Ulrich Schachtschneider [1]

Energy transition policies and their social impact

Energy transition

Urbanization has led to an increasing demand of energy, particularly for traffic, heating, cooling and electricity. As people in cities do not produce their own energy, but obtain it from energy suppliers, they are often not aware of the effects that their energy consumption has.
During the past 20 years there has been a policy for sustainable energy in Europe to reverse this development. The main goals of the move towards sustainable energy are the reduction of the dependence on fossil fuels and the reduction of the CO_2 emission to 20% of the present value. The sustainable situation requires a maximum emission of 2 tonne CO_2 per capita and year. At the moment it is in Germany 11 tonne CO_2 per capita and year. The emission is somewhat lower in the cities (9.8 tonne CO_2 per capita and year), but then some emission generated outside the cities has to be added. The emission from private households in Germany is about 2.3 tonne CO_2 per capita and year, which is about double the overall emission in Dehli (1.1 tonne CO_2 per capita and year including emission from industry, trade and traffic).
The energy transition is being realized with three main goals which are in agreement with the strategies consistency, efficiency and sufficiency as proposed in the debate of sustainability since the UN conference of Rio de Janeiro in 1992.
The first goal is the move towards renewable energy. As a result more consistency is obtained, i.e. idealiter no more anthropogenic emissions which disturb the natural cycles, such as the carbon cycle. The second goal is the improvement of the energy efficiency by which energy is transported from the production site to the user. As a result the overall energy efficiency is improved. The energy can come from sustainable sources, but this is not necessarily the case. The third goal is to save energy by changing the behaviour of the consumer, e.g. that some lights are switched off and the room temperature is reduced. This is called sufficiency.
So far the goals. In the following the methods are discussed by which cities in Germany and Europe try to implement the energy transition as well as the results obtained. The focus will be on the private households. This will lead to the conclusion that the CO_2 emission is only slightly reduced despite various efforts. As a result a thesis is presented that a greater energy transition would be associated with social frictions which cannot be solved by the present green government or green market policies. Finally some alternative approaches will be reviewed critically.

Energy transition policy in German and European cities

Many cities and towns in Germany and at least all bigger cities in Europe have an energy policy to achieve the three goals mentioned before. This could include the following examples that are by no means exhaustive:
The application of renewables is supported financially or is regulated. Example programs demonstrate the use of solar energy in public buildings. The awareness is

[1] Contribution to the Symposium RLS-ORF: Problems of Urbanization, New Dehli 2011

stimulated through competitions, giving awards, advising as well as by specifying constraints for new residential areas.
The same holds for energy efficiency. Subsidies are given to insulate housings, to replace old electrical equipment etc. Moreover, awareness campaigns are launched. Strict rules are applied for the construction of new buildings. The cities set ambitious goals for their buildings and for the equipment they buy which are stricter than the general rules. The energy consumption of their properties is monitored etc.
The activities are not only focused on the technical aspects. They include also information campaigns, neighbourhood assemblies and brochures to stimulate the citizen's consciousness about their own energy consumption. The involvement of the society and the citizens is increasingly part of the activities.

Energy transition policy and economic performance

How successful are the European cities? A team of scientists defined the "European Green City Index" (EGCI) to assess the sustainability of about 30 bigger European cities on a scale from 0 to 100. The following indicators of this index are important for the energy transition:

- CO2 emission per capita and year, CO2 emission per GDP, a measure of the ambition of their CO2 reduction strategy
- Energy consumption per capita and year, energy consumption per GDP, share of renewable energy, the quality of the programs to stimulate the use of renewable energy and energy efficiency.
- Energy consumption of buildings per m2, the number and extent of regulations, the quality of the support measures.
- Number of ecomobility2 participants, length of bicycle paths and of the public transport network, measures to stimulate ecomobility, quality of the measures to reduce traffic jams.

The authors reach the following conclusion: the environmental performance increases with the economic performance (fig. 1). This is at least clear for the 30 European cities. For the German cities the picture is somewhat different (fig. 2). The environmental performance is essentially the same regardless of the economic performance. One reason for this is that all German cities have an extensive environmental policy as a result of the environmental awareness of their administrations. The other reason is that the national energy policy in Germany affects all cities equally. This result seems to be in agreement with the theory behind the Environmental Kuznets Curve: the environmental problems increase to start with the economic performance, but at a certain level of wealth they decrease again.

CO_2 emission and economic performance

But the result is quite different when we look at the relationship between the CO_2 emission and the economic performance. One would expect that the CO_2 emission decreases with GDP. Based on the same EGCI data it can be concluded that the opposite is the case: the CO_2 emission increases with GDP (fig. 3)! This result is not entirely clear, but this tendency can be observed. There are a few outliers such as Oslo or Stockholm. Both cities have certainly a diverse and ambitious energy policy. Their low CO_2 emission can, however, be explained by other factors. Stockholm has

[2] Ecomobility is an environmentally friendly and socially inclusive way of transportation, including cycling, wheeling, walking and the use of public transportation.

almost no heavy industry and the city could expand an existing district heating network, which mainly uses biomass. Oslo's total energy consumption (heat and electricity) is according to the tradition in that country for 64% covered by hydro power, which is a very high percentage for European conditions. For all German cities we find the same relationship between CO_2 emission and GDP (fig. 4). Also here there is an exception: Bremen. This city is relatively small, but 48% of its energy consumption is caused by a big steelwork. Without the consumption of the steelwork, the relation CO_2 emission GDP is in agreement with the general tendency.
When we compare the relations environmental performance vs. GDP and CO_2 emission vs. GDP it is possible to conclude the following: the environmental performance increases with the GDP, but this does not result in successfully reducing the CO_2 emission. Apparently the relationship between CO_2 emission and GDP is more dominant. That is at least the snapshot. In the analysis of the "German Green City Index" (GGCI) this is mentioned indirectly at one point: "Environmental regulation contributes decisively to the good results of the German cities" Further down it says:. "German cities show weaknesses with regard to the actual consumption and infrastructures".[3]

