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Occasional Paper

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**Local Climate Protection and its Contribution
to Clean Air Policy in Germany**

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In the 1990s the threat to our climate has been identified as the biggest challenge facing the industrialised countries around the world. Certainly since the UN Conference on Environment and Development in Rio de Janeiro (June 1992), climate protection has become an important issue in the debate about environmental programmes in German towns and cities. With the 1995 World Climate Conference in Berlin and the concomitant local authority events ([1](#)) climate protection will now become an established part of local-authority environmental policy.

The task of incorporating climate-related topics in environmental policy ca. essentially be seen in terms of three objectives:

1. Urban climate: The emphasis here is on biological climate conditions in the city, with typical phenomena such as the effects of heat islands, smog pollution or wind comfort and wind protection. The welfare of human beings and quality of the conditions within the city are determined primarily by the interaction between the built environment and the locational as well as micro-climatic conditions.
2. Air quality: The urban and countryside climate factors simultaneously influence the situation regarding air quality pollution on both the city quarter and city district levels. In addition to steps designed to reduce emissions, protection against detrimental or hazardous effects on human health and the environment air pollution also requires approaches designed to protect against emissions, such as preserving the interchange of air or stipulating emission levels which are acceptable for the locality or type of use.
3. Climate protection: There is a distinction between climate protection and the two topics mentioned above in that global climate conditions are incorporated within the framework of local environmental policy over and above the specific examination of the situation on the locational, urban and

regional levels. In order to maintain the radiation and thermal balance of the earth's atmosphere, cities and local authorities play a role in reducing the anthropogenically-related, climate-relevant emissions within their own jurisdiction and in avoiding other detrimental or harmful effects (2). The measures mostly contribute simultaneously to objectives 1 and 2.

In the current public debate, the term "local climate protection" refers to local authority activities that contribute to reducing greenhouse gas emissions. Consumption of non-renewable substances and fossil fuels in the course of local economic activities is the main cause of atmospheric pollution with gases damaging the climate. The local authorities must therefore use their opportunities to influence the situation. Their close proximity to households, industrial and trade establishments and road users makes it easier for them to address target groups directly and effectively at the local level. This paves the way for extensive involvement of the various actors in drawing up local environmental and climate protection programmes in urban authorities (3).

The world-wide scientific and political discussion about defining CO₂-reduction targets was opened at the 1988 conference of scientists in Toronto (4). A corresponding development was seen at the local-authority level, and by the early 1990s this had given rise to an intensive discussion about the need for local climate protection programmes. Today more than 300 local authorities in Germany officially support the aims of climate protection and have declared their membership of city associations such as the Climate Alliance of European Cities (Alianza del Clima) or the International Council for Local Environmental Initiatives (ICLEI).

The targets for CO₂-reduction within local districts range from

- 50 % reduction in CO₂-emissions by 2010 (compared with 1987), Climate Alliance;
- 50 % reduction in energy consumption (without any timeframe), towns in the Brundtland region (in accordance with the requirements of the 1987 Brundtland Report);
- 25 % reduction in CO₂-emissions by 2005 (compared with 1990); many cities base their figures directly on the national target set by the federal government;
- 20 % reduction in CO₂-emissions by 2005 (50 % by 2050); a suggested target of ICLEI (in accordance with the 1988 World Climate Conference in Toronto).

In the field of energy policy, the central theatre of action for climate protection, local authorities ca. look back on a certain tradition. In the wake of experience during the energy crises in the 1970s, a number of cities have developed and implemented energy-saving programmes - in some cases with extraordinary success (5).

The local, and in some cases regional, energy supply concepts produced in recent years in many cities - particularly in the old länder of the Federal Republic of Germany - formed the main basis for information and data. This is the background which explains the dominance of energy projects within local activities for climate protection.

In view of the differing and structure-influencing results and objectives of the various energy concepts, there is a range of different local starting bases for the way ahead in each case within the framework of climate protection programmes. At this point the aim is to briefly outline the change in and significance of those energy concepts developed after the 70's.

