3.1.1 Comprehensive evaluation of existing Energy projects and strategies

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This project is implemented through the Central Europe Programme co-financed by the ERDF.

1 Representation of Current Situation in Heating Systems for Buildings in Germany

1.1 Number of newly built non-residential buildings by type of heating energy used in German

Year	Total	Coal	Oil	Gas	Electrical	District heating	Heat-pumps	Solar energy	Other
1993	20915	262	5897	12905	1431		28	9	383
1994	21235	218	5808	13340	1426		31	7	405
1995	20996	185	5617	13509	1222		29	9	425
1996	19770	163	4899	13071	1207		36	9	385
1997	21701	134	4811	13628	1168		34	10	455
1998	20644	111	4543	13105	1110		38	17	415
1999	21583	96	4418	13982	1200		67	17	397
2000	21291	111	4152	13886	1186	1410	70	26	450
2001	19243	93	3292	13032	1028	1243	84	23	448
2002	17203	99	2754	11510	1001	1211	119	29	480
2003	14745	94	2149	9915	819	1177	146	22	423
2004	14064	70	1951	9353	828	1192	148	20	502
2005	13009	64	1771	8605	772	1064	160	21	552
2006	13210	75	1504	8751	761	1116	265	33	705
2007	13251	56	1378	8617	727	989	491	26	967
2008	14017	60	1283	8933	803	1165	664	32	1077
2009	12678	56	1056	7929	646	1128	841	44	978

Source: German Federal Office of Statistics 2009

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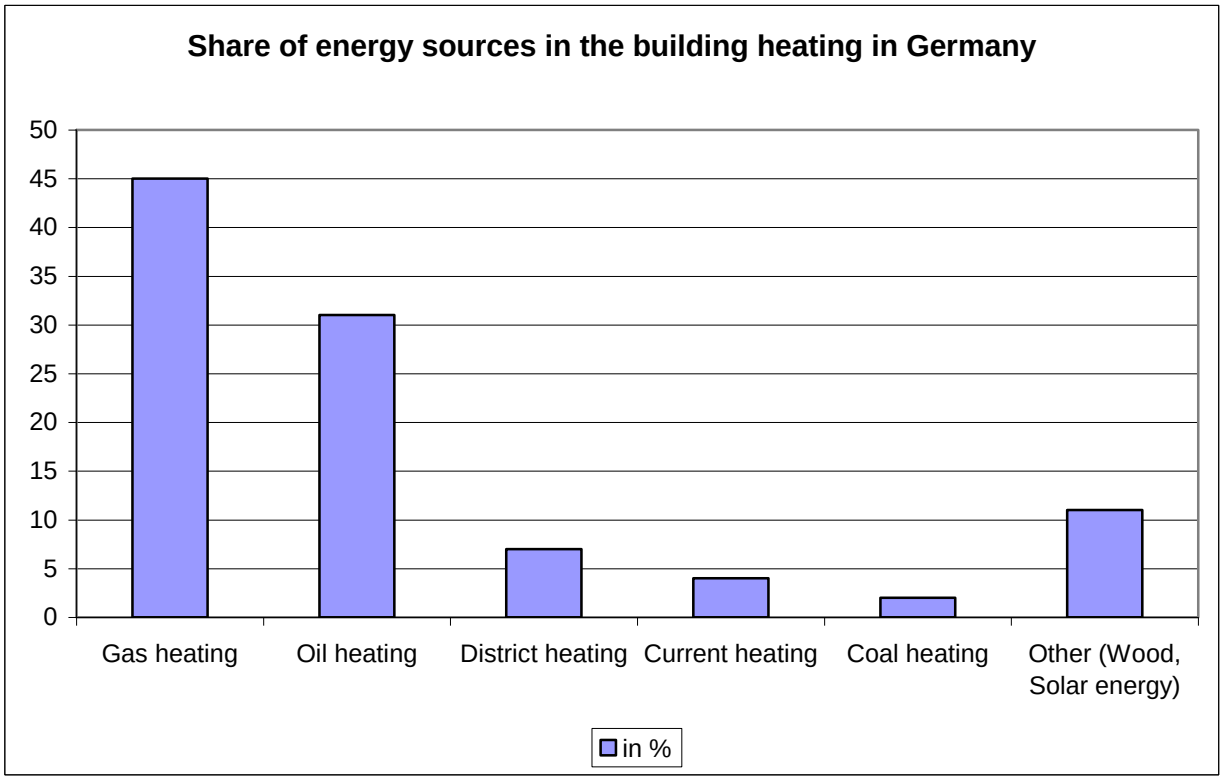
1.2 Percentage of energy for building heating systems in Germany

Type of Heating System	Share in Energy Consumption of Heating Systems in Germany in 2007 (in per cent)
Gas	45
Oil	31
District heating	7
Electrical	4
Coal	2
Other (wood, solar)	11



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The share of the different energy sources used to heat buildings in Germany differs according to region. Natural gas provides the majority of the energy for the heating systems in Germany, with the percentage continually increasing as the grid expands. Towns and regions with higher population densities already contain large and intricate gas distribution networks. The same applies to the eastern part of Germany, including villages.

