

OPEN HOUSE

METODOLOGIJA PROCENE

Ekonomski kvalitet

- 3.1 Building-related Life Cycle Costs (LCC)
- 3.2 Value Stability

3

Ekonomsku kvalitet

Indikator 3.1 Troškovi životnog ciklusa zgrade (LCC)

1. Informacije o indikatoru

Indikator 3.1 Troškovi životnog ciklusa zgrade (LCC) se procenjuje sa 2 pod-indikatora:

3.1.1 Troškovi životnog ciklusa

3.1.2 Troškovi celokupnog životnog ciklusa zgrade uključiv i eksterne troškove (nisu ocenjivani u ovoj verziji)

3.1.3 Analiza osetljivosti.

Smernice za proračun troškova životnog ciklusa zgrade (LCC kalkulator).

Troškovi životnog ciklusa zgrade baziraju na 2 proračunska lista:

- Ekonomski podaci

- Inicijalne vrednosti su date samo kao referenca ali mogu biti prilagođene specifičnim uslovima.
- Stopa inflacije za proizvode i ljudski rad može biti prilagođena lokalnim prilikama.
- Energetska inflacija će biti promenjena za analizu osetljivosti u ovoj tački.
- Procenitelj će takođe prilagoditi procenat investicionih troškova zbog rušenja prema vrsti objekta, premaza I procesu korišćenja.

- Obračunski list

- Procenitelj će obavestiti o prikupljenim podacima u koloni C, D, E i F.
- Informacije o životnom veku I održavanju su date u 2 poslednja lista "Rederentni vek trajanja prema standardima 2067" i CEN CWA 27"
- Spisak kategorizacija nije obavezan.
- Procenitelj ima mogućnost da proširi ili suzi tipove troškova.
- Ako nedostaje neka kategorija troškova ili je treba proširiti, procenitelj će insertovati još jedan red I kopirati prethodni red.

U **Listi rezultata**, rezultati će biti poređani u skladu sa životnim ciklusom zgrade (od izgradnje do dekonstrukcije).

2. Ocena

Pod-indikator 3.1.1 Troškovi životnog ciklusa

a. Navedite faze za koje je izvršen obračun troškova:

Faza 1 Troškovi nabavke repro-materijala i procesa gradnje

Faza 2a Troškovi korišćenja zgrade

Faza 2b Troškovi operativnog korišćenja energije

Faza 2c Troškovi operativnog korišćenja vode

Faza 3 Troškovi dekonstrukcije

Objašnjenja i dokazi se mogu naći u Aneksu **3.1.1_1**

b. Molimo navedite koji od sledećih uslova su izvršni za adaptaciju radnog veka procenjivane zgrade:

Izbor materijala

Karakteristike održavanja

Kvalitet konstrukcije

Adaptacija za spoljašnje i unutrašnje uslove

Korisnici (obuka, ...)

Objašnjenja i dokazi se mogu naći u Aneksu **3.1.1_2**

c. Molimo navedite tip podataka koji je korišćen za procenu :

Specifični podaci

Generalni podaci

Objašnjenja i dokazi se mogu naći u Aneksu **3.1.1_3**

Pod-indikator 3.1.3 Analiza osetljivosti

Molimo navedite kada je izvršena analiza osetljivosti da bi se proveli sledeći parametri:

Stabilnost vrednosti energije koja se odnosi na toplotni komfor i odstupanja u korišćenju energije

Stabilnost vrednosti za troškove ljudstva

Stabilnost vrednosti proizvoda

Objašnjenja i dokazi se mogu naći u Aneksu **3.1.3_1**

3. Ocena indikatora i zbir

3.1.1.a Završen proračun za različite faze životnog ciklusa	Poeni
Rezultati postignuti u zavisnosti od faze u kojoj je obračun bio završen	
Izvođenje proračuna za različite faze životnog ciklusa zgrade donosi različit broj bodova kao što se vidi u donjoj tabeli:	
Faza 1 Troškovi nabavke repro-materijala i procesa gradnje	30 poena
Faza 2a Troškovi korišćenja zgrade	5 poena
Faza 2b Troškovi operativnog korišćenja energije	20 poena
Faza 2c Troškovi operativnog korišćenja vode	10 poena
Faza 3 Troškovi dekonstrukcije	5 poena
	65

3.1.1.b Adaptacija na vek trajanja proizvoda na procenjivanoj zgradi	Poeni
Svih pet zahteva je ispunjeno	15
Četiri od pet zahteva je ispunjeno	12
Tri od pet zahteva je ispunjeno	9
Dva od pet zahteva je ispunjeno	6
Jedan od pet zahteva je ispunjen	3

3.1.1.c Tip podataka koji je korišćen za procenu	Poeni
Specifični podaci	15
Generalni podaci	10

3.1.3. Analiza osetljivosti	Poeni
Sve tri analize osetljivosti su urađene	100
Dve od tri analize osetljivosti su urađene	75
Jedna od tri analize osetljivosti je urađena	50
Analiza osetljivosti nije urađena	0

Pod-indikator 3.1.1 Troškovi životnog ciklusa:

87

Pod-indikator 3.1.3 Analiza osetljivosti:

0

Indikator 3.1 Troškovi životnog ciklusa zgrade (LCC):

43.5

4. Aneksi

Sledeći aneksi su korišćeni za podršku ocene ovog pod-indikatora:

Pod-indikator 3.1.1 Troškovi životnog ciklusa zgrade

LCC obračun

- Aneks 3.1.1_1: Naziv aneksa

Spisak proizvoda sa pripadajućim podacima (cene, vek trajanja, tehničke karakteristike..)

