Gradbeni inštitut ZRMK

Tipologija stavb

energetska učinkovitost in tipične stavbe v Sloveniji

Slovenia

SFH Single-Family House	TH Terraced House	MFH Multi-Family House	AB Apartment Block
 SI.N.SFH.01.Gen	 SI.N.TH.01.Gen	 SI.N.MFH.01.Gen	 SI.N.AB.01.Gen
 SI.N.SFH.02.Gen	 SI.N.TH.02.Gen	 SI.N.MFH.02.Gen	 SI.N.AB.02.Gen
 SI.N.SFH.03.Gen	 SI.N.TH.03.Gen	 SI.N.MFH.03.Gen	 SI.N.AB.03.Gen
 SI.N.SFH.04.Gen	 SI.N.TH.04.Gen	 SI.N.MFH.04.Gen	 SI.N.AB.04.Gen
 SI.N.SFH.05.Gen	 SI.N.TH.05.Gen	 SI.N.MFH.05.Gen	 SI.N.AB.05.Gen
 SI.N.SFH.06.Gen	 SI.N.TH.06.Gen	 SI.N.MFH.06.Gen	 SI.N.AB.06.Gen

Tipologija stavb: energetska učinkovitost in tipične stavbe v Sloveniji

IEE TABULA

Številka pogodbe: IEE/08/495/SI2.528393, program Inteligentna energija Evropa
Slovenski partner pri projektu: Gradbeni inštitut ZRMK, d.o.o.

Slovensko sodelovanje pri projektu je finančno podprlo Ministrstvo za gospodarstvo.

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Založnik in izdajatelj: Gradbeni inštitut ZRMK d.o.o.

Tisk: Studio Zenit Marko Jelovšek, s.p.

Naklada: 500 izvodov

Ljubljana, maj 2012

CIP - Kataložni zapis o publikaciji
Narodna in univerzitetna knjižnica, Ljubljana
697.1(035)
Tipologija stavb: energetska učinkovitost in tipične stavbe v Sloveniji / [avtorji Marjana Šijanec Zavrl ... et al.]. - Ljubljana : Gradbeni inštitut ZR MK, 2012
ISBN 978-961-6712-03-9
1. Šijanec Zavrl, Marjana
260140800

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Uvod

Brošura je nastala kot podporno gradivo pri evropskem projeku Tabula. Tabula je projekt iz sklopa Intelligent Energy Europe, pri katerem se gradi enotna evropska struktura tipologije objektov. Na podlagi enotne strukture je vsaka država partnerica izdelala svojo nacionalno tipologijo stavb, stavb s podobnimi energijskimi lastnostmi.

Vsaka stavba je edinstvena. Nobena stavba ni enaka drugi, tako kot nobena snežinka ni enaka drugi snežinki. Če pogledamo od daleč pa lahko rečemo, da so si snežinke podobne. Za stavbe velja enako. Ob določenih predpostavkah lahko posamezne stavbe združimo v skupine in jih predstavimo s tipičnimi stavbami. Tipična stavba neke skupine stavb je nekakšne povprečen približek vsem stavbam v tej skupini. Na tak način lahko vse stavbe razvrstimo v skupine in za vsako skupino določimo tipično stavbo. Takrat smo oblikovali tipologijo stavb.

Razvrščanje stavb v skupine lahko naredimo za različne namene. Poznamo arhitektonsko tiplologijo stavb, tipologijo stavb glede na namembnost, tiplogijo stavb za klasifikacijo gradenj, ipd. Mi obravnavamo tipologijo energetske učinkovitosti stavb. Stavbe smo razvrstili v skupine tako, da imajo stavbe v skupini podobno energetsko učinkovitost.

Dve različni stavbi, ena v Ljubljani, druga na Jesenicah.

Tipologije stavb v Sloveniji

Sodobni trendi oblikovanja tipologije stavb vključujejo vedno več kazalnikov stavb, kot so geometrijski, strukturni in energijski. V preteklosti se je pojavilo že več poizkusov izgraditve tipologij, ki pa so bile uporabljene za različne namene – preverjanje energetske sanacije, statistične kategorizacije stavb in preverjanje emisij ogljikovega dioksida. Med pomembnejšimi je bila sredi 90-ih opravljena študija, ki se je koncentrirala na energetsko sanacijo stavb (Boštjančič, J., Brezar, V., Zupančič, D. 1993).

Tipologija stavb, ki temelji na statični kategorizaciji

Statistični urad Republike Slovenije vsako leto opravi raziskavo gradbenih del v stanovanjskem in nestanovanjskem sektorju. Tipologije so namenjeni klasifikaciji gradenj in preglednica 1 nazorno prikazuje tako strukturiranje med leti 1962 in 1979, in za vsako kategorijo je navedeno število stavb, površina in volumen (R – stanovanjske stavbe, A – administrativne stavbe, C – kulturne/izobraževalne stavbe, M – zdravstvene stavbe, PC – stavbe povezane s fizično kulturo, O – druge javne stavbe, I – industrijske stavbe, E – druge stavbe v ekonomskem sektorju). Tabela 2 prikazuje zadnjo narejeno tipologijo novogradenj za leto 2010, v primerjavi z 2009. V Sloveniji so v letu 2010 dokončali nekaj manj kot 5.200 stavb ali skoraj 300 stavb manj kot leta 2009, in pridobili 2,2 milijona m^2 novih površin ali za 17 % manj kot v prejšnjem letu.

Preglednica 1: Frekvenca gradenj glede na statistično kategorizacijo za leto 2009 in 2010 (Vir: SURS)

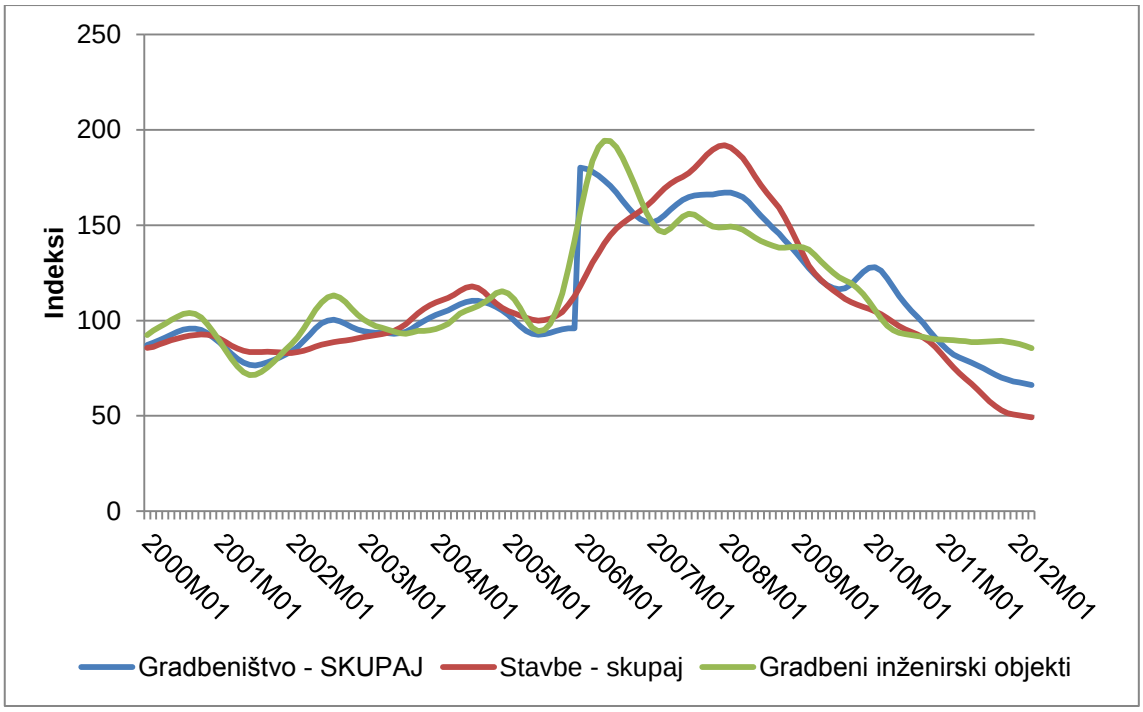
	Skupaj		Nove stavbe		Sprememba namembnosti stavb	
	število	m^2	število	m^2	število	m^2
2009						
Stavbe skupaj	5448	2711602	5300	2645706	148	65896
Stanovanjske stavbe	4.235	1.626.025	4.162	1.594.008	73	29.017
enostanovanjske stavbe	3.645	929.000	3.596	917.396	49	11.604
večstanovanjske stavbe	571	667.350	550	651.647	21	15.703
stavbe za posebne namene	19	29.675	16	27.965	3	1.710
Nestanovanjske stavbe	1.213	1.085.577	1.138	1.048.698	75	36.879
2010						
Stavbe skupaj	5.182	2.243.707	5.040	2.186.725	142	56.892
Stanovanjske stavbe	4.090	1.331.875	4.021	1.309.109	69	22.766
enostanovanjske stavbe	3.715	934.186	3.663	921.987	52	12.199
večstanovanjske stavbe	358	349.107	343	339.675	15	9.432
stavbe za posebne namene	17	48.582	15	47.447	2	1.135
Nestanovanjske stavbe	1.092	911.832	1.019	877.616	73	34.216

Preglednica 2: Frekvenca gradenj glede na statistično kategorizacijo med leti 1962 - 1979

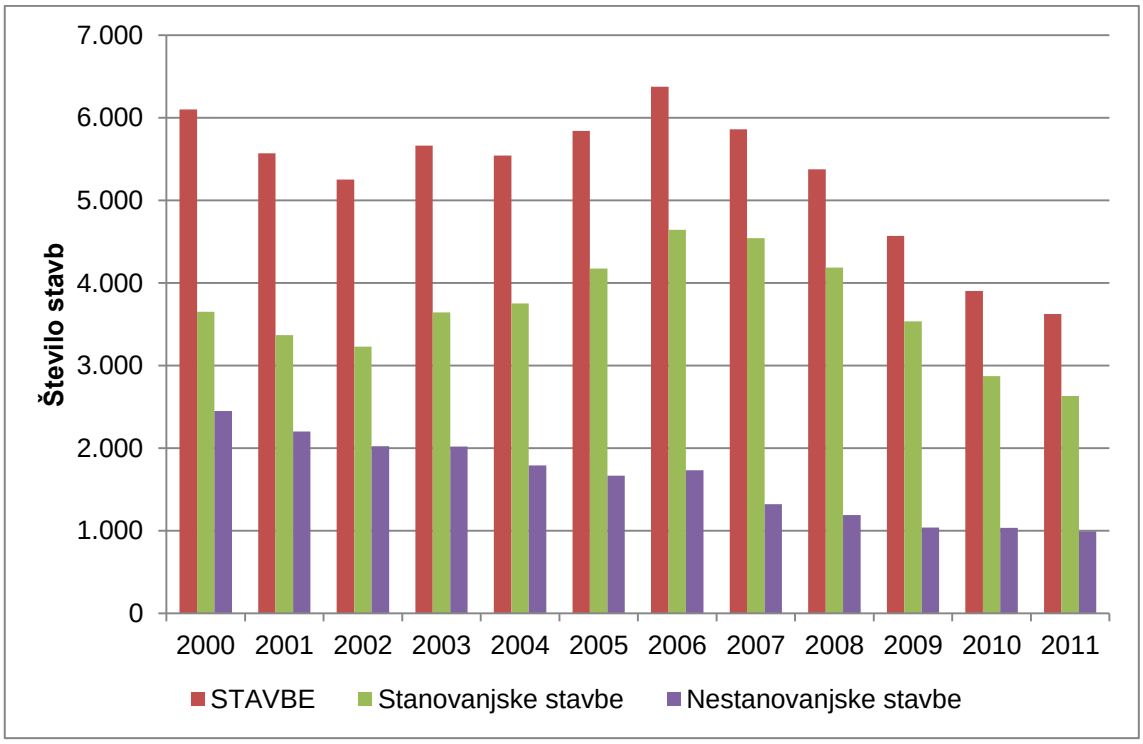
YEAR	UNIT	R	A	C	M	PC	O	I	E
1962	nr	2.693	19	41	23	6	87	61	44
	m^2	919.000	22.000	101.000	24.000	2.000	32.000	-	-
	m^3	2.767.000	76.000	384.000	80.000	7.000	91.000	-	-
1963	nr	2.657	28	43	26	4	82	75	93
	m^2	-	-	-	-	-	-	-	-
	m^3	-	-	-	-	-	-	-	-
1964	nr	2.611	13	39	15	6	95	89	41
	m^2	-	-	-	-	-	-	-	-
	m^3	-	-	-	-	-	-	-	-
1965	nr	3.255	18	37	16	5	125	91	47
	m^2	-	-	-	-	-	-	-	-
	m^3	-	-	-	-	-	-	-	-
1966	nr	3.840	14	40	19	8	248	51	93
	m^2	1.038.000	4.000	91.000	24.000	4.000	20.000	71.000	53.000
	m^3	3.086.000	22.000	400.000	87.000	21.000	73.000	452.000	224.000
1967	nr	3.866	7	27	9	5	312	87	178
	m^2	1.011.000	5.000	44.000	55.000	1.000	54.000	150.000	82.000
	m^3	2.959.000	15.000	168.000	199.000	7.000	131.000	940.000	335.000
1968	nr	3.849	11	26	8	7	352	78	142
	m^2	958.000	7.000	44.000	14.000	3.000	26.000	83.000	141.000
	m^3	2.727.000	18.000	179.000	54.000	19.000	72.000	462.000	678.000
1969	nr	4.485	12	40	13	22	171	141	165
	m^2	1.076.000	3.000	53.000	8.000	5.000	15.000	230.000	111.000
	m^3	3.154.000	9.000	103.000	25.000	15.000	41.000	1.440.000	413.000
1970	nr	4.926	7	35	5	18	91	182	186
	m^2	1.167.000	15.000	51.000	3.000	4.000	30.000	269.000	172.000
	m^3	3.260.000	53.000	196.000	32.000	6.000	96.000	1.649.000	594.000
1971	nr	4.825	8	36	7	32	93	220	174
	m^2	1.332.000	19.000	110.000	11.000	11.000	17.000	416.000	245.000
	m^3	3.950.000	346.000	370.000	72.000	39.000	42.000	2.634.000	935.000
1972	nr	4.537	16	36	7	23	238	292	128
	m^2	1.281.000	16.000	86.000	7.000	6.000	44.000	333.000	147.000
	m^3	4.423.000	60.000	372.000	66.000	22.000	134.000	2.122.000	659.000
1973	nr	4.885	16	34	7	16	121	181	116
	m^2	1.364.000	22.000	70.000	23.000	13.000	30.000	350.000	124.000
	m^3	4.017.000	82.000	300.000	108.000	84.000	92.000	2.148.000	589.000
1974	nr	5.029	26	43	21	12	50	268	189
	m^2	1.586.000	35.000	63.000	23.000	7.000	13.000	556.000	69.000
	m^3	4.017.000	67.000	254.000	57.000	50.000	48.000	3.250.000	296.000
1975	nr	5036	26	43	15	28	46	238	83
	m^2	1.786.000	39.000	52.000	59.000	26.000	36.000	550.000	74.000
	m^3	5.578.000	186.000	215.000	241.000	126.000	208.000	3.377.000	445.000
1976	nr	4.904	16	31	17	13	19	235	105
	m^2	2.049.000	17.000	48.000	51.000	30.000	14.000	528.000	953.000
	m^3	5.820.000	61.000	207.000	211.000	166.000	33.000	4.907.000	9.310.000
1977	nr	5.625	25	39	15	12	52	199	90
	m^2	1.787.000	29.000	130.000	11.000	16.000	33.000	366.000	152.000
	m^3	5.609.000	82.000	542.000	40.000	101.000	125.000	2.712.000	567.000
1978	nr	4.962	24	36	12	15	63	165	86
	m^2	1.570.000	39.000	78.000	65.000	22.000	112.000	354.000	56.000
	m^3	5.046.000	141.000	391.000	166.000	172.000	416.000	2.368.000	646.000
1979	nr	5680	33	38	25	9	75	182	88
	m^2	1.790.000	40.000	90.000	79.000	5.000	127.000	462.000	122.000

SURS opravlja raziskave tudi o številu stavb, za katere so bila izdana gradbena dovoljenja in vrednostih novih pogodb v Sloveniji. Vrednost novih pogodb januarja 2012 v primerjavi z januarjem 2011 znižala za 38,6 %. Vrednost novih pogodb za gradnjo stavb je nižja za 73,5 % (predvsem zaradi stanovanjskih stavb), medtem ko je vrednost novih pogodb za gradnjo inženirskih objektov višja za 9,9 %. V letu 2011 je

bilo izdanih 3635 gradbenih dovoljenj za stavbe, od tega 2633 (to je 72,4 %) za gradnjo stanovanjskih stavb, katerih investitorji so bile večinoma fizične osebe (88,5 %). Takšna kategorizacija nam omogoča napovedi o rasti oz. zniževanju vrednosti gradbenih del v stanovanjskem in nestanovanjskem sektorju.



Grafikon 1: Trend vrednosti novih pogodb, Slovenija, 2000-2012 (Vir: SURS)



Grafikon 2: Število stavb, za katera so bila izdana gradbena dovoljenja, Slovenija 2000-2011 (Vir: SURS)

Tipologija za pregled energije in vsebovanosti ogljikovega dioksida

Druga izdelana tipologija stavb v Republiki Sloveniji se uporabljala za študijo Kjotskega CO_2 in nacionalnega EEAP (Energy Efficiency Action Plan). Stanovanjske stavbe so bile razdeljene v dve geometrijsk tipologiji - enodružinske hiše in stanovanjske bloke.

Vsaka od teh arhitekturnih tipologij je bila nadalje razdeljena glede na leto izgradnje. V naslednjem koraku je bila ločitev narejena glede na stopnjo prenove ali stopnjo začetne izolativnosti. Zastopanost posameznih tipov objektov je izhajala iz statističnih virov.

Analiza obstoječega stanovanjskega stavbnega fonda

S projektom »Energetska sanacija obstoječih stanovanjskih zgradb« (Boštjančič, J., Brezar, V., Zupančič, D. 1993) se je zaznamoval pričetek k organiziranemu pristopu k energetski sanaciji obstoječih stanovanjskih zgradb v Republiki Sloveniji.

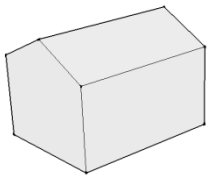
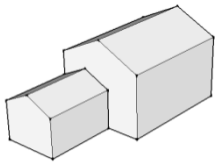
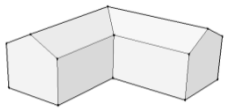
V prvem koraku je bila izdelana tipološka analiza obstoječih stanovanjskih stavb. Stavbni fond je bil najprej razdeljen glede na različne arhitekturne zasnove (preglednica 1–8). Nato je bil v narejen pregled zastopanosti posameznih tipov stavb. Osnova za ta pregled je bil popis iz leta 1991. V nadaljnjo analizo so bile zajete le stavbe zgrajene pred 1980. To leto ustreza nacionalnemu standardu s strožjimi pogoji glede toplotnih lastnostih stavbe gradbenih delov konstrukcij in energetske učinkovitosti stavbe. Za 18 tipskih stavb (Preglednica 9 –26) je bilo upoštevano, da niso izolirane in za vsako je bil nato predlagan plan prenove, ki je obsegal le ovoj stavbe. Razlika v rabi energije med tema dvema scenarijema (osnovni + prenova) ustreza prihrankom energije, ki so bile nato izračunane na nacionalni ravneh. Na podlagi primerjave izračunanih energetskih prihrankov in ocenjenih stroškov energetske sanacije je bila v končni fazi izdelana analiza ekonomska upravičenost vlaganj v sanacijo.

Tipologija stanovanjskih objektov je del splošne arhitekturne tipologije, ki se ravna po lastnih pravilih in kriterijih (Boštjančič,1993). Za potrebe tega projekta so bili ti kriteriji poenostavljeni in ustrezno prilagojeni. Ti kriteriji so:

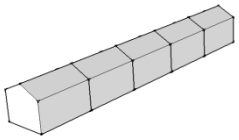
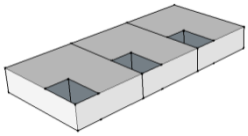
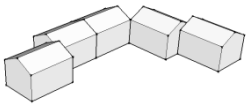
- **Kriterij tlorisne oblike**: od idealnega kvadrata do neugodnih razgibanih in lomljenih oblik
- **Kriterij volumenske oblike**: od idealne kocke do razgibanih prizem in stopničastih zgradb
- **Kriterij kompaktnosti zazidave**: od prostostoječih zgradb do neprekinjenih nizov

Na naslednjih straneh je shematsko prikazana obravnavana tipologija stavb.

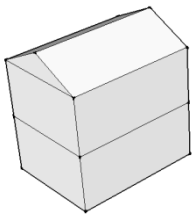
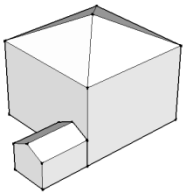
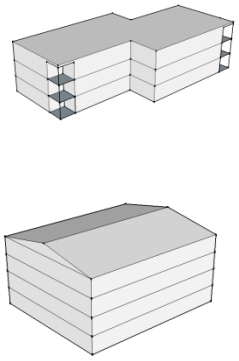
Preglednica 3: Arhitekturna zasnova prostostoječe enodružinske hiše

ENODRUŽINSKA HIŠA - PROSTOSTOJEČA		
Enostavna kompaktna oblika	Nepravilnost v horizontalnem in vertikalnem gabaritu	Posebne oblike (npr. L-oblika)
		

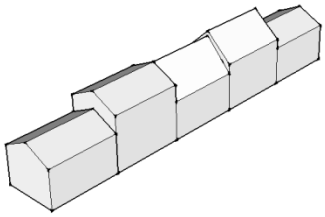
Preglednica 4: Arhitekturna zasnova enodružinske hiše v strnjeni obliki pozidave

ENODRUŽINSKA HIŠA V STRNJENI OBLIKI POZIDAVE		
Vrstna hiša	Atrijska hiša	Druge oblike pozidave (npr. grozd, veriga, terase)
		

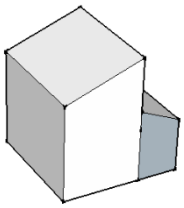
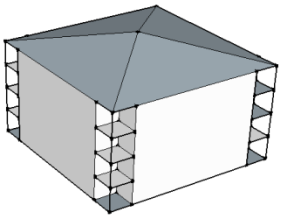
Preglednica 5: Arhitekturna zasnova prostostoječega večstanovanjskega objekta

VEČSTANOVANJSKI OBJEKT - PROSTOSTOJEČI		
4 ali 6 stanovanjske hiše	Vila	Vila-blok
		

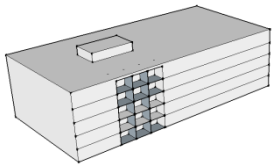
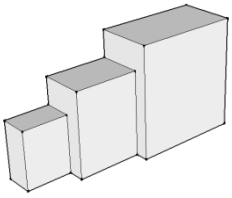
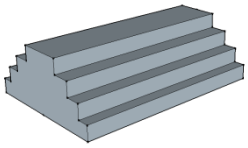
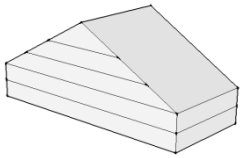
Preglednica 6: Arhitekturna zasnova večstanovanjskega objekta v nizu

VEČSTANOVANJSKI OBJEKT V NIZU
Hiše do P+3


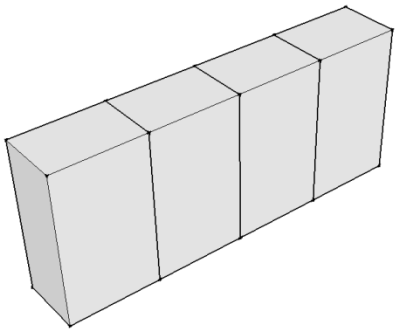
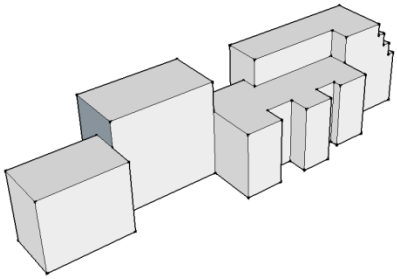
Preglednica 7: Arhitekturna zasnova stolpiča

STOLPIČ	
Objekti do P+5	
	

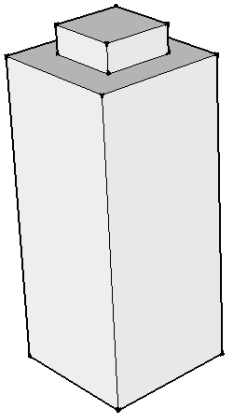
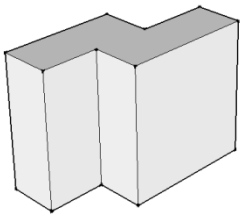
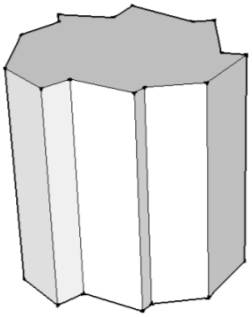
Preglednica 8: Arhitekturna zasnova prostostoječega stanovanjskega bloka

STANOVANJSKI BLOK - PROSTOSTOJEČI		
Enostavna prizmatična oblika	Zamik v horizontalnem in vertikalnem gabaritu	Posebne oblike (npr. terasni blok)
		 

Preglednica 9: Arhitekturna zasnova stanovanjskega bloka v nizu

STANOVANJSKI BLOK V NIZU	
Enostavna prizmatična oblika	Zamik v horizontalnem in vertikalnem gabaritu
	

Preglednica 10: Arhitekturna zasnova stolpnice

STOPLNICA		
Enostavne kompaktne oblike tlorisa	Zamik v horizontalnem gabaritu	Posebne oblike
		

Tipologija stavb TABULA

Tipologija stavb je razvrščanje stavb v razrede s podobnimi, najbolj pogostimi lastnostmi.
Tipologija stavb TABULA izdelana v letih od 2009 do 2012 temelji na energijskih lastnostih stanovanjskih stavb. Tipične stavbe predstavljajo najpogostejše stavbe v državi glede na leto izgradnje, velikost, toplotno zaščito in vgrajene sisteme.
Stavbe so razvrščene v razrede glede na lastnosti, ki vplivajo na rabo energije za ogrevanje, prezračevanje in pripravo tople vode. Kaj je tipologija stavb?

Glavna delitev je glede na:

- **kdaj je bila stavba zgrajena**: razdelitev stavbnega fonda na različne starostne razrede, meje med starostnimi razredi sovpadajo s spremembo področne zakonodaje, ki predpisuje energetske lastnosti stavb,
- **velikost stavbe**: razdelitev stavbnega fonda na različne velikostne razrede (npr.: enodružinska hiša, vrstna hiša, večstanovanjska stavba, itd.).

Ta dva razreda predstavljata dve koordinatni osi matrike tipologije stavb. Poleg glavne razdelitve, pa lahko stavbe razdelimo še na:

- **vrste in starosti vgrajenih sistemov za oskrbo z energijo**: leto vgradnje, vrsta ogrevalnega sistema, način priprave tople vode, ipd. To je obravnavano kot podrazred tipologije sistemi,
- **lokacije stavbe**: lastnosti stavb, ki vplivajo na rabo energije, so med evropskimi regijami zelo različne. Ta razlika bo zajeta znotraj državnih tipologij. Države, ki imajo večje število klimatskih con, bodo lahko izdelale tipologijo za posamezno regijo v podrazredu posebni primeri.

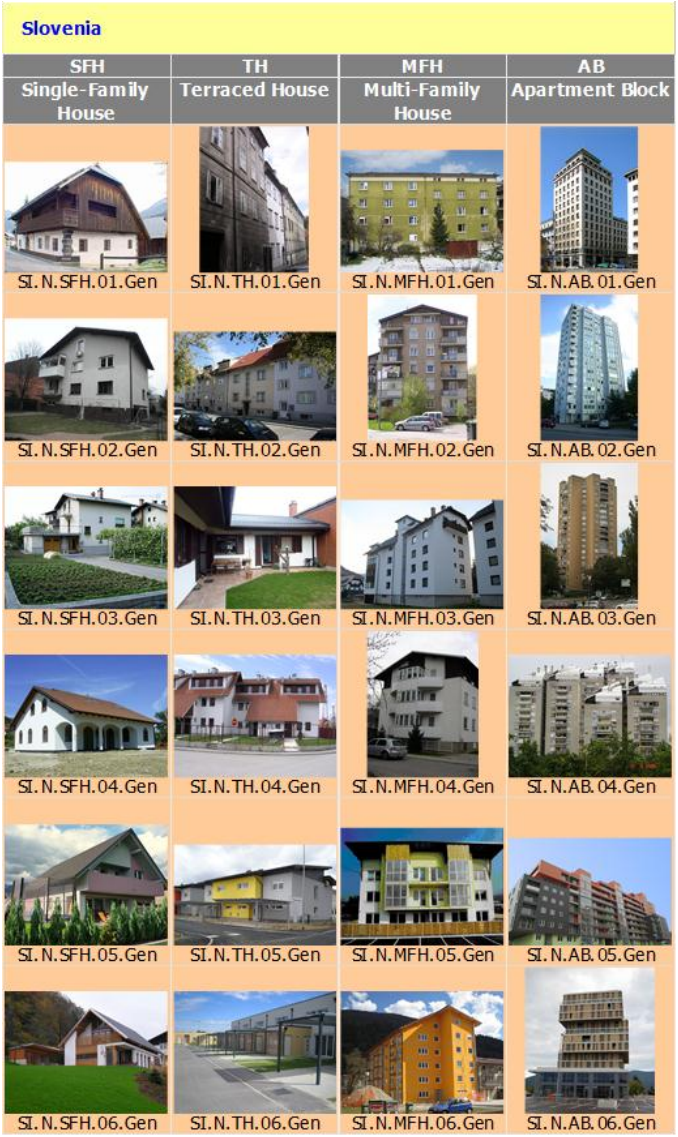
Tipologijo smo zgradili tako, da smo izmed vseh stavb v državi izbrali stavbo, ki predstavlja določen razred (npr.: enodružinska hiša, zgrajena med 1945 in 1960). Taki stavbi se določi vse energijske lastnosti, ki vključujejo tudi vgrajene sisteme.

Stavbne lastnosti:

- splošne: število nadstropij, uporabna površina, itd.
- geometrijske: debeline in površine obodnih konstrukcij, itd.
- toplotno fizikalne lastnosti ovoja: U vrednosti (glede na podrazred »elementi stavbe«)
- vgrajeni sistemi za oskrbo z energijo (glede na podrazred »sistemi«)

Podrazredi:

- Elementi stavbe: U vrednosti strehe, sten, oken, tal glede na leto izgradnje in energijskih ukrepov pri prenovah
- Sistemi: izkoristki sistemov za proizvajanje, shranjevanje in distribucijo energije.



Slika 1: Osnovna matrika tipologije stavb

Tipologijo smo zgradili tako, da smo izmed vseh stavb v državi izbrali stavbo, ki predstavlja določen razred (npr.: enodružinska hiša, zgrajena med 1945 in 1960). Taki stavbi se določi vse energijske lastnosti, ki vključujejo tudi vgrajene sisteme.

Stavbne lastnosti:

- splošne: število nadstropij, uporabna površina, itd.
- geometrijske: debeline in površine obodnih konstrukcij, itd.
- toplotno fizikalne lastnosti ovoja: U vrednosti (glede na podrazred »elementi stavbe«)
- vgrajeni sistemi za oskrbo z energijo (glede na podrazred »sistemi«)

Podrazredi:

- Elementi stavbe: U vrednosti strehe, sten, oken, tal glede na leto izgradnje in energijskih ukrepov pri prenovah
- Sistemi: izkoristki sistemov za proizvajanje, shranjevanje in distribucijo energije.

Tipologijo stavb TABULA lahko uporabljamo za:

1. Za energetsko svetovanje

Tipologijo stavb lahko preko spleta (http://www.gi-zrmk.eu/ensos/) uporablja lastnik stavbe sam ali pa s pomočjo svetovalca v energetski pisarni. Tipologija stavb služi kot izhodišče pri energetskem svatovanju. Svetovalec lastniku stavbe na podobni stavbi predstavi glavne energetske lastnosti stavbe, možne varčevalne ukrepe in njihov učinek. Poleg tega se bo tipologijo lahko uporabljalo za testiranje programske opreme svetoval-cev.

2. Za oceno lokalnega stavbnega fonda

Za stanovanjske fonde, občinske uprave in upravnike večstanovanjskih stavb je tipologija stavb orodje za oceno energijske kvalitete fonda, s katerim upravljajo. S pomočjo tipologije lahko pridobijo mnogo informacij o posameznem tipu stavbe, ki jih nato projicirajo na celoten fond.

3. Za oceno stavbnega fonda na nivoju države

Nacionalna tipologija stavb se lahko uporabi za modeliranje energijske porabe stanovanjskih stavb posamezne države. Za to so potrebni dodatni podatki:

- število posameznih tipov stavb in vgrajenih sistemov (frekvenčne porazdelitve)
- obseg že izvedenih energijsko učinkovitih prenov
- merjena poraba energije stavbnega fonda (za primerjavo z izračunanimi vrednostmi)

Predstavitev tipologije stavb

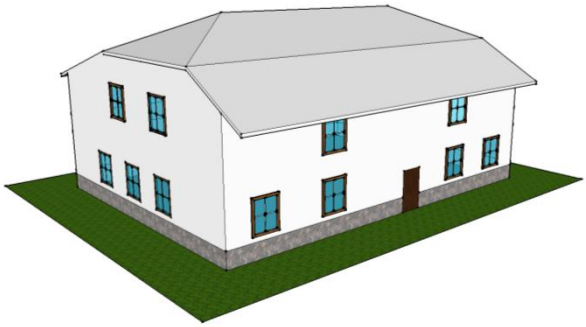
Na naslednjih straneh so predstavljene tipične stavbe iz osnovne matrike tipologije stavb (Slika 1: Osnovna matrika tipologije stavb).