The share of oil heating is slightly declining due to oil price increases and tightened safety requirements for oil storage tanks. However, continual decline in usage is primarily because of rigorous law amendments drastically limiting the share of primary energy sources. Specifically in new developments, the use of regenerative energies is becoming increasingly more economically viable. This tendency was highly influenced by strict energy saving ordinances affecting the energy efficiency required in external wall insulation, new technologies and the reduction of CO_2 emissions.

The share of district heating is slightly recovering from a plunge at the beginning of the 1990s. Small scale district heating grids were established as bio-gas plants and coal fired power plants were constructed. Resulting cost impacts were offset by funding plans covering up to 50% of the construction costs. The large-scale increase of heat-power cogeneration plants is also positively influencing the share of urban district heating. In rural areas with an abundance of wood resources, the share of wood-fired heating (firewood, wood chips) has surged in both existing and new housing developments. However, a further increase is not expected.

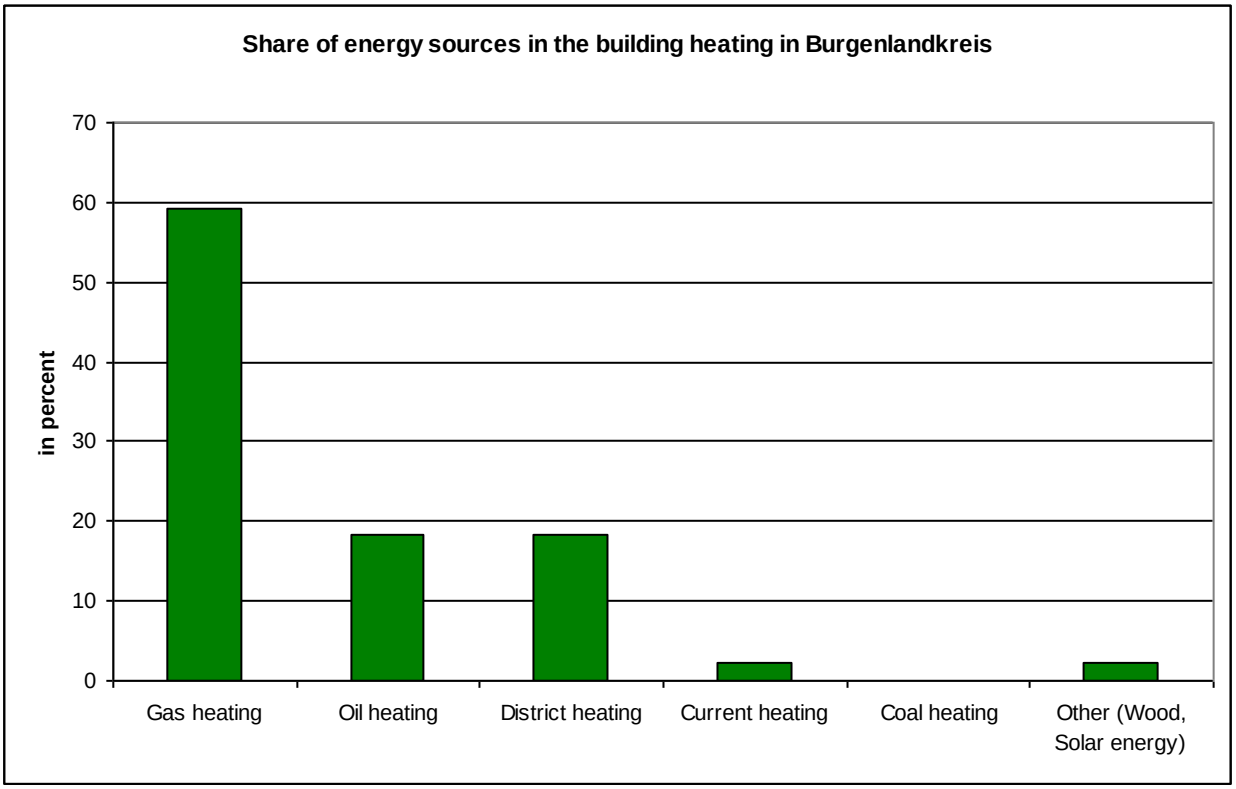
The share of electric and coal-fired heating systems is plummeting. Upon implementation of the Energy Saving Ordinance in 2009, the installation of electrical storage heating systems is only permitted in specific cases. Existing systems must be decommissioned according to their age.

The share of heating systems utilising wood pellets, heat pumps and solar heating is increasing rapidly, specifically in new housing developments. In accordance with 2009 law regulations for regenerative power sources (Erneuerbare Wärmegesetz), a minimum of 15 percent of the total energy consumption must be supplied by regenerative energy resources. In several federal states, similar requirements are enforced for the refurbishment of buildings.

