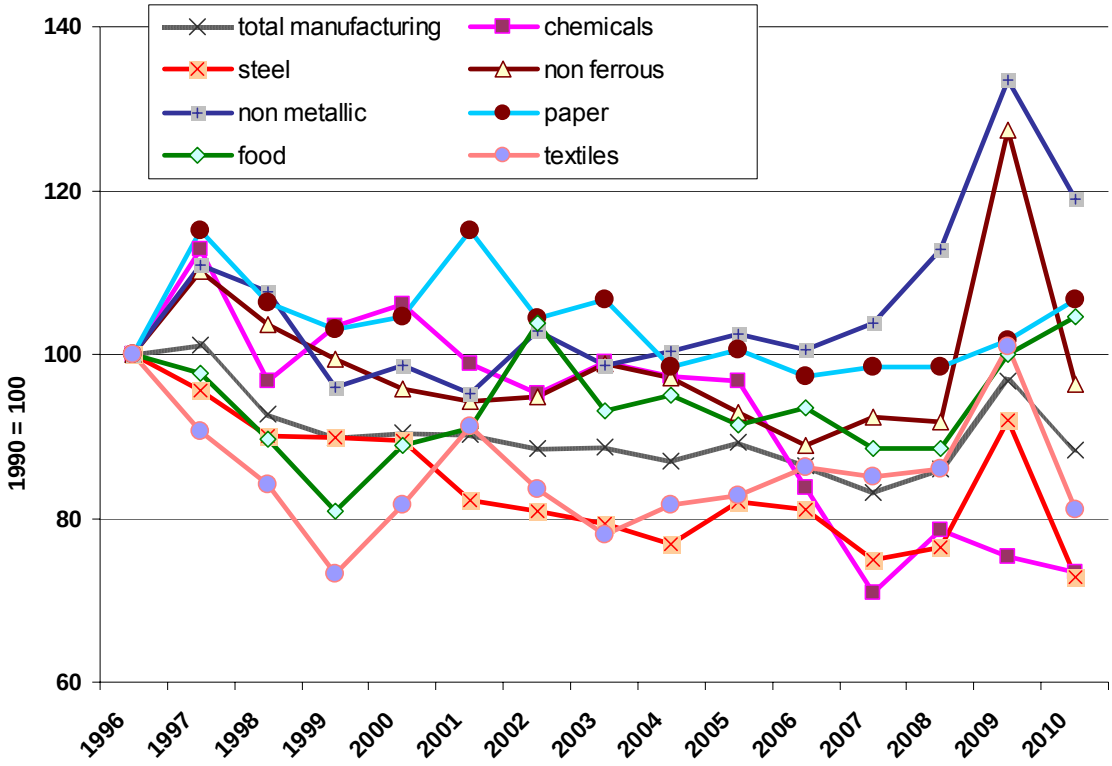
3.6.2.1 Energy efficiency in industry

Chart 3.26 shows the efficiency indices of selected branches over the period 1990-2010. The indices are characterised by fluctuating values, which makes it very difficult to draw meaningful conclusions. The economic crisis of 2009 caused lows in energy efficiency for all branches except chemicals, paper and food.

The main improvements are obtained in the steel industry (27% efficiency progress), chemicals (27% efficiency progress) and the textiles branch (19% efficiency progress). In contrast, some branches as the non metallic industry (19% less efficiency), paper industry (6% less efficiency) and food industry (5% less efficiency) have negative performances in the period under review. As can be seen, most indices are fairly fluctuating.

Chart 3.26: Energy efficiency of manufacturing sectors (three years moving average)

Source: ODYSSEE



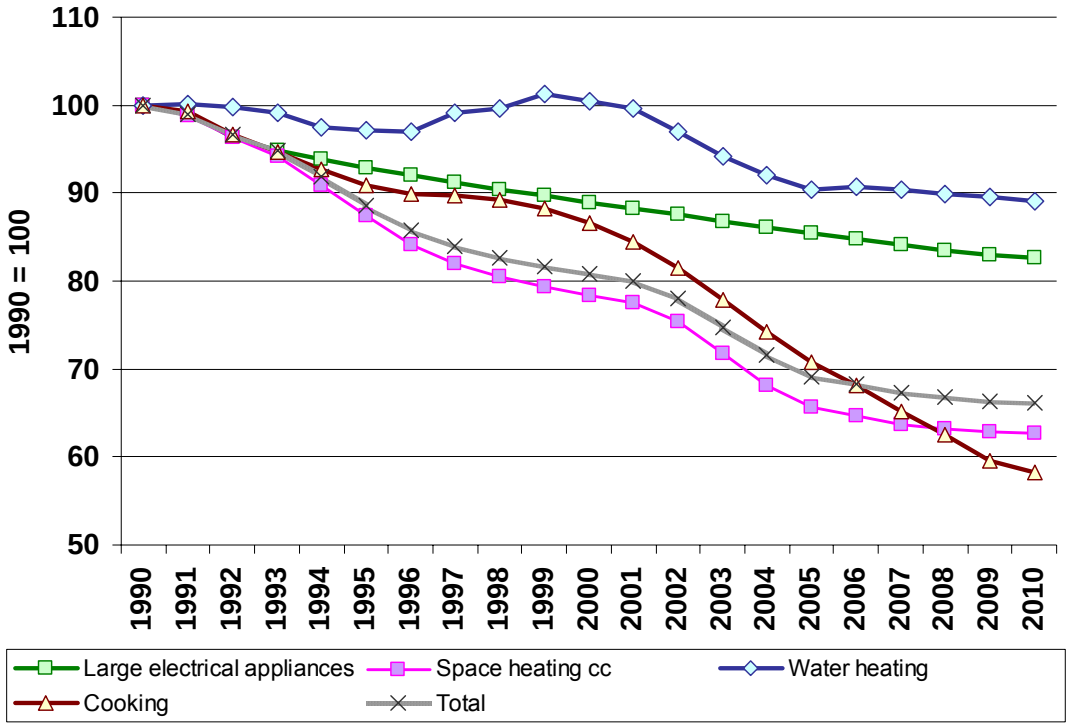
3.6.2.2 Energy efficiency in households

Energy efficiency in the household sector improved by 34% in 2010 compared to 1990. The efficiency index is calculated as a three-year moving average and is based on eight different types of end-use: space heating, water heating, cooking and six large electrical appliances (refrigerators, freezers, washing machines, dish washers, TV sets and dryers). Looking at the total households index, a mean annual progress of 0.9% from 1990 to 2010 can be observed. The index follows space heating which is by far the most important end-use being responsible for almost 80% of the index.

Efficiency of water heating was 11% higher in 2010 than in 1990. Energy efficiency of appliances improved steadily by 17% in the period under consideration. Efficiency of cooking shows a 42% improvement over the whole period, including an especially steep improvement by 31% between 2001 and 2010.

Chart 3.27: Energy efficiency indices in households from 1990 to 2010 (three years moving average)

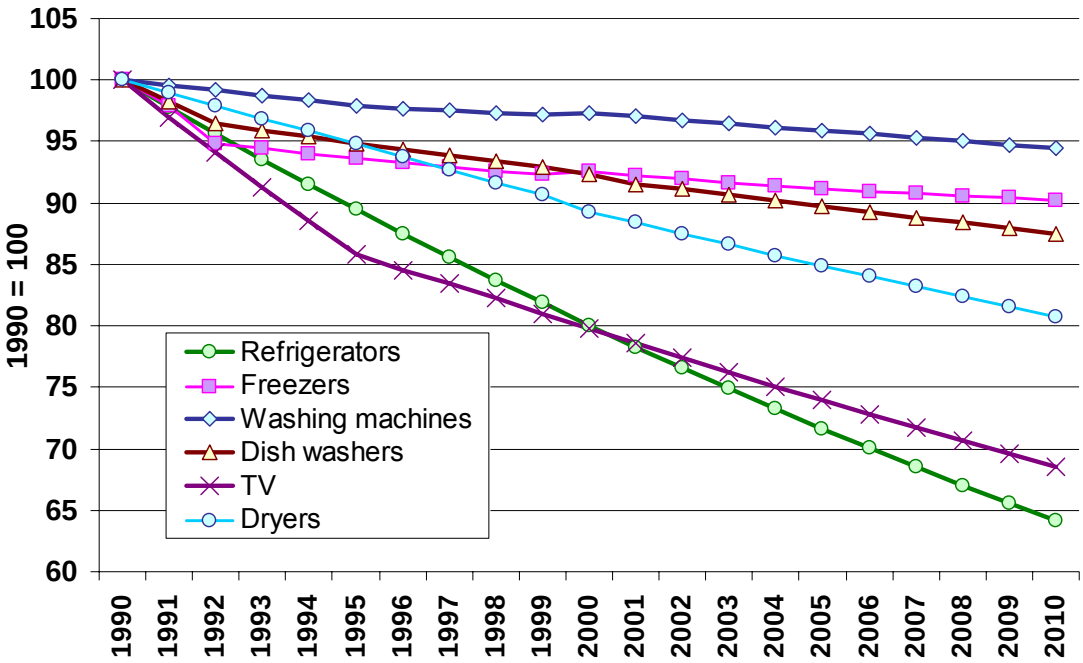
Source: ODYSSEE



A detailed picture of the six large appliances is given in Chart 3.28. All of the indices have a downward trend, with refrigerators (36% progress) and TV sets (31% progress) showing the biggest improvement in energy efficiency from 1990 - 2010. Energy efficiency of dryers improved by 19%, efficiency of dishwashers by 13%, efficiency of freezers by 10%. Washing machines show the least improvement with a relative low progress of 6% in the period under review.

Chart 3.28: Unit Consumption index of large electrical appliances from 1990 to 2010

Source: ODYSSEE

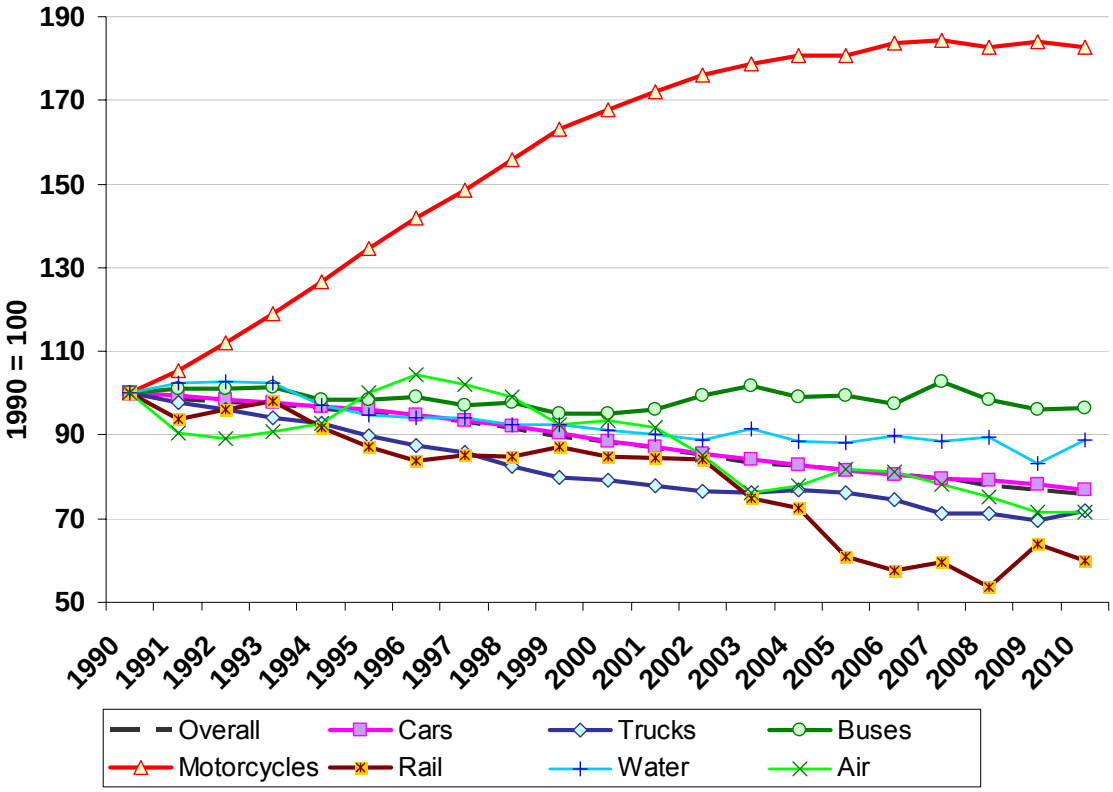


3.6.2.3 Energy efficiency in transport

In 2010 the energy efficiency index of the transport sector stood at 75.7, which indicates a 24.3% improvement in energy efficiency compared to the base year 1990 (Chart 3.29). This development is mainly caused by the constant efficiency improvements in car transport (23% improvement of the unit consumption measured in l/100km) and truck transport (28% improvement of the unit consumption measured in koe/tkm) due to the dominating role of these vehicle types within the transport sector. Unit consumption of rail transport (koe/tkbr) fluctuated and improved significantly by 40% from 1990 to 2010. A relatively steep disimprovement by 83% can be seen for motorcycles (toe/veh) in the period under consideration. However, the curve for motorcycles has significantly flattened since 2004. Unit consumption of buses (toe/veh) fluctuated and was 4% lower in 2010 than in 1990. Unit consumption of air transport (koe/pas) improved by 29% in the period under review.

