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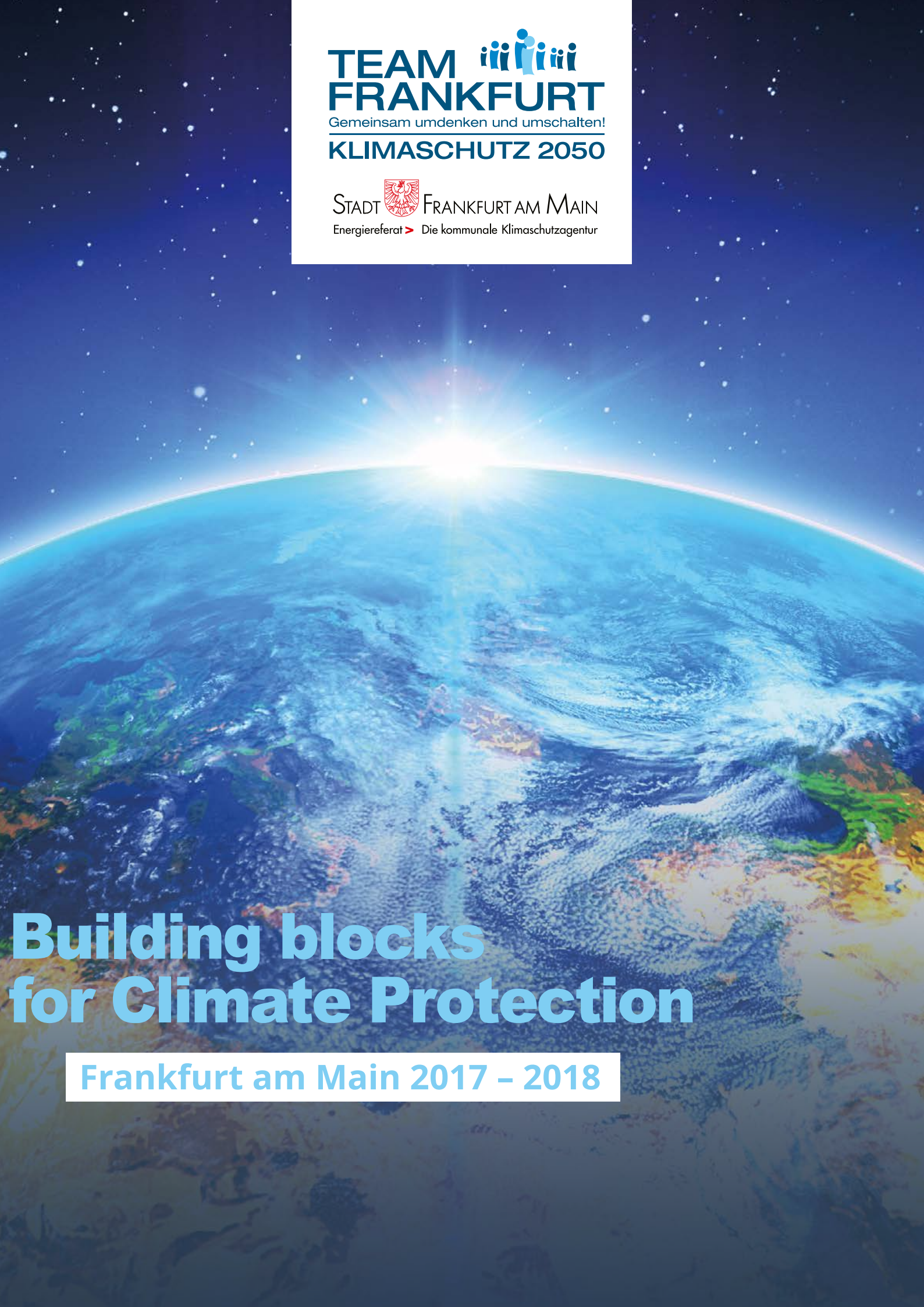

Building blocks for Climate Protection

Frankfurt am Main 2017 – 2018

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Foreword

Dear Citizens of Frankfurt,

Although I have been in politics for many years, I've never seen anything like it: in the European elections 2019 almost half of the German voters said that, for them, climate protection is the most important issue, far ahead of anything else. Greta Thunberg and the Fridays-for-Future movement have finally afforded climate protection the degree of urgency it deserves. The heatwave in the summer of 2018 made one thing abundantly clear: we have no time to lose.

This climate protection report provides a current overview of the many areas in which Frankfurt am Main is actively involved in overcoming our dependence on coal, oil and gas and preventing greenhouse gas emissions. Almost the entire urban society is now involved and making a contribution. On behalf of our climate protection campaign, the only one of its kind in Germany, we would like to give you all a big "thank you" for your support. Although many activities, such as expanding the district heating network or the use of waste water as a heat source, take place, literally, underground, they have considerable CO_2 reduction potential. And things are now also changing rapidly on Frankfurt's rooftops. Thanks to the cooperation between Mainova and ABG Holding, Frankfurt am Main is leading in landlord-to-tenant electricity from photovoltaic systems.

In the course of the Masterplan "100% Climate Protection" we have also adopted numerous suggestions made by citizens, for example there are now 13 Repair Cafés in various parts of the city and the information pack for freshmen and "new" Frankfurt residents has also been well received. At just the right moment, i.e. when they're moving in, they receive valuable hints on lowering energy costs, purchasing energy-efficient household appliances or on car sharing offers in the city.

Buzzword traffic: The first E-buses are raising hopes that the transition will also succeed on the streets. Many ideas from the first Masterplan draft, which were initially dismissed as utopian, are now being examined seriously: cable cars in the public transport system, a tramline on the tracks of the harbour railway, a water taxi. Changes, particularly in urban traffic will prove that climate protection can be fun and also increase the quality of life.

I'd like to thank all those who have contributed to this report. The Fridays-for-Future movement is giving the ambitious aims of our Masterplan a real boost: a city whose energy supply is 100% renewable and which generates almost no greenhouse gas emissions. Thank you for your commitment and keep up the good work!

Photo: Christina Clasen

Rosemarie Heilig
Head of Department of Environment and Women

Masterplan

Source: Westend61 - Fotolia.com

Masterplan 100% Climate Protection

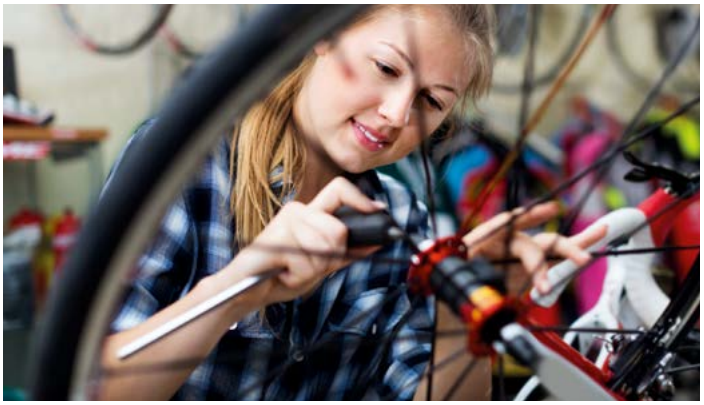
Since 2012 the National Climate Initiative of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) has been promoting 19 selected municipalities and rural districts with the "Masterplan 100% Climate Protection" funding project. Frankfurt am Main is the largest of these 19 municipalities with 22 new Masterplan municipalities and districts being added since 1st July 2016. The Masterplan guideline promotes municipalities and regions wanting to lower their greenhouse gas emissions by 95 percent by 2050 (compared to 1990) and their final energy by 50 percent. For the City of Frankfurt am Main the Department for Environment and Women's affairs has overall responsibility for this project while the Municipal Energy Agency is responsible for organisation and implementation. In December 2016 the Municipal Energy Agency received a positive decision from the BMU's National Climate Initiative (NKI) regarding subsequent funding of the "Masterplan 100% Climate Protection" project. This meant that the funding project will support ground-breaking climate protection projects and measures for another two years (until December 2018). The focal point in the two years was the shaping of the civil society process. This included securing the continuing involvement of the individual stakeholders in implementing the climate protection process for Frankfurt and supporting long-term concepts to reduce CO_2 emissions and make the commitment of the stakeholders better known.

Active press work and public relations keep people informed about the aims and activities of the "Masterplan 100% Climate Protection", a fact which is also confirmed by the large number of publications in the different media. The "Masterplan 100% Climate Protection" is closely linked to the individual municipal climate protection measures which are described in this report and which help the city reach its ambitious aims by 2050.

Activities at local level

- **Climate Protection Advisory Committee**
  The 4th session of the interdisciplinary Climate Protection Advisory Committee (with over 30 representatives from the relevant sectors) was held in June 2018. Guest speaker was Ms Keul (Head of the Climate Protection, Climate Change section; Hessian Ministry of the Environment, Climate Protection, Agriculture and Consumer Protection) who spoke about the implementation of the Integrated Climate Protection Plan Hesse 2025".
  In the subsequent workshop the Climate Protection Advisory Committee members exchanged ideas for the City, State and Federal Governments and discussed obstacles to implementing climate protection activities as well as possible solutions. The following Climate Protection Advisory Board meeting was held in December 2018 where the issues included updating Frankfurt's energy and climate protection concept and the roadmap for 2030.

- **Implementing citizens' ideas**
  Climate protection in a big city can only succeed when the whole urban community participates and everybody makes a contribution. In the Masterplan process Frankfurt has adopted many ideas and suggestions submitted by citizens. These include Repair Cafés in different parts of the city where clapped-out bicycles are restored to their former glory or electronic appliances are repaired. The gratifyingly rapid proliferation of the Repair Cafés proves that there is a great demand among the population for these facilities: Whereas in 2013 in Frankfurt there were no Repair Cafés at all, by 2018 there were already 13 active locations, which all operate on a volunteer basis. The concept of the New Resident Information Pack also stems from citizens. The pack was distributed at the start of the summer and winter semesters 2017 on the campus of the Goethe University Frankfurt during "Unistart" (the Fair for Frankfurt University's new students). The new students constitute a very large and promising target group of about 4,500. "New" residents received valuable hints on lowering energy costs, purchasing energy-efficient household appliances or car sharing offers in the city. The information pack is available free of charge from the Municipal Energy Agency at energiereferat@stadt-frankfurt.de.



13 Repair Cafés (as of 2018) in Frankfurt
Picture source: JackF - Fotolia.com

- **”Shortcuts to combatting climate change”**
  At the end of August 2016 Frankfurt’s Municipal Energy Agency called on citizens involved in clubs, associations and foundations to apply for funding as part of their initiatives with neighbourhood projects for climate protection. The aim was to make financial sponsoring available for project proposals in the framework of the BMU, the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety’s call for funding “Shortcuts to combatting climate change”. At the end of 2017 the three winning projects in the Frankfurt competition received BMU funding approval for the projects they submitted. This meant that, from the end of 2017/ start of 2018, many projects could start their work, such as the meeting point in the community garden “Tortuga Eschersheim”, the “Climate Workshop Ginnheim” and the “Heddernheim im Wandel – Starke Nachbarschaften für Klimaschutz und Lebensqualität” (The changing face of Heddernheim – Strong neighbourhoods for climate protection and quality of life).

The Kirchplatz Garden in Ginnheim. Photo: Sybille Fuchs

Activities at regional level

- **Cooperation with the Regional Authority FrankfurtRheinMain**
  As part of the Regional Energy Concept (REK), cooperation with partners from RheinMain in a variety of projects has been intensified. To support further networking of regional experts, in conjunction with the Regional Authority FrankfurtRheinMain, stakeholder meetings were held to give impetus to the implementation phase of the REK. In June 2017 a stakeholder meeting with over 60 participants was held in the Frankfurt Municipal Energy Agency. At 10 “topic tables” issues were discussed, such as “Environment Management for companies and operational facilities”, “Climate Protection in Communication” and the “Integrated Climate Protection Plan Hesse 2025”. At the end of 2017, as part of the development of a Frankfurt Rhein-Main regional energy concept and in cooperation with the Regional Authority FrankfurtRheinMain a survey of experts in the participation procedure was commissioned and conducted. The aim of the survey was to secure the involvement of stakeholders in the subsequent structuring of an expansion and consolidation process at regional level.

  The analysis of the survey by the Institute for Social-Ecological Research (ISOE) revealed that networking and exchange in the existing REK participation process received a generally positive overall evaluation and were deemed very important for the rest of the process, although a more active role on the part of the process management in developing and implementing REK measures is recommended (Network Office). Key tasks are coordinating and prioritising measures and the regular monitoring of the progress made. The findings of the survey were presented to the Regional Authority FrankfurtRheinMain in September 2018 and there was also the opportunity to discuss the feedback from the Municipal Energy Agency and the Regional Authority FrankfurtRheinMain.

- **Hessian Masterplan Municipalities Meeting**
  The Hessian Masterplan municipalities’ meeting was held in September 2017 at the Municipal Energy Agency in Frankfurt with participating stakeholders from Frankfurt, Bensheim and the District of Marburg/Biedenkopf. Also taking part was Ms Keul (Head of the Climate Protection, Climate Change section; Hessian Ministry of the Environment, Climate Protection, Agriculture and Consumer Protection). Besides presenting issues and projects from the respective Masterplan municipalities Ms Keul also reported on new developments in the Hessian Ministry of the Environment (implementing the “Integrated Climate Protection Plan Hesse 2025”, new funding programmes etc.).