1.3 Current Situation in Municipal Buildings of the Burgenlandkreis District in Saxony-Anhalt (as of 2010)

The following statements describe the distribution of energy sources for heating systems in the Burgenlandkreis district.

Energy consumption by different heating systems	Share of energy consumption of different heating systems in Burgenlandkreis district 2010 (in per cent)
Gas	59
Oil	18
District heating	18
Electrical	2,5
Coal	0
Other (wood, solar)	2,5



The large percentage of gas-fired heating systems is a direct result from the existing expansive gas distribution grid in Central Germany.This is particularly true for towns, where naturally most municipal buildings of a region are found.
The municipal buildings of the Burgenlandkreis district can be categorized according to type and age:

- **Schools housed in historical buildings:**
  Historical buildings seldom have any energy efficiency measures implemented.

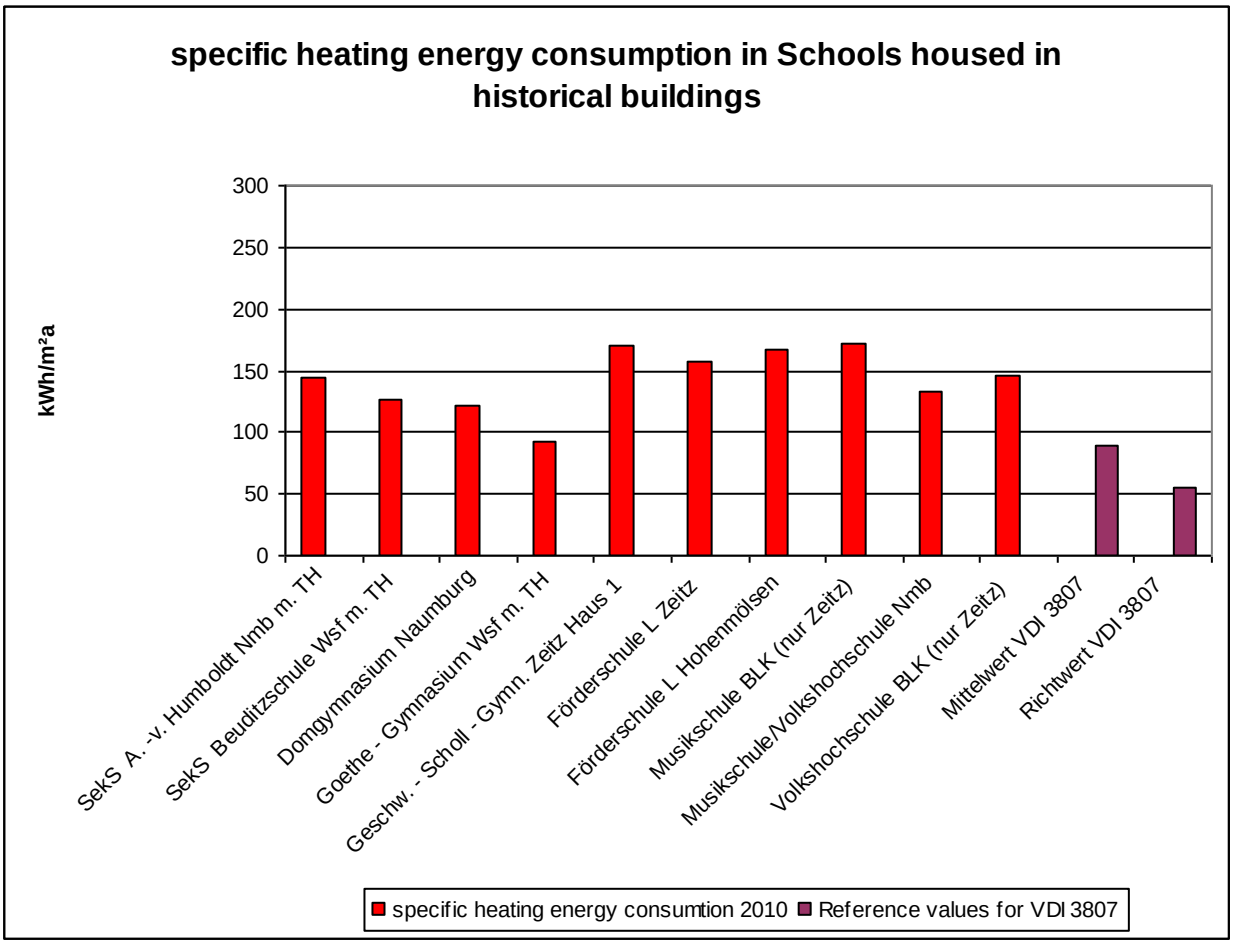
- **Schools built after 1991 or completely refurbished:**
  Schools constructed or completely refurbished after 1991 show a higher energy efficiency through implementation of external insulation and new heating technology. However, their energy demand is 30 to 200 percent higher as compared to that of new developments.

