X-tendo

INTRODUCTORY REPORTS

DISTRICT ENERGY

DISTRICT ENERGY GENERATION

$f_{Primary}$

f_{CO_2}

$f_{Renewable}$

DISTRICT ENERGY SUPPLY

$T_{min\,supply}$ $T_{min\,supply}$

$T_{expected\,return}$ $T_{expected\,return}$
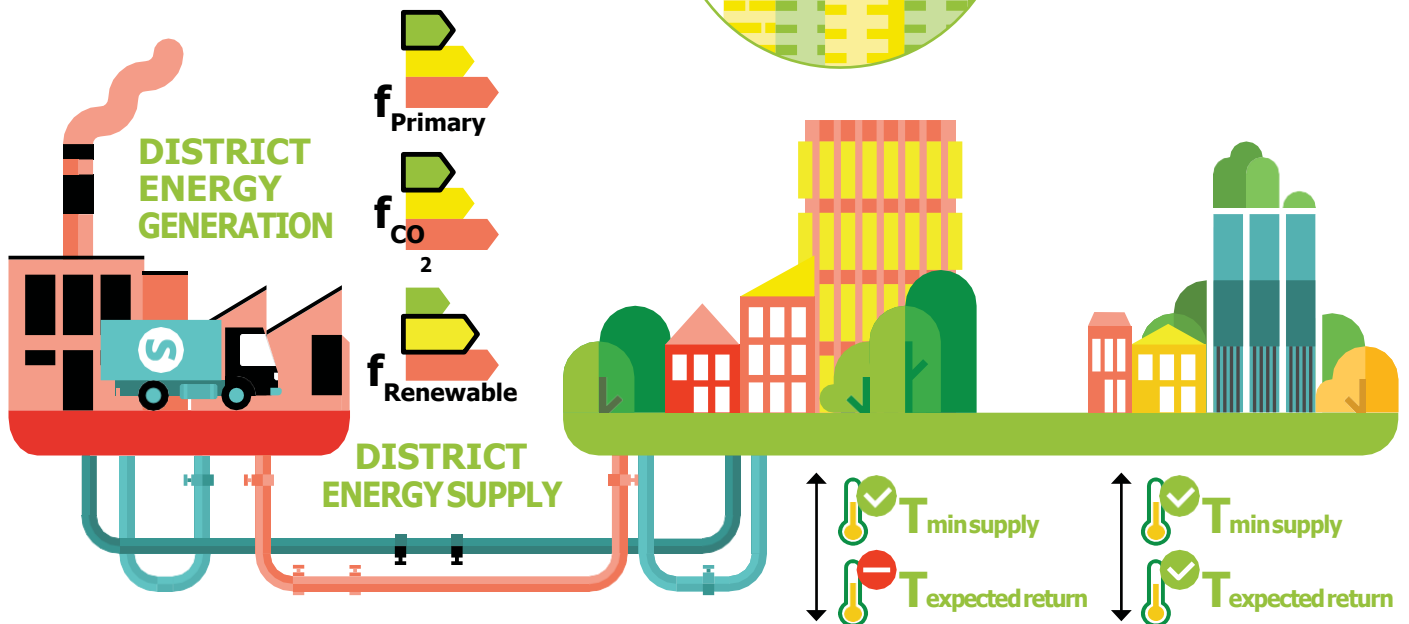
THE DISTRICT ENERGY INDICATORS INFORM RESIDENTS ABOUT THE EFFICIENCY AND CLIMATE EFFECT OF THE NEARBY DISTRICT HEATING (OR COOLING) NETWORK. THEY ALSO SHOW WHETHER THE BUILDING CAN BE CONNECTED TO A LOW-TEMPERATURE DISTRICT HEATING GRID OR USE OTHER LOW-TEMPERATURE HEAT SUPPLY SYSTEMS. OVERALL, THESE INDICATORS PROVIDE AN INCENTIVE TO DECREASE CARBON EMISSIONS IN EXISTING DISTRICT ENERGY NETWORKS & INCREASE INVESTMENTS IN NEW AND MORE EFFICIENT NETWORKS.

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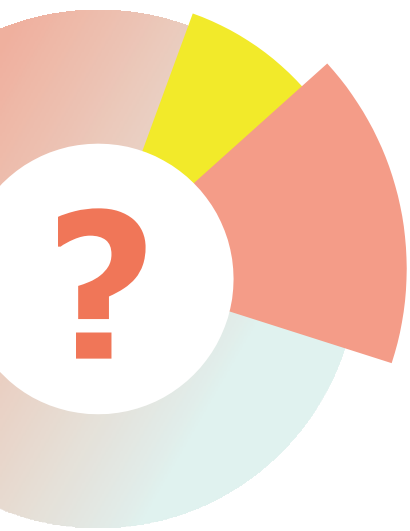
WHY WE DEVELOPED THIS FEATURE

District energy networks are an important pillar for low-carbon future heating (and cooling). Industrial waste heat or the heat from combined heat and power (CHP) plants can often only be used in district heating networks. The district energy indicator has two sets of parameters. The first indicates the efficiency, the carbon content and the share of renewables of the nearest district heating grid to end-users. These parameters will also be presented for a future point in time, thus showing the decarbonisation ambition of the district heating grid operator to the end-users. The second set consists of indicators and information related to the building's heat distribution system: on the one hand, the minimum predefined temperature sets for adequately heating the building with the existing heat distribution system together with related information, and on the other hand the information relevant for estimating the expected return flow temperature of the existing heat distribution system. These indicate the feasibility of the building being connected to a (low-temperature) network, to provide important information for potential future construction of efficient heat networks.


