



# *QuickCheck*

# **Toolkit**

To quickly and easily determine the potential for renewable energy sources in municipalities

## 1 About *QuickCheck*

The issues surrounding the preservation of the earth's reserves of raw materials and the related increase in the use of renewable energy resources are becoming increasingly important. As part of their efforts to reduce the level of CO<sup>2</sup> emissions produced by human activities, local authorities have established a climate group with the aim of making a direct contribution to this cause in their specific region.

The initial steps taken focused on insulation projects and the setting up of various central and district heating networks.

To facilitate the efficient and preservation-oriented use of energy reserves, energy concepts were developed in the regions and at local-authority level. The availability of detailed data surveys are a prerequisite to the development of such concepts.

The idea behind the *QuickCheck* project is to provide a means of facilitating the initiation of such projects through surveys of both existing renewable energy potential and the concrete possibilities for use which can be implemented both quickly and conveniently.

As part of *QuickCheck*, initial surveys are carried out and information on the use of renewable energy resources is made available for the local authority decision-making and consulting bodies (*LandesEnergieVerein* [Regional Energy Association], energy agencies etc.), thus making it possible to develop the essential points of an energy concept from a very modest basis:

- ◆ Which measures can be implemented quickly?
- ◆ Which measures require more long-term planning?
- ◆ What is directly available on our doorstep?
- ◆ What form can the realistic objectives of an energy concept take?

It is important to note that these questions only relate to potential projects involving renewable energy sources. A complete energy concept would, of course, cover many other areas.

Another idea behind the *QuickCheck* project consists of availing of existing human resources in the local authorities and regions (specifically in associations).

Persons involved in publicity tasks in local authorities and associations, for example environment and waste consultants, are very well integrated into the local authority structures and, due to the nature of their work, are also very familiar with the local situation. Thus, it makes complete sense to use these active local-authority employees as the driving force in energy projects of this nature.

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On the basis of its extensive activities in this particular area over many years, the *QuickCheck* team guarantees optimum help, support and supervision in all areas of implementation of the tool.

The *ARBEITSGEMEINSCHAFT MÜLLVERMEIDUNG* [Waste Avoidance Working Group] was founded in 1982 and its aim is to develop strategies for the avoidance of waste and emissions and to support the implementation of preventive environmental measures. The *Arbeitsgemeinschaft Müllvermeidung* has been active in adult education in the area of local-authority environmental protection since 1986.

The *Arbeitsgemeinschaft Müllvermeidung* was responsible for the target-group-specific processing and editing of the *QuickCheck* tool kit.

The *LANDESENERGIEVEREIN* [Regional Energy Association] works in close collaboration with the Energy Advisory Office of the Steiermark and provides technical and organisational supervision of energy projects. It also initiates projects and provides subsidies for them.

The *Landesenergieverein* is responsible for the areas of biomass and biogas in the *QuickCheck* tool kit.

The *ARBEITSGEMEINSCHAFT ERNEUBARE ENERGIE - AEE* [Renewable Energy Working Group] was founded in 1988 as an independent non-profit-making organisation. Its aim is to promote the rational use of renewable energy and the rational, sustainable use of energy. Its work focuses on the efficient use of energy and resources and the development of components, systems and strategies which will lead to the fastest and most widespread possible use of solar energy technologies as a basis for an environment-friendly energy supply for the future.

The *Arbeitsgemeinschaft Erneubare Energie - AEE* is responsible for the solar component in the *QuickCheck* tool kit.

The *AGENTUR UMWELT-ENERGIE-VERKEHR* [Environment - Energy - Transport Agency] was founded in 1977 in the Steiermark Städtebund [Towns Association]. Its purpose is to provide the local authorities with support in the area of the environment. The agency was initially involved in the area of energy conservation but today concentrates its activities in the areas of the environment and transport.

The *ÖSTERREICHISCHE BIOTREIBSTOFF INSTITUT* [The Austrian Biofuel Institute] is an expert pool, which includes all the institutes and persons with a history of involvement in pioneering work in the areas of biofuel and fuel additives from renewable raw materials since the beginning of such activities in Austria. The *Österreichische Biotreibstoff Institut* has provided the expert input on biofuels for *QuickCheck*.

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## 2 The QuickCheck Toolkit

The tool kit consists of the following four main sections: *General Local Authority Data (Chapter 3)*, *QuickCheck list (Chapter 4)*, *Detailed Surveys (Chapter 5)* and *Summarised Presentation of the Identified Potential (chapter 6)*.

The *QuickCheck* Toolkit provides participants with the tools they need to implement the *QuickCheck* project. It comprises lists which help those processing the data to identify salient points and also helps decision-makers and potential ancillary organisations to identify the general direction to be taken.

- ◆ The list of **General Local Authority Data** (Chapter 3) is used to provide an initial indication of the areas of renewable energy, in which potential for development exists, as well as those people actively involved in the area of energy within the local authority. The list contains a geographical description of the area being surveyed as well as an overview of the economic characteristics, settlement structure and general questions on different areas of energy.
- ◆ The **QuickCheck List** (Chapter 4) consists of a table based on the specific objects surveyed. It provides an overview of the applications for which the specified energy systems could be used and pinpoints potential sources of raw material for renewable energies. *It is basically irrelevant whether the buildings specified in the list are existing or planned structures.*

**The QuickCheck list does not, however, provide a comparative weighting of the different energy sources.**

The energy sectors and systems defined for the detailed surveys are identified in the *QuickCheck* list along with the relevant chapter numbers of the following detailed surveys.

- ◆ The **detailed surveys** (Chapter 5) are the most comprehensive part of the tool kit. They include brief comments and the corresponding criteria lists. These brief comments describe all of the possible uses of renewable energies.
    - The **brief comments** provide a general and technical overview of the different system variants.
    - Basic data for the logical use of the different systems is obtained using the **criteria lists**.
    - These criteria lists can be used to gather arguments for and against the use of certain systems for particular objects. They are intended to provide an initial indication as to whether it makes sense to use a particular form of energy for the object in question.
  - ◆ Chapter 6 - **Summarised Presentations of Established Potential** - provides an overview of all of the surveyed forms of using renewable energies.
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## 2.1 Using the *QuickCheck* Toolkit

To carry out surveys on the use of renewable energies in local authority areas with the help of the *QuickCheck* Toolkit, you must implement the following five stages:

1. Select a local authority area to survey.
2. Complete the **General Local Authority Data** lists (Chapter 3) so that you have all of the necessary specific data and names of contacts.
3. On the basis of this data, with the help of the **QuickCheck List** (Chapter 4), you may obtain an initial overview of the possible variants which can be used for the different objects. This general orientation aid then provides a guideline for the work on the detailed surveys.
4. The criteria lists (Chapter 5) must be completed for each object. The photocopy templates can be found at the end of the *QuickCheck* Toolkit.

Even if the initial overview indicates a clear bias in favour of individual energy systems, it is still important to work through all of the criteria lists to obtain a balanced information base.

For reasons of economic feasibility, minimum dimensions exist for larger plants, such as biodiesel production, biogas plants or biomass plants, and the resulting central heating networks. If the necessary raw material volumes cannot be obtained within the local authority, it makes sense to survey the available potential in neighbouring authorities in order to plan a shared system for the region.