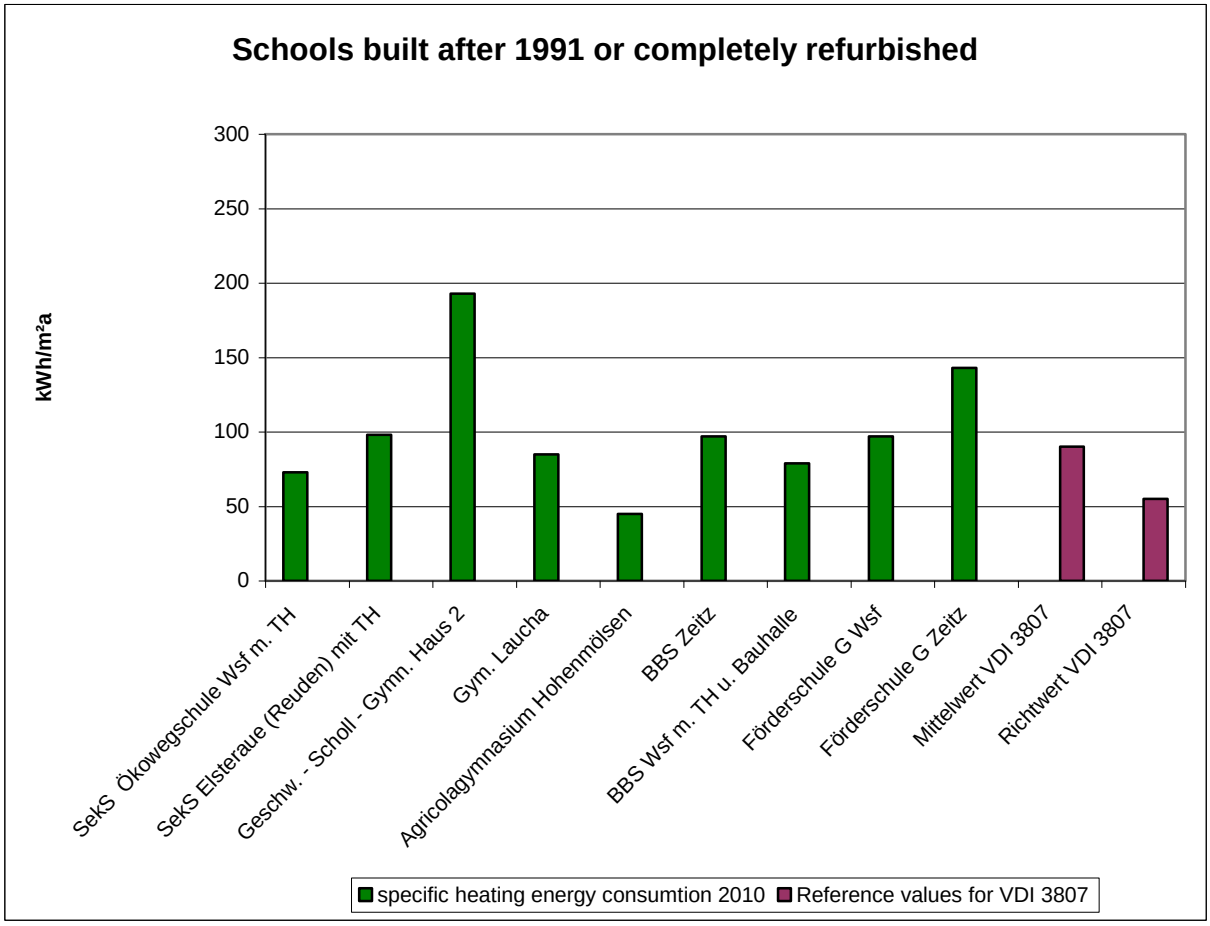
- **Schools partially or not refurbished:**
  In partially refurbished schools and those that have not yet undergone modernisation, few energy efficiency measures have been implemented.Thus, these buildings account for the highest average energy consumption.

- **Gym halls, constructed later than 1991:**
  The existing gym halls were built after 1991 and show similar patterns although the specific energy consumption varies.

- **Administrative buildings:**
  The administrative buildings comprise historical buildings which have been either completely refurbished or not at all.