- Aneks 3.1.1_2: Naziv aneksa

Specifikacija tipa podataka koji se koriste

- Aneks 3.1.1_3: Naziv aneksa

Pod-indikator 3.1.3 Analiza osetljivosti

Narativni opis analize osetljivosti

- Aneks 3.1.3_1: Naziv aneksa

A. Dodatne informacije o nacionalnim praksama

A1. Primena EU standarda/direktiva/propisa

Da li znate neke EU standarde/direktive/propise koji se odnose na ovaj indikator?

Nema standarda (EU ili nacionalnih) koji se odnose na ovaj indikator u Srbiji.

A2. Nacionalna osnovna i najbolja praksa

Za svaki pod-indikator, molimo specificirati aktuelnu primenjenu metodologiju korišćenu u Srbiji i naznačiti da li je obavezna:

Pod-indikator 3.1.1 Troškovi životnog ciklusa

- Standardi: naziv
- Propisi: naziv
- **Nema zajedničke metodologije**

Pod-indikator 3.1.2 Troškovi celokupnog životnog ciklusa zgrade uključiv i eksterne troškove (nisu ocenjivani u ovoj verziji)

- Standardi: naziv
- Propisi: naziv
- **Nema zajedničke metodologije**
-

Pod-indikator 3.1.3 Analiza osetljivosti

- Standardi: naziv
- Propisi: naziv
- **Nema zajedničke metodologije**

A3. Nacionalna osnovna i najbolja praksa

Za svaki pod-indikator specificirati tekuće primere iz preporuka ili propise prema praksi od osnovnih do najboljih primena u **Srbiji**.

Pod-indikator 3.1.1 Troškovi životnog ciklusa

Ne postoje uporedne analize niti primeri osnovne ili najbolje prakse.

Postoje sledeći primeri iz prakse / uporedne analize :

10	Ciljna najbolja praksa	Opis najbolje prakse/ ciljna vrednost indikatora
9		
8		...
7		
6		
5	Primer: performanse zgrade koja se ocenjuje	Primer: moje iskustvo objašnjeno ovde / vrednost postignuta ili planirana
4		
3		
2		
1	Osnovna praksa (propis)	Opis osnovne prakse prema propisima /vrednost minimalnih zahteva koji se podržavaju
0	Nema poštovanja propisa	

Molimo, izaberite u tabeli performanse vaše zgrade prema Vašem mišljenju, ukoliko ste je ocenjivali bez metodologije OPEN HOUSE benčmarkinga. Koristiti skalu od 1 do 10 (1 za osnovnu praksu prema propisima u **Srbiji**, 10 za najbolju praksu prema ciljnom rezultatu u **Srbiji**), i objasniti Vaš izbor u “opisnom polju”.

Pod-indikator 3.1.2 Troškovi celokupnog životnog ciklusa zgrade uključiv i eksterne troškove (nisu ocenjivani u ovoj verziji)

Ne postoje uporedne analize niti primeri osnovne ili najbolje prakse.

Postoje sledeći primeri iz prakse / uporedne analize :

10	Ciljna najbolja praksa	Opis najbolje prakse/ ciljna vrednost indikatora
9		
8		...
7		
6		
5	Primer: performanse zgrade koja se ocenjuje	Primer: moje iskustvo objašnjeno ovde / vrednost postignuta ili planirana
4		
3		
2		
1	Osnovna praksa (propis)	Opis osnovne prakse prema propisima /vrednost minimalnih zahteva koji se podržavaju
0	Nema poštovanja propisa	

Pod-indikator 3.1.3 Analiza osetljivosti

Ne postoje uporedne analize niti primeri osnovne ili najbolje prakse.

Postoje sledeći primeri iz prakse / uporedne analize :

10	Ciljna najbolja praksa	Opis najbolje prakse/ ciljna vrednost indikatora
9		
8		...
7		
6		
5	Primer: performanse zgrade koja se ocenjuje	Primer: moje iskustvo objašnjeno ovde / vrednost postignuta ili planirana
4		
3		
2		
1	Osnovna praksa (propis)	Opis osnovne prakse prema propisima /vrednost minimalnih zahteva koji se podržavaju
0	Nema poštovanja propisa	

Guidelines

The LCC is based on 2 calculation sheets:

- **Economic data**

Initial values are given as reference but can be adapted to specific conditions.

The inflation rate for products and human activities can be adapted to the local context.

Energy inflation rate shall be changed for the sensitivity analysis on this point.

Assessor shall also adapt the percentage of investment cost due to demolition according to the type of structure, coatings and process use.

- **Calculation sheet**

The assessor shall inform the data collection of columns C, D, E and F.

Information about lifetime and maintenance are given in the last 2 sheets "Reference service life according to VDI 2067" and to CEN CWA 27"

The list of category is not mandatory.

