MENERGERS

EU DE

Leading the way to climate neutrality

Energy Management in Municipalities in the EU and Germany

Experience and good practice

Imprint

Unabhängiges Institut für Umweltfragen e. V.
Greifswalder Straße 4
10405 Berlin

T +49 (0)30 42 84 99 3-0
F +49 (0)30 42 84 99 3-59
info@ufu.de
www.ufu.de
twitter.com/UfUberlin

Authors: Belinda Bäßler & Oliver Ritter

Supported by:
Federal Ministry for Economic Affairs and Climate Action
European Climate Initiative EUKI
on the basis of a decision by the German Bundestag

Table of Contents

Inhalt

Energy Management in Municipalities in the EU and Germany

Experience and good practices

The goal of municipal energy management is to design all relevant internal administrative processes in such a way that the energy consumption of municipal facilities is permanently minimized. There are opportunities for action in various fields of activity, like buildings, electricity use, mobility and energy systems. Energy management relieves municipalities of up to 20 percent of energy and water costs in supplying their properties.

The legal framework for implementing municipal energy management in Germany and the European Union is provided by various laws and directives at European, federal and state level, e.g., the EU Climate and Energy Framework 2030, the European Green Deal, several EU Directives and the Climate Protection Laws of individual countries.

In terms of municipal organization there is no uniform approach on how energy management is organized in German and European municipalities. If the position of an energy or climate protection manager exists, it often differs at which point in the municipal administration it is located. Communication, reporting and networking are not only relevant within municipalities, but also with regard to external stakeholders. Important institutions for energy management in Germany are the Energy Agencies at state, federal and municipal level.

This report provides information on the organization and status of municipal energy management in Germany and the European Union. Various topics such as municipal organizational structure, external communication, data situation, energy transition, education and barriers are addressed. Exemplary examples from practice are woven into the individual thematic chapters. At the end, the respective municipal energy management of the four German municipalities Birkenwerder, Treuenbrietzen, Ludwigsfelde and Hanover as well as the European municipalities Vienna, Delft and Aradippou are presented in more detail.

Supported by:

Federal Ministry for Economic Affairs and Climate Action

European Climate Initiative EUKI

on the basis of a decision by the German Bundestag

1. Energy managers services in the municipalities

1.1 The objective of municipal energy management

Municipal energy management (MEM) relates mostly to the energy efficiency of the municipality's own properties. The goal of municipal energy management is to design all relevant internal administrative processes in such a way that the energy consumption of municipal facilities is permanently minimized.[1]

The basis for this is the continuous recording and evaluation of consumption of heat, electricity and water. The energy report is the core element of municipal energy management. It systematically records how much energy the public buildings, street lighting, wastewater treatment plant and all other properties consume and what costs are incurred. It provides an overview of the energy status of the properties.[2]

Municipal energy management is most of the time not seen as a separate area, but closely linked to the broader concept of municipal climate protection management. It can be understood as one field of action amongst others of municipal climate protection management.

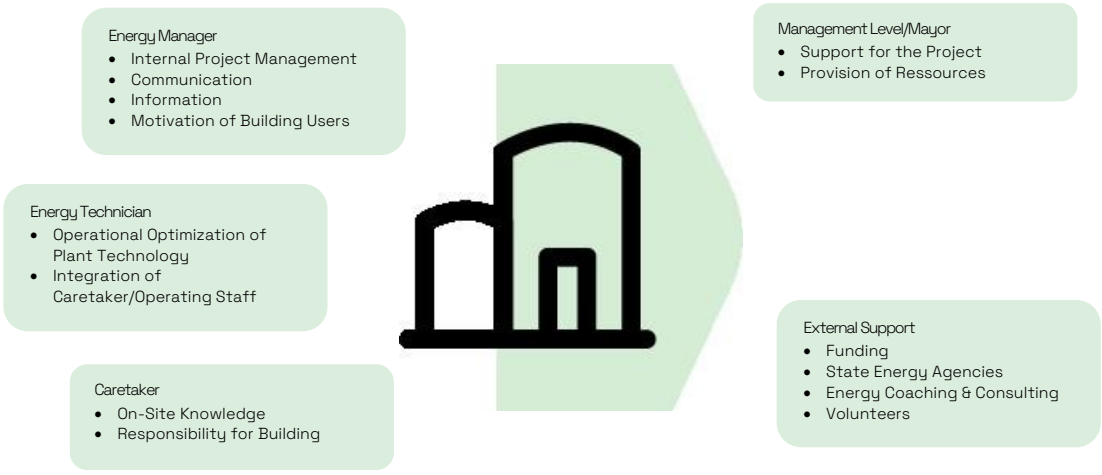

Figure 1: Actors of the municipal energy management, own representation based on KEA et al., n.d., p. 20

[1] KEA-BW, 2020

[2] Klimaschutz und Energieagentur Niedersachsen, 2023

Supported by:
Federal Ministry for Economic Affairs and Climate Action
European Climate Initiative EUKI
on the basis of a decision by the German Bundestag

1.2 Tasks of energy managers

Energy managers are entrusted with all energy-related topics (see Figure 2). They analyze properties, prepare data, determine suitable measures (non- / low-investment and investment), including possible subsidies. In addition, energy managers take care of the efficient operation of the buildings (use, installations, sensitization). In order to initiate implementation measures, they involve colleagues from the specialist departments, in particular the building and property management.[3]

Overall tasks of energy managers include 1) Energy consumption recording and evaluation, 2) Monitoring of plant operation and adjustment to demand and 3) Planning and implementation of organizational and preparation of investment energy saving measures.[4]

The energy manager is the contact person for the administration and coordinates the players involved in the cross-sectional task of energy management. The establishment of a permanently functioning organization of energy management in the administration is the basis of his work. For this, he needs: strong moderation and motivation skills, assertiveness and persuasiveness, knowledge of real estate management, planning and administrative law, commercial/business management skills, basic knowledge of construction and plant engineering.[5]

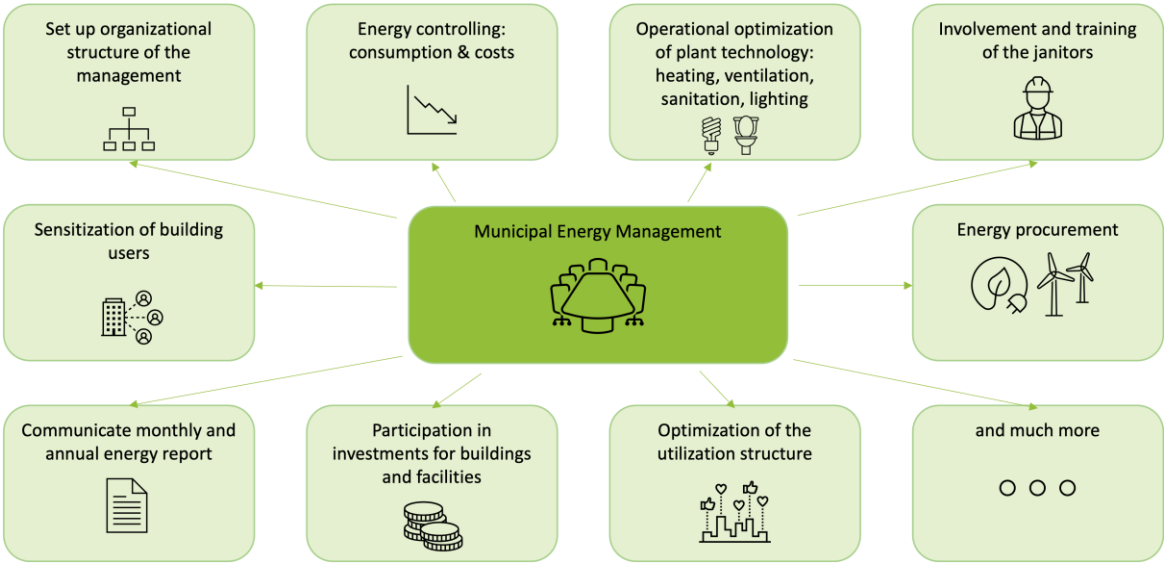

Figure 2: Tasks of the municipal energy management, own representation based on KEA et al., n.d., p. 16

[3] Energieagentur Rheinland-Pfalz, 2022

[4] KEA-BW, 2020

[5] KEA et al., n.d., p. 19

Supported by:
Federal Ministry for Economic Affairs and Climate Action
European Climate Initiative EUKI
on the basis of a decision by the German Bundestag

When implementing municipal energy management, it is important to define goals, clarify responsibilities and processes, and weigh existing and necessary resources. In addition, continuous success monitoring and process optimization play a decisive role.[6]

The areas of responsibility of the KEM are defined depending on the capacity of the municipal administration and the output situation. The available personnel capacity, the number and complexity of the plants and the existing data situation define the cornerstones. Exemplary focal points of tasks:

- In a municipality with a sharp decline in population and a large property stock, one focus could be on reducing space and concentrating use.
- Reducing the electricity consumption of properties can also be a focus, since each kilowatt hour of electricity saved reduces costs which equal four times the cost of one kilowatt hour of heat (costs in 2021 for electricity ~ 0,25 EUR/kWh, for heat ~ 0,6 EUR/kWh)
- A focus can also be laid on properties that will be renovated in the near future. The KEM determines and optimizes the demand and can save financial resources in the case of replacement investments. During support, follow-up regulation and consumption optimization, it can be monitored whether the predicted savings have actually been achieved. [7]

1.3 Job descriptions

The specific tasks and qualifications expected of energy managers in the individual municipalities can be found in published job advertisements. Typical portals for advertising jobs as municipal energy managers in Germany include the official career portal of the public service in Germany INTERAMT[8], Kommunal Stellenmarkt[9] or the website of the National Climate Protection Initiative (NKI)[10]. The job search for the position *energy manager* resulted predominantly in a manageable number of hits: *INTERAMT:* 22 hits, Kommunal Stellenmarkt: 15 hits, NKI: 21 hits (as of: 11.05.2022) An alternative is to use commercial and non-municipal job portals such as stepstone[11]. The job search here yielded 559 hits (as of: 11.05.2022) for the position energy manager. This results from the fact that not only municipal energy manager positions are advertised here, but also the job ads of private companies.

[6] KEA-BW, 2020

[7] KEA et al., n.d.p. 18

[8] https://interamt.de

[9] https://kommunal.de

[10] BMWK, 2023e

[11] https://www.stepstone.de/de

A comparison of seven job advertisement for the position of a municipal energy manager shows a large degree of agreement in the objectives, organization, tasks and requirements placed on municipal energy managers.

If an *objective* is posed, it refers to the (continuous) establishment and operation of an energy management system in order to reach the overarching goal to reduce energy consumption and CO2-emission.

The *organizational unit* to which the position of energy manager belongs seems mostly located in a building-related area (e.g. Department of Building Management/area of technical building equipment, Central Facility Management, Real Estate Office, Office of Facility Management/Department of Central Facility Management and Internal Services). In the case of the city of Wolfsburg, the position is designed as a staff position and in the case of the city of Heidenau it belongs to the Office for School and Family.

The designated *tasks* can be grouped into the four supercategories analyzation, communication, education and optimization (see Table 1).

Requirements for the positions of energy managers relate to degree and further qualifications.

In most of the cases a university degree is expected, only in two cases technicians and master craftsmen are named. Sometimes a bachelor degree is sufficient, in other cases the specifically required degree is not explicitly stated. The field of study is expected to be a technical (e.g. heating, ventilation and sanitation) or engineering area (e.g. supply engineering, civil engineering, environmental engineering) area or related to the topics of energy (e.g. energy economic/ energy management/renewable energies) and/or buildings (e.g. technical building equipment, architecture).

While professional qualifications (technical knowledge, knowledge of laws and regulations) are mentioned, they do not seem to be the most important selection criterion. In all job postings, motivation and a number of soft skills (most important communication, organization, independence, team-orientation, holistical thinking, presentation, moderation, cooperation) seem to be more critical. IT skills and a driver's license are also expected.

Supported by:
Federal Ministry for Economic Affairs and Climate Action
European Climate Initiative EUKI
on the basis of a decision by the German Bundestag

Task category	Tasks
Analyzation (monitoring, controlling, evaluating) of energy-related measure	• analyze energy-technical buildings (energy consumption and inventories, physical condition) as well as their systems • organize ongoing monitoring and controlling of energy consumption and energy costs • identify inefficiencies and options for improvement (e.g. saving potentials) • regular building inspections • review of energy procurement/contract controlling • monitoring newly implemented energy measures and projects
Communication (reporting, networking, public relations)	• stakeholder management (participation and reporting in press, political statements and committees, communication with internal departments, providing information) • Preparation of energy reports • Participation in the planning of new construction and renovation measures
Education (training, consulting)	• prepare, organize and conduct janitor and user trainings/workshops • Accompanying energy working groups in schools • Support of energy teams • Raising awareness among employees and building user, motivate and sensitize them for climate protection, saving energy and costs, the importance of energy-conscious user behaviour
Optimization	• development, preparation and implementation of energy saving concepts • Preparation and optimization of energy procurement/supply contracts • Preparation and Implementation of (catalogs of) energy saving measures • Development of updating of energy standards • Building prioritization on the basis of consumption shares and consumption parameters

Table 1: Categorized tasks of the compared job postings

Supported by:
Federal Ministry for Economic Affairs and Climate Action
European Climate Initiative EUKI
on the basis of a decision by the German Bundestag

Anyway, it depends on whether a direct energy manager position is advertised or energy management is envisioned as part of a climate change manager position (see Fehler! Verweisquelle konnte nicht gefunden werden., Birkenwerder). Moreover, if the energy manager position is not directly advertised by a municipality, but by service companies of the municipalities, differences become apparent (see Fehler! Verweisquelle konnte nicht gefunden werden., Berlin).

Birkenwerder – Climate Protection Manager For the job posting of Birkenwerder, expected degree and qualifications appear to be comparable to Energy Manager positions. However, the described tasks are even more communication and management oriented and therefore less technical. Berlin – Energy Manager/Engineer Measurement, Control, Regulation Technology In the case of the job advertisement by Berliner Immobilienmanagement GmbH, state-owned real estate service provider, the tasks are analysis and optimization. Communication and education are not explicitly part of the job description. The requirements also seem to be more technical and expertise-oriented.

Table 2: Examples of divergent job postings compared to typical municipal energy management postings

Supported by:

Federal Ministry for Economic Affairs and Climate Action

European Climate Initiative EUKI

on the basis of a decision by the German Bundestag

2. Fields of Action in municipal energy management

The German Energy Agency (dena) distinguishes between four fields of action in municipal energy and climate protection management: buildings, electricity use, mobility and energy systems. Both thematically and organizationally, there are potential overlaps between the fields of action. dena therefore points out that close cooperation between the relevant players avoids duplication of effort and exploits synergy effects.[12] In addition, we add a fifth field of action Energy Saving Models at Schools and Kindergartens, which is not covered by named dena methodology.

2.1 Buildings

In Europe, the building sector is responsible for around 40 percent of energy consumption and 36 percent of greenhouse gas emissions. It is therefore the largest European energy consumer and a key sector for achieving the European Union's (EU) energy and climate policy goals.[13]

Municipal buildings in particular are energy consumers with great potential for savings: they are responsible for around two-thirds of municipal CO2 emissions. Large savings can be achieved with targeted analyses and measures. In the direct sphere of influence, the municipality itself can decide on the implementation of measures at municipal properties. Indirectly, the municipality can also influence its citizens and companies. With regard to buildings, consumption of electricity and heat as well as water and wastewater are relevant for energy management. Energy consumption can be monitored on different ways: electric load profile can be monitored by remote metering (Smart-Meter, digital Meter, 15 Minutes load profile reading), energy and water consumption can alternatively be monitored by manual read out by the janitor on monthly basis. At least, consumption can be controlled on the annual basis of utility bills, which is often the case in municipalities, but does not satisfy the requirements of ambitious energy management. The monitored data should be collected at a central point in the municipal administration. They should be accessible to the energy and climate protection coordinator for evaluation – and by the public. By compiling the energy consumption and costs of the municipal properties, the largest energy consumers as well as potential leakages can be quickly identified. These should then be examined in further targeted analyses. [14]

[12] dena, n.d.-g

[13] Gebäudeforum klimaneutral, 2023

[14] dena, n.d.-i

Supported by:
Federal Ministry for Economic Affairs and Climate Action
European Climate Initiative EUKI
on the basis of a decision by the German Bundestag

2.2 Energy Saving Models in School

In addition, energy saving projects in schools can be implemented for the cause of awareness raising and raise of ownership of building users. In addition, those projects are of great use for gathering temperature data. Therefore, the pupils perform cross section temperature measurement of the complete building as well as long-duration temperature and CO2 measurement in selected rooms. This can only be realized, since the "work force" of pupils is many times over the economic and personnel capacities of the municipal energy management or private companies (30 kids compared to one adult professional). Eventually, the real temperature data can be compared with heating regulation and consumption data and thus improving building energy management. Furthermore, the pedagogical energy saving consultants detect energetic relevant weaknesses in the building as well in the organizational structure of the school or kindergarten. Those points will be then summarized in an action plan and forwarded to the municipal building owner. Those projects can be funded by NKI Municipal Directive (see section for funding programs) and are often realized by non-profit organizations in the field of environmental education such as UfU or companies which operate in the field of energy consulting. Examples for those energy saving models at schools is the German brand fifty-fifty[15]. Apart from the great opportunity for energy data monitoring, those projects raise pupils engagement and knowledge in the field of energy saving and climate protection.

2.3 Electricity Use & Public lighting

Electricity and efficient electricity use are another field of action within municipal energy management. Lighting systems and IT equipment such as printers, copiers and scanners are the focus here.[16]

In addition to potential savings in the energy and water supply of municipal properties, street lighting in particular offers considerable scope for reducing consumption and costs. In many municipalities, public lighting is not in good condition despite numerous renovation measures. This results in considerable potential for savings. Although a large part of the existing stock was renewed in many municipalities after 1990, the energy consumption of street lighting is often too high and the renewal rate is too low for long-term maintenance. In addition, systems that were renewed in the 1990s will reach their normal service life in the medium term and will have to be replaced in the near future. Many modernization measures can often be implemented in the short term. In most cases, the focus is on replacing outdated luminaire technology, often equipped with sodium vapor or high-pressure mercury vapor lamps. Savings potential here lies in the use of modern ballast technology, adaptive control and regulation, and optimized luminaires - usually in conjunction with LED technology.[17]

[15] https://www.fifty-fifty.eu/

[16] dena, n.d.-h

[17] KEA et al., n.d.p. 58

Supported by:
Federal Ministry for Economic Affairs and Climate Action
European Climate Initiative EUKI
on the basis of a decision by the German Bundestag

Treuenbrietzen: The conversion of the street lighting to LED was planned. Whereby a conversion of 60% would lead to savings of 75,500€ per year. A conversion of 90% of the street lighting would even lead to annual savings of 113,000 euros. [18]

Table 3: Examples Public Lighting

2.4 Urban mobility

In the field of action mobility, the focus is on the energy consumption caused by the transport routes of the employees of the municipal administration. A distinction is made between business travel and commuting. Business trips are made in the course of fulfilling municipal tasks. Commuting refers to the distance traveled by municipal employees between their homes and their workplaces.[19]

Treuenbrietzen: The focus was initially placed on the topic of mobility, as the citizens wished for better connections between the districts.[20]

Table 4: Examples Urban Mobility

[18] Wachs, 2019

[19] dena, n.d.-j

[20] Stadt Treuenbrietzen, 2017

Supported by:
Federal Ministry for Economic Affairs and Climate Action
European Climate Initiative EUKI
on the basis of a decision by the German Bundestag

2.5 Energy Systems & Renewable energy

The energy system is another important adjusting screw for more energy efficiency. What matters here is the extent to which the energy supply (electricity, heat, gas) is in municipal hands and the municipality has a direct influence on the final energy supply.[21]

Berlin Solar Act & Solar obligation
In Berlin, a solar obligation will apply from January 1, 2023. The aim of the Berlin Solar Law is to make the solar potential on Berlin's roofs usable and thus make an important contribution to achieving climate protection goals.[22] The Berlin Solar Act came into force on July 1, 2021. The solar obligation applies from January,1 2023. The Solar Act applies to new buildings and for basic roof renovations. Stricter requirements apply to public sector buildings. These are based on the Berlin Climate Protection and Energy Transition Act. Alternatives to PV systems on the roof are solar thermal systems or PV systems on the building facade.[23] Among the lighthouse projects that Berlin has already realized in the field of solar energy is the listed Red City Hall. As early as 2010, a solar power system was installed on the roof of the Red City Hall.[24] Various website offer information on the Solarwende Berlin: • Solarwende Berlin[25]: provides extensive information on the solar turnaround in Berlin. • SolarZentrum Berlin[26]: provides independent, free advice. • PV-Dashboard Berlin[27]: provides daily updated data on Berlin's solar power production. Climate protection pioneers: With the passing of the law, Berlin joins the German states of Hamburg and Baden-Württemberg as a climate protection pioneer in the use of renewable energy potential in the building sector.[28]

Table 5: Example Energy System & Energy Transition Berlin

[21] dena, n.d.-f

[22] Senatsverwaltung für Wirtschaft, n.d.