During the 80's so-called "new" local energy concepts emerged, concepts in which strategies for supply-side savings were developed. Since then efficient and environmentally-friendly approaches to energy supply have been increasingly incorporated in local supply structures. Local energy concepts very soon developed into generally accepted components of local development planning. As "new" local energy concepts have been developed more and more measures have been examined to increase efficiency within end-user sectors. In the beginning the emphasis of the concepts was exclusively on the market for heating in domestic households and public buildings. It was only later that additional topics such as "light and power" (efficient end-use of electricity), "renewable energies" etc. were incorporated in expert reports (6). During the 80's these approaches were finally combined into integrated energy concepts.

A distinction must be drawn between general energy concepts and technically and/or territorially-based, individual energy concepts derived from them, with their strong, implementation-orientated proposals for action based on district heating/gas supply network expansion, power-heat co-generation (PHC) and energy saving for public buildings, the use of renewable energy sources, and the like.

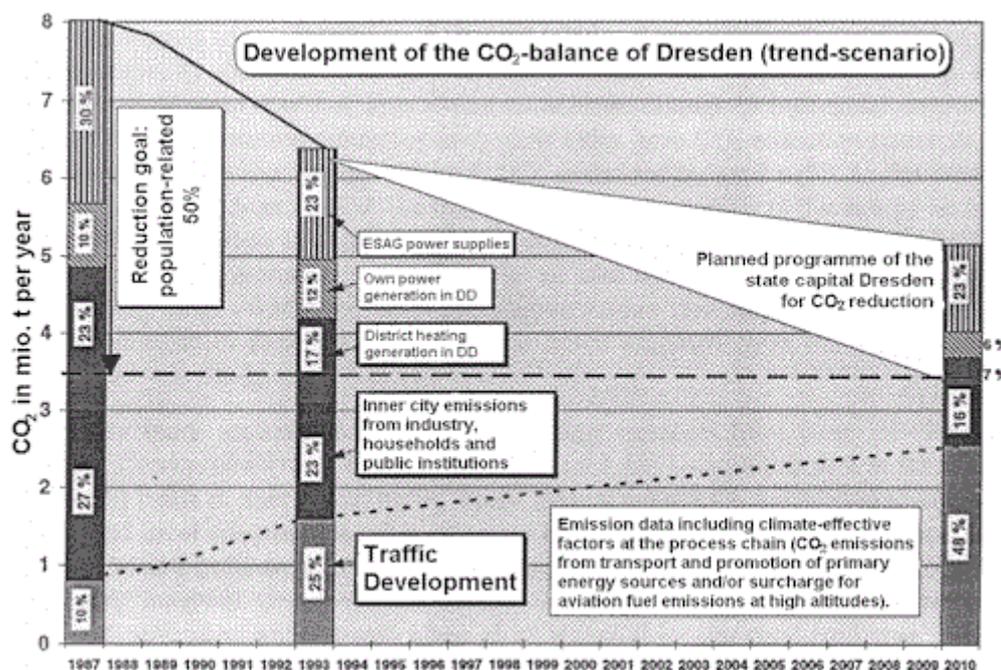
In addition, investigations carried out by the Federal Research Institute for Regional Studies and Regional Development (BfLR) discovered that the implementation level of various approaches in the energy supply sector depended heavily on economic factors. For example, individual concepts for the expansion of the gas or district heating supply network could be very quickly implemented since their costs were borne by the respective energy supply company on economic grounds. The construction of block heating power stations (BHPS) has increased somewhat over recent years since, in addition to the improved general conditions relating to supply legislation, gas and diesel powered BHPS's very quickly proved to be an economical alternative due to the collapse of oil and gas prices. In the case of renewable energy sources, the fall in energy prices had the opposite effect. There are no signs of conversion having any widespread impact here since the costs of the energy savings have to be funded through high levels of investment.

In the process of examining local energy concepts, little has been seen so far about "climate-friendly development planning" and "sustainable energy-based urban redevelopment". This was the reason why an additional need for research in this respect was announced. "This important area has remained 'underexposed' compared with supply engineering measures in the implementation of the energy concepts" (7).