Chart 3.29: Energy efficiency index of transport and unit consumption indices of selected modes of transport from 1990 to 2010

Source: ODYSSEE



3.7 CO_2-emissions trends

Austria has committed itself to contribute to the greenhouse gas reduction target of the EU by reducing its greenhouse gas emissions by 13% compared to 1990 levels by 2008 to 2012. Back in 1990, Austria's total greenhouse gas emissions amounted to 79.0 Mt CO_2 e. and CO_2 emissions came to 61.9 Mt. In 2010 the respective value for total greenhouse gas emissions was 88.0 Mt CO_2 e. (+ 11.3%) and 74.2 Mt for CO_2 emissions (+ 19.5%). CO_2 removals in connection with land-use change and forestry are not included in the emission data stated here.

3.7.1 Greenhouse gas emissions

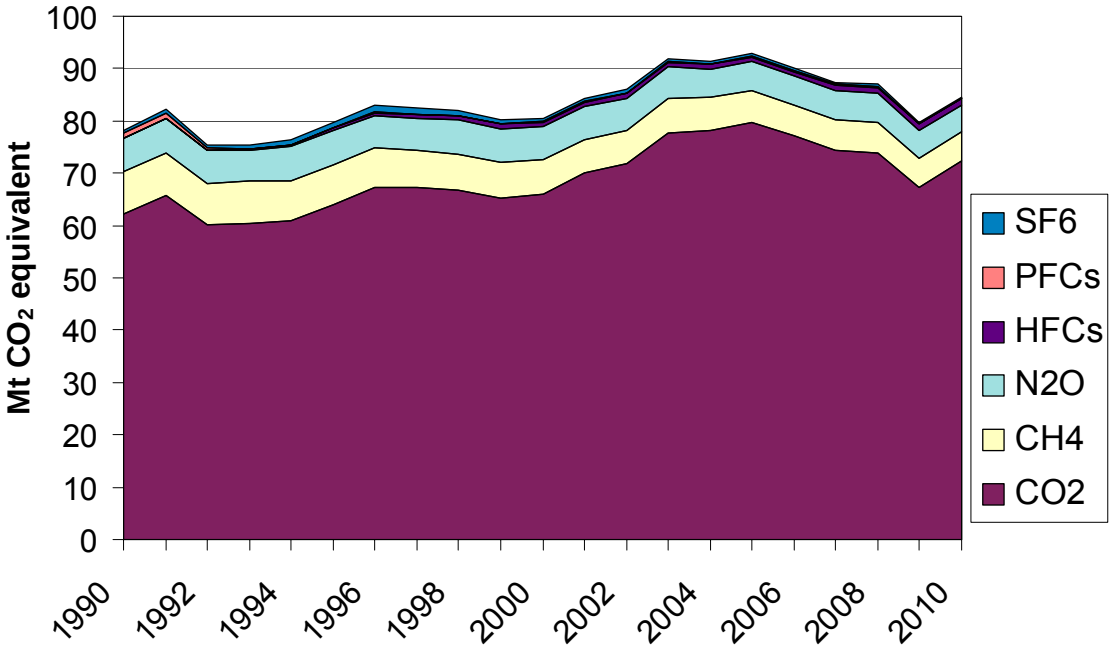
As can be seen in Chart 3.30, greenhouse gas emissions (without land use, land-use change and forestry) in Austria have been fluctuating since 1990, with the overall trend being an increase in emissions. Austria's total greenhouse gas emissions in 2010 were 8.2% above the level of 1990. A peak of total emissions can be observed in the year

2005 with 92.9 Mt CO_2 e, which is 14.7 Mt CO_2 e or 19% above 1990 the level. From 2005 to 2009 emissions decreased by 14%. In the last year of the period under review, emissions rose by 6%, resulting in total emissions of 84.6 Mt CO_2 e in the year 2010.

The major greenhouse gas in Austria is CO_2, which represents 85.5% of total greenhouse gas emissions in 2010 compared with 79.4% in 1990, followed by CH_4 (6.6% in 2010 compared to 10.6% in 1990) and N_2O (6.1% in 2010 and 7.9% in 1990).

Chart 3.30: Austria's greenhouse gas emissions (emissions without LULUCF) by gas

Source: Environment Agency Austria



3.7.2 CO_2 emissions

The following analyses focus on the development of CO_2 emissions in the period from 1990 to 2010. Chart 3.31 shows the development of overall CO_2 emissions in Austria, CO_2 emissions per capita and degree days in the index (1990 = 100). It can bee seen from the chart that overall CO_2 emissions increased more than CO_2 emissions per capita. Furthermore, the graph shows a correlation between the development of CO_2 emissions and degree days for most of the years.

CO_2 emissions fluctuated at the beginning of the decade, followed by an upward trend until 1996, and then slightly decreased until the year 1999. A sharp increase in CO_2 emissions from 2000 to 2003 by 18% – mainly due to higher emissions from transport

as will be shown later – was followed by a similar decrease of emissions from 2005 – 2009, eventually resulting in a total increase of 16.5% from 1990 to 2010.

Chart 3.31: Development of CO_2 emissions overall, per capita and degree days – index 1990 = 100

Source: Environment Agency Austria, ODYSSEE

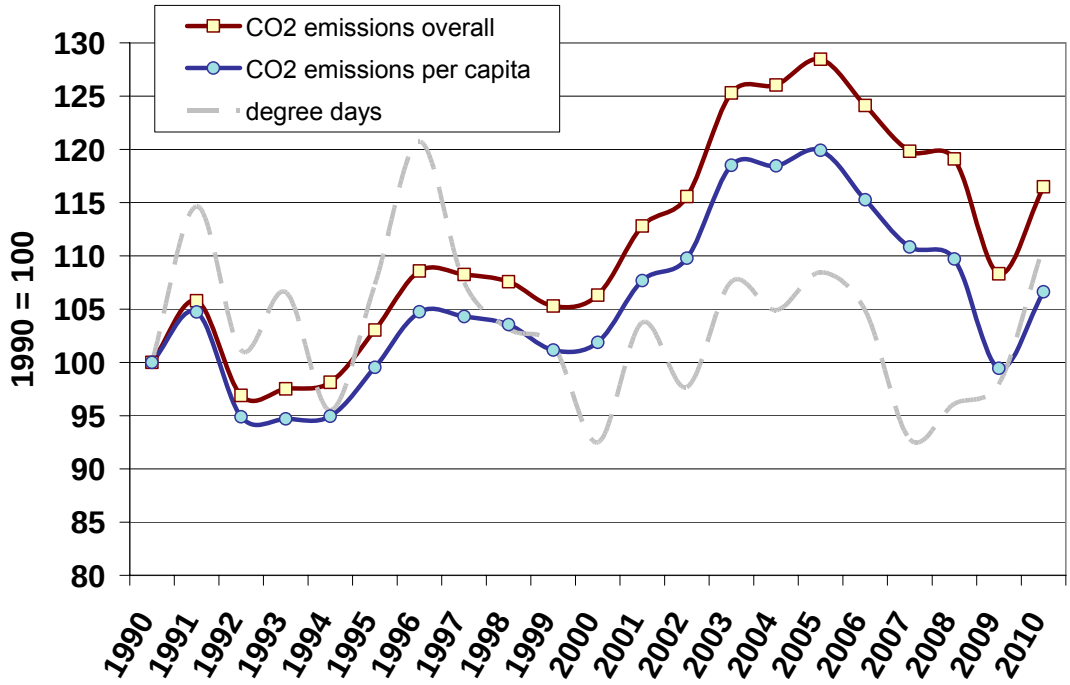


Chart 3.32 shows the development of CO_2 emissions in Austria by category for the period 1990 to 2010. CO_2 emissions from transport show the most pronounced growth with an increase of 61.2% from 13.8 Mt CO_2 in 1990 to 22.2 Mt CO_2 in 2010. A peak for transport emissions can be observed in 2005 with a figure of 24.7 Mt CO_2, which is 79% higher than 1990 and 11% higher than 2010.

Emissions from the energy industries sector (electricity and heat generation as well as energy transformation) fluctuated between 13.8 Mt CO_2 in 1990, with a minimum value of 11.5 Mt in 1992, and the maximum value of 16.3 Mt CO_2 in 2004. In 2010 emissions from energy industries were 14.2 Mt CO_2 (+ 2.8% compared to 1990).

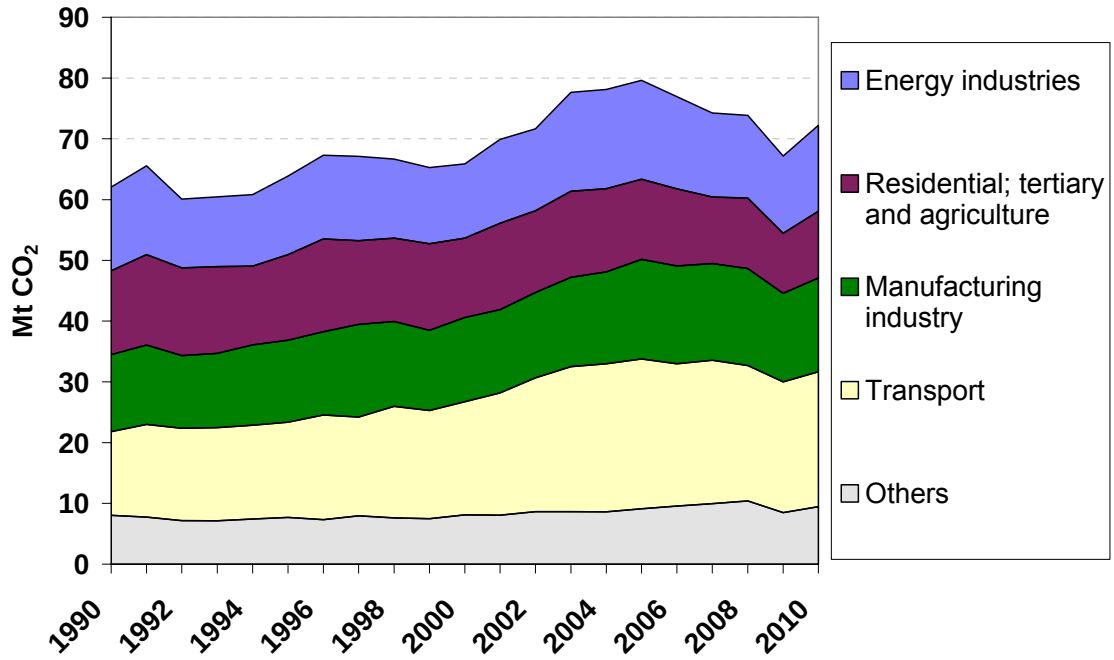
The combined residential, tertiary and agriculture sector is the only sector which shows a reduction in CO_2 emission in the period under review (-20.4% from 13.8 Mt CO_2 in 1990 to 11.0 Mt CO_2 in 2010). Emissions from the residential, tertiary and agriculture sector reached their minimum value in 2009 with 9.9 Mt CO_2; while the maximum value was observed in 1996 with 15.3 Mt CO_2.

CO_2 emissions from the manufacturing industry branches ranged between 11.9 Mt CO_2 (1992) and 16.4 Mt CO_2 (2005), recording an increase by 21.8% from 1990 – 2010 (from 12.7 Mt CO_2 in 1990 to 15.5 Mt CO_2 in 2010).

Other emissions, including emissions from industrial processes and fugitive emissions from fuels (both with a share of less than 0.1% of total emissions though) fluctuated between 7.1 Mt CO_2 (1993) and 10.4 Mt CO_2 (2008) and rose by 17.6% within the period observed.

