SDH solar district heating

SDHplus

Solar District Heating in Europe

WP2 – SDH enabling buildings with high energy performance
Task 2.1 – Survey and horizontal review of the existing models

D2.2 – Information sheet on building legislation and district heating

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1. *How DH is accounted for in the calculation of energy performance of buildings according to national laws, with specific attention to SDH.*

Buildings´ energy efficiency requirements and their basis calculations are defined within the OIB (Österreichisches Institut für Bauordnung - Austrian Institute for Construction Regulations) guideline 6. Within this guideline, district heating systems are an alternative option for any other type of energy saving measures at a building. The energy efficiency calculations´ results are based on various key data. One central key data is the gross area primary energy demand rate. This rate´s calculation is defined in the OIB-code of practice "„Energietechnisches Verhalten von Gebäuden - Buildings´ Energy characteristics" and is based on the application of conversion factors. District heating networks in Austria have a very good primary energy factor as they are mainly driven by energy from combined heat-power (CHP) systems or waste heat.
Renewable energy or solar thermal driven district heating systems are evaluated based on an alternative assessment within the Energy Performance of Building Directive (EPBD). This assessment is an expertise and is not related to legal regulations or norms. The system´s economic performance is a very critical factor within the assessment.

2. *Practical example of calculation.*

At first, the building is classified: new building,/old building, residential building/commercial building. Afterwards, the buildings´ heating demand and energy demand are calculated (including electricity etc.)

Energy Source	f_{PE} [-]	$f_{PE,n.ern.}$ [-]	$f_{PE,ern.}$ [-]	f_{CO2} [g/kWh]
Coal	1,46	1,46	0,00	337
Fuel Oil	1,23	1,23	0,00	311
Natural gas	1,17	1,17	0,00	236
Biomass	1,08	0,06	1,02	4
Electricity (Austrian-Mix)	2,62	2,15	0,47	417
District heating from heat plant (renewable)	1,60	0,28	1,32	51
District heating from heat plant (non-renewable)	1,52	1,38	0,14	291
District heating from high efficiency KWK[1] (Default data)	0,92	0,20	0,72	73
District heating from high efficiency KWK[1] (Best data)	≥ 0,30	Based on an itemization[2]		
Waste heat (Default data)	1,00	1,00	0,00	20
Waste heat (Best data)	≥ 0,30	Based on an itemization		

1) High efficient Combined Heat-and-Power (CHP) systems are defined in the 2004/8/EG

2) For an itemization based on EN 15316-4-5, no values lower than the waste heat (best data) value are allowed. Side calculations are defined in the document "Comments"

Figure 1: Conversion factors based on the OIB-Guidelines 6, October 2011

The total energy factor is based on several calculations, defined within the OIB-Guidelines RL6, October 2011, revision in December 2011:

The total energy efficiency factor is calculated in relation to the energy demand EEB_{IST} and the reference value EEB_{Ref}:
The energy demand EEB_{IST} is equal to the energy demand EEB_{BGF} regarding the conditioned gross area. The basis calculation is:

- $EEB_{IST} = EEB_{BGF}$
- An alternative calculation is optional:
- For WG: $EEB_{IST} = HWB_{IST} + WWWB_{Def} + HTEB_{IST} + HHSB_{Def}$
- For NWG: $EEB_{IST} = HWB_{IST} + WWWB_{Def} + HTEB_{IST} + KEB_{IST} + BelEB_{Def} + BSB_{Def}$

Basically, the $HHSB_{Def}$, the $BelEB_{Def}$ and the $_{BSB}$Def can be substituted by the $HHSB_{IST}$, $BelEB_{IST}$ and the BSB_{IST}, where (NPVE … Netto-Photovoltaic-Revenue):

- $HHSB_{IST} = HHSB_{Def}$ - NPVE
- $BelEB_{IST} = BelEB_{Def}$ - NPVE
- $BSB_{IST} = BSB_{Def}$ - NPVE

It is further possible to calculate the $BelEB_{IST}$ based on the EN 15193. Therefore, the $BelEB_{IST}$ can be different from the $BelEB_{Def}$.
As well, the NPVE - Netto-Photovoltaic-Revenue can be calculated based on the EN 15316-4-6. Here, the calculated value per month has to be below the per month calculated and balanced NPVE.

Further detailed calculations can be found in a „Leitfaden Energietechnisches Verhalten von Gebäuden - Guideline for buildings´ energy performance“ Appendix OIB-6.

3. *Standard methods and software tools usually used for such normative calculations.*

A lot of companies are calculating a buildings´ energy performance and are qualified to do so. Therefore, various company-specific tools exist. As an example, the city of Vienna uses a tool developed by Christian Pöhn and other partners. For further information, the following link is provided:
http://www.google.at/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&ved=0CEEQFjAC&url=http%3A%2F%2Fwww.oib.or.at%2FEA-WGv-2012-01-01-V10b2.xls&ei=yZCwUdOmLoj54QTv_4CICg&usg=AFQjCNFjgx-c74sPNDLbFMYssjhl5VnEOg&sig2=rCA1XkwMHGDafX4nbWXPGQ&bvm=bv.47534661,d.bGE

4. *Limits and opportunities for SDH according to the existing methodology.*

Within the current calculation schemes, the primary energy factor is very central. The primary energy factor from district heating systems is advantageous due to the district heating´s connection with CHP and waste heat plants. Many biomass plants can also be found within the existing district heating systems. Therefore, solar thermal energy feed-in systems only slightly influence a building´s total energy efficiency.

5. *Possible improvements for the methodology and for the current legislation.*

Conversion factors for CHP plants and waste heat are currently very low. This has positive effects on building´s total energy efficiency. If these conversion factors increased, plant operators would have incentives to realize more solar thermal feed-in systems to increase a district heating network´s advantage within building´s total energy efficiency. Another conversion factor for district heating systems which includes solar thermal plants would be beneficial.