Tendency in the past 15 years

The current situation hence does not show good results for a energy transition, although there is a well-developed environmental policy. How was the development? Has there been made great progress during the past years? Let us have a look at the data from Germany for that purpose. [4] The energy consumption (primary energy) per capita and year in all sectors (i.e. industry, services, transport and private households) has in fact stagnated, while the total CO_2 emission per capita and year has declined by 10% (fig. 5). In the following information is given on the situation for the private households. The heat consumption per m^2 and year has decreased, but not the heat consumption per capita and year (fig. 6). This means that the efficiency has increased, but the effect of this on the energy consumption has been compensated by an increase in the living area per capita. In the economy this is called a rebound effect. The picture for electricity consumption is similar (fig. 7). The electricity consumption has even increased, but less hot water has been used. The CO_2 emission caused by electrical equipment has increased (fig. 8). Although the equipment becomes more efficient and a larger fraction of the electricity is generated by renewable energy, the CO_2 emission increases nevertheless due an increased use of the equipment. A slight decrease in CO_2 emission per capita and year caused by heat consumption was recorded. In this case the increase in efficiency due to insulation and new heating equipment is larger than the increase in living area per capita, thus resulting in a 10% reduction in the CO_2 emission per capita and year. As about five times more energy is used for heating than for electrical equipment, the overall effect (heating and electrical equipment) is a slight decrease in CO_2 emission per capita and year.

Interim conclusion

So far the numbers. The following interim conclusion can be drawn: although Germany has tried to move towards energey transition during the past 15 years only limited results have been obtained. The current reduction of approximately 10% is

---

[3] Economist Intelligence Unit 2011: German Green City Index, P. 13

[4] Federal Environmental Authority (ed.) 2011: Energy efficiency in figures. (In German: Umweltbundesamt (Hrsg.) 2011: Energieeffizienz in Daten

caused by two purely technical strategies: switching to renewable sources and increasing the energy efficiency. There is yet no result of the strategy to change the consumer behaviour.

Thesis

My thesis is: a clear energy transition will be associated with serious social problems. It promotes social inequality, especially income inequality. The present policy made by the majority will not or cannot respond to. This is because a basic mechanism for the regulation of capitalistic societies is no longer possible in the future: cheap energy and cheap resources made the unequal distribution in the so called developed countries in the north bearable.

Social problems at the beginning of energy transition

Already with a CO_2 emission reduction of 10% the social problems are visible. This is shown by the price trend in the private households: The price for electricity has increased by 50% during the past ten years, the price of natural gas used for heating has increase by about 100% in the same period. For natural gas this is caused by increase prices on the world market (fig.9). The tax itself (27%) is not very important. The percentage of tax is higher for electricity (47%) (fig. 10). The tax consists of sales tax, license costs, a levy for renewable energy and ecotaxes, which was introduced for about ten years ago. Actually all these taxes work in the same way as ecotaxes as they depend on the amount of energy consumed. Politicians are afraid to increase these taxes to accelerate the energy transition because they fear that the majority of the population would protest.
To which degree is the policy to move towards sustainable energy in Germany and in Europe associated with social problems? This question will be answered taking into account two separate ideas of energy transition policy: the green market and the green state. The social consequences of these ideas, especially on the income distribution, will be assessed using some examples.

Green Market

The method of green market consists of steering the change to renewable energy technology through positive and negative economical incentives. These methods can be used by businesses and consumers alike. I will give here a few examples of green market:
A first example ist the „EEG“, the Renewable Energy Law in Germany. It guarantees the operator of a facility which creates electricity from renewable sources a specific reimbersement from the energy company which operates the network. This reimbursement is set above the market price for producing electricity, in Germany ca. 5 euro cents per kwh. However, the difference of the market price is not paid by the energy producers but by all consumers. The energy suppliers added costs are reimbersed through a fund created by setting an additional charge to the end cost, the EEG levy. With the development of renewable energy this additional charge has been rising. In 2011 it was 3,5 euro cents per kwh, or 15% of the price for electricity. At the moment 18% of the electicity in Germany is from renewable sources. Industry is to a large part freed of these costs. The more renewable energy is invested in the future, the higher the shared costs. In practical terms, every private consumer, from infants to the aged, poor to rich, will finance these guaranteed profits of private

investors in renewable energy. This method of green market has spread among many Europian countries. There are similar laws like the EEG in other countries.
A second example is the energy tax. A tax is paid by the consumer for the use of electricity, gas, heating oil and gasoline/diesel, ca. 5-10% of the price. This also applies to companies who receive certainly generous exceptions. Approximately 90% of the revenue (ca. 20 billion Euro pro year) goes into the public pension fund. In Germany, employers and employees pay the same amount into the government pension fund. Through this tax both save ca. 10% of their monthly amount. Even those who have no employment which pays into the public pension fund, such as part-time workers, students, the unemployed, and those receiving public assistence, receive no benefits from this repayment, but as a consumer they are still required to pay this tax.
A third example is the market incentive program „Renewable Energy“. Whoever installs a thermal solar system, a heat pump or a biomass heating etc. receives a govermental investment subsidy. Other than by the first two examples, this subsidy comes from tax revenue. Subsidies are also available for renovating housing space. The owner receives a favorable credit or direct subsidy up to 17.5% of the investment sum relative to the energy efficientcy of the renovation. Therefore the rate of modernisation of houses and apartments rises. Normally the rate of modernisation is 1% per year, but the government expects a rate of 2.5% through this program. Through this energetic modernisation the rent is raised. Calculations have proven this. The landlord has the right to raise the rent up to 11% of his investment costs. But the tenents will get back at maximum one half of the rise in rent by decreasing energy costs. This means a big raise in the rent, which causes many problems and much opposition, for example in Berlin. Because of this, poorer occupants from older city areas which are to be modernised are forced to move. In city research this is called ”gentrification”.