5. The **Summarised Presentation of Established Potential** makes it possible to compile a corresponding summary of the collected data. This means that summarised comments on the use of renewable energy potential can be made available for decision-making bodies.
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| 3  | QuickCheck-List | see Chapter                         | 5.1  | 5.2  | 5.3  | 5.4  | 5.5  | 5.6  | 5.7                                    | 5.8  | 5.9                                | 5.10                            | 5.11                                   | 5.12             |
|--|-----------------|-------------------------------------|--|--|--|--|--|--|--|--|------------------------------------|---------------------------------|--|------------------|
|  |                 |                                     | Passive solar energy use (e.g. conservatory) | Thermal solar energy systems for service water preparation | Thermal solar energy systems for partial solar heating | Synthetic absorber for heating swimming pool water | Photovoltaic systems with network connection | Photovoltaic systems in isolated operation | Solar-biomass central heating networks | Heat from biomass (micro-networks/major systems) | Heat (and electricity) from biogas | Generation and use of biodiesel | Wind energy for electricity generation | Geothermia       |
| Surveyed objects                                     |                 | Brief information<br>Criteria lists |  |  |  |  |  |  |  |  |                                    |                                 |  |                  |
| <i>Public and private objects</i>                    |                 |                                     |  |  |  |  |  |  |  |  |                                    |                                 |  |                  |
| Multiple dwellings/apartment buildings               |                 |                                     | ++   | ++   | + <sup>1)</sup>  | ++ <sup>4)</sup>                                   | ++   |  | 2)                                     | ++   | +                                  | ○○                              |  | 2)               |
| Homes (for children, the aged etc.)                  |                 |                                     | ++   | ++   |  |  | +  |  | 2)                                     | +  | +                                  | ○○                              |  | 2)               |
| Hospital   |                 |                                     | ++   | ++   |  |  | +  |  | 2)                                     | +  | +                                  | ○                               |  | 2)               |
| Single dwellings                                     |                 |                                     | ++   | ++   | ++ <sup>1)</sup>                                       | ++ <sup>4)</sup>                                   | ++   | +  | 2)                                     | +  | ++                                 | ○                               |  | 2)               |
| Local authority offices                              |                 |                                     | ++   | +  | + <sup>1)</sup>  |  | +  |  | 2)                                     | +  | ++                                 |                                 |  | 2)               |
| Local authority hall                                 |                 |                                     | ++   | +  | + <sup>1)</sup>  |  | +  |  | 2)                                     | +  | ++                                 |                                 |  | 2)               |
| Kindergarten/pre-school facility                     |                 |                                     | ++   | +  | + <sup>1)</sup>  |  | +  |  | 2)                                     | +  | +                                  |                                 |  | 2)               |
| Other public buildings (fire brigade etc.)           |                 |                                     | +  | +  |  |  | +  |  | 2)                                     | +  | +                                  |                                 |  | 2)               |
| School with gymnasium                                |                 |                                     | ++   | +  | + <sup>1)</sup>  | ++ <sup>4)</sup>                                   | +  |  | 2)                                     | +  | ○+                                 |                                 |  | 2)               |
| Gymnasium (with summer use)                          |                 |                                     | ++   | ++   |  | ++ <sup>4)</sup>                                   | +  |  | 2)                                     | +  | ++                                 |                                 |  | 2)               |
| Sports centre (e.g. football pitch etc.)             |                 |                                     | ++   | ++   |  | ++ <sup>4)</sup>                                   | +  |  | 2)                                     |  | +                                  |                                 |  | 2)               |
| Camp site  |                 |                                     |  | ++   |  | ++ <sup>4)</sup>                                   | +  | +  |  |  | +                                  | ○                               |  | 2)               |
| Outdoor swimming pool                                |                 |                                     |  | ++   |  | ++ <sup>4)</sup>                                   | +  |  | 2)                                     |  | +                                  |                                 |  | 2)               |
| Indoor swimming pool                                 |                 |                                     |  | ++   |  | ++ <sup>4)</sup>                                   | +  |  | 2)                                     | +  | +                                  |                                 |  | 2)               |
| <i>Agricultural operations</i>                       |                 |                                     |  |  |  |  |  |  |  |  |                                    |                                 |  |                  |
| Work buildings (agriculture)                         |                 |                                     | +  | ++   | + <sup>1)</sup>  |  | ++   | +  |  | +  | ○+                                 | ○                               |  |                  |
| Farms from 50 livestock units (LSU)                  |                 |                                     |  |  |  |  |  |  |  | ○+   | ○○++                               |                                 |  |                  |
| Fallow land > 10 ha                                  |                 |                                     |  |  |  |  |  |  |  | ○○   | ○○                                 | ○○                              |  |                  |
| Forest area > 50 ha                                  |                 |                                     |  |  |  |  |  |  |  | ○○   |                                    |                                 |  |                  |
| <i>Commercial/small business operations</i>          |                 |                                     |  |  |  |  |  |  |  |  |                                    |                                 |  |                  |
| Mountain huts  |                 |                                     | +  | ++   |  |  |  | ++   |  | +  | ○+                                 | ○+                              |  |                  |
| Restaurants  |                 |                                     | ++   | ++   |  | ++ <sup>4)</sup>                                   | +  |  | 2)                                     | +  | ○+                                 | ○○                              |  | 2)               |
| Guest accommodation                                  |                 |                                     | ++   | ++   | + <sup>1)</sup>  | ++ <sup>4)</sup>                                   | +  |  | 2)                                     | +  | ○+                                 | ○+                              |  | 2)               |
| Meat processing plant                                |                 |                                     |  | ++   |  |  |  |  | 2)                                     | +  | ○○++                               | ○○                              |  | 2)               |
| Market-garden  |                 |                                     |  | +  | ++   |  | ++   |  | 2)                                     | +  | ○++                                |                                 |  | 2)               |
| Joiner's/carpenter's workshop > 30 employees         |                 |                                     |  |  |  |  | +  |  | 2)                                     | ○○++   | +                                  |                                 |  | 2)               |
| Sawmill > 20,000 m <sup>3</sup> of solid timber/year |                 |                                     |  |  |  |  | +  |  | 2)                                     | ○○++   | +                                  |                                 |  | 2)               |
| Leather producer                                     |                 |                                     |  | +  |  |  | +  |  | 2)                                     | +  | ○+                                 | ○+                              |  | 2)               |
| <i>Industrial operations</i>                         |                 |                                     |  |  |  |  |  |  |  |  |                                    |                                 |  |                  |
| Recyclable biomass waste (e.g. paper)                |                 |                                     |  |  |  |  |  |  | 2)                                     | ○○++   | ○+                                 |                                 |  | 2)               |
| Food industry  |                 |                                     |  | +  |  |  | +  |  | 2)                                     | +  | ○○++                               | ○                               |  | 2)               |
| <i>Other areas in the local authority</i>            |                 |                                     |  |  |  |  |  |  |  |  |                                    |                                 |  |                  |
| Dense east centre with high energy density           |                 |                                     |  | +  | + <sup>1)</sup>  |  | +  |  | ++                                     | ++   | ++                                 | ○                               |  |                  |
| >3,000 tonnes oils/fats produced each year           |                 |                                     |  |  |  |  |  |  |  |  | ○○                                 | ○○                              |  |                  |
| Diesel-operated vehicle fleet                        |                 |                                     |  |  |  |  |  |  |  |  |                                    | ++                              |  |                  |
| >5,000 tonnes of biogenic waste produced             |                 |                                     |  |  |  |  |  |  |  |  | ○○                                 |                                 |  |                  |
| Purification plant > 10,000 population equivalent    |                 |                                     |  |  |  |  |  |  |  |  | ○○++                               |                                 |  |                  |
| Electronic information boards (traffic signs)        |                 |                                     |  |  |  |  |  | ++   |  |  |                                    |                                 |  |                  |
| Parking machines                                     |                 |                                     |  |  |  |  |  | ++   |  |  |                                    |                                 |  |                  |
| The local authority is located in a windy area       |                 |                                     |  |  |  |  |  |  |  |  |                                    |                                 | ○○ <sup>3)</sup>                       |                  |
| The local authority is located in a geothermal zone  |                 |                                     |  |  |  |  |  |  |  |  |                                    |                                 |  | ○○ <sup>3)</sup> |

On energy use: very suitable ++ suitable +

Supplier of raw material suitable for energy use: very suitable ○○ suitable ○

1) Only makes sense if the object is well insulated.

2) Use of energy depends on pipes (central heating network): sensible use depends on the length of the pipes.

3) The local authority area may also be suitable outside the zones (see special list).

4) Only makes sense if a swimming pool (outdoor) is available.

#### 4 General Local Authority Data

Please complete the following questions for your local authority - multiple answers can be given to all questions.

**Survey of potential carried out by:**

Name: .....

Office (address) .....

.....

Tel: ..... Fax: ..... e-mail: .....

**The survey is being carried out on behalf of:**

Name of local authority / area / region

.....

**Sea level:** ..... m

**Area:** ..... km<sup>2</sup>

**Number of inhabitants:** .....

**Overnight stays by visitors** - summer season: .....

- winter season: .....

**Is the local authority located in a windy area?**       yes       no

**Is the local authority is located in a well known geothermal area:**       yes       no

Use of local authority land in accordance with the land-use plan

..... % agriculture

..... % construction land

..... % forest

..... % other

..... % commerce/industry

**Estimation of future developments:**

Immigration

Emigration

Potential commercial/industrial development

- proposed industrial sectors: .....

**General development structure:**

very dense (uninterrupted buildings, density 0.7♦)

dense (obvious local centre, density 0.4♦)

sparse (dispersed settlement, density 0.2♦)

(♦density = gross floor area : site area)

**Settlements with multiple dwellings:**

no

yes

Percentage of all housing in multiple dwellings ..... %

**Planned residential buildings**

multiple dwellings

no

yes

proposed form of energy .....

individual dwellings (density > 0.3)

no

yes

proposed form of energy .....

**Renovation of multiple dwellings planned?**

no

yes

Form of energy currently used for heating: .....

Form of energy currently used for service water: .....



Parking meters no yes number: .....

Electronic information boards no yes number: .....

