



Climate mitigation, climate adaptation and energy strategy Stuttgart Region

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Climate mitigation, climate adaptation and energy strategy Stuttgart Region

The sustainable development of the region has been emphasized by the “Verband Region Stuttgart” (VRS) and its Economic Development Corporation (WRS) for quite some time now. Supported and accompanied by the Regional Assembly and promoted by various regional initiatives, in recent years a number of actions on climate change and climate change adaptation have been implemented in local practice. The many good examples are as individual elements part of a regional climate and energy plan. From the scope and number of measures taken, can be seen how much influence the VRS - as carriers of the regional planning authority and the WRS - as a presenter, and trigger for ideas and inspiration for the local economy, have. The examples also show up, where the broad instruments of the two organizations reach their limits.

Climate change mitigation

The most important control option to reduce or avoid greenhouse gas emissions is the instrument of spatial planning (for the VRS). This instrument is subdivided below in regional planning, regional transportation planning and the landscape planning framework. Apart from these formal instruments the VRS is able to use both the plan execution and informal instruments, such as incentive mechanisms to promote the desired effect. In particular, this includes the participation in the funding program “Modellregion Nachhaltige Mobilität“ of Baden-Württemberg as well as the region's own funding program.

Regional Planning

In terms of CO₂ adaptation and mitigation strategies the instrument of regional planning provides:

- The development of rail infrastructure and transport services in public transport
- A compact and to the development axes oriented residential development
- Specification of routes and power plant sites and extensions
- Control of sites for large-scale retail and primary care next to places of residence
- A significant contribution to curbing greenhouse emissions. Through an integrated settlement and transport area development, the use of public transport in relation to the individual traffic will be enhanced. Thus, the energy consumption in the region is noticeably reduced. Other options of formal nature consist in density requirements for residential land (space efficiency), the control of urbanization through development quotas (e.g.: for community self-development) and by the designation of (inter-municipal) focal points for habitation and business. Action priorities for prevention strategies are therefore primarily
- The gentle handling of non-sealed surfaces,
- Energy-efficient transport systems and
- The provision of land for renewable energy (particularly wind, biomass, solar)

Possibilities and limits of regional planning

Not relevant to spatial planning are systems for power generation from hydropower and geothermal energy. No intervention or even control options by the VRS can be made in energy efficiency measures (such as industry and business, private households) and in the final consumption (gas, oil, district heating) for industry, small businesses (retail, services) and consumers.

Regional transportation planning

About 30 percent of the total emissions are attributed to the transport sector. This block, and in particular the competitive relationship between the PT and the MIT is thus an important point for climate protection efforts by VRS and WRS. A central planning instrument and an engaging way of reducing or avoiding emissions from transport is the regional transportation plan. It has laid the groundwork for sustainable development of transport in the region of Stuttgart. The Regional Transportation Plan considers all modes of transport, by land, sea and air. It includes the important interactions for habitation, open space and infrastructure development. This integrated action plan forms the basis for many decisions of the Regional Assembly and for comments of the region regarding traffic. Ultimately, it is an instrument to take on investment decisions by federal, state and regional influence. The regional transportation plan includes, among other things:

- Definition of objectives and concepts
- Analysis of the traffic situation (based on 1995)
- Forecast of the traffic situation in 2010
- Assessment of the impact and urgency of actions for
 - Non-motorized transport (walking and cycling)
 - Public transport
 - Private road ("motorized private transport")
 - Commercial transport, air transport, shipping
 - Organizational, regulatory and price policies
- Assessment of costs and financing

Updating the regional transportation plan

The current version of the 2001 plan is currently being adapted to the changing demands on the transport infrastructure. The aim is to develop for both passenger as well as operational infrastructure options on the basis of a comprehensive and current data base. The plan is a three-stage approach. To obtain current information about what kind of ways the inhabitants of the region of Stuttgart cover and what kind of means of transport they use, there was a region-wide household survey made for 2009 and 2010. Based on this updated data base, goals of transport development will be developed. This also includes specific proposals for infrastructure improvements in rail and road.