SCOPE OF APPLICATION

Both sets of parameters would be included in the EPC for each type of building. In cases where the nearest district heating network is far away from the building, the first set of parameters contains the average values of all national district heating systems, and a note is included that no network is available in the immediate vicinity. The second set of parameters consists of information and parameters related to the building's heat distribution system.

Building typology	New and existing buildings • Residential (single-family and multi-family) • Non-residential (office, wholesale and retail, etc.) • Public (schools, public offices)
Tenure	Owner-occupied, co-operative, private rental, public rental
Property status	Renovating, renting, selling, buying

LEVEL OF EXPERTISE, SKILLS AND TRAINING
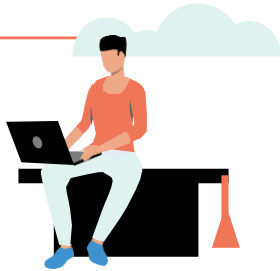
The first set of parameters for the nearest district heating network, should be calculated whether by certified engineers who have practical knowledge or by certified engineers working for district heating network operators they assess. To receive the certification, the engineer must prove they have the skills or experience to calculate these parameters according to the given standard. Then the parameters are calculated by using activity data provided by the district heating operator. A relevant authority, e.g. the national district heating association or the national authority responsible for district heating regulation, receives these parameters from the certified engineers and collects them in a database. The parameters will then be available for the EPC assessor when preparing the EPC. The second set of parameters, the temperatures and information related to the heat distribution system of the building, are collected by the EPC assessor in two steps: during a site visit, the EPC assessor identifies the types of heat transfer system (convector, radiator, etc.) and other parameters of the building being evaluated. Second, the assessor takes from a radiator database the lowest temperature setting with which the heating capacity of the heat transfer system still sufficiently heat the building. The radiator database should be set-up and maintained in close cooperation between radiator manufacturers and a public/private body.

	Fundamental awareness (basic knowledge)	Novice (limited experience)	Intermediate (practical application)	Advanced (applied theory)	Expert (recognised authority)
District energy indicators			✓		

GOOD PRACTICES

For the parameters related to the efficiency, carbon content and share of renewables of the nearest district heating system, good practice exists in several European countries. A similar system to the one proposed is currently implemented in Germany. The AGFW, the German district heating association, is the authority accredited to educate and certify engineers for calculating primary energy factors for district heating systems in Germany. The calculation is performed according to regulation FW 309 published by the AGFW [1] and the resulting parameters are published in a national database. At present, however, these factors are not included in the German EPCs. At present, however, these factors are not included in the German EPCs.
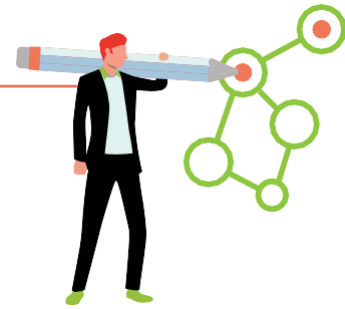
For the parameters related to the temperatures in the building's heat distribution system, no good practices are available.

[1] AGFW. 2014. Arbeitsblatt AGFW FW 309 Teil 1 - Energetische Bewtung von Fernwärme - Bestimmung der spezifischen Primärenergiefaktoren für Fernwärmeversorgungssysteme.

METHODS AND ASPECTS INCLUDED

As explained above, the district heating indicators consist of two sets of parameters. The first describes the efficiency and the carbon content of the nearest district heating network. By including this information in the EPC, building owners who are connected are better informed about their heat supply, while those who are not connected can compare these values with those of the heat supply system that they currently have installed. The same parameters for a future point in time will also be indicated to express the ambition of the district heating provider to increase efficiency and reduce carbon emissions. The recommended timeframe is 10 years. The following three parameters should be integrated in this first parameter set:

1   **Primary energy factor** – indicates how much primary energy is used to generate a unit of usable thermal energy delivered to the consumer.

2   **Carbon emission coefficient** – converts activity data (process/processes) into CO_2 emissions, calculated based on primary energy.

3   **Renewable energy factor** – gives the share of renewable energy in the heat supplied by the district heating system, calculated based on primary energy.

The second set of parameters looks at the heat distribution system in the building to give an indication of how far the building is suited for a connection to a low-temperature district heating system. This information is particularly suitable for use by public authorities and district heating utilities. It includes the following parameters:

1   **The minimum predefined temperature** sets for adequately heating the building with the existing heat distribution system together with related information.