**Industry > 100 employees** no yes central decentral

| Sector | Energy form used | unused biomass waste        |                              |
|--------|------------------|-----------------------------|------------------------------|
| _____  |                  | <input type="checkbox"/> no | <input type="checkbox"/> yes |
| _____  |                  | <input type="checkbox"/> no | <input type="checkbox"/> yes |
| _____  |                  | <input type="checkbox"/> no | <input type="checkbox"/> yes |
| _____  |                  | <input type="checkbox"/> no | <input type="checkbox"/> yes |
| _____  |                  | <input type="checkbox"/> no | <input type="checkbox"/> yes |

**Commercial operations < 100 employees**

Industrial and commercial estate  no  central  decentral

|   | Number | Energy forms used | Material available for energy use |
|---|--------|-------------------|-----------------------------------|
| Carpentry workshop >30 employees                  |        |                   |                                   |
| Sawmill > 20,000 m <sup>3</sup> solid timber/year |        |                   |                                   |
| Restaurants                                       |        |                   |                                   |
| Guest accommodation                               |        |                   |                                   |
| Meat-processing plant                             |        |                   |                                   |
| Garden centre                                     |        |                   |                                   |
| Leather producer                                  |        |                   |                                   |
| Food production                                   |        |                   |                                   |
|   |        |                   |                                   |
|   |        |                   |                                   |

**Farms/Forestry/Potential Energy Suppliers**

|   |                             |                              | Number | Material available for energy use |
|---|-----------------------------|------------------------------|--------|-----------------------------------|
| Farm with more than 50 LSU <sup>1</sup> | <input type="checkbox"/> no | <input type="checkbox"/> yes |        |                                   |
| Forestry operations larger than 50 ha   | <input type="checkbox"/> no | <input type="checkbox"/> yes |        |                                   |

Do **areas of agricultural land in excess of 10 ha which are permanently fallow** exist in the local authority area which could be planted with annual energy plants<sup>2</sup>?

no yes

Is there an **excess of 100 tonnes/year of timber waste products** (timber, bark, sawdust, etc.) from commerce and industry available for energy purposes in the local authority area (or surrounding local authority areas)?

no yes

Are **more than 5,000 tonnes of biogenic waste available per year** from central compost collection (also including neighbouring authority areas)?

no yes

**Is there central collection of used cooking oil:**

- from households no yes
- from restaurants, guest houses, hotels no yes

Level of disposal of domestic effluent? ..... %

Is there a **purification plant** which exceeds 10,000 population equivalent? no yes

<sup>1</sup> LSU (livestock unit) corresponds to 1 milk cow or 7 pigs

<sup>2</sup> Miscanthus, poplars, etc.

**Local (regional) energy supply companies**

| Name | form of energy used | distributed energy (heat/electricity) |
|------|---------------------|---------------------------------------|
|      |                     |                                       |
|      |                     |                                       |
|      |                     |                                       |

**Energy-generation plants in the local authority area**     not available     available

| Name | form of energy used | produced energy (heat/electricity) |
|------|---------------------|------------------------------------|
|      |                     |                                    |
|      |                     |                                    |
|      |                     |                                    |
|      |                     |                                    |
|      |                     |                                    |
|      |                     |                                    |
|      |                     |                                    |
|      |                     |                                    |
|      |                     |                                    |

**Existing energy networks**

- Electricity     60 kV     100 kV     280 kV | Transformers:  no     yes    number: .....

- Central heating networks:     no     yes     biomass  
 biogas  
 coal, coke  
 oil  
 fossil gas

**Is it possible to predict changes involving energy (e.g. district/central heating network, gas connection)?**

no       yes

If yes, which changes are predicted?.....  
 .....  
 .....  
 .....

**Do you know about any plans for the installation of low temperature heating systems in the local authority area? (floor/wall heating)?**

no       yes

Who/where? .....  
 .....  
 .....  
 .....

**Are there plans to convert the heating systems in major projects?**       no       yes

| Who/where | form of energy used | proposed form of energy |
|-----------|---------------------|-------------------------|
|           |                     |                         |
|           |                     |                         |
|           |                     |                         |
|           |                     |                         |

**Have priority areas for certain forms of energy been identified in regional development?**

no       yes

If yes, which forms of energy? .....  
 .....

**Does the local authority provide support for the use of renewable energies?**

no  yes

Promoted forms of energy:

- sun
- biomass
- biogas
- biodiesel
- geothermal
- wind
- geothermal/heat pump

Is there a special energy consultant in the local authority?

no  yes Who? .....

Is there an energy concept available for the local authority?

no  yes From which year? .....

Is energy accountancy available in the local authority?

no  yes

**Was advice provided by energy advice offices?**

no  yes

Which institution/when? .....  
.....  
.....

**Are there climate association activities in the local authority?**

no  yes

Which activities?.....  
.....  
.....

**Seminars for home builders:**

no  yes

**Home builder groups:**

no  yes

For which areas? .....  
.....  
.....

**Are there active citizens, groups, associations, companies involved in the promotion of renewable energy sources?**

no                       yes

Who/for which forms of energy .....

.....

.....

.....

.....

**Which other energy actors exist in the local authority?**

|                          |                             |                              |               |
|--------------------------|-----------------------------|------------------------------|---------------|
| Chimney sweeps           | <input type="checkbox"/> no | <input type="checkbox"/> yes | Number: ..... |
| Fitters                  | <input type="checkbox"/> no | <input type="checkbox"/> yes | Number: ..... |
| Petrol station operators | <input type="checkbox"/> no | <input type="checkbox"/> yes | Number: ..... |
| Fuel dealers             | <input type="checkbox"/> no | <input type="checkbox"/> yes | Number: ..... |
| Architects               | <input type="checkbox"/> no | <input type="checkbox"/> yes | Number: ..... |

## 5 Detailed Surveys

### 5.1 Passive Solar Energy Use and Thermal Insulation

#### 5.1.1 Brief Information

What are the prerequisites which must be fulfilled to facilitate the use of both passive and active solar energy in a building? Most mistakes are made at the very outset, in selecting the site as well as later during the actual design phase.

Buildings should be oriented in a way that enables the use of solar energy. Buildings constructed on an east/west axis have maximum sun-exposed surfaces in winter and are thus suitable for the use of solar energy. The main façade with the largest window surfaces, the roof surface on which the thermal solar energy equipment is situated and the photovoltaic system should be south-facing. Where possible, the roof surface should not be broken by dormer windows to facilitate the compact assembly of collector and generator surfaces.

As a general rule, the following procedures should be implemented in building design:

- ◆ Checking the application of energy-saving principles
- ◆ Use of passive solar energy technologies
- ◆ Use of active solar energy systems

It is important to tailor each of these components to each other and observe their interaction.

**High-quality thermal insulation represents the most efficient method for reducing heating requirements in a building. Thermal insulation can reduce the heating requirement to between 40 and 60 kWh/m<sup>2</sup> of residential floor space per year. The heating requirement can be reduced even further by availing of passive solar energy. The features which must be implemented to avail of passive solar energy include:**

- ◆ south-facing window surfaces
- ◆ high-quality windows (double glazing)  $k \leq 1.1 \text{ W/m}^2\text{K}$
- ◆ conservatories and atria
- ◆ storage walls which store the solar energy by day and release it by night

In addition to the energetic effect of the passive use of solar energy, these measures have added attractions in the form of enhanced comfort and brighter interior spaces.

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## 5.2 Thermal Solar Energy Systems for Service Water Preparation

### 5.2.1 Criteria List: multiple dwellings, homes (for the aged, youth, blind persons)


| No. | Criteria  | Requirement Profile  | Surveyed on-site   |
|-----|---|--|--|
| 1   | Orientation of building, particularly the roof surface for the fitting of collectors <sup>3</sup> | Max. south deviation of 50° in east-west direction   | Orientation:   |
| 2   | Roof pitch <sup>4</sup>   | Pitch > 25°  |  |
| 3   | Shadows thrown by trees or other objects <sup>5</sup>   |  | <input type="checkbox"/> yes <input type="checkbox"/> no |
| 4   | Number of persons living in the building  |  |  |
| 5   | Collector surfaces required   | 1 to 2 m <sup>2</sup> per person   | Collector surface m <sup>2</sup>                         |
| 6   | Size/dimensions of available roof surface   | Roof surface for the collectors > collector size   | <input type="checkbox"/> yes <input type="checkbox"/> no |
| 7   | Hot water storage required  | 40 to 60 litres per m <sup>2</sup> of collector surface  |  |
| 8   | Shaft provided for pipes  | Space requirement approx. 200 x 400 mm (solar flow and return)   | <input type="checkbox"/> yes <input type="checkbox"/> no |
| 9   | Space available in cellar or building for the boiler and fittings                                 | 8 to 10 m <sup>2</sup> for buffer storage and/or boiler and 6 m <sup>2</sup> wall surface for fittings |  |

#### INFO:

<sup>3</sup> If criterion 1 is not fulfilled: ⇒ alternative collector installation: installation of collectors on an adjacent structure (roofed car port), integration of collector into façade.