Na prvi strani je shema stavbe in fotografija vzorčne stavbe. Sledi opis zunanjega ovoja stavbe in vgrajenih sistemov.

Na drugi in tretji strani sta prikazani dve celoviti energetski prenovi, zmerna in intenzivna. Prenovi se dotikata celotnega ovoja. Prikazan je vpliv prenove na posamezen element toplotnega ovoja in element vgrajenega sistema.

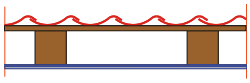
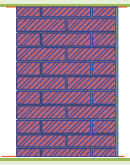
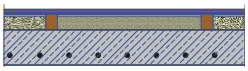
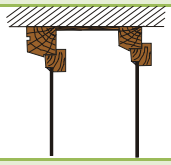
Na zadnji strani vidimo primerjavo med obstoječim stanjem, zmerno prenovo in intenzivno prenovo. Prikazani so glavni energijski kazalniki in energetski razred stavbe po energetski izkaznici stavbe.

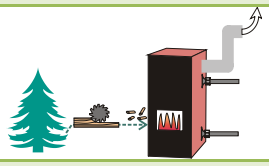
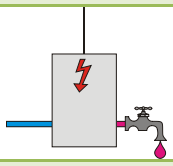
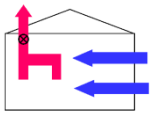
Obdobje pred 1945

ENODRUŽINSKA HIŠA	
Arhitekturna zasnova	**Primer**
	

Država	Slovenija
Regija tipologije	Nacionalna
Zasnova	Preprosta kompaktna oblika
Etažnost	K + P
Leto izgradnje	1945
Uporabna površina	151,00 m^2
Tabula	SI.N.SFH.01.Gen.ReEx.001.00

OPIS STAVBE - OSNOVNO STANJE

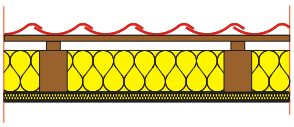
ZUNANJI OVOJ STAVBE				
Sklop	**Streha**	**Stena**	**Tla**	**Okna**
Površina	226,0 m^2	147,0 m^2	226,0 m^2	75,0 m^2
Skica				
OPIS	Leseno ostrešje z ometom na opažu	Naravni kamen z ali brez ometa	Betonska plošča, betonski estrih, lesni pod	Leseno škatlasto okno
U - faktor	2,7 W/(m^2K)	1,5 W/(m^2K)	1,17 W/(m^2K)	2,2 W/(m^2K)

SISTEMI			
Sistem	Sistem za ogrevanje	Sistem za pripravo tople vode	Sistem za prezračevanje
Skica			
Opis	Star kotel na lesno biomaso v neogrevanem prostoru.	Priprava tople vode s stenskim električnim kotličkom.	Brez sistema za mehansko prezračevanje.

ZMERNA PRENOVA ZUNANJEGA OVOJA STAVBE

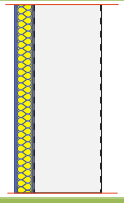
STREHA

Izolacija strehe, 12cm med špirovci, ter dodatnih 4cm



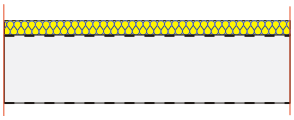
STENA

Dodatno 15 cm toplotne izolacije



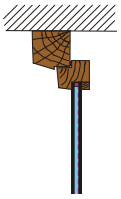
TLA

Dodatno 8 cm toplotne izolacije



OKNA

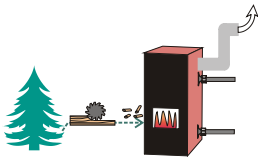
Vgradnja lesenega okna z dvoslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom

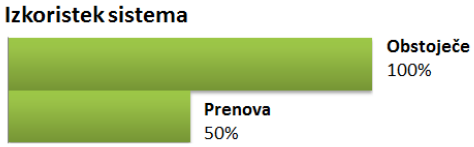


ZMERNA PRENOVA SISTEMOV

Sistem za ogrevanje

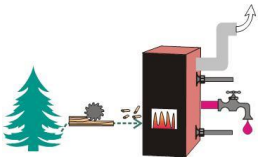
Nov kotel na lesno biomaso v ogrevanem prostoru.

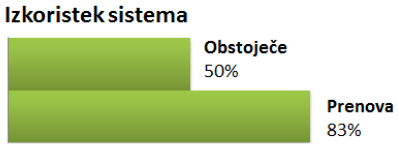




Sistem za pripravo tople vode

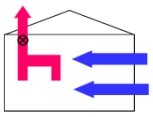
Centralna priprava tople vode kombinirana z ogrevalnim sistemom (star kotel na lesno biomaso). Brez cirkulacije.





Sistem za prezračevanje

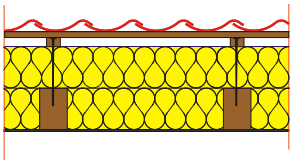
Brez sistema za mehansko prezračevanje.



INTENZIVNA PRENOVA ZUNANJEGA OVOJA STAVBE

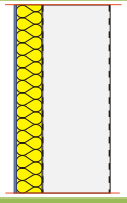
STREHA

Izolacija strehe, 12cm med špirovci, ter dodatnih 18cm



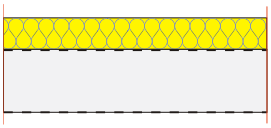
STENA

Dodatno 20 cm toplotne izolacije



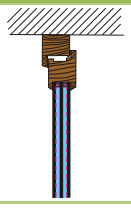
TLA

Dodatno 8 cm toplotne izolacije



OKNA

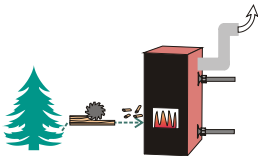
Vgradnja lesenega okna z dvoslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom

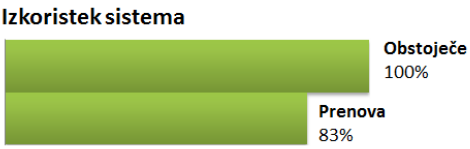


INTENZIVNA PRENOVA SISTEMOV

Sistem za ogrevanje

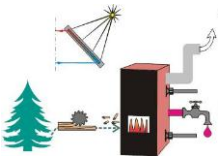
Nov kotel na lesno biomaso v ogrevanem prostoru.

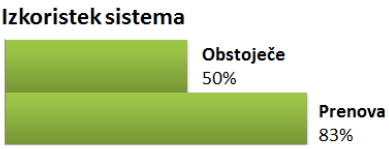




Sistem za pripravo tople vode

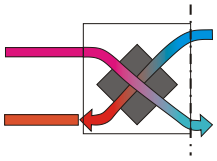
Centralna priprava tople vode kombinirana z ogrevalnim sistemom (nov kotel na lesno biomaso + sprejemniki sončne energije).





Sistem za prezračevanje

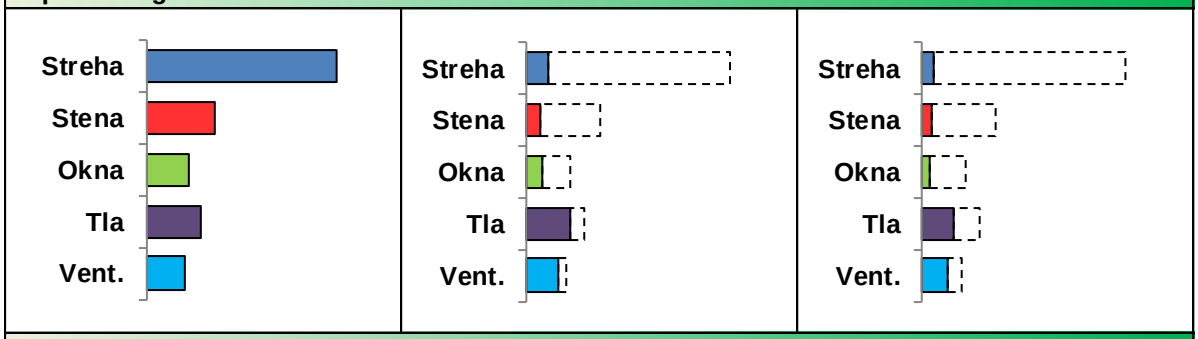
Sistem za mehansko prezračevanje z rekuperacijo toplote zavrženega zraka 80%.



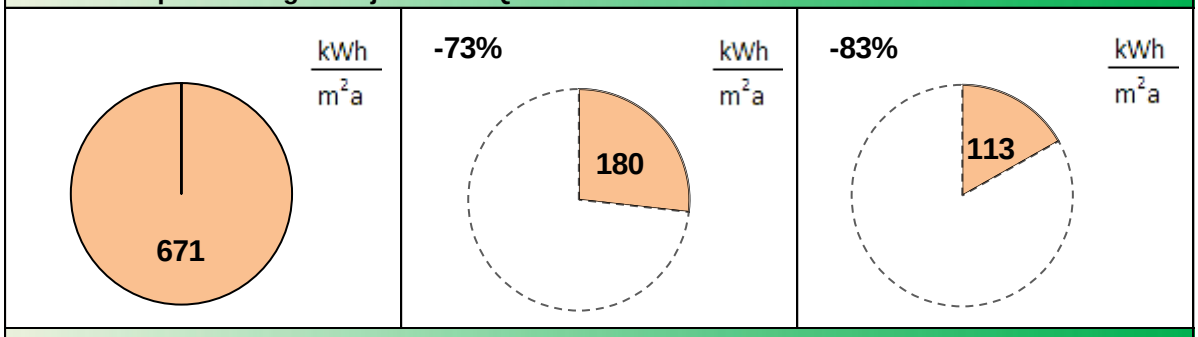
ENERGETSKI KAZALNIKI STAVBE

OSNOVNO STANJE	ZMERNA PRENOVA	INTENZIVNA PRENOVA

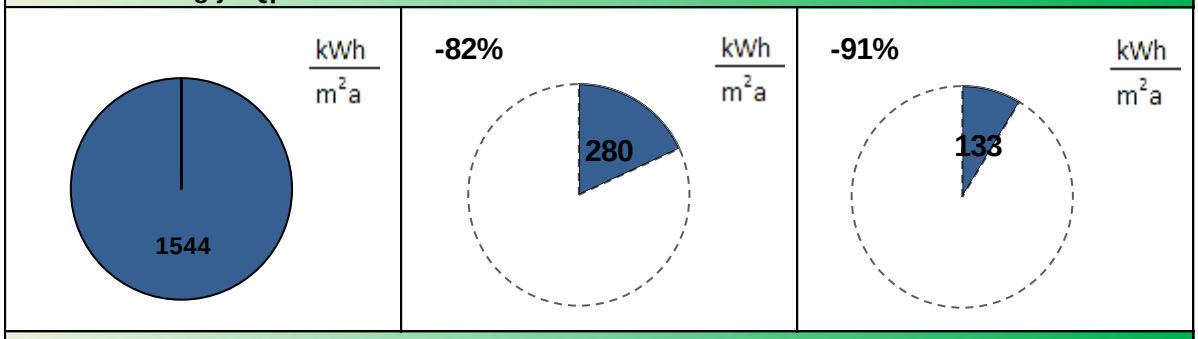
Toplotne izgube stavbe



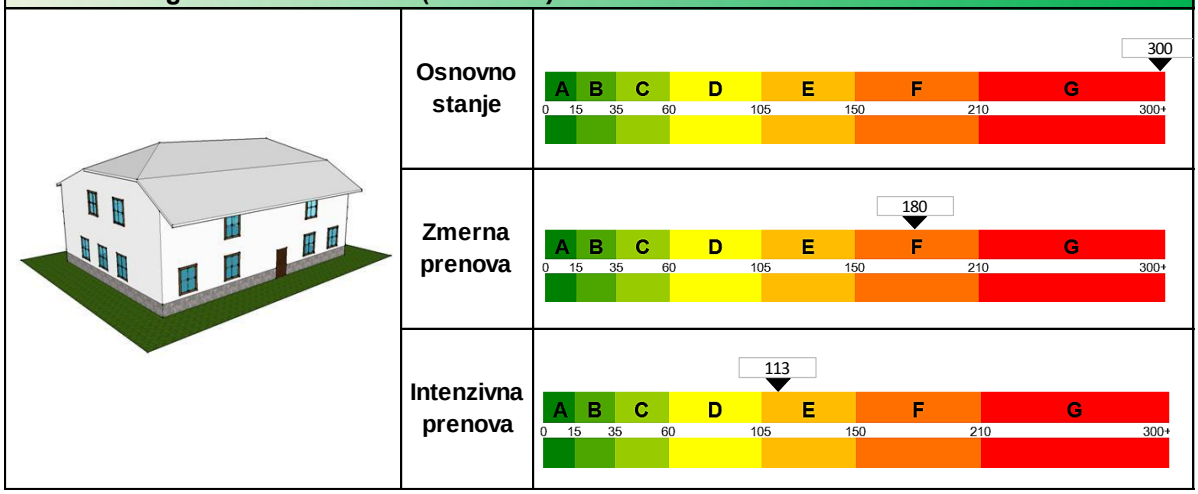
Potrebna toplota za ogrevanje stavbe Qnh



Primarna energija Qp



Razred energetske učinkovitosti (kWh/m²a)



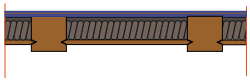
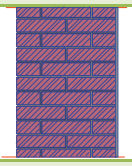
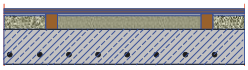
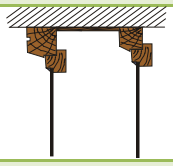
VRSTNA HIŠA

Arhitekturna zasnova	Primer

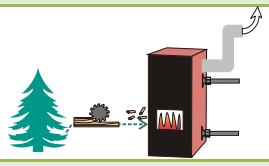
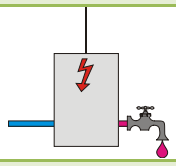
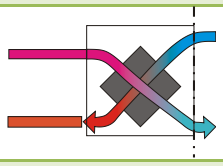
Država	Slovenija
Regija tipologije	Nacionalna
Zasnova	Enodružinska hiša v strnjeni obliki povezave
Etažnost	K + P
Leto izgradnje	1945
Uporabna površina	211,00 m^2
Opis	SI.N.TH.01.Gen.ReEx.001.00

OPIS STAVBE - OSNOVNO STANJE

ZUNANJI OVOJ STAVBE

	Streha	Stena	Tla	Okna
Površina	80,0 m^2	102,0 m^2	80,0 m^2	30,0 m^2
				
OPIS	Lesen tramovni strop, nasutje, bet. estrih, slepi pod	Naravni kamen z ali brez ometa	Betonska plošča, betonski estrih, lesni pod	Leseno škatlasto okno
U - faktor	0,77 W/(m^{2}K)	1,50 W/(m^{2}K)	1,17 W/(m^{2}K)	2,2 W/(m^{2}K)

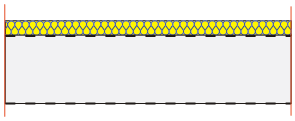
STROJNE INŠTALACIJE

Sistem	Sistem za ogrevanje	Sistem za pripravo tople vode	Sistem za prezračevanje
Skica			
Opis	Star kotel na lesno biomaso v neogrevanem prostoru.	Priprava tople vode s stenskim električnim kotličkom.	Brez sistema za mehansko prezračevanje.

ZMERNA PRENOVA ZUNANJEGA OVOJA STAVBE

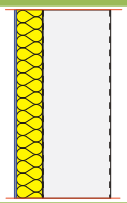
STREHA

Dodatno 8 cm toplotne izolacije



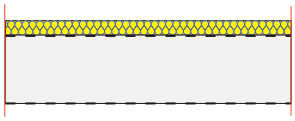
STENA

Dodatno 15 cm toplotne izolacije



TLA

Dodatno 8 cm toplotne izolacije



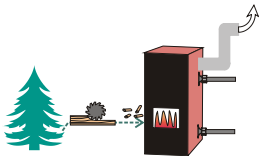
OKNA

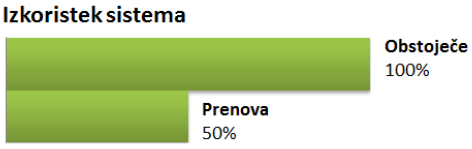
Vgradnja lesenega okna z dvoslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom

ZMERNA PRENOVA SISTEMOV

Sistem za ogrevanje

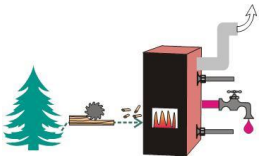
Nov kotel na lesno biomaso v ogrevanem prostoru.

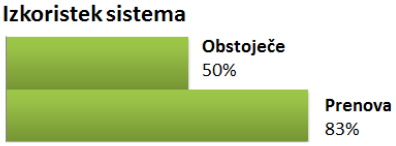




Sistem za pripravo tople vode

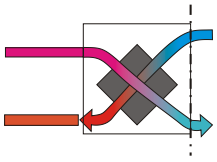
Centralna priprava tople vode kombinirana z ogrevalnim sistemom (star kotel na lesno biomaso). Brez cirkulacije.





Sistem za prezračevanje

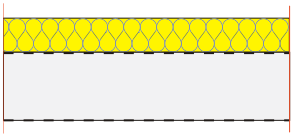
Brez sistema za mehansko prezračevanje.



INTENZIVNA PRENOVA ZUNANJEGA OVOJA STAVBE

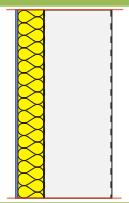
STREHA

Dodatno 20 cm toplotne izolacije



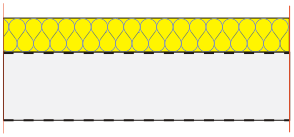
STENA

Dodatno 20 cm toplotne izolacije



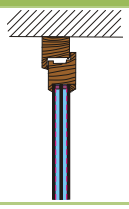
TLA

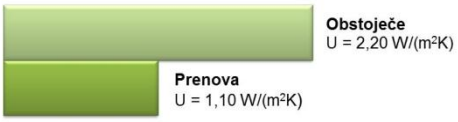
Dodatno 20 cm toplotne izolacije



OKNA

Vgradnja lesenega okna s troslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom

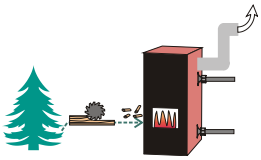


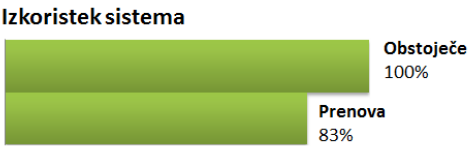


INTENZIVNA PRENOVA SISTEMOV

Sistem za ogrevanje

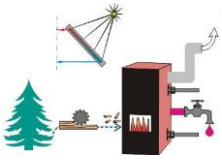
Nov kotel na lesno biomaso v ogrevanem prostoru.

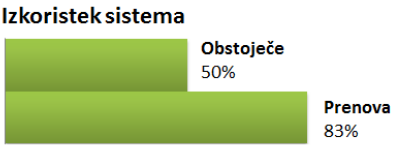




Sistem za pripravo tople vode

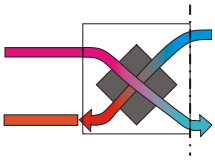
Centralna priprava tople vode kombinirana z ogrevalnim sistemom (nov kotel na lesno biomaso + sprejemniki sončne energije).





Sistem za prezračevanje

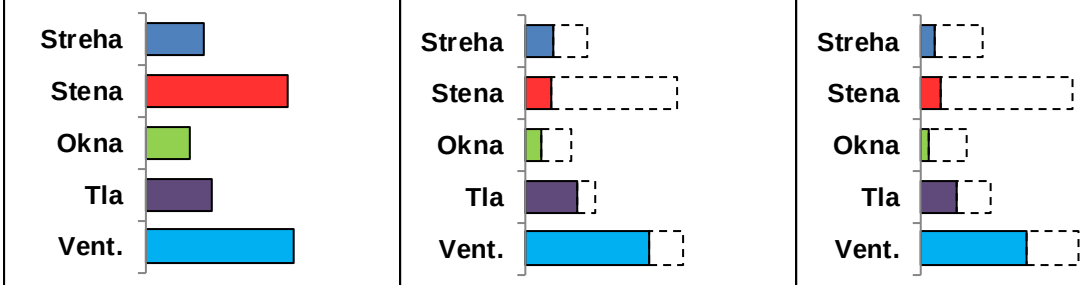
Sistem za mehansko prezračevanje z rekuperacijo toplote zavrženega zraka 80%.



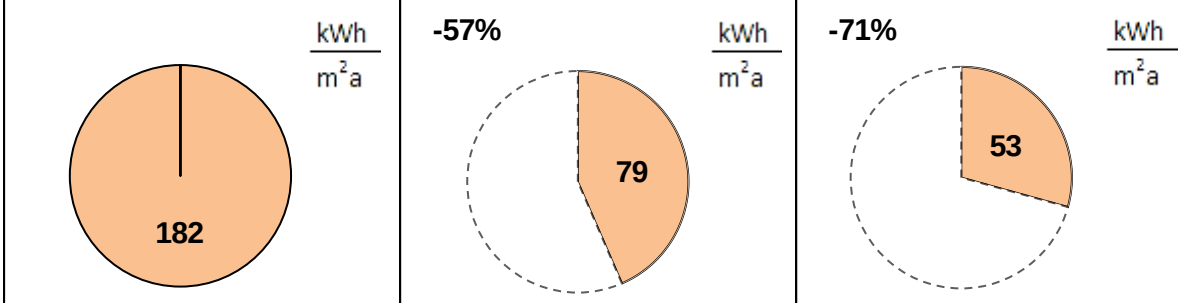
ENERGETSKI KAZALNIKI STAVBE

OSNOVNO STANJE	ZMERNA PRENOVA	INTENZIVNA PRENOVA

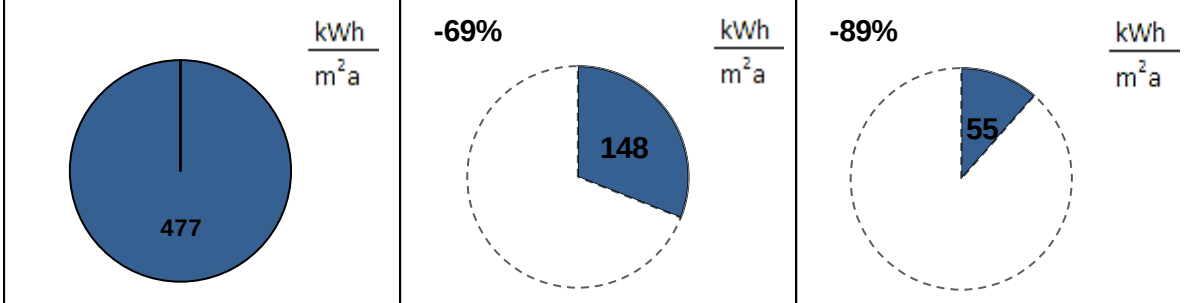
Toplotne izgube stavbe



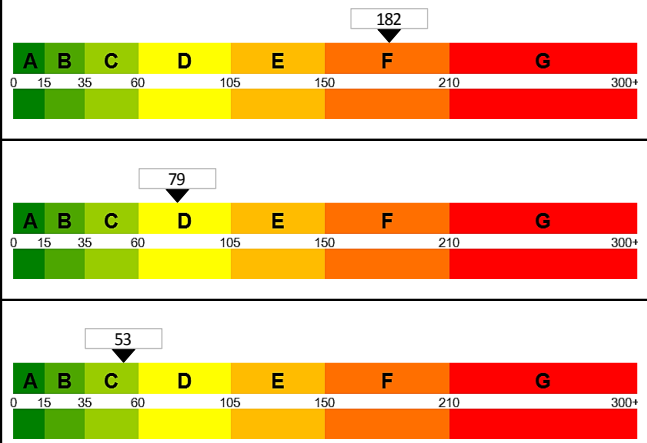
Potrebna toplota za ogrevanje stavbe Qnh



Primarna energija Qp



Razred energetske učinkovitosti (kWh/m²a)



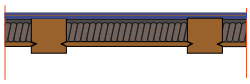
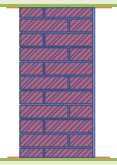
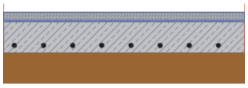
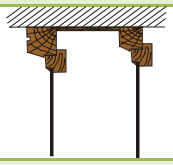
VEČSTANOVANJSKA STAVBA

Arhitekturna zasnova	Primer

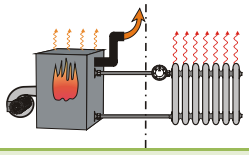
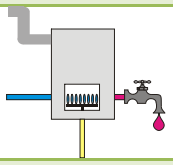
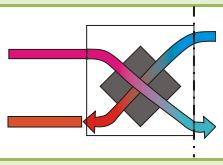
Država	Slovenija
Regija tipologije	Nacionalna
Zasnova	Preprosta kompaktna oblika
Etažnost	
Leto izgradnje	1945
Uporabna površina	1160,00 m^2
Opis	SI.N.MFH.01.Gen.ReEx.001.00

OPIS STAVBE - OSNOVNO STANJE

ZUNANJI OVOJ STAVBE

	Streha	Stena	Tla	Okna
Površina	303,0 m^2	890,0 m^2	297,1 m^2	95,52 m^2
Skica				
OPIS	Lesen tramovni strop, nasutje, bet. estrih, slepi pod	Polna opeka, omet	Betonski tlak 30 cm z ali brez estriha	Leseno škatlasto okno
U - faktor	0,77 W/(m^2K)	1,50 W/(m^2K)	1,46 W/(m^2K)	2,20 W/(m^2K)

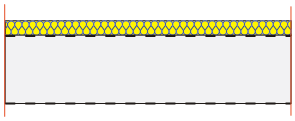
SISTEMI

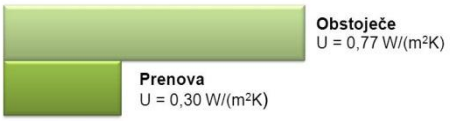
Sistem	Sistem za ogrevanje	Sistem za pripravo tople vode	Sistem za prezračevanje
Skica			
Opis	Viskotemperaturni standardni kotel ELKO v kotlovnici s hranilnikom, razvod je deloma v neogrevanem, deloma v ogrevanem prostoru.	Priprava tople vode s stenskim plinskim kotličkom.	Brez sistema za mehansko prezračevanje.

ZMERNA PRENOVA ZUNANJEGA OVOJA STAVBE

STREHA

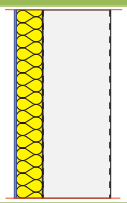
Dodatno 8 cm toplotne izolacije





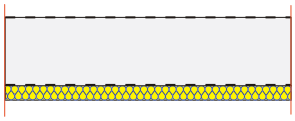
STENA

Dodatno 15 cm toplotne izolacije



TLA

Dodatno 6 cm toplotne izolacije proti kleti



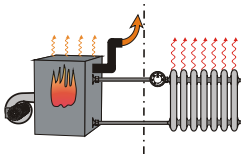
OKNA

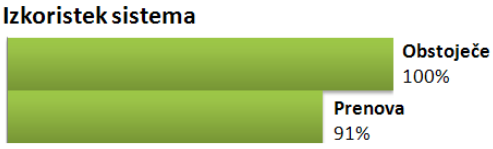
Vgradnja lesenega okna z dvoslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom

ZMERNA PRENOVA SISTEMOV

Sistem za ogrevanje

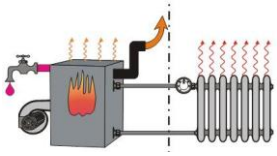
Nizkotemperaturni kotel v ogrevani kotlovnici, razvod znotraj ogrevanega prostora.

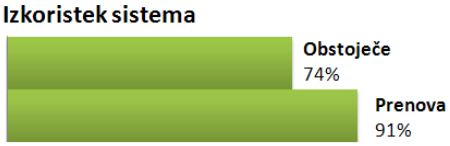




Sistem za pripravo tople vode

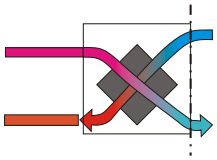
Centralna priprava tople vode kombinirana z ogrevalnim sistemom (nizkotemperaturni kotel). S cirkulacijo.





Sistem za prezračevanje

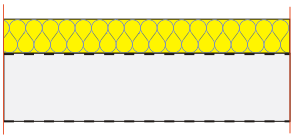
Brez sistema za mehansko prezračevanje.



INTENZIVNA PRENOVA ZUNANJEGA OVOJA STAVBE

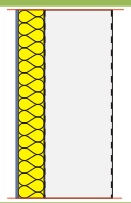
STREHA

Dodatno 20 cm toplotne izolacije



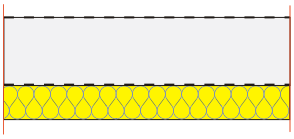
STENA

Dodatno 20 cm toplotne izolacije



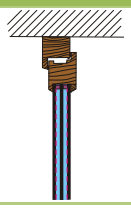
TLA

Dodatno 12 cm toplotne izolacije proti kleti



OKNA

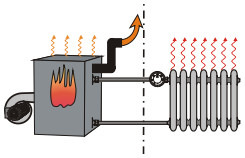
Vgradnja lesenega okna s troslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom



INTENZIVNA PRENOVA SISTEMOV

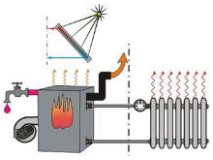
Sistem za ogrevanje

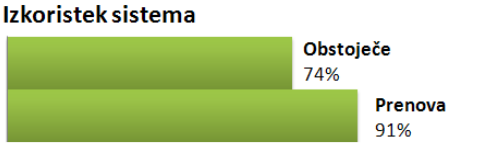
Nizkotemperaturni kotel v ogrevani kotlovnici, razvod znotraj ogrevanega prostora.



Sistem za pripravo tople vode

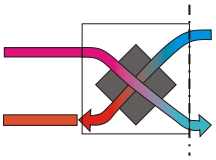
Centralna priprava tople vode kombinirana z ogrevalnim sistemom (nizkotemperaturni kotel + sprejemniki sončne energije). S cirkulacijo.





Sistem za prezračevanje

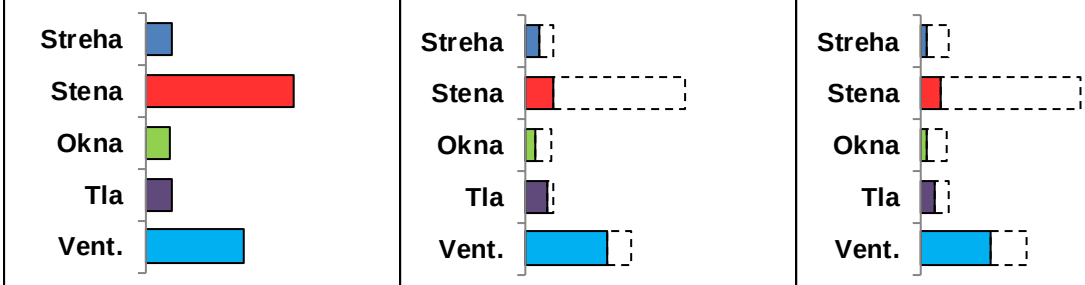
Brez sistema za mehansko prezračevanje.