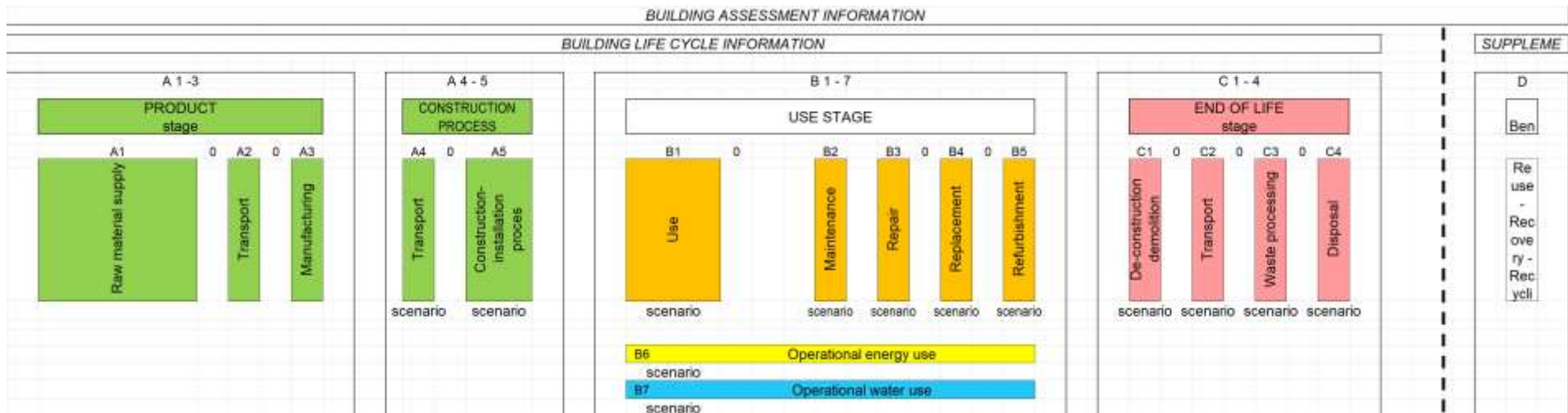
The assessor has the possibility to reduce or to expand the type of costs.

If a category of cost is missing or need to be expanded, the assessor shall insert a line, then copy and paste the previous one.

In the **Results sheet**, the results have been ordered according to the Life cycle of the building (from construction to demolition).

Economic data

Calculation Period	50
Inflation_rate (real interest rate)	1.15%
Inflation rate for products	2.50%
Inflation rate for human activities	3.00%
Inflation rate for energy	4.00%
Inflation rate for water	3.00%
Percentage for demolition cost_1	6.00%
Percentage for demolition cost_2	4.00%
Maintenance rate for products	4.00%



Item	Quantity [unit]	Life span [years]	Maintenance cleaning rate [per year]	Unitary costs [€/unit]	10	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
					10	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
						1.02687116	1.04057631	1.054446438	1.0685378	1.08279906	1.09725065	1.11189513	1.12673505	1.14177304	1.15701173	1.1724538	1.18810197	1.203959	1.22002760	
Design	1			20	20															
Land	1			250	250															
Site works	1			15	15															
Connection to services	1			50	50															
Building products				0	0															
Foundations and substructure	1	80	0.005	200	200	1.013346515	1.02687116	1.04057631	1.054446438	1.0685378	1.08279906	1.09725065	1.11189513	1.12673505	1.14177304	1.15701173	1.1724538	1.18810197	1.203959	
Superstructure	1	80	0.01	300	300	3.040039545	3.08061348	3.121172893	3.16339514	3.20561341	3.24839718	3.29175196	3.33568538	3.38020515	3.42531911	3.47103518	3.51736141	3.56430592	3.61187699	
Wall	24	1.2	0.01	20	24	0.243203164	0.24644908	0.24973831	0.25307145	0.25644907	0.25987177	0.26334016	0.26685483	0.27041641	0.27402553	0.27768281	0.28138891	0.28514447	0.28895016	
Door and glazing (m ²)	0.3	30	0.02	20	6	0.121601562	0.12322454	0.12486916	0.12653573	0.12822454	0.12993589	0.13167008	0.13342742	0.13520821	0.13701276	0.13884141	0.14069446	0.14257224	0.14447508	
Roof	1	80	0.01	15	15	0.152001977	0.15403067	0.15608645	0.15816966	0.16028067	0.16241986	0.1645876	0.16678472	0.16901026	0.17126596	0.17355176	0.17586807	0.1782153	0.18059385	
Floor and stairs	1	60	0.01	10	10	0.101334652	0.10268712	0.10405763	0.10544644	0.10685378	0.10827991	0.10972507	0.11118951	0.11267351	0.1141773	0.11570117	0.11724538	0.1188102	0.1203959	
Automatic transportation	1	30	0.02	30	30	0.608007909	0.6161227	0.62434579	0.63267863	0.64112268	0.64967944	0.65835039	0.66713708	0.67604103	0.68506382	0.69420704	0.70347228	0.71286118	0.7223754	
Partition wall	0.6	60	0.01	20	12	0.121601562	0.12322454	0.12486916	0.12653573	0.12822454	0.12993589	0.13167008	0.13342742	0.13520821	0.13701276	0.13884141	0.14069446	0.14257224	0.14447508	