Furthermore, in the light of experience over many years, the room for manoeuvre for the local authorities in the area of energy supply within the power generating sector is proving limited. Apart from the operation of individual power generating systems (including BHPS, photovoltaic,

hydro-electric and wind power systems) more effective measures for the efficient and environmentally-friendly generation of power ca. be achieved only in larger municipal utilities. According to the German Association of Local Utilities (Vku) in 1991 around 32.7 of the available output of electricity was self-generated in the eleven old länder. In 20 of the local district supply companies the self-generated portion was in excess of 70 %. 274 electricity self-generating systems were operated by the 800 Vku member companies who number more than 800. Approximately 30 % of the electricity generated by the local authorities is created in power-heat co-generation systems (PHC portion of the total public electricity supply: 4 %) (8).

Figure 1: Development of the CO₂-balance in Dresden (trend-scenario) from 1987-2010*



*Source: Landeshauptstadt Dresden, Amt für Umweltschutz, Dresden 1996

In summary, Lutter says of local authority energy concepts: "due to the effect - a very widespread one in some cases - of the programmes pursued by the länder and the changes which have taken place since in the commercial and supply legislative framework conditions, as well as the environmental policy objectives for energy supply which have gained significantly in importance, the energy concepts have become an extensively acknowledged and in some cases self-evident instrument of local authority development and energy policy" (9).

The forerunners of conceptual work at the local level were energy supply concepts that were originally completely supply oriented. These were later followed by energy (conservation) concepts that also aimed to achieve savings in individual consumption sectors. In the meantime numerous towns and cities have CO₂ reduction concepts, some of which consider the (energy-induced) CO₂ emissions by road traffic in the context of overall urban balances. Unlike

the many and various initiatives in the energy sector, the other fields of action in local climate protection are generally not so well developed. Motorised private transport in particular is an area that is very difficult to handle at a local policy level. This does, however, require further development towards integrated climate protection concepts. Results of the initial experiences in the cities have been available since the 90's.

It is only more recently that climate protection concepts have been developed that provide a comprehensive picture of the scope for local authority action in the two most important fields of energy and traffic. Some cities have already succeeded in drawing up integrated local climate protection strategies based on an understanding of local climate protection as a cross-sectoral task. Gradually all areas of local authority responsibility are becoming involved. One important basis for drawing up climate protection programmes is the identification and quantification of all essential locally generated greenhouse gas emissions (e.g. Hanover did so in 1992) ([10](#)).

Integrated climate protection that takes account of the main greenhouse gases confronts local authorities with a wide-ranging cross-sectoral task. Greenhouse gases are generated directly and indirectly by all forms of economic activity and at all stages in production and product life cycles, for example

- in energy generation and conversion (e.g. power plants, refineries),
- during transport operations (e.g. motor traffic),
- through energy consumption, product consumption and waste disposal (methanes, chloroflourocarbons) in households and in public and commercial enterprises or facilities,
- as a result of production and distribution operations in industry, trade and commerce.

The activities of numerous "pioneer cities" give an impressive idea of what local authorities ca. do within the framework of a national climate protection strategy. But it cannot be denied that local authorities could make an even greater contribution to the achievement of the national climate protection objectives if a number of oft-quoted administrative and economic framework conditions ([11](#)) were changed at the federal and the länder policy levels.

Thanks to reductions in emission levels, measures for local climate protection, energy savings and traffic avoidance are making a considerable contribution to maintaining air quality in cities and the quality of urban life as a whole. That is why many cities have recently been allocating permanent space to measures for reducing CO₂-levels in the areas of energy and transport (energy saving activities, environmentally-friendly traffic development) in the environmental reports on air quality/maintenance of air quality (e.g. Hanover 1994, Hamburg 1994, Munich 1994, Münster 1994, Frankfurt a.M. Regional Association 1994, Wuppertal 1995, Dresden 1995)).

By contrast, when drawing up urban CO₂-balances and formulating climate protection concepts, many local authorities are reverting to prior work in the area of air quality maintenance. Programmes of measures and action concepts formulated within the framework of local authority plans for the maintenance of air quality, emissions registers, air quality reports, urban climate reports, are being incorporated as part of the formulation of local

authority climate protection concepts since they also contribute towards reducing CO₂-levels through energy saving and traffic reduction measures.