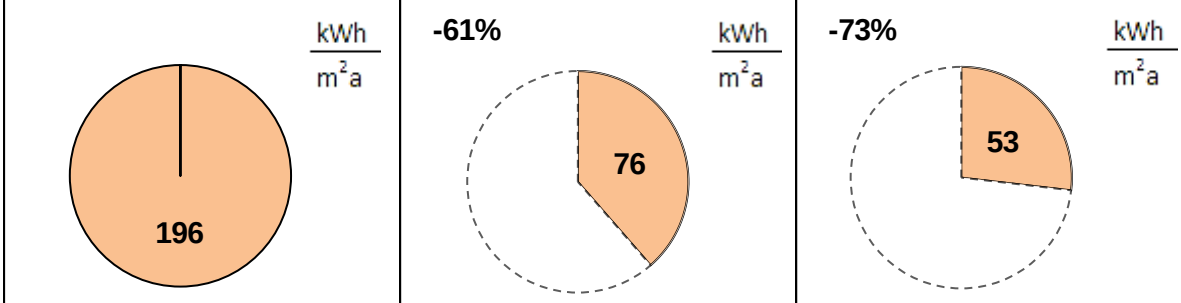
ENERGETSKI KAZALNIKI STAVBE

OSNOVNO STANJE	ZMERNA PRENOVA	INTENZIVNA PRENOVA

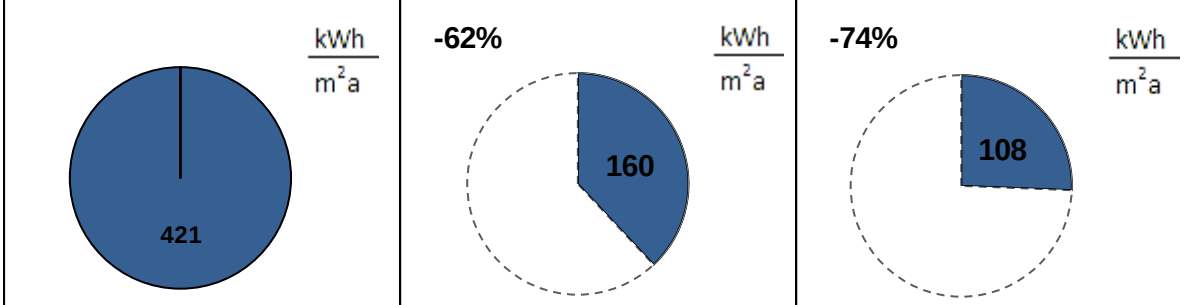
Toplotne izgube stavbe



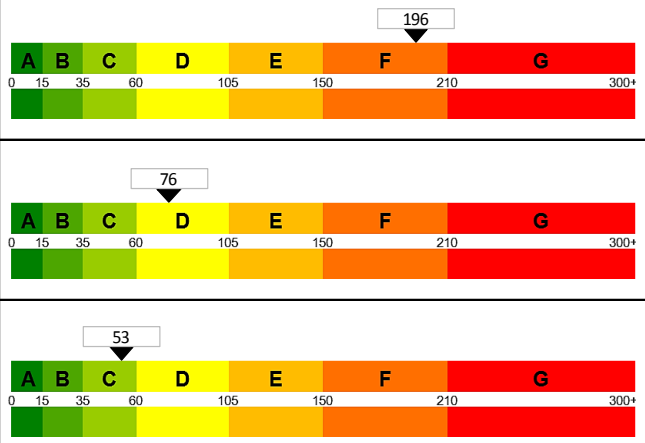
Potrebna toplota za ogrevanje stavbe Qnh



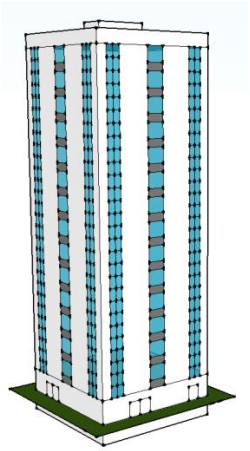
Primarna energija Qp



Razred energetske učinkovitosti (kWh/m²a)



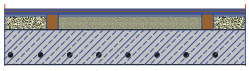
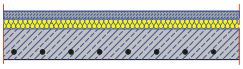
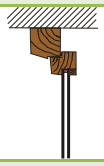
STANOVANJSKI BLOK - STOLPNICA

Arhitekturna zasnova	Primer
	

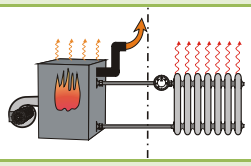
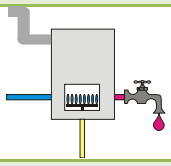
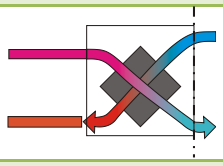
Država	Slovenija
Regija tipologije	Nacionalna
Zasnova	Preprosta kompaktna oblika
Etažnost	
Leto izgradnje	1945
Uporabna površina	2627,00 m^2
Opis	SI.N.AB.01.Gen.ReEx.001.00

OPIS STAVBE - OSNOVNO STANJE

ZUNANJI OVOJ STAVBE

	Streha	Stena	Tla	Okna
Površina	220,0 m^2	1929,0 m^2	220,0 m^2	500,0 m^2
Skica				
OPIS	Betonska plošča, betonski estrih, lesni pod	Betonska stena	Betonska plošča, toplotna izolacija 2 cm, betonski estrih, lesni pod	Lesno okno z dvojno zasteklitvijo
U - faktor	1,8 W/(m^{2}K)	2,8 W/(m^{2}K)	0,77 W/(m^{2}K)	2,8W/(m^{2}K)

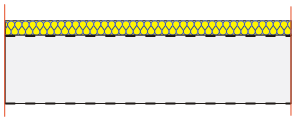
SISTEMI

Sistem	Sistem za ogrevanje	Sistem za pripravo tople vode	Sistem za prezračevanje
Skica			
Opis	Viskotemperaturni standardni kotel ELKO v kotlovnici s hranilnikom, razvod je deloma v neogrevanem, deloma v ogrevanem prostoru.	Priprava tople vode s stenskim plinskim kotličkom.	Brez sistema za mehansko prezračevanje.

ZMERNA PRENOVA ZUNANJEGA OVOJA STAVBE

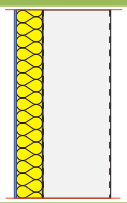
STREHA

Dodatno 8 cm toplotne izolacije



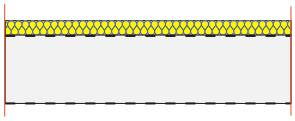
STENA

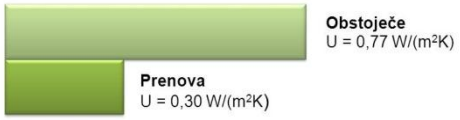
Dodatno 15 cm toplotne izolacije



TLA

Dodatno 20 cm toplotne izolacije





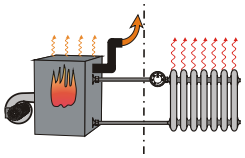
OKNA

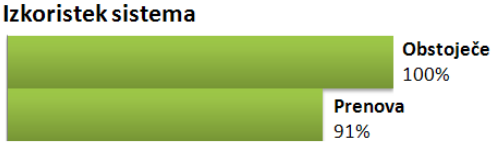
Vgradnja lesenega okna z dvoslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom

ZMERNA PRENOVA SISTEMOV

Sistem za ogrevanje

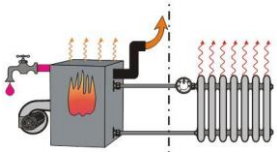
Nizkotemperaturni kotel v ogrevani kotlovnici, razvod znotraj ogrevanega prostora.

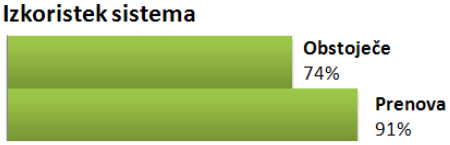




Sistem za pripravo tople vode

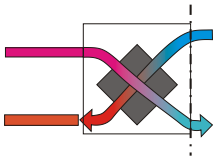
Centralna priprava tople vode kombinirana z ogrevalnim sistemom (nizkotemperaturni kotel). S cirkulacijo.





Sistem za prezračevanje

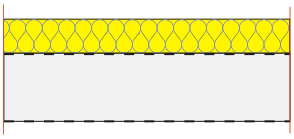
Brez sistema za mehansko prezračevanje.



INTENZIVNA PRENOVA ZUNANJEGA OVOJA STAVBE

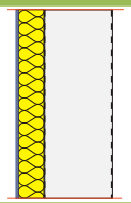
STREHA

Dodatno 20 cm toplotne izolacije



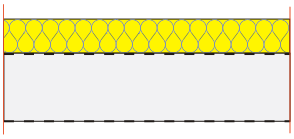
STENA

Dodatno 20 cm toplotne izolacije



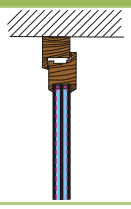
TLA

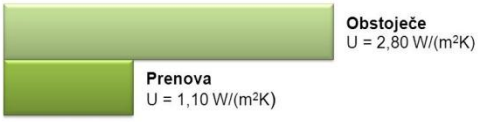
Dodatno 20 cm toplotne izolacije



OKNA

Vgradnja lesenega okna s troslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom

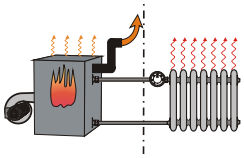




INTENZIVNA PRENOVA SISTEMOV

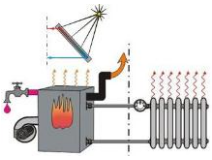
Sistem za ogrevanje

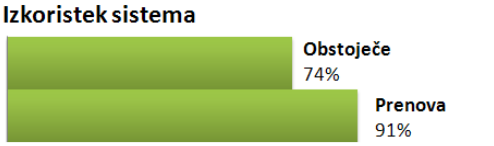
Nizkotemperaturni kotel v ogrevani kotlovnici, razvod znotraj ogrevanega prostora.



Sistem za pripravo tople vode

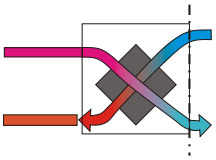
Centralna priprava tople vode kombinirana z ogrevalnim sistemom (nizkotemperaturni kotel + sprejemniki sončne energije). S





Sistem za prezračevanje

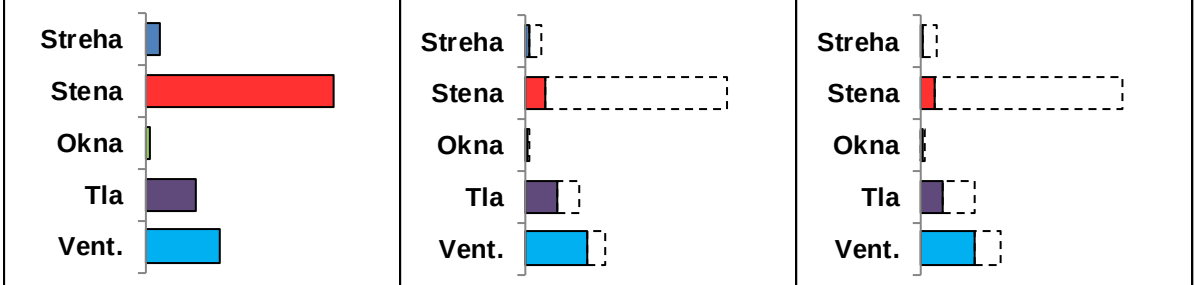
Brez sistema za mehansko prezračevanje.



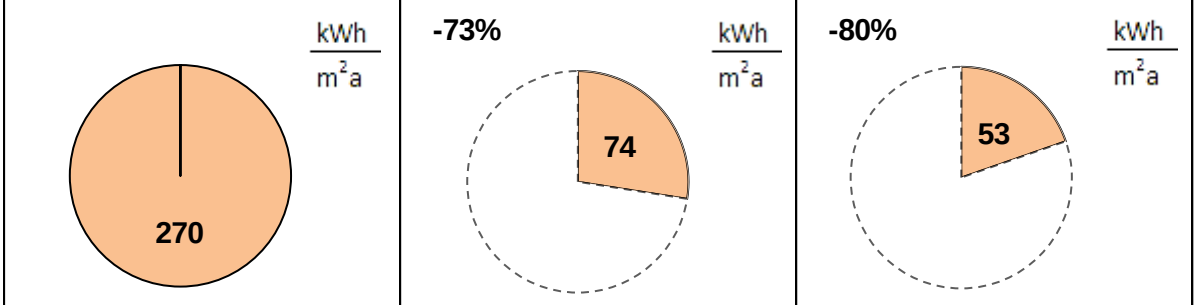
ENERGETSKI KAZALNIKI STAVBE

OSNOVNO STANJE	ZMERNA PRENOVA	INTENZIVNA PRENOVA

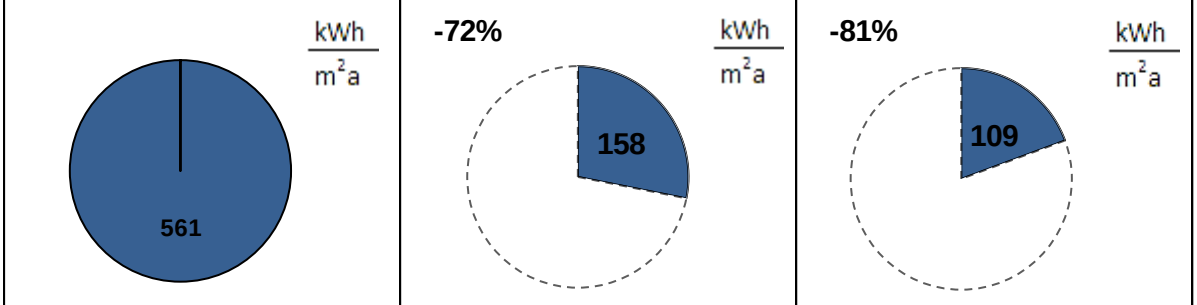
Toplotne izgube stavbe



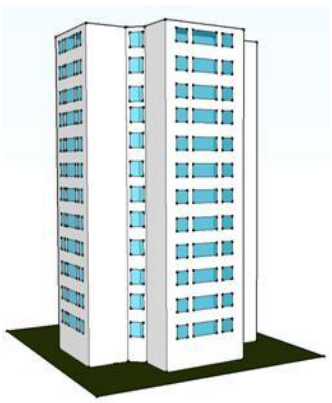
Potrebna toplota za ogrevanje stavbe Qnh

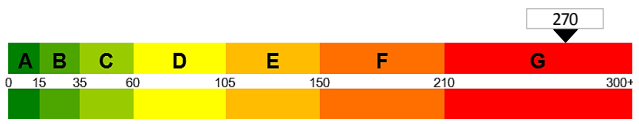


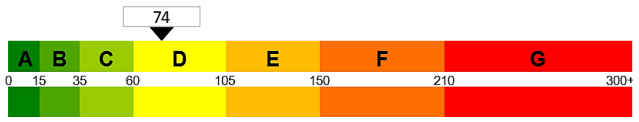
Primarna energija Qp

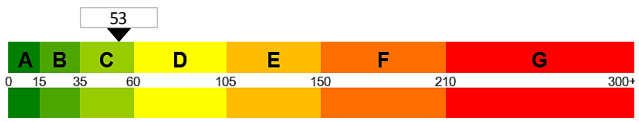


Razred energetske učinkovitosti (kWh/m²a)



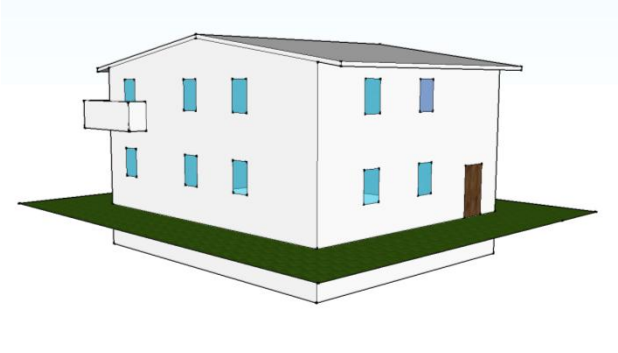






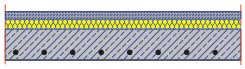
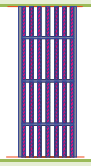
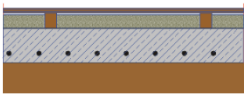
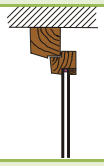
Obdobje 1946 - 1970

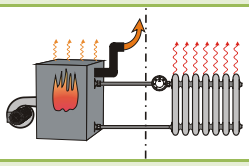
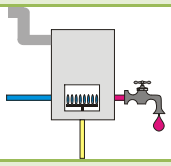
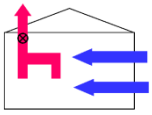
ENODRUŽINSKA HIŠA	
Arhitekturna zasnova	**Primer**



Država	Slovenija
Regija tipologije	Nacionalna
Zasnova	Preprosta kompaktna oblika
Etažnost	
Leto izgradnje	1970
Uporabna površina	190,00 m^2
Tabula	SI.N.SFH.02.Gen.ReEx.001.00

OPIS STAVBE - OSNOVNO STANJE

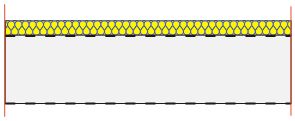
ZUNANJI OVOJ STAVBE				
Sklop	**Streha**	**Stena**	**Tla**	**Okna**
Površina	126,5 m^2	207,1 m^2	98,6 m^2	58,4 m^2
Skica				
OPIS	Betonska plošča, toplotna izolacija 2 cm, betonski estrih, lesni pod	Votlličasta opeka 29 cm	Podložni beton, nasutje, slepi - leseni pod	Lesno okno z dvojno zasteklitvijo
U - faktor	0,77 W/(m^{2}K)	1,50 W/(m^{2}K)	1,03 W/(m^{2}K)	2,8 W/(m^{2}K)

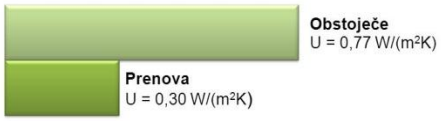
STROJNE INŠTALACIJE			
Sistem	Sistem za ogrevanje	Sistem za pripravo tople vode	Sistem za prezračevanje
Skica sistema			
Opis	Viskotemperaturni standardni kotel ELKO v kotlovnici s hranilnikom, razvod je deloma v neogrevanem, deloma v ogrevanem prostoru.	Priprava tople vode s stenskim plinskim kotličkom.	Brez sistema za mehansko prezračevanje.

ZMERNA PRENOVA ZUNANJEGA OVOJA STAVBE

STREHA

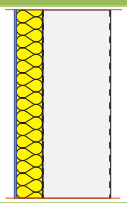
Dodatno 8 cm toplotne izolacije





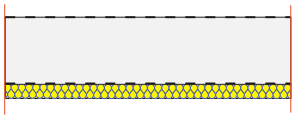
STENA

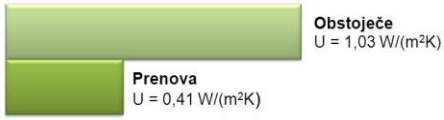
Dodatno 15 cm toplotne izolacije



TLA

Dodatno 6 cm toplotne izolacije proti kleti





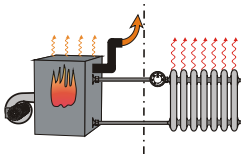
OKNA

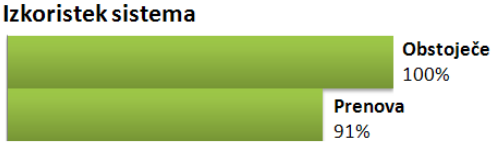
Vgradnja lesenega okna z dvoslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom

ZMERNA PRENOVA SISTEMOV

Sistem za ogrevanje

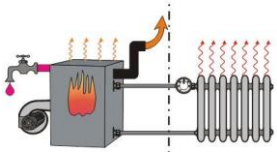
Nizkotemperaturni kotel v ogrevani kotlovnici, razvod znotraj ogrevanega prostora.

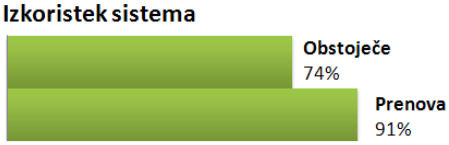




Sistem za pripravo tople vode

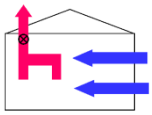
Centralna priprava tople vode kombinirana z ogrevalnim sistemom (nizkotemperaturni kotel). S cirkulacijo.





Sistem za prezračevanje

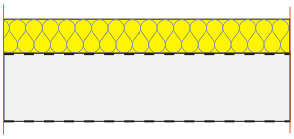
Brez sistema za mehansko prezračevanje.



INTENZIVNA PRENOVA ZUNANJEGA OVOJA STAVBE

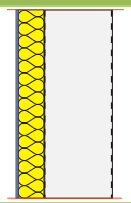
STREHA

Dodatno 20 cm toplotne izolacije



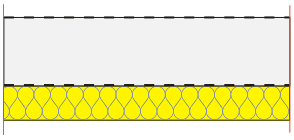
STENA

Dodatno 20 cm toplotne izolacije



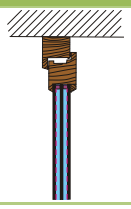
TLA

Dodatno 12 cm toplotne izolacije proti kleti



OKNA

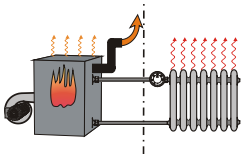
Vgradnja lesenega okna s troslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom



INTENZIVNA PRENOVA SISTEMOV

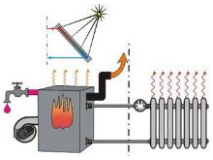
Sistem za ogrevanje

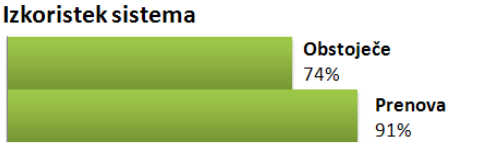
Nizkotemperaturni kotel v ogrevani kotlovnici, razvod znotraj ogrevanega prostora.



Sistem za pripravo tople vode

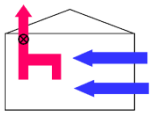
Centralna priprava tople vode kombinirana z ogrevalnim sistemom (nizkotemperaturni kotel + sprejemniki sončne energije). S





Sistem za prezračevanje

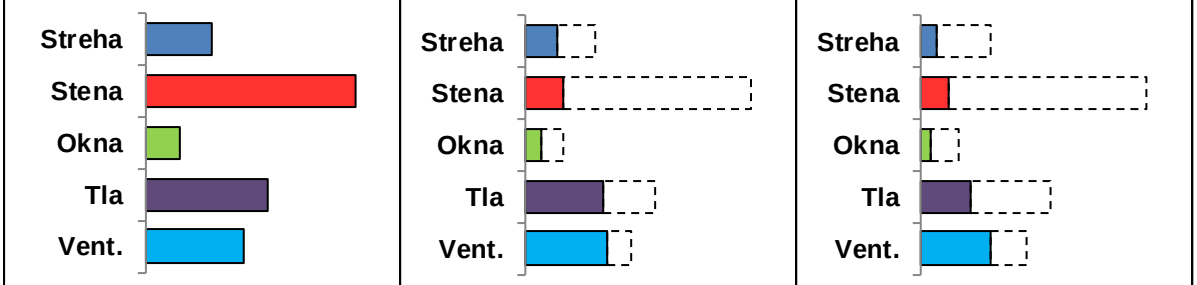
Brez sistema za mehansko prezračevanje.



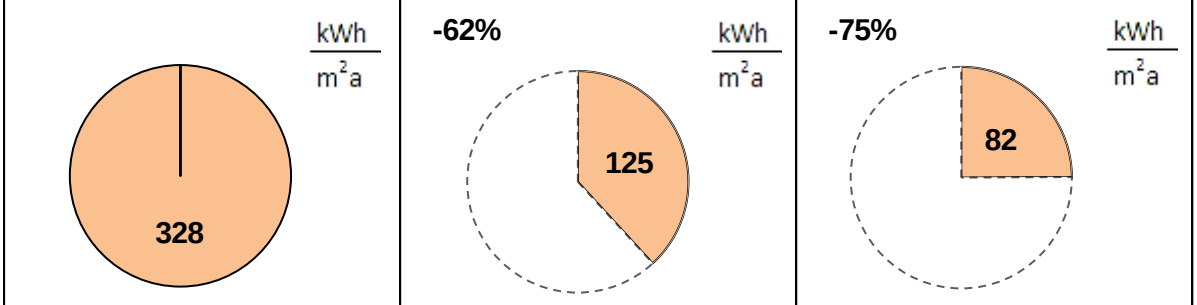
ENERGETSKI KAZALNIKI STAVBE

OSNOVNO STANJE	ZMERNA PRENOVA	INTENZIVNA PRENOVA

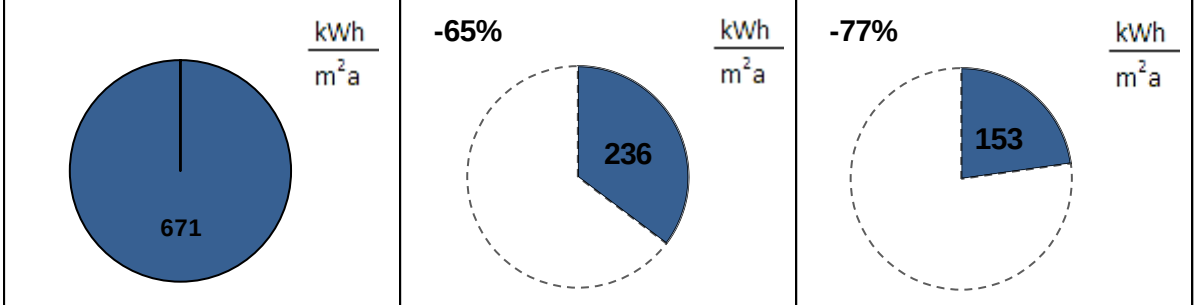
Toplotne izgube stavbe



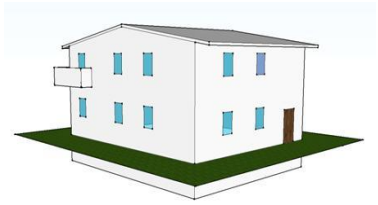
Potrebna toplota za ogrevanje stavbe Qnh

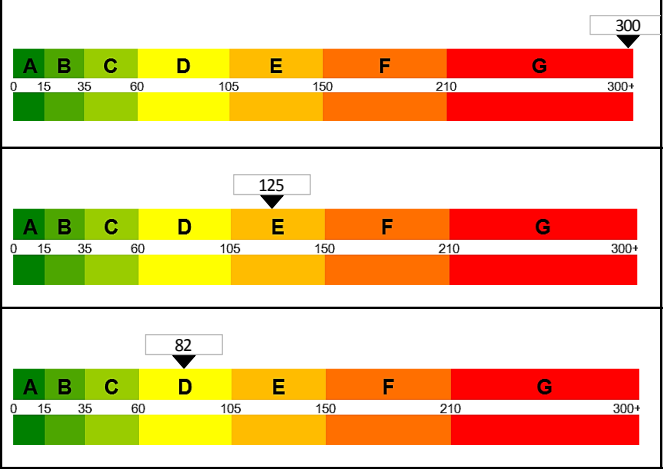


Primarna energija Qp



Razred energetske učinkovitosti (kWh/m²a)





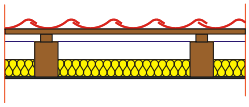
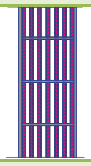
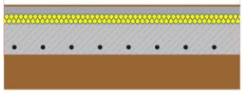
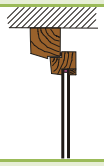
VRSTNA HIŠA

Arhitekturna zasnova	Primer

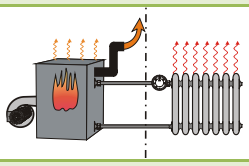
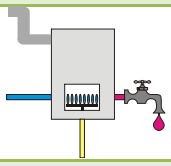
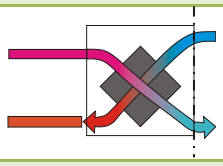
Država	Slovenija
Regija tipologije	Nacionalna
Zasnova	Enodružinska hiša v strnjeni obliki povezave – enostavna prizmatična oblika
Etažnost	
Leto izgradnje	1970
Uporabna površina	149,25 m^2
Tabula	SI.N.TH.02.Gen.ReEx.001.00

OPIS STAVBE - OSNOVNO STANJE

ZUNANJI OVOJ STAVBE

	Streha	Stena	Tla	Okna
Površina	84,0 m^2	116,0 m^2	64,0 m^2	25,0 m^2
Skica				
OPIS	Poševna streha z 8cm toplotne izolacije med škarniki	Votlličasta opeka 29 cm	Podložni beton, bit. hidroizolacija, toplotna izolacija 2 cm, estrih, obloga	Lesno okno z dvojno zasteklitvijo
U - faktor	0,60 W/(m^2K)	1,50 W/(m^2K)	1,40 W/(m^2K)	2,80 W/(m^2K)

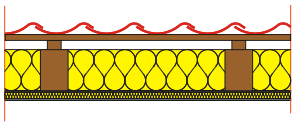
SISTEMI

Sistem	Sistem za ogrevanje	Sistem za pripravo tople vode	Sistem za prezračevanje
Skica			
Opis	Viskotemperaturni standardni kotel ELKO v kotlovnici s hranilnikom, razvod je deloma v neogrevanem, deloma v ogrevanem prostoru.	Priprava tople vode s stenskim plinskim kotličkom.	Brez sistema za mehansko prezračevanje.

ZMERNA PRENOVA ZUNANJEGA OVOJA STAVBE

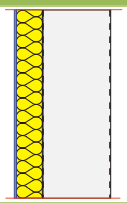
STREHA

Izolacija strehe, 12 cm med širovci, ter dodatnih 4 cm



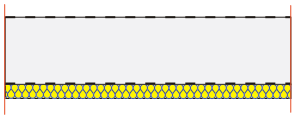
STENA

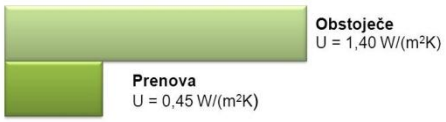
Dodatno 15 cm toplotne izolacije



TLA

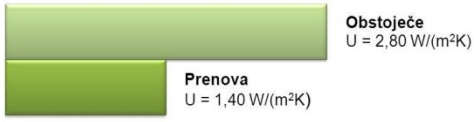
Dodatno 6 cm toplotne izolacije proti kleti





OKNA

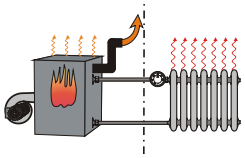
Vgradnja lesenega okna z dvoslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom

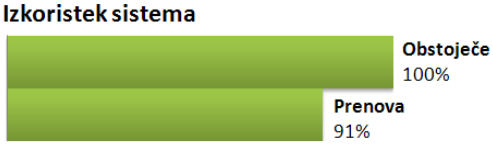


ZMERNA PRENOVA SISTEMOV

Sistem za ogrevanje

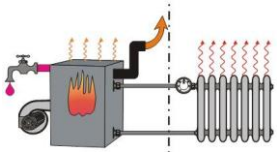
Nizkotemperaturni kotel v ogrevani kotlovnici, razvod znotraj ogrevanega prostora.

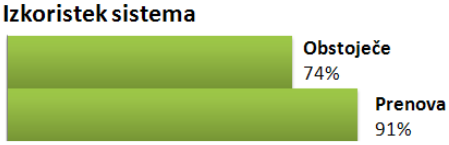




Sistem za pripravo tople vode

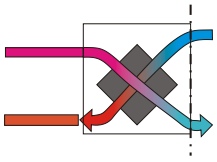
Centralna priprava tople vode kombinirana z ogrevalnim sistemom (nizkotemperaturni kotel). S cirkulacijo.





Sistem za prezračevanje

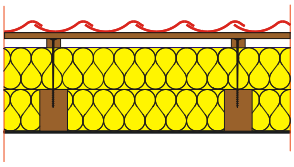
Brez sistema za mehansko prezračevanje.



INTENZIVNA PRENOVA ZUNANJEGA OVOJA STAVBE

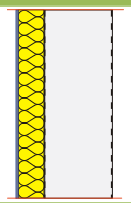
STREHA

Izolacija strehe, 12 cm med širovci, ter dodatnih 18 cm



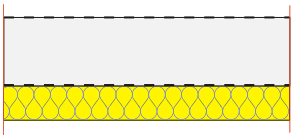
STENA

Dodatno 20 cm toplotne izolacije



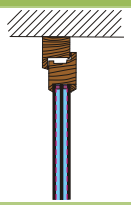
TLA

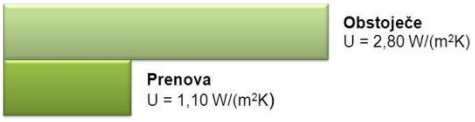
Dodatno 12 cm toplotne izolacije proti kleti



OKNA

Vgradnja lesenega okna s troslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom

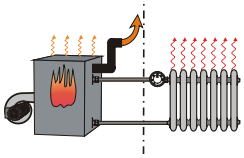




INTENZIVNA PRENOVA SISTEMOV

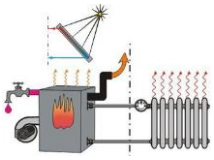
Sistem za ogrevanje

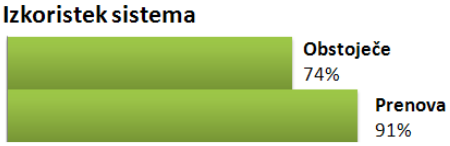
Nizkotemperaturni kotel v ogrevani kotlovnici, razvod znotraj ogrevanega prostora.



Sistem za pripravo tople vode

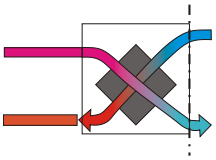
Centralna priprava tople vode kombinirana z ogrevalnim sistemom (nizkotemperaturni kotel + sprejemniki sončne energije). S





Sistem za prezračevanje

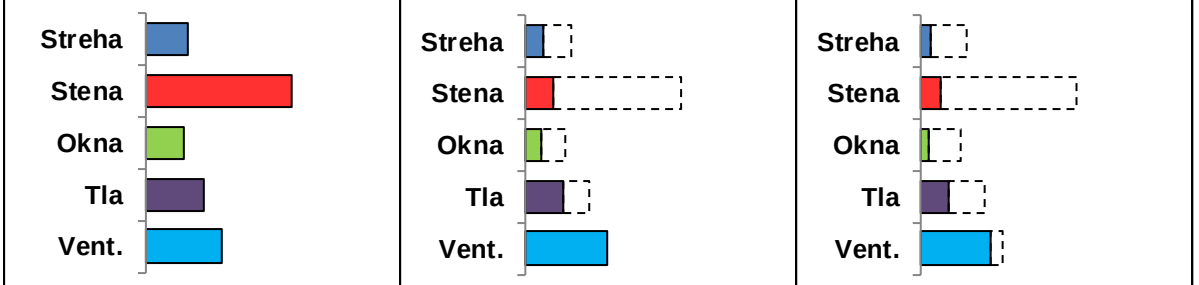
Brez sistema za mehansko prezračevanje.