Chart 3.32: Development of CO_2 emissions by category from 1990 to 2010

Source: Environment Agency Austria



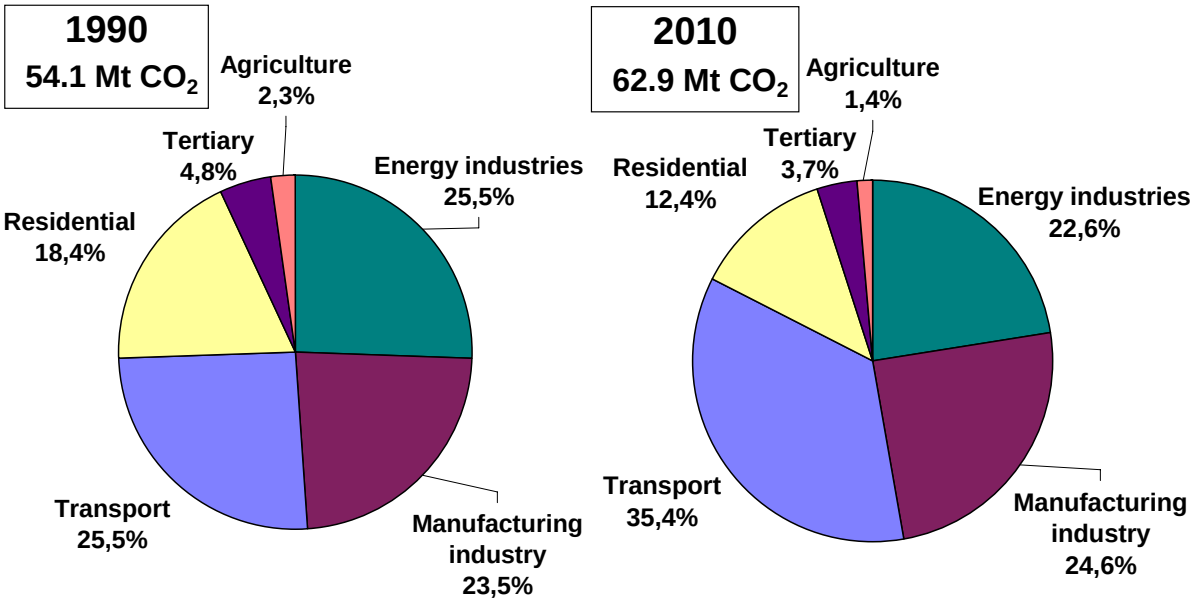
3.7.2.1 CO_2 emissions from fossil fuel combustion

The main source of CO_2 emissions in Austria is fossil fuel combustion (i.e. energy use), which increased by 16.2% from 54.1 Mt in 1990 to 62.9 Mt CO_2 in 2010.

Chart 3.33 shows the share individual categories had in CO_2 emissions from fossil fuel combustion in 1990 and 2010. The biggest increase can be observed in the transport sector, with a share of CO_2 emissions of 35.4% in 2010 compared to 25.5% in 1990. In contrary, the share of CO_2 emissions from the residential sector fell from 18.4% in 1990 to 12.4% in 2010. The share of manufacturing industry increased slightly from 23.5% in 1990 to 24.6% in 2010. The share of energy industries (electricity and heat generation, energy transformation) dropped from 25.5% in 1990 to 22.6% in 2010.

Chart 3.33: CO_2 emissions: share of categories in 1990 and 2010

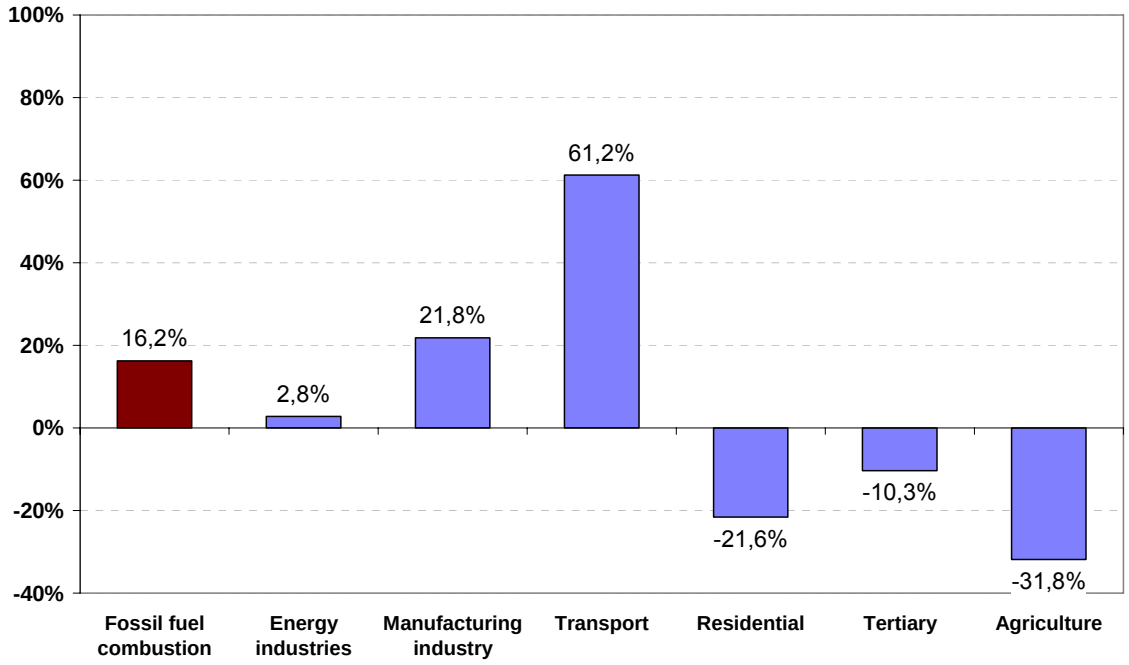
Source: Environment Agency Austria



Since 1990, CO_2 emissions have increased in transport (+ 61.2%), in the manufacturing industry (+21.8%) and in energy industries (+2.8%), while agriculture (-31.8%), the residential sector (-21.6%) and the tertiary sector (-10.3%) recorded a decrease in emissions between 1990 and 2010. As a whole, CO_2 emissions from fossil fuel combustion have increased by 16.2% from 1990 – 2010.

Chart 3.34 CO_2 emissions from fuel combustion activities by sector in 2010 compared to 1990

Source: Umweltbundesamt

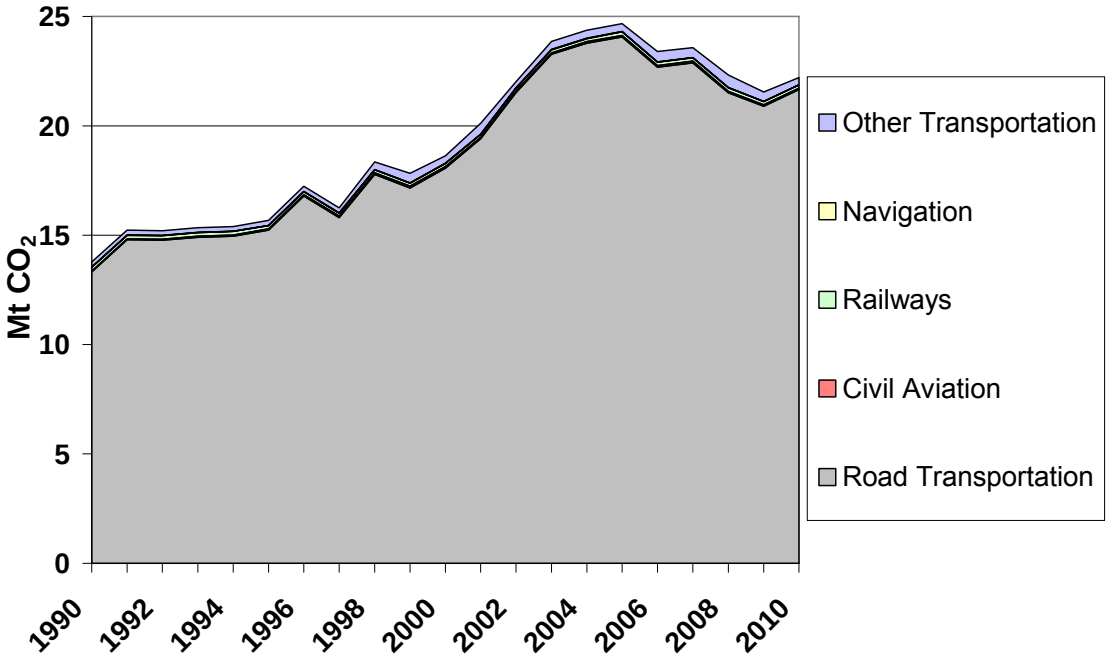


3.7.2.1.1 CO_2 emissions from the transport sector

Given the large contribution and the rapid increase of emissions from transport to overall CO_2 emissions, we take a closer look at this sector. In the year 2010, 97.6% (22.2 Mt CO_2) of emissions in the transport sector stem from road transport. The share of the other sub-sectors is accordingly low, nevertheless there can be seen considerable increases in absolute terms. For example, emissions from aviation are very low compared to emissions from road transport but show a strong increase: From 1990 to 2010 CO_2 emissions from this subcategory increased by 98.5%, while emissions from road transport increased by 62.6%. In contrast to this, emissions from railways decreased by 16.5% in the period under consideration. Austria's railway system is mainly driven by electricity, so only 0.7% of CO_2 emissions from transport originate from this sector.

Chart 3.35: CO_2 emissions of transport by subcategory: 1990 - 2010

Source: Umweltbundesamt



4 Energy efficiency measures

4.1 Recent Energy Efficiency measures

In the following selected recent energy efficiency measures are described by sector.

4.1.1 Residential sector –Smart metering systems

Smart meters and informative billing were introduced in Austria on the basis of the Electricity Industry and Organisation Act (EIWOG) adopted in 2010. In October 2011 the Austrian Energy Regulatory Authority E-Control issued a decree according to the Electricity Act which determines the functional requirements of smart metering systems in Austria. As it was expected by the stakeholders, the regulator determined in this decree mainly the topics mentioned in a catalogue with minimum function requirements for smart metering systems, which was already published in June 2010 for public consultation. In spring 2012 E-Control published a proposal for the mandatory Information of customers equipped with a smart meter. This regulation will enter into force in January 2013.

In April 2012 the Austrian Minister of Economy has issued a decree which determines the mandatory timetable for the rollout of smart metering services in Austria. The new decree will accelerate the rollout of smart meters. The main rollout can be expected in 2016 and 2017. The electricity network operators have to equip at least 95 per cent of all metering points by the end of 2019.

Until June 2011, smart meter pilot projects were introduced in three Austrian federal states. At the end of 2010, installation of nearly 24,000 smart meters complying with the necessary requirements pursuant to the methods document, as part of the voluntary agreements, was reported. These meters were evaluated in the framework of the National Energy Efficiency Action Plan (NEEAP). The evaluation indicates energy savings of 14 TJ as of 2010.

According to estimations of the regulatory authority, as of September 2012, about 150,000 electricity customers have already been equipped with smart meters within the different pilot projects and early rollouts.

4.1.2 Transport sector – *Ökoprämie*

On 1 April 2009 the Austrian government introduced an environmental bonus, the so-called ‘Ökoprämie’ (eco bonus) or ‘Verschrottungsprämie’ (scrapping bonus), which was granted for the exchange of an at least 13-year-old car for a new car by the end of

2009. The *Ökoprämie* amounted to 1,500 euros and was limited to 30,000 vehicles. Half of the amount was paid by the federal government, the other half by domestic car dealers.

This scheme aimed at fighting against the effects of the global downturn on domestic car sales, preserving jobs in the automotive industry and encouraging people to replace older, inefficient cars with the latest engine technology.

The limit of 30,000 vehicles was reached on 6 July 2009. This programme can be considered very successful in terms of supporting the demand for new cars, especially small cars on a short-term basis. However, a more detailed shows different results (see chapter 4.4.2.2)

4.1.3 Industry sector – JI/CDM programme

Since its introduction in 2003, the emissions trading system is the most important policy measure in the industrial sector. The Austrian JI/CDM programme contributes to achieving Austria's emission reduction commitment under the Kyoto Protocol through the application of project-related flexible mechanisms: Joint Implementation (JI) and Clean Development Mechanism (CDM).

The programme has a budget of 531 million Euros and is one of the largest governmental purchasing programmes on the carbon market. The overall target of the programme is to purchase emission reductions eligible under the Kyoto Protocol in the volume of 45 million tons of CO_2 equivalents through the direct purchase of emission reductions generated by emission-reducing activities and through investments in carbon funds and CDM project facilities. The programme also financed certain immaterial costs aimed to promote and facilitate climate change initiatives and projects. Details of the Programme are regulated in the directive for the Austrian JI/CDM Programme (last amended in 2007).

As of January 2012, 78 projects have been contracted. The projects are in the form of renewable energy projects from hydro power, wind, biomass, biogas, biofuel and geothermal as well as energy efficiency, landfill gas and N_2O emission reduction projects.

52 of the projects in the portfolio are carried out under the CDM Emission Reduction Purchase Agreement. The projects were carried out in various host countries with China, Egypt, India, and Brazil being the most frequent.