Fans	1	12	0.02	100	100	2.02669303	2.03374232	2.08115262	2.10892876	2.13707561	2.16559812	2.19450131	2.22379025	2.2534701	2.28354607	2.31402346	2.3449076	2.37620395	2.40791799	
Ventilation ducts	1	20	0.04	12	12	0.486406327	0.49289816	0.49947663	0.5061429	0.51289815	0.51974355	0.52668031	0.53370966	0.54083282	0.54805106	0.55536563	0.56277783	0.57028895	0.57790032	
Boiler/reservoir	1	15	0.04	15	15	0.608007909	0.6161227	0.62434579	0.63267863	0.64112268	0.64967944	0.65835039	0.66713708	0.67604103	0.68506382	0.69420704	0.70347228	0.71286118	0.7223754	
Radiators and emitters	6	40	0.01	20	120	1.216015818	1.23224539	1.24869157	1.26535725	1.28224536	1.29935887	1.31670078	1.33427415	1.35208206	1.37012764	1.38841407	1.40694456	1.42572237	1.44475079	
Pipes	2	50	0.01	10	20	0.202669303	0.20537423	0.20811526	0.21089288	0.21370756	0.21655981	0.21945013	0.22237903	0.22534701	0.22835461	0.23140235	0.23449076	0.23762039	0.2407918	
Lighting	6	12	0.01	5	30	0.304003955	0.30806135	0.31217289	0.31633931	0.32056134	0.32483972	0.3291752	0.33356854	0.33802052	0.34253191	0.34710352	0.35173502	0.35643059	0.3611877	
Regulation and BMS	1	20	0.005	10	10	0.050667126	0.05134356	0.05202882	0.05272322	0.05342689	0.05413995	0.05486251	0.05559476	0.05633675	0.05708865	0.05785059	0.05862269	0.0594051	0.06019795	
Electrical network	5	60	0.02	20	100	2.02669303	2.03374232	2.08115262	2.10892876	2.13707561	2.16559812	2.19450131	2.22379025	2.2534701	2.28354607	2.31402346	2.3449076	2.37620395	2.40791799	
Fire protection	1	20	0.04	30	30	1.216015818	1.23224539	1.24869157	1.26535725	1.28224536	1.29935887	1.31670078	1.33427415	1.35208206	1.37012764	1.38841407	1.40694456	1.42572237	1.44475079	
Water for construction	6			2.1																
Electricity for construction	5			3.5																
Fuels for construction	150			1																
					1549.1															
Human operation	1			12	12	12.211947603	12.4429662	12.6705439	12.902284	13.1382625	13.3785569	13.6232463	13.873411	14.1261328	14.3844951	14.6475827	14.9154822	15.1882814	15.46607	
Water use	3			2.1	6.3	6.415224913	6.53250725	6.65203556	6.77389909	6.8972678	7.0224424	7.15220432	7.28301577	7.41621971	7.55185992	7.68998093	7.83062814	7.97384773	8.11968677	
Tax for water used	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Electricity for EPBD use	35			0.9	49.5	52.32871899	53.8031317	55.3190875	56.8777568	58.4803431	60.1280839	61.8222513	63.5641536	65.3551357	67.1965805	69.0899097	71.0365854	73.0381105	75.0960306	
Fuels for EPBD use	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Electricity (others)	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Fuels (others)	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Environmental taxes on energy	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21