As the stakeholders all deemed this exchange among the Hessian Masterplan municipalities crucial it was decided to hold this meeting with the Hessian Ministry of the Environment on an annual basis. The next meeting took place in November 2018.

Activities at national level

- **Tandem Partnership with the State capital Stuttgart**
  At national level, in the framework of the subsequent funding of the "Masterplan 100% Climate Protection" Frankfurt is entering into a new tandem partnership. Masterplan municipalities of the first (2012) and second generation (2016) with comparable structural data are particularly well suited for intensive collaboration. Stuttgart, a new Masterplan community in the funding programme, is becoming a tandem partner, the main focus of which is that Frankfurt, one of the first Masterplan municipalities in Germany, takes on an advisory function, passing on its experience of the last three years' funding phase and that a professional exchange between the Masterplan municipalities takes place.

- **Networking meeting of all Masterplan municipalities in Frankfurt**
  The Masterplan municipalities meeting was held in Frankfurt on 15th and 16th November 2017. In the Council Chamber Councillor Rosemarie Heilig welcomed 70 participants from all over Germany to the tandem meeting of the 41 Masterplan municipalities. The meeting focused on the mutual exchange within the tandem partnership. On 16th November over 30 participants attended the Masterplan municipalities' meeting of the first generation (2012) which was held in the Municipal Energy Agency. The brief introduction touched on the best practices from the municipalities (Frankfurt's DANKE campaign was also presented), consolidation and further networking and the closing event in autumn 2018 in the BMU.

- **Federal Ministry of the Environment honours Frankfurt**
  At the "Masterplan Municipalities Conference: Role Models of Climate Protection" (19th September 2018) marking the end of the six-year funding phase, Rita Schwarzelühr-Sutter, Parliamentary State Secretary in the Federal Ministry of the Environment (BMU), awarded 19 municipalities a plaque for their exemplary involvement in climate protection. Environment Department Head Rosemarie Heilig accepted the award on behalf of the City, which plays a leading role in climate protection in Germany. This award also marked the end of BMU's funding project "Masterplan 100% Climate Protection" on 31st December 2018. Frankfurt will continue to pursue the aims of the "Reduction of CO_2 emissions by 95 percent compared to 1990 and Savings in Final Energy of 50 percent by 2050" project.

19 Masterplan municipalities were awarded a plaque for their exemplary involvement in climate protection. Source: BMU/Joerg Carstensen

www.frankfurt.de
www.klimaschutz-frankfurt.de

Energy concepts

Source: goodluz - Fotolia.com

Energy concepts at development plan level

When implementing the climate protection targets in the Masterplan, regarding the energy supply as a separate entity from the future urban and district development is often an obstacle. Linking energy supply to land-use and urban development plans reveals current and future potential which can be considered when planning the energy supply. Consequently, taking into account efficiency and energy supply with regenerative energies should be an integral component in urban and district development.

The Municipal Energy Agency is charged with implementing Frankfurt's climate protection targets in the fields of "Planning and Construction", which have long been important elements in Frankfurt's climate protection policy. This is a continuous process at several levels:

- **Committee work:** collaboration in urban working groups, such as the "Climate Change" coordination group, the project group "Sustainable Industrial Estates" the "Integrated Urban Development Concept and the regional energy concept, juries in urban development competitions, regular meetings with the Stadtplanungsamt (Urban Planning Department) and the early involvement of other Departments.
- **Education and further training/information transfer:** regular seminars on energy efficiency and climate protection for urban development trainees.
- **Information events** on energy concepts for City employees and for investors and property developers operating in Frankfurt.
- **Initiative counselling for potential property developers:** the Municipal Energy Agency is involved in the site-supervision planning process and makes potential investors in new development areas aware of its services in creating energy concepts.
- **Municipal statutes:** The Municipal Energy Agency is responsible for creating and updating municipal district heating statutes.
- **Waste heat register for Frankfurt:** The waste heat register for Frankfurt was presented to the public in March 2018. The Waste Heat Register provides an overview of where waste heat is produced – e. g. in industrial plants, commercial properties, data centres and waste water plants. Heat, which would otherwise be wasted, can be used a second time. The register facilitates the planning of environmen tally-friendly heat supply networks in buildings and development areas.

Passive house resolution

A resolution passed by Frankfurt's City Council requires all buyers and lessees of municipally-owned building land to construct new buildings in passive house standard. Exceptions will only be made when there are compelling structural reasons. The Municipal Energy Agency advises potential buyers and lessees of urban properties in the implementation of the passive house standard and also reviews planning specifications. In 2017/2018 the Municipal Energy Agency advised eight investors and planners and reviewed the planning on six occasions.

EU project Hotmaps

The Municipal Energy Agency is also participating in the EU-funded Hotmaps project, whose aim is to design planning instruments to support public authorities, energy agencies and urban planners in strategic district heating and district cooling planning. The first step is to create a heat-and waste heat register for the city and other computerised planning instruments will be developed to facilitate strategic energy planning.

A specially developed, computer-based programme models the energy system and correlates the renewable energies available and the building requirements. This is effected in a simulation calculation on an hourly basis. The programme is being developed in close cooperation with the municipalities i.e. the urban planners and strategic decision-makers. Aalborg, Bistrita, Frankfurt, Geneva, Milton Keynes, Kerry County and San Sebastian are the practice partners in the project which is coordinated by TU Vienna and managed by a consortium of leading experts in Denmark, Germany, Rumania, Spain, Ireland, Switzerland and the United Kingdom.

Climate-neutral Biogas

A contribution from RMB Rhein-Main Biokompost GmbH

Since 1999 the bio-waste from Frankfurt's households has been recovered in the bio-waste treatment plant of the FES subsidiary, RMB Rheine-Main Biokompost GmbH. The construction of a second fermenter doubled the processing capacity, which meant it was possible, in cooperation with Mainova, Frankfurt's energy service provider which has built a biogas treatment plant on an adjacent property, to further optimise the recycling chain for the benefit of the environment. Since the start of 2018 bio-waste has been converted to bio methane, which is then fed into Frankfurt's gas network by the Netzdienste Rhein-Main GmbH. Gas feed-in is more efficient and thus more environmentally-friendly than the previous conversion of biogas in a CHP unit. In the future up to 30,000 megawatt hours of biogas a year will be upgraded to biomethane and fed in. This corresponds to the annual requirements of about 1,500 households.

https://tinyurl. com/y4j95z3f

Climate-neutral biogas from bio-waste.
Source: Mainova AG

Energy-self-sufficient House Frankfurt

A contribution from KEG Konversions Grundstücksentwicklungsgesellschaft mbH

The "Energieautarkes Haus Frankfurt" (in short: EAH / Energy-self-sufficient House Frankfurt) is an apartment building with seven flats belonging to the KEG Konversions-Grundstücksentwicklungsgesellschaft mbH in the Parkstadt Unterliederbach development area which was completed in December 2018. Structural-technical equipment, regenerative energy supply and the energy-conscious lifestyle of the residents are all closely linked in this project. The aim of the project is to achieve a substantial CO_2 reduction in the living areas. Since heat use accounts for about 70 percent of the energy in households, occupier behaviour was included as an integral aspect of the actual energy consumption during the operational phase of the living concept for the building.

The building was constructed in the passive house style. The electricity and heat supply is provided by the use of sunlight via photovoltaic and solar-thermal systems in combination with battery and heat buffer storage. There are, however, plans to extend the storage system with an electrolyser linked to fuel cells. Solar energy can then be converted to hydrogen which is stored on a long-term basis and transmitted to fuel cells when the sun is not shining. Envisaged is the highest possible level of energy-based self-sufficiency. The efficient use of energy sources and energy-conscious everyday behaviour are central aspects of the operating principle of the building. These ideas can be implemented by installing particularly energy-saving appliances in the apartments (lights, refrigerators, ovens, TV) and the collective use of freezers and washing machines which are particularly energy-intensive. The residents share a laundry room, a freezer room and a communal room with kitchen, where they can cook together. The concept of community-oriented living is sound from an energy-based standpoint, as it enhances the efficiency of the use of energy. As occupier behaviour is crucial, the KEG held individual information talks with potential tenants during the planning phase and organised meetings to facilitate new personal contacts and encourage exchange among the residents.

The Energy-self-sufficient House Frankfurt is linked with the KEG's neighbouring Energy-Plus project Kamelienstraße, so the regeneratively-produced energy can be stored or used in the two buildings, depending on the storage capacities and requirements.

External West view of the „Energieautarkes Haus".
Source: BSMF

Dom-Römer Project

Energetic management

The Dom-Römer construction project was completed in due time in summer 2018 and officially opened at the end of September. Despite the highly complex construction requirements the aims of the energy management were achieved to a very large extent. Besides the consistently updated demands of construction supervision, the energetic quality control in the final months of the building phase was impacted by issues of air tightness and commissioning the building technology.

Other focal points were the drafting of information material for the owners and proposals for streamlining operations after the residents move in. As a follow-on to the energy-based management of previous years there were regular on-site inspections of the building site, where quality assurance aspects, commissioning and adjustment of the building technology took centre stage. Currently, a ten-page history of the project, including the energy aspects, is being prepared.

As the buildings were built on municipal land, according to the purchase agreement the passive house standard must be observed (15kWh/m2a). From the outset it was clear there was no way to prevent an increased demand for heating energy resulting from project-specific complications, especially the unfavourable ratio of the heat-transferring building envelope to the heated volumes, the small-scale floorplans, the additional escape staircases, the innumerable supply shafts and the low level of solar radiation, not to mention the restrictions imposed on reconstructions by wall structures and thermal bridges.

Despite these restrictions an energy-based standard was reached which was well below that of conventional newbuilds: The Dom-Römer-Areal only consumes between one third and one quarter of the heat energy of new buildings, even when taking into account the strict requirements of heritage protection.

Climate control saves energy in office buildings

A contribution from Fraport AG

In cooperation with MeteoViva GmbH Fraport AG is installing modern climate control in their head office. The technology works with foresight: when cooler temperatures are expected, the building heats up slightly in advance, when heat is expected it cools down. The system exploits the inertia of the building mass, which can only heat up or cool down slowly. The system has been in operation since 2016, and energy consumption has fallen sustainably by about 19 percent. The findings were evaluated in May 2017 at the end of the first year in operation: While the new system improved the indoor climate compared to conventional closed-loop control, at the same time the number of complaints about the indoor climate plunged. The new technology was fully-automated, robust and trouble-free. In the summer the climate control made for a higher level of comfort, and in winter for considerable energy savings, with Fraport now saving about 240 tonnes of CO_2 a year. At the DENA Energy Transition Congress in 2018 the project received the Energy Efficiency Award 2018. The project is currently being implemented in Fire Station 4 at Frankfurt Airport while its application in other buildings is also being assessed.

Fraport: corporate headquarters
Source: Fraport AG

Neighbourhood development Niederrad

A contribution from the Nassauische Heimstätte/ Wohnstadt

The Nassauische Heimstätte quarter in Adolf-Miersch-Straße/Melibocusstraße in Niederrad comprises 486 flats from the 1950's. In September 2018 two buildings with 25 flats were completed in the middle of the quarter. The rental flats are publicly-funded and constructed in the particularly energy-saving passive house standard and all 15 three-room and 10 four-room apartments are wheelchair-accessible. These new low-priced flats blend in with the extensive development concept for this area in Niederrad. The Nassauische Heimstätte is investing 19.8 million euros in modernising and maintaining the buildings and open spaces.

To provide more comfort and lower energy consumption thermal insulation on the facades, new balconies and piping systems are key elements in the comprehensive renovation. A heating system with two wood pellet boilers was installed in the cellar of one passive house, which also supplies heat to two existing buildings. Besides the pellet plant, the other heating systems were modernised and windows exchanged. These measures lowered energy consumption in the quarter by 68 percent from 3.3 to 1.1 million kilowatt hours a year. CO_2 emissions fell by 76 percent from about 800 tonnes annually to 200 tonnes. PV systems were also installed on the roofs of the buildings. The electricity generated is offered at competitive prices to the residents of the quarter in a tenant power model. The tenants can also use the car sharing at favourable conditions which "stadtmobil", in cooperation with the Nassauische Heimstätte, has made available to the tenants. Since summer 2018 an e-car, which is charged at a Nassauische Heimstätte recharging point in Melibocusstraße, has been permanently available for use.

The quarter is also still very much the "Essbare Siedlung" (eatable home-grown food) which is reflected in a variety of Urban Gardening projects there. Besides all these measures the Nassauische Heimstätte also offers household-related services to make everyday life easier for elderly tenants. Last but not least, the estate also boasts CUBITY, an innovative living concept for students.

https://tinyurl.com/y68l2pya

New photovoltaic systems and charging stations

A contribution from the FES Frankfurter Entsorgungs und Service GmbH

In 2017/18 the FES Frankfurter Entsorgungs und Service GmbH installed two new photovoltaic systems on the roofs of their properties. The FES now operates eight of its own PV plants in Frankfurt and one in Mainz-Kastel and areas of the solar park in Dreieich-Buchschlag. In 2018 the renewably generated electricity produced accounted for 96.5 percent of the FES-Group's requirements.

Eight new charging stations for E-vehicles. Source: FES

And in the last two years eight charging stations for electrical vehicles have been installed in some FES depots in the city. FES and also private vehicles can "fill up" at the stations. Total charging in the consumption period 2017 was about 22,000 kWh, of which 19 684 kWh came from recharging the 14 FES electric vehicles. Total savings corresponded to 7,800 litres of premium-grade petrol.