The possibilities to reduce CO₂ emissions through changes in the proportion of different transport of the total ("modal split") have not been investigated very qualified so far. A transparent and easily understandable presentation of various possible actions, that could lead to saving effects is supposed to complement the decision-making process. With such a process called "climate-proofing" as an extension to the regional transportation plan could the contribution of regional or regional transportation planning for climate change be made visible. The aim is to show what savings (in CO₂ equivalents) are possible by changes in the modal split. These include in particular:

- Shifts in the modal split
- Technological advances (e.g.: electric vehicles)
- Reductions in mileage
- Intelligent traffic control
- Integration of different transport

Attention will be also drawn to aspects of settlement structure, e.g.: the reachability of residential and commercial sites with public transport, cycle densities, distances to the workplace or commuter movements and the susceptibility to traffic jams of different route sections.

With the supplement to the practice of "Climate proofing", it would also be suitable to incorporate the climate protection efforts in the project "model region of sustainable mobility."

Participation in the national project "model region of sustainable mobility"

The state of Baden-Wuerttemberg started a project called "model region sustainable mobility" with the aim of promoting sustainable mobility in the Stuttgart region. The processing time is planned to be about five years and the project budget is estimated at around seven million € state funds. The project participants are currently adjacent to the land itself with the Fraunhofer Institute for Industrial Engineering IAO and the Institute of Social Sciences at the University of Stuttgart, two scientific institutions and the state capital Stuttgart, the WRS and the VRS. The overall project currently includes seven start projects with different project managers. Other subject areas and work packages can be added as needed.

- 1 Mission Statement Sustainable Region Stuttgart
- 2 Innovative public participation processes
- 3 Intermodal travel chain
- 4 Current traffic conditions in the regional road network - online
- 5 Environmentally Friendly Mobility Systems
- 6 Increased integration of transport and urban planning
- 7 Freight and logistics

Regional Program "Sustainable Mobility" of the Stuttgart region

The Stuttgart region is living from a functioning mobility on land, sea and air. It is reliant on mobile people, efficient transport infrastructure and well-functioning product streams need to be in the competition of business locations for a successful long term positioning. Sustainable mobility thereby has to cope with different requirements. In addition to environmental, social and urban needs, the interests of the economy and the people who live in our cities need to be considered, (Sitzungsvorlage 77/2011, Verkehrsausschuss).

Against this background, the WRS has developed guidelines for the program "Sustainable Mobility". The aim of this program is to create entrepreneurial opportunities (especially in the electrical mobility), to enable social and economic ties and to enhance the quality of life in the region. In this respect, the aspects of climate require a very special consideration. The Stuttgart region with its huge automobile industry has to take this especially into account. The action must therefore also act as an impetus in the context of economic development. The program will also make a major contribution to the transformation of the local economic area: from the "Car Region" to the mobility region. The Stuttgart region is for the current year 2012 co-financing in the amount of one million Euros for projects ready to contribute to sustainable mobility. Funded projects are individual and collaborative projects in the following fields of activity:

- Economic development / Business traffic
- Electric Mobility
- Information and communication technologies for mobility
- Intermodality / multimodality

Eligible applicants are municipalities, both in the Stuttgart region and private sector enterprises. Examples of sustainable mobility could be:

- Increase of the proportion of cycling
- Mobility card i.e.: combination of multiple providers (train, car sharing, Pedelec ...)
- Facilitating the access to public transport through communication technologies

Climate change adaptation

Adapting to climate change can only be accomplished by many different actors. This is partly due to the diversity of climate impacts and due to different responsibilities and capabilities of the relevant governmental and nongovernmental actors. Local actors play a key role in developing concrete adaptation measures.

Regarding the adaptation to the impacts of climate change, spatial planning plays a significant role in the extent that it is able to control long-term settlement patterns and other uses.

Assurance of greenhouse-free areas Principle of protection of climate relevant greenhouse compensation areas (Pls. 3.1.11)

Open space protection through green corridors and green spaces as a planning objective (Pls. 3.1.1, 3.1.2) to protect areas of cold air and ventilation lanes

Assurance of retention areas / flood protection The principles for flood protection (Pls. 3.4.2) refer on the rise of extreme weather situations due to climate change. An increased flood risk is expected.