3_1 Troškovi životnog ciklusa zgrada (LCC)



15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	
1.23631077	1.25281121	1.26953187	1.2864757	1.30364567	1.32104479	1.33867614	1.3565428	1.37464792	1.39299468	1.4115863	1.43042606	1.44951726	1.46886327	1.48846747	1.50833333	1.52846432	1.54886399	1.56953593	1.59048376	1.61171118	
1.22002765	1.23631077	1.25281121	1.26953187	1.2864757	1.30364567	1.32104479	1.33867614	1.3565428	1.37464792	1.39299468	1.4115863	1.43042606	1.44951726	1.46886327	1.48846747	1.50833333	1.52846432	1.54886399	1.56953593	1.59048376	
3.66008296	3.70893231	3.75843363	3.80859562	3.8594271	3.910937	3.96313438	4.01602842	4.0696284	4.12394376	4.17898403	4.23475891	4.29127818	4.34855179	4.4065898	4.46540242	4.52499998	4.58539296	4.64659198	4.70860779	4.77145128	
0.29280664	0.29671458	0.30067469	0.30468765	0.30875417	0.31287496	0.31705075	0.32128227	0.32557027	0.3299155	0.33431872	0.33878071	0.34330225	0.34788414	0.35252718	0.35723219	0.362	0.36683144	0.37172736	0.37668662	0.3817161	
0.14640332	0.14835729	0.15033735	0.15234382	0.15437708	0.15643748	0.15852538	0.16064114	0.16278514	0.16495775	0.16715936	0.16939036	0.17165113	0.17394207	0.17626359	0.1786161	0.181	0.18341572	0.18586368	0.18834431	0.19085805	
0.18300415	0.18544662	0.18792168	0.19042978	0.19297136	0.19554685	0.19815672	0.20080142	0.20348142	0.20619719	0.2089492	0.21173795	0.21456391	0.21742759	0.22032949	0.22327012	0.22625	0.22926965	0.2323296	0.23543039	0.23857256	
0.12200277	0.12363108	0.12528112	0.12695319	0.12864757	0.13036457	0.13210448	0.13386761	0.13565428	0.13746479	0.13929947	0.14115863	0.14304261	0.14495173	0.14688633	0.14884675	0.15083333	0.15284643	0.1548864	0.15695359	0.15904838	
0.73201659	0.74178646	0.75168673	0.76171912	0.77188542	0.7821874	0.79262688	0.80320568	0.81392568	0.82478875	0.83579681	0.84695178	0.85825564	0.86971036	0.88131796	0.89302926	0.905	0.91707859	0.9293184	0.94172156	0.95429026	
0.14640332	0.14835729	0.15033735	0.15234382	0.15437708	0.15643748	0.15852538	0.16064114	0.16278514	0.16495775	0.16715936	0.16939036	0.17165113	0.17394207	0.17626359	0.1786161	0.181	0.18341572	0.18586368	0.18834431	0.19085805	
2.4400553	2.47262154	2.50562242	2.53906375	2.5729514	2.60729134	2.64208959	2.67735228	2.7130856	2.74929584	2.78598936	2.8231726	2.86085212	2.89903453	2.93772653	2.97693495	3.01666665	3.05692864	3.09772798	3.13907186	3.18096753	
0.58561327	0.59342917	0.60134938	0.6093753	0.61750834	0.62574979	0.6341015	0.64256455	0.65114054	0.659831	0.66863745	0.67756143	0.68660451	0.69576829	0.70505437	0.71446439	0.724	0.73396287	0.7435472	0.75337725	0.76343221	
19.0324314	0.74178646	0.75168673	0.76171912	0.77188542	0.7821874	0.79262688	0.80320568	0.81392568	0.82478875	0.83579681	0.84695178	0.85825564	0.86971036	0.88131796	0.89302926	0.905	0.91707859	0.9293184	0.94172156	0.95429026	
1.46403318	1.48357292	1.50337345	1.52343825	1.54377084	1.5643748	1.58525375	1.60641137	1.62785136	1.6495775	1.67159361	1.69390356	1.71651127	1.73942072	1.76263592	1.78616097	1.80999999	1.83415718	1.85863679	1.88344311	1.90858052	
0.24400553	0.24726215	0.25056224	0.25390637	0.25729514	0.26072913	0.26420896	0.26773523	0.27130856	0.27492958	0.27859894	0.28231726	0.28608521	0.28990345	0.29377265	0.29769349	0.30166667	0.30569286	0.3097728	0.31390719	0.31809675	
0.3660083	0.37089323	0.37584336	0.38085956	0.38594271	0.3910937	0.39631344	0.40160284	0.40696284	0.41239438	0.41789840	0.42347589	0.42912781	0.43485518	0.44065898	0.44654024	0.4525	0.45853393	0.4646592	0.47086078	0.47714513	
0.06100138	0.06181554	0.06264056	0.06347659	0.06432379	0.06518139	0.06605224	0.06693681	0.06783214	0.06873824	0.06965473	0.07058232	0.07152113	0.07247086	0.0734316	0.07440337	0.0753862	0.07637922	0.07739237	0.07843572	0.07949927	
2.4400553	2.47262154	2.50562242	2.53906375	2.5729514	2.60729134	2.64208959	2.67735228	2.7130856	2.74929584	2.78598936	2.8231726	2.86085212	2.89903453	2.93772653	2.97693495	3.01666665	3.05692864	3.09772798	3.13907186	3.18096753	
1.46403318	1.48357292	1.50337345	1.52343825	1.54377084	1.5643748	1.58525375	1.60641137	1.62785136	1.6495775	1.67159361	1.69390356	1.71651127	1.73942072	1.76263592	1.78616097	1.80999999	1.83415718	1.85863679	1.88344311	1.90858052	
15.7489393	16.0369822	16.3302933	16.628969	16.9331073	17.2428062	17.5581735	17.8793067	18.2063133	18.5393007	18.8783784	19.2236576	19.575252	19.9332769	20.2978499	20.6690908	21.0471217	21.4320666	21.824052	22.2232066	22.6296617	
8.26819315	8.41941566	8.57340399	8.73020871	8.88988133	9.05247432	9.21804108	9.38663599	9.55831446	9.73311286	9.91114864	10.0924201	10.2770073	10.4649704	10.6563712	10.8512727	11.0497389	11.2518349	11.4576273	11.6671835	11.8805724	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
77.2119346	79.3874562	81.6242753	83.9241189	86.2887629	88.7200331	91.2198066	93.7900137	96.4326389	99.1497227	101.9433363	104.815717	107.769002	110.805499	113.927552	117.137572	120.438037	123.831496	127.32057	130.907951	134.59641	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	

	2736.7
Others in use related buildings costs	985.4
In use Energy	5594.1
In use Water	517.3
Demolition costs	62.0

ITEM Type						
Heating systems			Service life	Repair	Servicing	operation
	Cast iron radiators 40 1 0 0		40	1	0	0
	Steel radiators		35	1	0	0
	Flat radiators, steel		30	0	0	0
	Convectors with cladding		30	2	0	0
	Radiator paint		10	0	0	0
	Ceiling heating with suspended steel		20	1.5	0.5	0

	pipes and heat-conducting plates 20 1.5 0.5 0					
	Hot water underfloor heating		30	1	0	0
Control units						
	Thermostatic valves		10	1	0	0
	Valves with auxiliary power operation		10	1.5	0.5	0
	Hot-air heaters					
	Gas-fired air heaters for inter-storey heating		15	1.5	0.5	0
	1.1.4 Air heaters for heating large spaces, gas- or oil-fired		15	4	1	1
	1.1.5 Electric heating					
	Thermal storage heater		25	1	0.5	0
	Electric underfloor heating (incl. mounting on untreated concrete floors)		50	2	0	0
	Electric direct heating appliance, permanently built-in 25 1 0 0		25	1	0	0
1.2 Distribution						
	Pumps					
	Foundation pumps		18	2	1	0
	Inline pumps		10	2	0	0
	Circulation pumps		10	2	0	0
	Regulated jet pump		20	1.5	0	0
	1.2.2 Fittings		20	1.5	0	0
	1.2.3 Expansion tank, open or closed					
	with membrane		15	0	0.5	0
	with pressure pad		25	2	0.5	0