[23] Solarwende Berlin, 2022

[24] EUMB Pöschk GmbH & Co. KG, n.d.-a

[25] https://www.solarwende-berlin.de

[26] https://www.solarwende-berlin.de/solarzentrumberlin/das-solarzentrum-berlin

[27] https://pv-dashboard.berlin

[28] EUMB Pöschk GmbH & Co. KG, n.d.-b

Supported by:
Federal Ministry for Economic Affairs and Climate Action
European Climate Initiative EUKI
on the basis of a decision by the German Bundestag

3. Legal and administrative regulations for these services

The basis for the task of municipal energy management are numerous strategies, laws and regulations at European as well as national level. At the European level, the most important strategies are the EU Climate and Energy Framework 2030 and the European Green Deal. Relevant European directives are, for example, the Renewable Energy Directive, the Energy Efficiency Directive and the EU Building Directives. At the national level in Germany, the Energy Concept of Sept. 28, 2010, is the basis for the German federal government's energy policy. Important laws include the Federal Climate Protection Act (KSG), the Renewable Energies Act (EEG), the Building Energy Act (GEG) and the Energy Efficiency Act.[29]

3.1 European Union

EU Climate and Energy Framework 2030

The 2030 climate and energy framework includes EU-wide targets and policy objectives for the period from 2021 to 2030. As part of the European Green Deal, the Commission proposed in September 2020 to raise the 2030 greenhouse gas emission reduction target, including emissions and removals, to at least 55% compared to 1990. Key targets for 2030:

- At least 40% cuts in greenhouse gas emissions (from 1990 levels)
- At least 32% share for renewable energy
- At least 32.5% improvement in energy efficiency[30]

European Green Deal

The European Green Deal aims for a transition to a modern, resource-efficient and competitive economy that will emits no net greenhouse gases by 2050. Its main goal is to become the first climate neutral continent. To reduce net greenhouse gas emissions by at least 55% by 2030 compared with 1990 levels, the EU Commission has presented concrete proposals for a new climate, energy, transport and tax policy. Amongst other topics, the European Green Deal addresses energy as a field of action. It aims for refurbished, energy-efficient buildings, cleaner energy and the latest clean technologies – all in all: an efficient energy transition within the European Union. [31]

With a view to achieving the EU's 2030 energy and climate policy goals, EU countries are required to prepare Integrated National Energy and Climate Plans (NECPs) for the ten-year

[29] BMWK, 2021

[30] European Commission, n.d.-a

[31] European Commission, n.d.-d

period 2021-2030. The national plans outline how EU countries plan to proceed in the following five areas: Energy Efficiency, Renewable Energy, Greenhouse Gas Emissions Reduction, Interconnections, and Research and Innovation.[32]

The final integrated NECP´s for 2021 to 2030 of the Member States and the European Commission's individual assessment of each NECP can be found on the website of the European Commission.[33]

Renewable Energy Directive

The directive defines the framework for the promotion of energy from renewable energy sources. It sets binding national targets for the overall share of renewables in gross final energy consumption and in the transport sector. It also includes rules for joint projects, administrative procedures, information and access to the electricity grid.[34]

Energy Efficiency Directive (EED)[35]

The directive establishes a host of goals and measures to increase energy efficiency. One of the main targets is to reduce EU-wide energy consumption by 32.5% by 2030 compared with a reference development from 2007. To achieve this, the directive obliges member states to take measures to save final energy, among other things.[36]

Energy Performance of Buildings Directive (EPBD)[37]

The directive aims to reduce energy consumption in buildings in the EU.[38]

On December 15, 2021, the EU Commission presented its proposal for a new version of the EU Energy Performance of Buildings Directive (EPBD). The EPBD is now intended to increase the renovation rate more strongly and contribute to modernizing and decarbonizing the building stock in the EU. To this end, the requirements for existing buildings will also be significantly tightened. The draft directive presented by the European Commission in December 2021 is not yet final. In 2022, the European Council took a position on this proposal, and in mid-March 2023 the EU Parliament also gave its opinion. It is expected that the final text of the directive will be negotiated in the trilogue in April and that an agreement could be reached before the end of 2023. Key points in the negotiations will include the design of the MEPS (Minimum Energy Performance Standards) - particularly with regard to scope for national implementation - and the extent to which the MEPS affect the worst buildings - including in the residential building sector.

---

[32] European Commission, n.d.-b

[33] European Commission, n.d.-e

[34] BMWK, 2021

[35] EU-Energieeffizienzrichtlinie

[36] BMWK, 2021

[37] EU-Gebäuderichtlinie

[38] BMWK, 2021

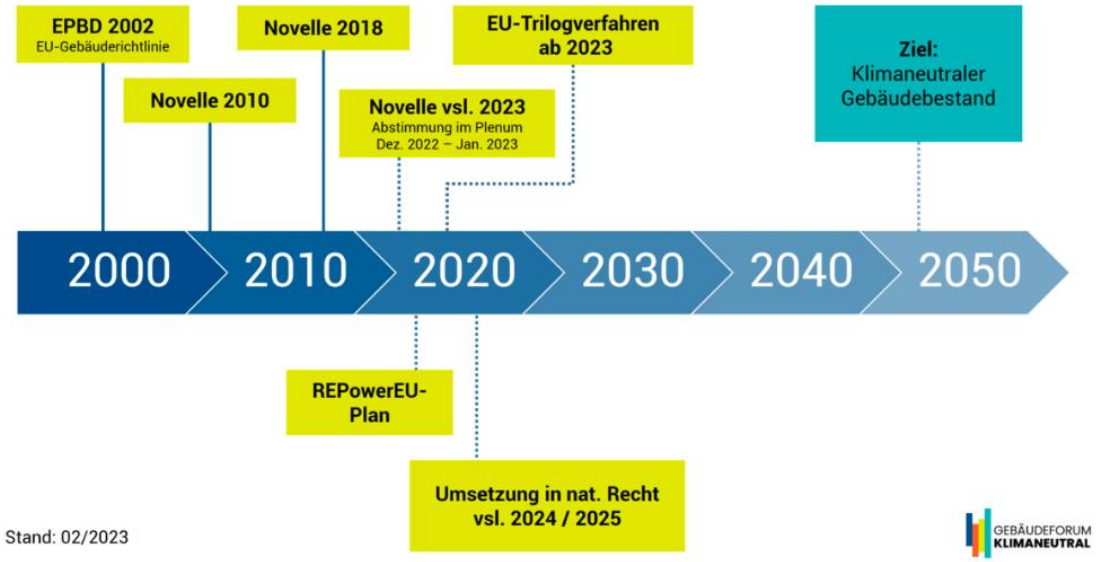

Figure 3: Further development of the Energy Performance of Buildings Directive (EPBD), source: dena/Gebäudeforum klimaneutral (www.gebaeudeforum.de), 2023

In addition, the concrete requirements regarding ZEB (Zero Emission Building) and the further development or Europe-wide harmonization of the Energy Performance Certificate (EPC) will be negotiated. In response to the war in Ukraine, the EU Commission adopted the REPowerEU plan in spring 2022, which will also have an impact on the EPBD. The plan includes a solar obligation for building roofs, a ban on new gas or oil heating systems, a heat pump offensive and a recommendation of tax measures for energy savings. These approaches are being incorporated into the current amendment of the EPBD.[39]

3.2 Germany

3.2.1 Federal legislation

Federal Climate Protection Act (KSG)[40]

The Climate Protection Act came into force on December, 18, 2019.[41]

Its purpose is to ensure that national and European climate protection targets are met. The basis is the obligation under the Paris Agreement based on the United Nations Framework Convention on Climate Change. According to this, the increase in the average global temperature is to be limited to well below two degrees Celsius and, if possible, to 1.5

[39] Gebäudeforum klimaneutral, 2023

[40] Klimaschutzgesetz

[41] BMUV, 2019

degrees Celsius compared with the pre-industrial level, in order to keep the effects of global climate change as low as possible.[42]

An amended Climate Protection Act entered into force on August 31, 2021. With the amendment the German government has tightened climate protection targets and anchored the goal of greenhouse gas neutrality by 2045. By 2030, emissions are already to be reduced by 65 percent compared with 1990. A reduction target of at least 88 percent applies for the year 2040. On the way there, the law provides for specific annual reduction targets in the 2030s. After 2050, the German government is aiming for negative emissions. The climate targets are continuously reviewed by monitoring. Starting in 2022, the Expert Council on Climate Issues will present a report every two years on the targets, measures and trends achieved to date. The German government is currently working on a comprehensive emergency climate protection program. It is designed to ensure that Germany is on the right track to achieve its climate protection targets for 2030.[43]

Buildings Energy Act (GEG)[44]

The GEG contains requirements for the energy quality of buildings, the preparation and use of energy certificates, and the use of renewable energies in buildings. It came into force on November 1, 2020. A further amendment came into force on January 1, 2023. The former Energy Saving Ordinance (EnEV[45]), the Energy Conservation Act (EnEG[46]) and the Act on the Promotion of Renewable Energies in the Heat Sector (EEWärmeG[47]) were merged with the GEG. The current European requirements for the energy performance of buildings were fully implemented with the GEG 2020 and the regulation of the lowest energy building was integrated into the energy saving law.[48]

On April 19, 2023, the German government passed the 2nd amendment to the Building Energy Act (GEG). According to this, at least 65% of renewable energy must be used when installing new heating systems from 2024 on. The draft law is intended to anchor the switch to renewable energies for heating and water heating in law, to initiate the decarbonization of the heating sector and to implement it step by step.[49]

The website of the Federal Ministry of Housing, Urban Development and Construction states: *'(...) from January 01, 2024, as far as possible, every newly installed heating system*

[42] BMUV, 2021

[43] Presse- und Informationsamt der Bundesregierung, 2022b

[44] Gebäudeenergiegesetz

[45] Energieeinsparverordnung; initial entry into force in 2002, latest revised version in 2007, expiration in 2020

[46] Energieeinsparungsgesetz; initial entry into force in 1976, latest revised version in 2013, expiration in 2020

[47] Erneuerbare-Energien-Wärmegesetz; initial entry into force in 2009, latest revised version in 2020, expiration in 2020

[48] BMWSB, 2023b

[49] Deutscher Städte- und Gemeindebund e.V., 2023

must be powered by at least 65% renewable energy. (…) Existing heating systems can continue to be operated. (…)[50]

The amendment is the subject of broad, controversial, and ongoing debate. Statements and criticism come from the federal council, politicians in both the coalition (e.g. FDP leader and finance minister) and the opposition, from business and industry associations (e.g. BDEW[5152], VKU[53]) or other stakeholders such as the German Association of Towns and Municipalities[5455]. For example, both BDEW and VKU are calling for the Building Energy Act to be linked to the Municipal Heat Planning Act, which has yet to be drafted. In parallel with the bill, an adjustment to the federal efficient buildings incentive (BEG) (see chapter Fehler! Verweisquelle konnte nicht gefunden werden.) was also proposed to cushion the burden on households and homeowners.[56]

The German government's goal is to pass the amended GEG 2024 in the Bundestag before the summer break 2023.[57]

Energy Efficiency Act[58]

The new Energy Efficiency Act obligates public authorities, corporations, and data centres to use less energy on the grounds that climate protection and the energy transition will only succeed if energy consumption in Germany is permanently reduced. The Federal and State Governments are to reduce their energy consumption by 50 terawatt hours by 2030. The intention is to implement the new measures as soon as possible in order for them to be sufficiently effective to meet the 2030 targets. The Federal Cabinet approved the Energy Efficiency Act draft and the amendment to the Energy Services Act on April 19, 2023.[59]

Renewable Energy Sources Act (EEG)[60]

The EEG 2023 is the biggest amendment to energy legislation in decades. It lays the foundations for Germany to become climate neutral. It initially came into force in 2000. The amended EEG came into effect on 1 January 2023. For the first time, the new EEG 2023 law is consistently geared towards achieving the 1.5 degree pathway as set out in the Paris

---

[50] BMWSB, 2023a

[51] Bundesverband der Energie- und Wasserwirtschaft e.V. – German Federal Association of the Energy and Water Industries

[52] BDEW, 2023

[53] Verband kommunaler Unternehmen e.V. – Association of Municipal Corporations

[54] Deutscher Städte- und Gemeindebund

[55] Deutscher Städte- und Gemeindebund e.V., 2023

[56] naturstrom AG, 2023

[57] Institut für Energie-Effiziente Architektur mit Internet-Medien, 2023

[58] Energieeffizienzgesetz

[59] Presse- und Informationsamt der Bundesregierung, 2023b

[60] Erneuerbare-Energien-Gesetz

Climate Agreement. The share of renewable energies in gross electricity consumption will almost double within less than a decade. Planning provides that at least 80 percent of Germany's electricity consumption is to be covered by renewable energies by 2030. In addition, the speed of renewable energy expansion will be tripled – on water, on land and on rooftops. As early as July 29, 2022, the law stipulates that renewable energies are in the overriding public interest and serve public safety. This means that in future they will have priority over other interests in weighing decisions. This means that the speed of planning and approval procedures can be significantly increased.[61]

3.2.2 State legislation

Climate Protection Programs of the federal states

In addition to the federal government's goals and measures under the Climate Protection Act, the federal states have each implemented their own climate protection laws and programs.[62]

The Agency for Renewable Energies (AAE) has compiled an overview of the respective climate protection targets and programs of the German federal states in a background paper.

Berlin Climate Protection and Energy Transition Act (EWG Bln)[63]

The Berlin Energy Transition Act, which came into force in 2016, provides the legal framework for Berlin's climate protection policy. An amendment was adopted in 2021. With the passing of the EWG Bln, Berlin has committed itself to reducing its CO2 emissions by at least 70 percent by 2030 compared to 1990 levels. By 2045 at the latest, emissions of the climate-damaging gas are to decrease by at least 95 percent. Key measures to achieve the climate targets are:

CO2 budget and sector targets

Targets are set to reduce carbon dioxide emissions, particularly in the energy supply, buildings, economy and transport sectors.

Mandatory solar energy and higher energy standards for public buildings

In new construction of public buildings, solar systems must be installed on roof surfaces. In the case of new public buildings, at least the Efficiency House 40 standard must be complied with.

CO2-free public vehicle fleet and more charging infrastructure

[61] Presse- und Informationsamt der Bundesregierung, 2022a

[62] Agentur für erneuerbare Energien, 2022

[63] Berliner Klimaschutz- und Energiewendegesetz

The motor vehicle fleets of the public sector are to be CO2-free vehicles by the end of 2030. The aim for charging infrastructure is a ratio of at least one charging point for every 10 registered vehicles. Climate-neutral district heating Between 2040 and 2045 the district heating supply must be CO2-free, from 2030 at least 40% of transported heat must be from renewable energies or unavoidable waste heat. Monitoring of heat data Anonymized data on the energy consumption of buildings, waste heat from commercial enterprises and the age and fuel consumption of heating systems should be collected by the senate and the districts, to draw up heat plans and develop further strategies for saving energy.[64] The central instrument for achieving Berlin's climate targets is the Berlin Energy and Climate Protection Program (BEK 2030). An updated version for the implementation phase 2022-2026 was approved in 2022. [65]

Table 6: Example – Climate Protection Program of Berlin (BEK 2030)

[64] BBU, 2021

[65] Senatsverwaltung für Mobilität, n.d.

Supported by:
Federal Ministry for Economic Affairs and Climate Action
European Climate Initiative EUKI
on the basis of a decision by the German Bundestag

4. Support Programs

4.1 European Union

4.1.1 European Climate, Infrastructure and Environment Executive Agency (CINEA)

The European Climate, Infrastructure and Environment Executive Agency (CINEA) is the successor organisation of the Innovation and Networks Executive Agency (INEA). It has started its activities on 1 April 2021 in order to implement parts of certain EU programmes. CINEA plays a key role in supporting the EU Green Deal through the efficient and effective implementation of its delegated programmes.[66]

EU Energy Funding Programmes:
• Connecting Europe Facility - Energy (Global) Supporting sustainable energy infrastructure projects.
• Energy Use (Horizon Europe) Support to efficient, sustainable and inclusive energy use
• Energy Supply (Horizon Europe) Supporting the transition to a reliable, sustainable and competitive energy system
• EU Renewable Energy Financing Mechanism (RENEWFM) Facilitating investment in renewable energy projects
• Clean Energy Transition (LIFE) Facilitating the transition toward an energy-efficient, renewable energy-based economy
• BUILD UP (LIFE) The European portal for energy efficiency in buildings
• EU Sustainable Energy Week (EUSEW) EU Sustainable Energy Week (EUSEW)

Table 7: EU Funding Programmes in the area of Energy by European Climate, Infrastructure and Environment Executive Agency (CINEA)[67]

[66] European Commission, n.d.-c

[67] European Commission, n.d.-c

4.1.2 ELENA – European Local Energy Assistance

ELENA provides technical assistance for energy efficiency and renewable energy investments targeting buildings and innovative urban transport. Eligible agencies include regional, local, and municipal. Typically, ELENA supports investment programmes above €30 million with a three-year implementation period for energy efficiency and four-year period for urban transport and mobility.[68]

Examples of completed ELENA projects:
• MADEV - Madrid Electrical Vehicles, Spain, 07/04/2014
• REDIBA - Renewable and Energy Efficiency in Diputació de Barcelona, Spain, 13/03/2015
• CPE-ECOLES - Contrats de performance énegétique des écoles de la ville de Paris, France, 22/12/2015
• Provincia de Milano - Energy efficiency Milan Covenant of Mayors, Italy, 29/12/2015
• Aarhus LRT - Aarhus Light Rail Transit project, Denmark, 12/06/2017
• Rotterdam-Leiden Heat Infrastructure, The Netherlands, 17/09/2020
• BEM - Efficiency for Berlin Properties, Germany, 13/03/2023

Table 8: Examples of completed ELENA projects[69]

4.2 Germany

4.2.1 Federal funding for efficient buildings (BEG[70])

In parallel with the 2nd amendment to the Building Energy Act (GEG) an adjustment to the federal efficient buildings incentive (BEG) was also proposed to cushion the burden on households and homeowners.[71]

The federal subsidy consists of three subprograms:

- BEG WG (new construction and complete renovation of residential buildings into an efficiency house),
- BEG NWG (new construction and complete refurbishment of non-residential buildings to create an efficient building) and
- BEG EM (refurbishment with individual measures on residential and non-residential buildings).

[68] European Investment Bank, 2023b

[69] European Investment Bank, 2023a

[70] Bundesförderung für effiziente Gebäude

[71] naturstrom AG, 2023

The KfW[72] and the Federal Office of Economics and Export Control (BAFA[73]) are responsible for implementing the BEG. Funding is provided either in the form of a non-repayable grant for individual measures from BAFA or in the form of a low-interest loan in conjunction with a repayment subsidy from federal funds (loan) for complete renovations or new construction from KfW. Private individuals, municipalities, companies and non-profit institutions are eligible to apply.[74]

4.2.2 NKI Municipal Directive[75]

With the National Climate Initiative (NKI), the German government promotes and initiates climate protection projects throughout Germany, thereby making an important contribution to achieving the national climate protection targets.[76] The NKI provides financial support through various funding programs, like the municipal directive.[77] With the municipal directive the NKI supports cities, municipalities, and counties in climate protection since 2008.[78]

Various strategic and investment measures directly or indirectly related to energy management are subsidized, e.g., introduction and expansion of energy management, energy-saving models at schools and kindergartens, preparation of a municipal heating plan, renovation of outdoor and street lighting, renovation of indoor and hall lighting, measures for climate-friendly mobility, energy and resource efficiency measures in data centers, and other measures.[79]

[72] KfW, 2023

[73] BAFA, 2023a

[74] BMWK, 2022

[75] Kommunalrichtlinie

[76] BMWK, 2023b

[77] BMWK, 2023a

[78] BMWK, 2023b

[79] BMWK, 2023d

"Establishment and expansion of an energy management system" - Subsidized expenses:
• EMS-Software[80] up to a maximum of 20,000 euros • Measurement technology up to a maximum of 50,000 euros, • Performance of building assessments • Specialist personnel who are additionally employed within the scope of the project, to the extent of at least a 50% part-time position • Service providers who support the set-up and operation of the EM - up to a maximum of 45 consultant days • the initial certification of the EM according to a recognized certification system • business trips for further qualification on up to 15 days

Table 9: Example of subsidized expenditure for a specific measure under the NKI municipal guideline[81]

4.2.3 Support programs of the federal states

In some cases, the individual German states had or have additional funding programs in addition to the nationwide programs described above.

Support programs of the German Federal States – examples:
• Baden-Würtemberg - Klimaschutz-Plus[82] • Hessen - Energetische Förderung im Rahmen des Hessischen Energiegesetzes (HEG)[83] • Saarland - Future Energy Program for Municipalities (ZEP-kommunal)[84] (Application suspended due to depleted funding) • Thuringia - Förderprogramm Klima Invest[85]

Table 10: Examples of support programs of the German Federal States[86]

[80] EMS – Energy Management System

[81] BMWK, 2023c

[82] Ministerium für UmweltEnergiewirtschaft Baden-Württemberg, 2023

[83] Wirtschafts- und Infrastrukturbank Hessen, 2022

[84] Ministerium für Wirtschaft, 2023

[85] TMUEN, n.d.