<sup>4</sup> If the roof pitch is lower than that specified (flat roof) ⇒ elevated erection of collectors (slope 45°).

<sup>5</sup> If there are shadows: ⇒ alternative collector installation: as in footnote 1).

|                 |   |
|-----------------|---|
| <b>ADDRESS:</b> | <b>CONTACT</b><br> |
|-----------------|---|

## Thermal Solar Energy Systems for Service Water Preparation

### 5.2.3 Criteria List: guest accommodation, hospital

| No. | Criteria  | Requirement Profile  | Surveyed on-site   |
|-----|---|--|--|
| 1   | Orientation of building, particularly the roof surface for the fitting of collectors <sup>6</sup> | Max. south deviation of 50° in east-west direction   | Orientation:   |
| 2   | Roof pitch <sup>7</sup>   | Pitch > 25°  |  |
| 3   | Shadows thrown by trees or other objects <sup>8</sup>   |  | <input type="checkbox"/> yes <input type="checkbox"/> no |
| 4   | Number of beds  |  |  |
| 5   | Collector surfaces required   | 1 to 2 m <sup>2</sup> per bed  | Collector surface m <sup>2</sup>                         |
| 6   | Size/dimensions of free roof surface <sup>9</sup>   | Roof surface for the collectors > collector size   | <input type="checkbox"/> yes <input type="checkbox"/> no |
| 7   | Hot water storage required  | 40 to 60 litres per m <sup>2</sup> of collector surface  |  |
| 8   | Shaft provided for pipes  | Space requirement approx. 200 x 400 mm (solar flow and return)   | <input type="checkbox"/> yes <input type="checkbox"/> no |
| 9   | Space available in cellar or building for the boiler and fittings                                 | 8 to 10 m <sup>2</sup> for buffer storage and/or boiler and 6 m <sup>2</sup> wall surface for fittings |  |

#### INFO:

<sup>6</sup> If criterion 1 is not fulfilled: ⇒ alternative collector installation: installation of collectors on an adjacent structure (roofed car port), integration of collector into façade.

<sup>7</sup> If the roof pitch is lower than that specified (flat roof) ⇒ elevated erection of collectors (slope 45°).

<sup>8</sup> If there are shadows: ⇒ alternative collector installation: as in footnote 1.

<sup>9</sup> Roof surface available for the collector smaller than collector: ⇒ alternative collector installation: as in footnote 1.

**ADDRESS:**

**CONTACT**



## Thermal Solar Energy Systems for Service Water Preparation

### 5.2.5 Criteria List: single dwelling

| No.          | Criteria   | Requirement Profile   | Surveyed on-site   |
|--------------|--|---|--|
| 1            | Orientation of building, particularly the roof surface for the fitting of collectors <sup>10</sup> | Max. south deviation of 50° in east-west direction                                      | Orientation:   |
| 2            | Roof pitch <sup>11</sup>   | Pitch > 25°   |  |
| 3            | Shadows thrown by trees or other objects <sup>12</sup>   |   | <input type="checkbox"/> yes <input type="checkbox"/> no |
| 4            | Number of persons living in the building   |   |  |
| 5            | Collector surface  | 2 m <sup>2</sup> per person   | Collector surface m <sup>2</sup>                         |
| 6            | Size/dimensions of free roof surface <sup>13</sup>   | Roof surface for the collectors > collector size  | <input type="checkbox"/> yes <input type="checkbox"/> no |
| 7            | Hot water storage (boiler)   | 80 to 120 litres per person   |  |
| 8            | Unused chimney or other shaft available for pipes  | Space requirement approx. 80 x 160 mm (solar flow and return)                           | <input type="checkbox"/> yes <input type="checkbox"/> no |
| 9            | Space available in cellar or building for the boiler and fittings                                  | 1.0 to 2 m <sup>2</sup> for the boiler and 1.5 m <sup>2</sup> wall surface for fittings |  |
| <b>INFO:</b> |  |   |  |

<sup>10</sup> If criterion 1 is not fulfilled: ⇒ alternative collector installation: installation of collectors on an adjacent structure (roofed car port), integration of collector into façade.

<sup>11</sup> If the roof pitch is lower than that specified (flat roof) ⇒ elevated erection of collectors (slope 45°).

<sup>12</sup> If there are shadows: ⇒ alternative collector installation: as in footnote 1.

<sup>13</sup> Roof surface available for the collector smaller than collector: ⇒ alternative collector installation: as in 1.


**ADDRESS:**

**CONTACT**



## 5.2 Thermal Solar Energy Systems for Service Water Preparation

### 5.2.7 Criteria List: local authority offices, local authority assembly hall, kindergarten, other public buildings (fire brigade, Red Cross etc.)

| No.             | Criteria   | Requirement Profile   | Surveyed on-site   |
|-----------------|--|---|--|
| 1               | Orientation of building, particularly the roof surface for the fitting of collectors <sup>14</sup> | Max. south deviation of 50° in east-west direction  | Orientation:   |
| 2               | Roof pitch <sup>15</sup>   | Pitch > 25°   |  |
| 3               | Shadows thrown by trees or other objects <sup>16</sup>   |   | <input type="checkbox"/> yes <input type="checkbox"/> no |
| 4               | Daily hot water requirement <sup>17</sup>  | in excess of 70 litres per day  |  |
| 5               | Collector surfaces required  | 1 m <sup>2</sup> per 20 to 30 l/hot water consumption per day (water temperature 45°C)  | Collector surface m <sup>2</sup>                         |
| 6               | Size/dimensions of free roof surface <sup>18</sup>   | Roof surface for collectors > collector size  | <input type="checkbox"/> yes <input type="checkbox"/> no |
| 7               | Hot water storage required   | 40 to 60 litres per m <sup>2</sup> of collector surface   |  |
| 8               | Shaft provided for pipes   | Space requirement approx. 80 x 160 mm (solar flow and return)   | <input type="checkbox"/> yes <input type="checkbox"/> no |
| 9               | Space available in cellar or building for the boiler and fittings                                  | 1 to 2 m <sup>2</sup> for the boiler and 1.5 m <sup>2</sup> wall surface for fillings or 8 to 10 m <sup>2</sup> for a system with buffer storage and/or boiler and 6 m <sup>2</sup> for fittings. |  |
| <b>INFO:</b>    |  |   |  |
| <b>ADDRESS:</b> |  | <b>CONTACT</b>  |  |
|                 |  |    |  |

<sup>14</sup> If criterion 1 is not fulfilled: ⇒ alternative collector installation: installation of collectors on an adjacent structure (roofed car port), integration of collector into façade

<sup>15</sup> If the roof slope is lower than that specified (flat roof) ⇒ elevated erection of collectors (slope 45°)


<sup>16</sup> If there are shadows: ⇒ alternative collector installation: as in footnote 1.

<sup>17</sup> If criterion 4 is not fulfilled and it is not possible to implement partial solar heating, there is no point in installing a thermal solar energy system.

<sup>18</sup> Roof surface available for the collector smaller than collector: ⇒ alternative collector installation: as in 1.

## Thermal Solar Energy Systems for Service Water Preparation

### 5.2.9 Criteria List: commercial building (agriculture), restaurant (without accommodation), meat-processing plant, leather producer

| No.             | Criteria   | Requirement Profile   | Surveyed on-site   |
|-----------------|--|---|--|
| 1               | Orientation of building, particularly the roof surface for the fitting of collectors <sup>19</sup> | Max. south deviation of 50° in east-west direction  | Orientation:   |
| 2               | Roof pitch <sup>20</sup>   | Pitch > 25°   |  |
| 3               | Shadows thrown by trees or other objects <sup>21</sup>   |   | <input type="checkbox"/> yes <input type="checkbox"/> no |
| 4               | Daily hot water requirement  |   |  |
| 5               | Collector surfaces required  | 1 m <sup>2</sup> per 20 to 30 l/hot water consumption per day (water temperature 45°C)                      | Collector surface<br>m <sup>2</sup>                      |
| 6               | Size/dimensions of free roof surface <sup>22</sup>   | Roof surface for the collector > collector size   | <input type="checkbox"/> yes <input type="checkbox"/> no |
| 7               | Hot water storage required   | 40 to 60 litres per m <sup>2</sup> of collector surface   |  |
| 8               | Unused chimney or other shaft available for pipes  | Space requirement approx. 80 x 160 mm (solar flow and return)   | <input type="checkbox"/> yes <input type="checkbox"/> no |
| 9               | Space available in cellar or building for the boiler and fittings                                  | 8 to 10 m <sup>2</sup> for the buffer storage and/or boiler and 6 m <sup>2</sup> wall surface for fittings. |  |
| <b>INFO:</b>    |  |   |  |
| <b>ADDRESS:</b> |  | <b>CONTACT</b>  |  |
|                 |  |                          |  |

<sup>19</sup> If criterion 1 is not fulfilled: ⇒ alternative collector installation: installation of collectors on an adjacent structure (roofed car port), integration of collector into façade

<sup>20</sup> If the roof slope is lower than that specified (flat roof) ⇒ elevated erection of collectors (slope 45°)

<sup>21</sup> If there are shadows: ⇒ alternative collector installation: as in footnote 1.

