



Tehno-ekonomska analiza CTS-a baziranog na geotermalnoj energiji na lokaciji Lanište

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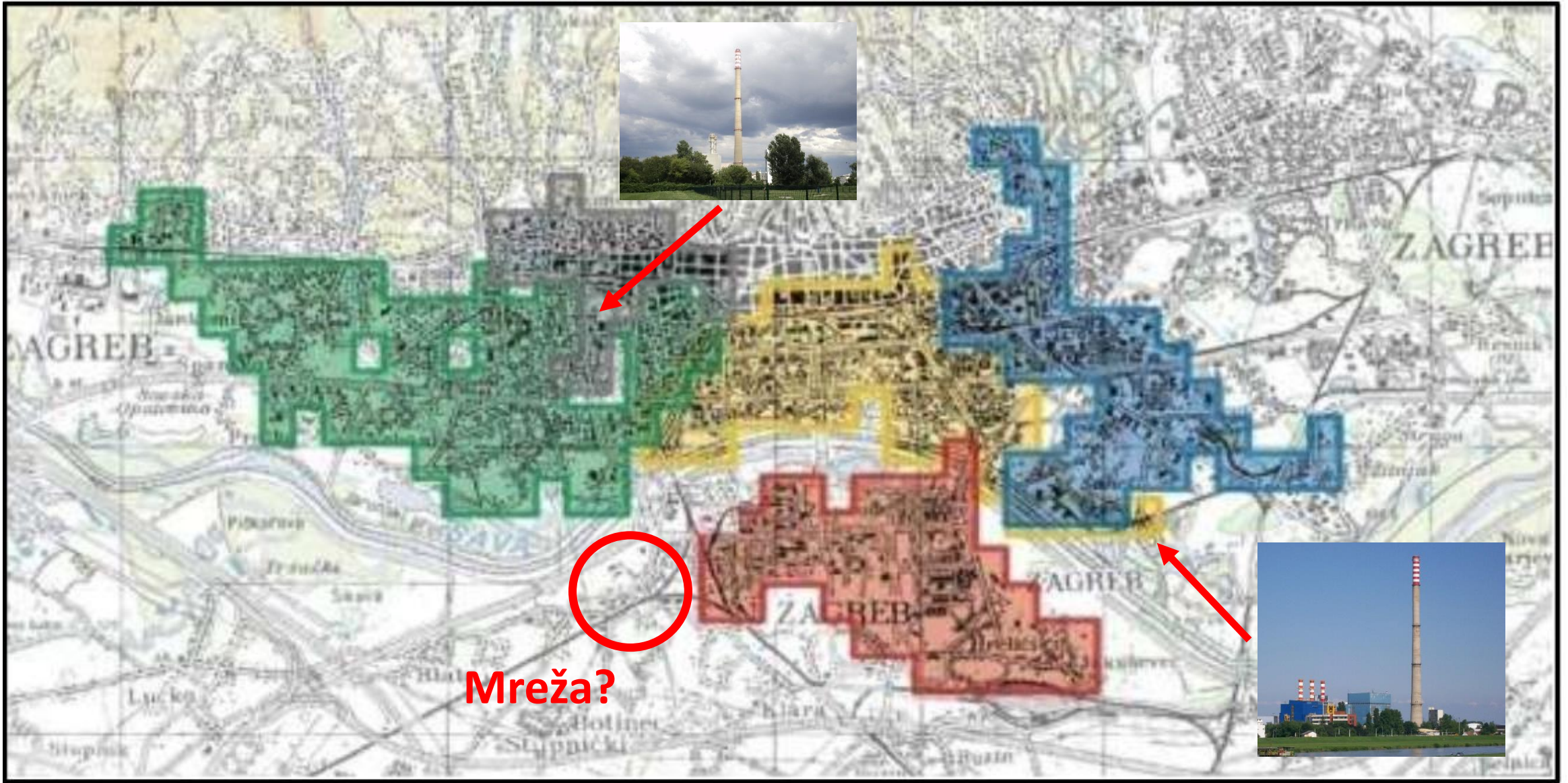
**10. ZAGREBAČKI ENERGETSKI TJEDAN 2019.
STRUČNI SKUP STUDENATA „MI IMAMO RJEŠENJA –
VIZIJE NOVIH GENERACIJA ZA ODRŽIVI ,ZELENI RAZVOJ“
13. Svibnja 2019. godine**