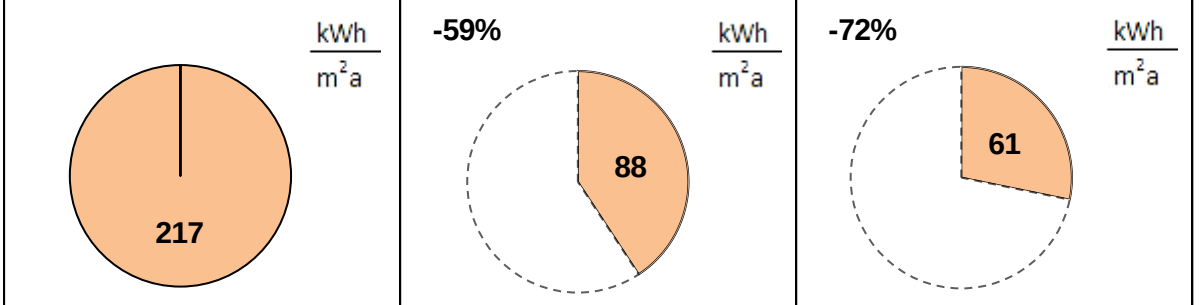
ENERGETSKI KAZALNIKI STAVBE

OSNOVNO STANJE	ZMERNA PRENOVA	INTENZIVNA PRENOVA

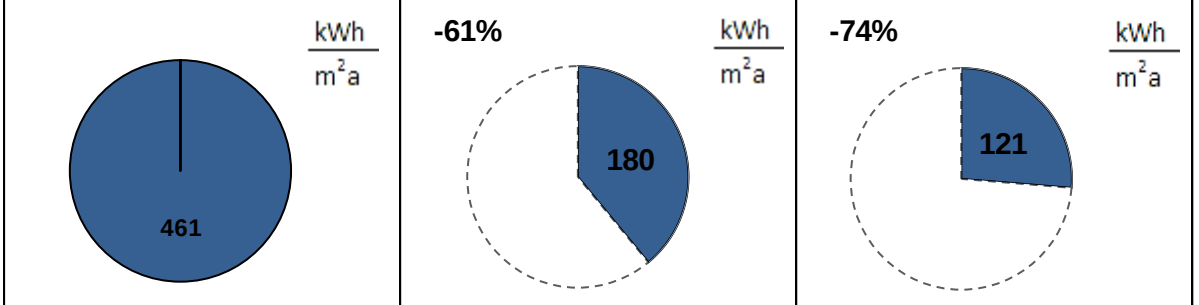
Toplotne izgube stavbe



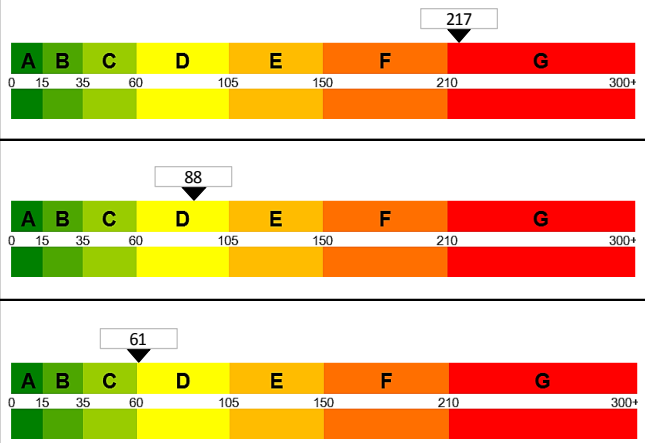
Potrebna toplota za ogrevanje stavbe Qnh



Primarna energija Qp



Razred energetske učinkovitosti (kWh/m²a)

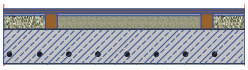
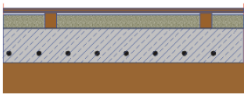
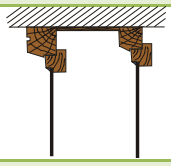


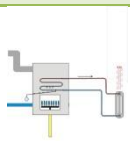
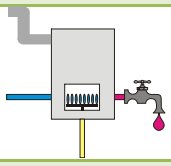
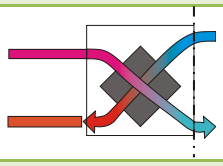
VEČSTANOVANJSKA STAVBA

Arhitekturna zasnova	Primer

Država	Slovenija
Regija tipologije	Nacionalna
Zasnova	Preprosta kompaktna oblika
Etažnost	
Leto izgradnje	1970
Uporabna površina	1097,00 m^2
Tabula	SI.N.MFH.02.Gen.ReEx.001.00

OPIS STAVBE - OSNOVNO STANJE

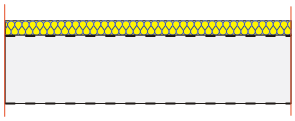
ZUNANJI OVOJ STAVBE				
	Streha	**Stena**	**Tla**	**Okna**
Površina	283,0 m^2	283,0 m^2	283,0 m^2	212,0 m^2
Skica				
OPIS	Betonska plošča, betonski estrih, lesni pod	Betonski blok, omet	Podložni beton, nasutje, slepi - leseni pod	Leseno škatlasto okno
U - faktor	1,17 W/(m^2K)	1,80 W/(m^2K)	1,03 W/(m^2K)	2,20 W/(m^2K)

SISTEMI			
Sistem	Sistem za ogrevanje	Sistem za pripravo tople vode	Sistem za prezračevanje
Skica			
Opis	Ogrevanje s kotlom na plin, skupna neogrevana kotlovnica, brez obtočne črpalke.	Priprava tople vode s stenskim plinskim kotličkom.	Brez sistema za mehansko prezračevanje.

ZMERNA PRENOVA ZUNANJEGA OVOJA STAVBE

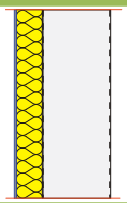
STREHA

Dodatno 8 cm toplotne izolacije



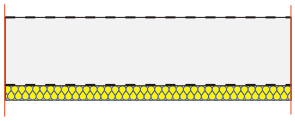
STENA

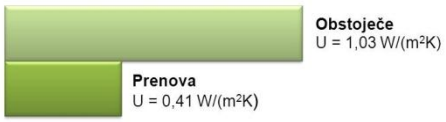
Dodatno 15 cm toplotne izolacije



TLA

Dodatno 6 cm toplotne izolacije proti kleti





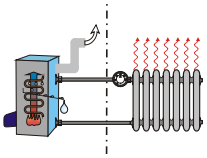
OKNA

Vgradnja lesenega okna z dvoslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom

ZMERNA PRENOVA SISTEMOV

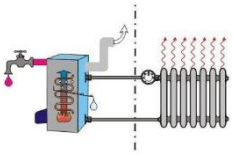
Sistem za ogrevanje

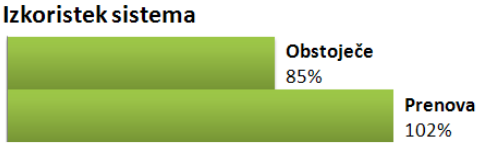
Nov kondenzacijski plinski kotel v ogrevani kotlovnici, razvod znotraj ogrevanega prostora.



Sistem za pripravo tople vode

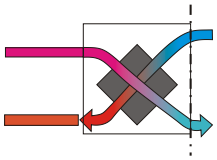
Centralna priprava tople vode kombinirana z ogrevalnim sistemom (nov kondenzacijski kotel). S cirkulacijo.





Sistem za prezračevanje

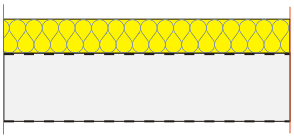
Brez sistema za mehansko prezračevanje.



INTENZIVNA PRENOVA ZUNANJEGA OVOJA STAVBE

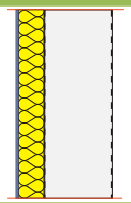
STREHA

Dodatno 20 cm toplotne izolacije



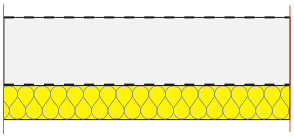
STENA

Dodatno 20 cm toplotne izolacije



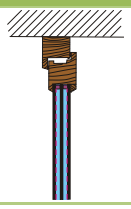
TLA

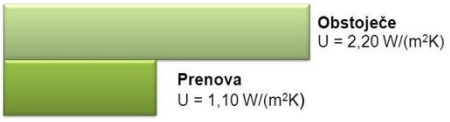
Dodatno 12 cm toplotne izolacije proti kleti



OKNA

Vgradnja lesenega okna s troslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom

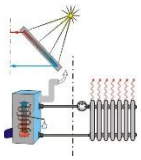




INTENZIVNA PRENOVA SISTEMOV

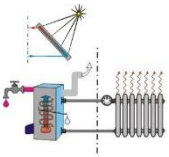
Sistem za ogrevanje

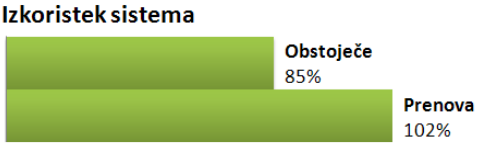
Nov kondenzacijski plinski kotel v ogrevani kotlovnici, razvod znotraj ogrevanega prostora. Sončni sprejemniki za



Sistem za pripravo tople vode

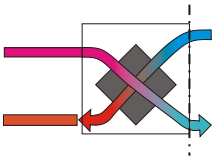
Centralna priprava tople vode kombinirana z ogrevalnim sistemom (nov kondenzacijski kotel + sprejemniki sončne energije). S





Sistem za prezračevanje

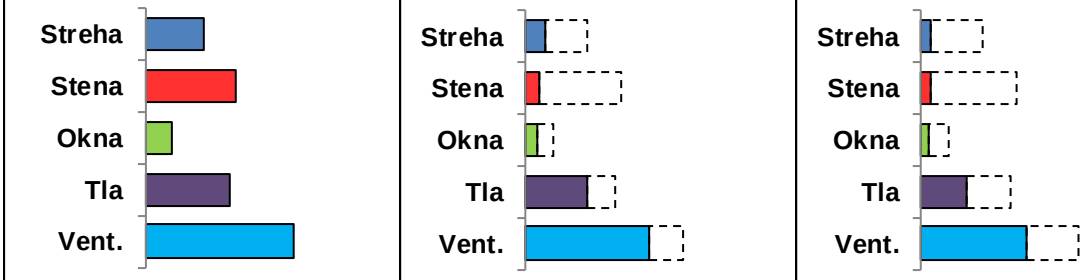
Brez sistema za mehansko prezračevanje.



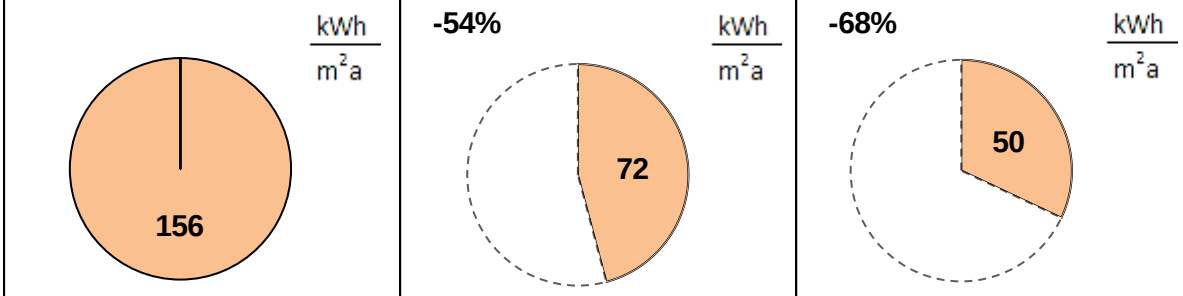
ENERGETSKI KAZALNIKI STAVBE

OSNOVNO STANJE	ZMERNA PRENOVA	INTENZIVNA PRENOVA

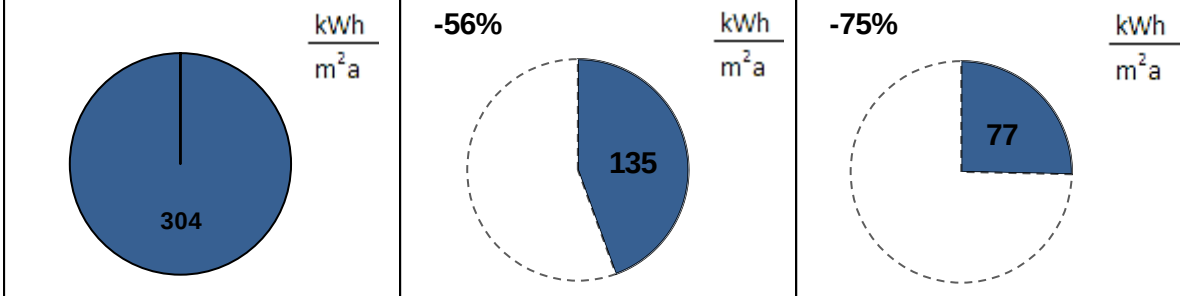
Toplotne izgube stavbe



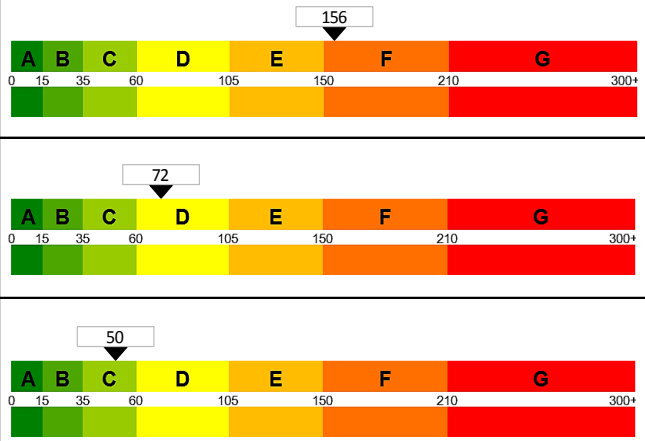
Potrebna toplota za ogrevanje stavbe Qnh



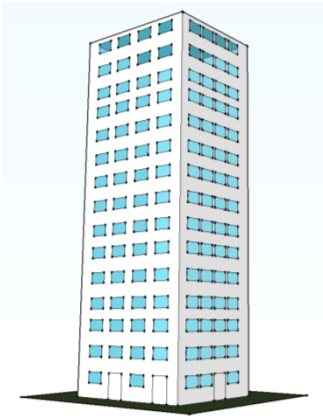
Primarna energija Qp



Razred energetske učinkovitosti (kWh/m²a)



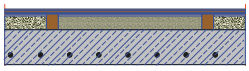
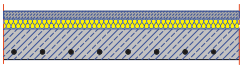
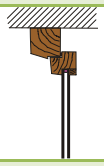
STANOVANJSKI BLOK - STOLPNICA

Arhitekturna zasnova	Primer
	

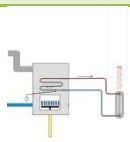
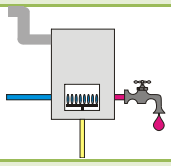
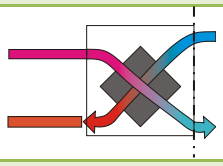
Država	Slovenija
Regija tipologije	Nacionalna
Zasnova	Preprosta kompaktna oblika
Etažnost	
Leto izgradnje	1970
Uporabna površina	2877,2 m^2
Tabula	SI.N.AB.02.Gen.ReEx.001.00

OPIS STAVBE - OSNOVNO STANJE

ZUNANJI OVOJ STAVBE

	Streha	Stena	Tla	Okna
Površina	312,0 m^2	2192,0 m^2	312,0 m^2	556,0 m^2
Skica				
OPIS	Betonska plošča, betonski estrih, lesni pod	Betonska stena	Betonska plošča, toplotna izolacija 2 cm, betonski estrih, lesni pod	Lesno okno z dvojno zasteklitvijo
U - faktor	1,17 W/(m^2K)	2,80 W/(m^2K)	1,17 W/(m^2K)	2,80 W/(m^2K)

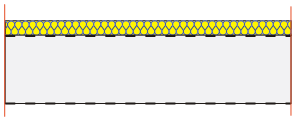
SISTEMI

Sistem	Sistem za ogrevanje	Sistem za pripravo tople vode	Sistem za prezračevanje
Skica			
Opis	Ogrevanje s kotlom na plin, skupna neogrevana kotlovnica, brez obtočne črpalke.	Priprava tople vode s stenskim plinskim kotličkom.	Brez sistema za mehansko prezračevanje.

ZMERNA PRENOVA ZUNANJEGA OVOJA STAVBE

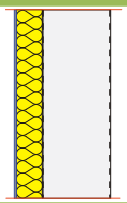
STREHA

Dodatno 8 cm toplotne izolacije



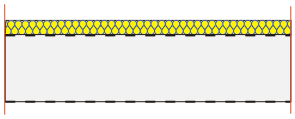
STENA

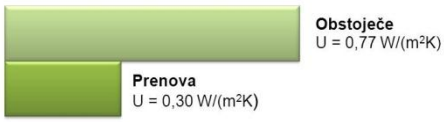
Dodatno 15 cm toplotne izolacije



TLA

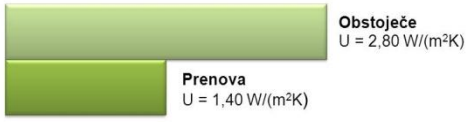
Dodatno 8 cm toplotne izolacije





OKNA

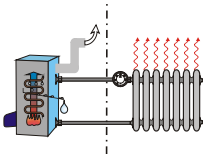
Vgradnja lesenega okna z dvoslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom



ZMERNA PRENOVA SISTEMOV

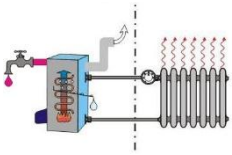
Sistem za ogrevanje

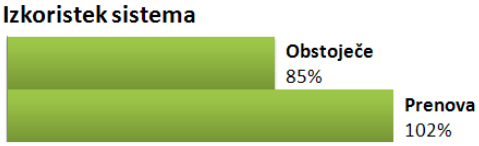
Nov kondenzacijski plinski kotel v ogrevani kotlovnici, razvod znotraj ogrevanega prostora.



Sistem za pripravo tople vode

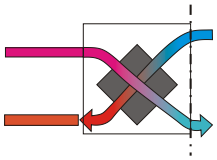
Centralna priprava tople vode kombinirana z ogrevalnim sistemom (nov kondenzacijski kotel). S cirkulacijo.





Sistem za prezračevanje

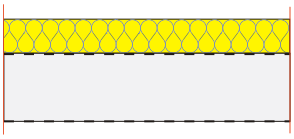
Brez sistema za mehansko prezračevanje.



INTENZIVNA PRENOVA ZUNANJEGA OVOJA STAVBE

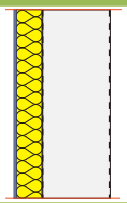
STREHA

Dodatno 20 cm toplotne izolacije



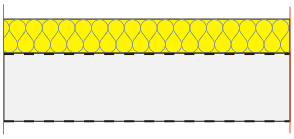
STENA

Dodatno 20 cm toplotne izolacije



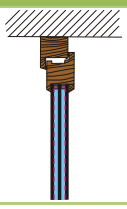
TLA

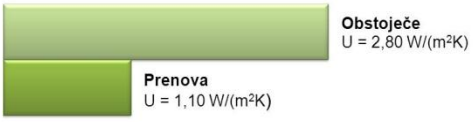
Dodatno 20 cm toplotne izolacije



OKNA

Vgradnja lesenega okna s troslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom

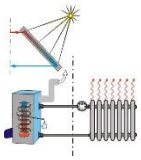




INTENZIVNA PRENOVA SISTEMOV

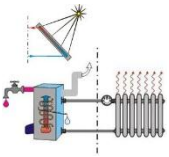
Sistem za ogrevanje

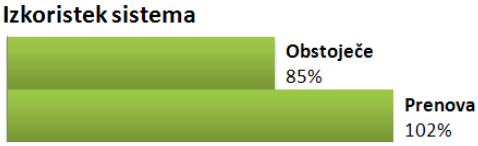
Nov kondenzacijski plinski kotel v ogrevani kotlovnici, razvod znotraj ogrevanega prostora. Sončni sprejemniki za ogrevanje in pripravo



Sistem za pripravo tople vode

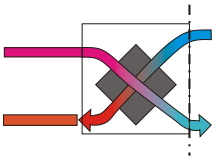
Centralna priprava tople vode kombinirana z ogrevalnim sistemom (nov kondenzacijski kotel + sprejemniki sončne energije). S cirkulacijo.





Sistem za prezračevanje

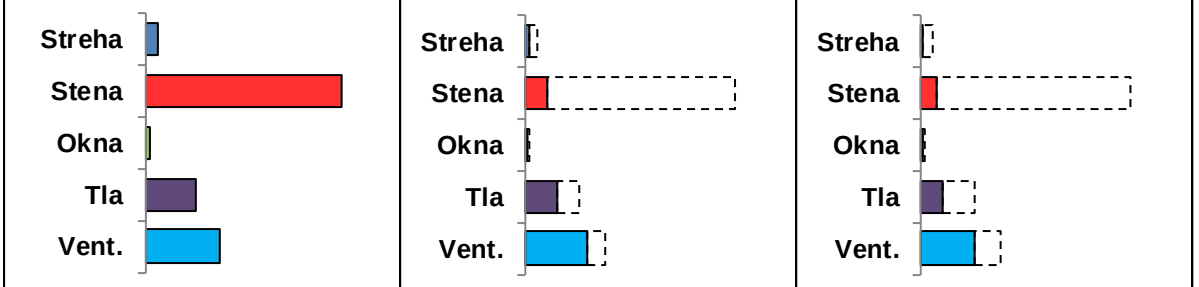
Brez sistema za mehansko prezračevanje.



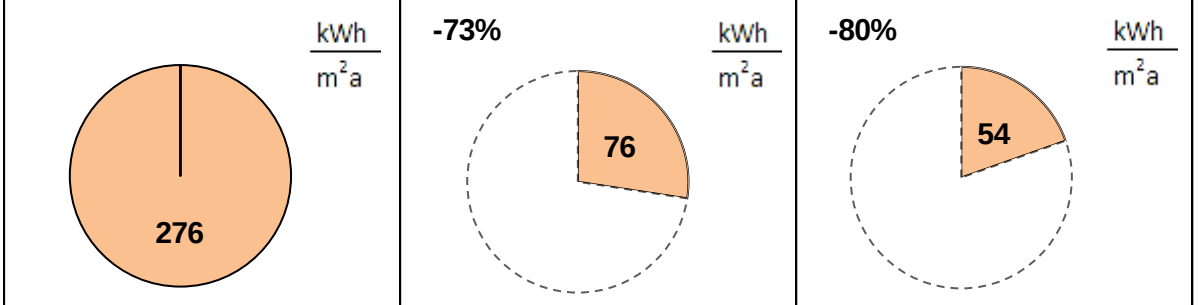
ENERGETSKI KAZALNIKI STAVBE

OSNOVNO STANJE	ZMERNA PRENOVA	INTENZIVNA PRENOVA

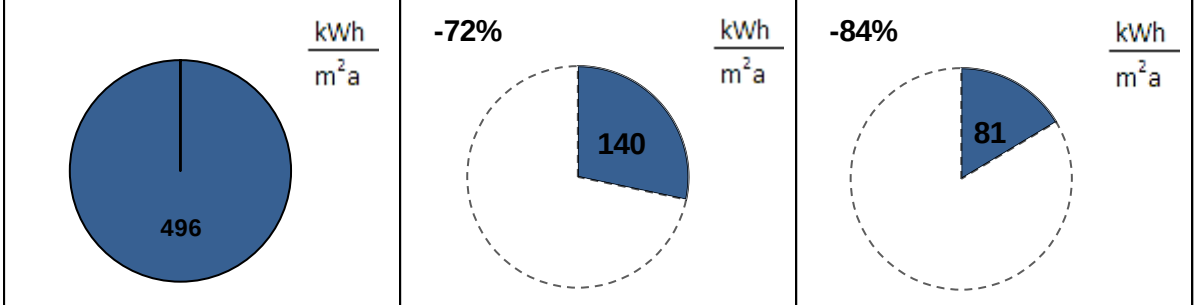
Toplotne izgube stavbe



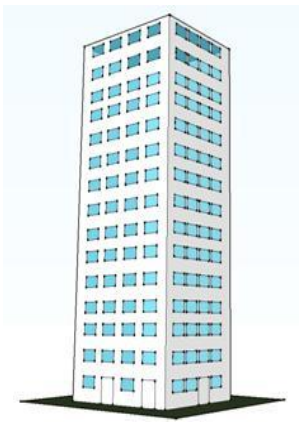
Potrebna toplota za ogrevanje stavbe Qnh

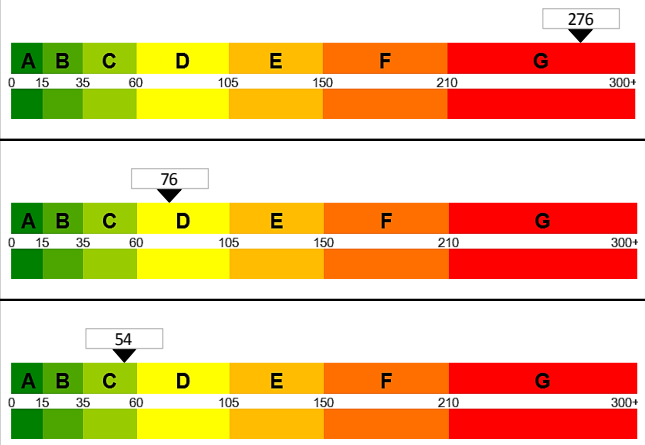


Primarna energija Qp



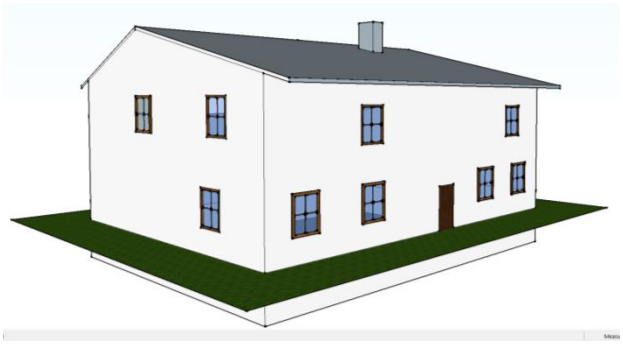
Razred energetske učinkovitosti (kWh/m²a)





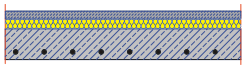
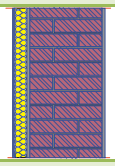
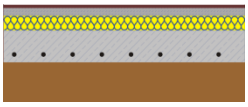
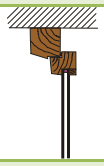
Obdobje 1971 - 1980

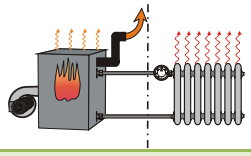
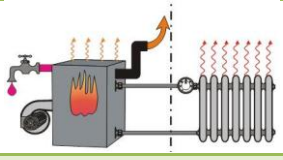
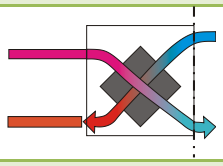
ENODRUŽINSKA HIŠA	
Arhitekturna zasnova	**Primer**



Država	Slovenija
Regija tipologije	Nacionalna
Zasnova	Preprosta kompaktna oblika
Etažnost	
Leto izgradnje	1980
Uporabna površina	181,00 m^2
Tabula	SI.N.SFH.03.Gen.ReEx.001.00

OPIS STAVBE - OSNOVNO STANJE

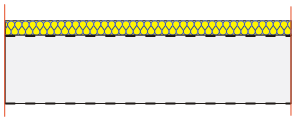
ZUNANJI OVOJ STAVBE				
	Streha	**Stena**	**Tla**	**Okna**
Površina	91,7 m^2	149,0 m^2	89,2 m^2	22,8 m^2
Skica				
OPIS	Betonska plošča, toplotna izolacija 2 cm, betonski estrih, lesni pod	Votličava opeka 29 cm, toplotna izolacija 3 cm	Tla na terenu s 3 cm toplotne izolacije	Lesno okno z dvojno zasteklitvijo
U - faktor	0,77 W/(m^{2}K)	0,70 W/(m^{2}K)	0,75 W/(m^{2}K)	2,8 W/(m^{2}K)

SISTEMI			
Sistem	Sistem za ogrevanje	Sistem za pripravo tople vode	Sistem za prezračevanje
Skica			
Opis	Viskotemperaturni standardni kotel ELKO v kotlovnici s hranilnikom, razvod je deloma v neogrevanem, deloma v ogrevanem prostoru.	Centralna priprava tople vode kombinirana z ogrevalnim sistemom (star kotel na ELKO). Brez cirkulacije.	Brez sistema za mehansko prezračevanje.

ZMERNA PRENOVA ZUNANJEGA OVOJA STAVBE

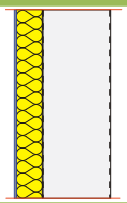
STREHA

Dodatno 8 cm toplotne izolacije



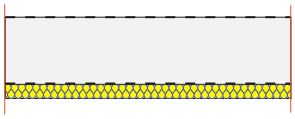
STENA

Dodatno 15 cm toplotne izolacije



TLA

Dodatno 6 cm toplotne izolacije proti kleti



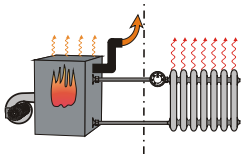
OKNA

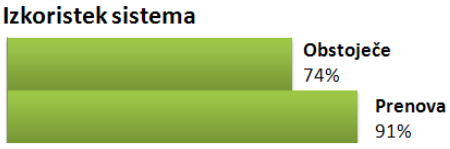
Vgradnja lesenega okna z dvoslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom

ZMERNA PRENOVA SISTEMOV

Sistem za ogrevanje

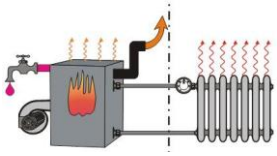
Nizkotemperaturni kotel v ogrevani kotlovnici, razvod znotraj ogrevanega prostora.

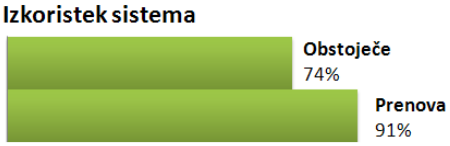




Sistem za pripravo tople vode

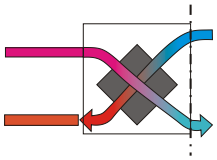
Centralna priprava tople vode kombinirana z ogrevalnim sistemom (nizkotemperaturni kotel). S cirkulacijo.





Sistem za prezračevanje

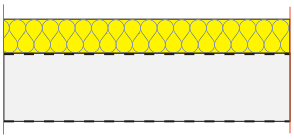
Brez sistema za mehansko prezračevanje.

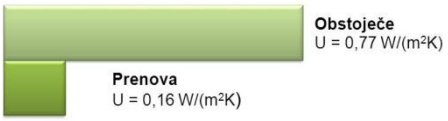


INTENZIVNA PRENOVA ZUNANJEGA OVOJA STAVBE

STREHA

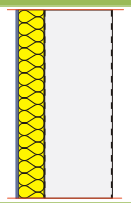
Dodatno 20 cm toplotne izolacije

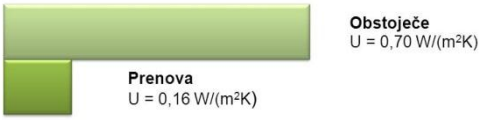




STENA

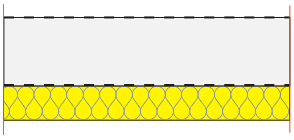
Dodatno 20 cm toplotne izolacije





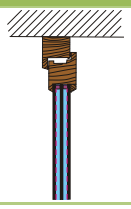
TLA

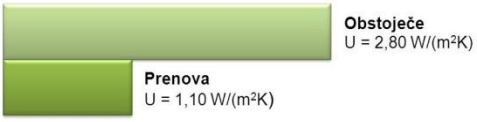
Dodatno 12 cm toplotne izolacije proti kleti



OKNA

Vgradnja lesenega okna s troslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom

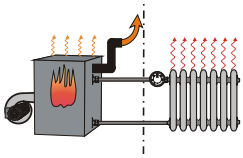


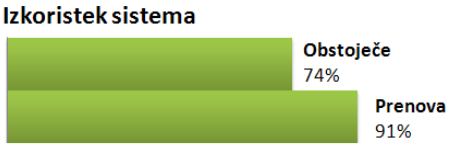


INTENZIVNA PRENOVA SISTEMOV

Sistem za ogrevanje

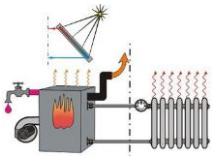
Nizkotemperaturni kotel v ogrevani kotlovnici, razvod znotraj ogrevanega prostora.

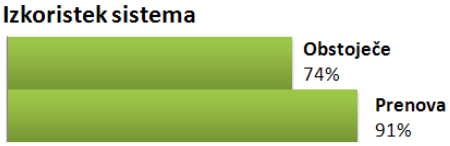




Sistem za pripravo tople vode

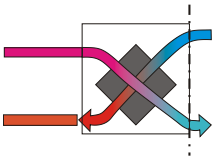
Centralna priprava tople vode kombinirana z ogrevalnim sistemom (nizkotemperaturni kotel + sprejemniki sončne energije). S





Sistem za prezračevanje

Brez sistema za mehansko prezračevanje.