[86] co2online gemeinnützige Beratungsgesellschaft mbH, n.d.

5. Organisation and communication within the municipality

5.1 Internal regulations – department, position

There is no uniform approach on how energy management is organized in German municipalities. Some municipalities have their own positions or even departments for energy management. In other municipalities, the position of climate protection manager also covers the area of responsibility for energy management. Still other municipalities have not yet established or filled the position of either an energy manager or a climate manager. If the position of an energy or climate protection manager exists, it often differs at which point in the municipal administration it is located. If energy management is part of another area such as building management, the energy manager is bound by instructions.

Hanover
In Hanover, energy management is part of the Building Management department.[87]
Birkenwerder
Birkenwerder does not have a separate position of energy manager, but rather the overarching staff position of climate protection manager.[88]
Oranienburg
Oranienburg has its own energy manager position, which is an overarching position in the Department of Urban Development.[89]
Potsdam
In Potsdam, Energy Management is part of the city's real estate service.[90]
Berlin
In the Berlin districts, energy management is a subunit of facility management, which in turn is a subunit of building management.[91]

Table 11: Examples of Internal Regulations from different German municipalities

[87] Hannover.de, 2019

[88] Gemeindeverwaltung Birkenwerder, 2023a

[89] Stadt Oranienburg, n.d.

[90] Landeshauptstadt Potsdam, n.d.

[91] Land Berlin, n.d.

Supported by:
Federal Ministry for Economic Affairs and Climate Action
European Climate Initiative EUKI
on the basis of a decision by the German Bundestag

Municipal energy management is a cross-sectional task of the administration. Functioning interfaces between energy management and the administrative departments responsible for real estate operation are indispensable for a successful energy management system. Especially in larger administrations, this should be taken into account when organizing energy management.[92]

Experience has shown that it helps not to appoint just one person as energy manager, but to divide the core tasks within an entire team. The energy manager then acts as a central interface and contact person for all stakeholders involved with regard to energy consumption in the operation of municipal properties. He or she is entrusted by top management with the introduction and consolidation of the energy management system. Successful energy management requires personal skills in the communicative-organizational and technical areas. Few employees bring both talents to the table at the same time. Therefore, the combination of an energy technician and an energy manager is ideal. Energy managers and energy technicians work more motivated as a team in the long term, the time required for the individual is less, and the solutions are more creative. And a possible failure can be better compensated.[93]

The competences of the energy management must be secured by the top management – within the rules of procedure, an energy directive or energy guidelines (e.g. authority to instruct operating personnel and janitors, access to consumption, building and system data, Contact person for energy-related tasks for external service providers, building managers and janitors, access to building control systems and remote meter reading, influence on the drafting of municipal energy supply contracts contracts).[94]

[92] KEA et al., n.d., p. 17

[93] KEA et al., n.d., p. 19

[94] KEA et al., n.d., p. 21

Supported by:
Federal Ministry for Economic Affairs and Climate Action
European Climate Initiative EUKI
on the basis of a decision by the German Bundestag

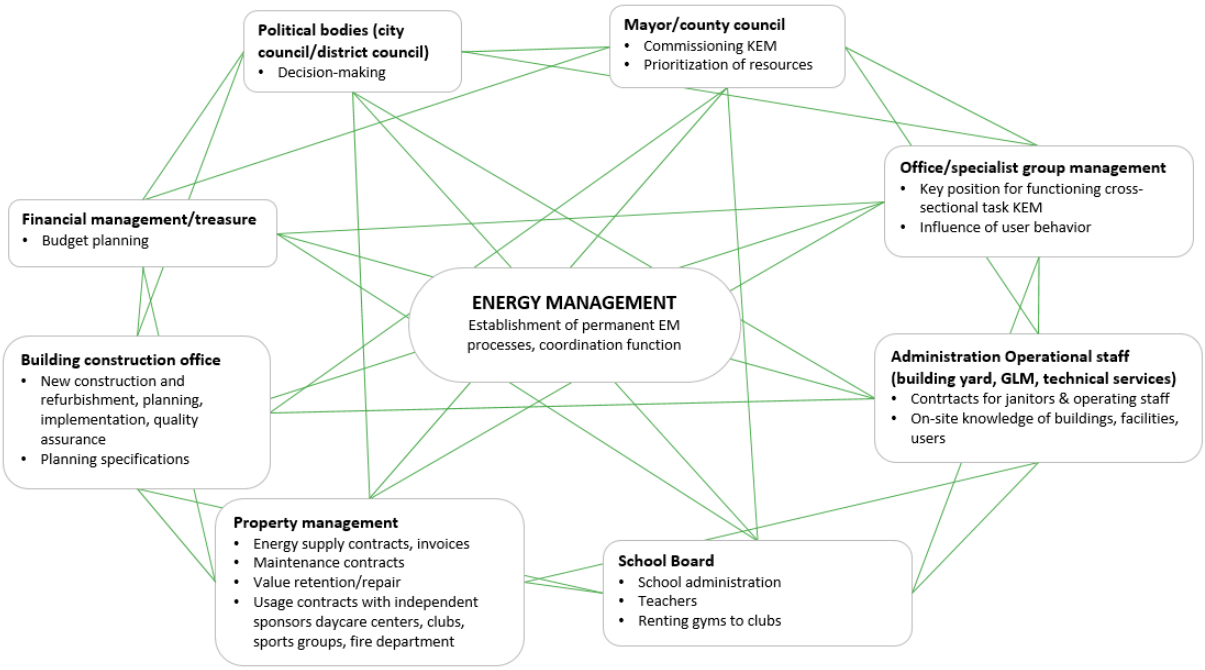

Figure 4: Interfaces of the municipal energy management in the administration, own representation based on KEA et al., n.d., p. 22

Smaller vs. larger municipalities

The initial situation in local governments varies, depending on how departments, responsibilities, tasks, competencies and data are distributed. In smaller municipalities, communication channels tend to be short, and organizational structures can be established with few contacts. In larger municipalities, a comprehensive analysis of the existing administrative structures is worthwhile in order to find points of contact, to plan the distribution of tasks and interfaces, and to coordinate these with the offices and departments concerned. All adjustments lead to success over time if the mayor supports the processes![95]

[95] KEA et al., n.d., p. 23

Supported by:
Federal Ministry for Economic Affairs and Climate Action
European Climate Initiative EUKI
on the basis of a decision by the German Bundestag

Energy Management up to 10,000 Inhabitants	Energy Management for Populations Of 10,000 Or More	Energy Management in Rural Districts
• At least one person responsible with a fixed time quota • Intensive support from the administration • Technical support by building yard, janitor, volunteers or inter-municipal cooperation	Energy team with shared tasks: Communication and technology	In the case of several sites distributed throughout the district, the solution may be centralized management - for example, in the real estate office - with the involvement of other specialized offices such as the education office and (janitor) teams for the individual sites.

Table 12: Organizational integration of energy management under different municipal conditions, own representation, source: KEA et al., n.d., p. 23

The integration of the tasks of the municipal energy management into the organizational structure of the administration depends on the type of local authority as well as on the number, type of use and size of the properties to be managed. The task should be integrated into the municipal organization in such a way that influence on building technology, building operation, building use, planning and construction is ensured. It is advisable to set up a staff unit for energy management. This will clarify the interdepartmental responsibility within the municipal administrative structure. Energy management can be assigned to central departments such as the building management department, the building construction department, or the environmental protection department. However, the departments responsible for real estate operation must always be involved.[96]

Hanover – Energy Management as a separate subject area with various thematic areas97

The independent department is divided into the following areas:

- Energy purchasing
- Energy management
- Energy controlling
- Optimization of operations
- Saving energy by changing behaviour

Table 13: Internal structure of the energy management in the city of Hanover

[96] KEA et al., n.d., p. 23

[97] Hannover.de, 2019

5.2 Reporting and communication with other departments

Both, reporting and internal communication are closely linked to the internal organizational structure and position of the energy manager within the municipal administration. For example, in smaller municipalities, the energy manager may report directly to the mayor. In larger municipalities with a large number of departments, energy management may not be a staff position, but may be accountable to the department head, e.g., of the building management department, and only then to the mayor.

In any case, the mayor exercises an important role and must lead the way in saving energy. He or she formulates goals, supports the formation of functioning organizational structures and backs the actors against internal and external resistance. The subordinate administrative level is also of central importance for the success or failure of the project: Here, the project must be accepted and supported. The relevant heads of department should therefore be informed before the measures begin and asked for support in their areas of responsibility. It is important to pay attention to the informal hierarchies, i.e. the invisible influences on internal administrative decisions.[98]

Berlin
In the Berlin districts, energy management is a subunit of facility management, which in turn is a subunit of building management (= "service unit"). Energy Management is therefore bound by instructions. The Head of the Department for Building and Urban Development has the authority to issue directives.[99]

Table 14: Examples Reporting

5.3 Communication with buildings'/facilities' owners

Since the energy manager is only responsible for public properties, his area of responsibility primarily includes public buildings such as schools and administrative buildings.

Key players such as building managers, facility operators and janitors, as well as building users, should be informed about the goals and structures and involved directly at the start of the project.[100]

[98] KEA et al., n.d., p. 17

[99] Land Berlin, n.d.

[100] KEA et al., n.d., p. 17

Supported by:
Federal Ministry for Economic Affairs and Climate Action
European Climate Initiative EUKI
on the basis of a decision by the German Bundestag

6. Communication with external institutions

6.1 European Union

European Energy Award (EEA)[101]

The Association European Energy Award AISBL (Association-sans-but-lucratif) is an international non-profit association. 2023 is the seventh year of formal operation. By the beginning of 2022 the AISBL had eight ordinary member countries and ten pilot countries. Switzerland currently has the highest number of awarded local authorities (total: 459).[102]

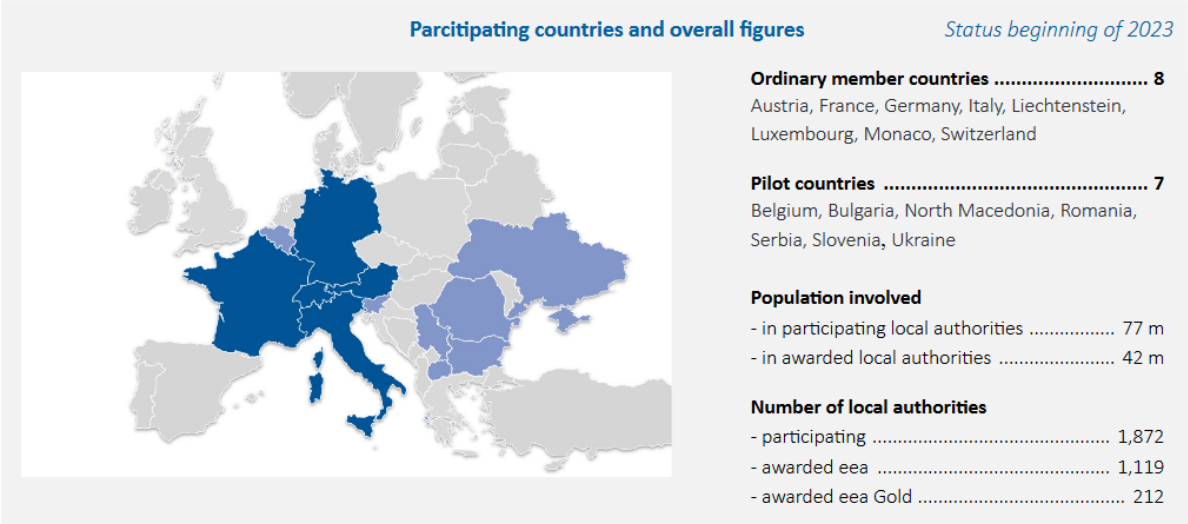

Figure 5: Participating countries of the european energy award, source: AISBL, 2023, p. 4

[101] AISBL, n.d.

[102] AISBL, 2022

Supported by:
Federal Ministry for Economic Affairs and Climate Action
European Climate Initiative EUKI
on the basis of a decision by the German Bundestag

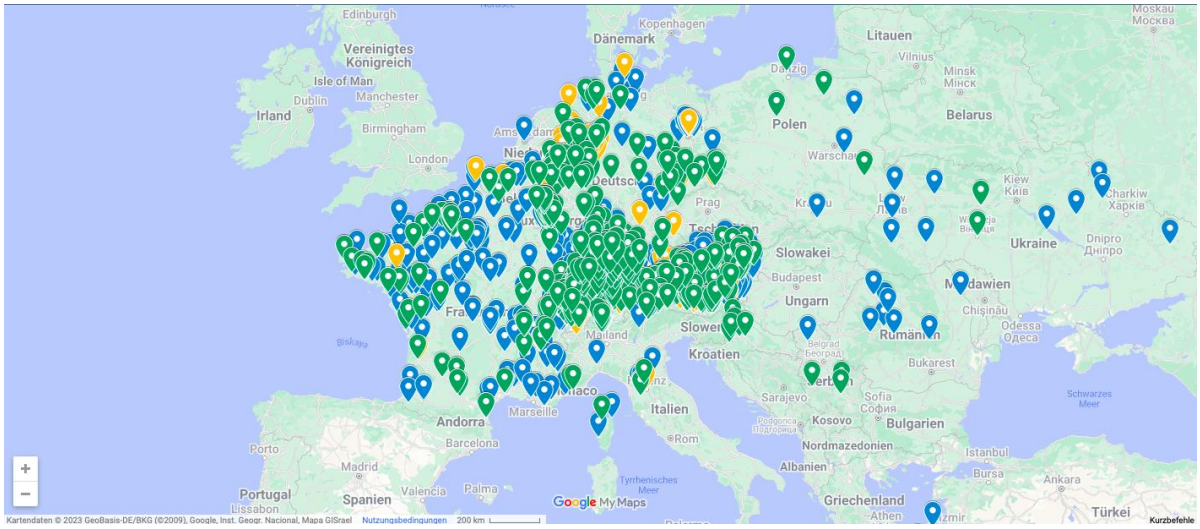

Figure 6: European Energy Award Participating Municipalities, source: AISBL, 2023

An overview of all so called 'Gold municipalities' awarded with the European energy award with further information on the award can be found on the EEA website. Awarded European municipalities outside Germany are for example Lausanne, Basel, Bern and Luzern (Switzerland), Virgen, Großschönau (Austria), Tandel, Schifflange and Beaufort (Luxembourg).[103]

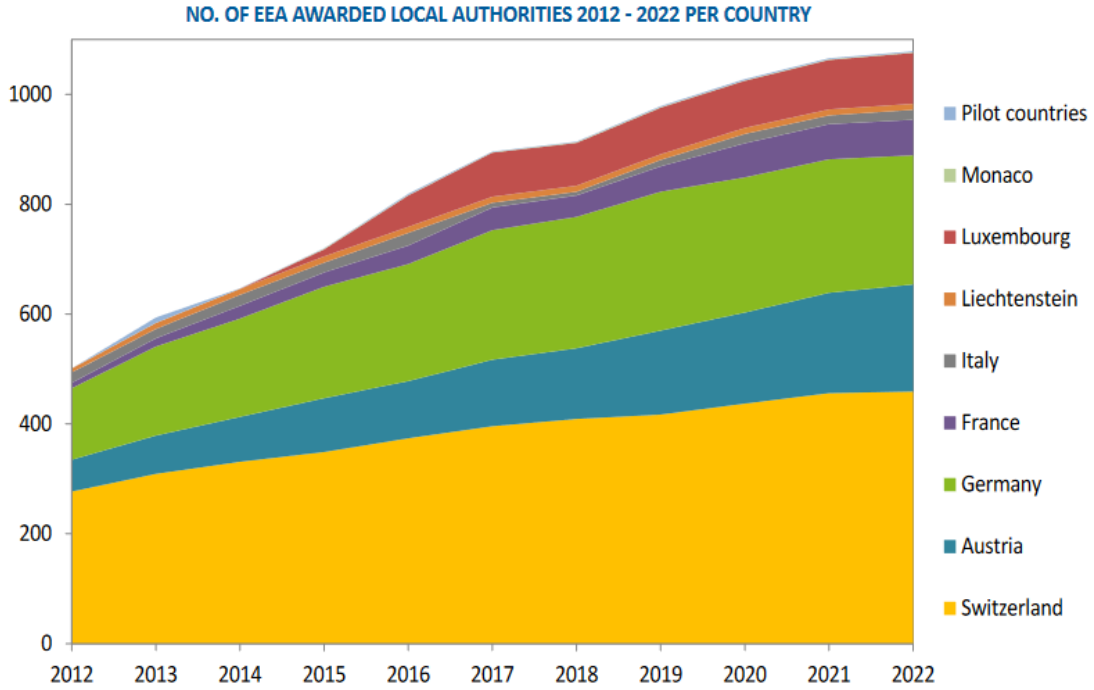

Figure 7: Number of eea awarded local autjorities 2012 – 2022 per country, source: AISBL, 2022

[103] AISBL, n.d.

6.2 Germany

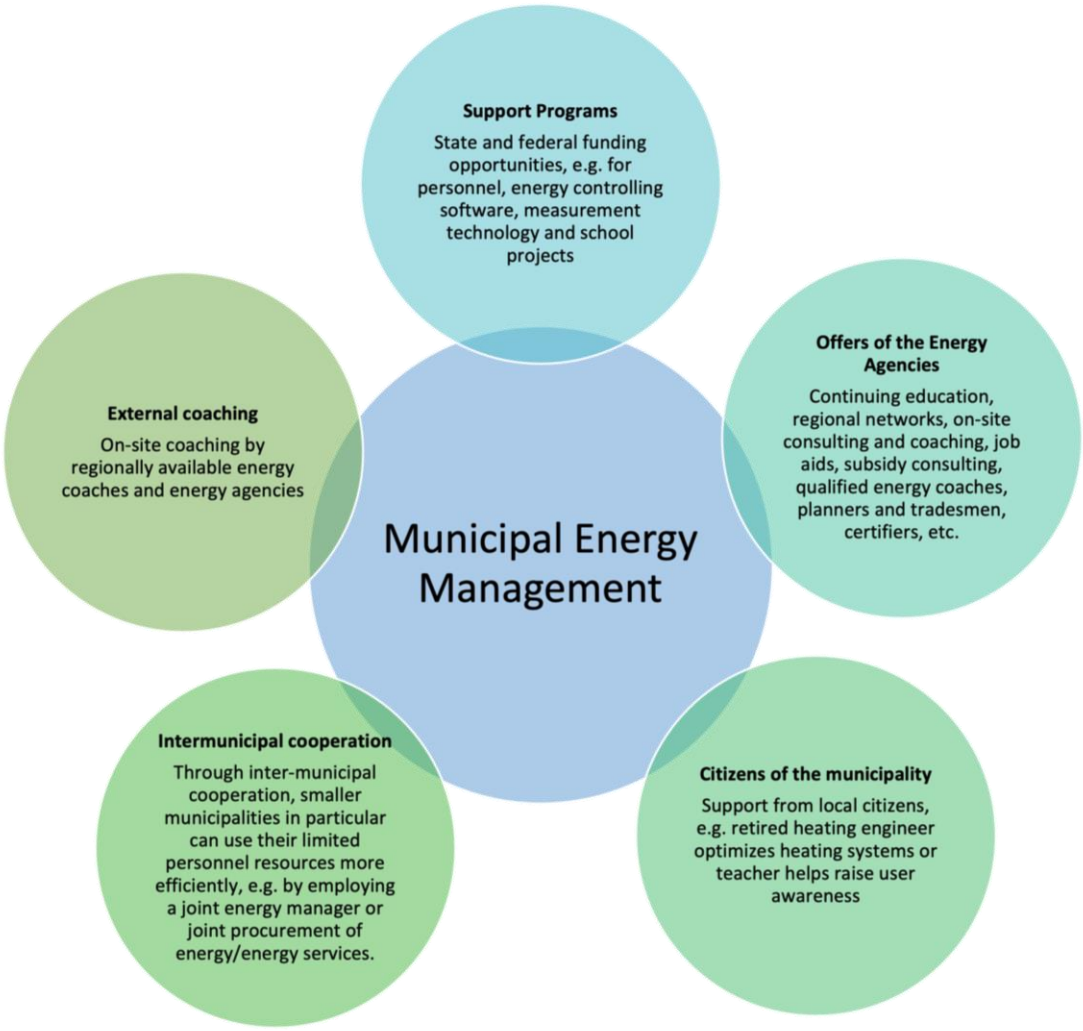

Figure 8: Overview of external institutions, own representation based on Kom.EMS Leitfaden - S. 25

6.2.1 Energy Agencies

Federal Energy Agency (dena – Deutsche Energieagentur)

The German Energy Agency supports the German government in achieving its energy and climate policy objectives. Dena brings together partners from politics, business, the

scientific community and all parts of society.[104] On the website Energieeffizienz-Kommune, dena provides information on different aspects of municipal energy management, like fields of action in energy and climate protection management, implementation aids, good examples and its own range of services (e.g. a provider database of services in the field of energy efficiency, renewable energies and climate protection or consulting with currently 35 listed providers in Germany).[105]

dena has developed its own energy and climate protection management system (EKM[106]). The EKM helps to successfully implement energy efficiency projects in municipalities and to optimally exploit savings potential. EKM supports municipal administrations to determine their own initial situation and, on this basis, to develop suitable focal points and strategies for increasing energy efficiency. The focus is on a systematic approach that considers all fields of action for saving energy in the areas of buildings, electricity use, energy systems and transport.[107]

Currently, around 50 municipalities throughout Germany are applying dena's EKM. In addition, municipalities have the opportunity to be certified by dena as dena Energy Efficiency Municipality. In addition to other requirements for certification, a position as energy and climate protection coordinator must first exist and be filled in the municipality. Currently, 15 municipalities in Germany have been certified for the first time. The dena practice database contains a large number of examples of municipal implementation of energy efficiency and climate protection measures.[108]

State Energy Agencies

Like dena at the federal level, energy and climate protection agencies also exist at the state level in all 16 German states. They are united in the Federal Association of Energy and Climate Protection Agencies in Germany[109] (eaD[110]). The energy and climate protection agencies at the state level implement the energy and climate policy goals in the regions and municipalities in concrete terms.[111] The eaD is currently composed of 39 members.[112] This means that in some federal states there is even more than one energy and climate protection agency.