1.4 Energy consumption in municipal buildings in Burgenlandkreis district





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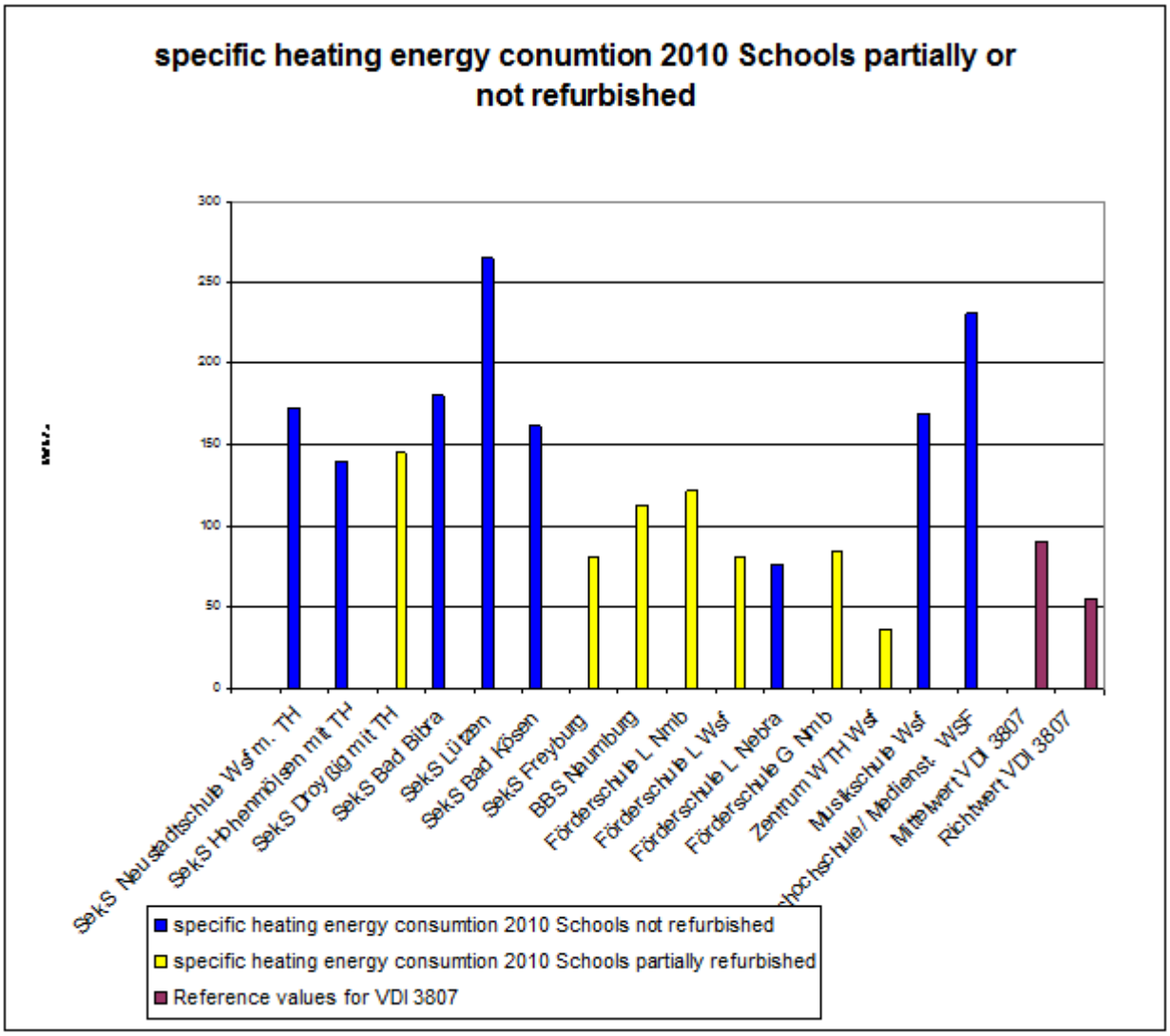
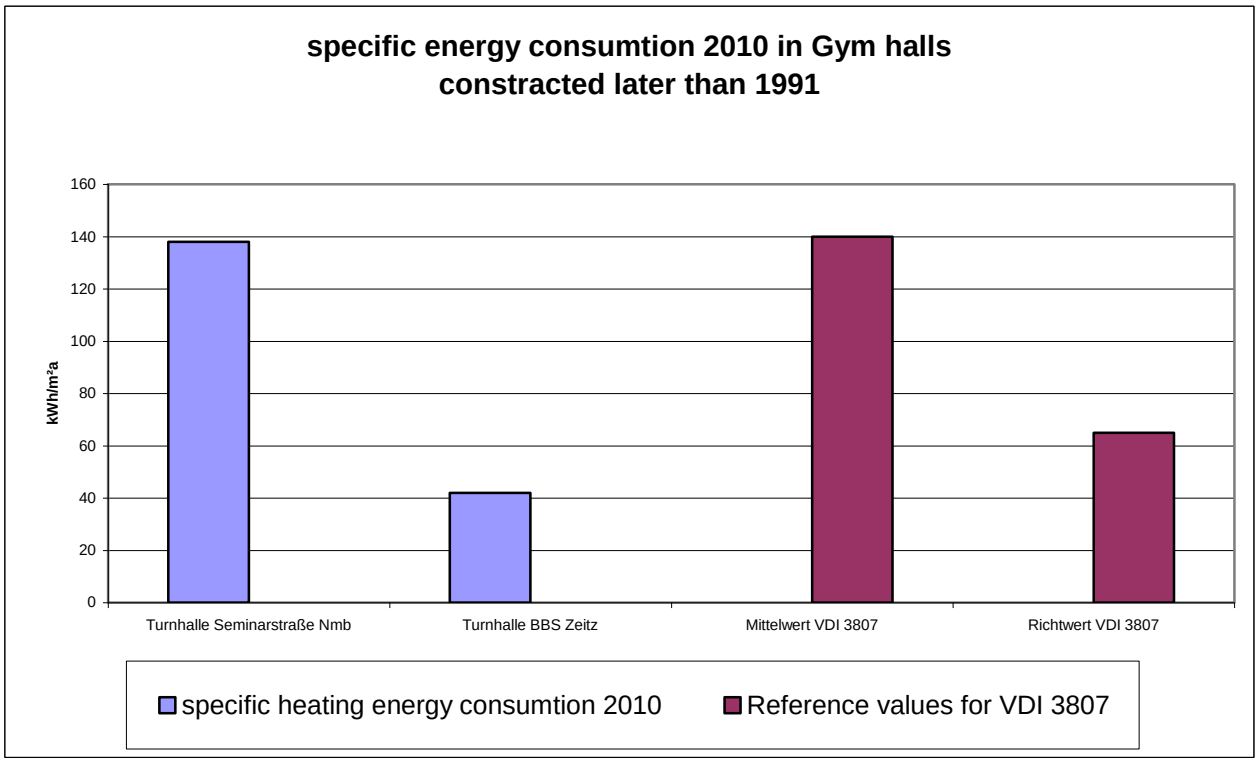
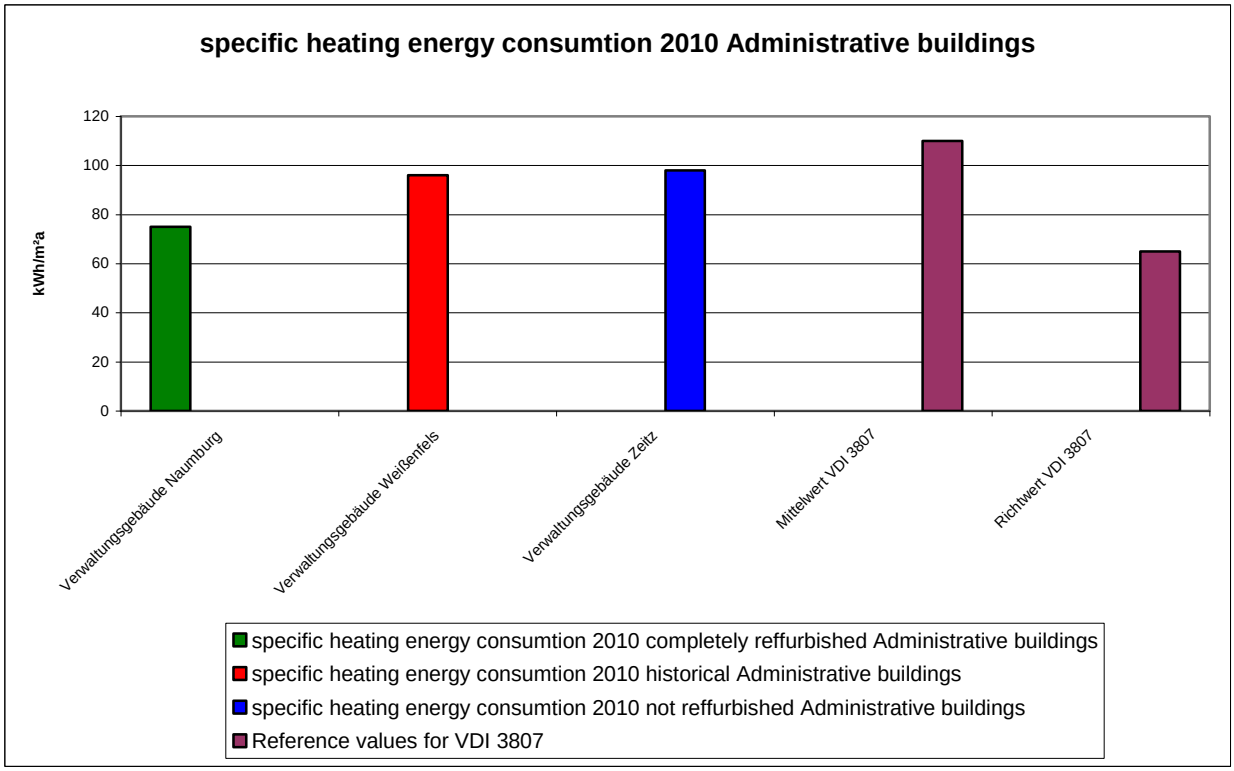