Retention areas are currently protected by regional green corridors and green spaces of the risk of overbuilding.

The protection and the reservation of land, both for the protection of resources and for the prevention or mitigation of future impacts of extreme weather events and other impacts are of fundamental importance. Eminent in the context of climate relevant protection of open space was the Digital Climate Atlas of the Stuttgart region, which served local authorities as an important source of information and planning assistance in the year 2008 already (see Chapter 4, successes). Other priority areas for action on adaptation strategies are

- The preventive flood protection in river basins
- The protection from heat effects in residential areas (bioclimatic stress areas)
- The reservation of climate-related areas and / or corridors
- A regional water scarcity
- The shift of the habitats of animals and plants

Climate change adaptation aims for the conservation and increase of the adaptability of natural and social systems. Climate change adaptation does not mean to downplay the tasks of climate change.

Vulnerability analysis for the Stuttgart Region

In a pilot project of Regional Planning (MORO), the vulnerability of the Stuttgart Region in relation to climate change has been extensively studied based on three sectors. The objectives of the pilot project were:

- The development of a multi-sectoral vulnerability analysis, as a technical basis for the strategy development and action planning
- The establishment of a regional actor network ("Climate Network") on issues of regional climate change adaptation/mitigation strategies
- The development of a regional climate change strategy as an informal, regional development concept
- The provision of integrated technical data base (Climate Information System of Stuttgart, KISS)

With financial support from the Federal Ministry of Transport, Building and Urban Development, and supported by the Institute for Urban Planning and Urban Transport at the Rheinisch-Westfälische Technische Hochschule Aachen (Prof. Dr. Dirk Vallée), three questions were the focus of analysis:

- In which sectors is the region particularly vulnerable to climate change?
- How to adapt the region to the changing climate?
- What contribution can the regional planning make in adapting to climate change?

The two-year research project "KlimaMORO", which ended at the beginning of 2011 was carried out together with the Institute for Regional Planning and Development Planning at the University of Stuttgart (Prof. Dr. Stefan Siedentop), the two partner cities of Ludwigsburg and Esslingen am Neckar and with the WRS. Broad support got the project especially for the actor-network with more than 50 experts from the fields of agriculture, forestry, water management, health and species and habitat protection.

The aim of the regional vulnerability analysis was to provide a cross-sectional survey of the related potential impact of climate change in the Stuttgart region, as well as to find out about adaptation requirements and possibilities. It should be identified where and in which sector space-related action is necessary and what priorities should be placed here. Therefore, three thematic working groups (water, health, biodiversity/agriculture) were formed to find appropriate methods for assessing the vulnerability. The methods are based on innovative approaches to indicator-based spatial data processing as well as on elements of discursive processes.

Water

Using a complex system analysis, the working group "water" could identify the following aspects as priority topics:

- The high flood damage potential in floodplains because of the strong colonization of floodplains, particularly in the Neckar Valley, combined with steep catchments through the topography and the so given risk of "Flash Floods"
- The potential shortage of cooling water from rivers and streams associated with risks to energy supply in the region (critical infrastructure)
- The low natural amounts of ground water and the pronounced dependence of the long-distance water supply

The analysis and evaluation of the working group shows the need for action for the region. In this context, a more effective flood control system is given particular significance.

Health

In the Working Group "Health" were mainly the heat problem and its health consequences in the heart of the debate. The vulnerability of the region is here evaluated as consistently high. In addition to the threat of increased incidence of problems such as heat stroke, heat exhaustion and heat collapse also play loss of well-being and work performance in hot summer periods a role. In addition, a moderate concern to the region is suspected

- With vector-borne diseases,
- The increased exposure to allergens through longer growing seasons,
- From air pollution-related diseases and impairments in mental state by ozone in the summer heat

For example, urban planning and urban development are becoming increasingly complex. When future developments or projects of district it has to be planned and built in a different way, especially concerning the

rise of hot days in the summer. In the future, there must be planned more with shading, green roofs, the (promising cooling) element of water and with adjusted building geometries.