[104] dena, n.d.-e

[105] dena, n.d.-b

[106] Energie- und Klimaschutzmanagementsystem

[107] dena, n.d.-a

[108] dena, n.d.-d

[109] https://energieagenturen.de

[110] Bundesverband der Energie- und Klimaschutzagenturen Deutschlands

[111] eaD e.V., n.d.-a

[112] eaD e.V., n.d.-c

Equivalent to dena's energy and climate protection management system, the four state energy agencies of Baden-Württemberg (KEA-BW[113]), Saxony (SAENA[114]), Saxony-Anhalt (LENA[115]) and Thuringia, have developed their own municipal energy management system Kom.EMS. Kom.EMS is an online based tool for the systematic development and consolidation of an energy management system for municipal administrations. Through its holistic approach, Kom.EMS involves all levels of administration relevant to energy management.[116] Kom.EMS consists of the four instruments Check, Guide, Knowledge Portal, Quality Assurance.[117] In Kom.EMS, certification is possible in three different quality levels: Basic, Standard, Premium.[118] At the moment, a number of municipalities from a total of 9 federal states are participating in Kom.EMS.[119] An overview of all participating municipalities can be found on the corresponding website.

It is important to know that the state energy agencies are not only a contact point for municipalities, but also for other actors such as end consumers, companies and other multipliers.[120]

KEA – State Energy Agency Baden-Württemberg[121]

- Municipal Climate Congress 2023 – May 17th 2023, Karlsruhe
- Best practice municipalities in Baden-Württemberg

LENA – State Energy Agency Saxony-Anhalt[122]

- Annual state network meeting "Energy & Municipality" – November 9th, 2022, 16th meeting, Halle (Saale)
- Publication (2023): https://lena.sachsen-anhalt.de/fileadmin/Bibliothek/Sonstige_Webprojekte/Lena/Dokumente/Downloads/Publikationen/Energie-Kommunen_Sachsen-Anhalt/LENA_Energiekommunen_Sachsen-Anhalt_web.pdf

[113] KEA Klimaschutz- und Energieagentur Baden-Württemberg GmbH

[114] Sächsische Energieagentur - SAENA GmbH

[115] Landesenergieagentur Sachsen-Anhalt GmbH (LENA)

[116] LENA, n.d.-d

[117] LENA, n.d.-b

[118] LENA, n.d.-a

[119] LENA, n.d.-c

[120] eaD e.V., n.d.-b

[121] https://www.kea-bw.de

[122] https://lena.sachsen-anhalt.de

ThEGA - State Energy Agency Thuringia[123] • Municipal Energy Managers Workshop Series since 2012 • Best Practice Videos (Eichsfeld district, City of Meiningen) SAENA – State Energy Agency Saxony[124] • 16th Annual Conference "Municipal Energy Dialogue Saxony – June, 12th, 2023, Dresden • Planning guide street lighting • Practical examples of municipal energy management from Saxony in the Saxony Energy Portal

Table 15: Example activities and provided information of the four state energy agencies, who developed the Kom.EMS management system

Figure 9: Overview of Energy and Climate Protection Agencies, Germany Federal Association, source: eaD e.V., n.d.-b

Regional energy agencies

In some German states, there are several regional energy agencies instead of or in addition to a single state energy agency.

[123] https://www.thega.de

[124] https://www.saena.de/index.html

Baden-Württemberg: There are five other regional energy agencies in addition to the state energy agency KEA:
Freiburg: Energieagentur Regio Freiburg GmbH
Heidelberg: KliBA – Klimaschutz- und Energie-Beratungsagentur Heidelberg- Rhein-Neckar-Kreis gGmbH
Karlsruhe: KEK – Karlsruher Energie- und Klimaschutzagentur gGmbH
Mannheim: Klimaschutzagentur Mannheim gGmbH
Stuttgart: Energie-Beratungs-Zentrum Stuttgart e.V.

Table 16: Example of regional energy agencies in Baden-Würtemberg

6.2.2 Citizens of the municipality

A clearly defined goal and a good information strategy help with the integration, convince the city council and strengthen the perception of the city administration as a role model for climate protection and energy efficiency among citizens and companies.[125]

In some municipalities, citizen participation is used to prioritize and support energy management measures to be implemented. For example, citizens are given the opportunity to express their wishes and opinions on planned measures at events set up for this purpose.

6.2.3 Intermunicipal communication

German Association of Cities and Towns - Energy Management Working Group

The Association of German Cities is the voice of cities and the national local-authority association of cities which are not belonging to a county as well as of most cities and towns within counties. As a community of solidarity of cities it represents the idea of local self-government to Federal Government, Federal States (Bundesländer), European Union, governmental and non-governmental organisations. The work and services of the Association of German Cities are primarily geared to the needs and interests of the direct member cities and their citizens.[126]

Within the Association of German Cities there is a working group *Energy Management*. Since 1996, this working group has been developing guidelines for municipal energy management, which are subsequently published by the Association of German Cities.[127]

[125] KEA et al., n.d., p. 17

[126] Deutscher Städtetag, n.d.

[127] Deutscher Städtetag, 2022

German Institute of Urban Affairs

The largest urban research institute in the German-speaking region advises municipalities on all tasks that they face now and in the future.[128] In the Practical Guide to Climate Protection in Municipalities, the topic of energy is addressed in the fields of action Energy & Buildings and Municipal Administration.[129] In addition, the German Congress for Municipal Energy Management is organized annually. The already 25th specialist congress will take place on June 12, 2023 in Eisenach (Thuringia). The focus in 2023 will be on the topic: "Shaping the heat transition. How municipalities can take action".[130]

Intercommunal energy management

Intermunicipal or intercommunal energy management is a practical option for small municipalities with fewer than 10,000 inhabitants in particular to benefit from the advantages of professional energy management. Small towns in particular often lack the human and financial resources to set up a functioning energy management system on their own.[131]

Kyffhäuserkreis (Thuringia) - Three municipalities, one energy manager
A cooperation that is unique throughout Thuringia was launched in May 2023 in the Kyffhäuser district: The mayors of Bad Frankenhausen, Roßleben-Wiehe and the town of An der Schmücke have signed an agreement for Thuringia's first inter-municipal energy manager. The energy manager position is funded by the state of Thuringia through the Climate-Invest funding program and by the federal government for three years with 95 percent of the personnel costs. The state energy agency ThEGA, which advised the three towns on technical matters and the funding application, expects savings in energy costs of 30 to 45 percent and a significant reduction in C02 emissions. The energy manager is due to start work on September 1 at the latest and will look after the 150 or so properties in the three towns - from village halls and gymnasiums to fire stations.[132]

Table 17: Example - Joint communal energy management

6.2.4 External coaching and consulting

Municipalities can have external consultants assist them with municipal energy management on one or more occasions. Permanent support or the assumption of energy management tasks by external service providers is also possible.

[128] Difu, n.d.

[129] Difu, 2023b

[130] Difu, 2023a

[131] ThEGA, 2023

[132] ThEGA, 2023

davidberlin[133]– Berlin energy service provider With the Energy Management Office (EWS), the State of Berlin combines energy data management, energy purchasing, energy contract controlling and energy management consulting for its properties. The operation of the EWS is subject to a public tender procedure. Since the EWS was first put out to tender in 1999, davidberlin has been awarded the contract each time and has been operating the EWS very successfully ever since. The EWS is designed as a permanent institution of the state of Berlin. It is the point of contact for the departments entrusted with energy management within the Berlin administration and is responsible for implementing the measures required to optimize the energy procurement costs of the state of Berlin. This includes, among other things, the management of energy purchasing for the media electricity, natural gas and district heating.[134] Adapton AG – e.g. Cities of Castrop-Rauxel, Soest, Eschborn, Düren[135] As a service provider, Adapton supports municipalities in the implementation of municipal energy management. This includes the establishment and expansion as well as the operation of energy management in municipal properties.[136]

Table 18: Example service providers

Energy efficiency expert list

The energy efficiency expert list[137] for federal funding programs is a nationwide directory of demonstrably qualified experts for energy-efficient construction and renovation. The approximately 13,000 experts listed come from all over Germany and work in energy consulting, architecture, engineering and the skilled trades.[138] The assignment of those enlisted experts for federal funded building projects ensures quality and achievement of energy efficiency targets in order to fulfill funding requirements. This expert list was initiated by Federal Ministry for Economy and Climate Protection (BMWK), the Federal Office for Economic Affairs and Export Control (Bafa), the German state-owned investment and development bank KfW and the dena.

[133] https://david.berlin

[134] Da.V.i.D. GmbH, n.d.

[135] adapton AG, n.d.-b

[136] adapton AG, n.d.-a

[137] https://www.energie-effizienz-experten.de/

[138] dena, n.d.-c

State Association for Energy Efficiency e.V. (LFE[139])

The State Association for Energy Efficiency e.V. (LFE)[140] is the professional association for experts on energy and resource efficiency. Decision-makers from the sectors: buildings, industry, agriculture, transport and mobility as well as energy production and distribution benefit from the expertise of LFE members. By providing qualified advice on planning, execution and use, LFE members make a significant contribution to the optimized use of energy and resources.[141] The LFE also offers continuing education and training for experts, e.g., seminars on the legal basis and innovations of the Building Energy Act (GEG2023), on sample calculations for ventilation systems or on the efficient use of air-to-water heat pumps in renovation projects.[142]

German Energy Consultants Network (DEN[143]) e.V.

The German Energy Consultants Network (DEN) e.V.[144] is an association of engineers, architects, planning offices, master craftsmen and technicians with a common field of work: consulting and planning services for energy-saving construction and modernization of buildings. Also many experts from other fields like resource and material efficiency, energy auditing or mobility are part of the DEN. The association was founded in 2001/2002. By now, more than 850 offices have joined the network and offer their services throughout Germany.[145]

Municipalities can obtain individual and independent advice from climate protection consultants from the network on regional climate protection, energy efficiency, the use of renewable energies and the funding opportunities available for this. It is possible, for example, for the consultants to draw up municipal climate protection concepts, and to develop feasible measures. With regard to the energetic refurbishment of all non-residential buildings (schools, functional or administrative buildings), refurbishment roadmaps can be drawn up and competent construction-accompanying consulting is offered.[146]

DEN also offers an online expert locator for energy and funding consultations.[147]

[139] Landesverband für Energieeffizienz e.V.

[140] https://www.lfe-energieberater.de

[141] LFE e.V., 2023a

[142] LFE e.V., 2023b

[143] Deutsche Energieberater-Netzwerk e.V.

[144] https://www.deutsches-energieberaternetzwerk.de

[145] DEN e.V., n.d.-c

[146] DEN e.V., n.d.-b

[147] DEN e.V., n.d.-a

7. Training and training needs assessment

In addition to the possibility of hiring external consultants (see, employees of the municipal administration, such as energy managers, can also receive training and further education themselves on the topic of municipal energy management. There are various options for this, for example:

Trainings by the energy agencies

The State Energy Agency of Saxony-Anhalt, together with the Saxony-Anhalt Institute of Studies in Municipal Administration (SIKOSA) and the Saxony-Anhalt Chamber of Engineers, offers basic and advanced training to become a municipal energy manager (KommEB). In a modular course, the basics of municipal energy management are taught and employees are enabled to take on the task of energy manager in the municipality.[148]

TÜV Thuringia Academy

The TÜV Thuringia Academy trains energy consultants with a focus on residential buildings and companies. But there is a small interface to municipal energy management in that a seminar on the Building Energy Act is on offer, which could also be interesting for municipal actors, e.g. energy managers or people from building, planning and building regulation offices.[149]

Bildungskompass Energieberater

Bildungskompass Energieberater[150] is an independent information platform for all those interested in training and further education to become a building energy consultant.

[148] LENA, 2023

[149] TÜV Akademie GmbH, n.d.

[150] https://www.ausbildung-energieberater.de/

Supported by:
Federal Ministry for Economic Affairs and Climate Action
European Climate Initiative EUKI
on the basis of a decision by the German Bundestag

8. Cost – benefit calculation

According to an evaluation of projects in Baden-Württemberg, Saxony, Saxony-Anhalt and Thuringia, between 10 and 20 percent of consumption and costs for energy and water can already be saved through non-investment measures. If the average cost of supplying electricity and heat to municipal properties in Germany is taken as a basis for a city with 20,000 inhabitants, i.e. 30 euros per inhabitant per year, energy management can achieve a permanent reduction in the municipal budget of 90,000 to 120,000 euros per year. Experience shows that a professional municipal energy management is the most economical way to reduce costs and CO2 emissions in the operation of municipal buildings.[151]

Municipality type	I	II	III	IV	V	VI
Inhabitants	< 5.000	5.000 – 10.000	10.001 – 20.000	20.001 – 50.000	50.001 – 100.000	> 100.000 (County)
Number of energy-relevant buildings (ex.)	12	20	35	75	130	70
Energy and water costs (ex.)	140.000 €	225.000 €	450.000 €	1,1 Mio. €	2,3 Mio. €	6 Mio. €
Time quota with introduced municipal energy management	25 %*	33 %*	50 %*	75 %*	100 %*	150 %*
Time contingent with introduced municipal energy management (MEM)	Experience shows that the time required for the introduction of a MEM can be twice as long. Depending on the initial situation and the framework conditions, the buildings are successively included in the MEM.					
Saved energy costs per year (~15 %)	21.000 € per year	34.000 € per year	68.000 € per year	165.000 € per year	345.000 € per year	900.000 € per year

Table 19: Personnel expenses for municipal energy management, own representation, * Percent of a full-time position, source: KEA et al., n.d., p. 19

[151] KEA et al., n.d., p. 2

Municipality	Inhabitants	Energy and water costs	Energy management since	Savings
City of Walldorf, Baden-Württemberg	15.909 (2016)	892.000 € (2016)	2013	Heating energy consumption of the 16 energy-relevant properties by 27 percent
Saale-Holzland district, Thuringia	84.525 (2016)	1.524.000 € (2016)	2009	Over 1.500.000 Euro
Unified municipality of Hohe Börde, Saxony-Anhalt	18.769 (2017)	797.000 € (2017)	2016	16.6 percent savings last year, i.e. 1,031,100 kWh of energy and approx. 225 t CO2 less
City of Gröditz, Saxony	7.266 (2016)	239.000 € (2017)	3 years	Energy cost savings of over 33 percent

Table 20: Examples of energy cost savings in four German municipalities, own representation, source: KEA et al., n.d., p. 4f

9. Energy data situation

Regarding the energy data of public properties, the data situation in Germany is very poor. There are not only difficulties in data collection, but in some cases, data is simply not available or not available centrally.

The environmental, nature and consumer protection organization Deutsche Umwelthilfe (DUH), together with Frag den Staat, a project promoting freedom of information, conducted the so-called Climate Building Check. Through the Climate Building Check, energy performance certificates for many public buildings in Germany were made digitally accessible to everyone for the first time.[152]

An energy certificate provides information on the energy quality of a building. It provides information about the energy efficiency of electricity and heat or about primary and final energy (see below) of a building and compares these with the legal requirements of the GEG, which also regulates the requirements and handling of energy certificates. Up to now, energy certificates have only had to be issued in the case of new construction, comprehensive refurbishment, letting or sale, and (official) public access within the building.[153]

The data collection was carried out with the help of citizens who could request energy certificates of public buildings via the DUH website. By April 14, 2021, 533 energy performance certificates had been collected from 1,030 users in 3,066 requests and compiled in a database on which the evaluation was based.[154]

The random samples reveal a devastating condition of public buildings: only a fraction of the schools, town halls, swimming pools and the like in Germany are in a condition compatible with climate targets. In accordance with the Environmental Information Act, energy requirement certificates and renovation roadmaps must be available for all public buildings, which can be viewed by the public and which transparently show which renovation steps are planned in order to achieve climate neutrality with the public buildings as quickly as possible. But in many cases it was only possible to find out information about the energy data at great expense and under threat of action for disclosure. [155]

The handling of energy certificates in Germany leads to much intransparency and unclear responsibilities. Before the energy data contained in the energy certificates can even be viewed, a great deal of stamina and background knowledge is required. Even the certificate itself does not shine with clarity. Of the total of 3,066 inquiries, 928 remained unanswered. Another 269 applicants were ignored despite multiple requests. It was often pointed out that no certificate had been issued or that the certificate was either outdated or being revised. This is despite the fact that, according to §4 of the Building Energy Act (GEG), public buildings are required to set an example in terms of energy. In addition, some public authorities are not aware of their responsibility to provide information and simply refused corresponding requests or a forwarding came to nothing, although the public authorities are

[152] Steinmeyer et al., 2021

[153] Steinmeyer et al., 2021, p. 19

[154] Steinmeyer et al., 2021, p. 6

[155] Steinmeyer et al., 2021, p. 2f

Supported by:
Federal Ministry for Economic Affairs and Climate Action
European Climate Initiative EUKI
on the basis of a decision by the German Bundestag

obliged by law to provide information via the Internet about the fulfillment of their exemplary function.[156]

Frequently, the request was forwarded because the authority contacted was not responsible. Nowhere in Germany is it possible to see centrally who is responsible for a building. Unfortunately, the forwarding does not seem to have been received by the new authority or has been lost. Only in about 17% of all cases did authorities send out an energy certificate. However, this still does not indicate whether the energy certificate is still valid or whether it is a comparable certificate of demand. The evaluation of the Climate Building Check reveals that the energy certificate as an instrument has glaring deficiencies. Neither the provision process nor the energy certificates themselves are consumer-friendly in their current form and thus do not contribute to a transparent presentation of the energy efficiency of public buildings. [157]

The authors of the survey therefore call for mandatory energy demand certificates for all buildings in Germany that are available online, with standardized and extended data and supplementary continuous consumption monitoring. In addition, a nationwide, publicly accessible online registry should be established that contains all available energy certificate data as well as individual renovation schedules in real time. The renovation sequence in the public building stock should then be prioritized according to the level of energy demand, and energy retrofits for all buildings that are not compatible with climate targets should be implemented on a mandatory basis by 2025.[158]

Rendsburg- Eckernförde
Publishes a comprehensive annual energy report including completed and planned refurbishments.
Aachen, Wuppertal
These cities have their own online portal: Not only the energy certificates, but also the monthly consumption data are provided in some cases.
Ostholstein, Frankfurt Am Main
Publishes certificates according to its own model: including heating costs and efficiency scale, and often with extensive recommendations for modernization and more efficient operation.
Berlin
Provides annual energy consumption data by district on a building-by-building basis.