specific heating energy conumtion 2010 Schools partially or not refurbished
300
250
200
150
100
50
0
SekS Neustadtschule Wsf m. TH
SekS Hohenmölsen mit TH
SekS Droyßig mit TH
SekS Bad Bibra
SekS Lützen
SekS Bad Kösen
SekS Freyburg
BBS Naumburg
Förderschule L Nmb
Förderschule L Wsf
Förderschule L Nebra
Förderschule G Nmb
Zentrum WTH Wsf
Musikschule Wsf
Hochschule/ Medienst. WSF
Mittelwert VDI 3807
Richtwert VDI 3807
specific heating energy consumtion 2010 Schools not refurbished
specific heating energy consumtion 2010 Schools partially refurbished
Reference values for VDI 3807





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1.5 Problems and Factors Impeding or Slowing Down the Improvement of the Energy Efficiency in Municipal Buildings:

- Historical buildings are often listed as National heritage and are therefore subject to specific requirements which make an energetic redevelopment financially unrealistic or even impossible.

- The implementation of regenerative energy resources often completely inhibited by the constraints of regulations on the conservation of monuments.

- Energy redevelopment measures are cost intensive and thus viable only over a long-term perspective.

- Funding conditions are subject to constant change and budget constraints, thus complicating planning and implementation of measures for the use of regenerative energies.

- German municipalities predominantly still use a single-entry accounting system. In many cases, only investment costs are analysed when considering redevelopment measures or modernisation of engineering systems. Operational costs are often ignored.

2 Tools for the Initiation and Implementation of Municipal Energy Efficiency Measures

2.1 Local and Regional Level

Energy Roundtables and Environmental Protection Initiatives

Many local environmental protection initiatives were initially inspired by grass-root activities of committed people. They organised themselves in associations, unions, initiatives and organisations found in different social sectors – state, municipality, business and work life and citizen. Some of these groups work completely independently without involvement in other special interest groups, while others join higher level of institutions and organisations. One example for the latter is the German National Network for Civil Society (BBE- Bundesnetzwerk Bürgerschaftliches Engagement). The BBE pools these activities and directs them to the federal level of political debate on social responsibility aimed at defining new roles for the different actors from state, business and civic society.

Agenda 21 Process

Municipalities play a key role in the implementation of the Agenda 21, as many problems and solutions discussed in this agenda have an impact on a local level.

Several municipalities and rural districts of our region participate in the world-wide process of a sustainable development. Economic, political, cultural and societal decisions have to be brought into alignment with the core principles of the Agenda 21:

- Economically feasible
- Ecologically sound
- Socially just

The respective municipal corporate bodies are called to promote the agenda process in their rural and urban municipalities. Specific agenda offices have been set up to coordinate the activities.

2.2 Federal state project Saxony -Anhalt on Municipal Energy Management

A sustainable conduction of an energy management on municipal level is a very efficient measure to reduce municipal energy consumption and all related costs. However, in Saxony-Anhalt a systematic municipal energy management has so far been inhibited by certain factors, including insufficient information, poor motivation, restricted financial and human resources.

In the period 1999-2003, a model project aimed at overcoming these barriers. It was carried out by the federal government and administered by the energy agency Energieagentur Sachsen-Anhalt GmBH. Conducted in the real property sector of several municipalities to implement municipal energy management measures, it provided practical tools like energy management software and offered workshops as well as training for facility managers.

2.3 National Level

Nation-Wide Programme for the Development of Municipal Concepts for Sustainable Energy and Climate Protection

This program provides funding based on the "Integrated Energy and Climate Programme of the German Government"(IEKP). Its main objective is to unlock potentials in cost efficiency and emission reduction on a municipal level. It also supports model projects in order to set examples which have a regional and nation-wide outreach.

The following activities are eligible for funding:

- **Design of sustainable climate protection concepts (complete as well as modular).**
- **Expert monitoring during the implementation of climate protection concepts and conducting a selected climate protection measure.**
- **Expert monitoring during the implementation of energy saving models in schools and child care centres.**
- **Implementation of climate protection technologies in energy consumption settings with low efficiency thresholds.**
- **Design of "Master Plans for total climate protection" and expert monitoring of its implementation.**

Several municipalities in Saxony-Anhalt have already engaged in this funding programme.

2.4 European Level

European Energy Award

The **European Energy Award® (eea)** is the quality management system and certification programme for municipal climate protection activities. It documents, evaluates, plans, controls and checks these activities in order to identify and use new potentials how political decisions can further sustainable energy management and climate protection. The most important tool of the eea-programme is its catalogue of measures. Its implementation is ensured by a special municipal energy team formed within the municipality. This team is supported by an eea-advisor.

Successful municipal activities in the field of energy reduction and climate protection are not only documented but also rewarded. Presenting urban and rural municipalities and regions with the European Energy Award® or the European Energy Award®Gold acknowledges the results achieved so far.

Several municipalities of the neighbouring federal state of Saxony participate in the programme.

"Climate Alliance of European Cities with Indigenous Rainforest Peoples"

The members of this registered association have agreed to consistently reduce their green house emissions. They have committed themselves to reduce their CO2 emissions by 10 percent every five years. By 2030 at the latest the important milestone of halving per capita emissions (as seen from 1990 baseline) is to be achieved. The long term goal is for the participating cities and communities to achieve a reduction in their greenhouse emissions to a sustainable level of 2.5 tons CO_2-equivalent per capita annually. This endeavour will be made possible through the implementation of energy saving measures, energy efficiency and the exploitation of regenerative energies. This goal can only be achieved through a concerted action of all government decision-making levels (European community, national state, regions and local municipalities. In certain cases it cannot be achieved through measures authorised solely on a local municipal level. Higher levels of political hierarchy must become involved. The members of the Climate Alliance regularly report on the development of their climate protection activities. Several municipalities of Saxony-Anhalt were or are members of the Climate Alliance.