Green State

The method of the green state consist in laws, rules and regulations for the use of energy. As opposed to green marketing, the attitude towards energy savings is not encouraged but demanded. It is regulated and can be scrutinized and enforced. A first example is the ENEV (energy saving ordinance). It sets maximum limits for the use of primary energy for the heating of dwellings. For the construction of new buildings there are relatively strict regulations. Depending on the shape of the building, they can use at the most 60-100 kwh per square meter, which is a third of the average energy use of older buildings (ca. 200 kwh per year). How the building owners arrive at these values is left up to them. There are however some obligations: 15% of the heating must come from renewable energy sources, such as solar heating, heat pumps,or combined heat and power generation, but there is also the possiblity to come short of the 15%, for example through better insulation. For older buildings there are few regulations. For example, only the ceiling of the upper floor must be insulated. This is relatively easy, since it is easily accessable. Measures which require a higher investment, for example insulating outer walls or replacing windows, are not required for older buildings.
Another example ist the BImSchV (the governmental emission protection ordinance). This ordinance allows a heating loss of 9-11% from the boiler relative to its size. Otherwise it has to be replaced. These poor values are generally for boilers over 20 years old which must be replaced because of their age. It is very similar with older so-called „night storage heaters“ which use a large amount of primary energy. They must be replaced, but only when they are 30 years old and only after 2019!

Regulations for the renovation of buildings are made in a way that house owners and rentors alike are not forced to make expensive and uneconomical renovations.
A third example is the ban on light bulbs based on the EU-ecodesign guideline. Those with a higher wattage than 60W are no longer allowed to be sold, a ban on lower wattage will follow. Such direct bans on devices with a high energy usage are seldom.
The manufacturers of large appliances (for example refridgerators) are required to state the energy usage for the information of the consumer. These labels are often confusing since the calculations are based on the average 25 years ago. 98% of refridgerators today are given the label „A“. An appliance with an above average energy consumption is therefore given the label A+ (the better ones A+++). The manufacturers have successfully hindered an exact labeling.
The further implementation of the EU-ecodesign guideline is so planned, that manufacturers must document the measures they are taking to better the efficiency of their products. A ban on certain devices with too high energy consumption is only planned in a few cases. Here also the influence of the manufacturer's implementation is obvious. They don't want too many restrictions.

Green New Deal with dilemma

Green market and green state are features of the political strategy of the „Green New Deal“, not only for the political party "The Greens", but also for UN institutions, NGOs, and is being propagated by a growing number of economists and environmental researchers.[5] The Green New Deal aspires toward answering the economical and ecological crises in an integrated way. The main idea consists in a governmentally-supported innovation and investment impetus to bring green technology to the field of green market. Through induced economic growth there should come at the same time ecological advancement, since with new technology less of the environment will be used or damaged.
The reference to the historical model of the New Deal lends the Green New Deal the spirit of intelligent transformation and feasability within the capitalistic system.
The New Deal, which was begun by President Roosevelt in the 30s and developed further after World War II, also consisted of governmentally-supported investments in infrastructure, at that time railroads and education. In retrospect, we find that through these initiatives the capitalistic system was finally able to free itself of the structural problems of capital assessment, expressed through the deep depression of the 30s.
Both of the main strategies of the Green New Deal, Green Market and Green State, however, find themselves in a dilemma: If the taxes and cost sharing are too low they have little effect on ecological management. If they are too high they are unsocial. The same is true for the regulations: If they are too lax they have little effect. If they are too high they force the poorer population to make expensive renovations. The Green New Deal requires massive mandatory investments in energy transition, which must sooner or later be paid for by the majority of the population. These additional costs should be compensated for by new jobs and higher income. But it must be questioned whether this effect on employment will occur at all and if such a growth strategy is ecologically permanently advantageous.

Alternatives

There are a few suggestions as to how an increase in social inequality through rising energy prices can be moderated or avoided.