New Waste Heat Register

The project "Integrated Heat Use in Frankfurt, with particular reference to Energy from Waste Water" (Waste Heat Register) is a partial energies concept for integrated thermal design, funded by the National Climate Protection Initiative to describe and use the waste heat potential from waste water, industry, commerce and large data centres. The waste heat register concentrates on the sub-areas mentioned and points out usage potential in the city:

- In sewers and sewage treatment plants,
- industrial areas,
- and data centres

there are 200 megawatts (MW) available. Over 90 percent of the waste heat potential measured is low temperature waste heat between 10 and 35°C, which must be harnessed for heating purposes using a heat pump. In all. about 1,380 gigawatt hours (GWh) of heat could be made available for heating (in the heating period) and hot water generation. This is about 47 percent of the households' current heating requirements. Should the saving targets for heating be reached by 2050, this would cover the households' entire heating needs and 75 percent of the commercial heating requirements, whereby the seasonal storage of waste heat and the development of additional industrial sources has not yet been taken into account.

The waste heat register is thus an important element in energy supply and for climate protection in Frankfurt, since it demonstrates where there is concrete potential for waste heat utilisation. Heat, which would otherwise be wasted can be used a second time, which facilitates the planning of an environmentally-friendly heat supply in (new) development areas.

Historisches Museum with passive house components

A contribution from the Department of Building and Real Estate (Amt für Bau und Immobilien)

Although the Historisches Museum on the Römerberg in Frankfurt is undoubtedly one of the most important historical institutions in Hesse, the former building in the "concrete brutalist" style of the late 60's, in which the Museum had been housed since1972, became increasingly unpopular among the citizens, as it gave the visitor no indication of the historical treasures inside. From today's museum-didactic standpoint the museum had serious functional and structural deficiencies. Above all, the architecture of the building found less and less acceptance among many citizens. As a result the building was completely rebuilt.

West view of the Historisches Museum.
Source: Department of Building and Real Estate
Photo: Roland Halbe

The planning and construction complied with the guidelines for efficient construction with passive house standard. The double shell exterior wall was insulated with 24 cm mineral fibre WLG 032 and with a U-value of 0.16 W/m²K. The windows had triple-pane heat insulation glazing with a U-value of 0.77 W/m²K and an overall energy transmittance factor of 0.55. The floor plate was insulated with 24 cm cellular glass WLG 042 with a U-value of 0.16 W/m²K. The roofs were insulated with mineral wool and EPS between 20 and 26 cm with U-values between 0.12 and 0.15 W/m²K. The buildings have an extensive ventilation system with heat recovery with the heat supply effected via Mainova's district heating system, which was 38 percent below the requirements of the Energy Saving Ordinance (EnEV).

Important dates:

- December 2014: completion of the shell form
- December 2015: completion of the new building
- Open day May 2017: Opening of the entrance building
- October 2017: Opening of the exhibition

Specifications:

- Usable floor space: 6,891 m²
- Net floor space: 9,028 m²
- Gross floor space: 10,132 m²
- Primary energy requirements: 89 kWh/m²a
- Construction costs: 21,531,517 euros

www.historisches-museum-frankfurt.de
www.energiemanagement.stadt-frankfurt.de

Intelligent energy and living concept Riederwald

A contribution from the ABG FRANKFURT HOLDING Wohnungsbau-und Beteiligungsgesellschaft mbH

A new lease of life. In two construction phases the ABG FRANKFURT HOLDING renovated two rows of houses from the 1950's in Riederwald with 48 flats, bringing them up to the "Efficiency House Plus" standard. The flats in Nebeniusstraße and Schlettweinstraße were ready for occupancy in the first construction phase in 2017 and in the second phase in September 2018. The flats have the highest energy standard, which is unequalled even in new buildings. With photovoltaic systems on the roofs and organic photovoltaics used for the first time on the facades, the use of geothermal energy with innovative water

and air source heat pumps, more climate-neutral energy is generated than the residents consume. This project proved that highest standards in energy efficiency can be applied, not only in new buildings, but also in the refurbishment of existing flats from the 1950's. The experience gained could be used nationwide for renovating thousands of similar types of houses.

Organic photovoltaics on a facade.
Source: ABG FRANKFURT HOLDING/Photo: Ralf Pelkmann

The energy concept adhered to the principle of the "Nur-StromHaus", i.e. any use of fossil fuels and local emissions was avoided. For the first time the ABG integrated organic photovoltaic modules into the composite heating system. Accumulators allow the residents to have direct use of about 45 percent of the electricity generated in the tenant power model.
Surplus energy is fed into the public grid. Heating is centralised with air-to-water-and brine-to-water thermal pumps. Hot water is produced by air/water heat pumps in each apartment separately.

Climate protection partial concept

Renewable energies in residential estates

This is a project funded by the National Climate Protection initiative. The climate protection partial concept focuses on residential areas and can serve as a blueprint for future estates as well as for regeneration areas. The aim is, together with potential investors, to achieve the optimum building standard with the highest possible proportion of renewable energies and the lowest potential costs. Initial findings are on hand for the new residential areas "Am Römerhof" and "Günthersburghöfe".

The energy concept involves ascertaining the energy requirements for potential individual consumers on the basis of current legal requirements and also based on the enhanced thermal insulation of the passive house standard. To do this, various energy supply alternatives were examined and compared for their economic and emission-related impact and on their technical feasibility. The planned climate protection partial concept comprises the following steps:

- Basic evaluation
- Energy and carbon footprint/Analysis of current planning according to current valid standards/ Evaluation of the plan in terms of energy standards
- Potentials analysis
- Shareholder participation
- Catalogue of measures and goal-setting
- Profitability assessment
- Controlling
- PR/communication strategy
- Initial findings available for three development areas

Climate protection for companies, cultural and sports facilities

Source: ake1150 - Fotolia.com

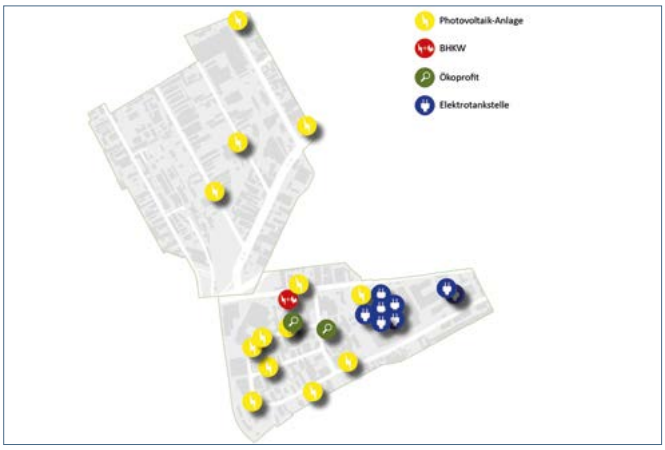
Sustainable commercial area in Fechenheim-Nord/Seckbach

To foster sustainable urban development the City of Frankfurt has decided on the further development and qualification of existing industrial areas. In a feasibility study, commissioned by the City Planning Department, recommendations were formulated as to how the commercial areas in Fechenheim Nord and Seckbach could be made fit for the future. There is location and climate protection management housed in an on-site office, for a period of five years under the control of the Wirtschaftsförderung. In addition, the Municipal Energy Agency also appointed a Climate Protection Manager. Following the recommendations of the study, on 17th December 2015 Frankfurt City Council agreed to allot 1.3 million euros for the development of locations.

Since January 2017 a Municipal Energy Agency employee has been employed as Climate Protection Manager for the commercial area Fechenheim-Nord/Seckbach. The location management of the Wirtschaftsförderung Frankfurt GmbH has been on site since autumn 2016. There are about 550 companies on the area which the Climate Protection Manager supports in saving energy and costs. The Location Manager, in cooperation with the companies and other local stakeholders, has turned the site into Frankfurt's first sustainable commercial area. One key factor is implementing a climate protection concept for the quarter. In 2017 the National Climate Initiative (NKI) approved about 45,000 euros in funding for the creation of this concept. The concept is currently being prepared in cooperation with the Zero Emission GmbH in Wuppertal. In the analysis of the existing situation both the overall energy consumption, in the form of electricity, gas, oil and fuels, and the aggregated consumption in water and waste were recorded. The findings were presented to the companies at an event in October 2018 and in future will be the starting point for the practical implementation of measures to save energy, resources and costs.

At the end of 2017 there was an energy counselling campaign for local companies. The advisory services offer entrepreneurs free energy counselling, which includes an on-site inspection tour and the creation of an individual report by professional energy consultants. Since the end of 2017 about 20 companies have availed themselves of this offer. Currently the Municipal Energy Agency is developing a complementary PV consultation campaign aimed at the high-potential free roof surfaces in the area. These complementary services will be available to the companies from January 2019.

Until 31st December 2018 the project will also receive 150,000 euros from the "Experimental Housing and Urban Development" (ExWoSt) research programme which was initiated by the Federal Institute for Research on Building, Urban Affairs and Spatial Development and the Federal Ministry of the Interior, Building and Community.



Existing climate protection activities in the sustainable commercial area. As of October 2018.
Source: Zero Emission GmbH

In the location office the following milestones were reached:
• Creation of a project homepage www.nachhaltiges-gewerbegebiet.de
• Planning and implementation of over 10 network and information events
• Creation of a concept paper with 34 measures
• Initiation of a location initiative (FrankFurterOsten Nachhaltig; FFN e. V.), founded in May 2018 (30 founding members)
• Creation of a location initiative homepage (www.frankfurter-osten.de) with corporate directory
• Creation of two image videos for the area and the location initiative

www.frankfurter-osten.de

Climate Protection Ideas Competition

Frankfurt Municipal Energy Agency's "Climate Protection Ideas Competition" invited companies from Frankfurt and the Rhein-Main region for the third time to apply for funding and called for good business ideas and technical innovations from companies and start-ups. All the ideas submitted had to contribute verifiably to saving CO_2 in Frankfurt and thus support the City in converting Frankfurt's energy supply to 100% renewable energy by 2050. Particular emphasis lay on the three issues: energy supply, building systems and mobility with the special category, electro mobility. An independent expert jury assessed the ideas submitted according to six criteria: degree of innovation, CO_2 savings, feasibility of the project before 30th September 2018, economic viability, transferability, multiplier effect and consolidation. The start-ups then had over nine months to implement their project ideas in Frankfurt.

The following four companies and their business ideas for climate protection were selected by the jury in 2017 and received funding of about 20,000 euros:

- **Conergia Verwaltungs GmbH** – Development of predictive system control for combined heat and power plants to optimise operations indivi dually and automatically according to local elec tricity and heat demand.
- **riemanndesign in cooperation with Sachen auf Rädern** – Enhancement of inner-city goods transfer by combining a logistics tram on the city's tram lines and the onward transport of the goods with E-cargo bikes (Special Prize: Electro mobility)
- **right. based on science UG** – Creation of an online platform (XD"), which calculates the CO_2 footprint of companies and highlights the indivi dual attainment of the Government's and the City of Frankfurt's climate targets.
- **VCD Hessen e. V., Regional Group Rhein-Main** – LASTENfrei – free use of cargo bikes to private users, initiatives and clubs

Environment Department Head Rosemarie Heilig and the winners of the "Climate Protection Ideas Competition"
Source: Energy Agency/Photo: Stefanie Kösling

Solar plant on exhibition hall 12

A contribution from Messe Frankfurt GmbH

Renewable energy enjoys high priority for Messe Frankfurt. On the roof of exhibition Hall 12 the third photovoltaic system on the property has been producing energy through solar radiation since autumn 2018. This is the first solar plant operated by Messe

Energy harvesting for internal use – the new solar plant on the roof of exhibition Hall 12. Source: Messe Frankfurt Photo: Jean-Luc Valentin

Frankfurt itself. The plant occupies an area of about 9,000 square meters and consists of 5,300 solar modules. In the future over 1 GWh of electricity for internal consumption will also be produced annually, which corresponds to the requirements of 241 households or about six percent of the exhibition grounds' current basic needs.

The modules are mounted on the hall roof in an East-West alignment which ensures a consistent energy yield over the whole day. Besides very effective solar modules, inverters produced by a manufacturer in Kassel were also installed. To foster the regional economy, Messe Frankfurt chose a company from Hesse. The energy obtained is used exclusively to meet their own internal electricity needs and thus further increase Messe Frankfurt's consumption of renewable energies.

Due to static requirements not all the hall roofs are suited to solar utilisation. Investments are made wherever possible and in 2009 Messe Frankfurt, with the support of an external consultant, installed their first large-scale photovoltaic system on the roof of Hall 10.

In September 2010 a second system was completed on the Messe car-park Rebstock which integrates the solar carports. Currently an average of about 900,000 kWh of solar energy is being harvested. Options for further PV systems on the exhibition hall roofs are being examined.

https://tinyurl.com/y4hu9ovm

Funding guideline for theatres

Until now, sustainability and energy efficiency are catchwords which have only rarely appeared in the "repertoire" of cultural facilities. The reasons for this are obvious: cultural facilities have neither the funds needed to finance efficient technology nor sufficient trained personnel. Potential savings can often be found in the lighting area, as well as in heating, air-conditioning systems and other electrical systems.

Another factor is that, unlike SME's, clubs and non-profit companies are generally excluded from Federal or State funding programmes which sponsor energy counselling and the implementation of energy-saving measures. As a potential local solution, on 10th May 2016 the Municipal Energy Agency published a new guideline for funding efficient-energy use in Frankfurt's theatres. A funding guideline in this form is unique in Germany.