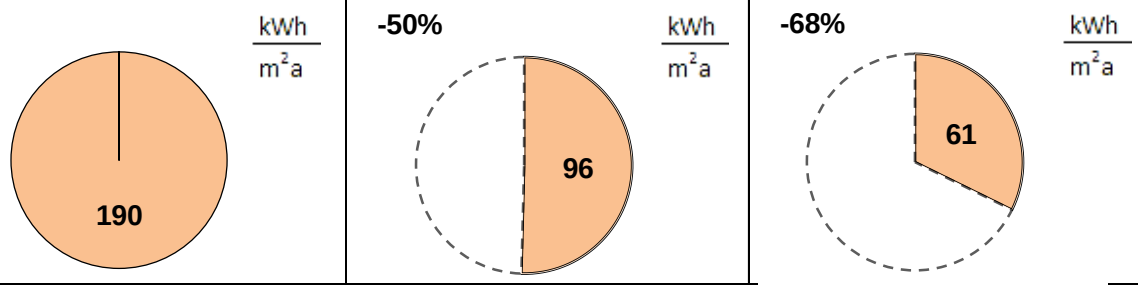


ENERGETSKI KAZALNIKI STAVBE

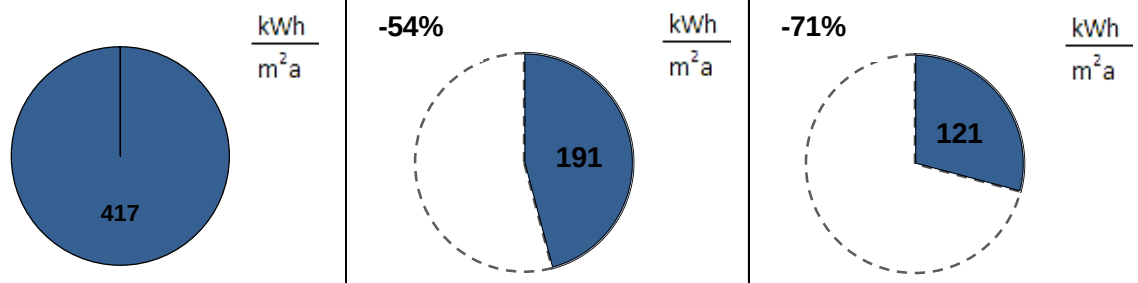
OSNOVNO STANJE	ZMERNA PRENOVA	INTENZIVNA PRENOVA

Toplotne izgube stavbe

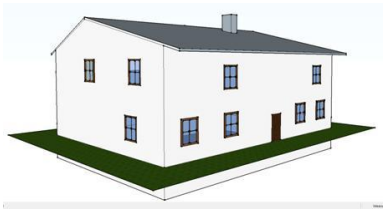
Potrebna toplota za ogrevanje stavbe Qnh



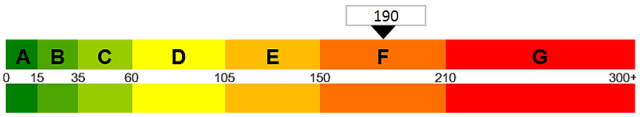
Primarna energija Qp



Razred energetske učinkovitosti (kWh/m²a)



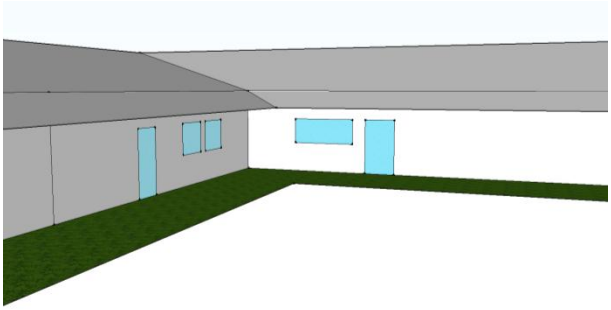
Osnovno stanje



Zmerna prenova

Intenzivna prenova

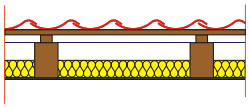
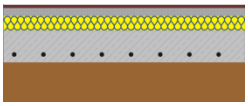
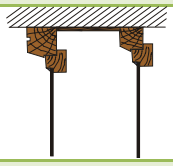
VRSTNA HIŠA

Arhitekturna zasnova	Primer
	

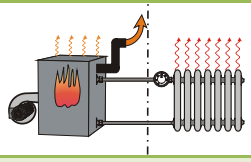
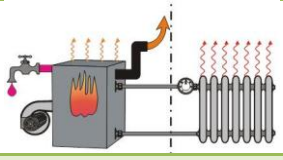
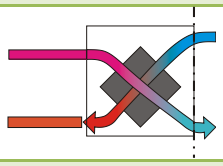
Država	Slovenija
Regija tipologije	Nacionalna
Zasnova	Enodružinska hiša v strnjeni obliki povezave – posebna L oblika
Etažnost	
Leto izgradnje	1980
Uporabna površina	113,40 m^2
Tabula	SI.N.TH.03.Gen.ReEx.001.00

OPIS STAVBE - OSNOVNO STANJE

ZUNANJI OVOJ STAVBE

	Streha	Stena	Tla	Okna
Površina	128,86,0 m^2	52,34 m^2	128,86 m^2	19,33 m^2
Skica				
OPIS	Poševna streha z 12 cm toplotne izolacije med škarniki	Votličava opeka 19 cm, omet, toplotna izolacija 8 cm, prezračevani sloj, fasadna opeka	Tla na terenu s 5 cm toplotne izolacije	Leseno škatlasto okno
U - faktor	0,30 W/(m^2K)	0,38 W/(m^2K)	0,65 W/(m^2K)	2,20 W/(m^2K)

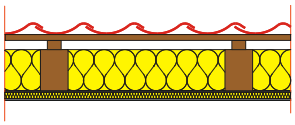
SISTEMI

Sistem	Sistem za ogrevanje	Sistem za pripravo tople vode	Sistem za prezračevanje
Skica			
Opis	Viskotemperaturni standardni kotel ELKO v kotlovnici s hranilnikom, razvod je deloma v neogrevanem, deloma v ogrevanem prostoru.	Centralna priprava tople vode kombinirana z ogrevalnim sistemom (star kotel na ELKO). Brez cirkulacije.	Brez sistema za mehansko prezračevanje.

ZMERNA PRENOVA ZUNANJEGA OVOJA STAVBE

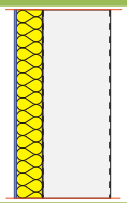
STREHA

Izolacija strehe, 12 cm med širovci, ter dodatnih 4 cm



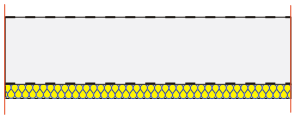
STENA

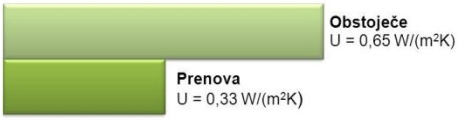
Dodatno 15 cm toplotne izolacije



TLA

Dodatno 6 cm toplotne izolacije proti kleti





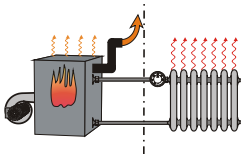
OKNA

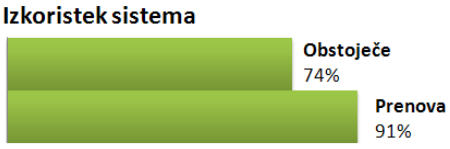
Vgradnja lesenega okna z dvoslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom

ZMERNA PRENOVA SISTEMOV

Sistem za ogrevanje

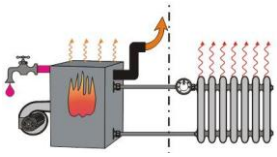
Nizkotemperaturni kotel v ogrevani kotlovnici, razvod znotraj ogrevanega prostora.

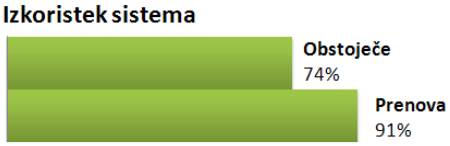




Sistem za pripravo tople vode

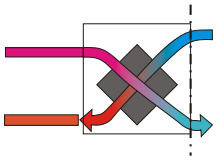
Centralna priprava tople vode kombinirana z ogrevalnim sistemom (nizkotemperaturni kotel). S cirkulacijo.





Sistem za prezračevanje

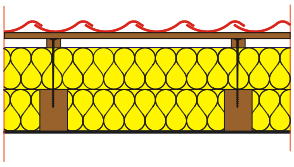
Brez sistema za mehansko prezračevanje.



INTENZIVNA PRENOVA ZUNANJEGA OVOJA STAVBE

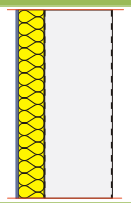
STREHA

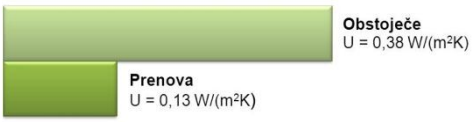
Izolacija strehe, 12 cm med širovci, ter dodatnih 18 cm



STENA

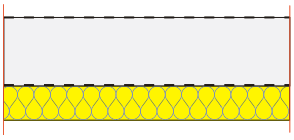
Dodatno 20 cm toplotne izolacije

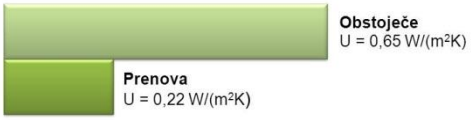




TLA

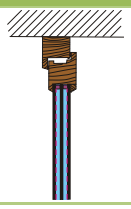
Dodatno 12 cm toplotne izolacije proti kleti





OKNA

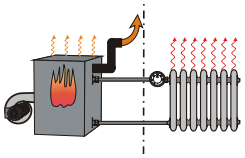
Vgradnja lesenega okna s troslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom

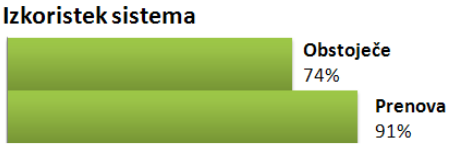


INTENZIVNA PRENOVA SISTEMOV

Sistem za ogrevanje

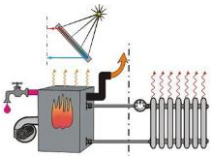
Nizkotemperaturni kotel v ogrevani kotlovnici, razvod znotraj ogrevanega prostora.

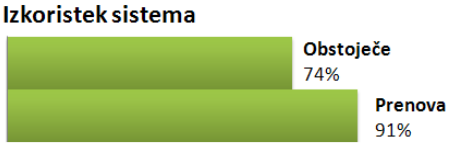




Sistem za pripravo tople vode

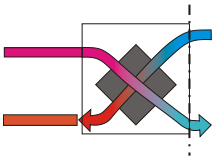
Centralna priprava tople vode kombinirana z ogrevalnim sistemom (nizkotemperaturni kotel + sprejemniki sončne energije). S cirkulacijo.





Sistem za prezračevanje

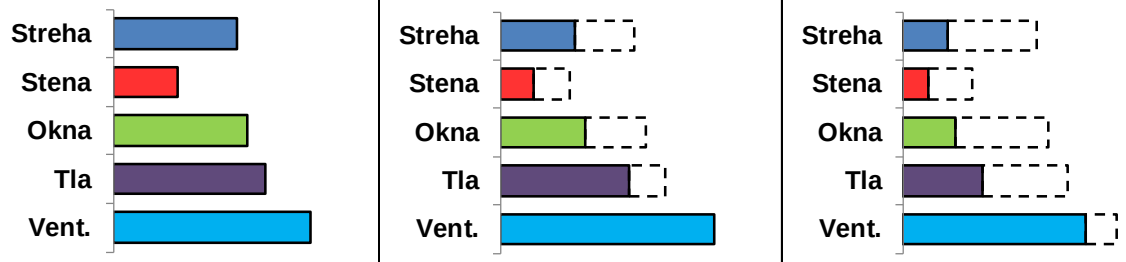
Brez sistema za mehansko prezračevanje.



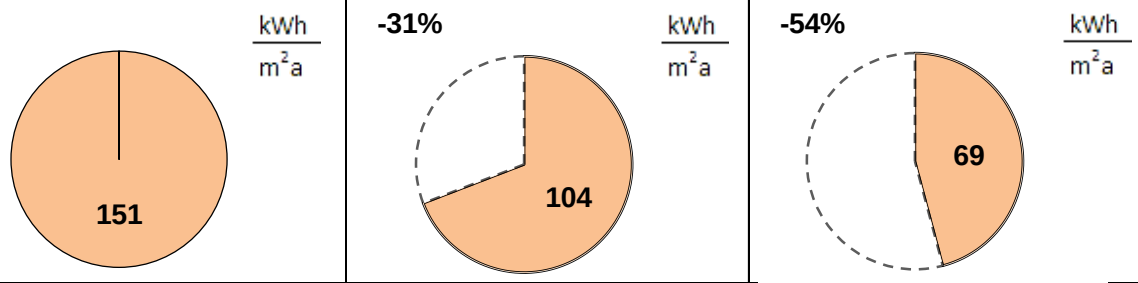
ENERGETSKI KAZALNIKI STAVBE

OSNOVNO STANJE	ZMERNA PRENOVA	INTENZIVNA PRENOVA

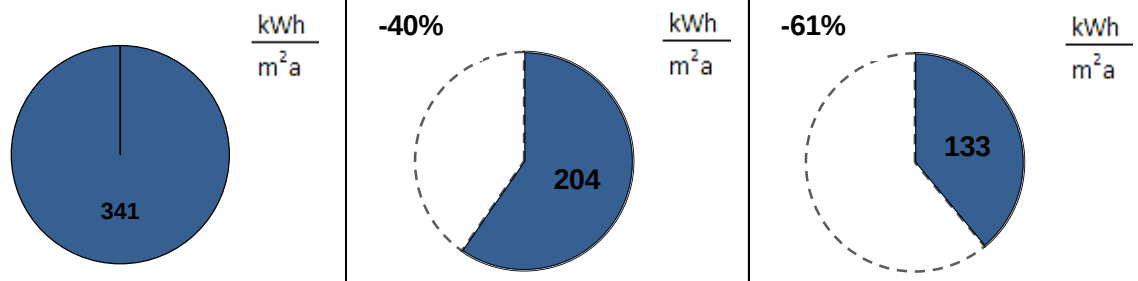
Toplotne izgube stavbe



Potrebna toplota za ogrevanje stavbe Qnh

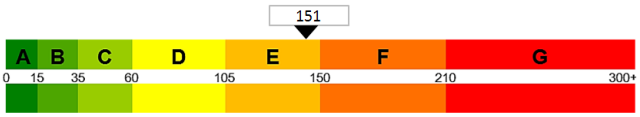


Primarna energija Qp



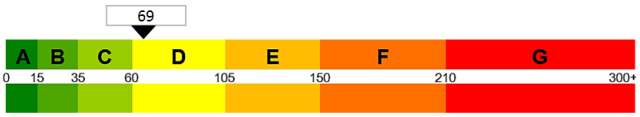
Razred energetske učinkovitosti (kWh/m²a)

Osnovno stanje



Zmerna prenova

Intenzivna prenova



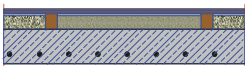
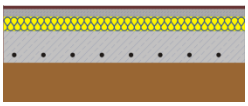
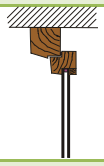
VEČSTANOVANJSKA STAVBA

Arhitekturna zasnova	Primer

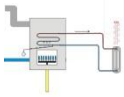
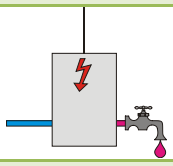
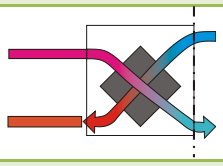
Država	Slovenija
Regija tipologije	Nacionalna
Zasnova	Preprosta kompaktna oblika
Etažnost	
Leto izgradnje	1980
Uporabna površina	2528,00 m^2
Tabula	SI.N.MFH.03.Gen.ReEx.001.00

OPIS STAVBE - OSNOVNO STANJE

ZUNANJI OVOJ STAVBE

	Streha	Stena	Tla	Okna
Površina	506,5 m^2	1242,9 m^2	506,5 m^2	267,9 m^2
Skica				
OPIS	Betonska plošča, betonski estrih, lesni pod	Betonski blok, omet	Tla na terenu s 3 cm toplotne izolacije	Lesno okno z dvojno zasteklitvijo
U - faktor	1,17 W/(m^{2}K)	1,80 W/(m^{2}K)	0,75 W/(m^{2}K)	2,8 W/(m^{2}K)

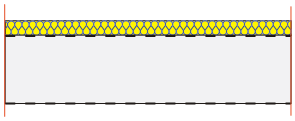
SISTEMI

Sistem	Sistem za ogrevanje	Sistem za pripravo tople vode	Sistem za prezračevanje
Skica			
Opis	Ogrevanje s kotlom na plin, skupna neogrevana kotlovnica, brez obtočne črpalke.	Priprava tople vode s stenskim električnim kotličkom.	Brez sistema za mehansko prezračevanje.

ZMERNA PRENOVA ZUNANJEGA OVOJA STAVBE

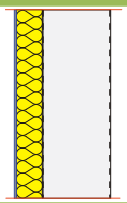
STREHA

Dodatno 8 cm toplotne izolacije



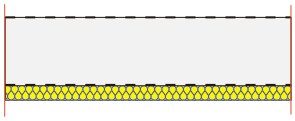
STENA

Dodatno 15 cm toplotne izolacije



TLA

Dodatno 6 cm toplotne izolacije proti kleti



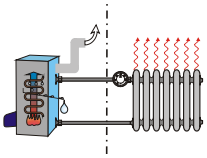
OKNA

Vgradnja lesenega okna z dvoslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom

ZMERNA PRENOVA SISTEMOV

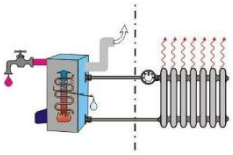
Sistem za ogrevanje

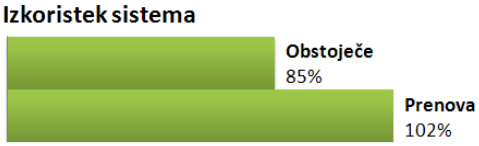
Nov kondenzacijski plinski kotel v ogrevani kotlovnici, razvod znotraj ogrevanega prostora.



Sistem za pripravo tople vode

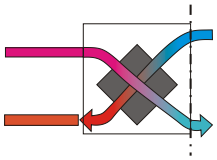
Centralna priprava tople vode kombinirana z ogrevalnim sistemom (nov kondenzacijski kotel). S cirkulacijo.





Sistem za prezračevanje

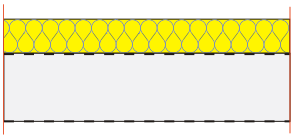
Brez sistema za mehansko prezračevanje.



INTENZIVNA PRENOVA ZUNANJEGA OVOJA STAVBE

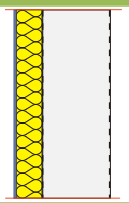
STREHA

Dodatno 20 cm toplotne izolacije



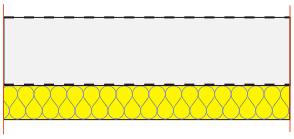
STENA

Dodatno 20 cm toplotne izolacije



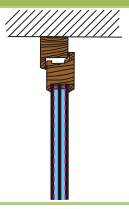
TLA

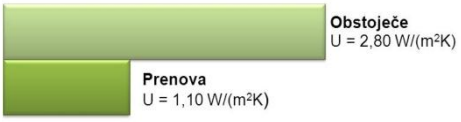
Dodatno 12 cm toplotne izolacije proti kleti



OKNA

Vgradnja lesenega okna s troslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom

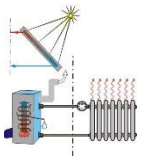




INTENZIVNA PRENOVA SISTEMOV

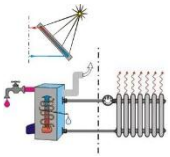
Sistem za ogrevanje

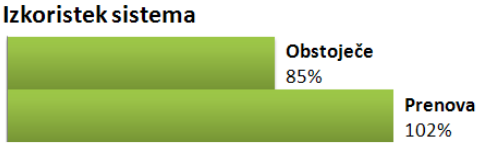
Nov kondenzacijski plinski kotel v ogrevani kotlovnici, razvod znotraj ogrevanega prostora. Sončni sprejemniki za ogrevanje in pripravo



Sistem za pripravo tople vode

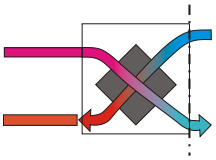
Centralna priprava tople vode kombinirana z ogrevalnim sistemom (nov kondenzacijski kotel + sprejemniki sončne energije). S cirkulacijo.





Sistem za prezračevanje

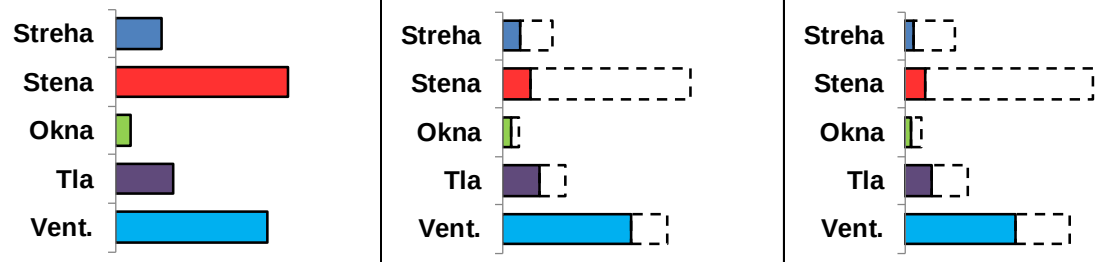
Brez sistema za mehansko prezračevanje.



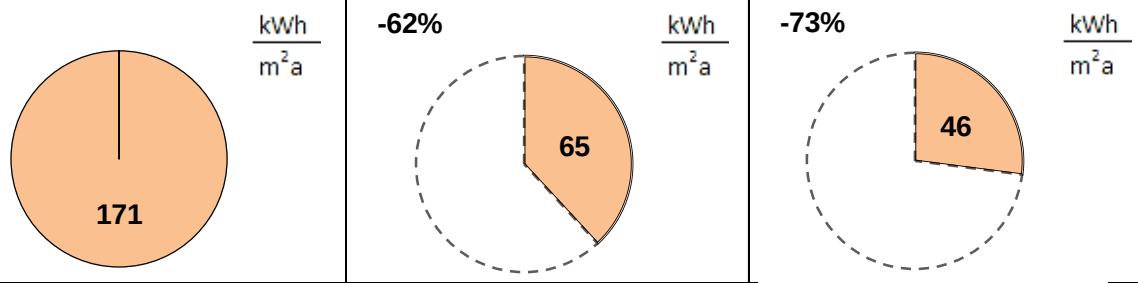
ENERGETSKI KAZALNIKI STAVBE

OSNOVNO STANJE	ZMERNA PRENOVA	INTENZIVNA PRENOVA

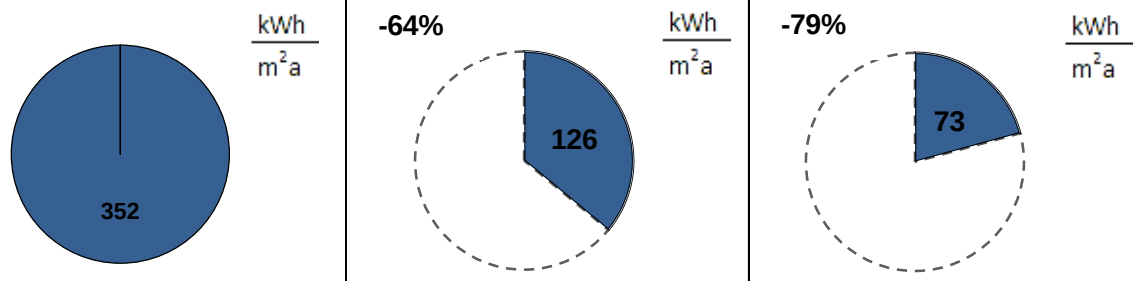
Toplotne izgube stavbe



Potrebna toplota za ogrevanje stavbe Qnh

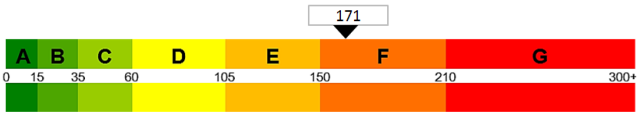


Primarna energija Qp



Razred energetske učinkovitosti (kWh/m²a)

Osnovno stanje



Zmerna prenova

Intenzivna prenova

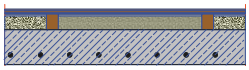
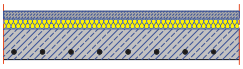
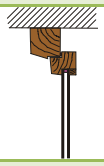
STANOVANJSKI BLOK - STOLPNICA

Arhitekturna zasnova	Primer

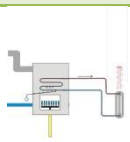
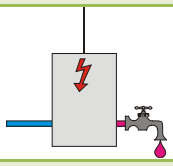
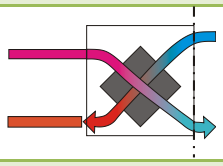
Država	Slovenija
Regija tipologije	Nacionalna
Zasnova	Preprosta kompaktna oblika
Etažnost	
Leto izgradnje	1980
Uporabna površina	6774,0 m^2
Tabula	SI.N.AB.03.Gen.ReEx.001.00

OPIS STAVBE - OSNOVNO STANJE

ZUNANJI OVOJ STAVBE

	Streha	Stena	Tla	Okna
Površina	504,0 m^2	2212,0 m^2	504,0 m^2	1840,0 m^2
Skica				
OPIS	Betonska plošča, betonski estrih, lesni pod	Betonska stena	Betonska plošča, toplotna izolacija 2 cm, betonski estrih, lesni pod	Lesno okno z dvojno zasteklitvijo
U - faktor	1,17 W/(m^2K)	2,80 W/(m^2K)	0,77 W/(m^2K)	2,80 W/(m^2K)

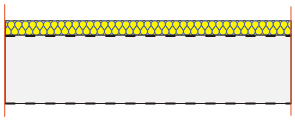
SISTEMI

Sistem	Sistem za ogrevanje	Sistem za pripravo tople vode	Sistem za prezračevanje
Skica			
Opis	Ogrevanje s kotlom na plin, skupna neogrevana kotlovnica, brez obtočne črpalke.	Priprava tople vode s stenskim električnim kotličkom.	Brez sistema za mehansko prezračevanje.

ZMERNA PRENOVA ZUNANJEGA OVOJA STAVBE

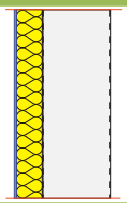
STREHA

Dodatno 8 cm toplotne izolacije



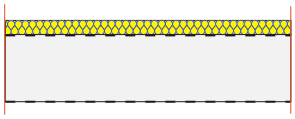
STENA

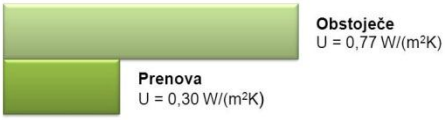
Dodatno 15 cm toplotne izolacije



TLA

Dodatno 8 cm toplotne izolacije





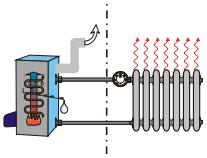
OKNA

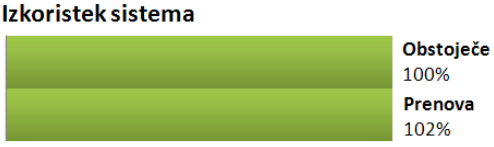
Vgradnja lesenega okna z dvoslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom

ZMERNA PRENOVA SISTEMOV

Sistem za ogrevanje

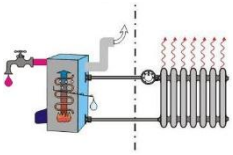
Nov kondenzacijski plinski kotel v ogrevani kotlovnici, razvod znotraj ogrevanega prostora.

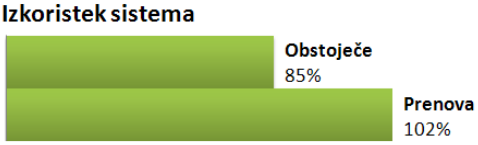




Sistem za pripravo tople vode

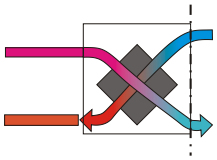
Centralna priprava tople vode kombinirana z ogrevalnim sistemom (nov kondenzacijski kotel). S cirkulacijo.





Sistem za prezračevanje

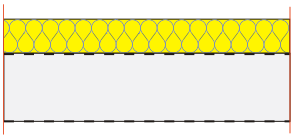
Brez sistema za mehansko prezračevanje.



INTENZIVNA PRENOVA ZUNANJEGA OVOJA STAVBE

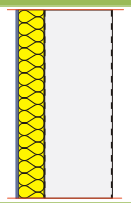
STREHA

Dodatno 20 cm toplotne izolacije



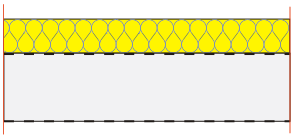
STENA

Dodatno 20 cm toplotne izolacije



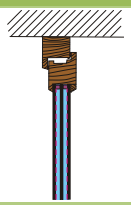
TLA

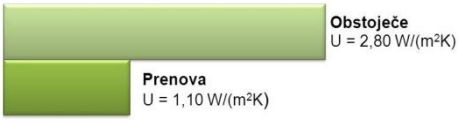
Dodatno 20 cm toplotne izolacije



OKNA

Vgradnja lesenega okna s troslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom

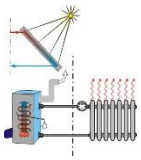




INTENZIVNA PRENOVA SISTEMOV

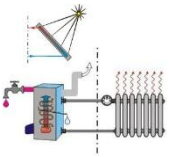
Sistem za ogrevanje

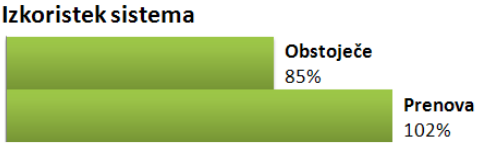
Nov kondenzacijski plinski kotel v ogrevani kotlovnici, razvod znotraj ogrevanega prostora. Sončni sprejemniki za ogrevanje in pripravo



Sistem za pripravo tople vode

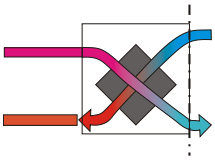
Centralna priprava tople vode kombinirana z ogrevalnim sistemom (nov kondenzacijski kotel + sprejemniki sončne energije). S cirkulacijo.





Sistem za prezračevanje

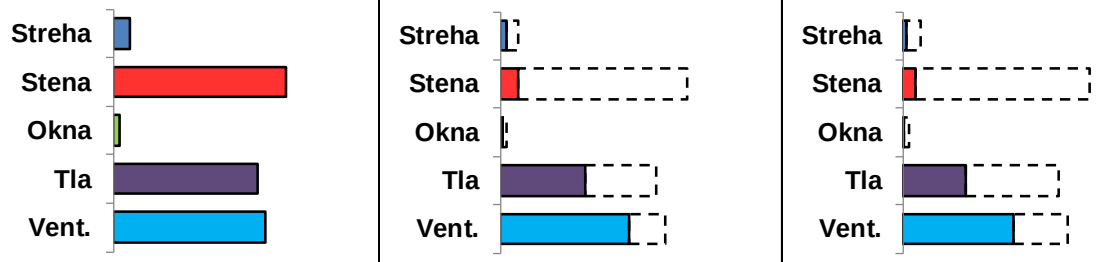
Brez sistema za mehansko prezračevanje.



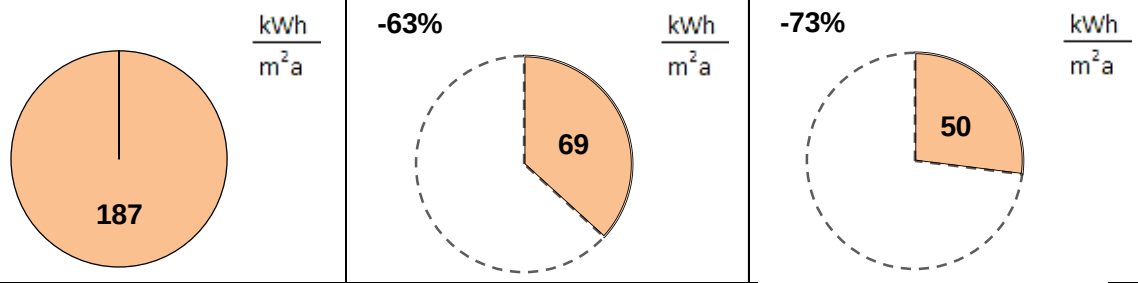
ENERGETSKI KAZALNIKI STAVBE

OSNOVNO STANJE	ZMERNA PRENOVA	INTENZIVNA PRENOVA

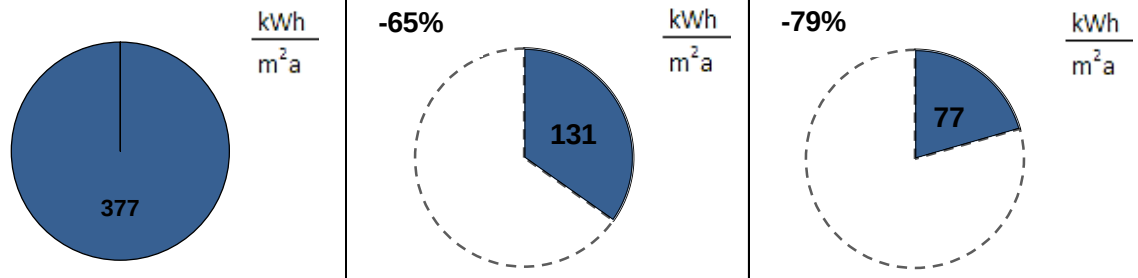
Toplotne izgube stavbe



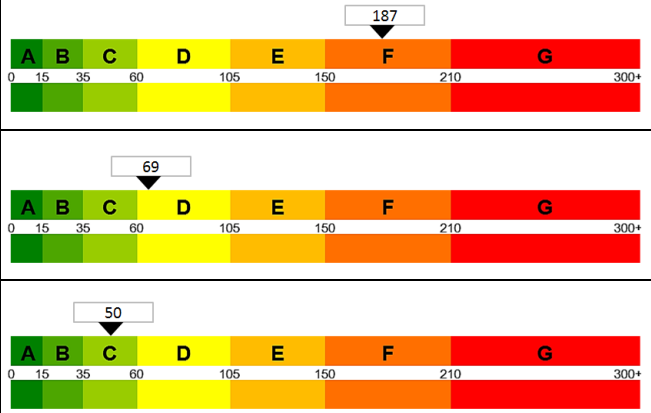
Potrebna toplota za ogrevanje stavbe Qnh



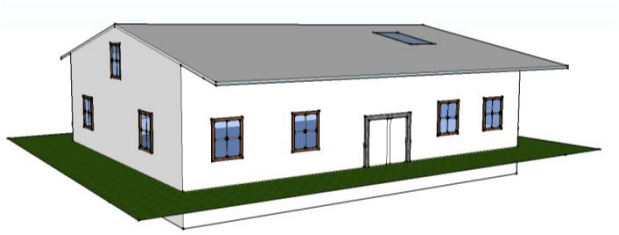
Primarna energija Qp



Razred energetske učinkovitosti (kWh/m²a)

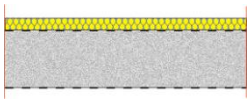
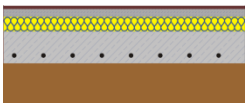
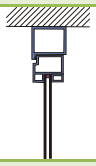


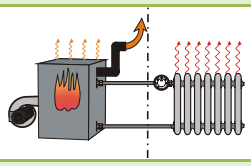
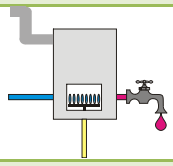
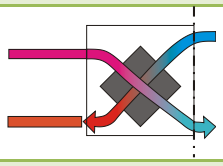
Obdobje 1981 – 2001

ENODRUŽINSKA HIŠA	
Arhitekturna zasnova	**Primer**
	

Država	Slovenija
Regija tipologije	Nacionalna
Zasnova	Preprosta kompaktna oblika
Etažnost	
Leto izgradnje	2001
Uporabna površina	133,2 m^2
Tabula	SI.N.SFH.04.Gen.ReEx.001.00

OPIS STAVBE - OSNOVNO STANJE

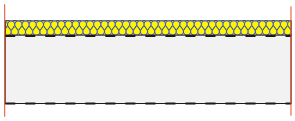
ZUNANJI OVOJ STAVBE				
	Streha	**Stena**	**Tla**	**Okna**
Površina	133,2 m^2	92,1 m^2	133,2 m^2	22,3 m^2
Skica				
OPIS	Strop iz celičnega betona 15 cm s toplotno izolacijo 10 cm	Votličava opeka 19 cm, omet, toplotna izolacija 5 cm, prezračevani sloj, fasadna opeka	Tla na terenu s 5 cm toplotne izolacije	Alu okno z dvoslojno toplotno izolacijsko zasteklitvijo
U - faktor	0,29 W/(m^2K)	0,52 W/(m^2K)	0,54 W/(m^2K)	1,60 W/(m^2K)

SISTEMI			
Sistem	Sistem za ogrevanje	Sistem za pripravo tople vode	Sistem za prezračevanje
Skica			
Opis	Srednjetemperaturni standardni kotel ELKO v kotlovnici s hranilnikom, razvod je deloma v neogrevanem, deloma v ogrevanem prostoru.	Priprava tople vode s stenskim plinskim kotličkom.	Brez sistema za mehansko prezračevanje.