---

[5] e.g. New Economics Foundation 2008: "A Green New Deal". London

A first idea consists of introducing social tarifs. Those whose income lies below a certain margin receives a basic amount of electricity or heating at no charge. Some energy providers exemplarily do this already for a limited number of customers who receive public assistence. There are already in certain cities „social tickets“ for public transportation which can be submitted for a lower price. With the principal of cheaper social tarifs certain problems are connected: First, the question of funding has not been solved. Until now social tarifs were offered to a limited extent. If this principle is to be introduced everywhere it has to be resolved who will pay: the other consumers, the indebted communities, should there be a rise in taxes? Second, it means a higher administrative expenditure for the communities, for those entitled, and for the providers of energy services. Evidence of income must be examined, etc. Third, applications for low-income tarifs means a social stigmatisation. This leads to the situation that many people will not accept their benefits out of a sense of shame. Fourth, there is a problem of demarcation, which represents a problem of fairness. Under a certain limit there is an entitlement to a price advantage or free delivery. Whoever earns one Euro more does not receive this advantage.
A similar idea is an energy consultation for those of lower income. This is also presently being implemented in certain cities. Recipients of public assistance receive a visit at home by an energy consultant free of charge and informed of energy-saving possibilities. This consultation is mainly directed towards a more frugal user attitude. Other strategies, such as investing in renewable energy or the purchase of more efficient appliances are not affordable for the poor. The problem with this is that among poorer levels of society a certain change in attitude is expected. On this basis there is possibly a threat that there will be less allowance for energy costs in the calculation of public assistence rates. The energy consultation, especially for the poor, also tends to stigmatisation.
The second idea is the green common. The basic idea consists in creating self-determined production attitudes. This can take place in the framework of a cooperative. This could also mean the return of control of energy services to the communities and cities from the private sector. Such a movement to a re-communalisation is found for example in Germany. The participating members or citizens will, hopefully, conduct themselves respectfully towards nature, by carefully generating their energy from locally available renewable sources such as wind, sun, biomass, and, eventually, hydropower. Their strategy of energy production will be planned in a participative, democratic process, independent of profit goals. They will therefore carry out the distribution and sale of energy in a socially just way. But the problem of the rising cost of energy is not solved even with a joint production and distribution. Indeed, the pressure of making a profit does not exist.. But even cooperatives need to invest in expensive efficient techniques and renewable energy, which influences the price of energy use. Some of the best examples in Germany show that the energy prices of cooperatives and municipal utilities are not lower than that of businesses. Even non-profit cooperatives are confronted with the problem of the intensification of social inequality through their energy-transition policies. Perhaps they have a greater motivation to find a solution to this problem.
A third solution is the „basically-progressive” tarif. A basic amount of energy is free for every citizen. Consumption beyond the basic use, in other words, „luxury consumption“, becomes more expensive. With this revenue the basic free amount is financed. The price per energy unit rises thereby, and investment in efficiency and change in behavior becomes more profitable. Preliminary calculations have shown that poorer families and those with many children profit from these tarif structures: they receive more in return in the form of the basic free amount than they need to pay in the form of a price rise for „luxury use“. A concrete example of this idea already exists: the city of Basel levies a so-called “guidance-fee electricity” and pays via the

energy bill the income to all citizens equally, ca. 60€ per person and year. It functions unburocratically.
The charm of this model lies in the fact that it connects redistribution and ecological supervision, without discrimination, without a problematic demarcation of entitled persons, and without more burocracy. Furthermore, it is a solution without more governmental regulations for correct consumption. It is left up to every individual how much he wants to use - but receives tougher limits in the form of monetary restrictions. This principle is similar to the combination of green market, green state, and green common. The element of the green market, an ecology tax becomes associated with a redistribution from the green social state, the element of the green common is at least partially introduced with the basic free use of energy.
This model is also described as „eco-bonus“ or „ecological basic income“ in discussions.[6] However, in politics and science it is rather marginal. The principal of per-person payout of eco taxes is not only suited for the use of energy supply of cities. It could also be excellently used in international climate politics.[7] Poorer countries in the south would profit financially because of their lower consumption and higher population. The model of the eco bonus, with its social compensation, could bring stalled global climate diplomacy as well as energy transition in european cities into movement again.

Nov. 2011

Dr. Ulrich Schachtschneider
Energy advisor and freelance author, Oldenburg, Germany
ulrich.schachtschneider@gmx.de

6 Peter Barnes introduced this into discussion in the form of the idea of a “Sky Trust”.
Barnes, Peter 2008: Capitalism 3.0. A Guide to Reclaiming the Commons. San Francisco 2006

7 This is proposed for example by Felix Ekardt with his conception for social justice in climate policy.
Felix Ekardt 2010: Soziale Gerechtigkeit in der Klimapolitik, Düsseldorf 2010