The guideline grants a maximum subsidy of 30,000 euros per year and applicant for technical energy-saving measures and also preliminary energy counselling with funding of up to 80 percent of the counselling costs. Depending on the economic viability of the measure, funding to implement technical measures covers between 30 and 60 percent of the eligible costs. Since 2016 16 measures, with a total investment volume of 310,000 euros, have been applied for over the funding guideline. The funding granted by the Municipal Energy Agency was 139,000 euros. In other words, every grant triggered 2.2 times that volume in investments. The eligibility conditions and application documents are available online at http://www.Frankfurt-spart-strom.de/gewerbe/. The funding programme was extended until 31st December 2019.

http://www.frankfurt-spart-strom.de/gewerbe/

Funding programme for sport facilites

A contribution from the Sports Department of the City of Frankfurt

Resources conservation, environmental and climate protection and sustainability are key social issues which must also be taken into account for sports facilities. At the same time, rising energy prices lead to increasing operating costs for sports facilities. Investing in technologies to reduce energy consumption and generate renewable energies can contribute to stabilising and containing a club's energy costs. From an energy standpoint many club facilities also have outdated technology and structural deficiencies.

The Sports Department's funding programme will enable the property-owning sports clubs to install amenities wisely to save energy or generate renewable energy in the areas used for sport. Funding was given for energy-saving heating systems, water-saving sanitary installations, thermal solar systems, thermal insulation measures, energy-saving lighting systems and procedures for efficient electricity consumption. Result: in 2017 a total of 49,993 euros was paid to three projects. In 2018 38,302 euros were granted for two projects, of which 18,583 euros was paid out, two other projects requesting subsidies of 24,519 euros are in the pipeline.

LEEN

The workshop phase of the LEEN (Learning Energy Efficiency Network) FrankfurtRheinMain which was launched in April 2015 came to an end with the 12th workshop in December 2018. The nine companies, which together employ over 40,000 people, already reached the agreed energy-saving goal (5 percent) a year before the final monitoring and even exceeded the CO_2 reduction target by 1 percent. Hopes are high that further successes can be announced at the closing event in May 2019. Energy-efficiency networks appear to be an appropriate format for improving companies' energy and cost efficiency and achieving positive effects on climate protection.

LEEN
Lernende EnergieEffizienz-Netzwerke

The CO_2 savings already achieved amount to over 19,000 tonnes a year which corresponds to the annual CO_2 storage capacity of 1,500-1,900 hectares of mixed forest in Germany.

Signing the LEEN contract in 2016.
Source: Municipal Energy Agency/Photo: Salome Roessler

Innovative refrigeration technology

A contribution from Fraport AG

In October 2017 Fraport AG's new data centre commenced operations. Besides fulfilling IT requirements the aim of the new building was to provide maximum efficiency in the use of energy, aspiring to a Power Usage Effectiveness (PUE) of less than 1.2. PUE is a ratio describing how efficiently a computer data centre uses energy and any system having this target value is considered "very efficient". The electricity consumption is about 30 percent lower than that of conventional data centres due to the innovative technology for cooling the new data centre which is mainly produced by the evaporation water. A conventional refrigeration system is also at hand to cover any potential peak demand. For a data centre this kind of system is still an exception in Germany. At full capacity Fraport anticipates annual

electricity savings compared with the old data centre of about 350 MWh, which corresponds to emissions savings of about 140 tonnes of CO_2 a year.

ÖKOPROFIT Frankfurt am Main

Ökoprofit is a cooperation project between the City of Frankfurt and the local economy sponsored by the Chamber of Industry and Commerce Frankfurt and the Wirtschaftsförderung Frankfurt. With the project the City of Frankfurt assists local companies and institutions to improve their environmental performance and helps them gain entry to operational environment management or to improve these. The aim of the Ökoprofit approach is to lower operating costs while conserving natural resources. Ökoprofit is an important pillar in Frankfurt's climate protection measures in the business sector. In the Ökoprofit project the participating companies address intensively many issues, from environment, energy efficiency and saving water to waste management and procurement to questions of employee motivation and job security.

One key feature of Ökoprofit is the networking between the participating companies, the City of Frankfurt and cooperating partners. For the City, Ökoprofit is not only a platform for increasing energy efficiency and reducing resource consumption in Frankfurt and the local region. It is also a networking project to promote sustainability in companies in Frankfurt and the local region. Ökoprofit is organised in rounds with at least eight companies and business facilities taking part in each round, in which they receive specialist support and can exchange experience. Upon successful completion of the project the participants can then call themselves "Ökoprofit Company Frankfurt".

Particularly committed companies subsequently consolidate their networking in the Ökoprofit Club which comprised 23 companies from Frankfurt and the local region in the 2018/2019 project round.

Findings of the 2016/2017 project round

- 10 companies/institutions participated in the beginners' round
- 21 companies in the Ökoprofit Club, in all 73 companies had completed the beginners' programme by the end of 2017

Savings achieved by 26 companies with consolidated statements in the project period 2016/end of 2017

- Electricity: 3,002,858 kWh
- Natural gas: 9,323 m^3
- District heating: 171,188 kWh
- Fuels: 50,000 l
- CO_2 emissions: 6,822,382 kg
- Water/waste water: 3,021,100 l
- Raw materials: 109,099 kg
- Savings: 928,410 euros

Ökoprofit beginner's project 2016/2017

- Druck-und-Verlagshaus Zarbock GmbH & Co. KG
- GWR gemeinnützige Gesellschaft for Wiederver wendung und Recycling mbH
- H.-J. Hölz GmbH
- Kliniken des Main-Taunus-Kreises GmbH
- MOW Architekten BDA
- NOWEDA Apothekergenossenschaft eG
- PricewaterhouseCoopers GmbH WPG
- Stadtverwaltung Maintal
- Verband der chemischen Industrie. V.
- Verband der Sparda-Banken e. V.

Closing event Ökoprofit Round 2017.
Source: Municipal Energy Agency/Photo: Holger Menzel

Ökoprofit Club 2016/2017

- AKA Ausfuhrkredit GmbH
- Alte Oper Frankfurt, Konzert und Kongresszent rum GmbH
- Carl Friederichs GmbH
- Compass Group Germany GmbH
- DB Regio AG, S-Bahn Rhein Main
- Deutsche Zentrale for Tourismus e. V.
- DZ Bank AG Deutsche Zentral- Genossenschafts bank
- FES Frankfurter Entsorgungs- and Service GmbH
- Goethe-Universität Frankfurt
- Haus der Volksarbeit e. V.
- HFM Managementgesellschaft for Hafen and Markt mbH
- IB Internationaler Bund
- ICS IT & Consulting Services GmbH
- ISOE Institut für sozial-ökologische Forschung
- Künstlerhaus Mousonturm
- NORMA Germany GmbH
- Philosophisch-Theologische Hochschule Sankt Georgen e. V.
- Stadtwerke Frankfurt Holding GmbH
- Union Asset Management Holding AG
- Stadtwerke Verkehrsgesellschaft Frankfurt am Main mbH
- VR-LEASING Aktiengesellschaft

A new Ökoprofit project round was organised in 2018. The project round 2018/2019 included the following companies:

Ökoprofit Beginners' project 2018/2019

- AGAPLESION Frankfurter Diakonie Kliniken GmbH
- Diakone Hessen e. V.
- Frabona GmbH
- Heidinger GmbH
- Julius Kleemann GmbH & Co. KG.
- Kinder im Zentrum Gallus e. V.
- Main-Taunus Kreis
- Haus Aja Textor-Goethe Sozial-Pädagogisches Zentrum e. V.
- St. Katharinen- and Weißfrauenstiftung

Ökoprofit Club 2018/2019

- AKA Ausfuhrkredit GmbH
- Alte Oper Frankfurt, Konzert und Kongresszent rum GmbH
- Carl Friederichs GmbH
- Compass Group Germany GmbH
- DB Regio AG, S-Bahn Rhein Main
- Deutsche Zentrale für Tourismus e. V.
- Druck-und Verlagshaus Zarbock GmbH & Co. KG
- DZ Bank AG Deutsche Zentral-Genossenschafts bank
- Ernst & Young GmbH
- FES Frankfurter Entsorgungs- and Service GmbH
- Goethe-Universität Frankfurt
- GWR gemeinnützige Gesellschaft for Wiederver wendung and Recycling mbH
- Haus der Volksarbeit e. V.
- HFM Managementgesellschaft for Hafen and Markt mbH
- IB Inter national Bund
- ISOE Institut für sozial-ökologische Forschung
- Künstlerhaus Mousonturm
- PricewaterhouseCoopers GmbH WPG
- Stadtverwaltung Maintal
- Stadtwerke Frankfurt Holding GmbH
- Union Asset Management Holding AG
- Stadtwerke Verkehrsgesellschaft Frankfurt mbH
- VR-LEASING Aktiengesellschaft

Frankfurt-spart-Strom / Commerce

One priority in urban climate protection measures in the commercial sector is energy efficiency. The funding programme Frankfurt-spart-Strom for industry, clubs and religious municipalities provides targeted financial incentives to implement steps to reduce operational electricity consumption. The funding programme focuses on SME's, clubs and religious municipalities and subsidises a maximum 30 percent of the eligible total investment.

The funding is limited to 50,000 euros a year and company. For every kilowatt hour of electricity saved by implementing a measure, the City of Frankfurt pays the applicant only once 10 cents as an invest-ment grant.

In the period from 2017 until the end of 2018 the following applications were accepted:

- Number of applications: 65 accepted, 41 applications paid
- Investments: 238,155 euros in applications

accepted, 134,088 euros in applications paid
- paid funding: 58,069 euros accepted, 36,107 euros paid
- Electricity savings: 697,513 kWh accepted, 446,002 kWh paid
- CO_2 savings: 441 t accepted, 282 t paid

The ratio of funding to investment in the 41 measures paid was 1:37. The commercial funding programme can thus be viewed as a good example of the effectiveness of the allocation of funds, which help lower final energy consumption in Frankfurt. Many of the measures are in lighting replacement where a great deal can be accomplished, especially in the retail sector. Comparatively simple measures, such as exchanging light sources, can generate enormous efficiency potential.

http://www.frankfurt-spart-strom.de/gewerbe/

Future Forum

Sustainable management and climate change call for adjustments in every sector, also in everyday operations. Which challenges will companies be facing? How can companies position themselves? How can the implementation succeed in a company? And how can companies in the Rhein-Main region benefit from the Ökoprofit networks?

The first Future Forum Ökoprofit Rhein-Main in Bad Homburg v. d. Höhe in December 2017 showed a wide range of operational possibilities and activities in the Rhein-Main region. This new event platform offered new impetus, an exchange of expertise and networking with experts in sustainable corporate management beyond municipal boundaries.

ZUKUNFTSFORUM
ÖKOPROFIT
RHEIN-MAIN

Although the Future Forum was aimed at experienced Ökoprofit companies and companies interested in extending environmental and sustainability activities in their own business practices,
it also addressed representatives from politics, the administration and associations. Sustainable management is a task for society as a whole, which calls for the cooperation among the widest range of stakeholders and levels of action. Over 100 representatives of business and administration took part in the forum which was organised by the Municipal Energy Agency in cooperation with the State capital Wiesbaden, Bad Homburg v. d. Höhe, Friedrichsdorf and Oberursel.

www.oekoprofit-rheinmain.de

BioBall

BioBall, the bio-economy in the conurbation, is the driving force behind structural change to a sustainable, bio-based economy and in the framework of the high-density, industrialised metropolitan region Frankfurt/RheinMain. Material flows which have so far hardly been recycled, if at all, should be developed in such a way that bio-based material cycles can be closed and a higher level of value added achieved. In view of climate change the use of bio-based material flows is urgent, as the limits of our economy, which is mainly based on the use of fossil resources, are foreseeable. In this context the initiators of the Innovation Area are pursuing the vision of developing a sustainable, bio-economic added value in a high-density, industrialised metropolitan region. This vision is oriented towards the Federal Government's bio-economy strategies.

Currently, biogenic resources originate above all in agriculture. In future the biomass produced there must be used more intensively for food. In no way should the targeted raw material change from fossil to biogenic resources use biogenic raw materials of the first generation to produce chemicals, fibres, plastics and fuels and energy, not only food and fodder. On the contrary, this change can only succeed when it is based on biogenic raw materials of the second to the fourth generation. The second generation includes the non-edible parts of the agricultural biomass (e. g. straw). The third generation derives from organic residue (e. g. lignin), from gaseous carbon sources (e. g. CO/H_2, CO_2 or CH_4).

Currently the Innovation Area has a funding application pending with the Federal Ministry of Research. The application was submitted following an 18-month preparation period, as required by the Ministry. The initiators of the Innovation Area are the Municipal Energy Agency and the Wirtschaftsförderung of the City of Frankfurt, the TU (Technical University) Darmstadt, TH Mittelhessen, TU Kaiserlautern, Provadis-Hochschule, Clariant International, right. basedonscience, FES, ISOE, DECHEMA and KADIB.

https://tinyurl.com/y6yqjmq5

New Light-on-demand Technology

A contribution from SRM Straßenbeleuchtung Rhein-Main GmbH

About 250 years ago the first oil lamps were installed in Frankfurt, later followed by gas and electric lamps. Today 68,000 streetlights ensure that Frankfurt's streets are illuminated, especially in the dark winter months. The street lighting in Frankfurt is managed by the SRM Straßenbeleuchtung Rhein-Main GmbH, a subsidiary of Mainova AG. About 60 percent of the electric lights have efficient metal halide or, high-intensity sodium vapour lamps. LED technology has already been installed in about 2600 luminaires and in the future the City will be focusing increasingly on these intelligent luminaires. At the same time a pilot project with 22 "smart" LED luminaires along Frankfurt's former ramparts (Wallanlagen) has been running since June 2018. The project will examine the economic efficiency of the lamps in different scenarios and test the technical feasibility in a real environment.