Table 21: Practical examples of transparent municipalities in terms of energy data, source: Steinmeyer et al., 2021, p. 18

[156] Steinmeyer et al., 2021, p. 9

[157] Steinmeyer et al., 2021, p. 11f

[158] Steinmeyer et al., 2021, p. 17

The experience of the "Smarte Energie macht Schule" project by the Independent Institute for Environmental Issues (UfU e.V.[159]) also confirms the poor energy data situation in Germany. The aim of the project was to make electricity consumption and Photo Voltaic (PV) yields at schools nationwide with an installed PV system transparent and visible to students in order to deepen understanding and sensitivity for the energy transition. The data was to be remotely obtained with the help of digital electricity meters, smart meters. Apps should be used to process the data for educational purposes. However, numerous obstacles to project implementation emerged. For example, schools nationwide did not meet the necessary technical and organizational requirements because: 1) No access to PV yield data was available, 2) Smart meters were not installed, 3) Smart meter data could not or were not allowed to be read, 4) No new smart meters were allowed to be installed as part of the project. As a result, the smart meter rollout announced in the 2016 Act on the Digitalization of the Energy Transition[160] failed to materialize (in 2023, the new German government undertakes a new approach for a reformed Energy Transition Digitalization Act[161]). Data retrieval in Berlin became a prime example of unclear responsibilities between district and school offices, building management, building construction office, senate administration, energy management office (EWS) and schools. Requests for data were made to 12 counties, with a response from only 5 counties. Many additional inquiries and contact attempts were necessary. Consequently, the entire data acquisition process took 1.5 years. It thus seems to pose great organizational challenges for municipal building operators/energy management to record energy consumption/load profiles and make them transparently accessible.[162]

Furthermore, the Federal Association of Energy and Climate Protection Agencies in Germany organizes regular expert exchanges on energy data. The next and already 8th exchange will take place on June 15 in Hanover. However, since it is a closed event, the data will probably not be available to the public.[163]

9.1 European Union

The EU currently generates 22 percent of its energy from renewable sources. By the end of the decade, it should be 40 percent, according to the plan announced last year. After Russia attacked Ukraine in February 2022, the EU Commission decided to raise the target to 45 percent. That would require a swift, decisive push to electrify particularly polluting sectors of the economy and clean up the continent's power grid. Due to the war in Ukraine, Europe is trying to replace natural gas from Russia as an energy source. Germany, the EU's largest economy, as well as other countries, have restarted coal-fired power plants, signed long-standing new contracts with gas producers in Africa and the Middle East, and built terminals

[159] https://www.ufu.de/en/

[160] https://dip.bundestag.de/vorgang/.../70189

[161] https://www.bundestag.de/dokumente/textarchiv/2023/kw16-de-digitalisierung-energiewende-941066

[162] UfU e.V., 2023

[163] eaD e.V., 2023

Supported by:
Federal Ministry for Economic Affairs and Climate Action
European Climate Initiative EUKI
on the basis of a decision by the German Bundestag

for shiploads of liquefied natural gas from abroad. That puts the plan to use 45 percent green energy by 2030 in jeopardy. Overall the EU's greenhouse gas emissions are falling more slowly than they should. In almost all areas, the energy transition in Europe is proceeding too slowly. In the energy sector, enough solar plants are being built, but too few wind power plants. Fewer than the required number of heat pumps are being built to meet climate targets. In the transport sector, emissions are rising instead of falling. And EU agriculture is hardly becoming more environmentally friendly either.[164]

9.2 Germany

The energy transition is regarded as the central challenge of the 21st century. It describes the transition from the unsustainable use of fossil raw materials and nuclear power to energy generation from renewable sources. For Germany, wind power, solar thermal energy and photovoltaics are the most important renewable energies. Bioenergy, hydropower, geothermal energy and ocean energy play a minor role in this country. The most important energy sectors are electricity, heat and mobility. In addition to switching to renewable energies, the energy turnaround includes increasing energy efficiency and reducing energy consumption.[165]

Electricity

Power supply via onshore and offshore wind farms and photovoltaic systems has been successively expanded in recent decades. However, the expansion of onshore wind energy in particular has seen a decline in recent years. Experts explain the decline via the many citizen protests against wind farms, but also political obstacles such as the insufficient provision of land and strict regulations regarding wind power and air traffic control, as well as wind power and the protection of monuments and species. These regulations cannot be changed at the municipal level. However, the cities and municipalities have a key function in increasing the acceptance of the citizens.[166]

Heat

One third of all energy-related climate gas emissions in Germany are caused by heat generation. Despite this, it is the sector that has so far received the least attention in the energy transition. In cities and municipalities, however, those responsible have recognized the urgency of a heat turnaround. German municipal utilities are already investing here in the expansion of alternative energy sources. They are well advanced in the energy transition in the heating sector. This is evidenced by a survey conducted by the Association of Municipal Companies (VKU) in 2018. At that time, 19 percent of their projects in the heating sector were related to renewable energies. 80 percent related to power plants with

[164] Niranjan, 2023

[165] Piron, 2020

[166] Piron, 2020

Supported by:
Federal Ministry for Economic Affairs and Climate Action
European Climate Initiative EUKI
on the basis of a decision by the German Bundestag

combined heat and power. According to VKU, the share of renewables in the generation mix of municipal utilities rose from 17.5 percent in 2016 to 21.3 percent in 2017. Many municipal utilities have their own heating network.[167]

Mobility

The goals of the traffic turnaround are, on the one hand, to switch to vehicles with sustainable drive systems and, on the other hand, to restrict individual traffic. There are many levers for local authorities to tighten here. For example, they can improve the charging infrastructure for vehicles with alternative drives, offer car sharing with more environmentally friendly vehicles, and designate parking spaces for electric or hydrogen fuel cell vehicles. Converting the municipal fleet (e.g., waste collection vehicles, snow removal vehicles, and buses) to hydrogen or electricity also contributes to the transportation transition. In addition, municipalities can create incentives for their citizens (e.g., cheaper public transport, more connections, tighter intervals, traffic lights optimized for bicycles, more and safer bicycle lanes) to forego or limit individual and motorized transport.[168]

An increasing share of Germany's energy needs is being met by renewable energies, such as wind power or photovoltaics: in 2021, their share was around 41 percent; in 2022, their share rose to 46.2 percent of gross electricity consumption. By 2030, this figure is set to rise to at least 80 percent. The share of renewable energies is therefore expected to almost double in less than ten years. The rate of expansion must even triple for this to happen. The Renewable Energy Sources Act (EEG) systematically gears the expansion of renewable energies toward achieving the 1.5-degree path under the Paris Climate Agreement. It sets the new, higher expansion targets for wind and solar energy and gives legal priority to renewable energy.[169]

At the recent Berlin Energy Days 2023, initiator and main organiser Jürgen Pöschk appealed for more speed in the implementation of energy transition and climate protection. In doing so, he emphasized the importance of energy transition and climate communication. The challenge for the rapid implementation of energy transition is primarily not technical issues, but acceptance problems. Therefore, the energy transition is increasingly becoming a communication task.[170]

[167] Piron, 2020

[168] Piron, 2020

[169] Presse- und Informationsamt der Bundesregierung, 2023a

[170] EUMB Pöschk GmbH & Co. KG, 2023

10. Innovation and education

An innovative and fruitful way of both cooperation and joint learning is cross-municipal energy management and municipal energy networks. In this way, municipalities can support each other in setting up and implementing energy management and save resources through synergies.

Education and support on the complex topic of municipal energy management is provided by federal, state and local energy agencies, among.

Other nationwide events also serve to promote exchange and networking among relevant stakeholders, such as the annual German Congress for Municipal Energy Management[171] organized by the German Institute of Urban Affairs (difu[172]) or the annual Berlin Energy Days[173].

[171] Difu, 2023a

[172] Deutsches Institut für Urbanistik

[173] https://www.energietage.de/home.html

Supported by:
Federal Ministry for Economic Affairs and Climate Action
European Climate Initiative EUKI
on the basis of a decision by the German Bundestag

11. Good Practices

There are different factors which foster the successful introduction of a municipal energy management system. These are:

- Support and backing from the management level, especially in the face of obstacles.
- Systematic, consistent approach
- Smart organization of the cross-sectional task of municipal energy management through functioning structures and processes as well as good communication in the administration
- Bundling of municipal activities and efficient use of expertise and human resources
- Involvement of the specialist levels - at least real estate operations, building construction and schools
- Cooperation with janitors and building users
- Rapid savings - verifiable examples should be available after 1.5 years at the latest (tip: align the number of buildings examined in the municipal energy management with the personnel capacity).
- Do good and talk about it: Communicate successes quickly and in a targeted manner
- Transparency of activities and results
- Offensive communication throughout the project.[174]

In the following chapters, some very concrete good practice examples from German and European municipalities are presented.

11.1 European Union – Examples from the Energy Cities Network

Energy Cities[175] is a network and community of several hundred local authority representatives from 30 countries. The network gathers frontrunners and energy transition beginners, city officials and technical experts. The European good practices presented here are from cities of the Energy cities network. They include two cities from Central and Western Europe (Vienna, Austria and Delft, Netherlands) and one city from Eastern Europe (Aradippou, Cyprus).

[174] KEA et al., n.d., p. 11

[175] https://energy-cities.eu

11.1.1 City of Vienna, Austria

Vienna, the capital of Austria, has 1 840 570 Inhabitants and is a member of Energy Cities since 2019.

In 2021 Vienna published its Climate Roadmap which quantifies the work it must accomplish to decarbonise its business sectors. Vienna is deploying renewable energies, renovating its heating system and mobilising civic participation in order to reduce and stabilise its carbon footprint at 60 million tonnes of C02 equivalent.

Energy system

The city proposed a budget of 1.29 billion Euros to develop renewable energy and solar energy and to renovate its heating system. This will make it possible to decarbonise its housing stock and decrease its overall CO_2 emissions by 1.9 million tonnes[176].

Vienna will meet its energy needs[177] with heat pumps, waste incineration, geothermal energy and green gas to cover peak demand. The capital is running a series of tests. The first test, which is currently under way, aims to increase hydrogen production in a co-production plant.

In 2040, the city hopes to meet 56% of heat demand using geothermal energy. Field surveys are ongoing. A large-scale heat pump will also cover 55% of district urban heating. The pump will be installed in the water treatment plant before 2040. Additionally, Vienna has created a grant to encourage the development of heat pumps.

Citizen participation and mobility

The department for energy planning has built citizen initiatives into its strategy[178]. In order to support the energy transition and civic participation, the city has launched the RenoBooster project[179], as a follow-up to the 'Smarter Together' project[180] (2016–2021), which was funded by the European Commission. The city has many old and complex buildings that will require costly renovations. With this project, the city has provided a central access point for property owners to find free advice and tools when planning renovations.

In the Simmering neighbourhood, this project has also encouraged local inhabitants to take part in the energy transition through over 40 renovation and electric vehicle sharing projects. Another project, 'WieNeu+'[181], aims to foster innovation in local urban

[176] Stadt Wien, 2022

[177] Energy Cities, 2022

[178] Energy Cities, 2022

[179] European Commission, n.d.-f

[180] Stadt Wien, n.d.-c

[181] Stadt Wien, n.d.-a

Supported by:
Federal Ministry for Economic Affairs and Climate Action
European Climate Initiative EUKI
on the basis of a decision by the German Bundestag

neighbourhoods to make Vienna a smart and adapted city before 2030. This project is based on the 'Smart City Wien'[182] strategy and the city's 2030 Economy and Innovation programme.

In autumn 2017, 6,000 local inhabitants took part in the 'Beat the Street' mobility game[183], and others borrowed a public bicycle and/or e-cargo bike for free. Vienna was a pilot city for the project and stands out for its integrated approach to climate action and its measures to improve its citizens' quality of life.

11.1.2 City of Delft, Netherlands

The city of Delft has 94 512 Inhabitants and is a member of Energy Cities since 2001.

The city of Delft is operating an active energy policy that has enabled it to reduce its carbon emissions by 15% between 1990 and 2022. In 2011, the Dutch city voted to target carbon neutrality by 2050 with the *"Delft energy neutral 2050"* strategy. But only 2% of the local carbon emissions are directly controlled by the city's actions (municipal buildings and facilities).

In addition, a number of citizen and entrepreneurial initiatives for sustainable development are being launched. Delft has therefore taken on the role of facilitating citizen-led projects. This has led to the city of Delft becoming one of the members of the Executive Board of Energy Cities.

Citizen participation, renewable energy and mobility

A number of citizens and companies wanted to achieve energy independence by producing their own energy in order to reduce their carbon footprint and costs. The city decided to encourage these local groups to take on more responsibilities. It empowered them to interpret objectives and provided funding and other resources in order for them to achieve these objectives.

It also implemented a local version of the Dutch Green Deal: the e-deal[184]. This tool is intended to help fund citizen-led projects that support Delft's ambitions for energy and climate transition. The projects must be completed and have sources of funding. The city provides subsidies and boosts project visibility.

Seventeen local stakeholders have signed deals and four projects have been completed. One of these led to the installation of a solar farmon[185] the rooftops of a public school, driven by parents and with the help of the local grocery store, *Ekoplaza*. A Green Village was also built, a sustainable neighbourhood initiative emerged, and the city uses a fleet of electric vehicles to import goods.

[182] Stadt Wien, n.d.-b

[183] Energy Cities, 2023a

[184] Gemeente Delft, n.d.

[185] Energy Cities, 2023f

Financing

In order to support citizen participation in the local energy transition, in 2006, Delft created an energy-saving fund[186] via a loan from the National Bank. This fund is used to grant low-interest loans to citizens and non-profit organisations. They can use these loans to invest in renewable energy systems, including heat pumps, solar panels and/or energy-saving measures. There is an additional financial tool citizens can use to renovate their homes[187].

The fund is self-sustained: over time, it is replenished as loans are paid off. Since it was launched, the Delft city council has maintained and developed this model of a self-sustaining fund, which leads to improvements, even on a small budget.

A grant system was recently added to this scheme. A total of 21 homes and 2 clubs have applied for it so far. This system has enabled private homeowners to receive up to €1,850 if its residents reduce their energy consumption by over 10% (according to the energy index).[188]

11.1.3 City of Aradippou, Cyprus

The Cypriot city of Aradippou has 19 594 Inhabitants and is a member of Energy Cities since 2015. It aims to become a Smart City[189] by 2030. To this end, it has submitted an Integrated National Energy and Climate Plan (INECP) to the European Commission in 2020, in which it proposes measures to decarbonise its energy. Although this document is recent, the Aradippou Municipal Council has already carried out many interregional European projects. As a member of the Energy Cities Board since 2019, Aradippou has an ambitious energy and social policy.

Mobility

As far as transport is concerned, Aradippou follows the national objectives of Cyprus. The city seeks to develop the share of clean individual and collective vehicles in tourist areas. The 2030 target is a road traffic share of 20% of electric cars and buses and 9% of hydropower engines. To this end, Aradippou is participating in the "ECORouTs" interregional project to promote eco-responsible transport and carpooling.

Energy

In terms of energy, the climate of Cyprus gives a clear advantage to solar electricity production. Thus, Aradippou has set up a subsidised loan with the *Cyprus Cooperative Bank*. Citizens will be able to obtain financial assistance to install photovoltaic panels. Today, the town is negotiating a zero-interest loan for the energy renovation of public and private buildings.

[186] Energy Cities, 2023d

[187] Energy Cities, 2023e

[188] Energy Cities, 2023c

[189] Aradippou Municipality, 2017

Finally, the municipality is organising the recycling of its biodegradable waste. A separate collection allows part of this waste to be used to produce electrical and thermal energy (biogas).

Promoting inclusion through sustainable environmental and social actions

Citizen participation

To reduce CO_2 emissions, Aradippou launched the collaborative and citizen-based campaign, *"I plant for Climate"*. For a minimum of 3 years, schools, NGOs and companies will be able to plant, finance and care for new plants. These plants will have been selected to suit the environment in which they will be grown. The final objective for Aradippou is to increase the number of trees planted from 70,000 to 300,000 per year until 2030.[190]

11.1.4 Further examples

The Energy cities website[191] contains an overview of all member cities within the network. Many more European practical examples and profiles of the cities and municipalities in the network with comprehensive information in English can be found online.

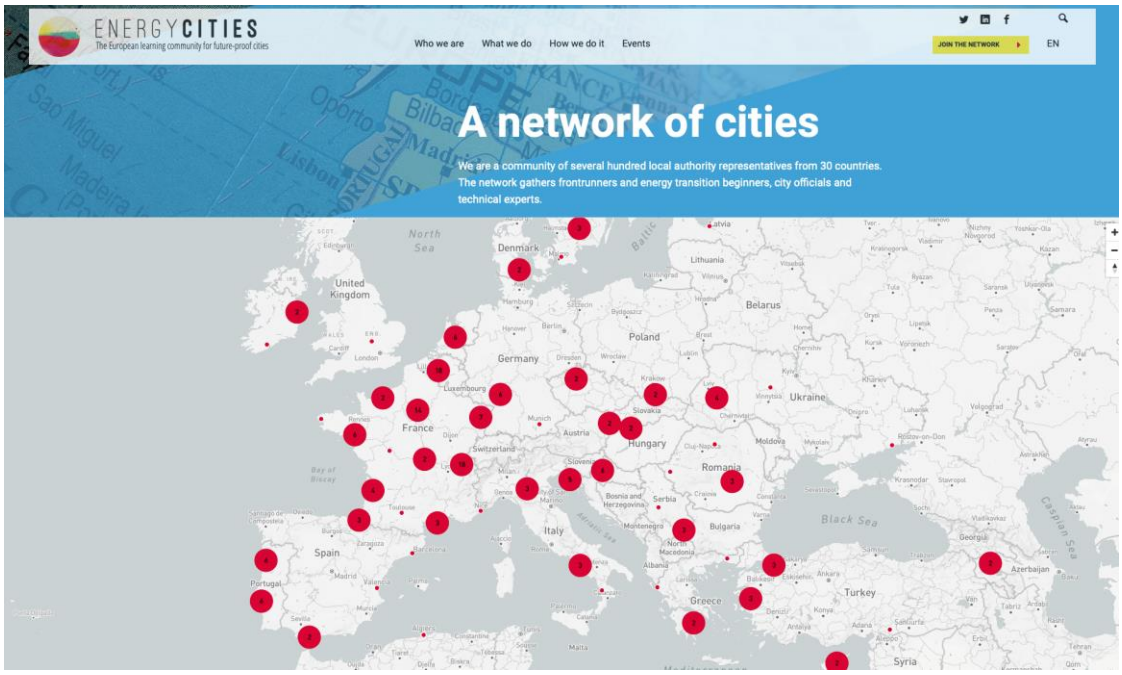

Figure 10: Overview of member cities of the European Energy Cities network, source: Energy Cities, 2023g

[190] Energy Cities, 2023b

[191] https://energy-cities.eu

11.2 Germany – Example municipalities from the UfU project region

The good practice examples from Germany described in detail are gathered from municipalities located in Brandenburg (Birkenwerder, Oranienburg, Treuenbrietzen, Ludwigsfelde) and one from Lower Saxony (Hanover). References to the possibility of finding out about other good practice examples from Germany are given in chapter 11.2.6.

11.2.1 Birkenwerder municipality, Brandenburg

Birkenwerder is a municipality in the district of Oberhavel in Brandenburg with a population of just under 8,000.[192] The municipality's declared goal is to achieve a significant reduction in energy consumption and greenhouse gas emissions throughout the municipality by 2030. To this end, the municipality of Birkenwerder has had a climate protection concept[193] drawn up in 2013. Salary of the climate protection manager, costs for business trips and expenses for public relations, such as printing costs, are reimbursed to the municipality by the Federal Ministry for the Environment and Reactor Protection up to 65% (funding program 'municipal directive'). The remaining 35% is borne directly by the municipality of Birkenwerder. Through the work of the climate protection manager, additional funding of €32,000 has been brought to Birkenwerder since February 2017 and direct private-sector investment of €50,000 has been triggered. [194]

The climate protection concept contains 4 groups of measures: 1) Energy saving and efficiency (Municipality, Private households, Business), 2) renewable energies, 3) mobility and 4) information and communication (Public relations, Information, Education, Coordination, Community Planning). Since not all measures could be processed at the same time, the measures were prioritized based on 4 criteria (significance, climate relevance, feasibility, economic efficiency). [195] This ultimately resulted in 16 priority tasks to be worked on, which had to be further refined during implementation by the climate protection management team.[196]

[192] Landkreis Oberhavel, n.d.

[193] INFRASTRUKTUR & UMWELT, 2013

[194] Gemeindeverwaltung Birkenwerder, 2023b

[195] INFRASTRUKTUR & UMWELT, 2013, p. 73f

[196] INFRASTRUKTUR & UMWELT, 2013

Examples - Measures planned and implemented since February 2017:[197]

Measure IK3: Cooperation with neighboring municipalities

The plan was to carry out climate protection projects jointly with neighboring municipalities. However, since the staff position of the municipality in question, Hohen Neuendorf, has been vacant since the end of January 2017, it has not yet been possible to implement any joint measures.

However, practical experience was exchanged with the municipality of Mühlenbecker Land, which has also drawn up a climate protection concept.

Measure IB1: Education schools

School and kindergarten education is realized by a Climate protection and energy saving project conducted by UfU.[198]

Measure EK1: Behavioral changes

The "Stadtradeln" competition was carried out in Birkenwerder with the aim to increase the use of the emission-free means of transport bicycle in everyday life by encouraging existing everyday cyclists and winning permanent "switchers" from other means of transport.

Measure EK2: Energy management

Establishment of regular controlling of the energy consumption of municipal properties. The acquisition of the computer tool "KOMMSOFT" including a module for energy management was achieved.

Measure EK7: Neighborhood concept

The goal was to establish a system for supplying climate-friendly heat to a neighborhood in Birkenwerder.

Two presumably suitable neighborhoods have been selected. SOPHENA was used as planning software (free of charge).

Measure E1: Solar promotion

The promotion of the use of solar energy for the generation of heat and electricity was envisaged For this purpose, a solar register for Birkenwerder was envisaged, on the basis of

[197] Gemeindeverwaltung Birkenwerder, 2023b

[198] https://www.fifty-fifty.eu/projekt/birkenwerder/

which the suitability of each location in the municipality for the use of solar energy can be determined. A solar cadastre costs about 15,000 €. It was planned to raise this sum without the community's own funds. 80% of the required funds for a solar cadastre in Birkenwerder were acquired.

Measure M10: Electricity charging stations

The plan was to set up charging infrastructure for electric cars and to inform residents and tradespeople about vehicles. Specifically, three normal charging points for visitors to Birkenwerder were to be built at the town hall in 2017. An investor has been found for the construction of a DC fast charging station for longer distances and electric cars traveling through along the B96 and A10, construction expected also in 2017.