16 JI projects were undertaken and implemented in Hungary, Ukraine, the Czech Republic, Bulgaria, Russia, Estonia, and New Zealand.

Furthermore, 6 Green Investment Schemes (GIS) contracts were sealed by the Austrian JI/CDM- Programme. The proceeds of the GIS transactions were mainly used to subsidise thermal insulation of buildings, energy efficiency measures and to enable the use of renewable energy in the biomass sector. The projects were conducted in Latvia, the Czech Republic, Estonia and in Bulgaria.

In order to reach the programme's target of 45 million tons, almost 70% of the necessary amount of emission reductions has already been delivered into the registry account. Another 17% of the volume is expected to come from projects that have already delivered credits to the Austrian account. Only 5 % out of the remaining 15% shall come from projects that have not achieved final project registration. Considering these figures and bearing in mind the fact that parties to the Kyoto Protocol must show their compliance not earlier than beginning of 2015 there is reasonable confidence that the Austrian JI/CDM-Programme will be able to contribute the full emission reduction target on time.

Source: Austrian JI/CDM-Programme, Information Brochure. February 2012 (available at http://www.ji-cdm-austria.at/blueline/upload/jicdminvestorreport022012.pdf)

4.1.4 Tertiary sector – Energy efficiency programmes for local authorities

In Austria, various energy advice and promotion programmes are available for local authorities. The aim is to support local authorities from the planning of measures up to implementation. This includes the e5 programme for energy efficient local authorities, the Climate Alliance, the energy saving local authorities programme, environmental local authorities, EKKO energy and climate model regions.

The budget for these projects amounts to about 3 million euros per year.

4.1.5 Cross-cutting measures

See chapter 4.3 for a description of klima:aktiv – the national programme for climate protection.

4.2 Patterns and Dynamics of Energy Efficiency Measures

In this section the use of spider graphs illustrates the patterns for each separate sector of the energy policies and measures in Austria. Spider diagrams are a graphical presentation of the distribution of energy efficiency policies. They provide an overview of the type of measures a country has implemented. Spider diagrams are constructed

by assigning each energy policy and measure in each sector to one of the following categories:

- Co-operative Measures (Coop)
- Cross-cutting with sector-specific characteristics (Cros)
- Financial (Fina)
- Fiscal/Tariffs (Fisc)
- Information/Education/Training (Info)
- Legislative/Informative (Le/I)
- Legislative/Normative (Le/N)
- Infrastructure (Infr)
- SocialPlanning/Organisational (Soci)
- New Market-based Instruments (Mark)

The broader the policies in a sector the more equally spread the measures on the different axes.

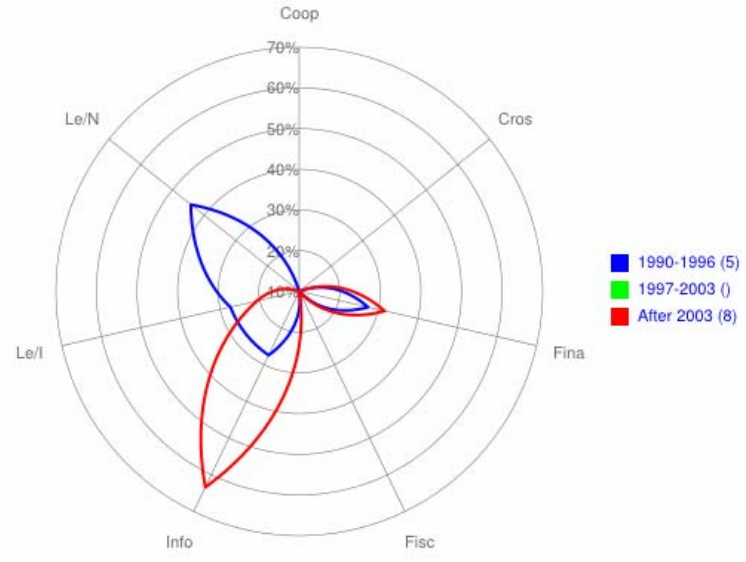
4.2.1 Residential sector

Based on the implementation of the klima:aktiv programme (see chapter 4.3) in 2004, measures in the residential sector focus on information and education in the period after 2003. In the spider graphs below, this change is clearly visible.

National and EU policies overlap in the majority of cases and some EU measures were decisive for national measures, e.g. labelling for domestic appliances.

Chart 4.1: Patterns of policy and measure in Austria 1990-2010 – household

Source: Mure

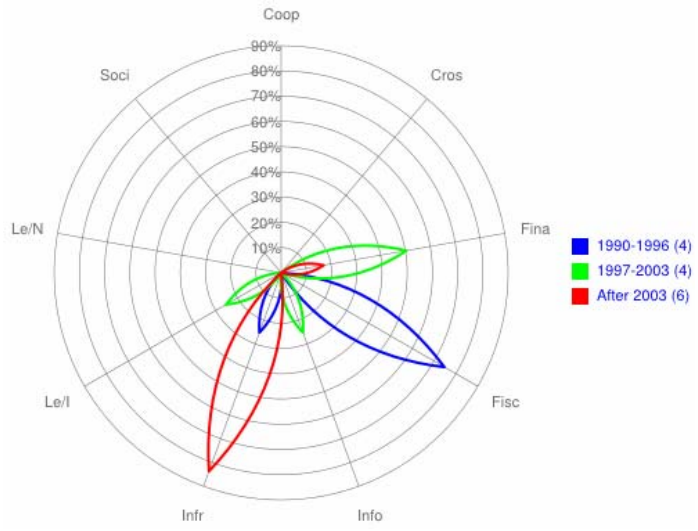


4.2.2 Transport sector

The transport sector was highly affected by an increase in informative and educational measures through the implementation of the klima:aktiv programme in the period after 2003. Particularly the transport sector is getting more and more an issue in the context of energy efficiency and climate change. Some national measures have their origin in EU policies, e.g. labelling of new passenger cars. In the late 1990s, the transport sector was primarily regulated by financial and fiscal measures, e.g. the toll for motorways and expressways, tax on oil, tax on motor vehicles, tax on motor vehicle's fuel consumption.

Chart 4.2: Patterns of policy and measure in Austria 1990-2010 – transport

Source: Mure

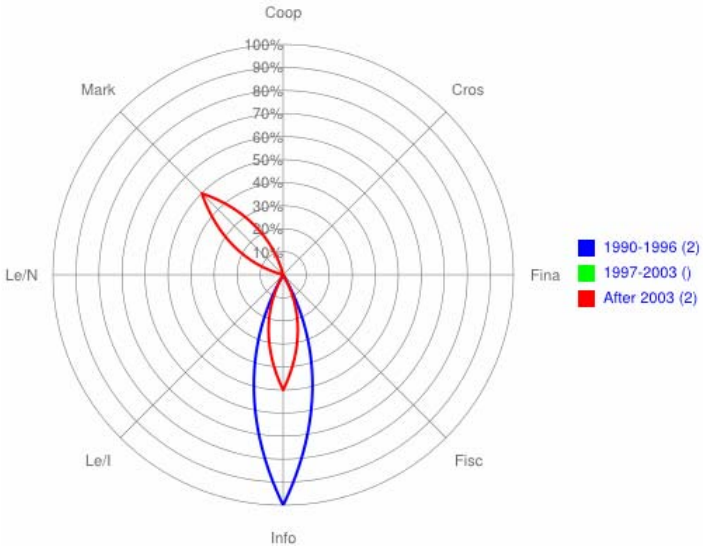


4.2.3 Industry sector

Unlike all other sectors, the industry sector did not see an increase, but a decrease in measures with an educational character in the periods after 1996. The most important implementation in the last period was a new market-based Instrument: The introduction of an emissions trading scheme with its accompanying JI/CDM programme. This measure has its origin in the Kyoto protocol, the EU member states had to implement the EU emissions trading directive in 2005.

Chart 4.3: Patterns of policy and measure in Austria 1990-2010 – industry

Source: Mure

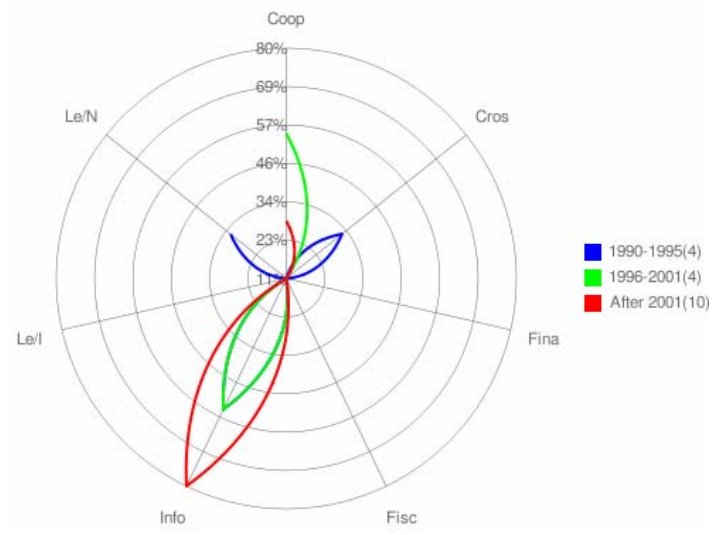


4.2.4 Tertiary sector

The tertiary sector has always been affected by education and information measures. The introduction of the klima:aktiv programme even strengthened this measure structure.

Chart 4.4: Patterns of policy and measure in Austria 1990-2010 – tertiary

Source: Mure



4.3 Innovative Energy Efficiency Measures – the klima:aktiv programme

The most innovative and popular measure in Austria is the long-term programme for active climate protection (klima:aktiv), which was launched in 2004. The programme was established in order to support the achievement of the Climate Change Strategy's goals. It is overseen by the Ministry of the Environment, and managed by the Austrian Energy Agency. The aim of the programme is to support energy efficiency and increased use of renewables in all sectors of the economy, through direct grant support and accompanying measures, such as information and advice. The overall goal is to reduce the greenhouse gas emissions.

The sub-programmes of klima:aktiv are designed to support the grant, regulation, and fiscal measures foreseen in the climate strategy, to give targeted incentives for the use of climate impact-reducing products. The programme is aimed at technology and service markets. It is an innovative add-on to common instruments, introducing target-group oriented programmes in the areas of buildings, mobility, municipalities and renewable energy sources.

The klima:aktiv thematic sub-programmes develop technological and organisational solutions able to compete on the market, take care of innovative quality standards and promote training of all relevant groups. The implementation of the klima:aktiv programmes must be accomplished within set time limits and results in concrete measurable targets.

The government provides approx. 7 million €/year. In addition, relevant branches of economy are invited to make contributions. The partners allow for easier access to the target groups. Thus, actions are capable of making powerful impact in terms of market transformation and energy savings. With almost 300 business partners, more than 5,000 implementation partners and 2,500 competence partners klima:aktiv has developed into a state-wide competence network that provides expertise in all energy and environment relevant issues.

Next to investment subsidy programmes and legal & fiscal instruments, klima:aktiv now provides targeted support for e.g. further education and vocational training of key players, for quality management or for target-group specific information, motivation and marketing. So it is that more than 6,000 people have already taken part in klima:aktiv training and further education courses.

klima:aktiv ensures high quality and so contributes to the efficiency of the funding. The best example here is the integral quality management system for wood-fired heating plants that has led to an increase in efficiency of more than 10%. With its quality standards klima:aktiv ensures good orientation with regard to what makes sense in the long-term. The best example of this is the klima:aktiv building standard which constitutes a genuine aid for real estate developers, planners, builders, housing developers, housing funding agencies as well as for all those who wish to build or renovate a house. Transparent criteria, guidelines, technical manuals, checklists and calculation tools all help with the implementation.

The central instruments of the national climate strategy (of which klima:aktiv is a part), such as subsidies for investments, fiscal measures, legal measures, are now supported and accomplished by klima:aktiv. In combination with other measures klima:aktiv has been instrumental directly and indirectly in reducing the CO_2 emissions by 1.6 million tons a year.

4.3.1 Thematic fields

4.3.1.1 klima:aktiv Building & Renovation

The major goals of this programme are:

- Increasing the market share of ecological buildings in the residential and service building sector
- Establishing the klima:aktiv building standard as the orientation benchmark for ecological building throughout the whole of Austria
- Further development of the funding policies and legal framework conditions in the building sector
- Innovation: implementation of marketable results of research

The focus is on quality: good planning, high-quality building materials and energy-efficient building methods not only significantly reduce the energy requirements of a building, they also enhance the quality of life and work for those who live and work in them.

380,000 t CO_2 emissions are annually saved thanks to renovation projects supported by klima:aktiv.