The luminaires along the Wallanlagen use Light-On-Demand technology, which allows intelligent dimming of the lighting and which, in future, will provide light as needed since it is also possible with these luminaires to adjust lighting times and intensity. The idea is, besides the already efficient LED technology, to generate more potential savings and ensure greater security for pedestrians with more homogenous light distribution.

Work on the street lighting.
Source: Mainova AG

Climate protection for households and building owners

Source: iStock.com_evgenyatamanenko

The Sanierungs-WEGweiser

To reach Frankfurt's ambitious goal of becoming climate-neutral by 2050, the volume and the quality of the energy-based renovation of residential buildings must be further increased. Consequently, the Municipal Energy Agency's SanierungsWEGweiser guides the homeowners' associations (WEG= Homeowners' Associations) through energy-based renovation. In the residential building sector there is still considerable potential for energy-saving measures and renewable energies, especially in condominiums, as a large proportion of the more than 13,000 buildings with over 100,000 condominiums has not yet been energetically renovated.

To tap the full potential, since 2016 the Municipal Energy Agency and its sub-partner Energiepunkt e. V. have been taking part in the European "ACE Retrofitting" (Accelerating Condominium Energy Retrofitting) project which aims to stimulate the energy-based renovation of condominiums. In this project, which will continue until March 2020, Frankfurt is cooperating with Paris, Liège, Antwerp, Maastricht and Aberdeen and with its partners Energy Cities, the University of Maastricht and Changeworks on the best ways to support participating stakeholders and inform them about condominium renovation, in order to boost the number of energy-based renovations. The overall project is managed by Energy Cities with participants receiving EU funding of up to 2.55 million euros. The aims of the project are primarily to support the owners and administrators of homeowners' associations, to sensitise the suppliers to foster communication between shareholders. One central element of the project activities is to provide an advisory service where Frankfurt's homeowners' associations receive free, objective support from the Municipal Energy Agency at every stage of the energy-based renovation– from the first potential analysis to site inspection to final acceptance of the completed contracted works.

Tools were also developed to help the owners solve technical, social and financial questions related to renovation and the search for qualified providers of renovation solutions. In cooperation with appropriate shareholders ways were also identified to improve the knowledge level of administrators and energy consultants in the energy-based renovation of condominiums and to present their expertise more effectively. To further this aim and promote networking, the Municipal Energy Agency organised numerous events, such as the first Frankfurt WEG Forum and initiated cooperation with key stakeholders in this sector. And finally, the preparation of a wide-raging website which functions not only as a central knowledge platform on the topic, but which also describes in detail Frankfurt's activities and those of its "affiliated municipalities".

Energiepunkt e.V.

The Energiepunkt FrankfurtRheinMain e. V. was launched by the Municipal Energy Agency and is a non-profit association to guide developers, modernisers, tenants, WEG's, SME's and interested parties through all questions relating to energy. Energy counselling is independent, grassroots and free for the first 90 minutes.

The client receives basic information on a more efficient energy supply, regenerative energies, building technology, funding options and energy saving in renovation and new construction. The association is a neutral contact during every construction phase. Planners, consultants and craftsmen can also compare notes, join forces and further their education. The long-term aim is to improve the quality of energy counselling, planning and implementation.

In the reporting period Energiepunkt advised over 200 private and professional clients. As the association is currently under time pressure, since 50 percent of its working hours are spent in intensive counselling and analyses in the EU "ACE Retrofitting" project, the 2017 and 2018 counselling figures are not comparable. The association has taken part in numerous events and also many of its own initiated projects, such as "Geocaching" and "Climate Cube"

Energiepunkt; independent, grassroots counselling.
Source: Municipal Energy Agency/Photo: Salome Roessler

(Selected) Counselling topics:

- Retrofitting: insulation materials, cellars, exteri or walls, windows etc.
- New construction: passive house construction, building technology, materials etc.
- Heating: condensing boiler technology, hydraulic balancing, circulator pumps etc.
- Alternative heating: pellet boilers, CHP units, heat pumps etc.
- Regenerative energies: photovoltaic systems, solar thermal energy, wind power etc.
- Building biology: anti-mould campaign, lighting etc.
- Energy concepts for old and new buildings (passive house, solar house, energy-efficient house)
- Assistance in funding, offers and tendering
- Assistance on EnEV (Energy Saving Ordinance) and EEWärmeG (Renewable Energy Heat Act)

Offers: an overview:

- Information material compiled by providers and members
- Impulse and thematic counselling
- Exhibition on projects, offers and models from providers and members
- Information products, such as the Mould Box, Meteokarte and brochures, appliances which can be leased and tested at home to measure air temperature, humidity, air pressure and noise level, moisture measurement for components and lots more.

www.energiepunkt-frankfurt.de

CHP Unit Check

Electricity produced in CHP units is one of the most cost-efficient measures for climate protection. Eco-friendly CHP units are now in operation in over 440 municipal and private properties in Frankfurt. Depending on the particular application, be it hotel, business entity or residential building, we have specially-tailored information packs which also contain project data sheets on projects already completed in Frankfurt.

With the CHP Unit Check the Municipal Energy Agency offers a free feasibility calculation for commerce and Home Owners' Associations. In the reporting period this offer, which has existed since 2000, was taken up five times. There are numerous activities, seminars, congresses and inspection tours in Frankfurt relating to the CHP unit. Permanently updated (check) lists with craft enterprises, engineering companies and contractors involved in CHP units in Frankfurt assist citizens and companies during implementation.

www.kwk-kampagne-frankfurt.de

Cooperation projects

A contribution from Nassauische Heimstätte and the Municipal Energy Agency

The Caritasverband Frankfurt e. V., the Municipal Energy Agency and the Nassauische Heimstätten/ Wohnstadt Group have been collaborating successfully in two climate protection projects: „Energy Counselling in the Quarter" and "New Tenant Counselling". The two projects are an offer for Nassauische Heimstätte tenants within the energy saving New Tenant Counselling project, the aim of which is to identify energy-saving potential in the households and to support the tenants with appropriate measures in saving energy and costs.

The free tenant counselling – for all Nassauische Heimstätte tenants in the project quartier and all new tenants – is carried out by the Caritasverband Frankfurt e.V's energy-saving service. New Nassauische Heimstätte tenants city-wide have been able to use the free energy counselling in their own homes since 2016. Besides tips on electricity guzzlers and savings potential in the heating area the tenants also receive energy-saving articles free of charge, such as LED luminaires or switchable power sockets.

As part of the pilot project, which ran from October 2014 to September 2015, Nassauische Heimstätte tenants in Sindlingen, Zeilsheim and Unterliederbach were also offered free energy counselling on electricity and heat consumption. The project was continued in 2017/2018 when the focus lay on counselling new Nassauische Heimstätte tenants. In this period 188 households received counselling at home with 877 on-the-spot saving aids being distributed to these households. The electricity savings potential in the households totalled 45,570 kWh. The potential savings are calculated on the basis of the on-the-spot saving aids installed, appropriate consumer behaviour and savings resulting from refrigerator exchange.

https://tinyurl.com/yypof8gg

Refrigerator - exchange programme

In addition to the free consulting services for low-income households the Caritasverband Frankfurt e.V., commissioned by the Municipal Energy Agency, also offers a refrigerator exchange programme. Vouchers are issued to support low-income households financially in buying new, energy-efficient refrigerators. 226 households received the bonus in the period 01/2017-10/2018. The exchange programme is thus an effective instrument for CO_2 savings in the household.

An energy-efficient refrigerator saves energy and costs. Source: stokkete-Fotolia.com

The bonus consists of 150 euros per appliance from the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety funds and 120 euros from the Municipal Energy Agency. The City of Frankfurt also takes on the collection and disposal costs of the old appliance.

https://tinyurl.com/y29xr9l5

Saving energy with the eClub

The eClub, a Municipal Energy Agency climate protection project which developed from the experience of Frankfurt-spart-Strom, is a moderated exchange platform for households wanting to actively lower their energy consumption. Participation in the eClub is free and is organised in project rounds of 12 months. Within this period the participants have the opportunity to examine their own energy consumption more closely and can also take part in an interesting workshop programme.

eClub
Energiesparen in Frankfurt

The development of the electricity consumption can be observed relatively simply at home. Consequently, electricity is one of the focal points in the eClub, which helps users understand more about personal energy consumption and to implement useful measures in everyday life. The first step in the project is neutral counselling in the eCluber's own home, where an experienced energy consultant visits each of the households taking part and determines the savings potential. Besides electricity consumption, the consultants look at potential approaches in the field of heating. On-site counselling helps locate the most important energy users in the household and is an opportunity to discuss saving strategies. A list of measures shows eClubers which actions can lower their own energy consumption. It's also possible that in some households the consultant finds no great savings potential. When the measures have been identified they are presented, well compiled, in the personal section of the eClub website. To make this as user-friendly as possible, the Municipal Energy Agency has developed a kind of project cockpit, over which important information on content and procedures, such as the regular workshops, can be accessed online. During the project the participants are invited regularly to the eClub workshops where they can discuss progress made and pass on practical knowledge to other participants. After the energy guzzlers in the household have been recognised and the savings plan drawn up, it's then a question of implementation. In this case the Municipal Energy Agency accompanies the participants professionally and financially in implementing the measures. In all, the households receive a bonus of up to 100 euros. This means, for example, that energy-saving appliances can be financed during the project. The eClub participants also benefit from eClub-Partner offers.

Findings of the first two project rounds in 2014/2015 and 2017/2018:

- Number of households participating: 160
- Number of energy-saving measures found in the households: 809
- Total electricity consumption of the households: 477,343 kWh
- Electricity saving potential: 81,699 kWh
- Verified electricity savings in kWh: 55,622 (12 percent)

The savings are equal to:

- The annual electricity consumption of 28 two-person households (dwelling in an apartment block, hot water supply without electricity, consumption category C (A-G) of the current mirror 2017)
- Total CO_2 savings: 35,200 kg (CO_2 factor Frankfurt)
- CO_2 compensation performance: 1,408 trees (1 ha = 10,000 kg CO_2 reduction = 400 trees)

www.eclub-frankfurt.de

„Energy-Saving Check“

Since 2005 the Caritasverband Frankfurt e. V. has been running the ”Energy-saving Check” project in conjunction with the Jobcenter Frankfurt am Main and the Municipal Energy Agency. This project pursues several different objectives: reducing the energy costs in low-income households with free on-site counselling, the qualification and employment promotion for the recipients of unemployment benefits (ALG-II) with the aim of fostering integration into the labour market. The participants receive practical training on energy and water provision and saving potential for electricity, heating and water in the household. Counselling in the households consists of a check in which the electricity, heating energy and water consumption are noted and evaluated. A subsequent report lists practical ways to save energy, such as replacing light sources, using switchable socket strips or installing a low-flow showerhead with aerator. Another focal point is personal consumer behaviour. All the households advised receive energy-saving articles free of charge with an average value of 52 euros which are installed during the consultation.

Frankfurt‘s energy savings service is an important pillar in its climate protection policy, outstanding because of its innovative approach of combining social and environment policy. This has also been recognised at Federal level. The Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety) is supporting the project with funds from the National Climate Protection Initiative, so that the project approach can be established at over 160 locations throughout Germany.

The findings: an overview (Period: 01/2017–10/2018):

- 1,849 on-site consultations
- Number of on-the spot power savers installed: 17,859

Average savings per household:

- Electricity savings through power savers: 260 kWh (77 euros)
- Additional savings through refrigerator ex change: 416 kWh (123 euros)
- Water: 11.2 m³ (40 euros)
- Energy for non-electric hot water generation: 293 kWh (22 euros)
- CO_2 reduction through power savers: 224 kg
- Additionally, through refrigerator exchange: 248 kg

Long-term savings (due to extended service life of the devices) per household:

- Electricity savings through power savers distri buted: 889 kWh (263 euros)
- Additional savings through refrigerator exchange
- Water: 112 m³ (401 euros)
- Energy for non-electric hot water generation: 2,934 kWh (145 euros)
- CO_2 reduction through the power savers: 1,219 kg
- Additional savings through refrigerator ex change: 1,311 kg

In the long run consulting clients on state transfer benefits (unemployment benefit II, basic security benefits, subsistence allowance) can save an average of 343 euros. Recipients of housing and child allowance, Social Pass Card holders and low-income households may receive up to 889 euros. With each Energy-saving Check Frankfurt saves 151 euros when reimbursing water and energy costs. In turn the Federal Government saves 147 euros per check. Counselling the 1,849 household saves the community a total of € 279,420 and the Government a total of € 271,607.

Frankfurt-spart-Strom / Households

Frankfurt-spart-Strom for Households is a Municipal Energy Agency programme to motivate households in Frankfurt to more conscious use of electricity. At the heart of the programme is the electricity savings bonus. The bonus is a monetary incentive to motivate consumers to look more closely at the question of saving energy in their own homes. The Municipal Energy Agency uses a variety of communication channels to make the energy-saving targets for electricity known. The Frankfurt-spart-Strom project team makes contact with consumers through activities in the social media or conventional brochures and flyers.