	1.2.4 Metering and regulating devices		20	1.5	1	0
	1.2.5 Heat insulation of pipes		20	1	0	0
	1.2.6 Pipelines from drawn or rolled pipes, following DIN for					
	Hot water heating		40	1	0	0
	Steam		40	1	0	0
	Condensation		8	5	0	0
	Gas		40	0.5	0	0
	1.2.7 Copper pipelines		30	0.5	0	0
	1.2.8 Plastic pipelines		30	0.5	0	0
	1.3 Generation					
	1.3.1 Heat generator					
1.3.1.1 Gas fireplace with burner or fan						
1.3.1.1.1 Recycle gas water heater and gas boiler with burner but no fan						
	Recycle gas water heater		18	2	1	0
	Combination recycle gas water heater		18	2	1	0
	Storage gas water heater		15	2	1	0
	Gas purpose-made heating boiler		18	1	1	0
1.3.1.1.2 Hot-air heaters						
	Gas-fired hot-air heaters for detached family houses 15 1.5 0.5 0		15	1.5	0.5	0
1.3.1.2 Purpose-made boiler for oil and gas furnaces						
	Purpose-made boiler for oil and gas furnaces under 120 kW		20	2	1.5	10
	Boilers over 120 kW as purpose-made boiler for oil and gas furnaces, as					

	cast-iron or steel boilers with a minimum return temperature or minimum volume flow		20	2	2	20
	Purpose-made boilers for oil and gas furnaces, as cast-iron or steel boilers over 120 kW without a minimum return temperature or minimum volume flow		20	2	1.5	20
	Gas condensing boiler, wall-mounted, under 100 kW		18	1.5	1	20
	Gas condensing boiler, pedestal type, under 200 Kw		20	1	1	20
	Gas condensing boiler, pedestal type, over 200 kW, with neutralisation system		20	1	1.5	20
1.3.1.3 Purpose-made boiler for solid fuel						
	Cast-iron sectional boiler, only for heating without return temperature boost		20	2	2.5	10
	new design					
	Steel boiler in similar design only for heating without return temperature in detached family house		15	2	2.5	20
	1.3.1.4 High-speed steam generator		10	4	1.5	50
	1.3.1.5 Tank-type boiler and water-tube boiler > 1 MW 25 2 1.5 80		25	1	1.5	80
	1.3.1.6 Thermo-oil boiler		15	3	1.5	30
	1.3.1.7 Burners					

	Gas burner without fan		20	1	2	0
	Gas burner with fan and fittings		12	2	10	0
	Oil burner with fan and fittings		12	2	10	0
1.3.1.8 Electric heating						
	Electric central storage heater, storage medium water		25	1	1.5	5
	Electric central storage heater, storage medium solid matter		25	1	1.5	5
	Electric central storage heater for technical installations		25	1	1.5	5
	Electrode boiler		25	1	1.5	5
1.3.1.9 Heat pumps						
	Electricity		20	3	1	20
	Gas		15	3	1.5	40
	Oil		15	3	1.5	40
	1.3.1.10 Block-type thermal power stations 15 6 2 100		15	6	2	100
1.3.1.11 Solar energy plants						
	Absorbers		20	0.5	0.5	5
	Flat plate collectors		20	0.5	0.5	5
	Vacuum tube collectors		20	0.5	0.5	5
	Vacuum flat plate collectors		18	0.5	0.5	5
	IKS-system		15	1	1	5
1.3.2 Connection piece (heat-insulated) between boiler and chimney						
	Sheet metal thickness up to 4 mm		10	1	1	0
	Sheet metal thickness of 4 mm or more		15	1	1	0
1.3.3 Heat exchanger with copper						

battery, soldered or similar incl.						
	Heating water or steam/heating water		20	2	0	0
	Heating water/drinking water		12	2	0	0
	Heating water/steam		12	2	0	0
1.3.4 Domestic delivery station for district heating with direct connection 30 2 1 0						
1.3.5 Local heating system						
Steel casing pipe (laid inside building) 40 1 0 0	Steel casing pipe (laid inside building) 40 1 0 0					
Plastic casing pipe (underground) 40 1 0 0	Plastic casing pipe (underground) 40 1 0 0					
Plastic pipe (underground) 40 1 0 0	Plastic pipe (underground) 40 1 0 0					
1.3.6 Fuel feeder, ash removal, fuel store						
Solid fuel feeder with mobile electro-pulley block 25 1.5 2 2	Solid fuel feeder with mobile electro-pulley block 25 1.5 2 2					
Solid fuel feeder with conveyor or plate belt 20 1.5 2 2	Solid fuel feeder with conveyor or plate belt 20 1.5 2 2					
Solid fuel feeder with forklift truck 15 4 2 2	Solid fuel feeder with forklift truck 15 4 2 2					
Pneumatic coal feeder 15 2 2 2	Pneumatic coal feeder 15 2 2 2					
Pneumatic coke feeder 10 4 2 2	Pneumatic coke feeder 10 4 2 2					
Cinder and ash transport via cinder lift 20 2 2 2	Cinder and ash transport via cinder lift 20 2 2 2					
Cinder and ash transport via pneumatic ash removal system 12 4 2 2	Cinder and ash transport via pneumatic ash removal system 12 4 2 2					
Dust removal system (without suction)	Dust removal system (without suction)					