Figures

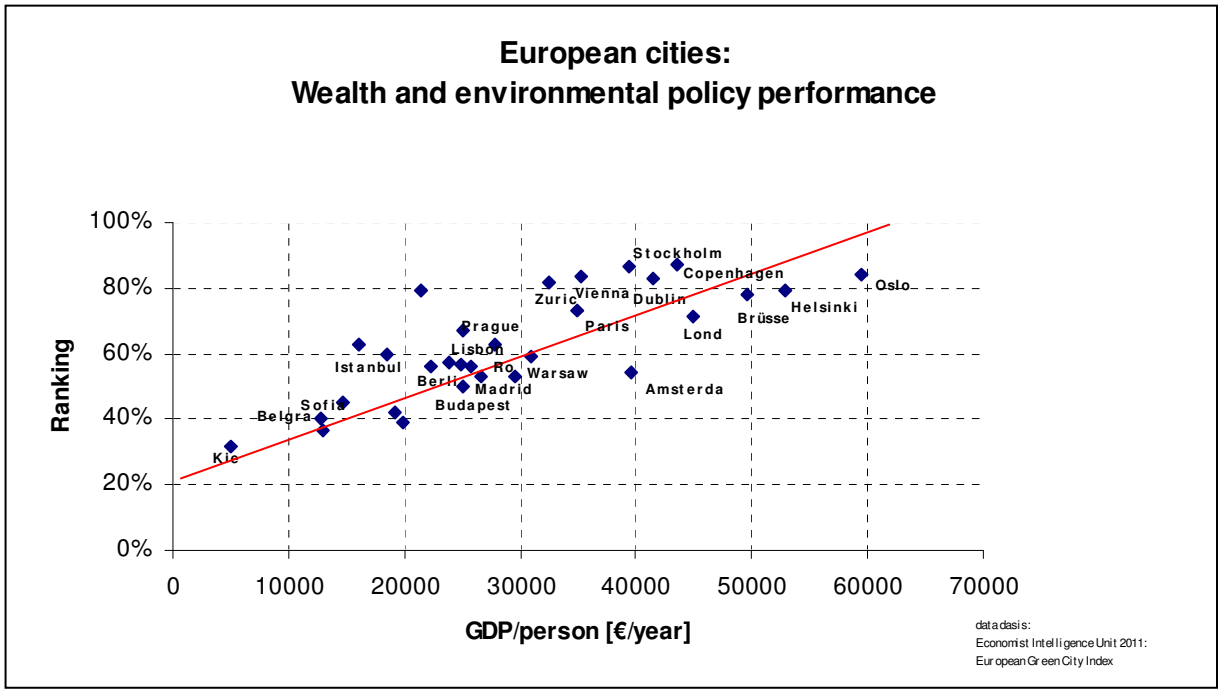


Fig.1

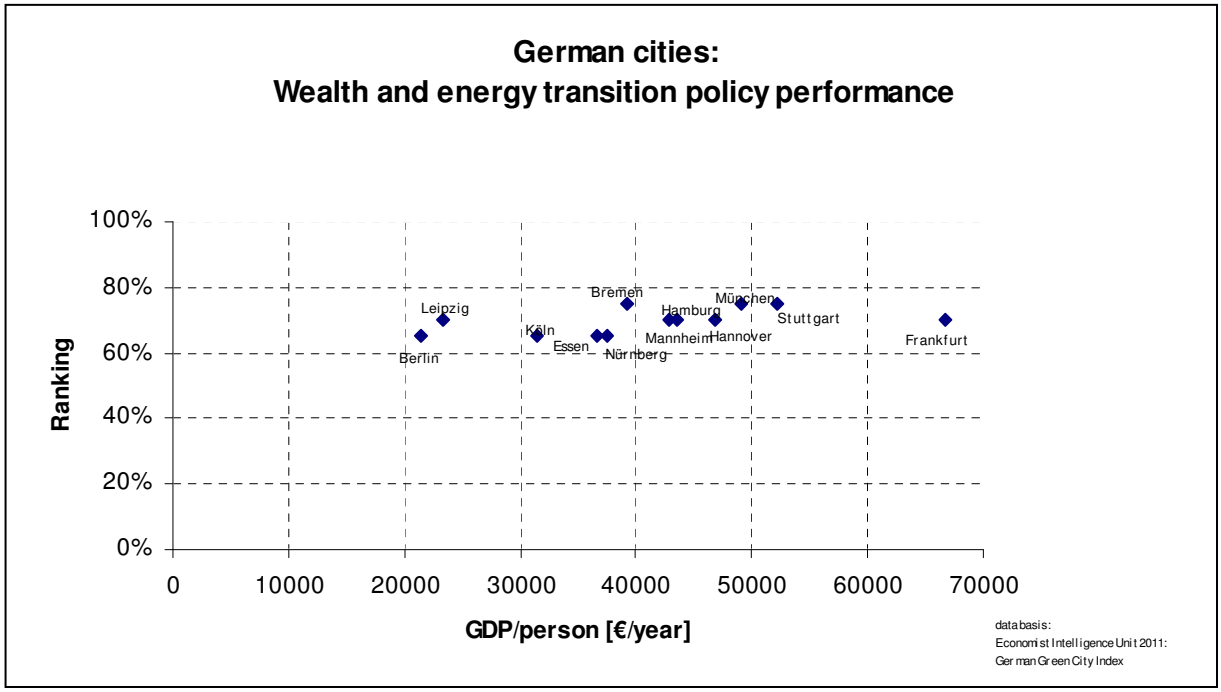


Fig.2

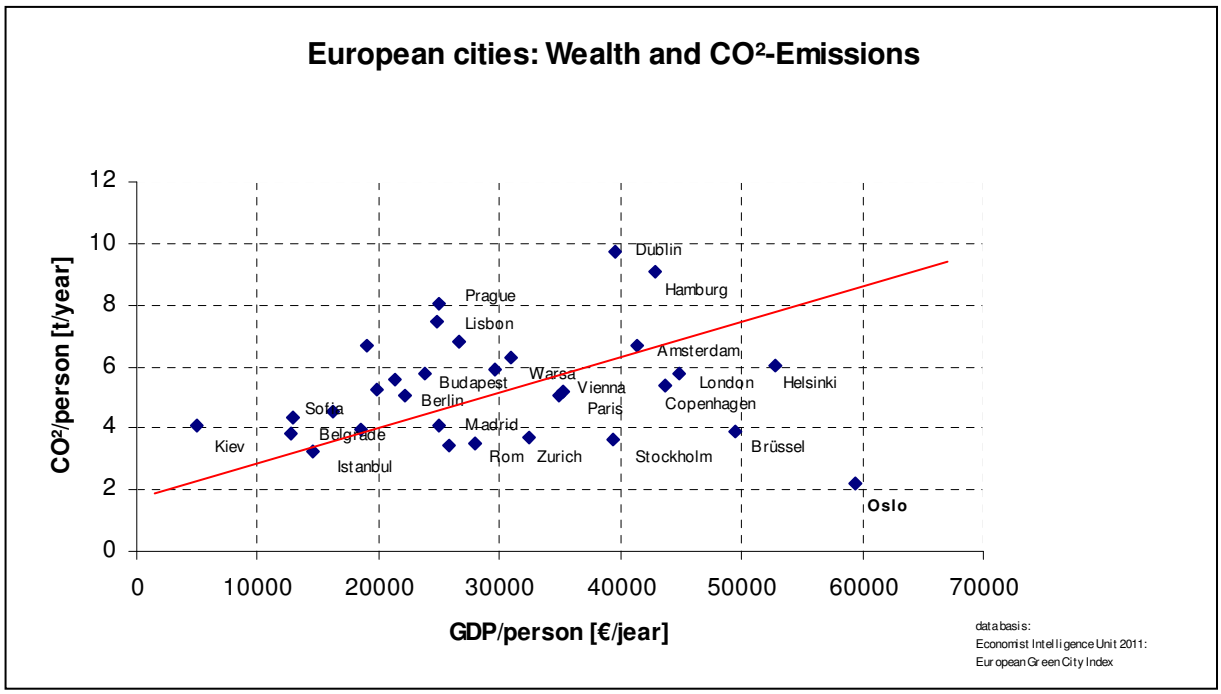

European cities: Wealth and CO²-Emissions
CO²/person [t/year]
GDP/person [€/jear]
0
2
4
6
8
10
12
0
10000
20000
30000
40000
50000
60000
70000
Dublin
Hamburg
Prague
Lisbon
Amsterdam
Warsa
Budapest
Vienna
London
Helsinki
Berlin
Paris
Copenhagen
Sofia
Madrid
Belgrade
Kiev
Rom
Zurich
Stockholm
Brüssel