2   **Information** relevant for estimating the **expected return flow temperature** of the existing heat distribution system.

HOW WE WILL IMPLEMENT IT

The first three parameters are calculated by the certified engineer whether working in an engineering office or directly at the district heating network operator. The data are then reported to a relevant authority. The calculated parameters are based on the values provided by the district heating network operator. Activity data as well future estimates are incorporated into the calculation of future values. These parameters are then passed on to an authority, which checks them and approves them. The authority could be for example a district heating association, as is the case in Germany.

After approval, these values should be stored in a central database. This enables the EPC assessors to easily find data for the nearest network for the calculations in the EPC. If there is no district heating network in the vicinity of the building, national average values are listed in the EPC with an explanatory note.

To collect and calculate the information and temperatures related to the heat distribution system in the building, the expertise of the assessor plays an important role. Support is given through a radiator database, which helps the assessor to find the right parameters.

The minimum predefined temperature set is determined for a single representative room of the building. First, the EPC assessor must calculate the maximum heat load by breaking down the total heat load of the building to the heat load of the representative room via the relation of heated floor area. The next step is to check model and dimensions of the heat transfer system (e.g. radiators) in the room. The minimum predefined temperature set at which the heating capacity of the transfer system is still sufficient to cover the heating load in the room can then be found by using the radiator database.

Other parameters show the type of control of the heating system in the building and whether thermal renovation with a readjustment of the heating system has taken place. This information helps to estimate the expected return temperature. The expected return temperature could change in future if measures were taken to improve the building's energy performance.

OVERALL EVALUATION

LESSONS LEARNT

- Easy approach considered best solution.
- End-users and district heating planners can benefit from open database of parameters.
- Statement of future values sets ambition to increase efficiency and share of renewables.

PREREQUISITES

- District heating operators/engineering offices need a certification scheme to be able to calculate the first set of parameters.
- A database for the first set of parameters must be created and available to the EPC assessors.
- A database with types and heat capacity of frequently used heat transfer elements must be created to support EPC assessors. parameters must be createdand available to the EPC assessors.

REPLICATION

- First set of parameters available in database.
- Second set of parameters must be calculated and collected from the radiator database for each building individually.
- Step-by-step calculation through pre-prepared calculation sheets.

PROS

- Comparison of own system to district heating grid.
- Easier to plan connection to a new network with district heating parameters and flow rate.
- Little additional training for auditors and others involved.

CONS

- Less use of parameters if no district heating in vicinity.
- Specification of representative room not currently in the EPC (additional effort).
- Representative space in large buildings difficult to find.

RISKS

- Additional data on the heating system in the representative room could only be checked with local presence of certificate issuer.
- Lack of information on district heating prices may make it hard for end-users to compare the benefits of switching from existing supply system to a potential district heating connection.

RECOMMENDATIONS

- Develop a database for district heating parameters and another database for frequently installed heat transfer elements.
- Databases should be open access.
- Define national average values for buildings that are too far from nearest district heating grid for a possible connection.

NEXT STEPS

- Further detail the Develop guidelines and calculation help sheets.
- Test feature on real cases.
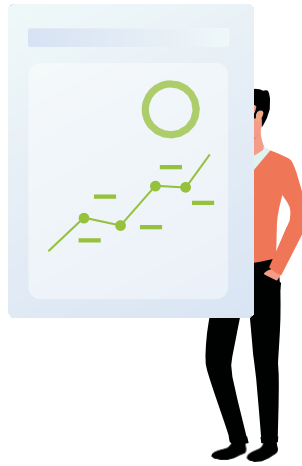- Incorporate test findings into the development.

COMPLEXITY

- Simple approach for representing complex relationship.
- Accredited engineers with advanced personnel required.
- Step-by-step calculation of temperature parameters for certificate issuers.

COMPLIANCE WITH CROSS-CUTTING CRITERIA

QUALITY AND RELIABILITY OF EPCS

The calculation will be done by accredited engineers. Good quality is ensured by the certification scheme and the guidelines provided. Providing spreadsheets ensures greater care and accuracy of inputs for a reliable output.

USER-FRIENDLINESS

By providing user-friendly guidelines in simple language, the calculation can be done with little training. The user interface and outputs are designed for better comprehension. The application of the feature will be described in the guidelines for all building types and different heating systems.

CONSISTENCY WITH STANDARDS

A literature review of existing standards was performed in the beginning of the feature development. Standards such as AGFW (FW 309), EN442 and EN 15316 were used.

ECONOMIC AND POLITICAL FEASIBILITY

Many EU Member States already calculate a form of district heating grid parameters and the necessary inputs for the temperature parameters are part of the current EPCs in most countries. With most of the inputs already available the influence on the price of an EPC would be minimal. The existing framework of EPCs in MS would support the acceptance and implementation of the feature by considering the national legislation in its development.

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