Sadržaj

- Pregled postojećeg stanja
- Metoda
- Rezultati analize
- Konačni rezultati
- Zaključak

CTS u Zagrebu



Termalni izvori u Hrvatskoj



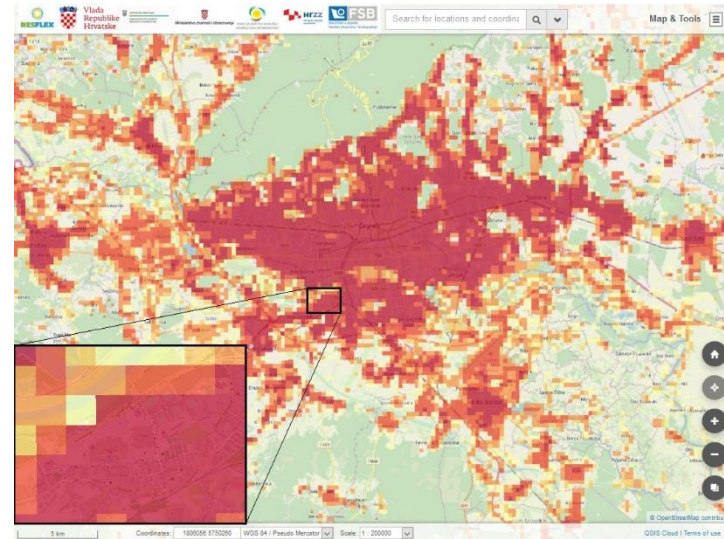
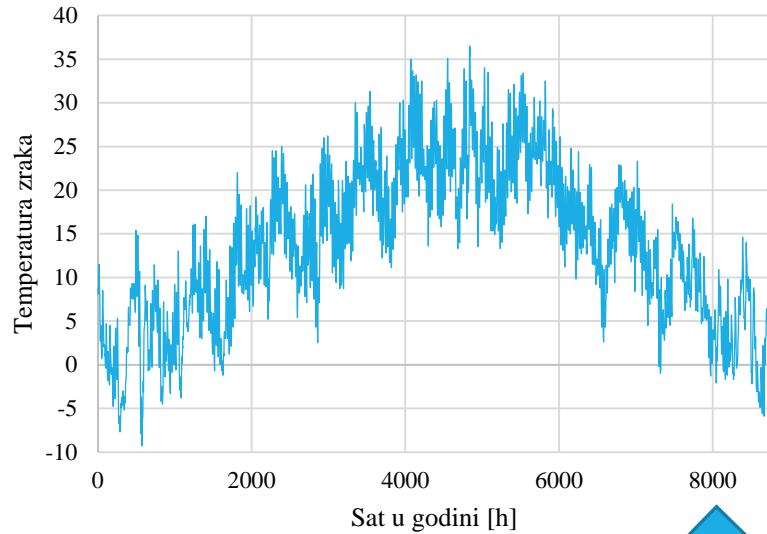
Termalni izvori u Zagrebu