<sup>22</sup> Roof surface available for the collector smaller than collector: ⇒ alternative collector installation: as in footnote 1.

## Thermal Solar Energy Systems for Service Water Preparation

### 5.2.11 Criteria List: school with gymnasium and sports centre with gymnasium, football pitch, tennis courts etc.


| No.          | Criteria   | Requirement Profile   | Surveyed on-site   |
|--------------|--|---|--|
| 1            | Orientation of building, particularly the roof surface for the fitting of collectors <sup>23</sup> | Max. south deviation of 50° in east-west direction  | Orientation:   |
| 2            | Roof pitch <sup>24</sup>   | Pitch > 25°   |  |
| 3            | Shadows thrown by trees or other objects <sup>25</sup>   |   | <input type="checkbox"/> yes <input type="checkbox"/> no |
| 4            | Number of showers taken per day  |   | litres   |
| 5            | Collector surfaces required  | 1 m <sup>2</sup> per shower   | Collector surface m <sup>2</sup>                         |
| 6            | Size/dimensions of free roof surface <sup>26</sup>   | Roof surface for the collectors > collector size  | <input type="checkbox"/> yes <input type="checkbox"/> no |
| 7            | Hot water storage required   | 40 to 60 litres per m <sup>2</sup> of collector surface   |  |
| 8            | Unused chimney or other shaft available for pipes  | Space requirement approx. 80 x 160 mm (Solar flow and return)   | <input type="checkbox"/> yes <input type="checkbox"/> no |
| 9            | Space available in cellar or building for the boiler and fittings                                  | 1 to 8 m <sup>2</sup> for the buffer storage and/or boiler and 1.5 to 3 m <sup>2</sup> wall surface for fittings. |  |
| <b>INFO:</b> |  |   |  |

<sup>23</sup> If criterion 1 is not fulfilled: ⇒ alternative collector installation: installation of collectors on an adjacent structure (roofed car port), integration of collector into façade

<sup>24</sup> If the roof slope is lower than that specified (flat roof) ⇒ elevated erection of collectors (slope 45°)

<sup>25</sup> If there are shadows: ⇒ alternative collector installation: as in footnote 1.

<sup>26</sup> Roof surface available for the collector smaller than collector: ⇒ alternative collector installation: as in footnote 1.

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|-----------------|---|
| <b>ADDRESS:</b> | <b>CONTACT</b><br> |
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## Thermal Solar Energy Systems for Service Water Preparation

### 5.2.13 Criteria List: campsite


| No.          | Criteria   | Requirement Profile  | Surveyed on-site   |
|--------------|--|--|--|
| 1            | Orientation of building, particularly the roof surface for the fitting of collectors <sup>27</sup> | Max. south deviation of 50° in east-west direction   | Orientation:   |
| 2            | Roof pitch <sup>28</sup>   | Pitch > 25°  |  |
| 3            | Shadows thrown by trees or other objects <sup>29</sup>   |  | <input type="checkbox"/> yes <input type="checkbox"/> no |
| 4            | Average number of guests per day during the camping season   |  | litres   |
| 5            | Collector surfaces required  | 1 to 2 m <sup>2</sup> per person   | Collector surface    m <sup>2</sup>                      |
| 6            | Size/dimensions of free roof surface <sup>30</sup>   | Roof surface for the collectors > as collector surface   | <input type="checkbox"/> yes <input type="checkbox"/> no |
| 7            | Hot water storage required   | 40 to 60 litres per m <sup>2</sup> of collector surface  |  |
| 8            | Shaft available for pipes  | Space requirement approx. 80 x 160 mm (Solar flow and return)  | <input type="checkbox"/> yes <input type="checkbox"/> no |
| 9            | Space available in cellar or building for the boiler and fittings                                  | 2 to 4 m <sup>2</sup> for the buffer storage and/or boiler and 3 m <sup>2</sup> wall surface for fittings. |  |
| <b>INFO:</b> |  |  |  |

<sup>27</sup> If criterion 1 is not fulfilled: ⇒ alternative collector installation: installation of collectors on an adjacent structure (roofed car port), integration of collector into façade

<sup>28</sup> If the roof slope is lower than that specified (flat roof) ⇒ elevated erection of collectors (slope 45°)

<sup>29</sup> If there are shadows: ⇒ alternative collector installation: as in footnote 1.

<sup>30</sup> Roof surface available for the collector smaller than collector: ⇒ alternative collector installation: as in 1.

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| <b>ADDRESS:</b> | <b>CONTACT</b><br> |
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## Thermal Solar Energy Systems for Service Water Preparation

### 5.2.15 Criteria List: thermal solar energy plants for service water preparation or hot water preparation with partial solar heating in mountain huts

| No.          | Criteria   | Requirement Profile  | Surveyed on-site   |
|--------------|--|--|--|
| 1            | Orientation of building, particularly the roof surface for the fitting of collectors <sup>31</sup>                   | Max. south deviation of 40° in east-west direction   | Orientation:   |
| 2            | Roof pitch <sup>32</sup>   | Pitch > 40°  |  |
| 3            | Shadows thrown by trees or other objects <sup>33</sup>   |  | <input type="checkbox"/> yes <input type="checkbox"/> no |
| 4            | Number of beds   |  |  |
| 5            | Collector surface required for a warm water preparation system <sup>34</sup> and partial solar energy heating system | 1 m <sup>2</sup> per person for hot water preparation and 3 to 4 m <sup>2</sup> per kW heat load for heating | Collector surface<br>m <sup>2</sup>                      |
| 6            | Size/dimensions of free roof surface <sup>35</sup>   | Roof surface for the collectors > collector size   | <input type="checkbox"/> yes <input type="checkbox"/> no |
| 7            | Hot water storage required   | 40 to 60 litres per m <sup>2</sup> of collector surface  |  |
| 8            | Unused chimney or other shaft available for pipes  | Space requirement approx. 80 x 160 mm (solar flow and return)  | <input type="checkbox"/> yes <input type="checkbox"/> no |
| 9            | Space available in cellar or building for the boiler and fittings  | 2 to 4 m <sup>2</sup> for the buffer storage and/or boiler and 3 m <sup>2</sup> wall surface for fittings.   |  |
| <b>INFO:</b> |  |  |  |


<sup>31</sup> If criterion 1 is not fulfilled: ⇒ alternative collector installation: installation of collectors on an adjacent structure (roofed car port), integration of collector into façade

<sup>32</sup> If the roof pitch is lower than that specified (flat roof) ⇒ elevated erection of collectors (slope 45°)

<sup>33</sup> If there are shadows: ⇒ alternative collector installation: as in footnote 1.

<sup>34</sup> Roof surface available for the collector smaller than collector: ⇒ alternative collector installation: as in footnote 1.

<sup>35</sup> If only one hot water preparation system is built, 1 to 2 m<sup>2</sup> collector surface should be provided per person.

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| <b>ADDRESS:</b> | <b>CONTACT</b><br> |
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### 5.3 Thermal Solar Energy Systems for Partial Solar Energy Heating

#### 5.3.2 Criteria List


| No.          | Criteria   | Requirement Profile  | Surveyed on-site   |
|--------------|--|--|--|
| 1            | Orientation of building, particularly the roof surface for the fitting of collectors <sup>36</sup> | Max. south deviation of 40° in east-west direction   | Orientation:   |
| 2            | Roof pitch <sup>37</sup>   | Pitch > 40°  |  |
| 3            | Shadows thrown by trees or other objects <sup>38</sup>   |  | <input type="checkbox"/> yes <input type="checkbox"/> no |
| 4            | Number of persons living in the household  |  |  |
| 5            | Collector surface required   | 1 m <sup>2</sup> per person for hot water preparation and 3 to 4 m <sup>2</sup> per kW heat load for heating | Collector surface<br>m <sup>2</sup>                      |
| 6            | Size/dimensions of free roof surface <sup>39</sup>   | Roof surface for the collectors > collector size   | <input type="checkbox"/> yes <input type="checkbox"/> no |
| 7            | Hot water storage required   | 40 to 60 litres per m <sup>2</sup> of collector surface  |  |
| 8            | Unused chimney or other shaft available for pipes  | Space requirement approx. 80 x 160 mm (solar flow and return)  | <input type="checkbox"/> yes <input type="checkbox"/> no |
| 9            | Space available in cellar or building for the boiler and fittings                                  | 2 to 4 m <sup>2</sup> for the buffer storage and/or boiler and 3 m <sup>2</sup> wall surface for fittings.   |  |
| <b>INFO:</b> |  |  |  |

<sup>36</sup> If criterion 1 is not fulfilled: ⇒ alternative collector installation: installation of collectors on an adjacent structure (roofed car port), integration of collector into façade

<sup>37</sup> If the roof slope is lower than that specified (flat roof) ⇒ elevated erection of collectors (slope 45°)

<sup>38</sup> If there are shadows: ⇒ alternative collector installation: as in footnote 1.