The electricity savings bonus is a monetary incentive to encourage households in Frankfurt to save energy. Source: Westend61-Fotolia.com

The programme content is currently being reworked. This also involved a more comprehensive evaluation of the bonuses already paid. The Municipal Energy Agency has also commissioned a socio-scientific Institute to learn more about the electricity-saving motives of the applicants. The findings obtained will be used to reach the consumers in Frankfurt even more effectively.

Findings: electricity savings bonus (2008-2018):

- Bonuses: 1,487
- Verified electricity savings: 975,868 kWh
- Average electricity savings per household: 656 kWh (23 percent)
- Average payment per household: 57 euros

The savings correspond to:

- The annual electricity consumption of 489 two-person households (Dwelling in an apartment building, hot water generation without electricity, in category of consumption C (A-G) of the electricity mirror 2017)
- Total CO_2 savings: 708 tonnes (CO_2 factor Frankfurt)
- CO_2 compensation performance: 28,300 trees (1 ha = 10,000 kg CO_2 reduction = 400 trees)

www.frankfurt-spart-strom.de/privathaushalte

Climate Protection events and information

Source: iStock.com_seb_ra

Climate Protection Campaign

Thank you motifs for Frankfurt. Source: Municipal Energy Agency

„Thank you for protecting the climate" is the slogan which the City of Frankfurt am Main presented in October 2017 to draw attention to climate protection and motivate people to take action. A "Thank You" is open, pleasant and appreciative. It makes people curious and attracts them to the Website www.klimaschutz-frankfurt.de. The aim of the new communication campaign for climate protection in Frankfurt am Main is to make people aware of the issue, then turn to the website and find out how easy it is to make a small personal contribution to climate protection. The new contact point in the Internet offers a wide spectrum of information, from blogposts to people actively involved in climate protection in Frankfurt am Main, to tips for target groups to current events – here you can find real-time information on climate protection in the Main metropolis.

To reach as many citizens as possible, the Municipal Energy Agency 12 DANKE motifs were translated into nine languages. The faces in the campaign are all from Frankfurt am Main and the surrounding area. Large-scale Mega-Light-posters spread the message at selected locations in every part of the city. In order to reach commuters and visitors to Frankfurt am Main, the campaign's motifs could also be seen on City-Light posters and info screens in a number of S-Bahn stations. Another accompanying action was a spot in selected cinemas in Frankfurt. The campaign slogan "Thank you for protecting the climate" could also be seen on a tram which travelled through Frankfurt on different routes, covering the entire city area in one year. Other actions included Edgar Cards, Velotaxis and bikuh-bicycles and one undertaking at all the weekly markets in Frankfurt addressed citizens personally. In the area of Social Media the Municipal Energy Agency has created a new Facebook channel www.facebook.com/ KlimaschutzTeamFrankfurt as a source of information and has been extending this systematically.

New brand for climate protection

The campaign introduced the newly-developed climate protection brand "Team Frankfurt – Climate Protection 2050" which acts as an umbrella over the existing projects, actions and campaigns which the Municipal Energy Agency has already been conducting successfully for many years.

The aim of the new brand is to assemble the contents of the many offers under one roof, so there is no doubt that the individual projects share a common aim: climate protection in Frankfurt am Main.

TEAM FRANKFURT
Gemeinsam umdenken und umschalten!
KLIMASCHUTZ 2050

At the same time existing, well-established projects retain their independence. The first external offers have already slipped under the roof.

Environment Department Head Rosemarie Heilig presenting the new climate protection campaign
"Thank you for protecting the climate"
Source: Municipal Energy Agency/Photo: Holger Menzel

www.klimaschutz-frankfurt.de

Climate Gourmet 2017 and 2018

With the Climate Gourmet Initiative, the Municipal Energy Agency and its partners want to highlight the connection between climate protection and nutrition. With this is mind a network of local initiatives, companies and institutions was set up which carries out a wide range of actions. The inter-active Climate Gourmet touring exhibition was reworked and another section dealing with the use/waste of food was added. Surprising for many is the amount of food which private households throw away. In the Climate Gourmet Week 2018 the new section could be seen for the first time in the Central Library. The exhibition, which has received several UNESCO awards, is still extremely popular all over the country, so much so that in 2018 the exhibition was on the road for 85 percent of the year. Some exhibitors (ranging from Evangelical Environmental Centres to industrial companies) report that actions like Frankfurt's Climate Gourmet Week were organised in connection with the exhibition.

KLIMAGOURMET

In Frankfurt the exhibition was on display at the Land and Genuss Trade Fair, at the Climate Piazza in the Zoo and in the Central Library during the Climate Gourmet Week. In cooperation with Frankfurt Zoo and the Zoo School, in the week after the Climate Piazza the learning workshop "Climate Gourmet" was held with pupils from grades eight to eleven. With experiments and inter-active learning stations in the learning workshop the school classes learn how climate protection and nutrition are linked.

Climate Gourmet Week, an annual event.
Source: Municipal Energy Agency/Photo: Ernst Stratmann

During the COP 23 in Bonn in 2017 the klimatgourmet.de website enjoyed unexpected attention: The organisers had asked the Municipal Energy Agency to translate the climate menu game (https://www.klimagourmet.de /mitmachen/CO2-rechner/), which shows playfully the carbon footprint of dishes, and make it available to the participants on the conference app. The hit rates showed how extremely popular the game was.

The Climate Gourmet Week has taken place every autumn since 2014 and is the highlight of the campaign. A wide variety of events is organised during

the ten days in autumn to provide information on the topic. In 2018 e.g. 40 partners cooperated in 60 events with over 5,000 visitors. The spectrum of events is as colourful as the cooperating partners themselves, ranging from culinary walks through the city to cooking lessons, street food markets, talks, bicycle tours, educational programmes such as the learning workshops "From Grain to Bread" or "Climate Breakfast" to happenings like the "Blaue Tafel". Extensive media coverage of the event reached a much wider audience than the 5,000 visitors and the Climate Gourmet Week has attracted national attention.

www.klimagourmet.de

WWF Earth Hour 2017 and 2018

In 2017 and 2018 the City of Frankfurt participated again under the motto "Gemeinsam Frankfurt bewegen" (Together we move Frankfurt) in the worldwide Earth Hour. Every year the Earth Hour, which was launched by the WWF, sends a clear global signal for climate protection. During the symbolic hour in March 2017 and 2018 millions of people around the globe switched off their lights on the same evening. From New York to Nairobi, from Paris to Panama over 7,000 cities in 184 countries take part every year. The Frankfurt Municipal Energy Agency in these two years ensured a blackout of the Skyline and appealed to companies to switch off the lights in their buildings for one hour.

Lights out for climate protection.
Source: Municipal Energy Agency/Photo: Holger Menzel

In 2017 162 companies in Earth Hour did so, and in 2018 205 companies turned off their lights. The City of Frankfurt switched off the lighting on Römer, on bridges and in churches. At the same time the Municipal Energy Agency and the Steigenberger Frankfurter Hof Hotel invited citizens to a climate protection party where a 4 by 4 meter dance floor was built just for the party in the Ehrenhof of the hotel on Kaiserplatz. The floor consisted of technical modules which generate energy when people dance and the well-known Frankfurt DJ Dennis Smith provided the music. More than 500 citizens came to the Earth Hour parties in 2017 and 2018. Although the lights were extinguished at 8.30 pm, the guests created their own party lighting by dancing on the modules.

https://www.klimaschutz- frankfurt.de/earth-hour

„Wild Sunday" 2018

As part of the Department for Environment and Women's Affairs' "Wild Sunday" event series, the Municipal Energy Agency and Feyza Morgül, political scientist and advisor for sustainable development, organised a climate protection walk through the city centre on 22th July 2018. Frankfurt's Head of Environment, Rosemarie Heilig had invited citizens to take part in the free walk and the 30 free places were quickly taken. Drinking fountains were visited to explain heat development in the city, solar energy station for generating renewable energies, beehives on high rise buildings for regional nutrition and second-hand-shops for resource conservation.

Der Wilde Sonntag

Following a climate-friendly snack delivered by a cargo bike to illustrate the topic of mobility in the city, the participants moved on to street lamps and illuminated shop windows to discuss energy saving and light pollution. The final stop showed climate-protecting building methods and restoration, examined the energy-saving effects of natural stone facades in comparison to glass facades and the cooling and the oxygen exchange which ensue from greening.

Climate Piazza: Climate protection tour of the city centre

In summer 2017, to illustrate climate change in major cities, Frankfurt's Environment Department organised its first multi-day information event on the Roßmarkt in Frankfurt, one of the hottest places in the city. The "Climate Piazza" event invited residents to get information at the exhibition stands, to discuss with other people, to participate in talks, workshops and guided tours or simply chill in a summer lounge.

The solar filling station on Zeil was one stop on the Climate Protection tour of the city centre.
Source: Municipal Energy Agency. Photo: Ulrike Wiedenfels

The topic "Climatic Adjustment " explained general community development and urban agriculture, demonstrated practical façade greening and considered the effects on human health, while "Building and Living" and "Photovoltaics " linked the topics to climate protection aspects, with the Municipal Energy Agency being responsible for the content. To highlight "Climate Protection in Frankfurt" even more, the Municipal Energy Agency, in the scope of the Climate-Piazza ,organised two climate protection guided tours through the city centre, where an Info-team handed out fans with the inscription "Climate Saver". In view of the high temperatures the fans actually proved to be a kind of "rescuer" from the heat and hence from the effects of climate change.

Although the information event "Climate Piazza" in 2018 took place in a scaled-down form in Frankfurt Zoo, it was supplemented by the topic of " Biodiversity in the Animal World" while climate protection was again presented informatively in the exhibition pavilions "Building and Living" and "Photovoltaics". Another climate protection aspect in 2018 was "Nutrition", with the Climate Gourmet Exhibition showing the link between nutrition and CO_2 emissions. 12,435 people visited the Zoo on the three days of the event, including 6,780 children.

Communal Congress at the EnEff Trade Fair (AGFW)

The future of our heat supply

How can we achieve the municipal thermal energy transition? This question occupied the participants at the end of April 2018 at the Congress in the Exhibition Centre Frankfurt, co-organised by the AGFW. This, the second Congress, took place during the biennial Trade Fair where it was very well received,

AGFW

with 120 participants in the forum and visiting the workshops. The focal points of two years earlier still preoccupied the participants and speakers. Supplying heat is a local affair which can not only be dealt with at Federal level. One important factor is the use of waste heat. Larger waste heat sources are only usable when the infrastructure i.e. district heating networks, is in place. This is a question of creating the appropriate framework, also on the political side. Regardless of this, all those present agreed that renewable energies only stood a chance of meeting requirements when buildings are constructed more efficiently and renovated substantially better and more intensively than in the past.

Luminale

The Luminale, a Festival of Light Culture, is held every two years in Frankfurt. For the 2018 event the organisers decided that in future the Luminale would be sustainable in order to save resources, consider ecological aspects and implement climate-protecting measures in the light projects. The Municipal Energy Agency welcomed this decision and funded the project "Mobile Light Cluster", in which children and young people built a vehicle based on alternative drive systems from renewable energies. The project ended with an evening Light Walk of the mobile light cluster on Sachenhausen river bank.

Consultants' Day

On 26th November 2018 Energiepunkt FrankfurtRheinMain e. V. and the Frankfurt Municipal Energy Agency organised an information event for energy consultants on the topic of "Sustainable and Electric Mobility in Frankfurt and the Local Region". Over 40 listeners learnt how the future of mobility in Frankfurt might appear and which current solutions already exist. In their talks the speakers described current strategies, legal requirements and practical examples, in order to create more incentives for the mobility of tomorrow in Frankfurt and the local region especially in view of the complexity.

Museum Embankment Festival 2017

In August 2017 the Municipal Energy Agency was again represented with its "Save Energy" pavilion at the Museum Embankment Festival. Many Festival visitors informed themselves at the stand about Frankfurt's climate protection targets, picked up brochures and flyers and took part in the Climate Quiz. As every year the lighting wall, where visitors can try out energy-saving LED lights, was extremely popular. People took a breather on the new seat upholstery under the big sun-umbrellas in front of the marquee and were delighted with the climate protection fans.

Lots of visitors to the "Save Energy" pavilion at the Museum Embankment Festival 2017.
Source: Municipal Energy Agency/Photo: Jannik Nefferdorf

Open Days in Römer

The "Open Days in Römer" were held on 27th and 28th October 2017. A flying info-team from the Municipal Energy Agency informed visitors about climate protection, the new website www.klimaschutz-frankfurt.de and handed out DANKE campaign saddle covers to the guests.

Hessian Climate Protection Special Prize

At the municipal climate conference „Klima Kommunal" in November 2017 Minister Priska Hinz honoured the "Regional Energy Concept" project with the Special Prize "Together for climate – intermunicipal cooperation". Frankfurt and the Regional Authority FrankfurtRheinMain have been coordinating jointly the work on the regional energy concept FrankfurtRheinMain since 2013. The aim is to make the energy supply in the city and the local region 100 percent efficient and renewable by 2050. To do this, in a first step, energy profiles of the 75 municipalities were compiled and the climate protection activities of the municipalities and rural districts collated. In strategy groups 150 experts from 100 institutions formulated 48 measures.

Priska Hinz, Hessian Minister for Environment, Climate Protection, Agriculture and Consumer Protection, Wiebke Fiebig, Head of the Frankfurt Municipal Energy Agency, Dr. Kirsten Schröder-Goga, Head of Energy/Environment and Innovation at the Regnal Authority FrankfurtRhein-Main. Photo: Roland Grün

Renewable Energies Day

On Renewable Energies Day in 2018 there was a successful Climate Gourmet culinary walk along Berger Straße where the participants learnt at the various stops where climate protection really occurs in cafés, restaurants and shops and why these concepts are good for the environment. A district power station and a newly-built passive house were also on the agenda.