The klima:aktiv entry-level building standard

It is not only energy efficiency that is neutrally assessed and evaluated in klima:aktiv buildings, but also the quality of the planning and execution, the building material and construction quality as well as the core aspect of comfort and ambient air quality. The klima:aktiv building standard exists for residential and office buildings, for new buildings and also for renovations.

The basic criteria were formulated in the year 2011. They constitute entry into klima:aktiv building in all categories. Specific klima:aktiv standards have been available since the end of 2011 for hotels, schools, nursery schools and nursing homes to enable even more targeted promotion in the sector of service buildings. All criteria catalogues are structured along the lines of a 1,000 point system which is used to assess the buildings and declare their compliance.

Around 240,000 m^2 in the residential building sector and over 180,000 m^2 in the service building sector have already been built in compliance with the klima:aktiv standard.

Consultation & Tools

Another major focus point in addition to the declaration of compliance of buildings is the consulting of planners, property developers and house owners.The key players in

planning and execution are supported nation-wide by klima:aktiv experts with tailor-made consulting packages.

Criteria catalogues, checklists and guidelines are all available online. Alone in 2011 more than 70 large-scale buildings with around 2,000 residential units and almost 200.000 m² of gross floor area benefited from a renovation consultation. Around 2,500 consultations have been carried out since the programme was launched in the year 2005.

4.3.1.2 klima:aktiv Energy Saving

klima:aktiv first turns its attention to energy consultants in its attempt to promote energy savings in manufacturing companies: these are given further training by experts from the Austrian Energy Agency within the framework of the energy efficient companies programme. Ventilators, pressure systems, energy management and pumps are all topics that have already been included in the course programme. The focus in 2011 was on steam systems: guidelines were developed, audits carried out and consultants given specialist training. In addition branches such as bakeries, butchers' shops and dry cleaners were given practical assistance in the form of workshops and info days.

More than 155,000 t CO_2 emissions are saved annually thanks to energy-efficiency projects in companies.

The topprodukte.at website

To this end a list of the most energy efficient appliances from many different groups has been complied and is available on the internet platform www.topprodukte.at. Not only is the energy consumption data for the individual products given here, but also other information that is useful when making a purchase decision such as recommended retail prices, the water consumption and noise level in the case of dish washers and the SAR values of mobile phones. This online appliance ranking has obviously struck a cord with consumers: there are currently around 400,000 visits to the platform a year.

4.3.1.3 klima:aktiv Renewable Energy

klima:aktiv promotes the efficient and qualitative use of biomass such as wood and biogas, solar heat, heat pumps and renewable raw materials by means of

- information on technologies, support programmes, tips at www.klimaaktiv.at/erneuerbare !
- hotline& consultations & planning audits

- leaflets, checklists & guidelines and many other tools for quality assurance
- trained professionals: solar heating installers and planners, heat pump and biomass installers, quality controllers for wood heating plants.These experts can be found at the klima:aktiv map: www.maps.klimaaktiv.at.

klima:aktiv offers help with choosing the right heating system for each personal requirement.Different heating systems that use renewable energy sources are recommended in dependence on the quality of the building.The“heating system matrix” is available for single family houses as well as for touristic and large residential buildings.

620,000 t of CO_2 emissions are saved annually thanks to the installation of renewables.

Quality management for heating plants

The QM heating plant project was launched in 2005 with the aim of supporting the planning and construction of more efficient biomass heating plants. After several years of implementing QM processes and training quality experts the focus of activities in 2010 and 2011 changed to concentrate more on the reviewing and assessing of accomplished measures.

The data collected here indicates an average improvement in the efficiency of heating plants of around 10%. There are currently around 1,000 heating plants registered in the program, whereby the quality management process is closely linked with environmental support programmes.

4.3.1.4 klima:aktiv Mobility

klima:aktiv mobil, the transport climate protection programme offers local communities, companies and different associations comprehensive support within the framework of the following five modules:

- **Good advice**

  Companies, real estate developers, public administrative bodies, towns and cities, communities and regions, the tourism and leisure operators, youth groups and schools all receive free consultation and support in developing and implementing climate-friendly mobility management and more efficient traffic solutions for reducing CO_2 emissions as well as help with applying for subsidies.

- **Efficient support programmes**

  Companies, SMEs, local communities and associations can all look forward to financial support if they change to climate-friendly traffic measures, in particular for switching their vehicle fleets over to alternative drives and alternative fuels, for promoting bicycle traffic or innovative climate-friendly mobility management such as the introduction of mobility centres or community busses.

- **Motivating information**

  The klima:aktiv mobil awareness raising and information campaigns inform Austrians and the media as opinion leaders about the opportunities and advantages of climate-friendly types of traffic, alternative vehicles, renewable fuels and fuel-saving driving behaviour and promote the environmentally-friendly and healthy use of bicycles.

- **Trained and certified**

  To push the creation of green jobs klima:aktiv mobil is increasing its offers of training courses and certifications and the chance to achieve higher qualifications. Such measures include the opportunity for driving instructors to receive certification as fuel-saving trainers, the courses of further training “Fit for E-Bike” for the retailers of sports goods and bicycle mechanics and the qualification as a youth mobil coach.

- **Awarded**

  Companies, towns and cities, states, associations, schools and youth groups and other project coordinators that are supported by klima:aktiv and that have committed themselves to implementing specific climate-friendly projects and to reducing CO_2 emissions are awarded the status of klima:aktiv mobil project partners by the Environmental Minister.

Six years on from its launch, more than 1,800 klima:aktiv mobil project partners are reducing CO_2 emissions by 450,000 t a year through their mobility projects. This has meant that the target of the climate strategy to reduce CO_2 emissions by 300,000 t a year by 2010 has been greatly exceeded.

klima:aktiv mobil supports the changeover of vehicle fleets to environmentally sound solutions as well as accelerating the market introduction of alternative drive technologies such as hybrid, flexi-fuel, methane gas and electric vehicles. To date 5,300 alternative vehicles have already been supported with funding amounting to approx. € 8.2 million; these included about 4,400 electric vehicles (predominantly single-track vehicles) that received approx. € 5.6 million in funding.

4.4 Energy efficiency measure evaluations

4.4.1 Semi-quantitative Impact Estimates of Energy Efficiency Measures

In Chart 4.5, the number of measures in each qualitative impact evaluation category is summarized.

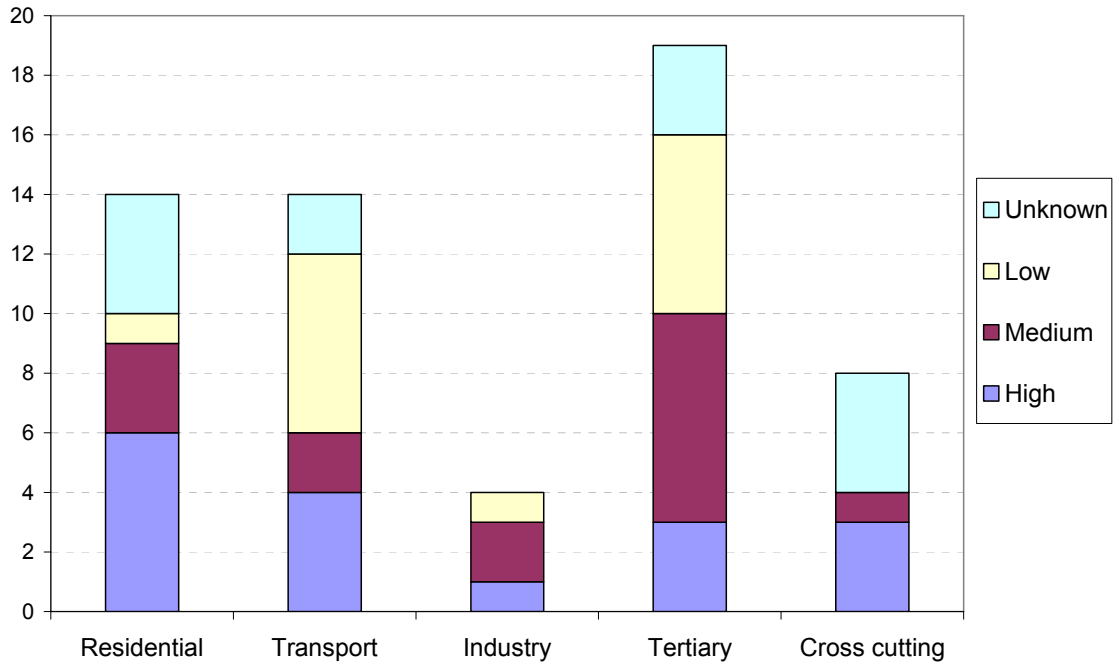
The given categories (low, medium, high) are linked to the aggregate electricity or final energy consumption of the respective sector (households, transport, industry or tertiary). The following limits are defined for the three impact levels:

- low impact: <0.1 %
- medium impact: 0.1-<0.5 %
- high impact: ≥0.5 %.

If a quantitative evaluation is available, the qualitative impact can easily be calculated by applying this definition to the quantitative figures. For measures with no quantitative evaluation, the qualitative evaluation is a relatively rough expert judgement.

Chart 4.5: Semi-quantitative impact evaluations by sector

Source: Mure



It is obvious that obligatory standards for buildings have the highest impact on energy efficiency in the households sector. But also grants and housing support schemes make their contribution to more efficiency. Soft measures in the residential sector were not well represented until 2004 (until the klima:aktiv programme was introduced in Austria). Since then they led to a change by awareness rising and therefore now have a medium to high impact on energy efficiency.

In the transport sector primarily fiscal and financial measures have a high impact on energy efficiency (Tax depending on fuel consumption, tax on oil, tax on motor vehicles). But also parking space management contributes to more efficiency within the respective regions. The “klima:aktiv” mobility management programmes that were implemented in 2004 and 2005, keeps increasing their positive impacts on energy efficiency.

The industry sector is affected by new market-based mechanisms like the European emission trading scheme and the accompanying JI/CDM programme.. Other measures in the industry sector are less popular.

The tertiary sector has it’s emphasis on compulsory standards, which have a high impact on energy efficiency in this sector. In the last years especially educational/ informative measures are well represented. These measures have their origin in the nation wide climate protection programme.

The most innovative and recent cross cutting measure is klima:aktiv, the national programme for climate protection, that was launched in 2004. The programme that sets especially awareness rising measures in the fields of municipalities, buildings, mobility and renewable energies already has a very high awareness level among Austrian population and therefore a high impact on energy efficiency.

4.4.2 Lessons from Quantitative Energy Efficiency Measure Evaluations

4.4.2.1 Klima:aktiv energy efficient enterprises

The national climate protection programme “klima:aktiv energy efficient enterprises” supports SMEs in improving their energy efficiency and implementing energy management. Information events, newsletters and an annual energy efficiency award raise the awareness of SMEs for energy efficiency.

Tools and instruments supporting the implementation of energy management and the elaboration of energy audits have been developed and are offered to the companies and to a network of energy consultants within trainings.

Additionally, an e-learning scheme for the implementation of energy management and an online benchmarking scheme are at the disposal of SMEs on the website www.energymanagement.at (in German only).

The programme started in October 2005. Its long-term target was to reduce, until 2010, CO_2 emission at 100,000 t or 250 GWh of primarily electrical energy. To reach this goal, single regional agencies were committed to individual objectives. Until September 2012, 390 consultants have been trained in using the tools and instruments. In total the programme initiated energy savings through approx. 100 companies of around 430 GWh or 155.000 t CO_2 from 2006 to 2011, thus exceeding the long-term target.

Results of carried out energy audits together with saving potentials are reported to the program managers responsible for quality assurance of the reports. In addition consultants document the implemented and planned measures in a partly public database, including the name of the company, the name of the consultant and details on activities as well as energy- and cost savings. This tool is used for the evaluation of the saving measures. The data base of measures includes a wide range of economical measures, about 15 % are measures concerning energy saving.

In 2012, a detailed evaluation of the program was carried out with the aim to show the areas of success but also to highlight areas that will need adjustments for optimal results. According to the results of this first evaluation, in the average a saving of 5-10% of electrical energy was reached with the given approach. The participating companies realised savings of up to 500,000 kWh (per company) after implementing the measures outlined in the program. These results mean that the given target of 60 GWh could be realised within 120 consulting cases.

For more details on case studies, measures and results for individual companies please visit http://www.klimaaktiv.at/article/archive/12030 (only in German).

4.4.2.2 The short-term and long-term effects of the *Ökoprämie*

As described in chapter 4.1.2, the Austrian government introduced an environmental bonus, the so-called ‘Ökoprämie’ (eco bonus) or ‘Verschrottungsprämie’ (scrapping bonus). With this measure, car owners were offered a bonus to scrap cars 13 years old or more if they buy a new car in exchange. The *Ökoprämie* amounted to 1,500 euros and was limited to 30,000 vehicles. The measure started on 1 April 2009 and was

scheduled to run until the end of the year. However, the maximum number of 30,000 vehicles was already reached on 6 July 2009.