ZMERNA PRENOVA ZUNANJEGA OVOJA STAVBE

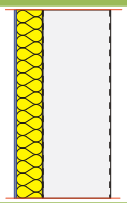
STREHA

Dodatno 8 cm toplotne izolacije



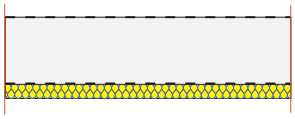
STENA

Dodatno 15 cm toplotne izolacije



TLA

Dodatno 6 cm toplotne izolacije proti kleti



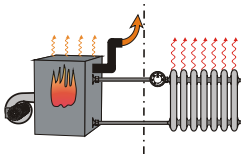
OKNA

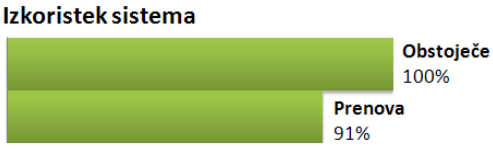
Vgradnja lesenega okna z dvoslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom

ZMERNA PRENOVA SISTEMOV

Sistem za ogrevanje

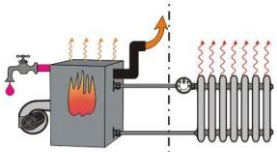
Nizkotemperaturni kotel v ogrevani kotlovnici, razvod znotraj ogrevanega prostora.

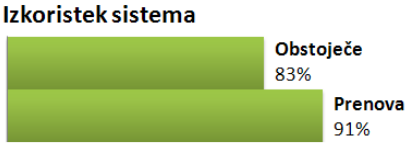




Sistem za pripravo tople vode

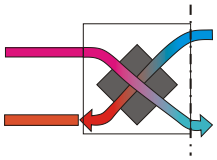
Centralna priprava tople vode kombinirana z ogrevalnim sistemom (nizkotemperaturni kotel). S cirkulacijo.





Sistem za prezračevanje

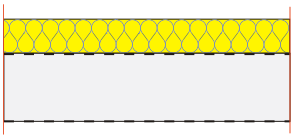
Brez sistema za mehansko prezračevanje.

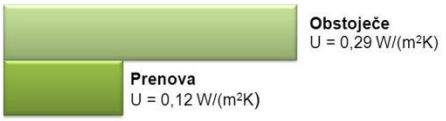


INTENZIVNA PRENOVA ZUNANJEGA OVOJA STAVBE

STREHA

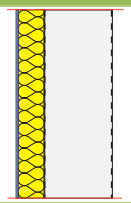
Dodatno 20 cm toplotne izolacije





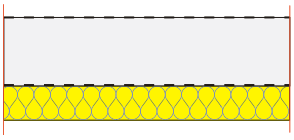
STENA

Dodatno 20 cm toplotne izolacije



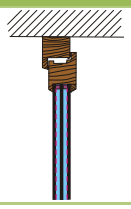
TLA

Dodatno 12 cm toplotne izolacije proti kleti



OKNA

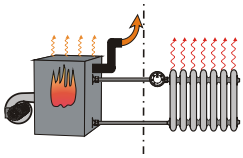
Vgradnja lesenega okna s troslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom



INTENZIVNA PRENOVA SISTEMOV

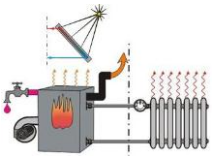
Sistem za ogrevanje

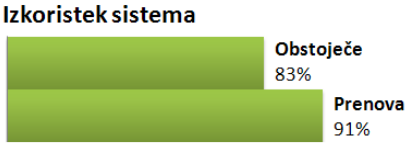
Nizkotemperaturni kotel v ogrevani kotlovnici, razvod znotraj ogrevanega prostora.



Sistem za pripravo tople vode

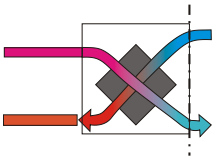
Centralna priprava tople vode kombinirana z ogrevalnim sistemom (nizkotemperaturni kotel + sprejemniki sončne energije). S cirkulacijo.





Sistem za prezračevanje

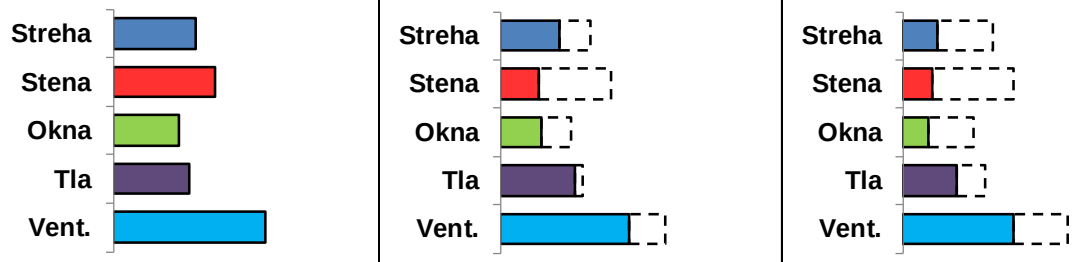
Brez sistema za mehansko prezračevanje.



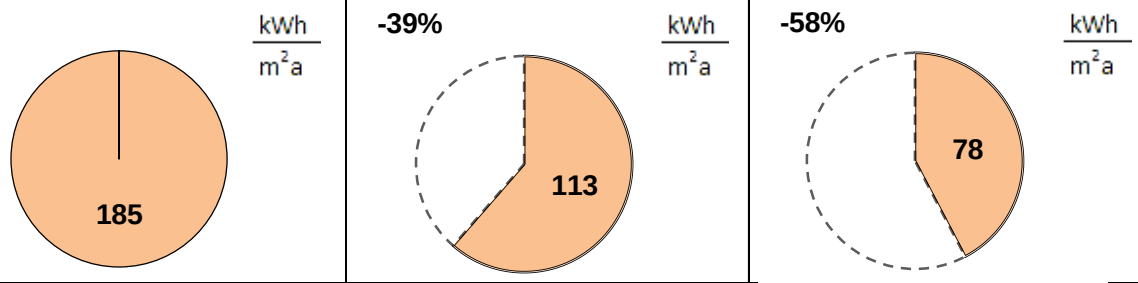
ENERGETSKI KAZALNIKI STAVBE

OSNOVNO STANJE	ZMERNA PRENOVA	INTENZIVNA PRENOVA

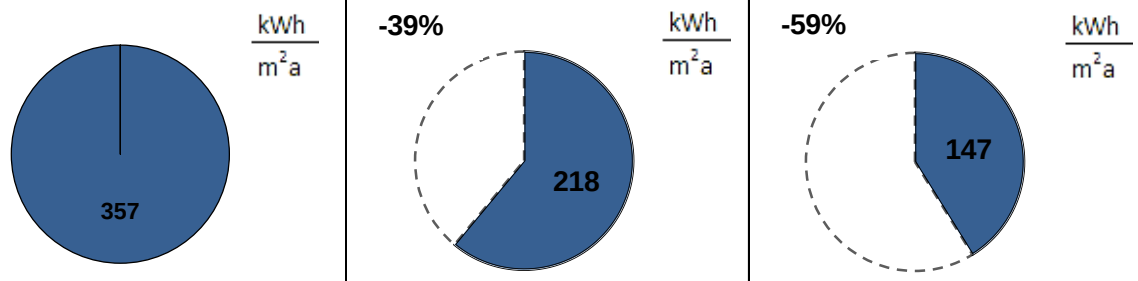
Toplotne izgube stavbe



Potrebna toplota za ogrevanje stavbe Qnh

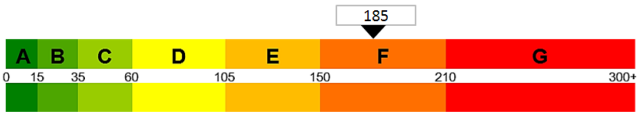


Primarna energija Qp

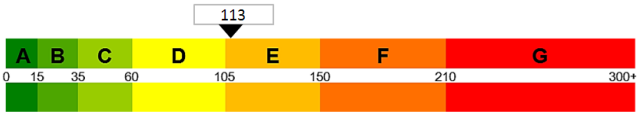


Razred energetske učinkovitosti (kWh/m²a)

Osnovno stanje

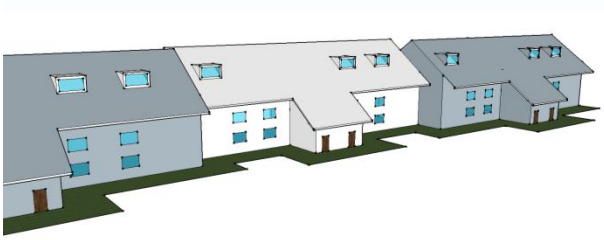


Zmerna prenova



Intenzivna prenova

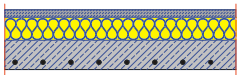
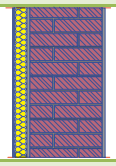
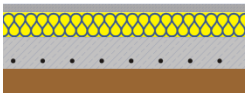
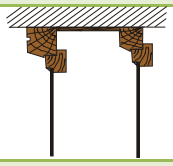
VRSTNA HIŠA

Arhitekturna zasnova	Primer
	

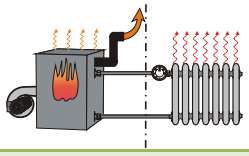
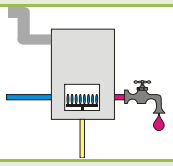
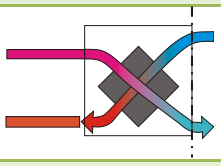
Država	Slovenija
Regija tipologije	Nacionalna
Zasnova	Dvojček v strnjeni obliki pozidave - grozd
Etažnost	
Leto izgradnje	2001
Uporabna površina	234,0 m^2
Tabula	SI.N.TH.04.Gen.ReEx.001.00

OPIS STAVBE - OSNOVNO STANJE

ZUNANJI OVOJ STAVBE

	Streha	Stena	Tla	Okna
Površina	133,20 m^2	169,80 m^2	145,82 m^2	55,0 m^2
Skica				
OPIS	Ravna streha z 20 cm toplotne izolacije	Votličava opeka 29 cm, toplotna izolacija 12 cm	Tla na terenu z 10 cm toplotne izolacije	Leseno škatlasto okno
U - faktor	0,20 W/(m^2K)	0,30 W/(m^2K)	0,33 W/(m^2K)	2,20 W/(m^2K)

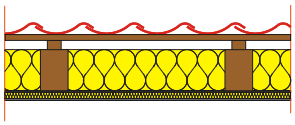
SISTEMI

Sistem	Sistem za ogrevanje	Sistem za pripravo tople vode	Sistem za prezračevanje
Skica			
Opis	Srednjetemperaturni standardni kotel ELKO v kotlovnici s hranilnikom, razvod je deloma v neogrevanem, deloma v ogrevanem prostoru.	Priprava tople vode s stenskim plinskim kotličkom.	Brez sistema za mehansko prezračevanje.

ZMERNA PRENOVA ZUNANJEGA OVOJA STAVBE

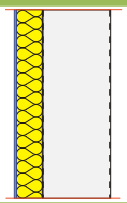
STREHA

Izolacija strehe, 12 cm med širovci, ter dodatnih 4 cm



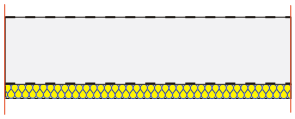
STENA

Dodatno 15 cm toplotne izolacije



TLA

Dodatno 6 cm toplotne izolacije proti kleti



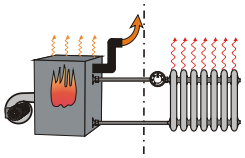
OKNA

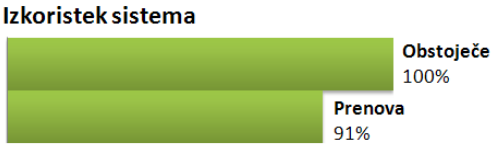
Vgradnja lesenega okna z dvoslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom

ZMERNA PRENOVA SISTEMOV

Sistem za ogrevanje

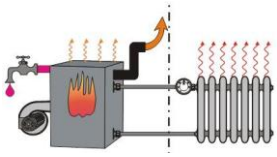
Nizkotemperaturni kotel v ogrevani kotlovnici, razvod znotraj ogrevanega prostora.

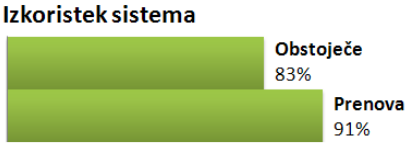




Sistem za pripravo tople vode

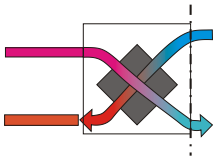
Centralna priprava tople vode kombinirana z ogrevalnim sistemom (nizkotemperaturni kotel). S cirkulacijo.





Sistem za prezračevanje

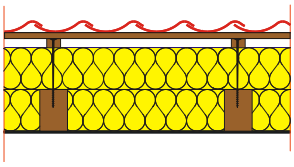
Brez sistema za mehansko prezračevanje.



INTENZIVNA PRENOVA ZUNANJEGA OVOJA STAVBE

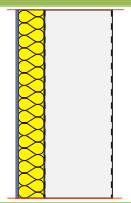
STREHA

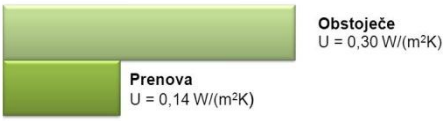
Izolacija strehe, 12 cm med širovci, ter dodatnih 18 cm



STENA

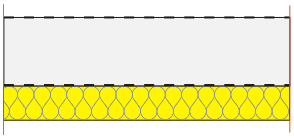
Dodatno 20 cm toplotne izolacije

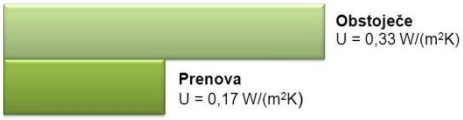




TLA

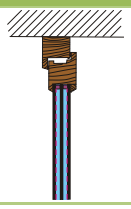
Dodatno 12 cm toplotne izolacije proti kleti





OKNA

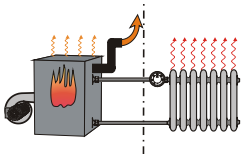
Vgradnja lesenega okna s troslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom



INTENZIVNA PRENOVA SISTEMOV

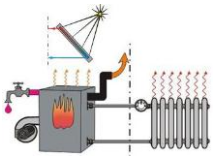
Sistem za ogrevanje

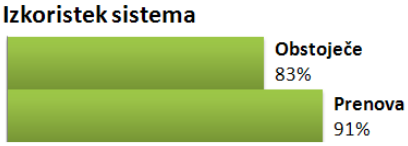
Nizkotemperaturni kotel v ogrevani kotlovnici, razvod znotraj ogrevanega prostora.



Sistem za pripravo tople vode

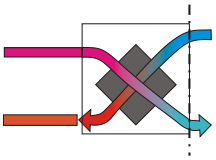
Centralna priprava tople vode kombinirana z ogrevalnim sistemom (nizkotemperaturni kotel + sprejemniki sončne energije). S cirkulacijo.





Sistem za prezračevanje

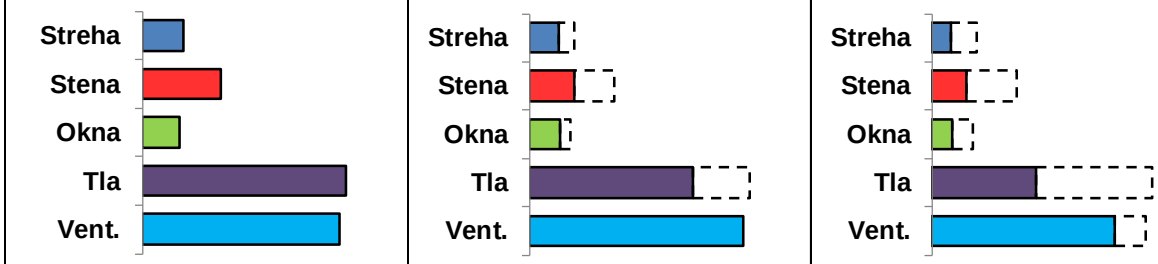
Brez sistema za mehansko prezračevanje.



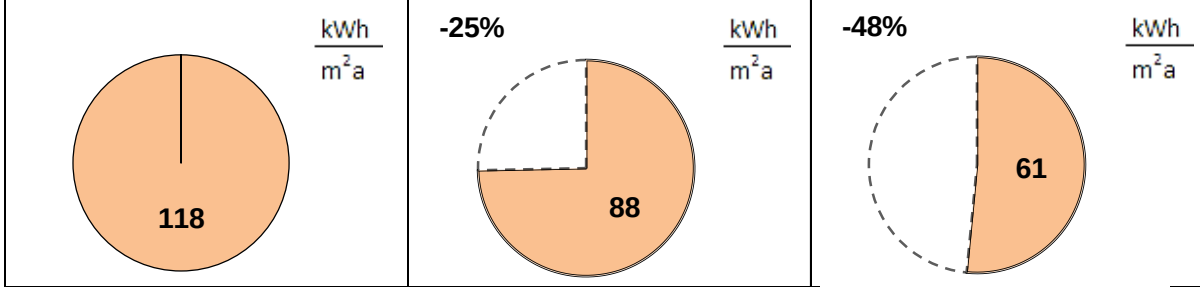
ENERGETSKI KAZALNIKI STAVBE

OSNOVNO STANJE	ZMERNA PRENOVA	INTENZIVNA PRENOVA

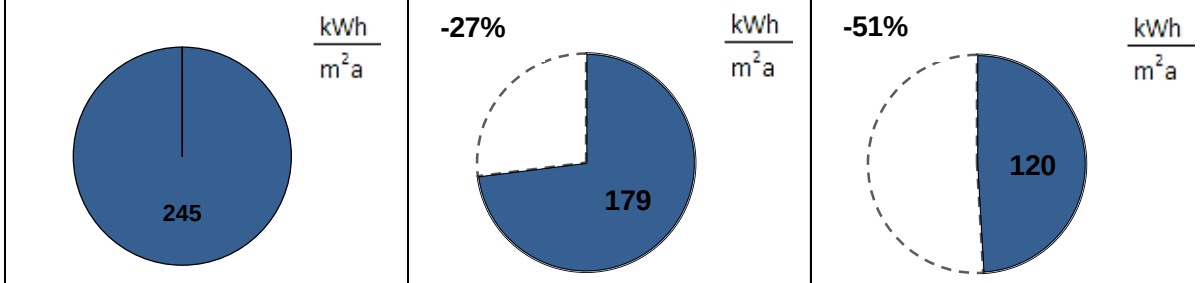
Toplotne izgube stavbe



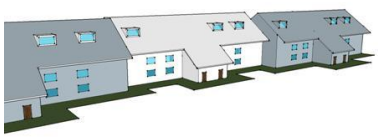
Potrebna toplota za ogrevanje stavbe Qnh

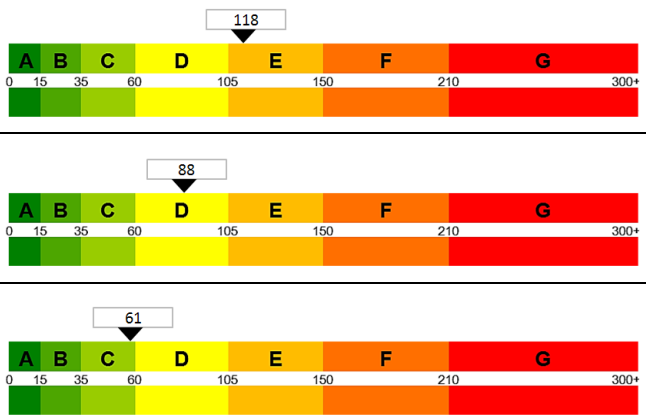


Primarna energija Qp

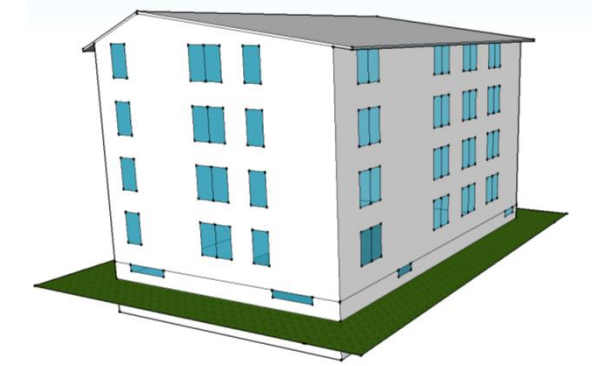


Razred energetske učinkovitosti (kWh/m²a)





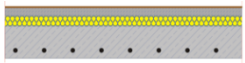
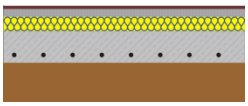
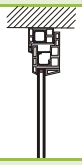
VEČSTANOVANJSKA STAVBA

Arhitekturna zasnova	Primer
	

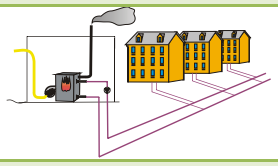
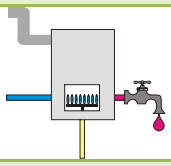
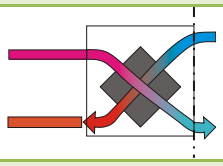
Država	Slovenija
Regija tipologije	Nacionalna
Zasnova	Preprosta kompaktna oblika
Etažnost	
Leto izgradnje	2001
Uporabna površina	876,38 m^2
Tabula	SI.N.MFH.04.Gen.ReEx.001.00

OPIS STAVBE - OSNOVNO STANJE

ZUNANJI OVOJ STAVBE

	Streha	Stena	Tla	Okna
Površina	140,0 m^2	916,6 m^2	233,0 m^2	101,5 m^2
Skica				
OPIS	Betonska plošča, toplotna izolacija 2 cm, betonski estrih, lesni pod	Betonska stena s 5 cm toplotne izolacije	Tla na terenu s 5 cm toplotne izolacije	PVC okno z dvoslojno toplotno izolacijsko zasteklitvijo
U - faktor	0,77 W/(m^2K)	0,62 W/(m^2K)	0,65 W/(m^2K)	1,40 W/(m^2K)

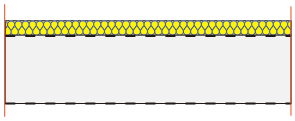
SISTEMI

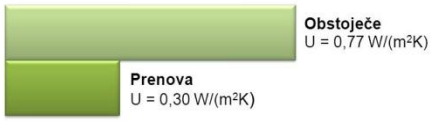
Sistem	Sistem za ogrevanje	Sistem za pripravo tople vode	Sistem za prezračevanje
Skica			
Opis	Daljinsko ogrevanje, priprava tople vode lokalno, toplotna postaja v neogrevani kotlovnici.	Priprava tople vode s stenskim plinskim kotličkom.	Brez sistema za mehansko prezračevanje.

ZMERNA PRENOVA ZUNANJEGA OVOJA STAVBE

STREHA

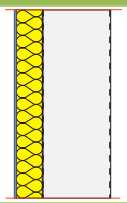
Dodatno 8 cm toplotne izolacije





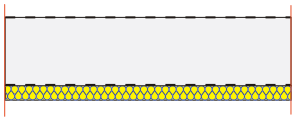
STENA

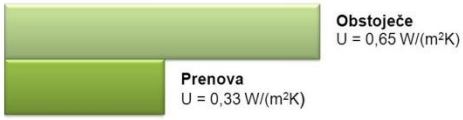
Dodatno 15 cm toplotne izolacije



TLA

Dodatno 6 cm toplotne izolacije proti kleti





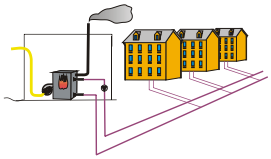
OKNA

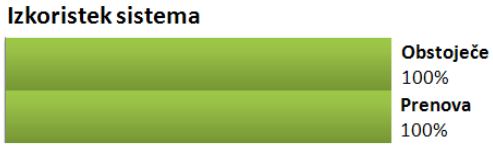
Vgradnja lesenega okna z dvoslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom

ZMERNA PRENOVA SISTEMOV

Sistem za ogrevanje

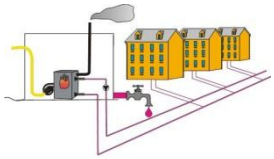
Daljinsko ogrevanje, priprava tople vode centralno, toplotna postaja v neogrevani kotlovnici.

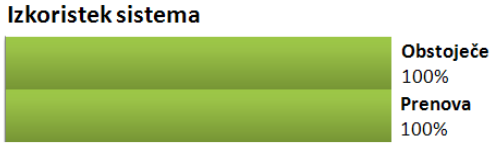




Sistem za pripravo tople vode

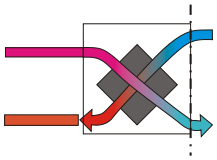
Daljinsko ogrevanje za ogrevanje in pripravo tople vode. Naprave nameščene v neogrevanem prostoru.





Sistem za prezračevanje

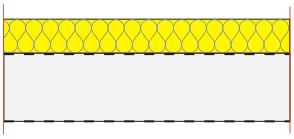
Brez sistema za mehansko prezračevanje.



INTENZIVNA PRENOVA ZUNANJEGA OVOJA STAVBE

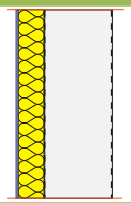
STREHA

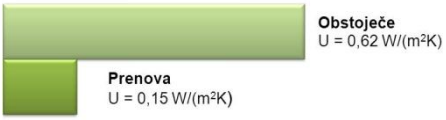
Dodatno 20 cm toplotne izolacije



STENA

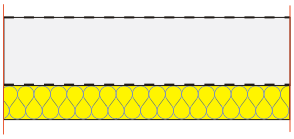
Dodatno 20 cm toplotne izolacije

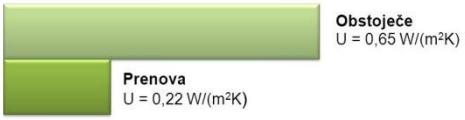




TLA

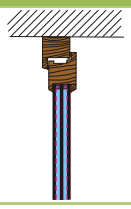
Dodatno 12 cm toplotne izolacije proti kleti





OKNA

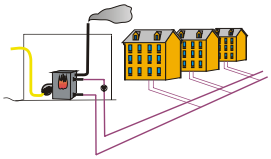
Vgradnja lesenega okna s troslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom

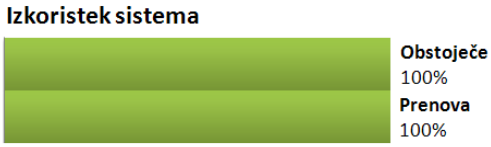


INTENZIVNA PRENOVA SISTEMOV

Sistem za ogrevanje

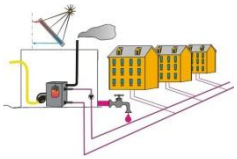
Daljinsko ogrevanje, priprava tople vode centralno, toplotna postaja v neogrevani kotlovnici.

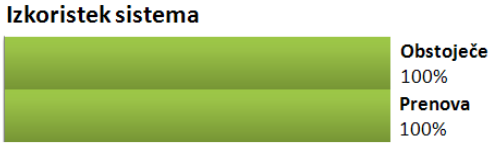




Sistem za pripravo tople vode

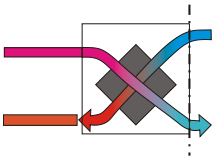
Daljinsko ogrevanje + sprejemniki sončne energije za ogrevanje in pripravo tople vode. Naprave nameščene v ogrevanem prostoru. S





Sistem za prezračevanje

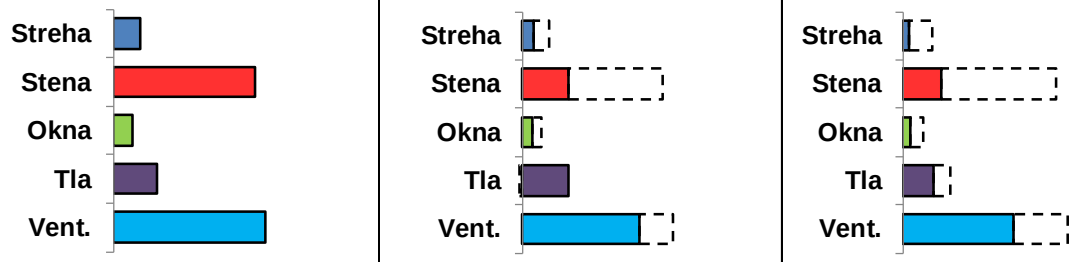
Brez sistema za **mehansko** prezračevanje.



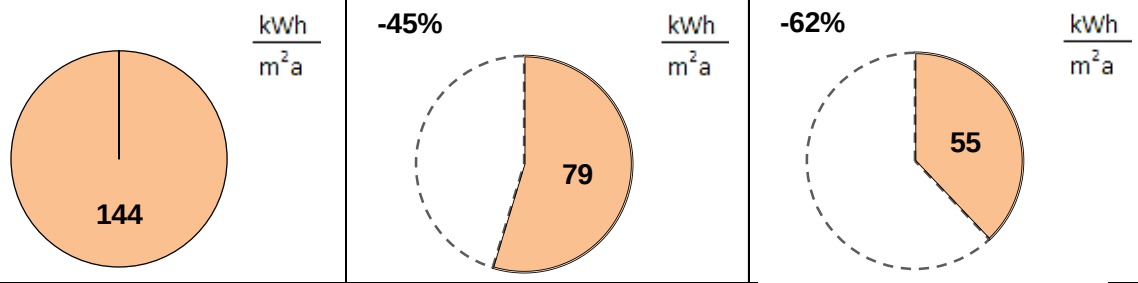
ENERGETSKI KAZALNIKI STAVBE

OSNOVNO STANJE	ZMERNA PRENOVA	INTENZIVNA PRENOVA

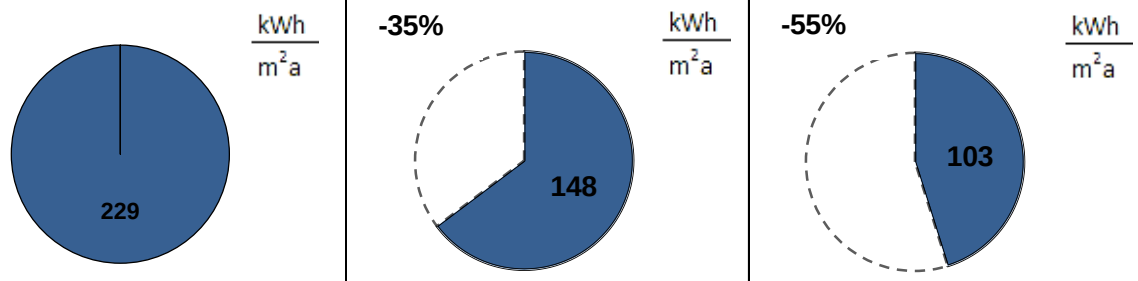
Toplotne izgube stavbe



Potrebna toplota za ogrevanje stavbe Qnh

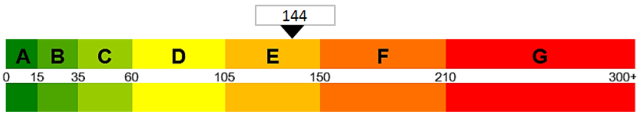


Primarna energija Qp



Razred energetske učinkovitosti (kWh/m²a)

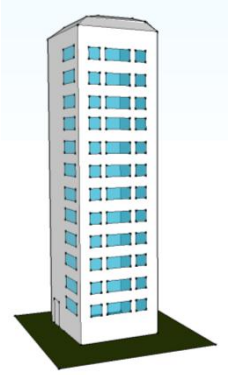
Osnovno stanje



Zmerna prenova

Intenzivna prenova

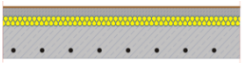
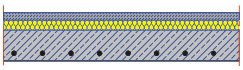
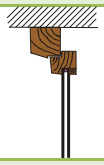
STANOVANJSKI BLOK - STOLPNICA

Arhitekturna zasnova	Primer
	

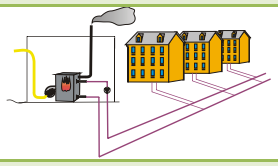
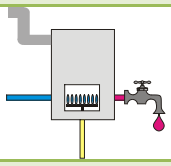
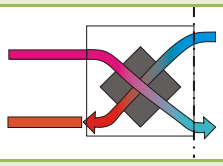
Država	Slovenija
Regija tipologije	Nacionalna
Zasnova	Preprosta kompaktna oblika
Etažnost	
Leto izgradnje	2001
Uporabna površina	2165,0 m^2
Tabula	SI.N.AB.04.Gen.ReEx.001.00

OPIS STAVBE - OSNOVNO STANJE

ZUNANJI OVOJ STAVBE

	Streha	Stena	Tla	Okna
Površina	280,0 m^2	1720,0 m^2	280,0 m^2	420,0 m^2
Skica				
OPIS	Betonska plošča, toplotna izolacija 5 cm, betonski estrih, lesni pod	Betonska stena s 5 cm toplotne izolacije	Betonska plošča, toplotna izolacija 2 cm, betonski estrih, lesni pod	Lesno okno z dvojno zasteklitvijo
U - faktor	0,56 W/(m^{2}K)	0,62 W/(m^{2}K)	0,77 W/(m^{2}K)	2,8 W/(m^{2}K)

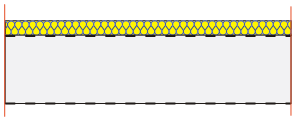
SISTEMI

Sistem	Sistem za ogrevanje	Sistem za pripravo tople vode	Sistem za prezračevanje
Skica			
Opis	Daljinsko ogrevanje, priprava tople vode lokalno, toplotna postaja v neogrevani kotlovnici.	Priprava tople vode s stenskim plinskim kotličkom.	Brez sistema za mehansko prezračevanje.