In the working group "Biodiversity, agriculture and forestry" were named a series of possible climate effects, indicating an increased attention in the spatial and sectoral planning.

Biodiversity / nature conservation

Climate change requires more dynamic strategies for nature conservation. To enable dynamic development processes means to provide ways of retreat and evasion possibilities for species and to create the precondition for the emergence of new living communities. This requires that the landscape is permeable to the migration of species. To create a functional network of the landscape is therefore one of the most important tasks of adaptation to climate change. Habitat network systems must be developed and require conceptual adjustment to the new challenges arising from the interaction of climate change with other risk factors.

Agriculture

The working group on agriculture acts on the assumption of a direct vulnerability derived from climate change. For the Stuttgart region, the following climate effects are considered to be particularly significant:

- Increased soil erosion by water
- A lack of water availability for crops
- Direct damage to crops caused by heavy rain and hail events

Overall, also the agricultural sector needs significant reactions. However, the regional planning has hardly any tools that have a direct influence on the type and intensity of agricultural land use. The responsibility for climate change adaptation is in this case clearly seen in the technical planning of agriculture. Basically, regarding the plant cultivation climate change adaptation measures are necessary in the following areas:

- Crop selection and crop rotation
- Tillage, soil conservation
- Plant food, fertilizer and humus reproduction
- Irrigation / water management

Conclusion

The experience in the Klima-MORO have shown that, in addition to the use of "hard" instruments, the regional planning commitments of relevant planning stakeholders could be a successful approach. Target agreements are possible, which include not only substantive and formal planning goals. In formal terms, it would be conceivable, for example, that the support of development planning in areas of high heat vulnerability - delimited in creating maps of the regional plan – requires the mandatory implementation of effects of climate change when executing construction projects.

For the Verband Region Stuttgart, as a carrier of regional planning, the project showed major requirements for action. An example is the local shape of regional planning open space goals, including the control systems of cold air areas and ventilation lanes. Especially in the tight interaction of the two planning levels, the administrative-boundaries-crossing approach is immanent.

Adjustment in land use planning

Climate impacts can be locally different and space structures are often very individual in their vulnerability. Thus, a differentiated, on the individual case focusing implementation is required (prioritization, time line).

Also, a subdivision in stock and new construction plans is necessary because the interventions in the stock are significantly lower than in the area of new construction. In the individual areas of climate change-friendly urban development, possibilities and limitations of planning interventions have been written down.

Action area health

The reservation of cold air or fresh air corridors (before development or other change) takes into account the health of citizens and especially for poor weather conditions of great importance. Here, the Regional Plan, by adopting green areas has already created a basic framework. In inner-city locations (e.g.: public places) may the provision of drinking water dispensers improve the quality of stay for the citizenship / for city tourists. An additional, subsequent shading of such places would be desirable but calls for conflict in the implementation (less parking space, root spread, tree care, disposal of leaves).

Action field energy

In the new designation of building areas, local authorities often already make commitments like the use of renewable energies. But with the use of solar energy (in the form of photovoltaic and solar thermal) and wind energy it comes to conflicts in practice (glare, unsightly roof-mounted, unwanted shadows,...). Potential for conflict also has the domestic heating with wood pellets.

In a new research project the material flows within an industrial area (GE / GI) could be researched in regard of potential savings and efficiency potentials (e.g.: cold / heat networks). This could include Local Agenda groups and architects.

Action area transport infrastructure

An urban development policy to enhance intermodal transport (e.g.: cycling) is intentional but will require adjustments in the transport area, to the disadvantage of other road users (e.g.: parking garages for rented bicycles) and requires the building of infrastructure (e.g.: charging stations).

Action area parks, open spaces

Increased use of vacant lots and waste land - in terms of densification in the urban centers - is in discrepancy to the demand of more green spaces and recreational areas in town centers. In this context, a few local authorities try to mark vacant lots as "climate comfort islands" with the aim that these areas can not be deducted as densification areas / internal development reserves (in order to plan more on areas in the outer urban area). Nevertheless, it may be useful as a balancing act to declare climate lawns in built-up areas that are stressed in a bioclimatic way.