Chart 4.6 illustrates that, as an effect of the economic crisis, registrations of new cars were 11-16% lower between November 2008 and March 2009 in comparison to the year before. In April 2009, which was the first month after the introduction of the eco bonus, this trend turned around and the number of newly registered cars increased by 13% year-on-year. In May and June, the effect of the bonus somewhat weakened and the number of new registrations rose by a "mere" 5%. The biggest effect was observed in July, when a 44% year-on-year increase in newly registered cars was recorded, although the eco bonus had run out in early July. In the following months this trend continued and a considerably higher number of new cars was licensed than in the months of the previous year.

Chart 4.6: Differences in registrations of new cars October 2008 – September 2009

Source: Statistics Austria

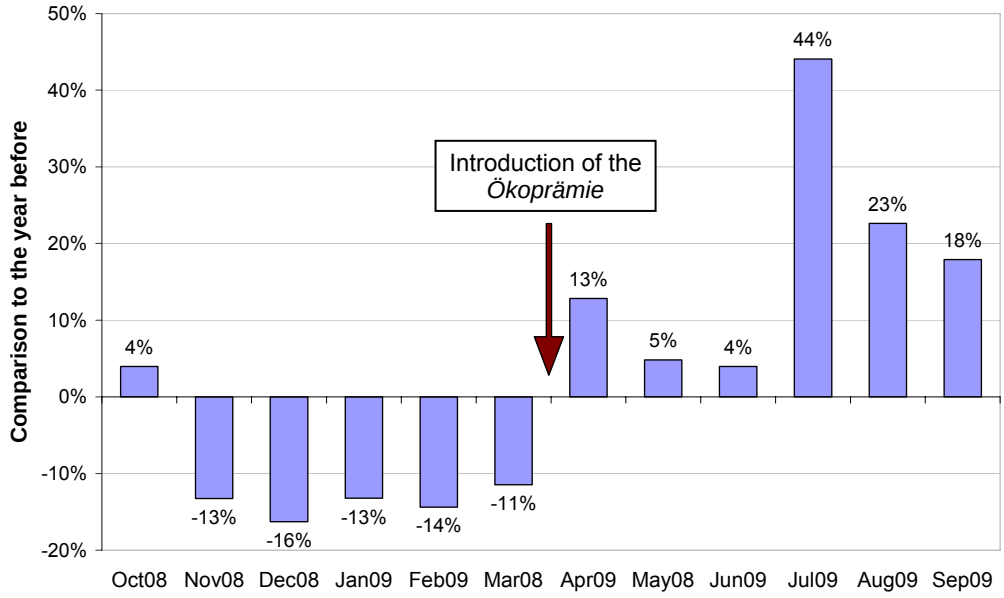
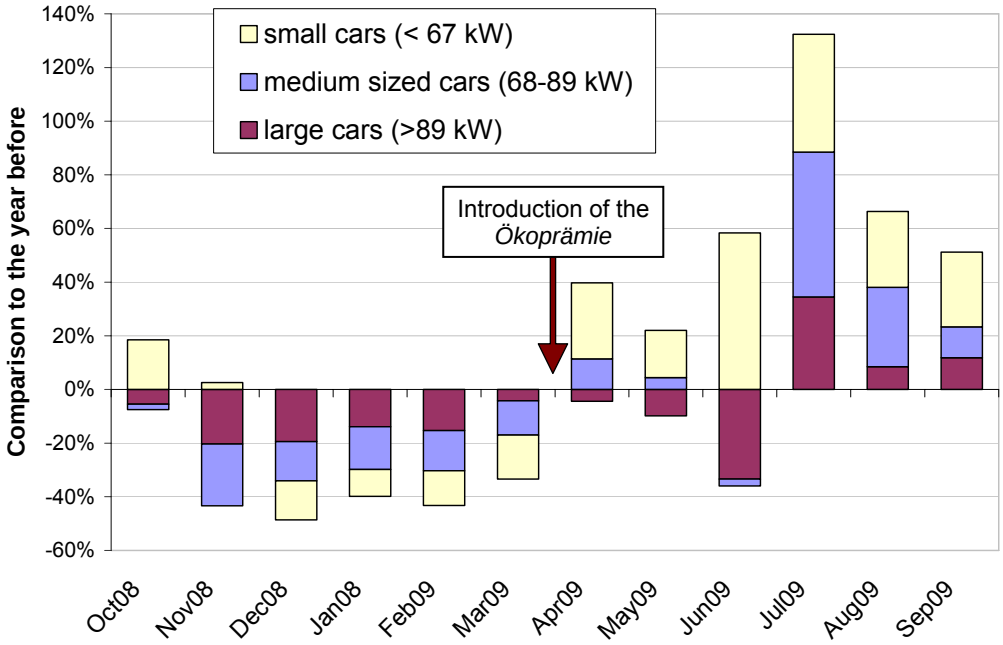


Chart 4.7 illustrates that the increase after the introduction of the *Ökoprämie* is due to a considerable increase in registrations of small cars in comparison to the year before, while registrations of large cars decreased from April to June 2009 year-on-year.

Chart 4.7: Differences in registrations of new cars by vehicle class (kW) October 2008 – September 2009

Source: Statistics Austria



In order to assess the effectiveness of that measure, it is also necessary to observe the second-hand car market, which is clearly more important in Austria than the market for new vehicles. In 2009, a total of 739 thousand used cars and 294 thousand new cars were registered. Thus, 252% more used cars than new cars were registered.

As shown in Chart 4.8, the additional registrations of new cars caused by the introduction of the *Ökoprämie* have not resulted in a decrease in the number of registrations of used cars.

Chart 4.8: Differences in registrations of used cars October 2008 – September 2009

Source: Statistics Austria

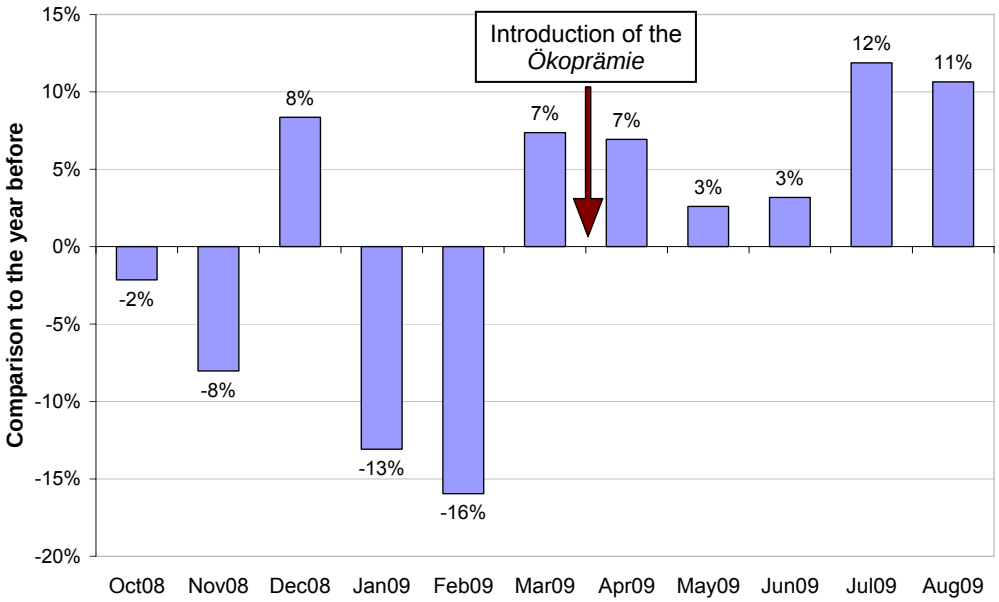


Chart 4.9 shows the long-term figures of registrations of new cars. It is clearly visible that in each of the past six years, the number of registrations of new cars reached lows in winter, started to rise relatively steep in February and reached peaks in spring. Thus, the increase in registrations of new cars in April 2009 can be at least partly explained by a long-term trend. However, in Winter 2008/2009 the number of registrations were, due to the economic crisis, exceptionally low, but reached a record peak level in spring 2009. It is likely that the *Ökoprämie* has for good parts contributed to this progress, stimulating in many cases the purchase of new cars which had been postponed due to the crisis. However, the number of registrations of new cars was somewhat below average in spring 2010, indicating that in some cases new cars may have been purchased earlier due to the *Ökoprämie*. In spring 2011, the number of registrations of new cars equalled the respective figures of 2009, the year in which the measure was introduced. These long-term results indicate that the expected effects of the *Ökoprämie* – to stimulate the purchase of new cars – was not really achieved, as the majority of consumers only bought their cars earlier. Overall, in 2010 and 2011 there were more new cars sold than in 2009.

This conclusion is underlined by the long-term development of all registrations of cars (used and new), which is given in Chart 4.10. This figure also peaked in April 2009, right after the introduction of the *Ökoprämie* and fell to below-average levels in 2010 only to reach the peak of 2009 again in 2011.

Chart 4.9: Number of registrations of used cars January 2006 – December 2011

Source: Statistics Austria

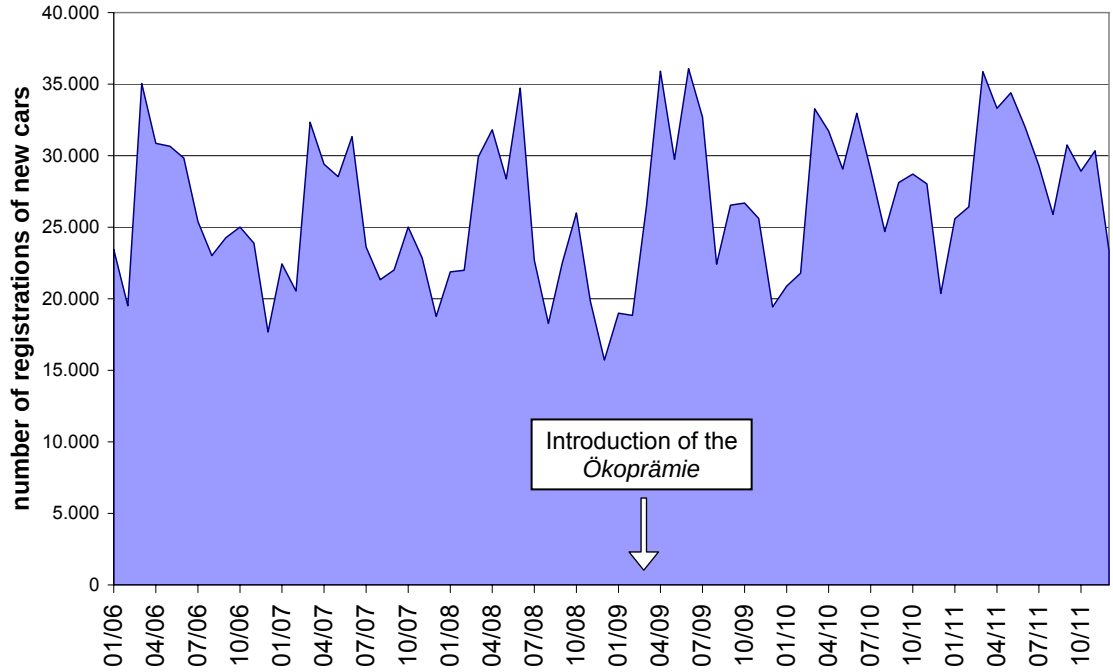
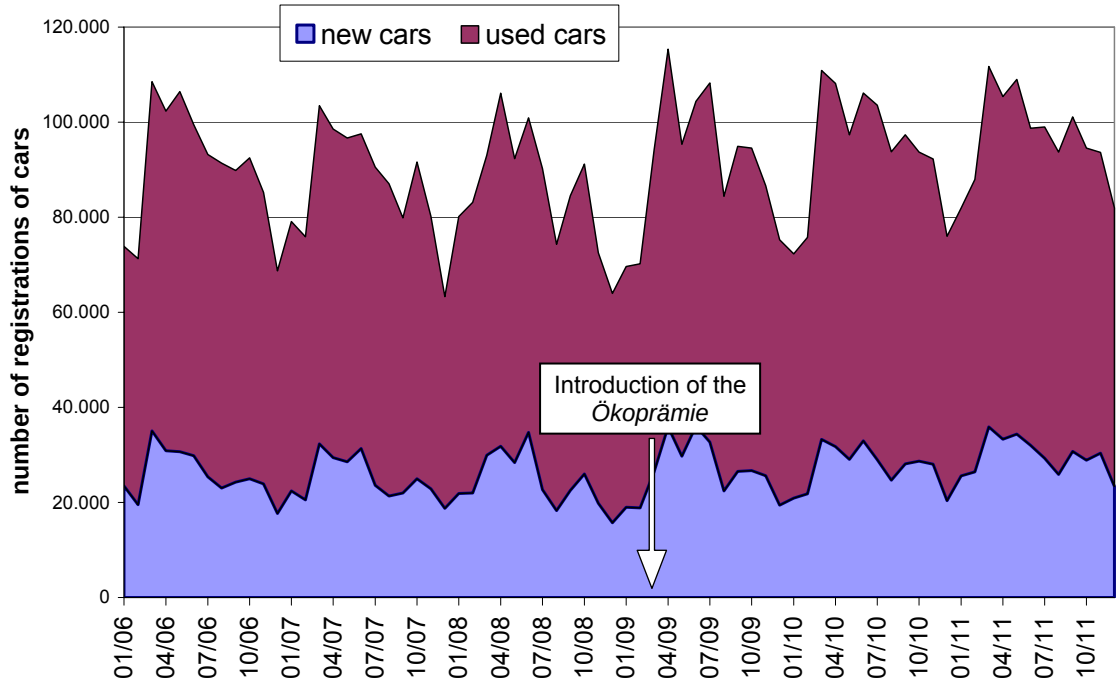


Chart 4.10: Number of registrations of cars January 2006 – December 2011

Source: Statistics Austria



5 National developments under the EU Energy Service Directive and the 20% Energy Efficiency Target of the EU

5.1 Implementation of the ESD in Austria

The deadline for the transposition of the ESD into national law was May 2008. In order to transpose the Directive, the federal Ministry of Economy and the federal provinces negotiated a state treaty according to article 15a of the federal constitution.