In the Federal Republic of Germany air quality policy is defined by the Federal Immissions Control Act (Bundes-Immissionsschutzgesetz). It is mainly a governmental task of authorities on the länder (state) level. Nearly all power stations and installations require the authorization of the länder.

Within the frame of federal and länder regulations local governments have several independent tasks:

- executive tasks (e.g. mediate responsibilities regarding permits and supervision of large-scale power stations by local emission control agencies in some länder),
- some direct tasks (e.g. permits and supervision of small-scale installations; special measuring responsibilities e.g. in Bavarian cities).

The local government possibilities for co-operation and action are not very extensive. As a general rule länder authorities (e.g. in North-Rhine Westfalia Gewerbeaufsichtsämter, a form of factory inspection administration) are responsible for the measures taken by polluters to maintain air quality.

Within the framework of the federal legislation on immissions control as well as the statutory decrees and administrative regulations passed in this respect (to date 22), in particular the Technical Instruction Air ("TA Luft"), the following are important to the maintenance of local air quality and city development:

- Part 5 of the BImSchG, together with the regulations on the monitoring of air pollution and air quality maintenance planning,
- 22nd BImSchV (decree on emission levels),
- the proposed 23rd BImSchV (decree on concentration levels) with the stipulation of test values on busy roads for nitrogen oxide, soot and benzene and empowerment of the local authorities to introduce traffic-reducing measures.

However, German cities have many possibilities to set environmental targets and define measures which are a major contribution to clean air policy. This concerns emission control in relation to products and substances (e.g. the environmentally-sound purchase of low-emitting heating systems or cars by local governments) and - first of all - many planning instruments affecting local environmental protection policy (urban development planning, land-use planning, measures in the transportation and energy sectors. German cities are thus a key factor in environmental policy.

In larger cities of some länder the emissions and immissions situation is set out in air quality maintenance plans. In these plans the causes and effects of situations are described and steps towards improving air quality listed together with an action plan. Many of the measures are within the competence of the city, in particular those relating to energy supply, transport and urban development. In 1995 a further campaign of testing, which formed the basis for the extrapolation of the air quality maintenance plan, was carried out, for example, in Karlsruhe (Baden-Württemberg).

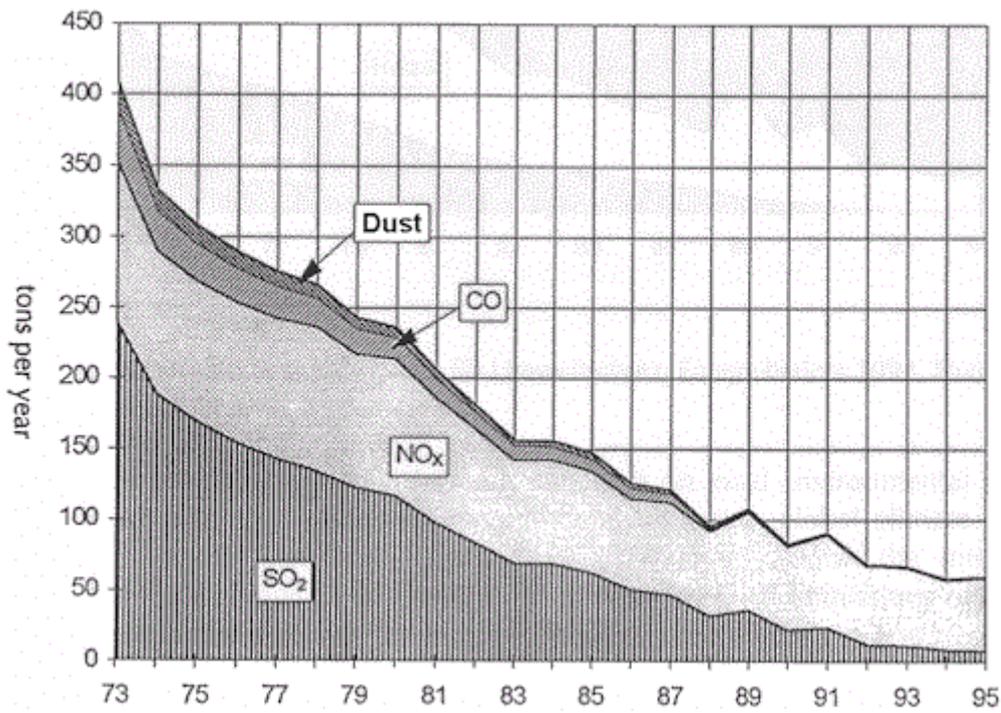
The city of Erlangen (Bavaria), for example, describes "specific" opportunities for improving air quality. These activities include the following areas:

1. Measures designed to clean flue gas in the city's heating power station
2. Consistent enforcement of the environmental legislation; this applies in particular to industrial plants
3. Exclusion of solid and liquid fuels from development planning
4. Consistent expansion of natural gas and district heating supplies through the Erlangen municipal utilities
5. Reduction in vehicle traffic through an environmentally-caring transport policy
6. Implementation of energy saving measures within the city area (local authority house building, municipal buildings) ([12](#)).

The effects that ca. be generated for maintaining air quality through a local commitment to energy saving and climate protection is illustrated by public buildings energy management in Stuttgart, which has been documented in detail.

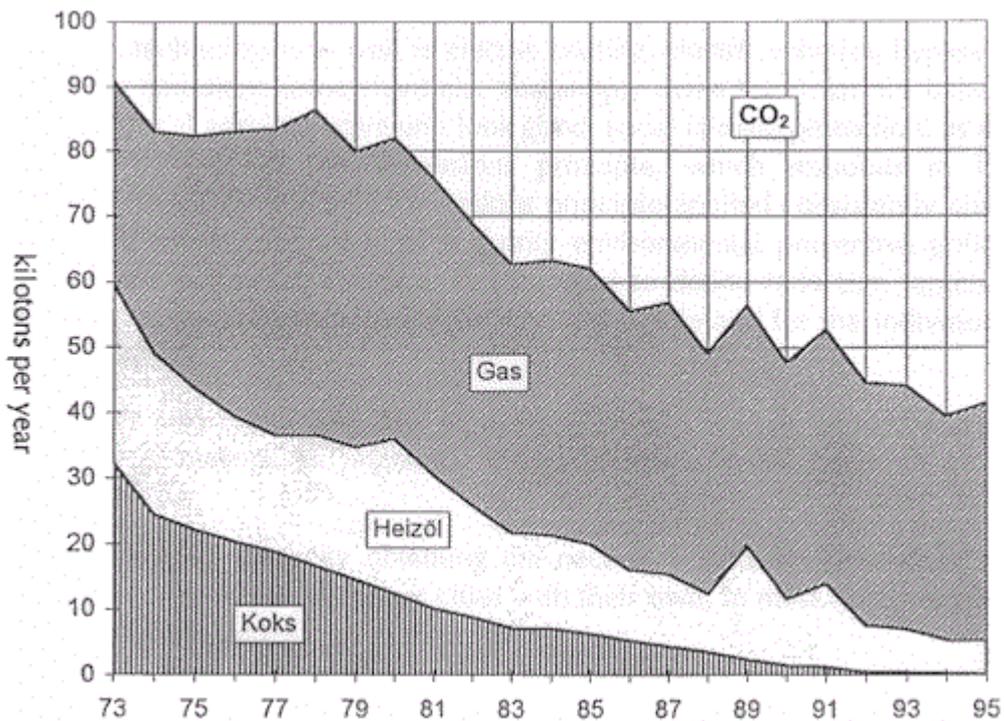
However, this kind of success in reduction is achievable only within the immediate jurisdiction and under optimum conditions. As a general rule this relates to local authority properties (schools, kindergartens, administrative buildings) which on average cause between 3 and 5 % of the city's total CO₂-emissions. Improved potential for action within the spheres of indirect jurisdiction of local authority energy and transport policy (e.g. influence consumption sectors) would also enable good results to be achieved in these areas. However, this type of success in emission reduction ca. be achieved only if an effective and environmentally-friendly use of energy is developed not on the supply side alone but also by exerting effective influence on end uses - e.g. the domestic household and industrial consumer sectors - especially through measures to reduce energy demand. At the same time we still see considerable shortfalls in implementation in this area since it is very difficult to motivate actors in view of the current framework conditions in respect of energy management and regulatory legislation. A general implementation of the standards within the framework of the Heat Insulation Ordinance (WSVO) or more comprehensive target levels cannot be guaranteed with the existing local authority apparatus (insufficient capacities as well as competencies for controls and more far-reaching stipulatory powers).