Exhibition and test drives of hydrogen vehicles by the Roadshow Electromobility of the Federal Ministry of Transport and Digital Infrastructure as part of the Birch Festival on 17.6.2017.

Exhibition and test drives of electric cars as a preview of the vehicle fair e/motion Oranienburg as part of the Birkenfest on 17.6.2017.

Other measures carried out in the period 2017 to 2019 can be found on the website.[199]

The position of climate protection manager is created as a staff position in the municipal administration. Gunnar Thöle has been climate protection manager for the Birkenwerder municipality since February 2017. The 39-year-old trained locksmith and mechanical engineer had the task of implementing the 22 climate protection measures decided by the municipal assembly into reality.[200]

At the moment, there is no specific person listed as a contact for this position.[201] In addition, a recently published job advertisement could be found in which a new climate protection manager was sought for 01 April 2023.[202]

The municipality of Birkenwerder operates its own climate protection website[203], which, however, does not appear to be fully maintained and up-to-date. Aside from info about a heat pump lecture in February 2023, and one news article from 2022, the last information on the website is from 2021.

[199] Thiele, 2020

[200] Gemeindeverwaltung Birkenwerder, 2017

[201] Gemeindeverwaltung Birkenwerder, 2023a

[202] Gemeinde Birkenwerder, 2023

[203] https://klimaschutz.birkenwerder.de

11.2.2 City of Oranienburg, Brandenburg

Oranienburg is located on the northern city limits of the federal capital Berlin. Oranienburg today has more than 48,000 inhabitants.[204] The city's integrated climate protection concept bundles the diverse local activities, derives realistic recommendations for action and serves as a basis for future urban climate protection measures.

The city administration has set itself the goal of being climate neutral by 2035. The entire city should be climate neutral by 2040, according to a resolution by the city council from 2021. The following sub-steps are implemented in an integrated climate protection concept, which ultimately define the climate protection strategy of the city of Oranienburg:

- Preparation of an actual analysis of the energy and greenhouse gas balance, taking into account various consumption sectors and sources of energy supply
- Determination of sector-specific CO2 reduction potential and prioritized areas of action
- Identification, discussion and prioritization of climate protection measures in a comprehensive participation process
- Creation of a catalog of measures for various fields of action in the above-mentioned areas. Areas with information on GHG savings, timing, costs and financing options
- Development of a controlling concept for the annual evaluation of activities and for monitoring success

As part of the creation of the climate protection concept, seven fields of action were defined, within which measures are defined.[205]

The measures were assigned to the following seven fields of action:[206]

- Higher-level measures
- Greenhouse gas-neutral city administration
- Make energy supply climate-neutral
- Climate-friendly mobility
- Climate adaptation
- Climate-adapted urban planning
- Communication and Cooperation

[204] Stadt Oranienburg 2023, n.d.-a, https://oranienburg.de/Stadtleben/Stadtinformationen/Stadtportrait-/

[205] Stadt Oranienburg 2023, n.d.-b

[206] Stadt Oranienburg 2023, n.d.-c

11.2.3 City of Treuenbrietzen, Brandenburg

Treuenbrietzen is a small town in the southwest of the German state of Brandenburg in the district of Potsdam-Mittelmark[207] with about 8000 inhabitants[208]. In 2015, the city of Treuenbrietzen adopted a climate protection concept[209] developed within the framework of a grant. The already successful conversion of the district of Feldheim to a bioenergy village[210] in 2010 represented a significant motivation. The company Ernst Basler + Partner (EBP) and complan Kommunalberatung were responsible for developing the climate protection concept. Support was provided by the energy and climate protection manager at the time. The climate protection concept contains an energy and C02 balance as well as content on energy saving potentials. It addresses various fields of action and contains a catalog of 42 possible measures. [211] The measures named in the climate protection concept were begun to be implemented within the framework of further funding from 2017.[212]

In 2017, an interim report[213] on the activities of the climate protection manager was published.

It refers to the necessary prioritization of measures, which was carried out with the help of citizen participation at the "Marketplace of Ideas" event in May 2017. One of the identified focal points was the desired integration of the local districts by strengthening public transport and alternatives to private transport. In the first phase of the project, the focus was therefore placed on the topic of mobility. The following measures were implemented:

Mobility concept

- 100% via funding (35,000€)
- Implementation 2018
- Focus on public transport, local rail transport and alternatives to reduce private transport

Acquisition of a new electric car for the municipal fleet

- 100% via funding (55.000€)
- Implementation 2018
- Acquisition of a BMWi3 and a charging station

[207] Stadtverwaltung Treuenbrietzen, n.d.-b

[208] Wikimedia Foundation Inc., 2023b

[209] Stadtverwaltung Treuenbrietzen, n.d.-a

[210] UfU e.V., 2021

[211] Treuenbrietzen, 2015

[212] Stadtverwaltung Treuenbrietzen, n.d.-a

[213] Stadt Treuenbrietzen, 2017

Creation of the new "Energy Tour" bicycle route
- Funding 100% through promotion (25.000€)
- Implementation beginning of 2019

Bicycle rental Treuenbrietzen
- 100% via funding, federal competition (220.000€)
- Implementation from spring 2019 (if approved)

Further planned projects
- Energy consulting for planned (re)construction measures (municipal)
- Initial energy consulting for citizens
- Planning of low-investment measures, e.g. retrofitting of interior lighting (municipal)
- NEF contact person for press appointments as well as leading delegations and school groups
- Networking with decision-makers and institutions in the sector
- Cooperation of several climate protection managers and cooperation with
- design school for the purpose of public relations
- Free e-bike rental at the train station (IHK-awarded)
- Participation in various competitions

According to the organization chart of the Treuenbrietzen administration, energy management is located in the Energy and Climate Protection staff unit.[214]
The energy and climate manager was initially André Hoyer from 2013, and after a break Stefan Them from 2017. According to his own statements, Stefan Them achieved ten times the cost of the staff position in benefits from 2017 to 2019. This was achieved primarily by saving energy costs and obtaining funding for projects. Other planned actions in 2019 included the installation of a combined heat and power plant in the conversion of schools and the conversion of the Marzahna community center, which achieved a saving of €11,500. Potential was also seen in the conversion of street lighting to LED. The conversion of 60% achieves savings of 75,500€ per year, a conversion of 90% even 113,000€ per year.[215]

As part of EUKI funded BEACON project UfU has shot a short documentary about the energy concept of Treuenbrietzen/Feldheim with collaboration of the Mayor Michael Knape and former Climate Protection Manager of the district Potsdam-Mittelmark Barbara Ral. The video is freely accessible on UfUs youtube channel.[216]

[214] Stadtverwaltung Treuenbrietzen, 2021

[215] Wachs, 2019

[216] https://www.youtube.com/watch?v=z880HEZzqYI

11.2.4 City of Ludwigsfelde, Brandenburg

The town of Ludwigsfelde is located in Brandenburg about 11 km south of the Berlin city limits and east of Potsdam. With over 27,000 inhabitants, it counts as a small medium-sized town according to the criteria of the Federal Institute for Research on Building, Urban Affairs and Spatial Development.[217]

In May 2014, the city council of Ludwigsfelde decided to develop a municipal energy and climate protection concept. In a one-and-a-half-year development process, the municipal energy and climate protection concept was developed together with a consulting firm from Potsdam. In addition to workshops with the municipal utilities, the heads of the city council's parliamentary groups, the housing companies and the municipal building management, the population of Ludwigsfelde was also called upon to participate in the development process. To this end, a public event was held at which the measures for a climate-friendly Ludwigsfelde were presented by the Potsdam consulting office and could be prioritized by those present. In June 2016, the city council took note of the finished concept[218] and decided to implement it. The finished concept includes a description of the study area, a comprehensive energy and CO2 balance, a chapter on the potential energy and cost savings, scenarios for future climate-friendly urban development and a catalog of measures with a total of 34 individual measures.[219]

The measures relate to seven areas: 1) Process control (organization, stabilization ...), 2) Public relations & communication, 3) Energy production and energy infrastructure, 4) Municipality (public buildings / facilities), 5) Residential buildings & settlement development, 6) Companies and 7) Mobility.[220]

The position of Climate Protection Manager was funded by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) as part of the National Climate Protection Initiative for a period of three years from October 01, 2017 - July 31, 2021 at 65%. He was the central contact person in Ludwigsfelde's city hall for the topics of climate protection, energy efficiency and renewable energies. His tasks included supporting the administration in terms of content and organization in the implementation of climate protection measures. Among other things, this included: making everyday work in the administration more energy- and resource-efficient, supporting processes, and initiating the implementation of measures in cooperation with external partners. Another very important component was public relations and educational work.[221]

---

[217] Stadt Ludwigsfelde, n.d.-c

[218] Stadt Ludwigsfelde, 2016

[219] Stadt Ludwigsfelde, n.d.-b

[220] Stadt Ludwigsfelde, 2016, p. 128

[221] Stadt Ludwigsfelde, n.d.-a

11.2.5 Hanover, Lower Saxony

Hanover is the capital of the state of Lower Saxony and has over half a million inhabitants.[222]

Energy management in Hanover is part of the Building Management department.[223]

With around 420 employees, the Building Management department looks after a building stock of around 1,000 properties. These are primarily schools and daycare centers, but also youth and leisure facilities, libraries, administrative and fire department buildings, as well as retirement homes, swimming pools, sports facilities, museums, fountains and monuments. In the years 2020/21, around 190 million euros were used for the operation of the buildings as well as for the refurbishment, expansion and maintenance of the buildings and for rented properties.[224]

The task of energy management is to implement the goal of economical and rational energy use in the real estate/buildings used by the city. Since 1990, the combined effect of all energy-saving measures has led to a considerable reduction in electricity consumption, heating consumption and water consumption. The Energy Management department is divided into the following areas:

Energy purchasing

Commercial energy management is carried out on the basis of concluded supply contracts. The electricity supply contracts are put out to tender throughout Europe. Due to the precisely determined purchase profiles of the individual properties, favorable electricity prices could be achieved.

Energy management

Energy management services amounting to 20 million euros per year are currently incurred for the approximately 1,000 buildings and structures. These include around 2,000 energy and water consumption points and 450 precipitation water notices. A total of 20,000 payment transactions have to be processed each year.

Energy controlling

In energy controlling, energy and water consumption is monitored in real time, checked for plausibility and evaluated. Based on these results, the required characteristic values are formed, which make it possible to compare buildings, optimize contracts and analyze weak points.

Operational optimization

Energy inspections are carried out to ensure that the technical building systems in the individual properties are operated efficiently and in an energy-saving manner. Significant

[222] Wikimedia Foundation Inc., 2023a

[223] Hannover.de, 2019

[224] Hannover.de, 2022b

savings can be achieved by optimizing the control parameters of heating and ventilation systems, lowering room temperatures during the night, on weekends and other periods of non-use.

Saving energy by changing behavior

An additional 10 to 15 percent of energy can be saved through environmentally conscious consumer behavior. In order to exploit this potential, the City of Hanover launched three target group-specific projects (1. GSE - school project, 2. KliK - climate protection in daycare centers, 3. Tatort Büro - project for employees of the city administration)[225] at an early stage, which are supervised by the energy management department.[226]

The GSE School Project follows the fifty fifty framework and is conducted by UfU.[227]

In the wider Hanover Region, there is also a Municipal Energy Efficiency Network. It supports municipalities in setting up systematic energy management. The energy efficiency network is funded as part of the NKI funding program Climate Protection Projects in the Municipal Environment (Municipal Guideline) of the German Federal Ministry for the Environment. The aim of the network is to systematically record and monitor energy consumption in the properties of the participating municipalities in order to identify and prioritize potential savings and implement concrete measures. target GmbH supervises 13 participating municipalities in the network. Cooperation in the network makes it easier to establish the necessary structures in each individual municipality. The 13 administrations learn together and can thus bundle a wealth of offers and services that could not be managed by one municipality alone. The network runs for three years, from June 2020 to June 2023.[228]

11.2.6 Further examples

There are a large number of other German municipalities that are active in the field of energy management and can serve as an good practice example. For example, they can be found via the following websites:

[225] Hannover.de, 2022a

[226] Hannover.de, 2019

[227] https://www.fifty-fifty.eu/projekt/gse-hannover/

[228] target GmbH, 2021

Practice database[229] of the German Energy Agency (dena): Energy efficiency municipalities, e.g. City of Magdeburg[230] Municipal Atlas[231] Energy municipalities awarded by the Agency for Renewable Energies Energy Atlas Bavaria[232] Practical examples Bavaria Energy Atlas Rhineland-Palatinate[233] Practical examples Rhineland-Palatinate Frankfurt am Main[234] Comprehensive information on the energy management available in English

Table 22: Listing of websites for further practical examples of municipal energy management in Germany

[229] https://www.energieeffiziente-kommune.de/gute-beispiele/praxisdatenbank/

[230] Landeshauptstadt Magdeburg, n.d.

[231] https://www.unendlich-viel-energie.de/projekte/energie-kommunen/alle-energie-kommunen-auf-einen-blick

[232] https://www.energieatlas.bayern.de/energieatlas/praxisbeispiele

[233] https://www.energieatlas.rlp.de/earp/praxisbeispiele/uebersichtskarte-praxisbeispiele

[234] https://energiemanagement.stadt-frankfurt.de

Supported by:
Federal Ministry for Economic Affairs and Climate Action
European Climate Initiative EUKI
on the basis of a decision by the German Bundestag

12. Barriers

Prioritization & limited resources

In many municipalities in Germany, professional energy management is not yet established and the existing efficiency and savings potential is not or only partially exploited. In most cases, there is a lack of information on economic efficiency, personnel resources and priority over mandatory municipal tasks.[235]

Personnel shortage

A major problem is the shortage of skilled workers in Germany. Particularly for the implementation of the energy transition, a large number of qualified people are needed, but they are not available.

According to a study by the Competence Center for Skilled Workforce Assurance (KOFA), there will be a shortage of 216,252 skilled workers on average in 2021/2022 for the expansion of renewable energies such as wind and solar power alone. In addition, there are many other sectors such as the construction industry, skilled trades or municipal administrations that are looking for people with the same qualifications. The competitive situation further intensifies the shortage of skilled workers. [236]

Staff shortages are also a problem in local government. According to the German Civil Service Association, there already now is a shortage of around 350,000 employees in local government in Germany. New tasks such as energy management also result in a need for additional, new people. Looking ahead to 2030, the problem will become even more acute as more than 500,000 employees retire over the next ten years. The Stiftung Energie & Klimaschutz[237] therefore demands 'No energy turnaround without personnel turnaround'.

Solutions to alleviate the shortage of skilled workers include training offensives, retraining and continuing education, increasing the proportion of women and the volume of work done by part-time employees, and image campaigns for the public sector. Many elements of this have already been actively implemented for years by municipalities and their companies as part of the skilled labor strategy adopted by the federal cabinet. According to the Energy & Climate Protection Foundation, however, additional building blocks are needed. These include, for example, immigration, inclusion of artificial intelligence, periodization and shortening of tasks, streamlining of planning and approval procedures, and tightening of public participation. [238]

[235] KEA et al., n.d., p. 3

[236] Malin et al., 2023

[237] Energy & Climate Protection Foundation

[238] Landsberg, 2023

Supported by:
Federal Ministry for Economic Affairs and Climate Action
European Climate Initiative EUKI
on the basis of a decision by the German Bundestag

Limited budgetary resources[239]

Most communities and cities in Germany have fewer than 10,000 inhabitants - and rarely an energy manager. The topic of energy is usually taken care of by the head of the building department, the head of the main office, the treasurer or the mayor. Often, there is a lack of qualified personnel to supervise the technical systems. For such municipalities, working in a group is a good idea, for example within the framework of a municipal energy efficiency network. Eight to twelve municipalities are introduced to the tasks of the municipal energy management and the individual work steps under professional guidance. The goal is to make a municipal energy management feasible with little effort on their part. In addition to regular meetings, on-site coaching plays an important role.[240]

Lack of persistence

For successful energy management in the long term, continuous support from the top management and the municipal council and the perception of municipal energy management as an interdisciplinary task of the administration are required.[241] Because municipal energy management is an ongoing task, structures and processes that function sustainably must be introduced.[242]

Poor data situation

With regard to the energy data of public properties, the data situation in Germany is very poor. There are not only difficulties in data collection, but in some cases data is simply not available or not available centrally. Detailed information on this was described in chapter 3.2.2.

[239] KEA et al., n.d., p. 3

[240] KEA et al., n.d., p. 10

[241] KEA et al., n.d., p. 3

[242] KEA et al., n.d., p. 9

13. Other

Energy controlling software

Energy controlling software makes a significant contribution to the success of the project. As a data repository for automated evaluation and reporting, it simplifies the processes required for energy controlling. At the same time, the manual workload is reduced. The right choice of software is important. It should be able to provide a property-wide annual energy report and a property-specific monthly and annual energy report, as well as taking into account specific framework conditions in the municipality.[243]

BAFA funding list Energy management software

The Federal Office of Economics and Export Control (BAFA[244]) has compiled an extensive list of eligible energy management software. [245] The listed software products are assessed by BAFA as eligible for funding according to the guideline of the Federal Ministry for Economic Affairs and Energy Federal 'funding for energy efficiency in business – grant'[246] of February 15, 2020. However, BAFA points out that the list does not provide a complete overview of the products available on the market and does not constitute a product recommendation. The list exclusively informs companies about suitable software solutions for the introduction/maintenance of ISO 50001[247]. Beyond that, it is not intended to serve as a decision-making aid for the selection of suitable software.

[243] KEA et al., n.d., p. 29

[244] Bundesamt für Wirtschaft und Ausfuhrkontrolle

[245] BAFA, 2023b

[246] Bundesförderung für Energieeffizienz in der Wirtschaft - Zuschuss

[247] ISO 50001 is the International Energy Management Standard published in 2011. With ISO 50001, an international standard for an energy management system was created, source: Umweltbundesamt, n.d.

Appendix[248]

→ 5 Organisation and communication within the municipality

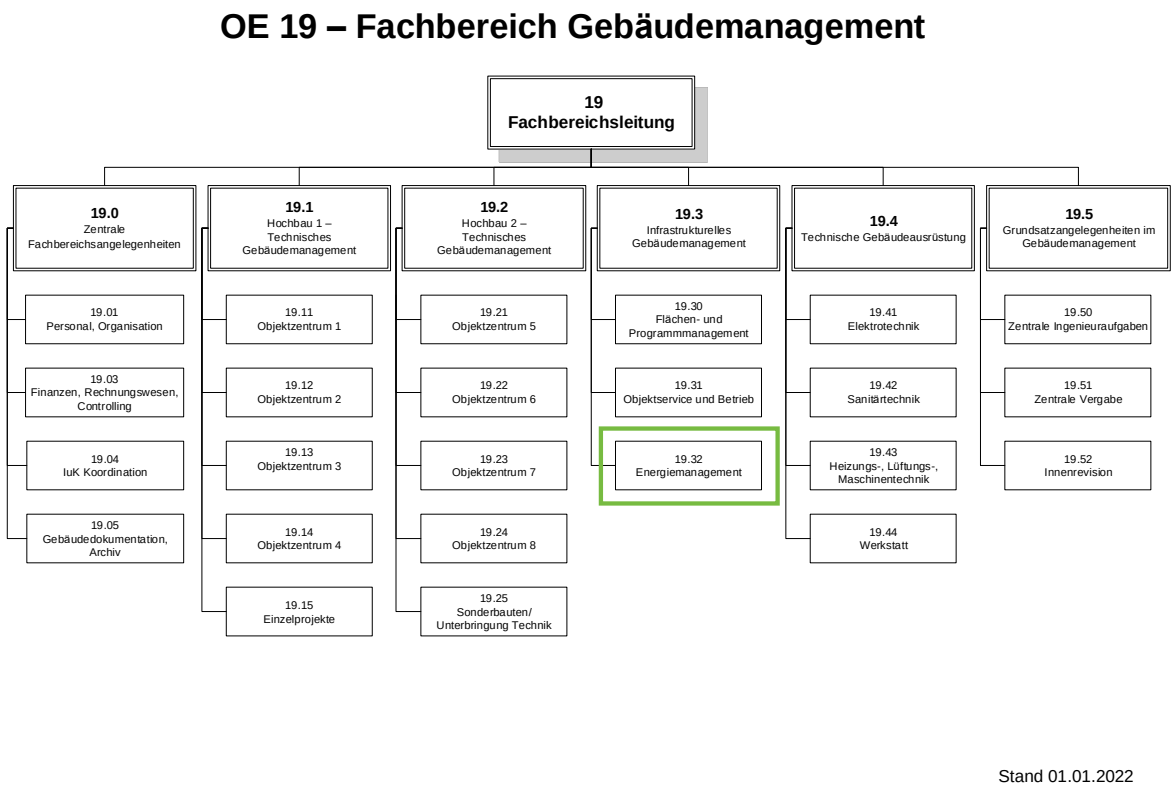

Figure 11: City of Oranienburg – Organizational affiliation of the energy management (picture in the backround: Frank Sperling), source: Stadt Oranienburg, n.d.

[248] The numbering of the appendix corresponds to the chapters in the main part.

