

Guide to data connection to solarheatdata.eu

This document contains a description of the procedure and formatting of the data collection from solar heating plants to the website and database solarheatdata.eu.

1 Background of the development of solarheatdata.eu

The web portal solvarmedata.dk is owned by the Danish District Heating Association's Solar Group). The management is handled by PlanEnergi.

solarheatdata.eu contains an overview of large scale solar heating systems in Danish district heating networks as well as current and historical production data for these systems.

An international version of solvarmedata.dk was created under the domain solarheatdata.eu in order to allow SDH systems outside Denmark to be connected as well.

2 Connection procedure

2.1 Connection

To be connected to solarheatdata.eu with the solar heating plant measurement data, the following steps are required:

- A) Complete the form with general information (i.e., alternative heat source, solar field design, etc.)
- B) Establish the link to transfer data to the solarheatdata.eu server.

The form for point A and the guidance for point B are attached to this document as Appendix A and Appendix B respectively.

The four steps to complete the connection are as follows:

- 1) Contact the solarheatdata.eu-administrator via the link on the website or directly by mail solvarmedata@planenergi.dk with the request for a connection. At the same time/immediately thereafter, send the filled in template (see Appendix A).
- 2) Login information for the data connection is provided by the administrator.
- 3) The solar heating plant owner prepares data collection according to the table in section 2.2. This data is collected in a .txt file at fixed intervals. The plant/solar heating plant owner completes the connection with its login and starts sending data continuously.
- 4) The solar heat data is displayed on solarheatdata.eu and the connection fee is invoiced.

2.2 Collected data

The data given in the table below is compiled in a .txt file, which is uploaded on a server (see Appendix B). This is done at fixed intervals, typically every 5 or 10 minutes.

#	Parameter	Unit	Number of decimals
I	Current solar production (measured power on the <i>secondary</i> side of heat exchanger)	MW	3
II	Current solar radiation in W/m ² (total radiation on the solar panel surface)	W/m ²	2
III	Outdoor temperature	°C	1
IV	Diffuse radiation on the collector surface (if available)	W/m ²	0
V	Direct radiation on the solar surface (if available ¹)	W/m ²	0
VI	The temperature of the heat transfer medium at the outlet of the heat exchanger on the primary side (sent <i>to</i> the solar collectors)	°C	1
VII	The temperature of the heat transfer medium at the inlet to the heat exchanger on the primary side (coming <i>from</i> the solar collectors)	°C	1
VIII	Flow rate in the primary circuit (solar circuit)	m ³ /h	1
IX	Solar thermal power measured on the <i>primary</i> side	MW	3
X	The temperature of the water at the outlet <i>from</i> the heat exchanger on the secondary side (water side)	°C	1
XI	The temperature of the water at the inlet <i>to</i> the heat exchanger on the secondary side (water side)	°C	1
XII	The flow rate in the secondary circuit	m ³ /h	1
XIII	Gross heat production e.g. total thermal power production at the district heating plant (to calculate solar coverage)	MW	3

2.3 Data quality control

Extreme limits for parameters are introduced so it is easy to identify if, for example, a factor of 1000 is wrong in a data value (e.g., because it is given in kW instead of MW). Values outside the limits are indicated visually (by a red exclamation mark on the website data table) to indicate that the historical data for this time interval contains an error.

2.4 Security

IT security is a top priority for web administrators and it should also be for the responsible parties of solar heating systems – regardless of whether they are connected to solarheatdata.eu or not. For the record, it should be mentioned that neither the Danish District Heating Association nor PlanEnergi nor the web host can in any way be held responsible for any errors, damages, data breaches, etc. related to the connection to solarheatdata.eu.

¹ Required for concentrating collectors.

Annex A General information for setting up the system

Mandatory fields are marked in **bold**.

Information	Unit	Number of decimals
Name of the plant/system	Name	-
Address	Text	-
Latitude	° northern latitude	4
Longitude	° eastern longitude	4
Year of construction	YYYY	-
Number of solar collectors	-	0
Solar collector brand and type	Text	-
Total collector area (gross collector area)	m²	0
Fixed or tracking collectors (in case of tracking please specify)	Text	-
Ground area occupied by the collector field	m ²	0
Azimuth of the solar collectors (deviation from south, west is positive, east is negative)	°	0
Collector tilt angle from the ground	°	0
Slope of the ground	°	0
Distance between collector rows	m	
Associated storage type	-	-
Volume of storage	m ³	-
Expected solar heat production per year	MWh	-
Maximum solar thermal power	MW	1
Expected coverage of annual heat demand	%	0
Expected yearly CO ₂ reduction	tonnes	0
Investment for the solar system excl. storage	million EUR	3
Price of storage	million EUR	3
Grants, if any	million EUR	3
Contractor	Name	-
Simple payback time of the solar heating plant	Number of years	0
Guaranteed collector efficiency parameters: Maximum efficiency (or "zero-loss efficiency") η_0	-	3
Guaranteed collector efficiency parameters: First order heat loss coefficient a_1	-	3
Guaranteed collector efficiency parameters: Second order heat loss coefficient a_2	-	3
Guaranteed collector efficiency parameters: Incident angle modifier (IAM) K_{50}	-	2
Other relevant information	-	2

Annex B Data connection to the server

The connection is established by collecting the data specified in the table in section 2.2 and uploading a text file (.txt) to an FTP server every 5 or 10 minutes with the current values.

The details regarding the server, which data is to be sent to, are to be provided after expressing interest in connecting to solarheatdata.eu.

The file should only contain a single line with the data. When sending data, the following criteria should be fulfilled:

- The values must be separated by semicolons.
- The values must be in the same order, as listed in section **Fejl! Henvisningskilde ikke fundet.**
- A comma must be used as decimal separator unless otherwise agreed with the website administrator.
- If not all values can be provided, the fields for the missing values are to be left empty, and the semicolons are kept in. There must always be 12 semicolons in the line.

Example

Below an example of such a txt file is shown. The values are explained below.

2,055;650,40;12,3;;;43,4;77,7;65,5;2,105;74,7;40,4;62,3;5,250

if

- Current solar heat production delivered on secondary side of the heat exchanger is 2,055 MW
- Current solar radiation is 650,40 W/m²
- Outdoor air temperature is 12,3 °C
- There is no measurement of diffuse radiation on the solar collector surface
- There is no measurement of direct radiation on the solar collector surface
- Glycol/water temperature sent to the solar collectors is 43,4 °C
- Glycol/water temperature sent to the solar collectors is 77,7 °C
- Glycol/water flowrate (primary circuit) is 65,5 m³/h
- Solar heat production produced on the primary side of the heat exchanger is 2,105 MW
- Water temperature delivered from the heat exchanger is 74,7 °C
- Water temperature sent to the heat exchanger is 40,4 °C
- Water flowrate (secondary side) is 62,3 m³/h
- Current total thermal power production (e.g. sum of production from all DH plant units) is 5,250 MW