Figure 2: Rated emissions of heating systems of local government buildings in Stuttgart from 1973-1993*



*Source: Landeshauptstadt Stuttgart, Amt für Umweltschutz, Energiebericht 1994, Stuttgart 1995

Figure 3: Development of CO₂-emissions of heating systems in local government buildings in Stuttgart from 1973-1993*



*Source: Landeshauptstadt Stuttgart, Amt für Umweltschutz, Energiebericht 1994, Stuttgart 1995.

The increasing efforts to not only draw up standards on local environmental protection but, associated with this, more wide-ranging contributions to global climate protection through development planning, does, however, come up against the interpretation boundaries of the Building Code (BauGB). In addition to local immissions protection, it would be meaningful explicitly to include global climate protection and to grant local authorities extensive competence to stipulate energy parameters and efficient types of energy supply ([13](#)). Increased competence for local authorities in climate protection and CO₂ reduction would go a very long way towards preventing "classic" air pollutants in accordance with the BImSchG-targets.

In contrast to conventional air quality maintenance plans or emissions registers, however, the emphasis in climate protection is not on local environmental consequences, e.g. the importance of sulphur dioxide or nitrogen oxides for air quality, but on the global effect of greenhouse-relevant gases. When determining the spatial limits of urban CO₂-balances whilst drawing up the corresponding status reports (energy, CO₂-reduction or climate protection concepts) it ca. be seen that climate protection is a global problem. However, through the measures proposed in this context, local environmental problems will implicitly be taken into account (e.g. reduction in pollutants through energy savings). By making the right choice of system and spatial-based balance limits, the aim must be especially to avoid recommending wrong measures (e.g. technologies as well as electric heating, electric vehicles, bypasses) which only move the emissions somewhere else and simply make the emissions balance sheet of a particular local administrative unit look good. Local climate protection, as explained above, therefore extends the immissions principle, which responds to limit and concentration levels, by adding an emissions principle applied consistently and directly to polluters, in the sense of a local authority environmental preventive policy. Local authority climate protection concepts ca. be used to define reduction targets and the corresponding action programmes for the city as a whole and for the individual energy application fields ([14](#)).

But subsidiarity also needs adequate conditions. Finally, it must be said that there are still a number of reasons for improving the conditions of local clean air and climate protection activities:

1. many cities have difficulty obtaining the necessary data; in the case of clean air policy there are only a few larger cities with their own, in most cases mobile, means of measuring air quality,
2. since direct instruments for a local clean air policy are generally lacking, the implementation of other environmental measures that support clean air targets (see above) is very difficult; mostly other targets than environmental protection or energy saving and traffic avoidance are given higher priority (e.g. targets of the local economy),
3. especially the emissions of new pollutants (e.g. ozone, benzene) in cities show the necessity of effective local instruments in the sector of clean air policy.

This means in particular improved conditions of action regarding the prevention principle within local environmental protection policy, because the actual legal framework stresses output-oriented regulations. Clean air policy is

more or less reactive. The origin-oriented preventive instruments are still to be developed. This is a challenge for the European Union as a whole and for the individual Member States.

In cooperation with BMU/UBA the German Institute for Urban Affairs has prepared guidelines for drawing up and implementing local climate protection concepts ("Klimaschutz in Kommunen"). On about 660 pages it provides very detailed information. For example in the general part A it describes how to define aims, map up the current situation, select measures and start implementation. Cooperation and integration are stressed as main principles of managing the process. In a part B the main cross-sectoral instruments are explained

urban planning instruments (energy-efficient, land-use and city planning),
information policy/social marketing (social marketing is based on the idea to combine information with attractive offers possibilities to act,
financial instruments and financing (fundraising; grants/incentives from the EU/federal/Länder governments; Third Party Financing)
environmental-sound purchasing (of goods in the office sector, cars, buildings and energy management in municipal buildings).