with associated pipeline 20 2 2 2	with associated pipeline 20 2 2 2					
Suction system 15 2 2 2	Suction system 15 2 2 2					
Steel battery case (DIN 6620-1) 25 2 1 0	Steel battery case (DIN 6620-1) 25 2 1 0					
Double-walled steel casing for underground storage (DIN 6606-2)	Double-walled steel casing for underground storage (DIN 6606-2)					
30 1.5 1 0	30 1.5 1 0					
Steel case assembled in situ (DIN 6625-1) 30 1.5 1 0	Steel case assembled in situ (DIN 6625-1) 30 1.5 1 0					
Steel case for overground or partially overground storage (DIN 6616, DIN 6618 and DIN 6619)	Steel case for overground or partially overground storage (DIN 6616, DIN 6618 and DIN 6619)					
25 2 1 0	25 2 1 0					
Case with plastic coating in accordance with RAL-RG 998, RAL-RG 977 30 1.5 1 0	Case with plastic coating in accordance with RAL-RG 998, RAL-RG 977 30 1.5 1 0					
Case with protective inner sleeves or protective lining (tested and approved) 30 1.5 1 0	Case with protective inner sleeves or protective lining (tested and approved) 30 1.5 1 0					
Case out of material other than steel (tested and approved), e.g. aluminium, plastic (PE, glass fibre reinforced plastic etc.) and reinforced concrete with inner coating (none of which corrode) 30 1 0.5 0	Case out of material other than steel (tested and approved), e.g. aluminium, plastic (PE, glass fibre reinforced plastic etc.) and reinforced concrete with inner coating (none of which corrode) 30 1 0.5 0					
Tank mounting with pipes 20 3 1 0	Tank mounting with pipes 20 3 1 0					
Leak detecting device 10 3 1 0	Leak detecting device 10 3 1 0					
Liquid gas container 18 1.5 1 0	Liquid gas container 18 1.5 1 0					
1.3.7 Structural installations						
General construction costs 50 1 1 0	General construction costs 50 1 1 0					

Chimney in building 50 1 1 0	Chimney in building 50 1 1 0					
Free-standing chimney, brick-built or concrete 40 1 1 0	Free-standing chimney, brick-built or concrete 40 1 1 0					
Platforms or steps in boiler house 40 1 1 0	Platforms or steps in boiler house 40 1 1 0					
2 Ventilation and air-conditioning						
2.1 Benefit transfer						
2.1.1 Air transmission						
	2.1.1.1 Ceiling air transmission 20 0 0.5 0	20	0	0.5	0	
	2.1.1.2 Wall air transmission 20 0 0.5 0	20	0	0.5	0	
	2.1.1.3 Floor air transmission 20 0 0.5 0	20	0	0.5	0	
2.1.2 Heat						
2.1.2.1 Air heaters						
2.1.2.1.1 Direct-central						
	Gas 20 1 1 0	20	1	1	0	
	Oil 20 1 1 0	20	1	1	0	
	Electric 20 1 0.5 0	20	1	0.5	0	
2.1.2.1.2 Direct-local						
	Gas 20 1 1 0	20	1	1	0	
	Oil 20 1 1 0	20	1	1	0	
	Electric 20 1 0.5 0	20	1	0.5	0	
2.1.2.1.3 Indirect-central						
	Water	20	1	1	0	
	Steam	20	1	1	0	
	Gas	20	1	1	0	
2.1.2.1.4 Indirect-local						
	Water	20	0	0	0	
	Steam	20	0	0	0	

	Gas	20	0	0	0
2.1.2.2 Heat recovery devices					
	Plate heat exchangers 20 2 10 0	20	2	10	0
Circulation heat exchangers 20 2 10 0	Circulation heat exchangers 20 2 10 0	20	2	10	0
Heat exchanger tubes 20 2 10 0	Heat exchanger tubes 20 2 10 0	20	2	10	0
Rotating heat exchangers 15 3 10 0	Rotating heat exchangers 15 3 10 0	15	3	10	0
2.1.3 Cooling					
2.1.3.1 Air coolers					
	Water	20	2	4	0
	Brine	20	2	4	0
2.1.3.2 Heat recovery devices					
	Plate heat exchangers	20	2	10	0
	Circulation heat exchangers 20 2 10 0				
	Heat exchanger tubes 20 2 10 0				
	Rotating heat exchangers 15 3 10 0				
	Heat pumps 20 2 1 0				
2.1.3.3 Refrigerated case					
2.1.3.3.1 Closed refrigerated case					
	Cases or longitudinal plates with water pipes (with clamped joints) 20 1 0.5 0				
	Roll-bonding elements with plastic cast (integrated water channels) 30 0 0 0				
	Extruded section with moulded water channels (embedded copper pipes) 30 0 0 0				
	Cases with copper pipe meanders (pipes flattened), laid loose or fixed to a support plate above or below				

	20 1 0.5 0					
	Cases or longitudinal plates with capillary tube matting 20 1 0.5 0					
	Cases with aluminium heat conducting section and embedded copper pipes (some sections with own support system)					
	20 1 0.5 0					
2.1.3.3.2 Open refrigerated case						
	Slanting plates on water pipes (clamped joints) and louvered cover 20 1 1 0					
	Longitudinal plates with water pipes (clamped joints) 20 1 1 0					
	Extruded section with moulded water channels (embedded copper pipes)					
	20 1 1 0					
	Cases or longitudinal plates with open air passages (e.g. interleaved slits)					
	20 1 1 0					
	2.1.3.3.3 Cooling propeller 20 1 1 0					
2.1.4 Humidity						
2.1.4.1 Humidifiers						
	Vaporisation 15 3 2 0					
	Evaporation 15 3 2 0					
	Water jets 15 3 2 0					
	Compressed air jets 15 3 2 0					
	Mechanical 15 3 2 0					
	Ultrasound 15 3 2 0					