Stops on the culinary walk:

- Bio-Bäckerei Denninger
- Weltladen
- Berger-Palais neighbourhood power station (tenants and owners generate their own electricity)
- New ABG passive house in Höhenstraße
- Maingemüse
- Unverpackt-Laden gramm on Merianplatz

The walk was organised by Stadtevents, the participation fees were donated to the Association "Leben nach Tschernobyl e.V." on Renewable Energies Day the Rhein-Main Biokompost held their annual Compost Day where visitors could see how biogas is made from biowaste and how valuable compost develops. They could also take along soil samples (0.5 litre) which then underwent a free quality test. Technically-minded visitors could take part in one of the regular tours of the biowaste digestion plant, the composting plant, the heat/power cogeneration plant or the photovoltaic plant.

Climate Protection City Map

The decision to create a climate protection city map for the City of Frankfurt was made by the City Council back in 2007. The aim of the project is to stimulate experience exchange between the citizens and to motivate them to act and help realise new projects. The plan also documents climate protection projects and energy-efficient plants and buildings in Frankfurt. Whether solar plant, cogeneration unit or passive house: the map gives an overview with detailed information about which climate protection activities citizens, companies, the municipal administration and other stakeholders are implementing.

In 2016 the online Climate Protection City Map was overhauled technically, structurally and in terms of content and can now also be used with mobile appliances such as mobile phones or tablets.
In 2018 another 800 projects were added, mainly as a result of expanding the number of sub-categories. Bike sharing- and car-sharing locations were incor-

porated into the Mobility section and currently there are about 4,300 climate protection projects listed in the Frankfurt city area.

The climate protection city map documents Frankfurt's climate protection projects online. Source: VadimGuzhva - Fotolia.com

Besides the purely visual presentation of individual projects for PR the climate protection city map and the underlying database have become indispensable information tools. This information is vital in the framework of quarter concepts and strategic planning, such as the "Masterplan 100% Climate Protection" and the carbon footprint. The Climate Protection City Map is also ideally suited for providing information at local levels, such as cities, urban districts or even postal code areas.

The plan contains the following topic maps divided into theme categories (as of July 2018):

Energy Generation
- 443 BHKWs (CPUs)
- 6 waste heat projects

Construction
- 105 NEHs (low-energy houses)
- 262 PHs (passive houses) with over 3,400 residential units in passive house design

Regenerative energies
- 1 364 photovoltaic systems
- 1 402 solar thermal energy systems
- 130 biomass projects
- 2 hydropower projects

Concepts/initiatives
- 29 Bürger solar systems
- 119 tenant power systems
- 15 particularly innovative projects
- 23 quarter concepts
- 67 Ökoprofit participants
- 12 LEEN participants
- 12 Repair Cafés

Mobility
- 40 electricity charging stations
- 305 Bike sharing locations
- 11 Car sharing locations

http://klimaschutzstadtplan-frankfurt.de/

Climate Savings Book

The Climate Savings Book is now a regular feature in Frankfurt. The 2018 edition focused on "Sustainable Learning" and described the extracurricular educational opportunities offered by external partners to Frankfurt's schoolchildren. In a joint action with the Oekom Verlag (publishers) school administrators distributed 6,500 Climate Savings Books to Frankfurter teachers from all types of school in Frankfurt. Besides a wide range of vouchers the Climate Savings Book contains many valuable tips on minimising your own carbon footprint.

The Climate Savings Book presents many of the initiatives in Frankfurt involved in issues relating to sustainability, such as Community-Supported Agriculture Frankfurt, community gardens, food-sharing projects, Repair Cafés or Transition Town. These initiatives make for a liveable, sustainable city and encourage people to join in. The central theme of the Climate Savings Book 2019 is "Frankfurt am Main and the Local Region" and discusses the numerous sustainability offers outside Frankfurt am Main. The Climate Savings Book is published by the Frankfurt Municipal Energy Agency in cooperation with the Oekom e.V. New citizens also receive a voucher for the Climate Savings Book which can be redeemed at the Citizens Advice Bureau. The Climate Savings Book has been issued since 2010 with an annual circulation of 20,000 copies.

Source: Oekom-Verlag

Solar Bundesliga

The Solar Bundesliga is a ranking of the most successful municipalities in Germany in terms of thermal solar energy use. The solar Bundesliga compares the collector area per resident for solar heat and the kilowatts installed per capita for solar electricity. The editors of the magazine "Solarthemen" manage the Liga in cooperation with the Deutschen Umwelthilfe e. V.. Frankfurt is also a member of the Solar Bundesliga, with the Municipal Energy Agency regularly submitting values and is ranked 14th of the 54 large cities (as of 22 May 2018)

http://www.solarbundesliga.de/

Education and Networks

Source: istock.com_NicoElNino

„Saving energy and water at schools in Frankfurt“

A contribution from Umweltlernen in Frankfurt e. V. / Department of Building and Real Estate (Amt für Bau und Immobilien)

Under the motto “Save Energy– Increase your Budget” the Department of Building and Real Estate (the former Hochbauamt), in cooperation with Umweltlernen in Frankfurt e. V. and the Stadtschulamt (education authority), has been implementing a programme for saving energy in schools since 1998. In 2017 alone energy-saving schools in Frankfurt reduced their energy consumption by 12,200 MWh, without anyone having to freeze or sit in the dark. 1,030,000 euros were saved, with the schools benefitting directly from 50 percent of this sum, while the other 50 percent was put aside for energy-saving investments. The point of departure for reducing energy consumption in schools is a well-functioning internal energy management. Consumption checks are carried out on site and the findings correlated to the operating system which can be adjusted directly according to use. To tailor the organisation and technology to the needs of the school, there are training courses and energy tours of the buildings in question. Internal school energy management turns the know-how of school administrators’, teachers, parents and pupils into ”the motor” for lowering the energy consumption in schools.

UMWELTLERNEN IN FRANKFURT e.V.
Nachhaltigkeit lernen

Together with school administrators and teachers pupils explore the school buildings with measuring appliances in search of energy leaks and inform the other pupils about the project. All the participants get together for an energy dialogue at a Round Table and form an energy team. The E-Team develops an action plan for saving energy and water and organises the step-by-step implementation of this plan. The economical use of energy and water is not only economically and ecologically imperative, it is particularly well-suited to being incorporated into educational practice as a field for learning, action and experience and to sensitise children, young people and also adults for the subject. A dialogue on existing problems and creating a plan of action for saving energy brings climate education to life and teaches communication skills-and action competence. In addition, Umweltlernen in Frankfurt e. V., in cooperation with the Municipal Energy Agency, offers learning workshops on “Energy”. The project is an educational building block for sustainable development for which the City has been officially recognised by UNESCO on a number of occasions. The schools are not left alone in their energy saving activities, but supported by the Department for Bau- and Immobilien, Umweltlernen in Frankfurt e. V. and the Education Authority. The support structure includes presentation, training courses with materials and support for school administrators.

https://tinyurl.com/y45tk8x7
https://tinyurl.com/y3yh5mqv

„Climate protection in Frankfurt schools“

A contribution from Umweltlernen in Frankfurt e. V.

The challenges of climate change and the use of energy are among the key issues of sustainable development in the city. Frankfurt’s climate protection concept Umweltlernen in Frankfurt e. V. offers a large variety of learning workshops on ”Energy”. The learning workshops are well-established in Frankfurt’s schools and have often initiated other energy-saving activities there.

The learning workshops are also highly regarded nationally and were honoured in the UN Decade „Education for Sustainable Development”; while the VDEW-Verlag published hand books on the ”Electricity“ and ”Energy Efficiency” workshops. The teaching methods in the learning workshops work with the pupils‘ personal environment and address phenomena dealing with climate and energy. The subse-

quent work with the pupils includes both specialist aspects and concrete options for action in daily life. The following learning workshops for schools are currently in the programme:

- Electricity
- Heat
- Wind
- Use energy wisely
- Passive house
- Energy transition
- Climate Gourmet (nutrition)

The learning workshop Climate Gourmet shows pupils the links between Nutrition and Climate Protection.
Source: Municipal Energy Agency

The Municipal Energy Agency supports the learning workshops with expertise and financially. In 2018 learning workshops were given in 20 schools to all the pupils of one year, in all over 2500 pupils, whereby the demand on the part of the schools greatly exceeded the budget available for implementation.

One example of a learning workshop: Energy transition

With the "Masterplan 100% Climate Protection" Frankfurt has set itself the aim of a carbon-free energy supply in the city, questions arise as to how the energy transition can not only be achieved technically, but also how it is communicated. Education will assume a pivotal role in the transition, with the "Energy Transition" making a contribution to this. The learning workshop shows pupils the advantages and disadvantages of the various forms of electricity generation, the importance of the electricity grids and energy efficiency and discusses options for action. In the learning workshops specialist groups are "educated" on the diverse topics of energy transition. Using a variety of media and experiments they examine the efficiency of a wind turbine, solar power generation depending on the time of day and the season, the function of a biogas plant, thermal insulation in buildings, energy saving and also an intelligent grid which is built into a working model to test the effects of fluctuating energy sources and consumption. The pupils come to realise that electricity from renewable energy is only feasible when electricity consumption is reduced significantly and the grid is able to link producers and consumers intelligently. Building on this, the school groups work out schemes to help the energy transition succeed in the city.

https://tinyurl.com/y4pbdvab

„School Year of Sustainability"

A contribution from Umweltlernen in Frankfurt e. V.

Funded by the "Integrated Climate Protection Plan Hesse 2025", Umweltlernen in Frankfurt e. V. is carrying out the model project "School Year of Sustainability" for secondary schools. This is based on the tried-and-tested programme of the same name for primary schools which was officially recognised by the UNESCO in the UN decade "Education for sustainable development" (BNE). In the "School Year of Sustainability" the challenge of climate change is the starting point for the comprehensive compilation and subject specific questions on sustainable development. The modules are: Energy Efficiency, Renewable Energy, Nutrition, Mobility and Sustainable Lifestyle. The central theme of the modules, which are spread across the whole school year, is "Climate Education for Sustainable Development".

The central features are in the implementation in the schools are the two to four hour teaching modules which are led in team-teaching form by qualified disseminators and include a wide range of methods, experiments and excursions. These modules come with supplementary materials which offer the teachers suggestions for introducing climate education into regular lessons. To implement the modules there are also training courses and educational days for the teaching staff. The "School Year of Sustainability" is thus contributing to establishing the BNE in the educational landscape, as laid down in the Hessian Education Act.

Since implementing the ”School Year of Sustainability” in secondary schools is uncharted territory, the programme is to be tested in five selected schools with all the pupils from one year. The model project will run for four years; starting with the implementation of the first modules in autumn 2018. The ”School Year of Sustainability” for secondary schools has the potential to develop into a flagship project for climate education in Frankfurt and beyond.

https://tinyurl.com/y6dgcy6j

„Energy advice centres and environmental education centres“

A contribution from Umweltlernen in Frankfurt e. V.

Funded by the Integrated Climate Protection Plan Hesse 2025, Umweltlernen in Frankfurt e. V. is managing a model project on systematic cooperation between energy advice centres and environmental education centres. Its starting point is the international Paris Agreement on Climate Protection which in § 12 calls for the intensified use of knowledge transfer and climate education as climate protection measures. Although technology, science and education are crucial for successful climate protection and sustainable development, the different sectors are generally still operating unconnected with each other. In terms of climate-friendly transition, systematic cooperation is indispensable, as environmental education centres and energy advice centres have diverse and complementary skills in climate protection. Model cooperation being tested between educational institutions and energy consultants promises productive synergies: education actors benefit mutually from the in-depth knowledge of the energy consultants and the mediating skills of the educators. Energy counselling and climate education should be viewed as one, should complement and mutually reinforce each other.

This intensified cooperation then underwent “field tests”, the starting point being the event programme ”21 Tage Klima-Zukunft” (21 days for the future of the Climate) in autumn 2018. Cooperation partners included the Municipal Energy Agency Frankfurt, Energiepunkt, the Energy Advice Centre Hanau and Offenbach, the Municipal Education Authority, the Environment Centre Hanau and Umweltlernen in Frankfurt. There were also new, innovative formats, such as:

- Energy Counselling To Go” at Sunday learning festivals for young and old.
- Pupils meet planners at the ”School Building Site: Climate”
- Edu-caching on climate protection in Frankfurt
- Learning workshops on the passive house
- Serious Games on climate protection

The Real-World Laboratories on cooperation of energy advice centres and environmental education centres to be continued in the next three years, also in the form of inter-municipal cooperation.

https://tinyurl.com/y6dgcy6j

Experience exchange and knowledge transfer

The Municipal Energy Agency regularly represents the City of Frankfurt at national and international congresses and events dealing with climate protection. The Municipal Energy Agency is also active in numerous local and national working groups and initiatives. The Head of Division and her employees also receive delegations from abroad. The aim here is to consistently extend the City of Frankfurt’s national and international network.