In part C several technical fields (energy, traffic and waste management) are described: It starts with energy saving measures, which are described for the main end-use sectors

municipal buildings,
households,
commerce and industries.

The two other topics in the energy chapter are energy-efficient building (most of energy is used for heating buildings) and the energy supply sector.

The Chapter "Mobility" deals with

traffic-/city planning,
public transport,
enforcement of the environmental friendly pedestrians and bicycle users,
individual motor traffic.

There is also a chapter on the energy impact of waste "production", its treatment and on energy saving opportunities within waste water management.

All chapters are completed by service parts, where further leading literature and experts in cities and science are listed. In a part D the user will find a collection of good practise cases in German cities for every measure described in the guidelines. Cities embarking on climate protection ca. thus see that "it works".

The guidelines are written for the special situation in Germany and they cannot be directly applied by other nations or especially in east European cities, which live under very different conditions. It is up to individual national governments to provide such help. But some of the Difu work will be transferred to central and eastern European Countries, e.g.

on the basis of the brochure "Local Climate Protection" Hungarian experts will define subjects to be discussed in workshops there, parts of the guidelines suitable for central and eastern European countries will be translated (for selected countries) in another project ([15](#)); e.g. a publication on energy saving in municipal facilities will be transferred to the Czech Republic, Bulgaria and Hungary.

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- 1 Weltbürgermeistertagung zur Kampagne "Städte für den Klimaschutz" (ICLEI - Internationaler Rat für lokale Umweltinitiativen, 27.-29.3.1995 in Berlin); Fachtagung "Erfolgsfälle kommunaler Klimaschutzpolitik" (Klima-Bündnis der europäischen Städte, 3.-5.4.1995 in Berlin).
 - 2 Chapter "Energie und Klimaschutz" of the Difu-publication "Kommunale Umweltberichte" (published in winter 1997).
 - 3 See Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit (eds.), Kommunalen Klimaschutz in der Bundesrepublik Deutschland, Bonn 1995.
 - 4 Edda Müller, Zur Verwendung wissenschaftlicher Ergebnisse in der Umweltpolitik. Ein Kommentar aus der Regierungspraxis, in: Axel Murswieck (eds.), Regieren und Politikberatung, Opladen 1994, p. 49-57.
 - 5 See also Horst Lutter, Zehn Jahre Energiekonzepte. Erfahrungen und Perspektiven, in: Informationen zur Raumentwicklung, Nr. 6/7 (1990).
 - 6 VDEW/Landesgruppe Nordrhein-Westfalen, Handlungshilfe zur Erstellung von CO₂-Minderungskonzepten, Frankfurt a.M. 1994, p. 14.
 - 7 Lutter 1990, p. 311 ff. and p. 314.
 - 8 Vku 1991 in: stromthemen, Oktober 1993, p. 1.
 - 9 Horst Lutter, Zehn Jahre Erfahrungen mit örtlichen und regionalen Energiekonzepten in der Bundesrepublik Deutschland, in: Information zur Raumentwicklung, Nr. 6/7 (1990), p. 313.
 - 10 Landeshauptstadt Hannover, Umweltdezernat, Klimarelevante Emissionen in Hannover. Datenerhebung zu Treibhausgasen und ozonabbauenden Substanzen, Hannover 1993.
 - 11 Karl-Heinz Fiebig und Carlo Kallen, Kommunale Klimaschutzprogramme - zum Stand der Programmentwicklung und Maßnahmenumsetzung, in: Der Städtetag, Nr. 5 and 7 (1994).
 - 12 Stadt Erlangen, Umweltzustand der Stadt Erlangen im Vergleich mit drei europäischen Städten, Erlangen 1993.
 - 13 Werner Neumann, Stadtentwicklungsplanung - energiegerechte und klimaschützende Bauleitplanung, in: Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit (eds.), Kommunalen Klimaschutz in der Bundesrepublik Deutschland, Bonn 1995.
 - 14 See the Difu-publication "Klimaschutz in Kommunen", guidelines for drawing up integrated local climate protection programmes, Berlin 1997.
 - 15 "Arbeitshilfen für den kommunalen Umweltschutz in den Ländern Mittel- und Osteuropas".
-