Istanbul
Oslo
databasis:
Economist Intelligence Unit 2011:
European Green City Index

Fig.3

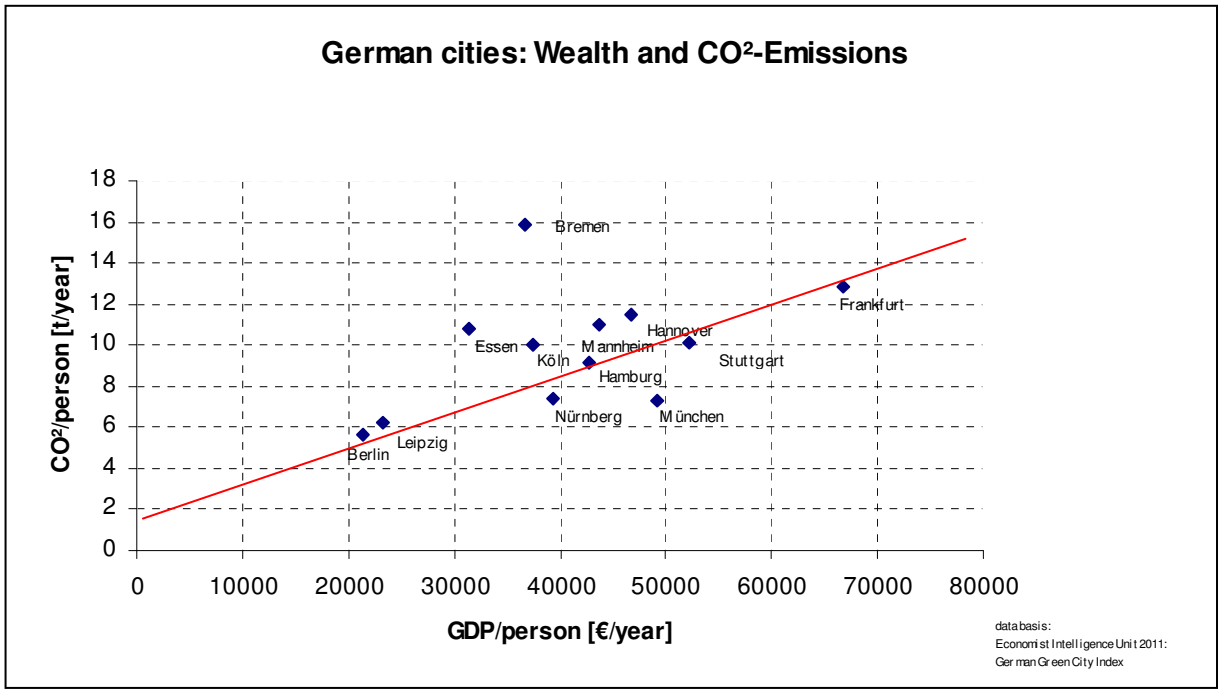

German cities: Wealth and CO²-Emissions
CO²/person [t/year]
GDP/person [€/year]
0
2
4
6
8
10
12
14
16
18
0
10000
20000
30000
40000
50000
60000
70000
80000
Bremen
Frankfurt
Hannover
Essen
Mannheim
Köln
Stuttgart
Hamburg
Nürnberg
München
Leipzig
Berlin
databasis:
Economist Intelligence Unit 2011:
German Green City Index