Bušotina	Kratica	Lokacija	Protok (l/s)	Temperatura na ušću bušotine (°C)	Namjena
Mladost-1	Mla-1	Mladost	3,1	70,0	Nije u funkciji
Mladost-2	Mla-2	Mladost	74,0	64,0	Utisna
Mladost-3	Mla-3	Mladost	80,0	80,0	Proizvodna
KBNZ-1	KBNZ-1	Blato	-	-	Likvidirana
KBNZ-1A	KBNZ-1A	Blato	6,9	68,0	Utisna
KBNZ-1B	KBNZ-1B	Blato	88,0	82,0	Proizvodna
KBNZ-1C	KBNZ-1C	Blato	-	-	Likvidirana
KBNZ-2	KBNZ-2	Blato	0,6	51,0	Mjerna
KBNZ-2A	KBNZ-2A	Blato	25,0	64,0	Nije u funkciji
KBNZ-3	KBNZ-3	Blato	-	-	Likvidirana
KBNZ-3B	KBNZ-3B	Blato	0,6	27,0	Nije u funkciji
KBNZ-3 alfa	KBNZ-3 alfa	Blato	25,6	57,0	Nije u funkciji
Stupnik-1	Stu-1	Lučko	8,1	57,0	Nije u funkciji
Lučanka-1	Luč-1	Lučko	5,6	55,0	Proizvodna
Jarun-1	Jrn-1	Jarun	0,8	38,0	Nije u funkciji
Sava-1	Sava-1	Savski nasip	5,0	58,0	Mjerna

POSTUPAK PRORAČUNA



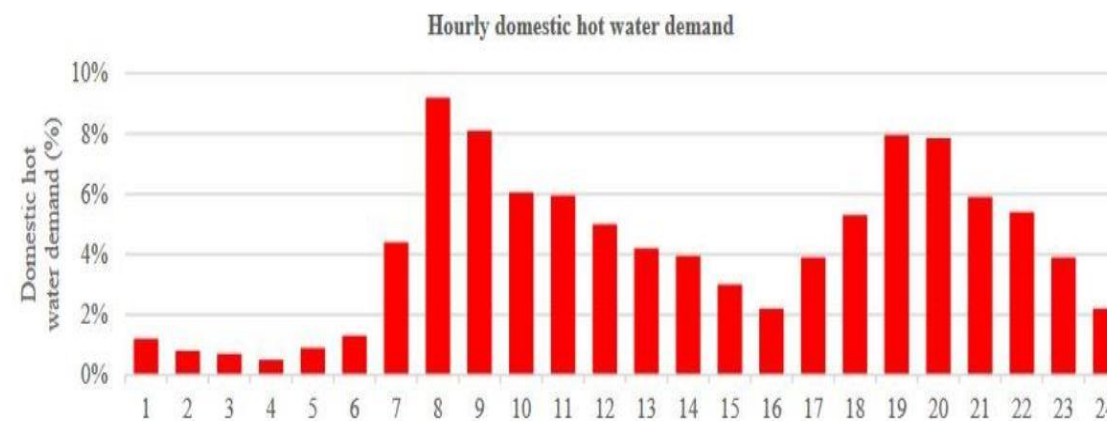
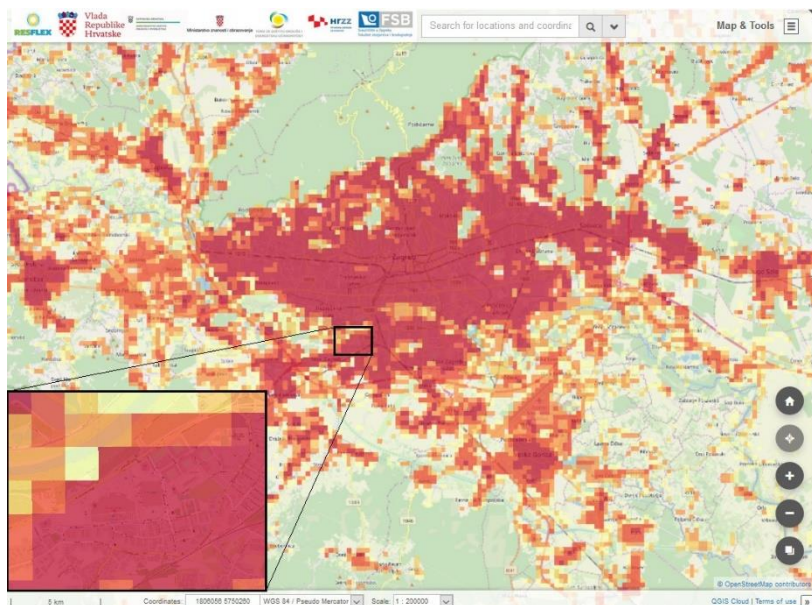
Potrebe za grijanjem prostora