To get the energy utilities involved – as requested by the ESD – the federal Ministry concluded voluntary agreements with the interest representations of the utilities. These agreements with professional associations constitute an alternative to regulations defined by a member state and imposed by it on utilities, distribution grid operators and/or energy retail traders.

Voluntary agreements according to article 6 par. 2 lit. b are subject to the appraisal, surveillance and ongoing control of the member states in order to ensure that they will not be less functional than one or more of the above-mentioned requirements.

Article 4 requires the assignment of a body verifying the energy savings. The Federal Ministry of Economy commissioned the Austrian Energy Agency (AEA) to lead this process and to develop the methods for the Ministry. An energy efficiency monitoring body was established in 2008 (www.monitoringstelle.at).

In order to measure energy savings, bottom-up and top-down measures were developed. Austria started in 2008 with the development of bottom-up methods within a participatory process that involved all the relevant stakeholders (the federal and regional level of governance, the interest groups and energy utilities, etc.).

In order to survey all energy efficiency measures implemented in Austria a database was developed, which can be used by stakeholders (authorities, utilities within the scope of the directive) to document their measures and calculate the corresponding savings according to harmonised European and national bottom up methods. This database was put online in 2009.

5.1.1 Public sector

In Austria some obligations, supporting and information mechanisms for the public sector exist:

- Federal procurement law

- Contracting for public buildings
- Energy commissioners and energy accounting for federal public buildings
- Legislation in preparation for provinces
- e5 program for municipalities

Federal procurement law

The only direct obligation for the public sector is incorporated in the federal procurement law (revised in 2007 due to ESD), which states that the procurement has to incorporate “environmental security” by

- covering ecological aspects (like energy efficiency) in the specification
- the technical specification or by
- bonus/deduction criteria relating ecological aspects

Contracting for public buildings

This is not an obligation but a successful programme with private contractors to enhance public buildings (administration, schools, universities, museums...) with respect to energy efficiency legitimated by a decision on the council of Austrian Ministers in 2001. The aim of the contracting program is to cover 500 federal buildings under contract and to save 11.4 Mio. €/year of energy cost. So far about one fourth of the aim has been achieved. Information on the results of the program is distributed on the website http://www.bundescontracting.at.

Energy commissioners for federal public buildings

Federal energy commissioners (already operating since 1980) implemented monthly energy accounting in most of the federal public buildings and produce yearly energy statistics. They found energy savings in federal public buildings of 47 GWh between 2004 and 2005. They calculate ratios like energy used for heating and electricity per m3 and compare them with benchmarks in order to find potential energy savings.

Legislation in preparation for provinces

Concerning the nine Austrian provinces legislation is in preparation that also assigns the requirements of ESD to the provinces. So far no obligation for the provincial public buildings has entered into force.

e5 program for municipalities

Some municipalities take part in the e5 program, which is a supporting programme for municipalities to reduce and monitor energy use. At present 104 municipalities from seven (out of nine) Austrian provinces take part in the program.

5.1.2 Voluntary agreements

The Federal Ministry of Economy, Family and Youth concluded voluntary agreements with the interest representations of the energy suppliers of electricity, gas, district heating, oil and coal in line with §6, (2b) of the ESD.

The negotiations took place in two parallel processes. First the text of the agreement including the main rights and duties of the parties was agreed upon. Second the quantitative energy saving target that has to be achieved by the companies' measures was defined. The process of target finding was accompanied by external experts.

5.2 NEEAP, calculation methods and database

5.2.1 NEEAP

The national energy savings target for Austria amounts to 80.4 PJ or 22.34 TWh. In order to achieve this target, national energy efficiency action plans (NEEAP) have been developed and handed over to the European Commission.

The first Austrian energy efficiency action plan, which is the basis for the **efficiency policy of Austria**, has been created by the Austrian Energy Agency. This action plan contains a set of 378 measures, which range from thermal building renovation to the transport system and further on to the manufacturing sector.

In the second NEEAP, the achievement of the Austrian energy savings target was reported to the European Commission and the respective measures described. It turns out that it can be expected that Austria will achieve its target for 2016.

5.2.2 Calculation methods

In order to measure energy savings, bottom-up and top-down measures are being developed. In 2008, Austria started to develop bottom-up methods within a participatory process that involved all the relevant stakeholders (the federal and regional level of governance, the interest groups and energy utilities, etc.). The Federal Ministry of Economy commissioned the Austrian Energy Agency (AEA) to lead this process and to develop the methods for the Ministry.

Bottom-up methods allow assessing or estimating energy savings induced by single measures and expressed in energy metering units; subsequently they get added to energy savings achieved by other specific measures (i.e. bottom up). In doing so, double counting of energy savings has to be avoided.

The European Commission had announced to present a harmonised bottom-up model by early 2008, but did not do so. Thus, the **energieeffizienz monitoringstelle (Austrian Energy Agency)** presented a national bottom-up methodology and has discussed these methods in a participatory process with all stakeholders affected by the ESD.

Bottom-up methods developed by the **energieeffizienz monitoringstelle:**

- Building Envelope
- Boilers
- Heat Pumps
- Circulation Pumps
- Solar Thermal Systems
- Lighting
- District Heating
- Cooling & Air-Conditioning
- Household appliances
- Energy Audits
- Energy Counselling
- Smart Meters
- Photovoltaics
- Combined heat and power in industry

The bottom-up methods were developed during a **participative process**. The Austrian Energy Agency developed the methods and established a feedback process during a series of workshops with relevant stakeholders, the federal ministry and the provinces.

5.2.3 Database

For the metering of energy savings via bottom-up methods, all measures aiming at efficiency improvement have to be captured and administrated in a consistent and comprehensive way.

As a means for more efficient data handling, the energy efficiency monitoring unit of the Federal Ministry (energieeffizienz monitoringstelle) has set up an on-line database. After registration, any enterprise or public institution carrying out energy efficiency improvement measures within the scope of the directive can enter these measures into the database from the year 2009 onwards. Savings achieved by these measures get calculated in real time and according to the Directive on Energy Efficiency and Services contribute to gross energy savings achieved at national level.

Savings appraised in this way will be accessible at any time in aggregated state but grouped into the domestic, industrial, transport, private services and public sector.

Annex 1

Energy Efficiency Measure Summary by Country

Sector	Code	Title	Status	Type	Starting Year	Ending Year	Semiquantitative Impact
Household	AU1	EU-related: Energy Labelling of Household Appliances (Directive 92/75/EC) - EU-related Energy Labelling of Household Appliances (Directive 92/75/EC)	Ongoing	Legislative/Informative	1994		Medium
Household	AU5	Minimum thermal standards for buildings	Ongoing	Legislative/Normative	1991		High
Household	AU6	Heating system design standards, maximum exhaust gas losses	Ongoing	Legislative/Normative	1989		High
Household	AU8	Heating cost settlement for common thermal facilities	Ongoing	Legislative/Normative	1992		Medium
Household	AU10	Grants for renewable energy (thermal solar, heat pumps, biomass heating, ...)	Ongoing	Financial	1992		High
Household	AU13	Residential building subsidy	Ongoing	Financial	1989		High
Household	AU17	topprodukte.at - Platform for energy efficient appliances	Ongoing	Information/Education	2005		Low
Household	AU18	klima:aktiv building - new standards for efficient buildings	Ongoing	Information/Education	2005		High
Household	AU19	„Wohnmodern“ – support for building developers in the extensive renovation of large apartment buildings	Ongoing	Information/Education	2006		Medium
Household	AU21	EU-related: Energy Performance of Buildings (Directive 2002/91/EC) - Energy Certificates for Buildings (Energieausweis für Gebäude)	Ongoing	Legislative/Informative	2008		High
Household	AU22	EU-related: Energy Labelling Office Equipment (Energy Star)	Unknown	Co-operative Measures			Unknown
Household	AU26	National recovery plan / renovation voucher	Ongoing	Financial	2009		Unknown
Household	AU27	Energy advice for households	Ongoing	Information/Education	1990		Unknown
Household	AU28	Smart Metering and Informative Billing	Ongoing	Information/Education	2008		Unknown
Transport	AU1	Annual Technical Inspection of Cars	Ongoing	Legislative/Normative	1967		Low
Transport	AU4	Toll on Motorways and Expressways (Road Pricing and Toll by Vignette [sticker]and	Ongoing	Financial	1997		Low
Transport	AU7	Parking Space Management	Ongoing	Infrastructure	1995		High
Transport	AU8	Tax on Oil - Mineraloelsteuer MOEST	Ongoing	Fiscal	1995		High
Transport	AU9	EU-related: Emission performance standards new passenger cars (Regulation 443/2009/EC) - Consumer information on fuel consumption of passenger cars	Ongoing	Legislative/Informative	2001		Low

Sector	Code	Title	Status	Type	Starting Year	Ending Year	Semiquantitative Impact
Transport	AU11	Tax on motor vehicles	Ongoing	Fiscal	1993		High
Transport	AU13	Vienna City bikes	Ongoing	Information/Education/Training	2002		Low
Transport	AU14	Eco-Drive Campaign and Competition	Ongoing	Information/Education/Training	2004		Medium
Transport	AU2	Tax Depending on Motor Vehicle's Fuel Consumption (NoVA)	Ongoing	Fiscal	1992		High
Transport	AU22	Subsidies for electric vehicles (cars, bikes and scooters)	Ongoing	Financial	1998		Unknown
Transport	AU23	Subsidies for natural gas vehicles	Ongoing	Financial			Low
Transport	AU33	Improvements in efficiency and attractiveness of public transport	Ongoing	Infrastructure	1960		Medium
Transport	AU35	Transport measures of the Climate and Energy Fund	Ongoing	Infrastructure	2007		Unknown
Transport	AU36	Subsidies for scrapping of old cars	Unknown	Financial	2009		Low
Industry	AU1	Branch Concepts for Industry and Trade	Ongoing	Information/Education/Training	1994		Low
Industry	AU3	Cleaner Production Programme ECOPROFIT	Ongoing	Information/Education/Training	1991		Medium
Industry	AU8	EU-related: EU Emission Trading Scheme (2003/87/EC)	Ongoing	New Market-based Instruments	2005		High
Industry	AU9	Energy efficient companies	Ongoing	Information/Education/Training	2005		Medium
Tertiary	AU5	Austrian Climate-Competition for Communes and Cities	Completed	Information/Education/Training	1996	2002	Low
Tertiary	AU6	Special Energy commissioners of the Federal Government	Ongoing	Information/Education/Training	1979		High
Tertiary	AU7	Building shell insulation	Ongoing	Legislative/Normative	1995		High
Tertiary	AU8	Heating system design standars, maximum exhaust gas losses	Ongoing	Legislative/Normative	1982		High
Tertiary	AU9	Heating cost and sanitary hot water cost settlement for collective heating equipment	Ongoing	Information/Education/Training	1992		Medium