2.1.4.2 De-humidifiers						
	Condensers 15 2 2 0					
	Absorption 10 3 3 0					
	Adsorption 10 3 3 0					
2.1.4.3 Air washers						
	Jet-humidifiers 15 3 2 0					
	Trickling-humidifiers 15 3 2 0					
2.1.5 Hygiene						
2.1.5.1 Filters, single stage						
	Cross-flow/panel filter 0.25 0 0 0					
	Circular air filter 0.25 0 0 0					
	Drum filter 0.25 0 0 0					
	Boiler filter 0.25 0 0 0					
	Closed-circuit filter 0.25 0 0 0					
	Pocket filter 0.25 0 0 0					
	Rotating air filter 0.5 0 0 0					
2.1.5.2 Filters, multi-stage						
	Cross-flow filter 0.25 0 0 0					
	Circular air filter 0.25 0 0 0					
	Drum filter 0.25 0 0 0					
	Boiler filter 0.25 0 0 0					
	Closed-circuit filter 0.25 0 0 0					
	Pocket filter 0.25 0 0 0					
	Rotating air filter 0.5 0 0 0					
	Electric filter 20 0 6 0					
	Activated carbon filter 0.5 0 0 0					
2.1.6 Air discharge						
2.1.6.1 Axial fans						

	Wall fan 8 0 0 0					
	Fan without stator 12 2 10 0					
	Fan with stator 12 2 10 0					
	Air expulsion devices 12 2 10 0					
2.1.6.2 Mixed flow fans						
Half radial						
2.1.6.3 Radial fans						
	Blades bent backwards	12	2	10	0	
	Straight blades	12	2	10	0	
	Blades bent forwards	12	2	10	0	
2.1.6.4 Cross flow fans		12	2	10	0	
2.1.7 Silencers						
	Absorption silencer	20	0	1	0	
	Choke silencer	20	0	1	0	
	Reflection silencer	20	0	1	0	
2.1.8 Air conduction – air channels						
	High pressure air duct	20	0	1	0	
	Low pressure air duct	20	0	1	0	
2.2 Distribution						
2.2.1 Hot water, see Heating						
2.2.2 Cold water						
	Pipelines	40	1	0	0	
	Insulation	20	1	0	0	
	Pumps	10	2	0	0	
	Fittings	20	1.5	0	0	
	Control unit	15	1.5	1	0	
2.3 Generation						

2.3.1 Heat, see Heating						
2.3.2 Cooling						
2.3.2.1 Cooling machine, indirect						
	2.3.2.1.1 Compression cooling systems	15	2	1	1	
	2.3.2.1.2 Absorption cooling systems	15	1.5	1	0	
	2.3.2.1.3 Thermo-electric cooling systems	15	1	1	0	
	2.3.2.2 Recooling plants	20	2	1	0	
3 Heated drinking water						
3.1 Benefit transfer						
3.1.1 Fittings						
	Shut-off and regulating fittings	15	1	1	0	
	Tap fittings	10	1	0	0	
	Cut-out and safety fittings	15	1	1	0	
3.1.2 Pipelines						
	Drinking water pipelines	40	1	0	0	
	Heated drinking water pipelines for suitable water conditions or appropriate treatment	25	2	0	0	
	Hot water pipelines for unsuitable water conditions or untreated water	15	3	0	0	
3.1.3 Heat insulation of pipelines 20 1 0 0		20	1	0	0	
3.1.4 Metering and control devices 20 1.5 1 0		20	1.5	1	0	
3.1.5 Pumps 10 2 0 0		10	2	0	0	

3.1.6 Local hot water supply						
	Flow heaters	15	1	0	0	
	Electric boiling water apparatus	15	1	0.5	0	
	Electric pressure flow heater	15	1	0	0	
	Electric open storage tank, isolated or not isolated, capacity 5 to 80 l	15	1	0.5	0	
	Electric closed storage tank	20	2.5	0.5	0	
	Storage-water heating tank with separate heating	15	2	0.5	0	
	Gas circulator water heater	15	4	0.5	0	
	Gas hot water or gas reserve tank	12	2	0.5	0	
3.2 Distribution						
3.2.1 Hot water, see Heating						
3.3 Generation						
3.3.1 Heaters, see Heating						
3.3.2 Central hot water supply						
	Hot water storage tank	25	1	0.3	0	
	Flow heater	15	1	0	0	
3.3.3 Water treatment plants 15 1 1 1		15	1	1	1	



from CEN CWA 27 - Europe				
				Reference Service Life
1 Insulation: building envelope				>25
2 Draught proofing				5
4 Windows/glazing 24				24
5 Replace hot water storage tank				15
6 Insulation of hot water pipes				>25
7 Heat reflecting radiator panels				18
8 Small boilers				17
9 Large boilers				17
10 Heating control				5
11 Heat recovery systems				17
12 Hot water saving faucets				15
13 Heat pump (household)				17
14 Efficient chiller or room air conditioner				10
15 New/upgraded district heating				20
16 Solar water heating 19				19
17 Efficient cold appliances 15				15
18 Efficient wet appliances 12				12
19 Consumer electronic goods				3
20 Efficient bulbs CFL				6000h
21 Luminaire with ballast systems 15				15
23 Micro-CHP				8
24 PV-panels				23
25 Hydraulic balancing of heating				10
26 Electricity saving				2
27 Heat saving				2



28 Feedback on use from smart meters					2
29 Windows/glazing					24
30 Insulation: building envelope				>25	
31 Heat recovery systems					17
32 Energy efficient architecture				>25	
33 Heat pumps (commercial sector)					20
34 Efficient chillers in AC					17
35 Efficient ventilation systems					15
36 Commercial refrigeration (supermarkets)					8
37 Energy efficient office appliances					3
38 Combined heat *and power					8
39 Motion detection light controls					10
40 New/renovated office lighting					12
41 Public lighting systems					13
42 EMS (monitoring, ISO)					2