Fig.4

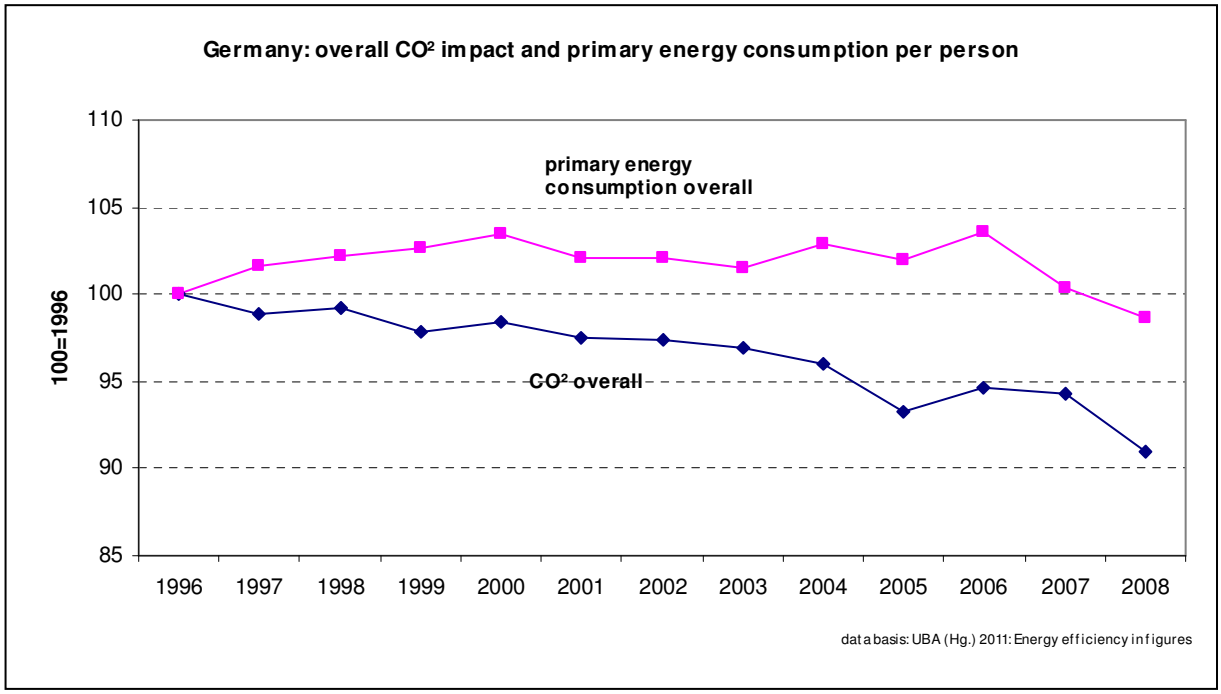

Germany: overall CO² impact and primary energy consumption per person
110
105
100
95
90
85
100=1996
primary energy consumption overall
CO² overall
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
data basis: UBA (Hg.) 2011: Energy efficiency in figures

Fig.5

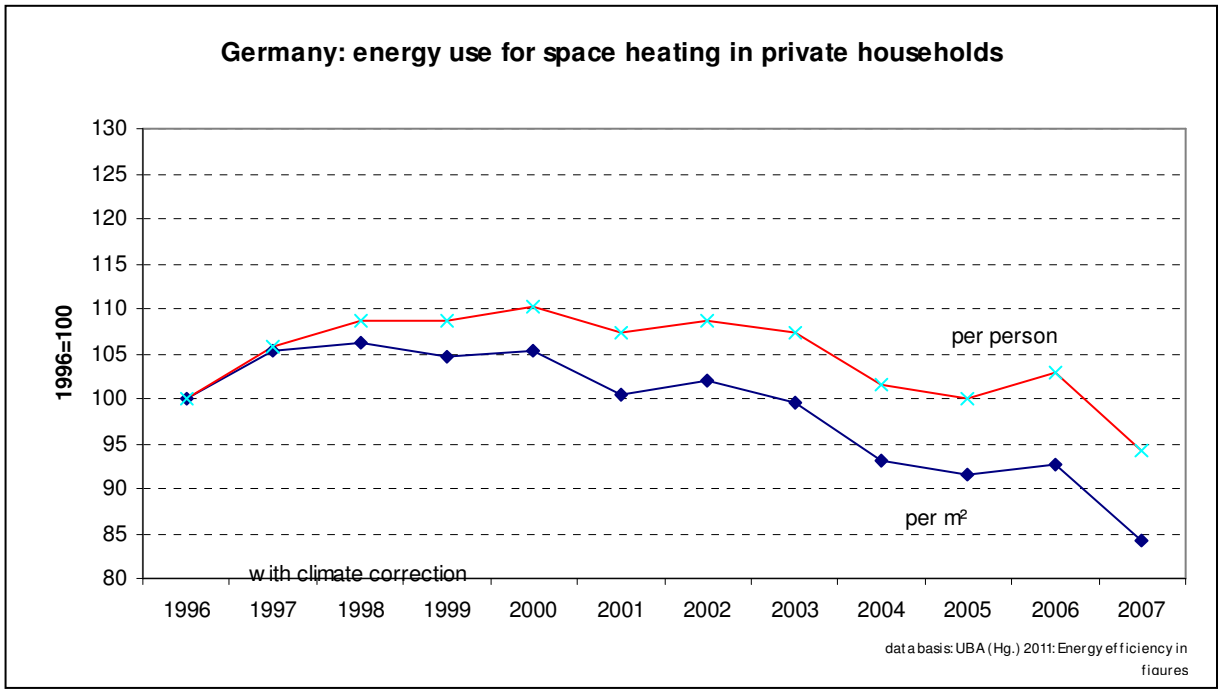

Germany: energy use for space heating in private households
130
125
120
115
110
105
100
95
90
85
80
1996=100
per person
per m²
with climate correction
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
data basis: UBA (Hg.) 2011: Energy efficiency in figures