Code	Maßnahme	Prio.
Energieeinsparung und -effizienz		
EK1	**Nutzung der Einsparmöglichkeiten durch Verhaltensänderungen**	**Hoch**
EK2	**Systematische Verbrauchserfassung der kommunalen Liegenschaften und kontinuierlicher Vergleich**	**Hoch**
EK3	Erarbeitung und Umsetzung eines Sanierungskonzepts	Mittel
EK4	Mustersanierung eines öffentlichen Gebäudes	Gering
EK5	**Energieeffiziente Straßenbeleuchtung**	**Hoch**
EK6	Berücksichtigung von Klimaschutz im Beschaffungswesen	Gering
EK7	Quartierskonzept im Rahmen KfW-Programms Energetische Stadtsanierung	Mittel
EK8	**Nutzung der Wärmebildkamera der Gemeinde für die thermografische Untersuchung privater Gebäude, in Verbindung mit Beratung**	**Hoch**
EK9	**Kraft-Wärme-Kopplung auf Objektebene (kommunale Einrichtungen)**	**Hoch**
EP1	Klimaeffiziente Sanierung von Ein-/Zweifamilienhäusern	Mittel
EP2	Austausch alter Elektrogeräte	Mittel
EP3	Austausch alter Heizungsanlagen	Mittel
EU1	Kraft-Wärme-Kopplung auf Objektebene	Mittel
Erneuerbare Energien		
E1	**Maßnahmen zur stärkeren Nutzung von Solarenergie durch private Haushalte**	**Hoch**
E2	**Solaranlagen auf öffentlichen und gewerblichen Dächern**	**Hoch**
E3	Kommunale Energieversorgungsangebote	Mittel
E4	Kommunale Entsorgungsangebote	Gering
E5	Untersuchung von Möglichkeiten der energetischen Nutzung von Abfällen	Gering

Figure 12: City of Hanover – Energy management as part of the Department of Facility Management, source: Hanover.de, 2023

Code	Maßnahme	Prio.
E6	Untersuchung der Potenziale der Nutzung von mitteltiefer bzw. tiefer Geothermie in der Gemeinde	Gering
Mobilität		
M1	**Stärkung ÖPNV und innovativer Konzepte**	**Hoch**
M2	**Optimierung der Gestaltung von Bahnhof und Bahnhofsumfeld**	**Hoch**
M3	Mobilitätsmanagement Schulen / Betriebe / Einrichtungen mit Publikumsverkehr / Förderung der Kindermobilität	Gering
M4	Kommunale Fahrzeugflotte: Neufahrzeuge mit geringem Verbrauch, evtl. Elektrofahrzeuge	Mittel
M5	Kontinuierliche Verbesserung der Rad-Infrastruktur	Mittel
M6	Förderung von Netzwerken für Mitfahrgelegenheiten	Gering
M7	Förderung von Carsharing-Angeboten	Gering
M8	Training „Kraftstoffsparendes Fahren"	Mittel
M9	Unterstützung eines Tempolimits auf der A10 im Gemeindegebiet Birkenwerder	Gering
Information und Kommunikation		
IÖ1	**Öffentlichkeitsarbeit**	**Hoch**
IÖ2	Klimaschutzpreis für Unternehmen	Mittel
II1	**Energieberatungsangebote für Privatpersonen**	**Hoch**
II2	**Energieberatung für Unternehmen**	**Hoch**
II3	Information zu Finanzierungsangeboten und Fördermöglichkeiten	Gering
IB0	Aktivitäten zur Änderung des energetischen Nutzerverhaltens	Mittel
IB1	Klimabildung an Schulen	Mittel
IB2	Spielend Energiesparen in Kindertagesstätten	Mittel
IB3	Klimabildung für Kinder und Jugendliche	Mittel
IK1	**Anstellung eines Klimaschutzmanagers**	**Hoch**
IK2	**Überführung der Lenkungsgruppe in einen Energie-und Umweltausschuss der Gemeinde**	**Hoch**
IK3	**Koordination von Maßnahmen mit Nachbarkommunen**	**Hoch**
IK4	Öko-Profit	Mittel
IP1	Planerischer Klimaschutz (Landschaftsplan)	Mittel
IP2	Planerischer Klimaschutz (Bebauungspläne)	Mittel
IP3	**Schutz von Bäumen, Waldgebieten und kommunalem Grün (insb. Briesetal), u.a. durch Aktualisierung und Umsetzung des Grünordnungsplans**	**Hoch**
IP4	Kommunales Regenwassermanagement und Erhaltung von Feuchtgebieten	Mittel

Figure 13: 16 priority tasks of the climate protection concept by Birkenwerder, source: INFRASTRUKTUR & UMWELT Professor Böhm und Partner, 2013, p. 78f

Supported by:
Federal Ministry for Economic Affairs and Climate Action
European Climate Initiative EUKI
on the basis of a decision by the German Bundestag

14. Literature

adapton AG. (n.d.-a). Kommunales Energiemanagement. Retrieved from https://www.adapton.de/kommunales-energiemanagement/ (accessed on: May 31, 2023)

adapton AG. (n.d.-b). Referenzen. Retrieved from https://www.adapton.de/referenzen-2/ (accessed on: May 31, 2023)

Agentur für erneuerbare Energien. (2022). Energieverbrauch und Co2-Emissionen in den Bundesländern. Analyse der Primärenergieverbräuche, Emissionsentwicklungen und der politischen Zielsetzungen

. Retrieved from https://www.unendlich-viel-energie.de/media/file/4711.RenewsKompakt_Klimaschutz_in_den_BL_mai22.pdf (accessed on: May 19, 2023)

AISBL, Association European Energy Award. (2022). *Annual Report 2021*. Retrieved from Zurich:

AISBL, Association European Energy Award. (2023). European Energy Award municipalities. Retrieved from https://www.european-energy-award.org/eea-municipalities (accessed on: May 31, 2023)

AISBL, Association European Energy Award. (n.d.). eea Gold Municipalities. Retrieved from https://www.european-energy-award.org/gold-municipalities-new (accessed on: May 30, 2023)

AISBL, Association European Energy Award. (n.d.). Welcome to the European Energy Award. Retrieved from https://www.european-energy-award.org/welcome-to-the-european-energy-award (accessed on: May 19, 2023)

Aradippou Municipality. (2017). EU Program - Aradippou Smart City. Retrieved from http://www.aradippou.org.cy/index.php/en/euro-programs/aradippou-eu-smart-city (accessed on: June 1, 2023)

BAFA, Bundesamt für Wirtschaft und Ausfuhrkontrolle. (2023a). Bundesförderung für effiziente Gebäude

. Retrieved from https://www.bafa.de/DE/Energie/Effiziente_Gebaeude/effiziente_gebaeude_node.html;jsessionid=8E4C5B279A97C2E6AB758B462480D4F5.2_cid371%5D (accessed on: May 30, 2023)

BAFA, Bundesamt für Wirtschaft und Ausfuhrkontrolle (2023b). Liste förderfähiger Energiemanagementsoftware. Retrieved from https://www.bafa.de/DE/Energie/Energieeffizienz/Energieeffizienz_und_Prozesswaerme/Modul3_Energiemanagementsysteme/ems_liste_foerderfaehige_software.html (accessed on: May 19, 2023)

Supported by:
Federal Ministry for Economic Affairs and Climate Action
European Climate Initiative EUKI
on the basis of a decision by the German Bundestag

BBU, Verband Berlin-Brandenburgischer Wohnungsunternehmen e.V. (2021). Energie & Klimaschutz. Novelliertes Berliner Klimaschutz- und Energiewendegesetz (EWG Bln) am 19. August 2021 verabschiedet. Retrieved from https://bbu.de/nachricht/47990 (accessed on: May 30, 2023)

BDEW, Bundesverband der Energie- und Wasserwirtschaft e.V. (2023). „Klimafreundliches Heizen ist die Königsdisziplin auf dem Weg zur Klimaneutralität". Retrieved from https://www.bdew.de/presse/presseinformationen/klimafreundliches-heizen-ist-die-koenigsdisziplin-auf-dem-weg-zur-klimaneutralitaet/ (accessed on: May 19, 2023)

BMUV, Bundesministerium für Umwelt, Naturschutz, nukleare Sicherheit und Verbraucherschutz. (2019). Fact Sheet Klimaschutzgesetz. Retrieved from https://www.bmuv.de/fileadmin/Daten_BMU/Download_PDF/Klimaschutz/fact_sheet_klimaschutzgesetz_bf.pdf (accessed on: May 19, 2023)

BMUV, Bundesministerium für Umwelt, Naturschutz, nukleare Sicherheit und Verbraucherschutz (2021): *Bundes-Klimaschutzgesetz, https://www.bmuv.de/gesetz/bundes-klimaschutzgesetz/ (accessed on: May 19, 2023).*

BMWK, Bundesministerium für Wirtschaft und Klimaschutz. (2021). Gesetzeskarte für das Energieversorgungssystem. Retrieved from https://www.bmwk.de/Redaktion/DE/Publikationen/Energie/gesetzeskarte.pdf?__blob=publicationFile&v=1 (accessed on: May 30, 2023)

BMWK, Bundesministerium für Wirtschaft und Klimaschutz. (2022). Dossier. Energiewende im Gebäudebereich. Retrieved from https://www.bmwk.de/Redaktion/DE/Dossier/energiewende-im-gebaeudebereich.html (accessed on: May 30, 2023)

BMWK, Bundesministerium für Wirtschaft und Klimaschutz. (2023a). Das Förderprogramm für ihr Vorhaben. Retrieved from https://www.klimaschutz.de/de/foerderprogramme (accessed on: May 30, 2023)

BMWK, Bundesministerium für Wirtschaft und Klimaschutz. (2023b). Die nationale Klimaschutzinitiative. Retrieved from https://www.klimaschutz.de/de/ueber-die-initiative (accessed on: May 30, 2023)

BMWK, Bundesministerium für Wirtschaft und Klimaschutz. (2023c). Implementierung und Erweiterung eines Energiemanagementsystems. Retrieved from https://www.klimaschutz.de/de/foerderung/foerderprogramme/kommunalrichtlinie/implementierung-und-erweiterung-eines-energiemanagements (accessed on: May 30,2023)

BMWK, Bundesministerium für Wirtschaft und Klimaschutz. (2023d). Kommunalrichtlinie. Retrieved from https://www.klimaschutz.de/de/foerderung/foerderprogramme/kommunalrichtlinie (accessed on May 30, 2023)

BMWK, Bundesministerium für Wirtschaft und Klimaschutz (2023e): *Aktuelle kommunale Stellenangebote, https://www.klimaschutz.de/de/service/kommunale-stellenangebote (accessed on: May 19, 2023).*

BMWSB, Bundesministerium für Wohnen, Stadtentwicklung und Bauwesen (2023a): *Bundeskabinett beschließt Novelle des Gebäudeenergiegesetzes – Umstieg auf Heizen mit Erneuerbaren eingeleitet. Pressemitteilung 19.04.2023.*, *https://www.bmwsb.bund.de/SharedDocs/pressemitteilungen/Webs/BMWSB/DE/2023/04/geg-bmwk.html (accessed on: May 19, 2023)*.

BMWSB, Bundesministerium für Wohnen, Stadtentwicklung und Bauwesen (2023b): *Das Gebäudeenergiegesetz, https://www.bmwsb.bund.de/Webs/BMWSB/DE/themen/bauen/energieeffizientes-bauen-sanieren/gebaeudeenergiegesetz/gebaeudeenergiegesetz-artikel.html (accessed on: May 19, 2023)*.

co2online gemeinnützige Beratungsgesellschaft mbH. (n.d.). Energiemanagement: Alle Förderprogramme & Zuschüsse von KfW, BAFA und Co. Retrieved from https://www.co2online.de/foerdermittel/liste/kmu_energiemanagement/ (accessed on: May 30, 2023)

Da.V.i.D. GmbH. (n.d.). Energiewirtschaftsstelle. Retrieved from https://david.berlin/energiewirtschaftsstelle (accessed on: May 31, 2023)

DEN e.V., Deutsches Energieberater-Netzwerk e.V. (n.d.-a). Expertensuche. Retrieved from https://www.deutsches-energieberaternetzwerk.de/eb_suche/den/ (accessed on: May 31, 2023)

DEN e.V., Deutsches Energieberater-Netzwerk e.V., (n.d.-b): *Kommunen, https://www.deutsches-energieberaternetzwerk.de/qualifizierte-energieberatung/kommunen/ (accessed on: May 19, 2023)*.

DEN e.V., Deutsches Energieberater-Netzwerk e.V. (n.d.-c). Über uns. Retrieved from https://www.deutsches-energieberaternetzwerk.de/das-deutsche-energieberater-netzwerk-e-v/ueber-unsabout-us/ (accessed on: May 31, 2023)

dena, Deutsche Energie-Agentur GmbH. (n.d.-a). Das Energie- und Klimaschutzmanagement (EKM) der dena. Retrieved from https://www.energieeffiziente-kommune.de/managementsystem/ (accessed on: May 30, 2023)

dena, Deutsche Energie-Agentur GmbH. (n.d.-b). dena Energieeffizienz-Kommune. Retrieved from https://www.energieeffiziente-kommune.de/startseite/ (accessed on: May 30, 2023)

dena, Deutsche Energie-Agentur GmbH. (n.d.-c). EnergieeffizienzExperten für Förderprogramme des Bundes. Retrieved from https://www.energie-effizienz-experten.de (accessed on: May 31, 2023)

dena, Deutsche Energie-Agentur GmbH. (n.d.-d). Praxisdatenbank Energieeffizienz-Kommune. Retrieved from https://www.energieeffiziente-kommune.de/gute-beispiele/praxisdatenbank/ (accessed on: May 30, 2023)

dena, Deutsche Energie-Agentur GmbH. (n.d.-e). We are the Deutsche Energie-Agentur – the German Energy Agency. Retrieved from https://www.dena.de/en/about-dena/ (accessed on: May 30, 2023)

dena, Deutsche Energie-Agentur GmbH (n.d.-f). dena Energie- und Klimaschutzmanagementsystem. Bestandserfassung Effiziente Kommune - Energiesystem

. Retrieved from https://www.energieeffiziente-kommune.de/umsetzungshilfen/werkzeuge-zum-energiemanagement/?tx_rsmdenacontent_downloads%5BchangeFilter%5D=345&tx_rsmdenacontent_downloads%5Bcontroller%5D=Downloads&cHash=2ee72ac2738e31239aecfe2b8c7cb418 (accessed on: May 19, 2023)

dena, Deutsche Energie-Agentur GmbH (n.d.-g). Die Handlungsfelder des Energie- und Klimaschutzmanagements im Überblick. Retrieved from https://www.energieeffiziente-kommune.de/handlungsfelder/ (accessed on: May 19, 2023)

dena, Deutsche Energie-Agentur GmbH (n.d.-h). Energieeffizienz durch intelligente Stromnutzung. Retrieved from https://www.energieeffiziente-kommune.de/handlungsfelder/stromnutzung/ (accessed on: May 19, 2023)

dena, Deutsche Energie-Agentur GmbH (n.d.-i). Handlungsfeld Gebäude. Retrieved from https://www.energieeffiziente-kommune.de/handlungsfelder/gebaeude/ (accessed on: May 19, 2023)

dena, Deutsche Energie-Agentur GmbH (n.d.-j). Handlungsfeld: Verkehr. Retrieved from https://www.energieeffiziente-kommune.de/handlungsfelder/verkehr/ (accessed on: May 19, 2023)

Deutscher Städte- und Gemeindebund e.V. (2023). Bundeskabinett beschließt Novelle des Gebäudeenergiegesetzes (GEG). Retrieved from https://www.dstgb.de/themen/energiekrise/aktuelles/bundeskabinett-beschliesst-novelle-des-gebaeudeenergiegesetzes-geg/ (accessed on: May 17, 2023)

Deutscher Städtetag. (2022). Arbeitskreis "Energiemanagement". Hinweise zum kommunalen Energiemanagement. Retrieved from https://www.staedtetag.de/themen/klimaschutz-und-energie/hinweise-zum-kommunalen-energiemanagement (accessed on: May 30, 2023)

Deutscher Städtetag. (n.d.). Association of German Cities. Retrieved from https://www.staedtetag.de/english (accessed on: May 30, 2023)

Difu, Deutsches Institut für Urbanistik. (2023a). Difu-Tagungen/-Kongresse. 25. Deutscher Fachkongress für kommunales Energiemanagement. Retrieved from https://difu.de/veranstaltungen/2023-06-12/25-deutscher-fachkongress-fuer-kommunales-energiemanagement (accessed on: May 30, 2023)

Difu, Deutsches Institut für Urbanistik. (2023b). Klimaschutz in Kommunen – gewusst wie! Retrieved from https://leitfaden.kommunaler-klimaschutz.de (accessed on: May 30, 2023)

Difu, Deutsches Institut für Urbanistik. (n.d.). Institute. Retrieved from https://difu.de/en/institute (accessed on: May 30, 2023)

eaD e.V., Bundesverband der Energie- und Klimaschutzagenturen Deutschlands e.V. (2023). 8. Fachaustausch Energiedaten. Retrieved from

https://energieagenturen.de/aktuelles/termine/8-fachaustausch-energiedaten/ (accessed on: May 31, 2023)

eaD e.V., Bundesverband der Energie- und Klimaschutzagenturen Deutschlands e.V. (n.d.-a). Retrieved from https://energieagenturen.de (accessed on: May 31, 2023)

eaD e.V., Bundesverband der Energie- und Klimaschutzagenturen Deutschlands e.V. (n.d.-b). Der eaD. Retrieved from https://energieagenturen.de/der-ead/ (accessed on: May 31, 2023)

eaD e.V., Bundesverband der Energie- und Klimaschutzagenturen Deutschlands e.V. (n.d.-c). Mitglieder. Retrieved from https://energieagenturen.de/der-ead/mitglieder/ (accessed on: May 31, 2023)

Energieagentur Rheinland-Pfalz. (2022). Bundesförderung kommunales Energiemanagement Kommunalrichtlinie 2022. Faktenpapier. Retrieved from https://www.energieagentur.rlp.de/fileadmin/user_upload/kommunen/Faktenpapier_Foerderung_Kommunales_Energiemanagement.pdf (accessed on: May 19, 2023)

Energy Cities. (2022). Vienna´s strategy to accelerate its fossil fuel independency. Retrieved from https://decarbcitypipes2050.eu/2022/05/17/from-80-dependency-on-russian-gas-to-0-viennas-strategy-to-accelerate-its-fossil-fuel-independency/ (accessed on: June 1, 2023)

Energy Cities. (2023a). Beat the street. Walking and cycling game with points and prizes. Retrieved from https://energy-cities.eu/best-practice/beat-the-street/ (accessed on: June 1, 2023)

Energy Cities. (2023b). City of Aradippou. Retrieved from https://energy-cities.eu/members/city-of-aradippou/ (accessed on: June 1, 2023)

Energy Cities. (2023c). City of Delft. Retrieved from https://energy-cities.eu/members/city-of-delft/ (accessed on: June 1, 2023)

Energy Cities. (2023d). The Delft Energy Saving Fund. Retrieved from https://energy-cities.eu/best-practice/the-delft-energy-saving-fund/ (accessed on: June 1, 2023)

Energy Cities. (2023e). The Delft Low-interest energy renovation loans. Retrieved from https://energy-cities.eu/best-practice/the-delft-low-interest-energy-renovation-loans/ (accessed on: June 1, 2023)

Energy Cities. (2023f). E-deals to achieve a carbon neutral target by 2050. Retrieved from https://energy-cities.eu/best-practice/delft-the-netherlands-e-deals-to-achieve-a-carbonneutral-target-by-2050/ (accessed on: June 1, 2023)

Energy Cities. (2023g). A network of cities. Retrieved from https://energy-cities.eu/members/?mode=map (accessed on: June 1, 2023)

EUMB Pöschk GmbH & Co. KG. (2023). Telegramme | Präsenz. Retrieved from https://www.energietage.de/service/presseportal/meldungen-und-aktuelles/2023-telegramme-paesenz.html (accessed on: May 31, 2023)

EUMB Pöschk GmbH & Co. KG. (n.d.-a). Denkmalgeschütztes rotes Rathaus erzeugt Solarstrom. Retrieved from https://www.solarwende-

berlin.de/blog/leuchtturm/denkmalgeschuetztes-rotes-rathaus-erzeugt-solarstrom (accessed on: May 30, 2023)

EUMB Pöschk GmbH & Co. KG. (n.d.-b). Masterplan Solarcity. Monitoring 2020 und 2021. Retrieved from https://www.solarwende-berlin.de/allgemein/masterplan-solarcity-berlin/monitoring (accessed on: May 30, 2023)

European Commission. (n.d.-a). 2030 climate & energy framework. Retrieved from https://climate.ec.europa.eu/eu-action/climate-strategies-targets/2030-climate-energy-framework_en (accessed on: May 30, 2023)

European Commission. (n.d.-b). Energy and the Green Deal

. Retrieved from https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/energy-and-green-deal_en (accessed on: May 30, 2023)

European Commission. (n.d.-c). European Climate Infrastructure and Environment Executive Agency. Retrieved from https://wayback.archive-it.org/12090/20221205163723/https:/cinea.ec.europa.eu/index_en (accessed on: May 30, 2023)

European Commission. (n.d.-d). A European Green Deal. Retrieved from https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en (accessed on: May 30, 2023)

European Commission. (n.d.-e). National energy and climate plans. EU countries' 10-year national energy and climate plans for 2021-2030. Retrieved from https://commission.europa.eu/energy-climate-change-environment/implementation-eu-countries/energy-and-climate-governance-and-reporting/national-energy-and-climate-plans_en (accessed on: May 30, 2023)

European Commission. (n.d.-f). RenoBooster - the Smart Renovation Hub Vienna. Retrieved from https://cordis.europa.eu/project/id/847029 (accessed on: June 1, 2023)

European Investment Bank. (2023a). Completed projects. Retrieved from https://www.eib.org/en/products/advisory-services/elena/completed-projects/index (accessed on: May 30, 2023)

European Investment Bank. (2023b). ELENA – European Local ENergy Assistance. Retrieved from https://www.eib.org/en/products/advisory-services/elena/index.htm (accessed on: May 30, 2023)

Fifty-Fifty Energy Saving Models for Schools and Kindergartens. (2023). Retrieved from https://www.fifty-fifty.eu (accessed on: June 6, 2023)

Gebäudeforum klimaneutral. (2023). Die EU-Gebäuderichtlinie EPBD: Ein Überblick. Retrieved from https://www.gebaeudeforum.de/ordnungsrecht/energieeinsparrecht/epbd/ (accessed on: May 30, 2023)

Gemeente Delft. (n.d.). E-deal. Retrieved from https://www.delft.nl/milieu/energie/energieneutraal-2050/e-deal (accessed on: June 1, 2023)

Supported by:
Federal Ministry for Economic Affairs and Climate Action
European Climate Initiative EUKI
on the basis of a decision by the German Bundestag

Gemeinde Birkenwerder, (2023): *Stellenausschreibung Klimaschutzmanager (m/w/d), https://www.birkenwerder.de/fileadmin/dokumente/stellenanzeigen/2023-01-27_Stellenausschreibung_Klimaschutz.pdf (accessed on: May 31, 2023)*.