In general, participants stressed that the quality of a location in municipalities (e.g.: as a residential area) as soft factor are getting always more important. E.g.: for the establishment of technical and management personnel. The issue of climate change however, often gets in conflict with other fields of municipal design options and is therefore often being neglected because of the long planning phase and the not immediate affection.

Information, communication, informal instruments

Digital Climate Atlas Region of Stuttgart

According to the Building Code, climate and air are important issues in spatial planning, which should be considered in the assessment. While in larger cities laminar climate researches are being performed more and more, a general lack of such assessments can be recognized at the regional level. The Climate Atlas Region of Stuttgart, released in 2008, was presented to the public, to close this gap. It gives basic information about wind, solar radiation, temperature and precipitation in the region of Stuttgart. On this base, statements were made, where cold air is created and how the air-exchange proceeds. In the so-called climate analysis maps one can find the values for air pollution in different areas of the Stuttgart region. The Climate Atlas also gives indications of how developed or undeveloped areas affect or encourage the exchange of air. Large areas of woodland, meadows and fields are important "green lungs" for the region. Designed as a planning tool for municipalities, it is used for further planning at municipal and community level.

Civil dialogue "Future of Energy"

In the summer of 2011 the IFOK Institute together with the Verband Region Stuttgart as cooperation partners organized as part of the civil dialogue "Future of Energy" a one-day public conference in the House of Sport, Stuttgart and two public workshops (one in Sindelfingen and one in Waiblingen). This civil dialogue "Future of Energy" goes back to an initiative by the Federal Minister Annette Schavan and builds on the work of the Chancellor appointed by the ethics committee "Secure energy supply". Interested citizens could apply in advance for participating in the citizens' conference, ask questions and participate in various discussion formats. With this event more than 150 citizens in the region could participate in a lively exchange of views with representatives from academia, business, civil society and politics. The findings and recommendations of these three events carried out in the Stuttgart region were incorporated into a civil report, which was published in November 2011. The citizen report contains concrete recommendations for the design of the energy-turn. The key messages are:

- In all areas of education new standards and a new sense of value creating should be established
- Create sustainability through decentralization - depending on local and regional conditions
- Create laws, rules and incentives for energy-efficient production and consumption-reducing structures
- Power generation, network and storage infrastructure should be adapted to the needs of renewable energy generation and cooperate on all levels

Model region for electric mobility

The Community model region for electric mobility in the Stuttgart region contributes to visualize electric mobility in the public space, explore different paths towards electric mobility and ultimately accelerate the market introduction of electric vehicles. Considerably more than 1,000 electric vehicles - pedelecs, electric scooters, cars, vans and buses were traveling in summer 2011 on the roads in the region. Hundreds of charging points in public and semi-public spaces (such as car parks) are the first step in the necessary area-wide infrastructure development.

The Stuttgart region as birth region of the automobile is the most important automotive cluster in Europe. Around 180,000 jobs in the vehicle industry are located in the region. Thus, the region is affected to a considerable extent by the impending change in individual behavior and mobility. Manufacturers and suppliers of the automotive industry are aware that on the way to electric vehicles, the vehicle itself must be reinvented and the aim thereby is to tackle that challenge together.

The federal government encouraged the expansion and the market introduction of electric vehicles from 2009-2011 with a total of 500 million Euros from the economic stimulus package II. Therefore, eight pilot projects will be supported with a total of 130 million Euros by the BMVBS through the funding priority "e-mobility in model

regions". This is enhanced by complementary funding means of the industry. Actors from academia, industry and the participating municipalities are working closely together with these pilot projects to advance the development of infrastructure and the incorporation of electric mobility in public spaces.

The Stuttgart region is one of eight award-winning model regions for electric mobility. The joint mission of the participating partners is to respond in a holistic approach to key issues of market and technology preparation of electric vehicles in Germany and thus the goal of the federal government to contribute to integrate one million electric vehicles on German roads in environmentally friendly mobility concepts by 2020.