Fig.6

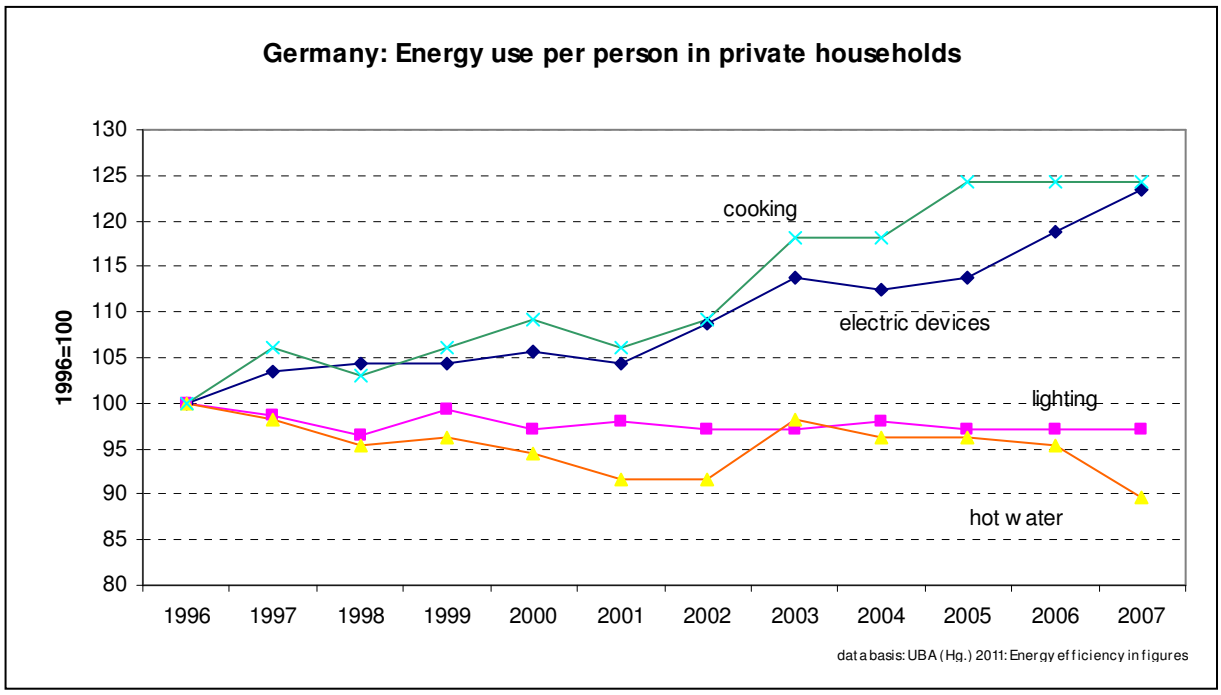
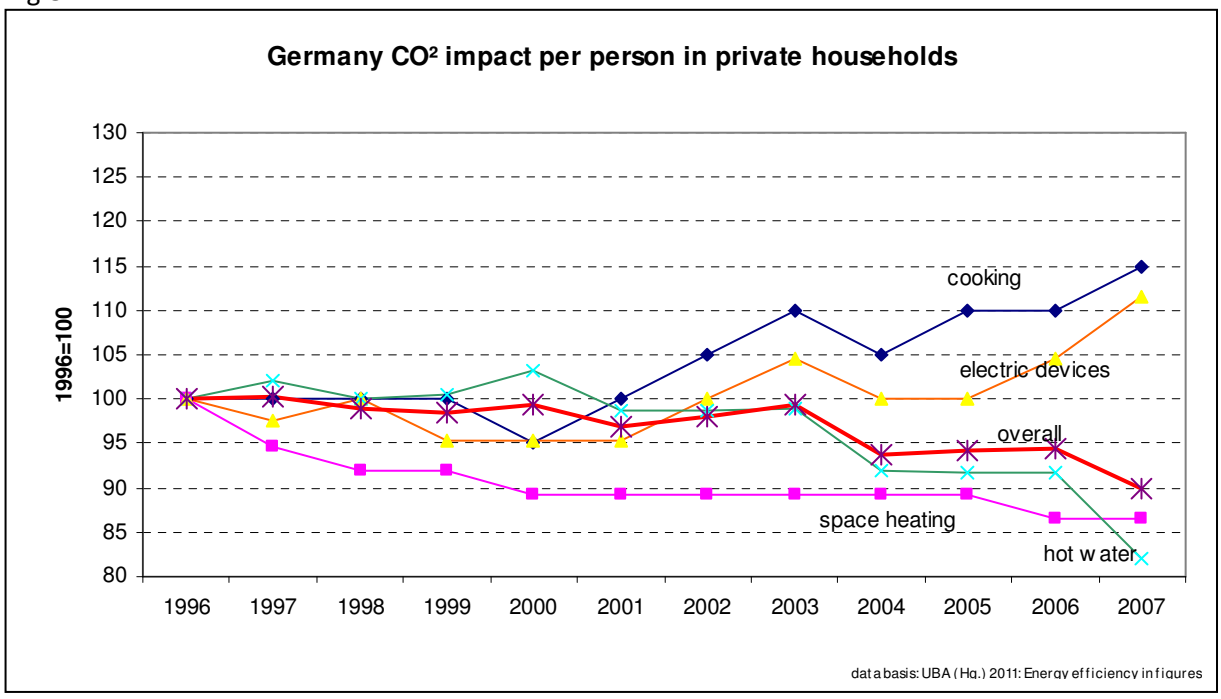

Germany: Energy use per person in private households
1996=100
130
125
120
115
110
105
100
95
90
85
80
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
cooking
electric devices
lighting
hot w ater
data basis: UBA (Hg.) 2011: Energy efficiency in figures

Fig.7

Fig.8


Germany CO² impact per person in private households
1996=100
130
125
120
115
110
105
100
95
90
85
80
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
cooking
electric devices
overall
space heating
hot w ater
data basis: UBA (Hg.) 2011: Energy efficiency in figures