<sup>39</sup> Roof surface available for the collector smaller than collector: ⇒ alternative collector installation: as in 1.

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| <b>ADDRESS:</b> | <b>CONTACT</b><br> |
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## Synthetic Absorber for Heating Pool Water


### 5.3.2 Criteria List

| No.          | Criteria  | Requirement Profile                                   | Surveyed on-site  |
|--------------|---|---|---|
| 1            | The pool is wind-protected and the water surface is not shaded  |   | <input type="checkbox"/> yes <input type="checkbox"/> no                          |
| 2            | Water surface of swimming pool  |   | m <sup>2</sup>  |
| 3            | Laying of the absorber surface with wind-protected position and nocturnal covering of swimming pool <sup>40</sup> | 1 : 0.5<br>Ratio of water surface to absorber surface | Collector surface<br>m <sup>2</sup>   |
| 4            | Laying of the absorber surface if the criteria specified under point 3 are not fulfilled <sup>41</sup>            | 1 : 0.8<br>Ratio of water surface to absorber surface | Collector surface<br>m <sup>2</sup>   |
| 5            | Laying of the absorber surface with wind-protected position <sup>42</sup>   | 1 : 0.5<br>Ratio of water surface to absorber surface | Collector surface<br>m <sup>2</sup>   |
| 6            | Slope of the synthetic absorber with respect to the horizontal  | 0 to 30°  |   |
| 7            | Space available for the synthetic absorber  |   | <input type="checkbox"/> flat roof<br><input type="checkbox"/> underground laying |
| 8            | Roof load on flat roofs (weight of absorber incl. water filling)  | 6 to 11 kg/ m <sup>2</sup>                            |   |
| 9            | Shadows thrown by trees or other objects  |   | <input type="checkbox"/> yes <input type="checkbox"/> no                          |
| <b>INFO:</b> |   |   |   |

<sup>40</sup> Applies to private swimming pools.


<sup>41</sup> Applies to private swimming pools.

<sup>42</sup> Applies to public swimming pools.

|                 |   |
|-----------------|---|
| <b>ADDRESS:</b> | <b>CONTACT</b><br> |
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## 5.5 Photovoltaic System with Network Connection

### 5.5.2 Criteria List

| No.             | Criteria  | Requirement Profile   | Surveyed on-site   |
|-----------------|---|---|--|
| 1               | Orientation of building, particularly of roof surface for the fitting of solar energy modules <sup>43</sup> | Max. south deviation of 50° in east-west direction  | Orientation  |
| 2               | Roof pitch <sup>44</sup>  | Pitch 10° to 60°  |  |
| 3               | Shadows thrown by trees or other objects <sup>45</sup>  |   | <input type="checkbox"/> yes <input type="checkbox"/> no |
| 4               | Solar energy module surface   | 8 to 10 m <sup>2</sup> per 1 kW power (corresponds to a power yield of approximately 800 kWh/a)       | Solar module surface m <sup>2</sup>                      |
| 5               | Size/dimensions of free roof surface <sup>46</sup>  | Roof surface for the solar energy modules > total solar energy module surface                         | <input type="checkbox"/> yes <input type="checkbox"/> no |
| <b>INFO:</b>    |   |   |  |
| <b>ADDRESS:</b> |   | <b>CONTACT</b><br> |  |

<sup>43</sup> If criterion 1 is not fulfilled: ⇒ alternative installation of solar energy module fittings: free-standing solar energy modules, installation of solar energy modules on an adjacent building, integration of solar energy modules into the façade


<sup>44</sup> If the roof slope is lower than that specified (flat roof) ⇒ elevated erection of solar energy modules (slope 45°)

<sup>45</sup> If there are shadows: ⇒ alternative installation of solar energy modules: as in footnote 1.

<sup>46</sup> Roof surface available for the solar energy modules smaller than the total solar energy module surface: ⇒ alternative solar energy module fittings as in footnote 1.

## Isolated Operation of a Photovoltaic System

### 5.6.2 Criteria List

| No.             | Criteria  | Requirement Profile   | Surveyed on-site   |
|-----------------|---|---|--|
| 1               | Orientation of building, particularly of roof surface for the fitting of solar energy modules <sup>47</sup> | Max. south deviation of 50° in east-west direction  | Orientation  |
| 2               | Roof pitch <sup>48</sup>  | Pitch 10° to 60°  |  |
| 3               | Shadows thrown by trees or other objects <sup>49</sup>  |   | <input type="checkbox"/> yes <input type="checkbox"/> no                         |
| 4               | Emergency energy set available  |   | <input type="checkbox"/> yes <input type="checkbox"/> no<br>If yes, which system |
| 5               | Solar energy module surface   | 8 to 10 m <sup>2</sup> per 1 kW power (corresponds to a power yield of approximately 800 kWh/a) | Solar module surface m <sup>2</sup>  |
| 6               | Size/dimensions of free roof surface <sup>50</sup>  | Roof surface for the solar energy modules > total solar energy module surface                   | <input type="checkbox"/> yes <input type="checkbox"/> no                         |
| 7               | Space for the batteries   |   | <input type="checkbox"/> yes <input type="checkbox"/> no                         |
| <b>INFO:</b>    |   |   |  |
| <b>ADDRESS:</b> |   | <b>CONTACT</b>  |  |
|                 |   |              |  |

<sup>47</sup> If criterion 1 is not fulfilled: ⇒ alternative installation of solar energy modules: free-standing solar energy modules, installation of solar energy modules on an adjacent building, integration of solar energy modules into the façade.


<sup>48</sup> If the roof slope is lower than that specified (flat roof) ⇒ elevated erection of solar energy modules (slope 45°)

<sup>49</sup> If there are shadows: ⇒ alternative installation of solar energy modules: as in footnote 1.

<sup>50</sup> Roof surface available for the solar energy modules smaller than the total surface of the solar energy modules: ⇒ alternative installation of solar energy modules as in footnote 1.

## Thermal Solar Energy Systems with Solar-Biomass Central Heating Networks

### 5.5.2 Criteria List

| No.             | Criteria  | Requirement Profile   | Surveyed on-site   |
|-----------------|---|---|--|
| 1               | Orientation of building, particularly of roof surface for the fitting of solar energy modules <sup>51</sup> | Max. south deviation of 50° in east-west direction                                  | Orientation  |
| 2               | Roof pitch <sup>52</sup>  | Pitch > 25°   |  |
| 3               | Shadows thrown by trees or other objects <sup>53</sup>  |   | <input type="checkbox"/> yes <input type="checkbox"/> no |
| 4               | Size/dimensions of roof surface available for fitting of collectors   |   |  |
| <b>INFO:</b>    |   |   |  |
| <b>ADDRESS:</b> |   | <b>CONTACT</b>  |  |
|                 |   |  |  |

<sup>51</sup> If criterion 1 is not fulfilled: ⇒ alternative collector installation: separate elevated erection of collectors

<sup>52</sup> If the roof slope is lower than that specified (flat roof) ⇒ elevated erection of collectors (slope 45°)

<sup>53</sup> If there are shadows: ⇒ alternative collector installation: as in footnote 1.