Experience exchange at local, nation and international level. Source: contrastwerkstatt-Fotolia.com

A selection of Talks and Delegations

- Lecture during the City Exchange between Frankfurt and Toronto
- Lecture TU-Munich: Integrated energy concepts for building development areas in Frankfurt
- Delegation from Taichung, Taiwan – Frankfurt's climate protection targets
- Hessian Climate Protection Officer – Lecture on the Climate Gourmet campaign
- Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety Symposium "Climate Protection through Waste Heat Utilisation" Berlin – Lecture on Frankfurt's waste heat register
- Lecture on "Networks in Climate Protection in the Business Sector" at the „Undertaking Climate Protection" Conference„ Municipal Climate Protection Competence Centre of the German Institute for Urban Studies
- Lecture on sustainable commercial area at the Difu seminar: "Undertaking Climate Protection – Cooperation between Municipalities and In dustry, Trade and Commerce"– German Institute for Urban Studies (Difu)
- Lecture on the commercial area at the work shop "The Industrial Region Frankfurt-Rhein-Main as a Work Region"– Cooperation Office Universities and Trade Unions Frankfurt-Rhein-Main
- Lecture at Mainova's "Verwalterfrühstück" (Administrator Breakfast)
- Expert workshop "Data Centres of Tomorrow", Co-organiser with the Borderstep Institute and the national Network of Energy-efficient Data centres (NeRZ)
- Content management of a webinar on Contracting as part of the Climate Administrator training course
- Presentation of the waste heat register of data centres at the Digital Days and the founding meeting of the "Hessian Energy Efficiency in Computer Technology Centres" (HERTZ) network
- Lecture on the sustainable commercial area at the annual conference of BUND Hesse
- Participation in the Energy Cities Annual conference
- Organisation presentation and lecture at the 1st expert meeting on the energy-based renovation of condominiums 2018
- Delegation energy forum Zürich – Lecture on Frankfurt's climate protection policy
- Vietnamese Government delegation – Lecture on climate protection in Frankfurt
- Energy-related guided tour of the Dom-Römer Quarter for a group of participants from the Passive House Institute

Selection of participation in working groups

- Association of Energy-Efficiency Networks Germany e. V. (AGEEN): The City of Frankfurt am Main is on the Board of the non-profit organisation AGEEN which pursues the goal of extending the number of efficiency networks in Germany, in order to accelerate energy-efficient solutions by means of an experience exchange in the networks. Positive examples of this are the Ökoprofit Frankfurt and the LEEN Rhein-Main networks which help lower the participants' energy costs while contributing to climate protection.
  Further information at: www.ageen.org
- Working group Building and Health (day-care centres and schools) of the City of Frankfurt: regular participation in the sessions starting in spring 2018
- National Association of Energy and Climate Protection Agencies Germany e. V. (eaD): Headed by the Deputy Chairperson, participati on in general and Board meetings and meetings of the working groups Building and Companies
- National Network of Stakeholders in energy-based Building Modernisation: participation in the network meeting with nation-wide actors in the rapid energy-based retro-fitting of existing buildings, for climate protection and employment

IUC-cooperation Yokohama

As part the European Union's "International Urban Cooperation (IUC)" programmes the City of Frankfurt is cooperating with the Japanese metropolis, Yokohama. In the course of the subsidised exchange programme the Municipal Energy Agency regularly shares its experiences with its twin on the topic of "Smart Cities". In April 2018 a delegation from Frankfurt visited Yokohama where they visited flagship projects, such as a pilot plant for converting water into hydrogen using regenerative wind power. In August 2018 a Japanese delegation visited the Main metropolis to learn about innovative projects, such as the Climate Gourmet, the "Climate Protection Ideas Competition" or the Saving Electricity Programme for private households (eClub). The next step in 2019 will be to co-develop a "Local Action Plan" with clear-cut project ideas which the two partner cities can implement together.

http://iuc.eu/

23rd UN Climate Conference in Bonn

At the invitation of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) Ms Wiebke Fiebig for Frankfurt and representatives of two municipalities ,
Enkenbach-Alsenborn and Flecken Steyerberg, all three of which are Masterplan municipalities in the BMU funding programme "Masterplan 100% Climate Protection", together with public utility company Konstanz, presented practical examples of district heating, land use and sufficiency, projects in small, rural, municipalities and climate protection in communication.
The event was chaired by an employee of the Association of Municipal Companies e. V. (VKU). The event "100% Renewable – Cities on their way to clean energy„ pursued the aim of demonstrating the importance of local stakeholders (municipalities, municipal energy suppliers, citizens, local companies) in reaching global climate targets. Following short presentations of the findings of the individual Masterplan municipalities the public took the opportunity to discuss the various schemes with the speakers. The findings of the presentations and the subsequent discussion were presented graphically by an illustrator: The COP23 took place in Bonn from 6th to 17th November 2017.

Source: Visual by Barbara Schneider

New Municipal Energy Agency brochures

The following brochures can be obtained free of charge from the Frankfurt Municipal Energy Agency at energiereferat@stadt-frankfurt.de or 069-212-39193

ÖKOPROFIT 2016-2017
This project brochure was created to mark the end of the final Ökoprofit project round 2016-2017.
On over 40 pages the brochure gives an overview of the 26 enterprises which reported on measures in the scope of the project work. The company pages show an extract from the environment programme of every participant.

Climate Savings Book 2017 and 2018
Published by the Oekom publishing house and the City of Frankfurt, the Climate Savings Book gives loads of tips and coupons for ecologically-fair daily life. It can be purchased in bookshops for 4.95 euros.

Brochure with especially economical household appliances
Every year the Municipal Energy Agency publishes information for consumers on "Especially economical household appliances", to assist citizens when purchasing new appliances.

New brochures on climate protection and renewable energies. Source: Municipal Energy Agency.
Photo: Salome Roessler

Masterplan for the creation of a Spatial Data Infrastructure

Digital data with geographical references (geodata) are elementary building blocks for documentation and administration of the City of Frankfurt. Some examples of this are city maps, real estate, green spaces, locations of social institutions, urban development plans and much more statistical data. They describe the historical, current and future status of the city, thus forming the basis for analysis and planning and for internal and external information. The Municipal Energy Agency is participating in the Spatial Data Infrastructure (GDI FFM) project. The aim is to not only provide internal data but also to ensure the efficient utilisation of the geodata already available to the city to analyse priorities for future measures. This is all part of residential area concepts and town planning, as is the preparation of a waste heat register.

Traffic

Source : Pierre - Fotolia.com

Pilot project: Logistics Tram

A contribution from Stadtwerke Verkehrsgesellschaft Frankfurt am Main mbH

In these days of steadily growing E-shopping and the imminent ban on diesel vehicles, the climate-friendly, low-emission transport of goods in a big city like Frankfurt is an important, future-oriented issue. To what extent logistics involving the tram is feasible was demonstrated in September 2018.

In partnership, the winners of the "Climate Protection Ideas Competition" (riemanndesign and Sachen auf Rädern), the City of Frankfurt, the House of Logistics & Mobility (HOLM) GmbH, the Frankfurt University of Applied Sciences (UAS), the IHK Frankfurt, the Climate Alliance and the VGF in summer 2018 developed the concept for the pilot. Hermes Germany GmbH, the dispatch service provider, was also included in the project.

The idea of a logistics tram is highly acclaimed in Frankfurt am Main. Source: VGF

The idea: a logistics tram is loaded with transport boxes containing parcels. These are then transported in off-peak periods to reloading sites in the city centre and unloaded in microdepots. From there specially equipped bicycle couriers deliver the parcels to the customer's door. The microdepots and Logistikbox-Trailers (bicycle trailers) which distribute the packages after unloading from the tram, are an integral part of the project.

As part of the "Climate Protection Ideas Competition" in November 2017 riemanndesign in cooperation with "Sachen auf Rädern", one of the four winners, received funding for this concept idea from the Frankfurt Municipal Energy Agency. Splitting the transport routes into short stretches for E-Bikes and longer ones for the logistics tram results in a synergy of the two means of transport for almost CO_2 zero-emission City logistics. Compared to motorised transport, over short stretches in the city the flexibility of the bicycle makes it as unbeatable as the tram over longer stretches with its speed and volume capacity. The findings from the pilot phase, which starts in Spring 2019, will be important building blocks for implementing climate-friendly inner-city logistics.

https://tinyurl.com/y5q9twkg

Procurement initiative for E-vehicles

A contribution from the Wirtschaftsförderung Frankfurt GmbH

In view of current developments in air pollution control, the introduction/use of alternative drive systems however has gained in importance for the City of Frankfurt which is focusing increasingly on electromobility and is planning to further increase the proportion of electric vehicles in the municipal carpool. The programme is to be continued following the successful completion of the procurement initiative in 2015 with 35 subsidised new electric vehicles.

Between 2017 and 2019 the municipal offices again received a grant to purchase new E-cars which made it possible to subsidise 20 to 30 new E-cars. To ensure recognition value and to underline the concept of a fleet of cars the E-cars will carry the new Frankfurtemobil logo. The procurement initiative is managed by the Wirtschaftsförderung Frankfurt on behalf of the City. The project is one component in the "Electromobility in 2025 in Frankfurt" strategy paper.

The Wirtschaftsförderung Frankfurt GmbH has been initiating and coordinating electromobility projects since 2009 in order to make traffic in the city more environmentally-friendly. Besides the procurement initiative this also includes sustainable, climate-friendly mobility projects in business traffic (Micro-depot) and City logistics (Logistics Tram).

Energy-based optimisation in U-Bahn stations

A contribution from Stadtwerke Verkehrsgesellschaft Frankfurt am Main mbH

The VGF, an energy-intensive municipal public service company has a special responsibility to use energy efficiently and economically. This can be seen in the VGF's involvement in two energy-efficiency networks. The VGF's efforts to use energy more prudently are very wide-ranging e. g. acquiring more experience in network and vehicle technologies with innovative concepts. These include the use of flywheel accumulators in the traction current network, the inductive heating of points or the use of hybrid wheels with light aluminium rims. The new tram type, the T, uses permanent magnet motors which are particularly energy-efficient due to their high level of efficiency and low weight. The VGF is also paying special attention to updating the infrastructure in the U-Bahn stations and tram stops. One important energy aspect here is the optimisation of the lighting systems. To enhance the passengers' sense of security and the quality of time spent in the stations, today brighter, more homogenous illumination is being planned. LED technology was used in the public areas for the first time in 2017 with the lighting modernisation in the U-Bahn station Höhenstraße.

This was followed in 2018 by the lighting in the U-Bahn stations Dom/Römer and Leipziger Straße and the tunnels between Konstablerwache and Seckbacher Landstraße. This renewal process is to be continued on an ongoing basis. The much more efficient LED luminaires have led to significant energy savings of over 50 percent below ground and up to 90 percent above ground, despite the higher luminosity. Together with the updated lighting at several tram stops consumption fell by about 350,000 kilowatt hours (kWh) annually.

Höhenstraße U-Bahn station with new LED lighting.
Source: VGF

One key element in the renewal process is implementing a new concept for the stations' electricity infrastructure. Exchanging the electrical distribution facilities and installing measurement, control and regulation technology allow improved passenger surveillance to reveal further efficiency potential. Optimising the heating and ventilation systems has so far saved an additional 130,000 kWh of energy which corresponds to an annual reduction of 230 tonnes of CO_2.

https://tinyurl.com/y3zo36g3

Frankfurt's first electric bus route

A contribution from traffiQ Lokale Nahverkehrsgesellschaft Frankfurt am Main mbH

On 9th December 2018 five new E-buses went into operation on route 75 in Frankfurt. The vehicles on the Ring Line, which connects Bockenheimer Warte, Uni-Campus Westend, Palmengarten and the Botanical Garden, have a battery capacity of 240 kWh which enables a range of 150 kilometres a day. The batteries can be recharged at night. Frankfurt's buses and lightrail trains are already making a considerable contribution to environment-friendly mobility in Germany's commuter capital.

On route 75: the new E-buses.
Source traffiq Frankfurt am Main / Photo: Krutsch

For decades the lion's share of the local public transport in Frankfurt (S-Bahn, U-Bahn and trams) has been electric, in 2017 accounting for about 80 percent of all rides. The bus fleet of 370 vehicles is one of the most modern in Germany and the EEV Standard ("Enhanced Environmentally Friendly Vehicle", an exceptionally environmentally-friendly vehicle complying with requirements above Euro-5 Norm) is a matter of course, as one third of the buses already comply with Euro 6. The full changeover of route 75 to E-buses means that approx. 200 tonnes of carbon dioxide (CO_2) and 640 kg of nitrogen oxide (NOx) less are discharged into the environment annually-a substantial contribution to reducing air pollutants in Frankfurt.

The ICB's additional investment costs in buses and charging infrastructure amount to about 1,900,000 euros with the State of Hesse funding the project with 760,800 euros The grant is earmarked for the procurement of the buses and for the expansion of the charging infrastructure required. Procurement of the buses is significantly more expensive than the purchase of diesel vehicles. The charging infrastructure needed must still be developed. To support Hessian bus operators in Hesse, Ministry of Transport makes five million euros funding available annually. Hesse is the first federal state with its own funding programme for E-buses.

www.traffiQ.de

Database and timeframes

The brochure is based on a City Executive Board report to the city council dated 8th April 2019. Every two years since 2011 the Executive Board has been reporting in this form on measures and projects relating to climate protection. The current report contains all the climate protection projects the Frankfurt Municipal Energy Agency expedited in 2017 and 2018 as well as the climate protection projects of other Offices, public-sector companies and Holdings registered with the Municipal Energy Agency. The sources of the contributions are identified directly below the heading. The respective authors are solely responsible for the content of these articles. There shall be no obligation to publish the projects.

Participating offices, public-sector companies and holdings

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For your notes

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