3 Liste List of Current Best Practice Projectes

3.1 Refurbishment of a 16th century listed building

State of Affairs: 2010

Institution/ Carrier: Große Kreisstadt Delitzsch

Municipality: Delitzsch

Federal State: Sachsen

Project Description

Former Latin school
Source: city of Delitzsch

The city of Delitzsch participates in the 'European Energy Award' with a pilot project „An der Kirche 1“ in order to set an example for the use of regenerative energies in municipal buildings. The former Latin school 'Alte Lateinschule' was refurbished at a cost in the range of 1.2 million Euros. The joint federation-federal state funding programme for the preservation of urban historical buildings, 'Bund Länder Programm Städtebaulicher Denkmalschutz', provided 775.000 Euros of the above stated costs. Thus, innovative heating technology was integrated in this building which had been built more than half a century ago. Geothermal heat now provides all the energy for the building. A heat pump with a rated power of 35 kilowatts delivers the heat via six geothermal probes (each at a depth of approx. 93 metres) to an underfloor heating system.

Objectives of the Measure

A significant and lasting reduction of both energy consumption and operating costs can be achieved by heating the building via a heat pump distributing geothermal heat and using an efficient lighting system. Innovative technologies can be used in the urban

redevelopment of historical buildings thus adding new life to well-aged building structures.

3.2 Contracting Project at the Federal School of Pforta (Burgenladkreis district)

Set in beautiful countryside the Landesschule Pforta near Naumburg is both school and home for 400 grammar school students who specialise in music, languages and natural sciences. The historic building complex of the former Cistercian monastry was heated by coal via solid fuel boilers until well into 2003, causing particular problems with the heating process in the 1980s. The urgent need for a new, environmentally sound and reliable technological solution could no longer be ignored.

Thus a tender procedure for facility contracting was initiated and the winning contractor has since undertaken the energy supply of the site in the specified range. As the beneficiary, the contractor took over existing equipment and bears the responsibility for financing, maintenance, upgrading and operating the facilities. The expenses are refinanced via the basic charge and the price per kWh for the heat supply.

3.3 Multi-storey Building Factory in Berlin-Oberschöneweide

Finding modern uses for buildings constructed during the Industrial revolution of the 19th century seems to be an omnipresent task of the present. The architect Frank Augustin combined unusual technical solutions with an respect for the existing historic building structure of this listed monument dating from 1904. His concept positively contradicts the general opinion that preservation of historic structures hinders efficiency and innovation. Any necessary change to the existing structures were aimed at flexibility, reduced energy consumption and consequent economy of means. The energy supply system represents a particular highlight demonstrating a symbiosis of solar absorption technology, cogeneration of heat and power and hypocaustic heating.

3.4 Estate of Half-timbered Frame Houses in Wienhausen

Model project of the German Energy Agency *dena*

Year of Construction:	around 1885 Listed as National Heritage
Effective area:	714 m^2 (overall)
Energy-Standard:	"Energy Saving Ordinance for New Development minus 40 percent"

The estate of half-timbered framed houses is comprised of five buildings arranged around the central former town hall of Wienhausen. The oldest building is the former mill of the Wienhausen monastery and it is slated to become a community centre for cultural activities. The remaining four buildings date back to the 19th century. They are used as hotels by the *Lebenshilfe Celle e.V,* the city of Celle branch of a nation-wide association committed to people in need of special care. The challenge was to preserve the historical architecture of the building and still meet the specifications for low energy housing. This was accomplished by sacrificing a negligible amount of liveable floor space and installing foil-laminated polyurethane foam panels along the internal walls of the building. All buildings are supplied with heat by a small-scale de-centralised heating scheme fed by wood chips.

3.5 Total Conversion of an Historical Monument into a Low-Energy Building

Child Day Care Centre (former Administrative Building of the Slaughterhouse)

The new renaissance building was constructed from 1890 to 1892. It housed both the inn and the administration of the Nuremberg slaughterhouse and stockyard. The slaughterhouse was demolished in 1998/99 and the New Renaissance building was abandoned at that time.

During the conversion the insulation of all relevant external parts was upgraded to modern specifications. The new building was constructed according to current standards for new buildings with a notably high level of heat loss prevention. Several energy efficient technologies were combined in the conversion, including an efficient gas-fired condensing boiler to provide heating and central warm water. The first and second floor were fitted with an under floor heating system which allows separate heat regulation for each room. The loft is heated by steel-panel radiators. Water saving sanitary engineering systems and an energy efficient system of fluorescent luminaries were installed to further the energy efficiency of the building.