Gemeindeverwaltung Birkenwerder. (2017). Birkenwerders neuer Klimaschutzmanager Gunnar Thöle hat Angebote dabei! Retrieved from https://www.birkenwerder.de/rathaus/aktuelles/neuigkeiten/details/birkenwerders-neuer-klimaschutzmanager-gunnar-thoele-hat-angebote-dabei (accessed on: May 31, 2023)

Gemeindeverwaltung Birkenwerder. (2023a). Gemeindeverwaltung. Retrieved from https://www.birkenwerder.de/rathaus/buergerservice/gemeindeverwaltung (accessed on: May 19, 2023)

Gemeindeverwaltung Birkenwerder. (2023b). Klimaschutzkonzept und Klimaschutzmanagement in Birkenwerder. Retrieved from https://klimaschutz.birkenwerder.de/klimaschutzmanagement-und-projekte-in-birkenwerder/ (accessed on: May 31, 2023)

Hannover.de. (2019). Energiemanagement. Geringer Energieverbrauch als Ziel. Retrieved from https://www.hannover.de/Leben-in-der-Region-Hannover/Verwaltungen-Kommunen/Die-Verwaltung-der-Landeshauptstadt-Hannover/Dezernate-und-Fachbereiche-der-LHH/Stadtentwicklung-und-Bauen/Fachbereich-Gebäudemanagement/Energiemanagement (accessed on: May 19, 2023)

Hannover.de. (2022a). Die Projekte GSE, KliK und Tatort Büro. Energiesparprojekte des Fachbereichs Gebäudemanagement Retrieved from https://www.hannover.de/Leben-in-der-Region-Hannover/Umwelt-Nachhaltigkeit/Klimaschutz-Energie/Klimaschutz-konkret/Die-Projekte-GSE,-KliK-und-Tatort-Büro (accessed on: May 31, 2023)

Hannover.de. (2022b). Fachbereich Gebäudemanagement. Landeshauptstadt Hannover. Retrieved from https://www.hannover.de/Leben-in-der-Region-Hannover/Verwaltungen-Kommunen/Die-Verwaltung-der-Landeshauptstadt-Hannover/Dezernate-und-Fachbereiche-der-LHH/Stadtentwicklung-und-Bauen/Fachbereich-Gebäudemanagement (accessed on: May 31, 2023)

Hannover.de. (2023). Retrieved from https://www.hannover.de (accessed on: May 31, 2023)

INFRASTRUKTUR & UMWELT, Professor Böhm und Partner. (2013). *Integriertes Klimaschutzkonzept. Gemeinde Birkenwerder*. Retrieved from https://klimaschutz.birkenwerder.de/wp-content/uploads/2018/02/2013-11-25_Klimaschutzkonzept_Endfassung_inklusive_Anlagen.pdf (accessed on: May 31, 2023)

Institut für Energie-Effiziente Architektur mit Internet-Medien. (2023). Koalition vereinbart ambitionierten Zeitplan:

Novelle GEG 2024 vor Sommerpause beschließen. Retrieved from https://geg-info.de/geg_news/230328_ergebnisse_koalitionsausschuss_fuer_gebaeudebereich.htm (accessed on: May 30, 2023)

KEA, Klimaschutz- und Energieagentur Baden-Württemberg GmbH; LENA, Landesenergieagentur Sachsen-Anhalt GmbH; SAENA, Sächsische Energieagentur

GmbH & ThEGA, Thüringer Energie- und GreenTech-Agentur GmbH. (n.d.). Kom.EMS Leitfaden. Energiemanagement in Kommunen. Eine Praxishilfe.

KEA-BW. (2020). Kommunales Energiemanagement mit System Kom.EMS: Werkzeug, Förderung, Coaching. Retrieved from https://www.youtube.com/watch?v=qP4qilEAE04 (accessed on: May 19, 2023)

KfW. (2023). Energetische Sanierung. Energieeffizient sanieren und dauerhaft Energiekosten sparen. Retrieved from https://www.kfw.de/inlandsfoerderung/Privatpersonen/Bestehende-Immobilie/Energieeffizient-sanieren/ (accessed on: May 30, 2023)

Klimaschutz und Energieagentur Niedersachsen. (2023). Retrieved from https://www.klimaschutz-niedersachsen.de/zielgruppen/kommunen/kommunales-energiemanagement/index.php (accessed on: May 19, 2023)

Kreisverwaltung Uckermark. (2020). Herr Stefan Them. Retrieved from https://www.uckermark.de/Umwelt-Landwirtschaft-Natur/Energie-und-Klimaschutz/index.php?object=tx,3615.1.1&ModID=9&FID=2203.70.1 (accessed on: May 31, 2023)

Land Berlin. (n.d.). Retrieved from https://www.berlin.de/politik-verwaltung-buerger/suche.php?site=local&q=Energiemanagement (accessed on: May 31, 2023)

Landeshauptstadt Magdeburg. (n.d.). Energie- und Klimaschutzprogramm. Retrieved from https://www.magdeburg.de/Bürger-Stadt/Leben-in-Magdeburg/Umwelt/Klimaschutzportal/Ziele-br-Wege/index.php?a=3&NavID=37.725&object=tx%7C37.9142.1&La=1& (accessed on: May 31, 2023)

Landeshauptstadt Potsdam. (n.d.). Energiemanagement des Kommunalen Immobilien Service Potsdam. Retrieved from https://www.potsdam.de/energiemanagement-des-kommunalen-immobilien-service-potsdam (accessed on: May 31, 2023)

Landkreis Oberhavel. (n.d.). Gemeinde Birkenwerder. Retrieved from https://www.oberhavel.de/Landkreis/Städte-und-Gemeinden/Birkenwerder/ (accessed on: June 1, 2023)

Landsberg, Dr. Gerd. (2023). Keine Energiewende ohne Personalwende. Der Fachkräftemangel in den deutschen Kommunalverwaltungen. Retrieved from https://www.energie-klimaschutz.de/keine-energiewende-ohne-personalwende-der-fachkraeftemangel-in-den-deutschen-kommunalverwaltungen/ (accessed on: May 19, 2023)

LENA, Landesenergieagentur Sachsen-Anhalt GmbH -. (2023). Weiterbildungsangebot für kommunale Angestellte. Retrieved from https://lena.sachsen-anhalt.de/oeffentlicher-sektor/kommunales-energiemanagement/kommunale-energiebeauftragte-kommeb (accessed on: May 19, 2023)

LENA, Landesenergieagentur Sachsen-Anhalt GmbH -. (n.d.-a). Die drei Qualitätsstufen. Retrieved from https://www.komems.de/AboutKem/qualityLabels/ (accessed on: May 30, 2023)

LENA, Landesenergieagentur Sachsen-Anhalt GmbH -. (n.d.-b). Die vier Instrumente. Retrieved from https://www.komems.de/AboutKem/instruments/ (accessed on: May 30, 2023)

LENA, Landesenergieagentur Sachsen-Anhalt GmbH -. (n.d.-c). Teilnehmende Kommunen. Retrieved from https://www.komems.de/AboutKem/enrolledCommunities/ (accessed on: May 30, 2023)

LENA, Landesenergieagentur Sachsen-Anhalt GmbH -. (n.d.-d). Was ist Kom.EMS? Retrieved from https://www.komems.de/AboutKem/whatIsKem/ (accessed on: May 30, 2023)

LFE e.V., Landesverband für Energieeffizienz e.V. (2023a). Landesverband für Energieeffizienz e.V. Retrieved from https://www.lfe-energieberater.de (accessed on: May 31, 2023)

LFE e.V., Landesverband für Energieeffizienz e.V. (2023b). Veranstaltungen. Retrieved from https://www.lfe-energieberater.de/veranstaltungen (accessed on: May 31, 2023)

Malin, Dr. Lydia; Jansen, Dr. Anika & Kutz, Vico. (2023). Energie aus Wind und Sonne Welche Fachkräfte brauchen wir? STUDIE 03/2022.

Märkische Allgemeine. (n.d.). Zurück in die Heimat: Klimaschutzmanager Stefan Them verlässt Treuenbrietzen. Retrieved from https://www.maz-online.de/lokales/potsdam-mittelmark/treuenbrietzen/zurueck-in-die-heimat-klimaschutzmanager-stefan-them-verlaesst-treuenbrietzen-QFM6N5XOCNZXU27OMLCNGJ2HRI.html (accessed on: May 31, 2023)

Ministerium für Umwelt, Klima und & Energiewirtschaft Baden-Württemberg. (2023). Förderprogramm Klimaschutz-Plus. Retrieved from https://um.baden-wuerttemberg.de/de/klima/informieren-beraten-foerdern/klimaschutz-plus/ (accessed on: May 30, 2023)

Ministerium für Wirtschaft, Innovation, Digitales und Energie Saarland, . (2023). ZEP kommunal 2014-2020. Retrieved from https://www.saarland.de/mwide/DE/portale/energie/foerderprogramme/zep_kommunal_2014-2020.html (accessed on: May 30, 2023)

naturstrom AG. (2023). Bundesrat mahnt Schutz für einkommensarme Haushalte an. Retrieved from https://www.energiezukunft.eu/erneuerbare-energien/waerme/bundesrat-mahnt-schutz-fuer-einkommensarme-haushalte-an/ (accessed on: May 19, 2023)

Niranjan, Ajit. (2023). Green Deal: Wie setzt die EU die Energiewende um? *Deutsche Welle*. Retrieved from https://www.dw.com/de/eu-green-deal-tracker-faktencheck-klimaneutraler-umbau/a-64990834 (accessed on: May 31, 2023)

Piron, Rebecca. (2020). Kommunen als Vorreiter. Wie die Energiewende gelingen kann. *KOMMUNAL*. Retrieved from https://www.kommunal.de/energiewende-kommunen (accessed on: May 31, 2023)

Presse- und Informationsamt der Bundesregierung. (2022a). EEG 2023. “We’re tripling the speed of the expansion of renewable energies”. Retrieved from https://www.bundesregierung.de/breg-de/themen/klimaschutz/amendment-of-the-renewables-act-2060448 (accessed on: May 30, 2023)

Presse- und Informationsamt der Bundesregierung. (2022b). Generationenvertrag für das Klima. Klimaschutzgesetz. Retrieved from https://www.bundesregierung.de/breg-de/themen/klimaschutz/klimaschutzgesetz-2021-1913672 (accessed on: May 19, 2023)

Presse- und Informationsamt der Bundesregierung. (2023a). Anteil der Erneuerbaren Energien steigt weiter. Fragen und Antworten zur Energiewende. Retrieved from https://www.bundesregierung.de/breg-de/themen/klimaschutz/faq-energiewende-2067498 (accessed on: May 31, 2023)

Presse- und Informationsamt der Bundesregierung. (2023b). Energy Efficiency Act. The public sector set to become a role model. Retrieved from https://www.bundesregierung.de/breg-en/issues/remembrance-and-commemoration/the-energy-efficiency-act-2184958 (accessed on: May 30, 2023)

Senatsverwaltung für Mobilität, Verkehr, Klimaschutz und Umwelt,, (n.d.): *BEK 2030 – Umsetzung 2022 bis 2026, https://www.berlin.de/sen/uvk/klimaschutz/klimaschutz-in-der-umsetzung/bek-2030-umsetzung-2022-bis-2026/ (accessed on: May 19, 2023)*.

Senatsverwaltung für Wirtschaft, Energie und Betriebe. (n.d.). Solargesetz Berlin. Retrieved from https://www.berlin.de/sen/energie/erneuerbare-energien/solargesetz-berlin/artikel.1053243.php (accessed on: May 30, 2023)

Solarwende Berlin. (2022). Das Berliner Solargesetz kurz erklärt

. Retrieved from https://www.youtube.com/watch?v=kqkH06fiPdI&t=47s (accessed on: May 30, 2023)

Stadt Ludwigsfelde. (2016). *Kommunales Energie- und Klimaschutzkonzept für die Stadt Ludwigsfelde*. Retrieved from https://www.ludwigsfelde.de/wp-content/uploads/2018/03/20180322_Ludwigsfelde_Energie-und_Klimaschutzkonzept-2016.pdf (accessed on: May 31, 2023)

Stadt Ludwigsfelde. (n.d.-a). Energie- und Klimaschutzmanagement (EMIL). Retrieved from https://www.ludwigsfelde.de/stadt-und-tourismus/klimaschutz/energie-und-klimaschutzmanagement-emil/ (accessed on: May 31, 2023)

Stadt Ludwigsfelde. (n.d.-b). Kommunales Energie- und Klimaschutzkonzept. Retrieved from https://www.ludwigsfelde.de/stadt-und-tourismus/klimaschutz/kommunales-energie-klimaschutzkonzept/ (accessed on: May 31, 2023)

Stadt Ludwigsfelde. (n.d.-c). Ludwigsfelde vorgestellt. Retrieved from https://www.ludwigsfelde.de/stadt-und-tourismus/historie/vorgestellt/ (accessed on: June 1, 2023)

Stadt Oranienburg. (n.d.). Enrico Przibylla. Retrieved from https://oranienburg.de/index.php?object=adr%7C2967.1319.1%7C%7C1%7C&previewMode&gipsy=1&viewFrame=true (accessed on: May 30, 2023)

Stadt Treuenbrietzen. (2017). Zwischenbericht über die Tätigkeiten des Klimaschutzmanagers. Retrieved from https://daten2.verwaltungsportal.de/dateien/seitengenerator/e95121170112b9a0c718d46c77d58fac15976/zwischenbericht_17_0.pdf (accessed on: May 19, 2023)

Stadt Wien. (2022). *How to decarbonise heating in Vienna by 2040*. Retrieved from https://decarbcities.eu/wp-content/uploads/2022/05/DecarbCities-conference-presentations.pdf (accessed on: June 1, 2023)

Stadt Wien. (n.d.-a). A new era of smart urban renewal. Retrieved from https://smartcity.wien.gv.at/en/wieneu/ (accessed on: June 1, 2023)

Stadt Wien. (n.d.-b). Smart City. Retrieved from https://smartcity.wien.gv.at (accessed on: June 1, 2023)

Stadt Wien. (n.d.-c). Smarter together. Retrieved from https://smartcity.wien.gv.at/en/smarter-together-2/ (accessed on: June 1, 2023)

Stadtverwaltung Treuenbrietzen, (2021): *Organigramm, https://daten2.verwaltungsportal.de/dateien/seitengenerator/e95121170112b9a0c718d46c77d58fac15976/organigramm_stadt_treuenbrietzen_082021.pdf (accessed on: May 31, 2023)*.

Stadtverwaltung Treuenbrietzen. (n.d.-a). Energie- und Klimamanagement. Retrieved from https://www.treuenbrietzen.de/klimaschutz/ (accessed on: May 19, 2023)

Stadtverwaltung Treuenbrietzen. (n.d.-b). Stadtportrait. Retrieved from https://www.treuenbrietzen.de/seite/476392/portrait.html (accessed on: June 1, 2023)

Steinmeyer, Nina; Fritsch, David Valentin & Staudt, Elisabeth, Deutsche Umwelthilfe e.V., (2021): *Staatsgeheimnis Energieverschwendung. Enthüllungsbeericht Klima-Gebäude-Check., https://www.duh.de/fileadmin/user_upload/download/Projektinformation/Klima-Gebäude-Check/Enthüllungsbericht_Klima-Gebäude-Check.pdf (accessed on: May 31, 2023)*.

target GmbH. (2021). Kommunales Energieeffizienz Netzwerk Region Hannover. Retrieved from https://www.targetgmbh.de/foerderprojekte/kommunales-energieeffizienz-netzwerk-region-hannover/ (accessed on: May 31, 2023)

ThEGA, Thüringer Energie- und GreenTech-Agentur GmbH. (2023). Drei Kommunen aus Kyffhäuserkreis wollen mit gemeinsamem Energiemanager Kosten senken. Retrieved from https://www.thega.de/aktuelles/detail/drei-kommunen-aus-kyffhaeuserkreis-wollen-mit-gemeinsamem-energiemanager-kosten-senken/ (accessed on: May 30, 2023)

Thiele, Martin. (2020). Klimaschutz in Birkenwerder 2017-2019. Retrieved from https://klimaschutz.birkenwerder.de/ksmbilanz/ (accessed on: May 31, 2023)

TMUEN, Thüringer Ministerium für Umwelt, Energie und Naturschutz. (n.d.). Förderprogramm Klima Invest. Retrieved from https://umwelt.thueringen.de/ministerium/unsere-foerderprogramme/klima-invest (accessed on: May 30, 2023)

Treuenbrietzen, Stadtverwaltung, (2015): *Kommunales Energie- und Klimaschutzkonzept für die Stadt Treuenbrietzen, https://daten2.verwaltungsportal.de/dateien/seitengenerator/e95121170112b9a0c718d46c77d58fac15976/kek_treuenbrietzen_endbericht_08-07-15_final.pdf (accessed on: May 19, 2023)*.

TÜV Akademie GmbH. (n.d.). Weiterbildung Energiemanagement. Retrieved from https://die-tuev-akademie.de/management-seminare/energie-umwelt/weiterbildung-energiemanagement/ (accessed on: May 31, 2023)

UfU e.V., Unabhängiges Institut für Umweltfragen (Producer). (2021). Wind-Wagnis-(Mit)Wirkung - A portrait of the energy self-sufficient town of Feldheim. Retrieved from https://www.youtube.com/watch?v=z880HEZzqYI (accessed on: May 31, 2023)

UfU e.V., Unabhängiges Institut für Umweltfragen (Producer). (2023). Fachdialog Geheime Energiedaten. Erfahrungen aus dem Projekt „Smarte Energie macht Schule". *Berliner Energietage 2023*. Retrieved from https://www.energietage.de/fileadmin/user_upload/2023/Vortraege/BET2023_P.342_BET_2023_Geheime_Energiedaten_Praesentation_Bock_UfU.pdf (accessed on: May 31, 2023)

Umweltbundesamt. (n.d.). ISO 50001. Retrieved from https://www.umweltbundesamt.de/energiemanagementsysteme-iso-50001#iso-50001-aufbau-und-anwendung (accessed on: May 31, 2023)

Wachs, Thomas. (2019). Stadt hält an aktivem Klimaschutz fest. Retrieved from https://www.maz-online.de/lokales/potsdam-mittelmark/treuenbrietzen/stadt-haelt-an-aktivem-klimaschutz-fest-7FQSGCWDRRYQ4DKEZVAMGRRNIM.html (accessed on: May 19, 2023)

Wikimedia Foundation Inc. (2023a). Hannover. Retrieved from https://de.wikipedia.org/wiki/Hannover (accessed on: June 1, 2023)

Wikimedia Foundation Inc. (2023b). Treuenbrietzen. Retrieved from https://de.wikipedia.org/wiki/Treuenbrietzen#Persönlichkeiten (accessed on: June 1, 2023)

Wirtschafts- und Infrastrukturbank Hessen. (2022). Energetische Förderung HEG. Energetische Förderung im Rahmen des Hessischen Energiegesetzes (HEG). Retrieved from https://www.wibank.de/wibank/energetische-foerderung-im-rahmen-des-heg/energetische-foerderung-heg-312036 (accessed on: May 30, 2023)

Supported by:
Federal Ministry for Economic Affairs and Climate Action
European Climate Initiative EUKI
on the basis of a decision by the German Bundestag