## 5.8 Heat from Biomass

We understand biomass as:

- ◆ Pieces of timber, approx. 30 cm pieces of hardwood and softwood, 50 cm or 1m lengths of chopped wood
- ◆ Pieces of brushwood of different sizes and humidity levels (see Austrian standard) are produced from small trunks, branches (woodland thinning residues), energy plants, fruit tree cuts, waste timber or large trunks.
- ◆ Barks and mixed material with bark
- ◆ Industrial timber residues, e.g. rolls from the veneer industry
- ◆ Timber pellets pressed from saw dust and/or shavings

### Conversion factors for annual biomass potential and corresponding energy volume


- ◆ The energy potential from waste timber and woodland thinning represents approximately 5 kW/ha for thermal energy use
- ◆ Rule of thumb: 3 kg timber (20% moisture, well air-dried timber) corresponds to approximately 1 litre of heating oil
- ◆ 1000 litres of oil (10,000 kWh) can be replaced by 5-6 stacked m<sup>3</sup> of hardwood (= 1 m<sup>3</sup> of layered timber), 7-8 stacked m<sup>3</sup> of softwood or 10-15 stacked m<sup>3</sup> of timber chips.
- ◆ Energy forest: 10 tonnes per hectare and year = 3,500 kWh/t

### Example: a single dwelling with an annual requirement of 2,500 l of heating oil

- requires approximately 12.5 to 15 stacked m<sup>3</sup> (1 stacked m<sup>3</sup> = m<sup>3</sup> of layered timber) hardwood or
  - 17.5 to 20 stacked m<sup>3</sup> of softwood or
  - 25-37.5 stacked m<sup>3</sup> of chips or
  - 7.5 stacked m<sup>3</sup> of pellets
- 
-


## 5.8.2 Criteria List: individual furnaces

### Manual loading


| No.             | Criteria                             | Requirement Profile   | Surveyed |
|-----------------|--------------------------------------|---|----------|
| 1               | Fuel                                 | Own cultivation possible  |          |
| 2               | Heating conversion planned/necessary | School caretaker, heating operator etc. available                                   |          |
| 3               | Store room/area                      | Annual requirement (approximately 8 stacked m <sup>3</sup> for 10,000 kWh)          |          |
| 4               | Chimney cleaning                     | Cross-section area in accordance with standard information - chimney sweep          |          |
| <b>INFO:</b>    |                                      |   |          |
| <b>ADDRESS:</b> |                                      | <b>CONTACT</b>  |          |
|                 |                                      |  |          |

### Automatic loading

| No.          | Criteria            | Requirement Profile  | Surveyed |
|--------------|---------------------|--|----------|
| 1            | Store room/area     | Fire-preventive separation<br>Heating room/ fuel storage room<br><br>Dry store |          |
| 2            | Chimney suitability | Cross-section area in accordance with standard                                 |          |
| 3            | Access              | Short transport path for fuel  |          |
| <b>INFO:</b> |                     |  |          |

|                 |   |
|-----------------|---|
| <b>ADDRESS:</b> | <b>CONTACT</b><br> |
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**5.8.4 Criteria List: biomass-based micro networks**

| No.             | Criteria  | Surveyed on-site  |
|-----------------|---|---|
| 1               | High density new development  |   |
| 2               | Individual solution necessary for existing district heating                     |   |
| 3               | Smaller-scale solution if proposed large-scale network does not come into being |   |
| 4               | Is waste timber produced by carpentry/joinery operations?                       | <input type="checkbox"/> no <input type="checkbox"/> yes<br>Volume produced per year                  |
| 5               | Is residual timber etc. available from forestry use?                            | <input type="checkbox"/> no <input type="checkbox"/> yes<br>Volume produced per year                  |
| 6               | Are timber waste products available?  | <input type="checkbox"/> no <input type="checkbox"/> yes<br>Volume produced per year                  |
| <b>INFO:</b>    |   |   |
| <b>ADDRESS:</b> |   | <b>CONTACT</b><br> |

## 5.8.5 Brief Information on Biomass Central Heating Networks

### Heating plant operated using timber chips and/or bark

Unlike the micro networks, biomass central heating networks supply heating for a significantly greater number of objects and more power and, thus, by necessity require greater investments. This means that such systems can only be realised as part of a very expensive framework and optimisation process. We would thus urgently advise the involvement of experts from the outset to avoid very expensive investment errors.

The installation of 1 MW continual thermal power is proposed at a cost of approximately ATS 12 million [= approx. IEP 686,813]. This sum covers the operating building, all installations, the boiler and the planning costs. These specific costs decrease with the size of the system.

In Austria there are currently some 300 biomass central heating networks in operation, of which around 100 are located in the Steiermark region. They are operated by farming co-operatives, private companies and local authorities or by energy supply companies. In 1998 the total installed power was approximately 450 MW.

Austrian plants are mainly operated using chips and timber waste from industry (parquet flooring, veneers etc.) and commercial concerns (timber waste products). The following Austrian standards should be used for the analysis and evaluation of these fuels: M7132 / M7133 / M7135.

Solar Energy Biomass District Heating Networks, see Chapter 5.7.

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**Ideal Project Plan:**

|   | <b>Actors</b>   | <b>Action/Documents</b>  |
|---|---|--|
| <b>Idea</b>   | Motivated individuals, fuel suppliers, local authorities, associations etc. | Discussions, first basic decisions, search for support   |
| <b>First draft</b>  | local authorities, energy agencies, advisory centres, planners              | Basic data survey, feasibility estimates, examples   |
| <b>Preliminary project</b>  | Planners/energy agencies  | Site plan, customers, development phases, possible sites, use forecasts, cost estimates (investment, operation), checking of finance options, economic feasibility calculation |
| <b>Founding of company</b>  | Future operators  | Founding procedure, selection of legal form, statutes, business order etc.   |
| <b>Informing involved parties (citizens, companies, local authorities etc.)</b> |   | Information events, discussion, persuasion work  |
| <b>Publication of planning</b>  | Operators/planners  | Planning requirements, preparation   |
| <b>Official procedure, finance plan</b>   | Operators/planners/advisors (energy agency)                                 | Negotiation, contracts, licenses   |
| <b>Implementation of detailed planning</b>                                      | Planners  |  |
| <b>Publication and awarding of tender</b>                                       | Operators/planners  |  |
| <b>Construction and test operation</b>  | Companies/operators   | Building, operator's contribution, optimisation of operation   |
| <b>Standard operation</b>   |   | Monitoring   |

Within this process, the success of the project depends on each individual participant and requires, in particular, participants with high levels of tolerance and determination who are willing to see the

project

through

the

good

and

bad


times.

**5.8.6 Criteria List: biomass central heating network**

| No. | Criteria  | Surveyed on site   |
|-----|---|--|
| 1   | Potential interested operator exists (farmers, local authority, companies)  | <input type="checkbox"/> no <input type="checkbox"/> yes                           |
| 2   | Suitable consumer structure (public buildings, other major consumers). Heat density in excess of 0.7 kW/running metres of line (flow and return together) | <input type="checkbox"/> no <input type="checkbox"/> yes                           |
| 3   | Low temperature consumers from return or flue gas condensation (e.g. garden centres) available  | <input type="checkbox"/> no <input type="checkbox"/> yes                           |
| 4   | Is waste timber produced by carpentry/joinery operations?   | <input type="checkbox"/> no <input type="checkbox"/> yes<br>Annual volume produced |
| 5   | Is residual timber etc. available from forestry use?  | <input type="checkbox"/> no <input type="checkbox"/> yes<br>Annual volume produced |
| 6   | Are waste timber products available?  | <input type="checkbox"/> no <input type="checkbox"/> yes<br>Annual volume produced |
| 7   | Are energy plants available   | <input type="checkbox"/> no <input type="checkbox"/> yes                           |
| 8   | Does the possibility exist for combined firing in an existing central heating network possible?   | <input type="checkbox"/> no <input type="checkbox"/> yes                           |

## Biogas for thermal energy use (and electricity generation)

### 5.9.2 Criteria List: biogas plant for thermal energy use and electricity generation


| No.             | Criteria   | Surveyed on site  |
|-----------------|--|---|
| 1               | Agricultural operation > 50 LSU<br>Who:                                      | <input type="checkbox"/> no <input type="checkbox"/> yes  |
| 2               | Food industry with usable waste  | <input type="checkbox"/> no <input type="checkbox"/> yes      volumes                                 |
| 3               | Hotels/restaurants/guest houses with large volumes of biogenic waste<br>Who: | <input type="checkbox"/> no <input type="checkbox"/> yes  |
| 4               | Treatment plant with unused sludge gas (flare-off)                           | <input type="checkbox"/> no <input type="checkbox"/> yes  |
| 5               | Bio-waste collection in excess of 5,000 tonnes                               | <input type="checkbox"/> no <input type="checkbox"/> yes  |
| 6               | Year-round heating consumers<br>Who/where                                    | <input type="checkbox"/> no <input type="checkbox"/> yes  |
| 7               | Existing central heating network with feed option                            | <input type="checkbox"/> no <input type="checkbox"/> yes  |
| 8               | Built-up area with adjacent site for a central heating network centre        | <input type="checkbox"/> no <input type="checkbox"/> yes  |
| <b>INFO:</b>    |  |   |
| <b>ADDRESS:</b> |  | <b>CONTACT</b><br> |