ZMERNA PRENOVA ZUNANJEGA OVOJA STAVBE

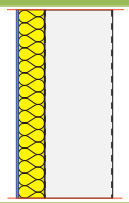
STREHA

Dodatno 8 cm toplotne izolacije



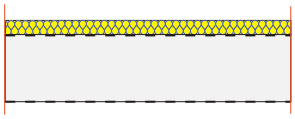
STENA

Dodatno 15 cm toplotne izolacije



TLA

Dodatno 8 cm toplotne izolacije



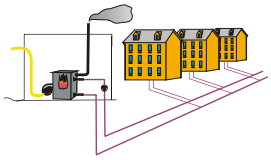
OKNA

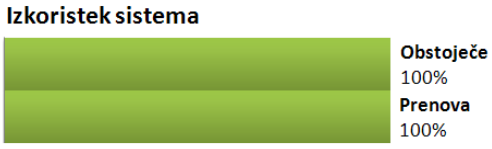
Vgradnja lesenega okna z dvoslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom

ZMERNA PRENOVA SISTEMOV

Sistem za ogrevanje

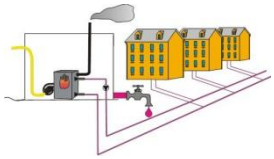
Daljinsko ogrevanje, priprava tople vode centralno, toplotna postaja v neogrevani kotlovnici.

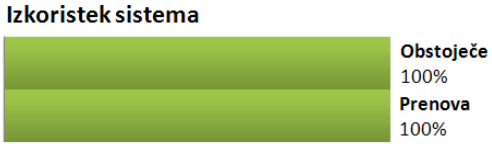




Sistem za pripravo tople vode

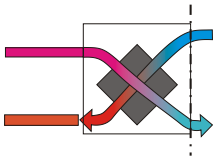
Daljinsko ogrevanje za ogrevanje in pripravo tople vode. Naprave nameščene v neogrevanem prostoru.





Sistem za prezračevanje

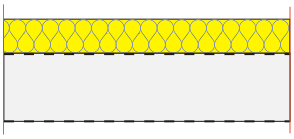
Brez sistema za mehansko prezračevanje.



INTENZIVNA PRENOVA ZUNANJEGA OVOJA STAVBE

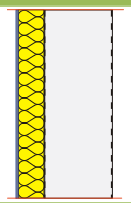
STREHA

Dodatno 20 cm toplotne izolacije



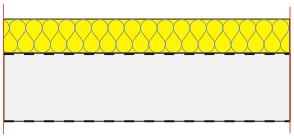
STENA

Dodatno 20 cm toplotne izolacije



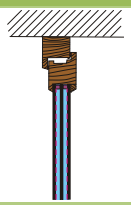
TLA

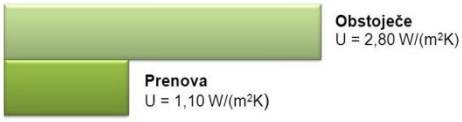
Dodatno 20 cm toplotne izolacije



OKNA

Vgradnja lesenega okna s troslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom

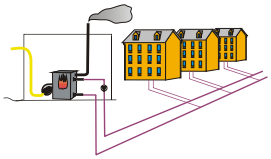


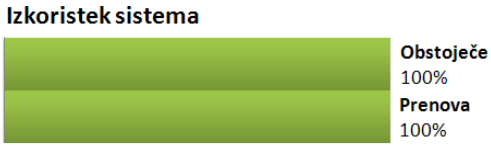


INTENZIVNA PRENOVA SISTEMOV

Sistem za ogrevanje

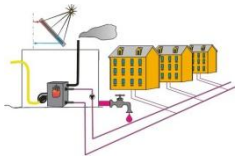
Daljinsko ogrevanje, priprava tople vode centralno, toplotna postaja v neogrevani kotlovnici.

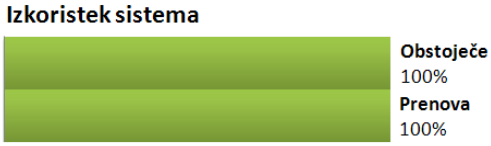




Sistem za pripravo tople vode

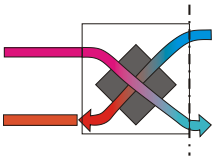
Daljinsko ogrevanje + sprejemniki sončne energije za ogrevanje in pripravo tople vode. Naprave nameščene v ogrevanem prostoru. S





Sistem za prezračevanje

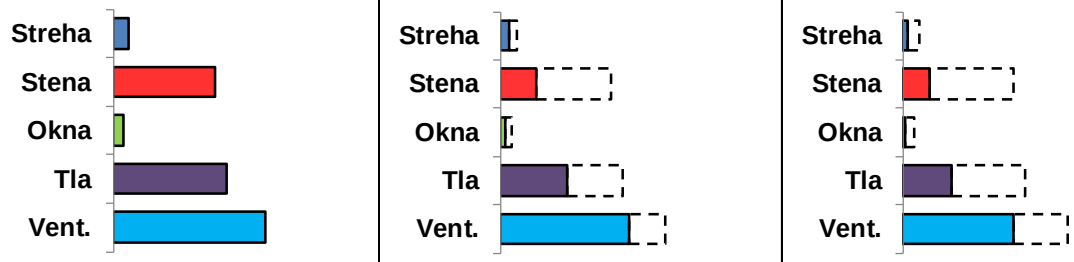
Brez sistema za mehansko prezračevanje.



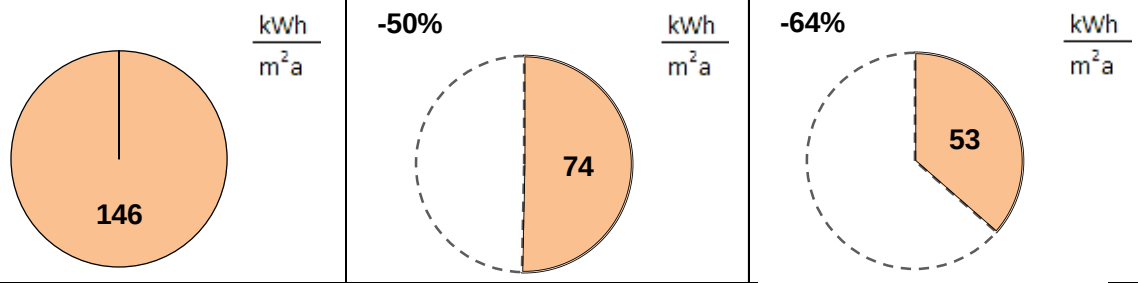
ENERGETSKI KAZALNIKI STAVBE

OSNOVNO STANJE	ZMERNA PRENOVA	INTENZIVNA PRENOVA

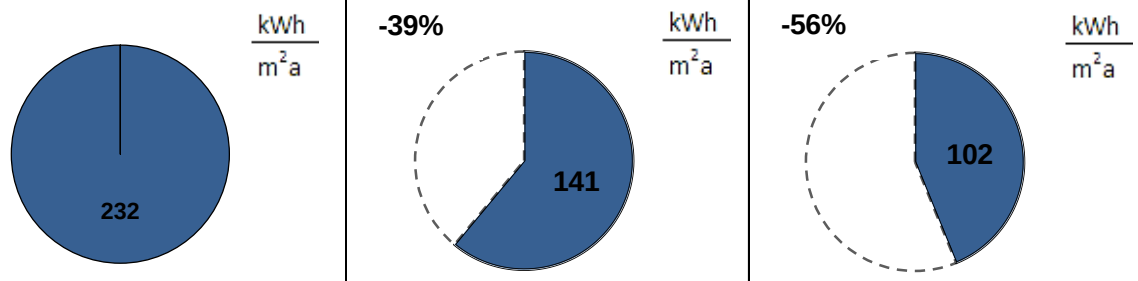
Toplotne izgube stavbe



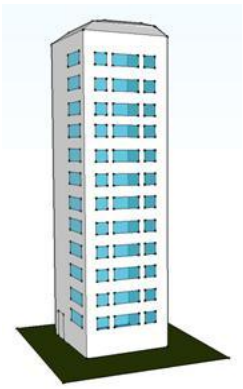
Potrebna toplota za ogrevanje stavbe Qnh



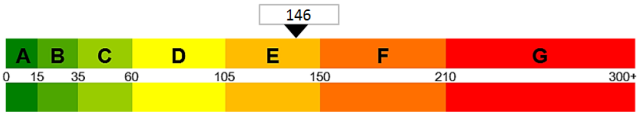
Primarna energija Qp



Razred energetske učinkovitosti (kWh/m²a)



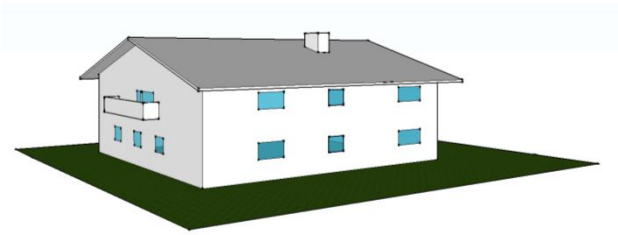
Osnovno stanje



Zmerna prenova

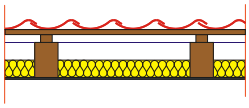
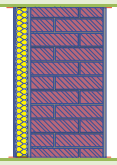
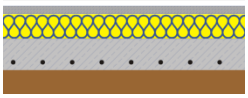
Intenzivna prenova

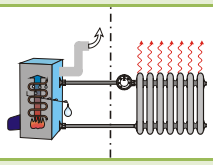
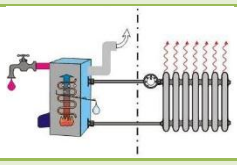
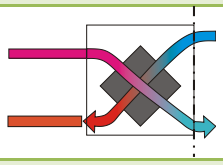
Obdobje 2002 – 2008

ENODRUŽINSKA HIŠA	
Arhitekturna zasnova	**Primer**
	

Država	Slovenija
Regija tipologije	Nacionalna
Zasnova	Preprosta kompaktna oblika
Etažnost	
Leto izgradnje	2008
Uporabna površina	285,0 m^2
Tabula	SI.N.SFH.05.Gen.ReEx.001.00

OPIS STAVBE - OSNOVNO STANJE

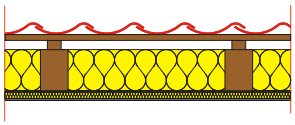
ZUNANJI OVOJ STAVBE				
	Streha	**Stena**	**Tla**	**Okna**
Površina	69,13 m^2	235,93 m^2	104,24 m^2	29,95 m^2
Skica				
OPIS	Poševna streha z 20 cm toplotne izolacije med škarniki	Votličava opeka 29 cm, toplotna izolacija 8 cm	Tla na terenu z 10 cm toplotne izolacije	PVC okno z dvoslojno toplotno izolacijsko zasteklitvijo
U - faktor	0,20 W/(m^2K)	0,38 W/(m^2K)	0,30 W/(m^2K)	1,4 W/(m^2K)

SISTEMI			
Sistem	Sistem za ogrevanje	Sistem za pripravo tople vode	Sistem za prezračevanje
Skica			
Opis	Zračna toplotna črpalka, hranilnik in razvodni sistem je v ogrevanem prostoru, obtočna črpalka.	Centralna priprava tople vode kombinirana z ogrevalnim sistemom (zračna toplotna črpalka). S cirkulacijo.	Brez sistema za mehansko prezračevanje.

ZMERNA PRENOVA ZUNANJEGA OVOJA STAVBE

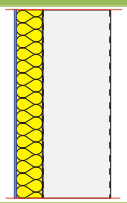
STREHA

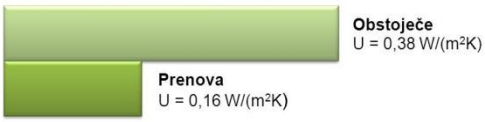
Izolacija strehe, 12 cm med širovci, ter dodatnih 4 cm



STENA

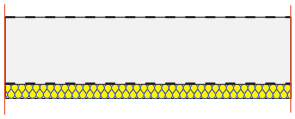
Dodatno 15 cm toplotne izolacije





TLA

Dodatno 6 cm toplotne izolacije proti kleti



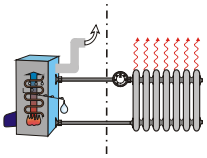
OKNA

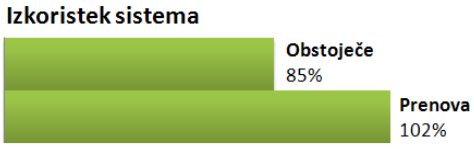
Vgradnja lesenega okna z dvoslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom

ZMERNA PRENOVA SISTEMOV

Sistem za ogrevanje

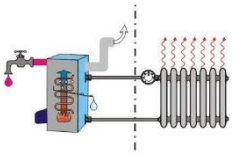
Nov kondenzacijski plinski kotel v ogrevani kotlovnici, razvod znotraj ogrevanega prostora.

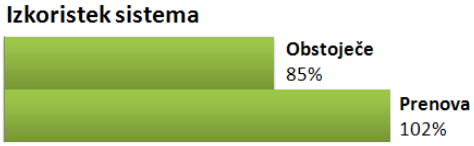




Sistem za pripravo tople vode

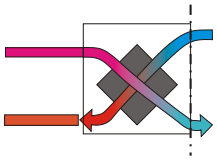
Centralna priprava tople vode kombinirana z ogrevalnim sistemom (nov kondenzacijski kotel). S cirkulacijo.





Sistem za prezračevanje

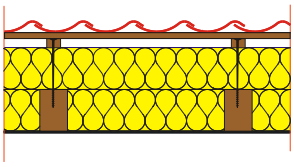
Brez sistema za mehansko prezračevanje.

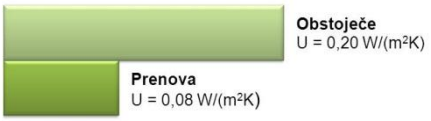


INTENZIVNA PRENOVA ZUNANJEGA OVOJA STAVBE

STREHA

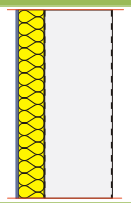
Izolacija strhe, 12 cm med širovci, ter dodatnih 18 cm





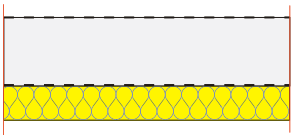
STENA

Dodatno 20 cm toplotne izolacije



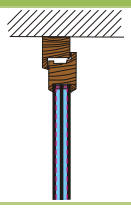
TLA

Dodatno 12 cm toplotne izolacije proti kleti



OKNA

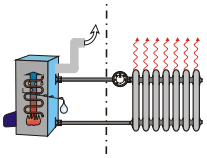
Vgradnja lesenega okna s troslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom

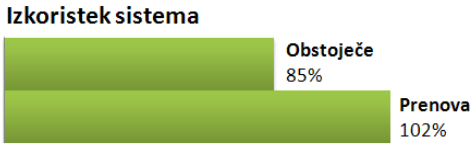


INTENZIVNA PRENOVA SISTEMOV

Sistem za ogrevanje

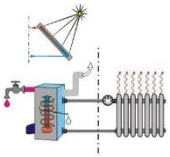
Nov kondenzacijski plinski kotel v ogrevani kotlovnici, razvod znotraj ogrevanega prostora. Sončni sprejemniki za

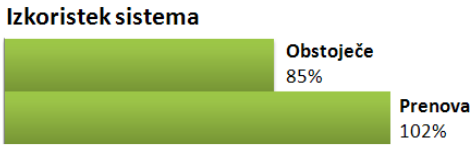




Sistem za pripravo tople vode

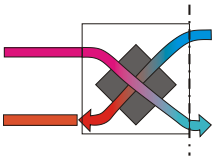
Centralna priprava tople vode kombinirana z ogrevalnim sistemom (nov kondenzacijski kotel + sprejemniki sončne energije). S cirkulacijo.





Sistem za prezračevanje

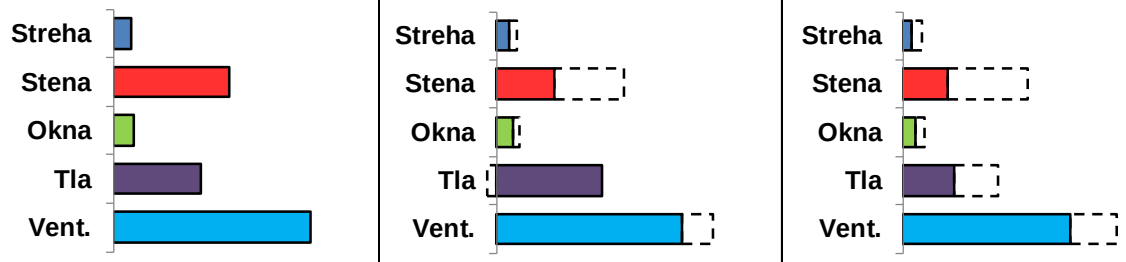
Brez sistema za mehansko prezračevanje.



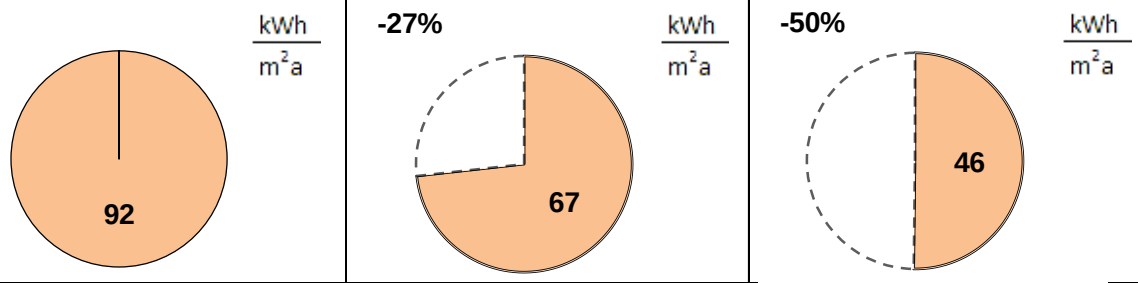
ENERGETSKI KAZALNIKI STAVBE

OSNOVNO STANJE	ZMERNA PRENOVA	INTENZIVNA PRENOVA

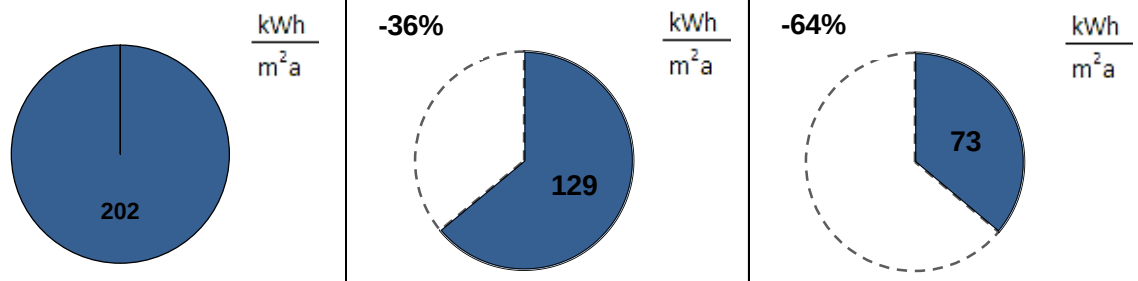
Toplotne izgube stavbe



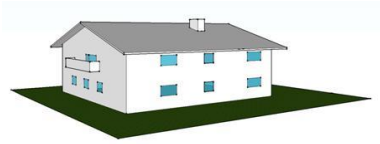
Potrebna toplota za ogrevanje stavbe Qnh



Primarna energija Qp



Razred energetske učinkovitosti (kWh/m²a)

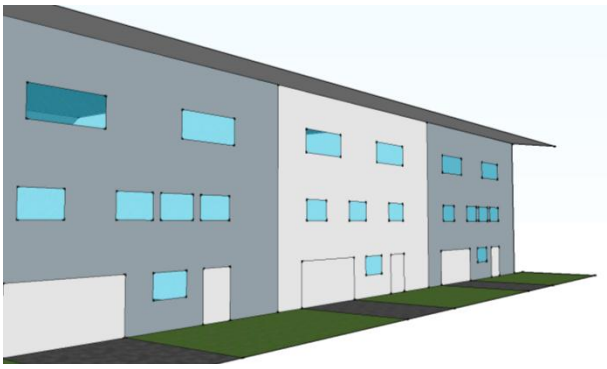


Osnovno stanje

Zmerna prenova

Intenzivna prenova

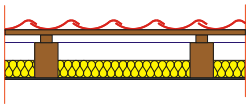
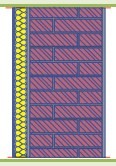
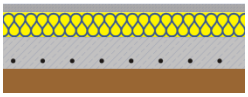
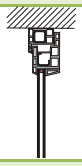
VRSTNA HIŠA

Arhitekturna zasnova	Primer
	

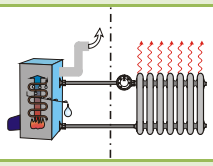
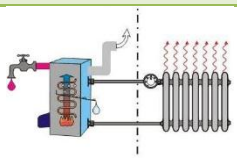
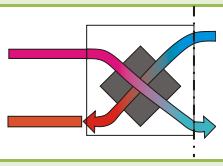
Država	Slovenija
Regija tipologije	Nacionalna
Zasnova	Enodružinska hiša v strnjeni obliki pozidave
Etažnost	
Leto izgradnje	2008
Uporabna površina	174,0 m^2
Tabula	SI.N.TH.05.Gen.ReEx.001.00

OPIS STAVBE - OSNOVNO STANJE

ZUNANJI OVOJ STAVBE

	Streha	Stena	Tla	Okna
Površina	162,68 m^2	134,17 m^2	161,23 m^2	20,50 m^2
Skica				
OPIS	Poševna streha z 20 cm toplotne izolacije med škarniki	Votličava opeka 29 cm, toplotna izolacija 12 cm	Tla na terenu z 10 cm toplotne izolacije	PVC okno z dvoslojno toplotno izolacijsko zasteklitvijo
U - faktor	0,20 W/(m^2K)	0,30 W/(m^2K)	0,33 W/(m^2K)	1,40 W/(m^2K)

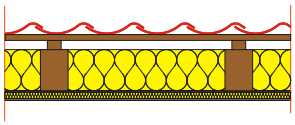
SISTEMI

Sistem	Sistem za ogrevanje	Sistem za pripravo tople vode	Sistem za prezračevanje
Skica			
Opis	Star kondenzacijski plinski kotel v ogrevani kotlovnici, razvod znotraj ogrevanega prostora.	Centralna priprava tople vode kombinirana z ogrevalnim sistemom (star kondenzacijski kotel). S cirkulacijo.	Brez sistema za mehansko prezračevanje.

ZMERNA PRENOVA ZUNANJEGA OVOJA STAVBE

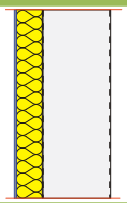
STREHA

Izolacija strehe, 12 cm med širovci, ter dodatnih 4 cm



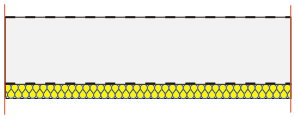
STENA

Dodatno 15 cm toplotne izolacije



TLA

Dodatno 6 cm toplotne izolacije proti kleti



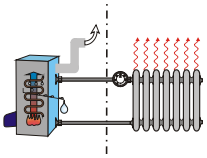
OKNA

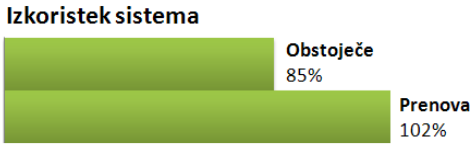
Vgradnja lesenega okna z dvoslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom

ZMERNA PRENOVA SISTEMOV

Sistem za ogrevanje

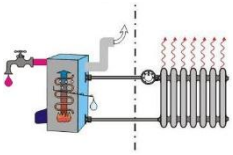
Nizkotemperaturni kotel v ogrevani kotlovnici, razvod znotraj ogrevanega prostora.

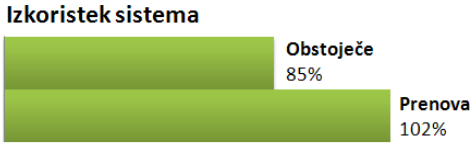




Sistem za pripravo tople vode

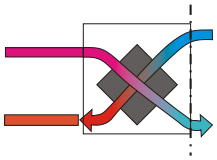
Centralna priprava tople vode kombinirana z ogrevalnim sistemom (nov kondenzacijski kotel). S cirkulacijo.





Sistem za prezračevanje

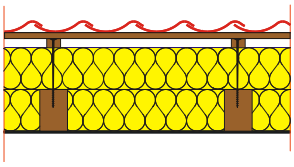
Brez sistema za mehansko prezračevanje.

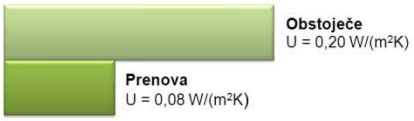


INTENZIVNA PRENOVA ZUNANJEGA OVOJA STAVBE

STREHA

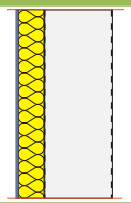
Izolacija strehe, 12 cm med širovci, ter dodatnih 18 cm

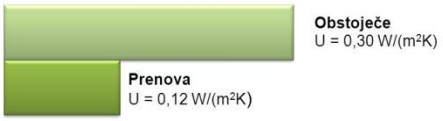




STENA

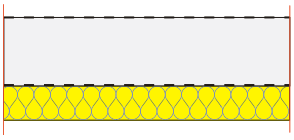
Dodatno 20 cm toplotne izolacije

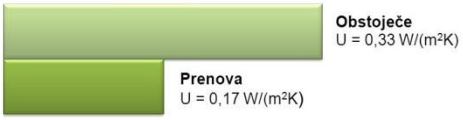




TLA

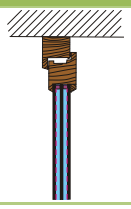
Dodatno 12 cm toplotne izolacije proti kleti





OKNA

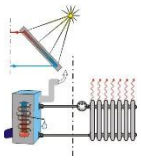
Vgradnja lesenega okna s troslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom

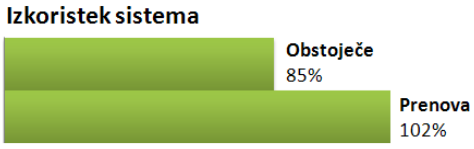


INTENZIVNA PRENOVA SISTEMOV

Sistem za ogrevanje

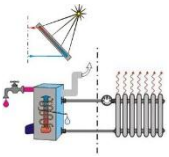
Nov kondenzacijski plinski kotel v ogrevani kotlovnici, razvod znotraj ogrevanega prostora. Sončni sprejemniki za ogrevanje in pripravo

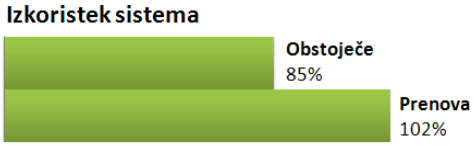




Sistem za pripravo tople vode

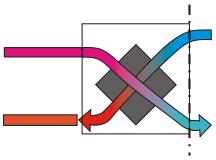
Centralna priprava tople vode kombinirana z ogrevalnim sistemom (nov kondenzacijski kotel + sprejemniki sončne energije). S cirkulacijo.





Sistem za prezračevanje

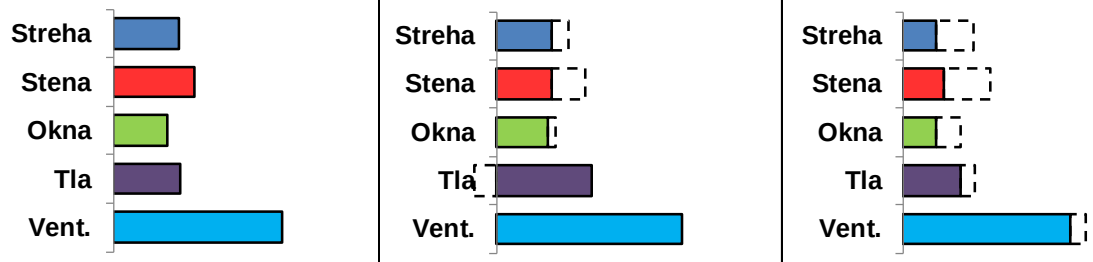
Brez sistema za mehansko prezračevanje.



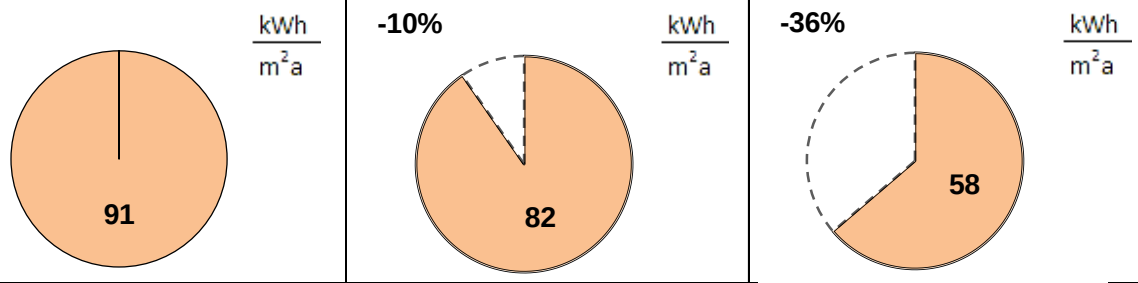
ENERGETSKI KAZALNIKI STAVBE

OSNOVNO STANJE	ZMERNA PRENOVA	INTENZIVNA PRENOVA

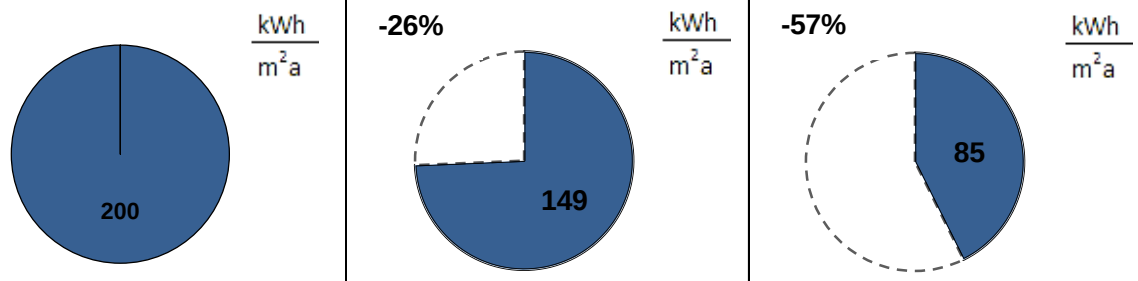
Toplotne izgube stavbe



Potrebna toplota za ogrevanje stavbe Qnh



Primarna energija Qp



Razred energetske učinkovitosti (kWh/m²a)

Osnovno stanje

Zmerna prenova

Intenzivna prenova

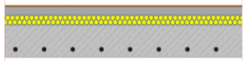
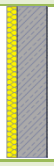
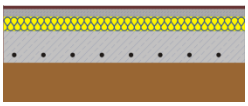
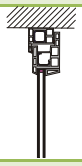
VEČSTANOVANJSKA STAVBA

Arhitekturna zasnova	Primer

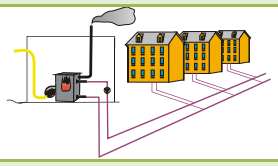
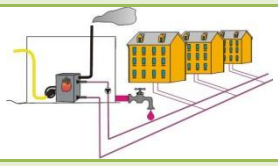
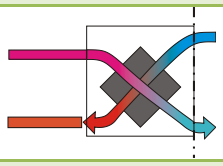
Država	Slovenija
Regija tipologije	Nacionalna
Zasnova	Preprosta kompaktna oblika
Etažnost	
Leto izgradnje	2002
Uporabna površina	661,72 m^2
Tabula	SI.N.MFH.05.Gen.ReEx.001.00

OPIS STAVBE - OSNOVNO STANJE

ZUNANJI OVOJ STAVBE

	Streha	Stena	Tla	Okna
Površina	246,18 m^2	767,18 m^2	492,36 m^2	143,81 m^2
Skica				
OPIS	Betonska plošča, toplotna izolacija 8 cm, betonski estrih, lesni pod	Betonska stena z 10 cm toplotne izolacije	Tla na terenu s 5 cm toplotne izolacije	PVC okno z dvoslojno toplotno izolacijsko zasteklitvijo
U - faktor	0,45 W/(m^2K)	0,35 W/(m^2K)	0,40 W/(m^2K)	1,40 W/(m^2K)

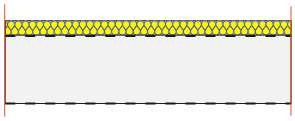
SISTEMI

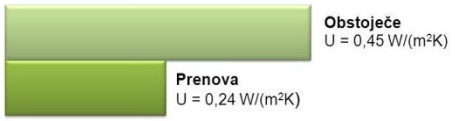
Sistem	Sistem za ogrevanje	Sistem za pripravo tople vode	Sistem za prezračevanje
Skica			
Opis	Daljinsko ogrevanje, priprava tople vode centralno, toplotna postaja v neogrevani kotlovnici. Daljinsko ogrevanje za ogrevanje in pripravo tople vode. Naprave nameščene v neogrevanem prostoru.		Brez sistema za mehansko prezračevanje.