Competence center in Ludwigsburg Energetikom

Energetikom is a competence center for energy, climate change and eco-design. Constituted as an association of public and private actors, it is a think tank for innovative energy projects that promote climate protection and energy efficiency. The organization supports projects from initiation to implementation. The service offer is divided into different areas of competence: information, advice, training and education, cooperation, networking and research & development.

An important goal is to save energy and emissions through new concepts. Other objectives are to strengthen the social awareness of energy issues and climate change, creating sustainable jobs and the anchoring of a European network for energy and climate change. As an initiative of the city of Ludwigsburg, Energetikom also supports the local sustainable urban development. The development and expansion of the competence center was funded mainly by the National Urban Development Policy of the BMVBS, by EU funds from the project "Living Green" and the Stuttgart Region Economic Development Inc.

Summary and Outlook

The climate and energy plan Stuttgart region unifies all available information on the topics of climate, environment and energy. It shows possible regional demands for action, but also the limits on regional control and provides answers to four questions:

- Where are we today?
- What have we done?
- What should we do?
- Where do we stand in 2020?

Roadmap for climate protection and energy in 2020

Neither the causes nor the effects of the (global) climate change end in technical and administrative boundaries. Mitigation and adaptation strategies must therefore be developed and coordinated on the regional level. The core is to establish a regional discourse about practice and proven strategies for climate adaptation paths through a network of experts from industry, associations, utilities, government and society. Both approaches, climate change mitigation and climate change adaptation are backed with best-practice examples and transparently communicated, both nationally and internationally and being reflected and developed jointly with the owners of land-use planning and sectoral planning. In parallel, a close interaction takes place with the Regional Transportation Plan and with partial updates to the regional plan (e.g.: wind power). Centrally important for the active participation and involvement of stakeholders in a facilitated process are:

- Manageable costs
- A clear objective
- A timeline and prioritization
- Defined roles

It is important to design dialogues to establish platforms and exchange knowledge and experience. During this dialogue, the control level should be separated from the working level. Good examples are:

- Organize inter-sector communication
- Linking decision makers from business and non-governmental organisations
- Include the operating level: affected people and "practitioners"

Well-intentioned appeals alone will not be sufficient. Local authorities, business and the civil society should be invited to develop their own concepts or a codex to the master plan - even if self-regulated.

It is of key importance to agree on common goals, communicate those goals and the financial transparency and describe as accurately as possible the time required and the desired measures of climate and climate change adaptation. Here, a master or action plan with a time horizon of the year 2020 would be adequate.

A kickoff event providing the ideal platform to gather different actors and their knowledge could serve as starting point. There should equally being included specialists for sectoral considerations, but also generalists with a view for system interdependencies and domino effects.

Finally, the regional energy plan should be accessible for the relevant stakeholders and for the public. This is done most easily by focusing on three key projects. This not only facilitates media coverage, but also the relationships within the actor network "Climate, Energy and Environment" are strengthened. A strong involvement and participation of these actors creates trust and creates a feeling of WE. Especially desirable are such core projects that help to overcome existing limitations of regional cooperation and work together across levels and with high interdisciplinary character.

The medium-term goal is to uncouple economic growth in the Stuttgart region of fossil fuels and to provide significantly more energy from renewable sources. In addition the energy productivity should be enhanced .

The central task of spatial planning will be to formulate guiding principles and requirements for adaptable, sufficiently robust spatial structures. Including space structures, which are understood to provide a robust and flexible response to extreme events and potential damage of climate change. Danger zones and "hot spots" of spatially relevant climate change impacts and utilization competitions have to be identified spatially and illustrated sufficiently. The aspect of vulnerability has to be considered more than ever in planning concepts. This requires a discussion about risk and value of protective goods. A more flexible approach of spatial planning and the set of instruments should be encouraged to deal with uncertainties, for example through the use of scenario techniques, rather than through rigid zoning or through the integration in accompanying management (governance) processes.

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