**Generation and Use of Biodiesel**

**5.10.2 Criteria List: use of oils and fats in the generation of biodiesel**

|  |                                |   |   |
|--|--------------------------------|---|---|
| With availability of central used cooking oil/fat collection |                                |   |   |
| 1  | from households                | t/year  |   |
|  | restaurants/hotels             | t/year  | <input type="checkbox"/> pure <input type="checkbox"/> mix fraction |
|  | industry                       | t/year  | <input type="checkbox"/> pure <input type="checkbox"/> mix fraction |
| 2  | (Nearest) plant for processing | <input type="checkbox"/> no <input type="checkbox"/> yes<br>Distance .....km<br>What can be processed<br>.....<br>available capacity<br>..... |   |

|                                       |                                      |   |
|---------------------------------------|--------------------------------------|---|
| With availability of rape cultivation |                                      |   |
| 3                                     | Available volumes of rape            | tonnes/year   |
| 4                                     | Possible additional rape cultivation | ha  |
|                                       | (Nearest) plant for processing       | <input type="checkbox"/> no <input type="checkbox"/> yes<br>Distance .....km<br>What can be processed<br>.....<br>available capacity<br>..... |

|                 |   |
|-----------------|---|
| <b>INFO:</b>    |   |
| <b>ADDRESS:</b> | <b>CONTACT</b>  |
|                 |  |


## Wind Energy for Electricity Generation

### 5.11.2 Criteria List

| No.          | Criteria   | Surveyed on-site   |
|--------------|--|--|
| 1            | Does the local authority have an exposed site without forest vegetation which is clearly more elevated the surrounding area?               | <input type="checkbox"/> no <input type="checkbox"/> yes               |
| 2            | At what height above sea level is this site located?   | ..... m above sea level  |
| 3            | Is the area in question located in a nature or landscape protection area?  | <input type="checkbox"/> no <input type="checkbox"/> yes <sup>54</sup> |
| 4            | Is it possible to maintain sufficient distance from residential objects (at least 300 m)?  | <input type="checkbox"/> no <sup>55</sup> <input type="checkbox"/> yes |
| 5            | Does the site have heavy-vehicle access?   | <input type="checkbox"/> no <input type="checkbox"/> yes               |
| 6            | Are there operations with an electricity requirement in excess of 100 MWh?   | <input type="checkbox"/> no <input type="checkbox"/> yes               |
| 7            | Are the local authority or interested citizens interested in the realisation of this project (civic action group/environment association)? | <input type="checkbox"/> no <input type="checkbox"/> yes               |
| <b>INFO:</b> |  |  |

<sup>54</sup> If the answer to this question is yes, it is not possible to use wind energy

<sup>55</sup> If the answer to this question is no, it is not possible to use wind energy

|                 |   |
|-----------------|---|
| <b>ADDRESS:</b> | <b>CONTACT</b><br> |
|-----------------|---|

**Examples of possible applications**


- ◆ Combined use of deep hot water at Blumau site in the Steiermark thermal energy region
- ◆ Extension of the existing Altheim geothermal plant for multiple geothermal use
- ◆ Haag geothermal project at Hausruck
- ◆ Multiple purpose use of geothermal energy in Waltersdorf (Steiermark)
- ◆ Heating of school, kindergarten, residence, outdoor swimming pool

For the purpose of financial support, approach the relevant regional energy agency or the office of the regional government.

Geothermal temperature ranges and possible uses

|                   |  |                                       |  |   |  |  |  |
|-------------------|--|---------------------------------------|--|---|--|--|--|
| Water temperature | Agricultural cultivation<br><br>Garden centre etc. | Thermal pool                          | Low temperature district heating                   | District heating 80° C                                      | District heating 100° C                                  | District heating 120° C                                      | Low pressure steam for industry          |
| 25° C             |  | Outdoor swimming pools, floor heating | Local district heating supply, authorities schools | District heating supply for small regions, public buildings | District heating supply for towns, commercial operations | District heating supply with extensive distribution networks | Industrial plants, hot water preparation |
| 40° C             |  |                                       |  |   |  |  |  |
| 60° C             |  |                                       |  |   |  |  |  |
| 80° C             |  |                                       |  |   |  |  |  |
| 100° C            |  |                                       |  |   |  |  |  |
| 120° C            |  |                                       |  |   |  |  |  |
| 140° C            |  |                                       |  |   |  |  |  |

### 5.12.2 Criteria List

| No.             | Criteria   | Surveyed  |
|-----------------|--|---|
| 1               | Are geothermal anomalies known to exist in the local authority area?           | <input type="checkbox"/> yes <input type="checkbox"/> no  |
| 2               | Are geothermal anomalies known to exist in neighbouring local authority areas? | <input type="checkbox"/> yes <input type="checkbox"/> no  |
| 3               | Have samples been drilled in the local authority area?                         | <input type="checkbox"/> yes <input type="checkbox"/> no  |
| 4               | Have samples been drilled in the neighbouring local authority area?            | <input type="checkbox"/> yes <input type="checkbox"/> no  |
| <b>INFO:</b>    |  |   |
| <b>ADDRESS:</b> |  | <b>CONTACT</b><br><br> |

6 Summarised Presentation of Established Potential

**Potential for passive solar energy use**

- Private buildings                      Number: .....
- Public buildings                         Number: .....

For the following public buildings: .....

.....

.....

**Potential for thermal solar energy plants for service water preparation**

- Single dwellings                         Number: .....
- Multiple dwellings                       Number: .....
- Homes                                       Number: .....
- Guest accommodation                 Number: .....
- Restaurants                               Number: .....
- Hospitals                                  Number: .....
- Agricultural buildings                 Number: .....
- Meat-processing plants                 Number: .....
- Other commercial ops.                 Number: .....

For the following public buildings: .....

.....

.....

For the following sports facilities: .....

.....

.....

**Potential for thermal solar energy plants providing partial solar heating**

- Single dwellings                      Number: .....
- Multiple dwellings                      Number: .....

For the following public buildings: .....  
.....  
.....

**Synthetic absorbers for heating swimming pool water**

- Outdoor swimming pools              Number: .....
- Indoor swimming pools                Number: .....
- Hotel swimming pools                 Number: .....

Other possibilities: .....  
.....

**Potential for photovoltaic systems with network connection**

- Single dwellings                      Number: .....
- Multiple dwellings                      Number: .....

Operation of individual photovoltaic systems  
- possible for the following remote electricity consumers: .....  
.....

**Potential for use of solar energy in mountain huts**

- individual photovoltaic systems                      Where? .....
- thermal solar energy systems for service water preparation                      Where? .....

hot water preparation with partial solar energy heating

Where? .....

**Potential for thermal solar energy plants with solar energy biomass central heating networks**

- for an existing biomass central heating network  
 for a planned biomass central heating network

**The available usable biomass (timber)**

- per year is : ..... (please specify unit of measurement: t/m<sup>3</sup>)

- it would be possible to establish one biomass plant  
 a biomass plant would not be economically feasible  
 a central heating network is available for sharing

**The available fermentable biogenic volume**

- per year is : ..... (please specify unit of measurement:t/m<sup>3</sup>) and  
 ..... LSU<sup>56</sup>

- it would be possible to establish one biogas plant  
 a biogas plant would not be economically feasible

**Use of wind energy**

Wind measurements:

- have been carried out  
 planned  
 should be carried out  
 should not be carried out

- construction of wind energy plants is economically feasible  
 construction of wind energy plants is not economically feasible

**Geothermia**

Drilling:

- has been carried out  
 planned  
 should be carried out  
 should not be carried out

- the use of geothermal energy is economically feasible
- the use of geothermal energy is not economically feasible

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<sup>56</sup> 1 LSU (livestock unit) corresponds to one milk cow or seven pigs

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**Oils and fats for biodiesel production**

The annual available volume of used cooking oil/fats is:

.....

(please specify unit of measurement: litre/m<sup>3</sup>)

- from households: ..... (please specify unit of measurement: litre/m<sup>3</sup>)

- from hotels/guest houses/restaurants:..... (please specify unit of measurement: litre/m<sup>3</sup>)

- from industry: ..... (please specify unit of measurement: litre/m<sup>3</sup>)

The nearest processing plant is:

.....

- the distance is: ..... km

- it has free capacity  no  yes

The construction of a biodiesel plant is economically feasible.

The construction of a biodiesel plant is economically feasible.

**Biodiesel should be used for:**

Taxis Number: .....

Ski run trucks Number: .....

Engines for irrigation systems Number: .....

City buses Number: .....

Transport companies Number: .....

- the following suitable vehicles and machines in the local authority area: .....

.....

.....

.....