Sector	Code	Title	Status	Type	Starting Year	Ending Year	Semiquantitative Impact
Tertiary	AU11	Comprehensive Municipal Climate Protection Guide	Completed	Information/Education/Training	1994	1995	Low
Tertiary	AU12	Bundesgebäude Contracting - Energy saving programme for federal buildings	Ongoing	Co-operative Measures	1999		Unknown
Tertiary	AU13	Municipal Energy Concept of Austrian Cities (KEK)	Ongoing	Co-operative Measures	1996		Low
Tertiary	AU15	The Austrian Green-Light Programme	Ongoing	Co-operative Measures	2004		Medium
Tertiary	AU16	Austrian Climate-Competition for Communities and Cities	Completed	Information/Education/Training	1996	2002	Low
Tertiary	AU18	ecofacility - renovation of private service buildings	Ongoing	Co-operative Measures	2004		Medium
Tertiary	AU21	Heat pumps programme	Ongoing	Information/Education/Training	2005		Low
Tertiary	AU23	"solarwärme" - solar energy for water and space heating	Ongoing	Information/Education/Training	2004		Medium
Tertiary	AU24	klima:aktiv programme biogas	Ongoing	Information/Education/Training	2005		Medium
Tertiary	AU25	klima:aktiv programme "holzwärme" - increasing the share of biomass heating	Ongoing	Information/Education/Training	2005		Medium
Tertiary	AU27	Energy efficient appliances for companies	Ongoing	Information/Education/Training	2006		Low
Tertiary	AU3	Calculation method for Public Buildings and Governmental Offices	Ongoing	Legislative/Informative	1982		Medium
Tertiary	AU30	Public procurement of energy efficient products	Ongoing		2001		Unknown
Tertiary	AU31	Energy efficiency programmes for local authorities	Ongoing				Unknown
General cross-cutting	AU2	"klima:aktiv" National programme for climate protection	Ongoing	General Energy Efficiency / Climate Change / Renewable Programmes	2005		High
General cross-cutting	AU4	Austrian Climate Strategy	Ongoing	General Energy Efficiency / Climate Change / Renewable Programmes	2002		High
General cross-cutting	AU3	Agreement between Federal and provincial government concerning energy conservation	Ongoing	Legislative/Normative Measures			Medium
General cross-cutting	AU7	EU-related: Biomass Action Plan	Unknown	General Energy Efficiency / Climate Change / Renewable			Unknown

Sector	Code	Title	Status	Type	Starting Year	Ending Year	Semiquantitative Impact
				Programmes			
General cross-cutting	AU11	directly measured projects	Unknown				Unknown
General cross-cutting	AU9	Domestic Environmental Support	Ongoing	Financial Measures	1993		High
General cross-cutting	AU10	Energy and transport taxes	Ongoing	Legislative/Normative Measures	1996		Unknown
General cross-cutting	AU12	lighting	Unknown	General Energy Efficiency / Climate Change / Renewable Programmes			Unknown

Annex 2

Country Profile

Energy Efficiency Profile : Austria

October 2012

Energy Efficiency Trends

Overview

The Austrian energy efficiency index for the whole economy (ODEX) improved by 15% between 1996 and 2010, compared to a figure of 16% for the EU. Most of the efficiency improvements were achieved in the households and transport sectors. In the industry sector, a significant decrease in energy efficiency can be observed from 2007. The reason for this negative development is believed to be the economic crisis. Austria's efficiency in industry lags considerably behind that of the EU.

Industry

Energy efficiency in the industry sector improved by 7% over the period 1996 - 2010. This value is far behind the respective figure for the EU, where efficiency improved by 21%. The peak regarding energy efficiency in Austria in the period under review is recorded for the year 2007, which shows an improvement of efficiency by 15% compared to 1996. In the three-year period from 2007 to 2010, efficiency in industry decreased by 9%. Among the branches involved, the largest improvements were obtained in the transport vehicles, steel and chemical industry. Some branches like wood, non ferrous, paper and pulp, food, mining and construction, posted a negative development.

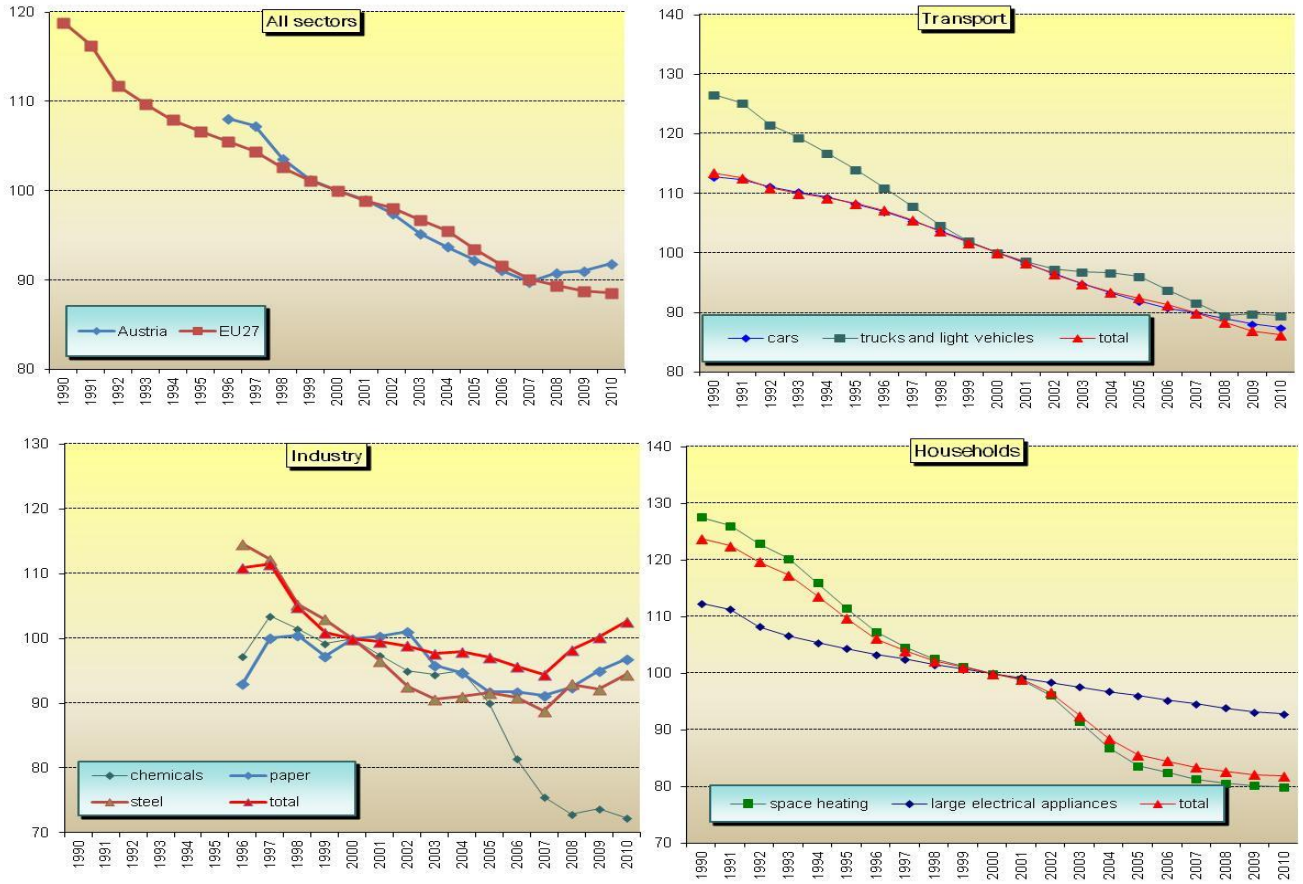
Households

In the household sector, energy efficiency improved by 34% in Austria over the period 1990 to 2010, compared to 25% for the EU. Space heating efficiency improved by 37% over the period under review. Space heating is by far the most important end use, being responsible for more than 80% of the energy efficiency progress. This is mainly due to the increasing share of well insulated dwellings, which outweighs the effect of a larger number of single family homes, higher indoor temperatures and longer heating periods. Energy efficiency of large appliances increased steadily, by 17% over the period 1990-2010. While energy efficiency of cooking increased by 42% over the whole period, efficiency of water heating rose by a mere 11%.

Transport

Transport energy efficiency improved steadily by 24% over the period 1990-2010, compared to 20% for the EU. This development is mainly caused by efficiency improvements in road transport (in particular, progress by 29% for trucks and 22% for cars). Energy efficiency of rail transport improved by 38%, while air transport shows an increase of efficiency by 28%. From the year 2007, the curve for efficiency of trucks flattened, while a slight decrease in efficiency of rail transport can be noted.

Energy efficiency index (base 100=2000)*



* All indicators measured as a three-year moving average; the overall ODEX was calculated from 1996 due to non available data for the production index for industry.

Source ODYSSEE For more information : http://www.odyssee-indicators.org/

Energy Efficiency Policy measures

Institutions and programmes

Austria's National Energy Efficiency Action Plan (NEEAP) set a target of 80.4 TJ energy savings in 2016. The intermediate target of 17.9 TJ for 2011 was exceeded, since final energy savings achieved in 2010 amounted to 49 TJ. In March 2010, the Austrian Energy Strategy included new energy efficiency measures and new targets. A 10% reduction below the 2005 level of final energy demand by 2020 was set for buildings, and a 5% reduction for the transport sector.
According to the 2010 Electricity Act, smart metering will be introduced. In 2012 the Minister of Economy has issued a decree, which determines that electricity network operators have to equip at least 95 percent of all metering points by the end of 2019.
In 2003, the Austrian government launched the Climate Action Plan and a Joint Implementation programme: "klima:aktiv", the national programme for climate protection has run since 2005. The aim of this long-term programme is to widely introduce energy efficient and climate-friendly technologies and services in the fields of construction and living, mobility, company policies and renewable energy sources. The programme contains more than twenty thematic sub-programmes.

Industry

Improvements in industrial energy efficiency are triggered by a targeted energy efficiency programme, consisting of benchmarking, Best Practice and energy audits elements. Besides the usual measures on the demand side (buildings envelope, process heat and steam recovery, motors/drives, lighting, etc.), specific emphasis is put on the supply side (e.g. industrial CHP, substitution of fossil fuels, fuel switch etc.). Energy-intensive industries are involved in the European emissions trading scheme, which was launched in 2005 and is currently in its second phase. This scheme is seen as a major instrument to achieve further energy efficiency improvements (and CO_2 reductions) within the energy-intensive industries.

Households, Services

There are many programmes in Austria which aim to improve energy efficiency by granting subsidies for suitable measures. The housing support scheme is the most important subsidy, in quantitative terms, among the energy relevant subsidies in Austria. As it is the case with housing subsidies, the building regulations also lie within the authority of the Austrian provinces. Energy related regulations for existing buildings within the building codes exist with respect to the renewing of construction, to building extensions and to the modernisation or replacement of the heating system. There are several renovation programmes and initiatives at the level of the Austrian provinces.

Transport

Taxes on fuels and on the purchase of vehicles as well as road pricing are the main factors to influence the financial framework for motorised transport. The road pricing for trucks was introduced in 2004. Since 2007, taxes on diesel and gasoline and the purchase tax on cars have been determined according to ecological criteria. The purchase tax on cars (NoVA) depends on fuel consumption. In 2008, this tax system has been amended with a bonus/malus system where cars with relatively low CO_2 emissions get tax breaks and cars with higher CO_2 emissions have to pay a higher NoVA tax. The Climate Action Plan comprises a bundle of 14 measures at national level as well as 11 measures at the level of federal provinces and municipalities. "klima:aktiv", the national programme for climate protection, contains seven sub-programmes in the field of transport. They mainly aim at introducing mobility management, for example in companies, schools or administration departments and a nation-wide initiative for a fuel-efficient driving style (Ecodriving).

Energy prices and taxes

In addition to the traditional mineral oil tax, specific taxes on electricity and natural gas were introduced in the nineties.

Selected Energy Efficiency Measures

Sectors	Title of Measure	Since
All	National programme for climate protection ("klima:aktiv")	2005
Households	Housing support scheme – refurbishment of buildings	1989
Households	Grants for Renovation concerning Energy Conservation	1989
Households	Grants for using renewable energy in the fields of heating and hot water (thermal solar, heat pumps, biomass heating ,...)	1992
Households	Domestic appliances labeling and efficiency standards National energy labels for household appliances and efficiency standards	1993
Transport	Eco Driving Initiative	2004
Transport	Tax Depending on Motor Vehicle's Fuel Consumption (NoVA) (ecological criteria from 2007), and Vehicle Tax (ecological criteria from 2008)	1992 (2011)
Transport	Subsidies for electric vehicles	2009
Industry	Emission Trading Scheme	2005
Tertiary	Energy saving programme for federal buildings	2001

Source MURE
For more information : http://www.isisrome.com/mure/

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