ZMERNA PRENOVA ZUNANJEGA OVOJA STAVBE

STREHA

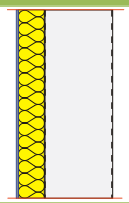
Dodatno 8 cm toplotne izolacije





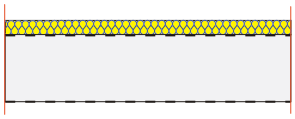
STENA

Dodatno 15 cm toplotne izolacije



TLA

Dodatno 8 cm toplotne izolacije



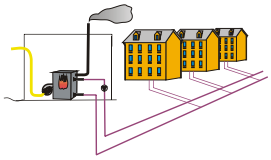
OKNA

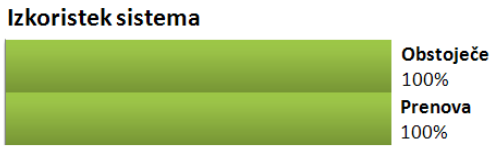
Vgradnja lesenega okna z dvoslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom

ZMERNA PRENOVA SISTEMOV

Sistem za ogrevanje

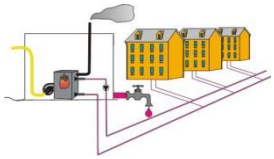
Daljinsko ogrevanje, priprava tople vode centralno, toplotna postaja v neogrevani kotlovnici.

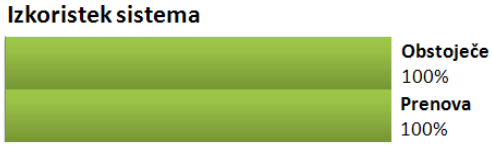




Sistem za pripravo tople vode

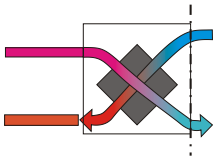
Daljinsko ogrevanje za ogrevanje in pripravo tople vode. Naprave nameščene v neogrevanem prostoru.





Sistem za prezračevanje

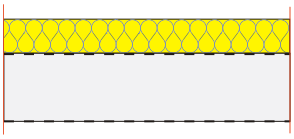
Brez sistema za mehansko prezračevanje.



INTENZIVNA PRENOVA ZUNANJEGA OVOJA STAVBE

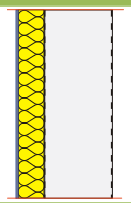
STREHA

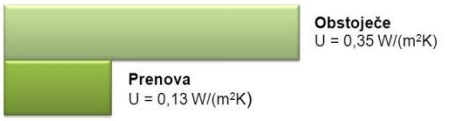
Dodatno 20 cm toplotne izolacije



STENA

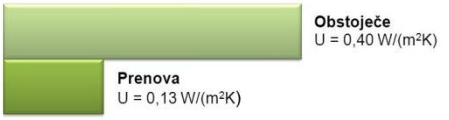
Dodatno 20 cm toplotne izolacije





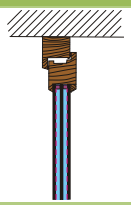
TLA

Dodatno 20 cm toplotne izolacije



OKNA

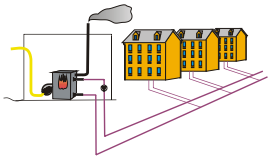
Vgradnja lesenega okna s troslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom

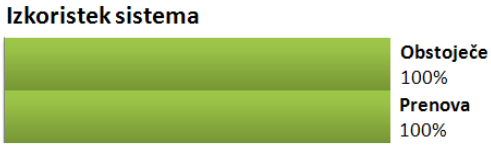


INTENZIVNA PRENOVA SISTEMOV

Sistem za ogrevanje

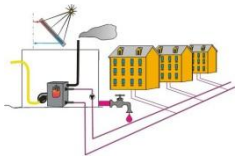
Daljinsko ogrevanje, priprava tople vode centralno, toplotna postaja v neogrevani kotlovnici.

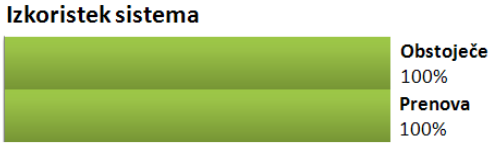




Sistem za pripravo tople vode

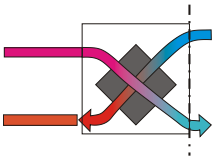
Daljinsko ogrevanje + sprejemniki sončne energije za ogrevanje in pripravo tople vode. Naprave nameščene v ogrevanem prostoru. S





Sistem za prezračevanje

Brez sistema za mehansko prezračevanje.

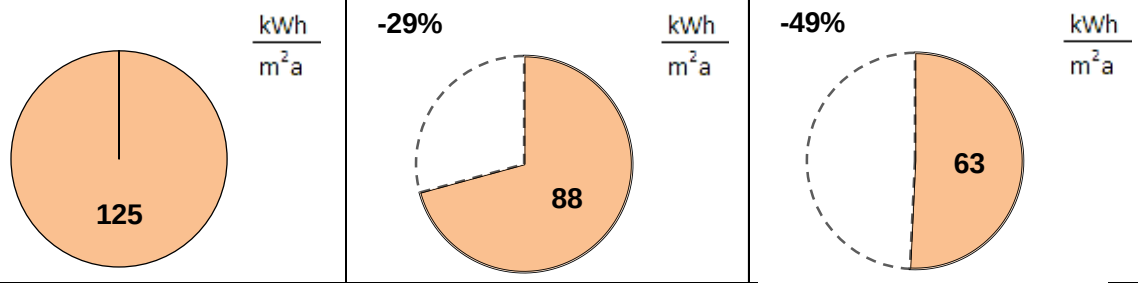


ENERGETSKI KAZALNIKI STAVBE

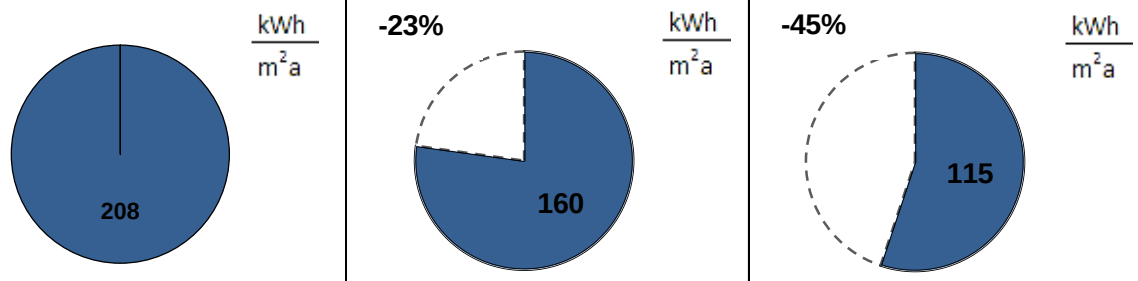
OSNOVNO STANJE	ZMERNA PRENOVA	INTENZIVNA PRENOVA

Toplotne izgube stavbe

Potrebna toplota za ogrevanje stavbe Qnh

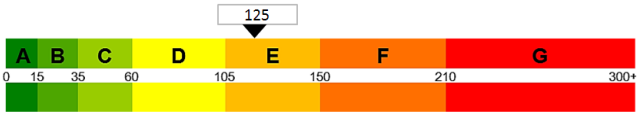


Primarna energija Qp



Razred energetske učinkovitosti (kWh/m²a)

Osnovno stanje



Zmerna prenova

Intenzivna prenova

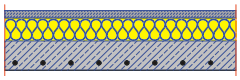
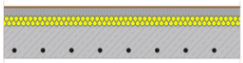
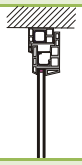
STANOVANJSKI BLOK - STOLPNICA

Arhitekturna zasnova	Primer

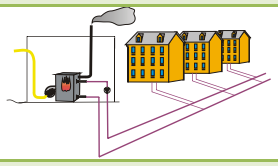
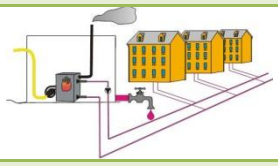
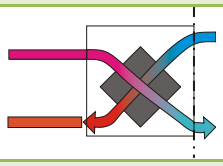
Država	Slovenija
Regija tipologije	Nacionalna
Zasnova	Enostavna prizmatična oblika
Etažnost	
Leto izgradnje	2008
Uporabna površina	15742,0 m^2
Tabula	SI.N.AB.05.Gen.ReEx.001.00

OPIS STAVBE - OSNOVNO STANJE

ZUNANJI OVOJ STAVBE

	Streha	Stena	Tla	Okna
Površina	34,83,0 m^2	5203,0 m^2	2520,0 m^2	1982,0 m^2
Skica				
OPIS	Ravna streha z 20 cm toplotne izolacije	Betonska stena z 12 cm toplotne izolacije	Betonska plošča, toplotna izolacija 15 cm	PVC okno z dvoslojno toplotno izolacijsko zasteklitvijo
U - faktor	0,20 W/(m^2K)	0,30 W/(m^2K)	0,24 W/(m^2K)	1,4 W/(m^2K)

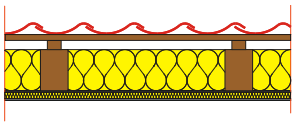
SISTEMI

Sistem	Sistem za ogrevanje	Sistem za pripravo tople vode	Sistem za prezračevanje
Skica			
Opis	Daljinsko ogrevanje, priprava tople vode centralno, toplotna postaja v neogrevani kotlovnici. Daljinsko ogrevanje za ogrevanje in pripravo tople vode. Naprave nameščene v neogrevanem prostoru.		Brez sistema za mehansko prezračevanje.

ZMERNA PRENOVA ZUNANJEGA OVOJA STAVBE

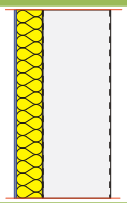
STREHA

Izolacija strehe, 12 cm med širovci, ter dodatnih 4 cm



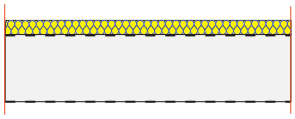
STENA

Dodatno 15 cm toplotne izolacije



TLA

Dodatno 8 cm toplotne izolacije



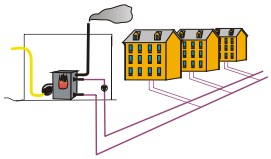
OKNA

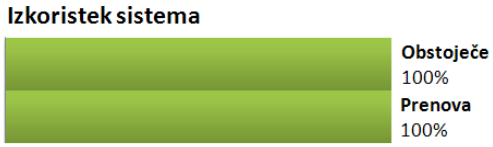
Vgradnja lesenega okna z dvoslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom

ZMERNA PRENOVA SISTEMOV

Sistem za ogrevanje

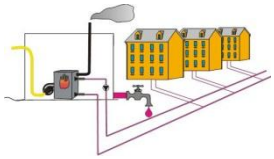
Daljinsko ogrevanje, priprava tople vode centralno, toplotna postaja v neogrevani kotlovnici.

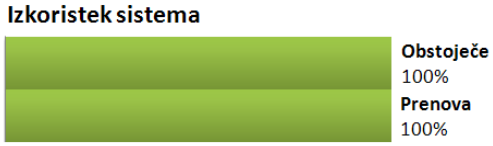




Sistem za pripravo tople vode

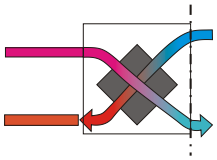
Daljinsko ogrevanje za ogrevanje in pripravo tople vode. Naprave nameščene v neogrevanem prostoru.





Sistem za prezračevanje

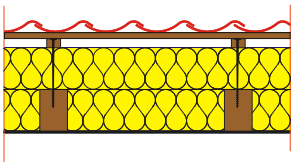
Brez sistema za mehansko prezračevanje.



INTENZIVNA PRENOVA ZUNANJEGA OVOJA STAVBE

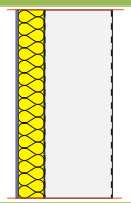
STREHA

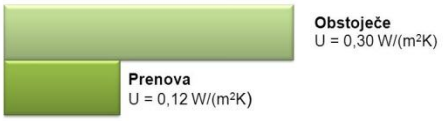
Izolacija strhe, 12 cm med širovci, ter dodatnih 10 cm



STENA

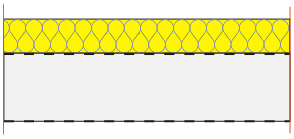
Dodatno 20 cm toplotne izolacije

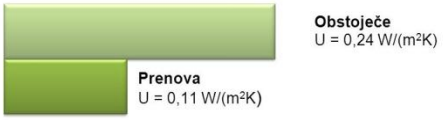




TLA

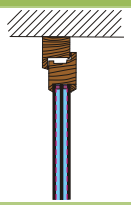
Dodatno 20 cm toplotne izolacije





OKNA

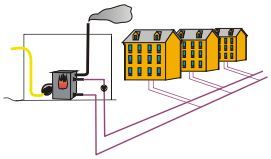
Vgradnja lesenega okna s troslojno nizkoemisivno zasteklitvijo in medstekelnim prostorom polnjenim z žlahtnim plinom

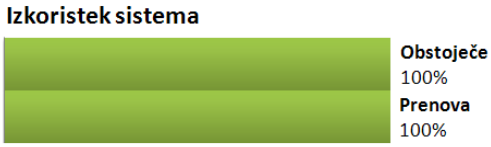


INTENZIVNA PRENOVA SISTEMOV

Sistem za ogrevanje

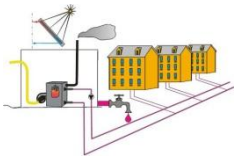
Daljinsko ogrevanje, priprava tople vode centralno, toplotna postaja v neogrevani kotlovnici.

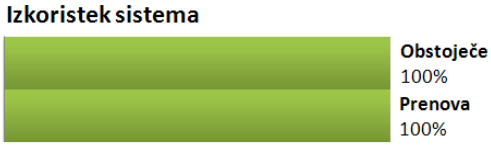




Sistem za pripravo tople vode

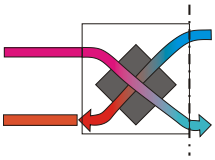
Daljinsko ogrevanje + sprejemniki sončne energije za ogrevanje in pripravo tople vode. Naprave nameščene v ogrevanem prostoru. S





Sistem za prezračevanje

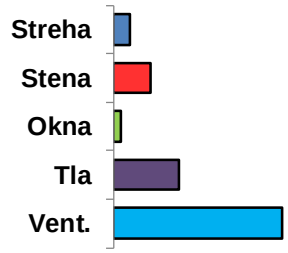
Brez sistema za mehansko prezračevanje.

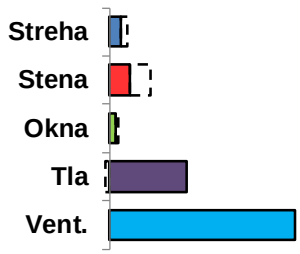


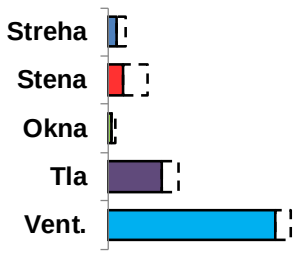
ENERGETSKI KAZALNIKI STAVBE

OSNOVNO STANJE	ZMERNA PRENOVA	INTENZIVNA PRENOVA

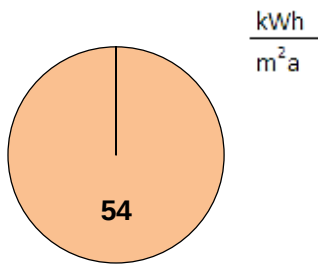
Toplotne izgube stavbe

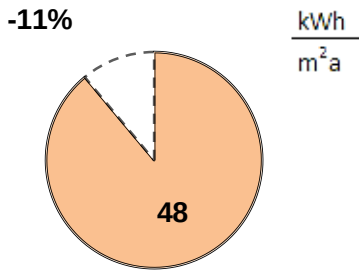


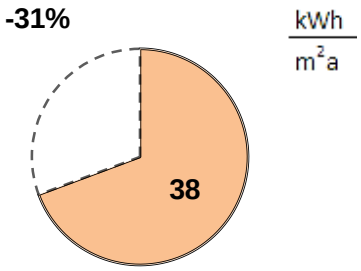




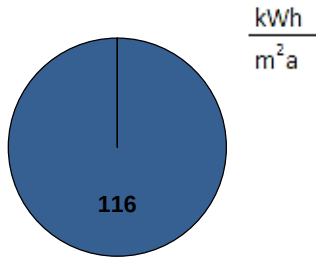
Potrebna toplota za ogrevanje stavbe Qnh

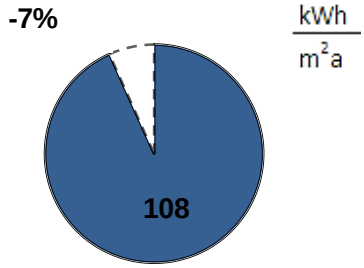


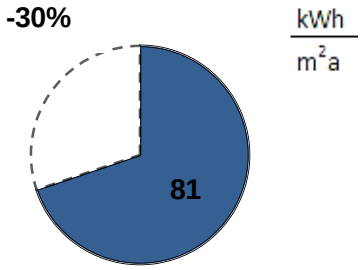




Primarna energija Qp







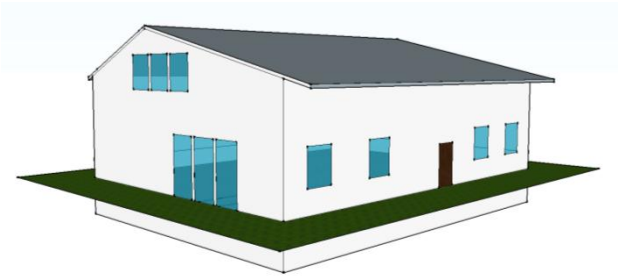
Razred energetske učinkovitosti (kWh/m²a)

Osnovno stanje

Zmerna prenova

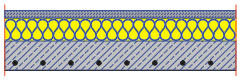
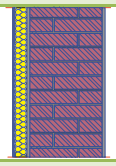
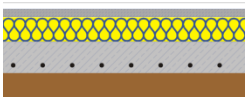
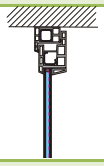
Intenzivna prenova

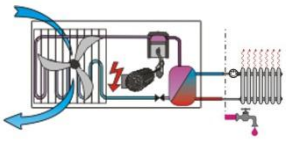
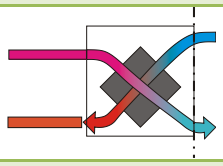
Obdobje 2009 – danes

ENODRUŽINSKA HIŠA	
Arhitekturna zasnova	**Primer**
	

Država	Slovenija
Regija tipologije	Nacionalna
Zasnova	Preprosta kompaktna oblika
Etažnost	
Leto izgradnje	-
Uporabna površina	287,0 m^2
Tabula	SI.N.SFH.06.Gen.ReEx.001.00

OPIS STAVBE - OSNOVNO STANJE

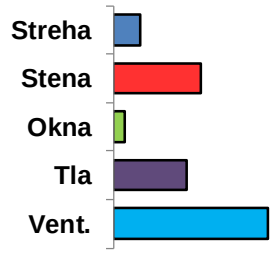
ZUNANJI OVOJ STAVBE				
	Streha	**Stena**	**Tla**	**Okna**
Površina	126,36 m^2	368,71 m^2	129,59 m^2	65,65 m^2
Skica				
OPIS	Ravna streha z 20 cm toplotne izolacije	Votličava opeka 29 cm, toplotna izolacija 15 cm	Tla na terenu z 15 cm toplotne izolacije	PVC okno z dvoslojno zasteklitvijo low e in plinom
U - faktor	0,20 W/(m^2K)	0,23 W/(m^2K)	0,16 W/(m^2K)	1,1 W/(m^2K)

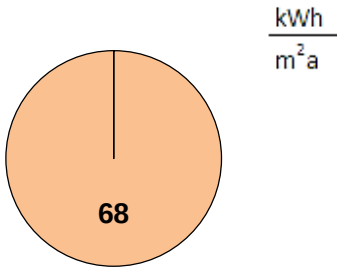
SISTEMI			
Sistem	Sistem za ogrevanje	Sistem za pripravo tople vode	Sistem za prezračevanje
Skica			
Opis	Zračna toplotna črpalka, hranilnik in razvodni sistem je v ogrevanem prostoru, obtočna črpalka.	Centralna priprava tople vode kombinirana z ogrevalnim sistemom (zračna toplotna črpalka). S cirkulacijo.	Brez sistema za mehansko prezračevanje.

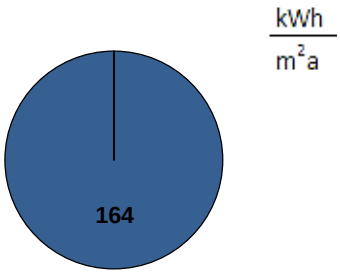
ENERGETSKI KAZALNIKI STAVBE

OSNOVNO STANJE

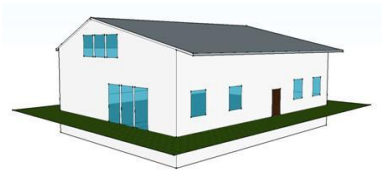
Toplotne izgube stavbe	Potrebna toplota za ogrevanje stavbe Qnh	Primarna energija Qp







Razred energetske učinkovitosti (kWh/m²a)



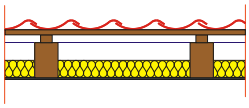
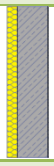
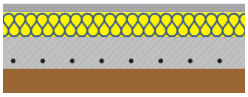
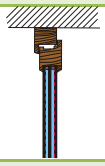
VRSTNA HIŠA

Arhitekturna zasnova	Primer

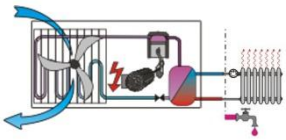
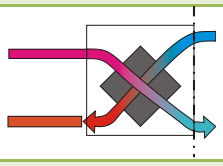
Država	Slovenija
Regija tipologije	Nacionalna
Zasnova	Preprosta kompaktna oblika
Etažnost	
Leto izgradnje	-
Uporabna površina	188,0 m^2
Tabula	SI.N.TH.06.Gen.ReEx.001.00

OPIS STAVBE - OSNOVNO STANJE

ZUNANJI OVOJ STAVBE

	Streha	Stena	Tla	Okna
Površina	104,16 m^2	183,09 m^2	100,20 m^2	29,32 m^2
Skica				
OPIS	Poševna streha z 30 cm toplotne izolacije med škarniki	Betonska stena z 20 cm toplotne izolacije	Tla na terenu z 15 cm toplotne izolacije	Leseno okno z troslojno zasteklitvijo low e in plinom
U - faktor	0,13 W/(m^2K)	0,19 W/(m^2K)	0,17 W/(m^2K)	0,80 W/(m^2K)

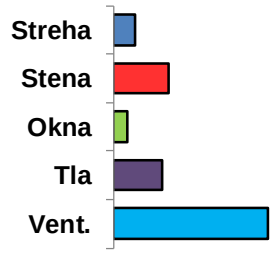
SISTEMI

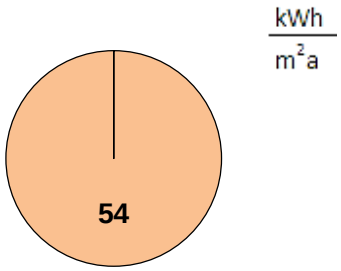
Sistem	Sistem za ogrevanje	Sistem za pripravo tople vode	Sistem za prezračevanje
Skica			
Opis	Zračna toplotna črpalka, hranilnik in razvodni sistem je v ogrevanem prostoru, obtočna črpalka.	Centralna priprava tople vode kombinirana z ogrevalnim sistemom (zračna toplotna črpalka). S cirkulacijo.	Brez sistema za mehansko prezračevanje.

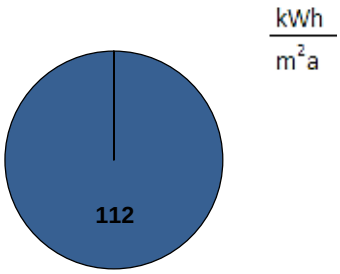
ENERGETSKI KAZALNIKI STAVBE

OSNOVNO STANJE

Toplotne izgube stavbe	Potrebna toplota za ogrevanje stavbe Qnh	Primarna energija Qp

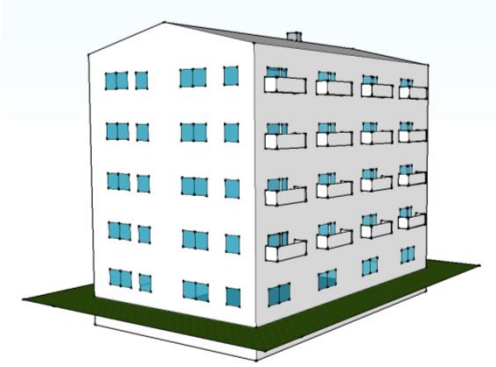






Razred energetske učinkovitosti (kWh/m²a)

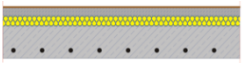
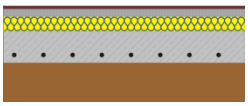
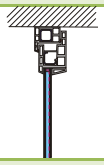
VEČSTANOVANJSKA STAVBA

Arhitekturna zasnova	Primer
	

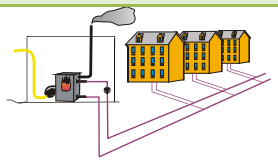
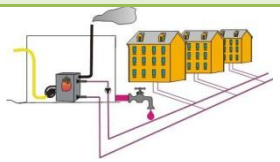
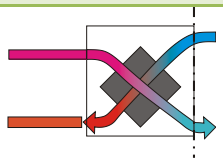
Država	Slovenija
Regija tipologije	Nacionalna
Zasnova	Enostavna prizmatična oblika
Etažnost	
Leto izgradnje	-
Uporabna površina	1851,0 m^2
Tabula	SI.N.MFH.06.Gen.ReEx.001.00

OPIS STAVBE - OSNOVNO STANJE

ZUNANJI OVOJ STAVBE

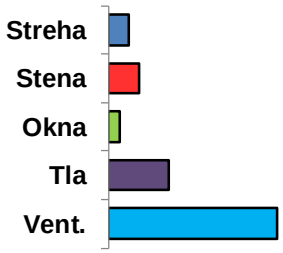
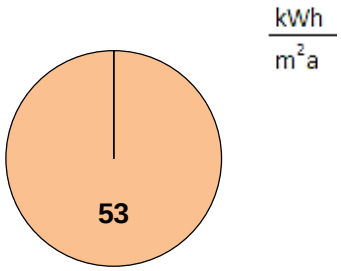
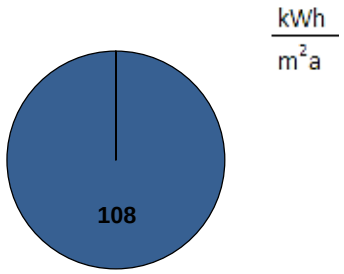
	Streha	Stena	Tla	Okna
Površina	417,75 m^2	559,38 m^2	395,1 m^2	304,6 m^2
Skica				
OPIS	Betonska plošča, toplotna izolacija 15 cm	Betonska stena z 12 cm toplotne izolacije	Tla na terenu s 5 cm toplotne izolacije	PVC okno z dvoslojno zasteklitvijo low e in plinom
U - faktor	0,26 W/(m^2K)	0,30 W/(m^2K)	0,32 W/(m^2K)	1,10 W/(m^2K)

SISTEMI

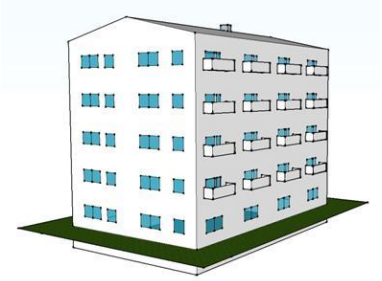
Sistem	Sistem za ogrevanje	Sistem za pripravo tople vode	Sistem za prezračevanje
Skica			
Opis	Daljinsko ogrevanje, priprava tople vode centralno, toplotna postaja v ogrevani kotlovnici. Daljinsko ogrevanje za ogrevanje in pripravo tople vode. Naprave nameščene v ogrevanem prostoru.		Brez sistema za mehansko prezračevanje.

ENERGETSKI KAZALNIKI STAVBE

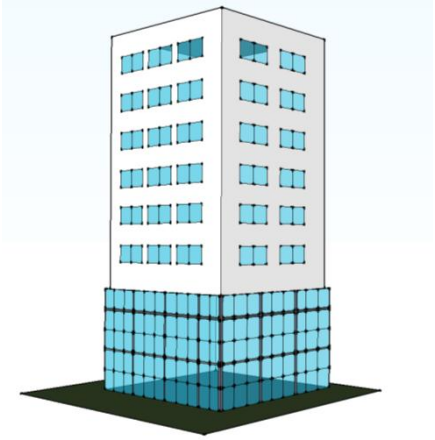
OSNOVNO STANJE

Toplotne izgube stavbe	Potrebna toplota za ogrevanje stavbe Qnh	Primarna energija Qp
		

Razred energetske učinkovitosti (kWh/m²a)



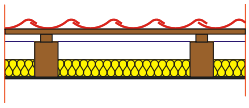
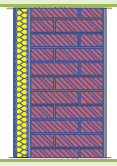
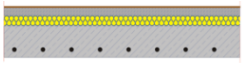
STANOVANJSKI BLOK - STOLPNICA

Arhitekturna zasnova	Primer
	

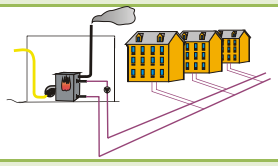
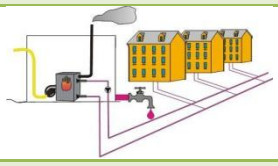
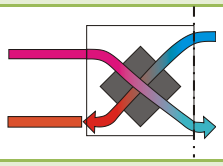
Država	Slovenija
Regija tipologije	Nacionalna
Zasnova	Preprosta kompaktna oblika
Etažnost	
Leto izgradnje	-
Uporabna površina	6066,0 m^2
Tabula	SI.N.AB.06.Gen.ReEx.001.00

OPIS STAVBE - OSNOVNO STANJE

ZUNANJI OVOJ STAVBE

	Streha	Stena	Tla	Okna
Površina	1341,0 m^2	2449,0 m^2	1341,0 m^2	1629,7 m^2
Skica				
OPIS	Poševna streha z 30 cm toplotne izolacije med škarniki	Votličava opeka 29 cm, toplotna izolacija 15 cm	Betonska plošča, toplotna izolacija 30 cm	Alu okno z dvoslojno zasteklitvijo low e in plinom
U - faktor	0,13 W/(m^2K)	0,23 W/(m^2K)	0,13 W/(m^2K)	1,3 W/(m^2K)

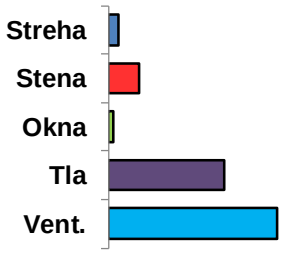
SISTEMI

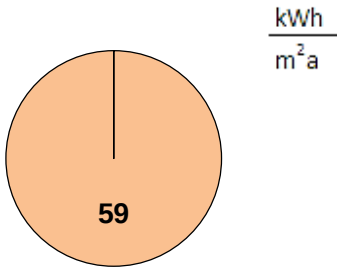
Sistem	Sistem za ogrevanje	Sistem za pripravo tople vode	Sistem za prezračevanje
Skica			
Opis	Daljinsko ogrevanje, priprava tople vode centralno, toplotna postaja v ogrevani kotlovnici. Daljinsko ogrevanje za ogrevanje in pripravo tople vode. Naprave nameščene v ogrevanem prostoru.		Brez sistema za mehansko prezračevanje.

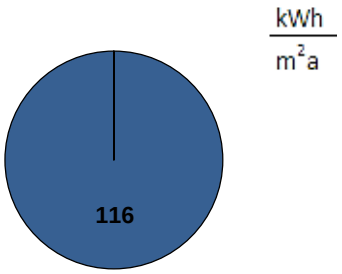
ENERGETSKI KAZALNIKI STAVBE

OSNOVNO STANJE

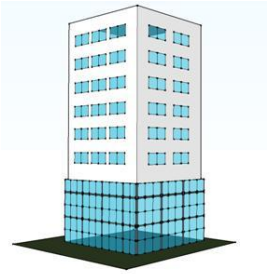
Toplotne izgube stavbe	Potrebna toplota za ogrevanje stavbe Qnh	Primarna energija Qp

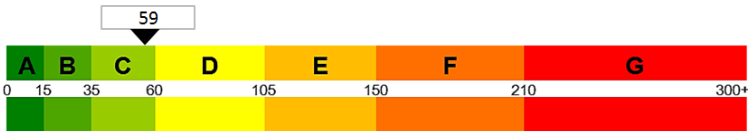






Razred energetske učinkovitosti (kWh/m²a)





Tipologija stavb: energetska učinkovitost in tipične stavbe v Sloveniji

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