PRETPOSTAVKE

$$Q_t = \frac{SS \cdot Q_{god}}{\sum_1^{8760} SS}$$

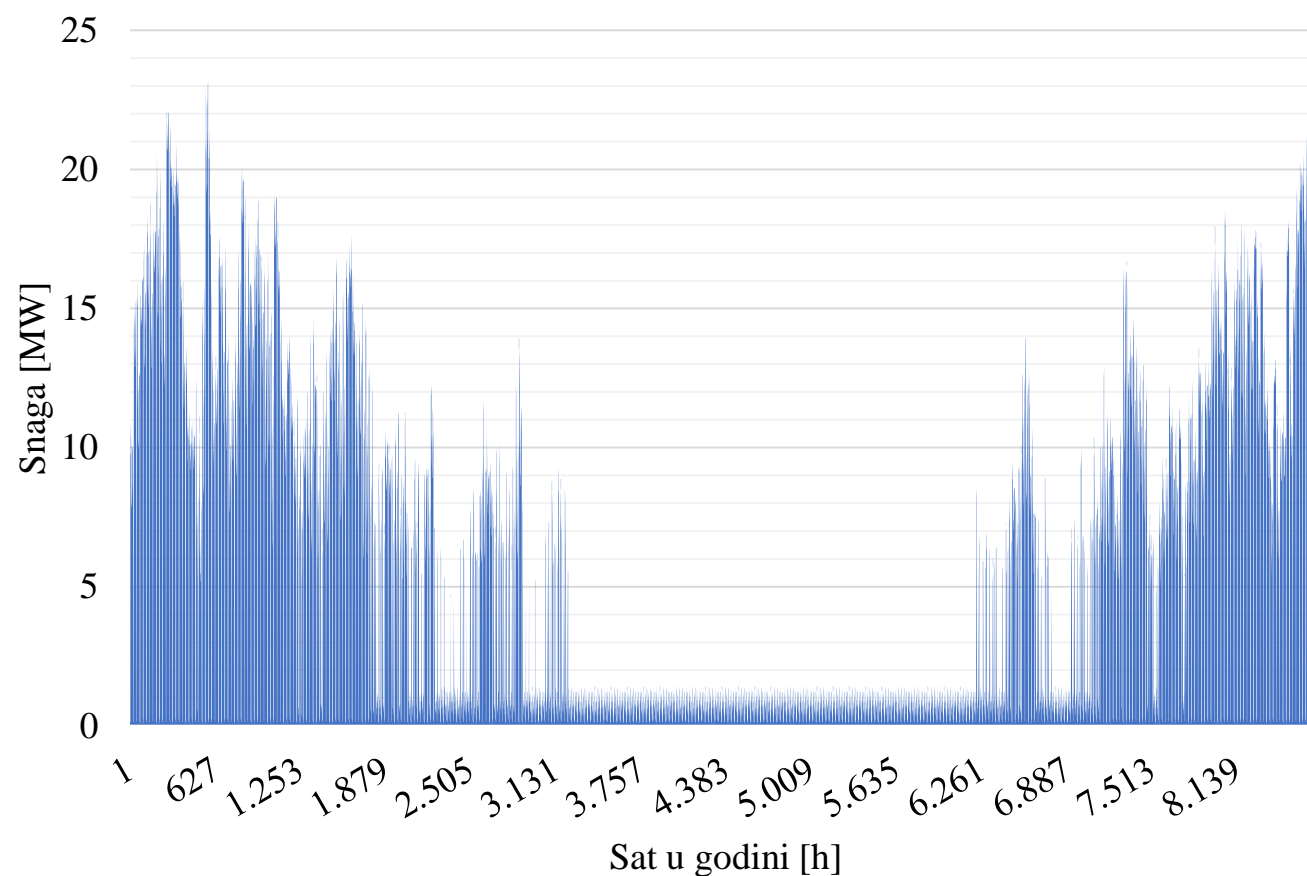
Potrebe za potrošnom toplom vodom



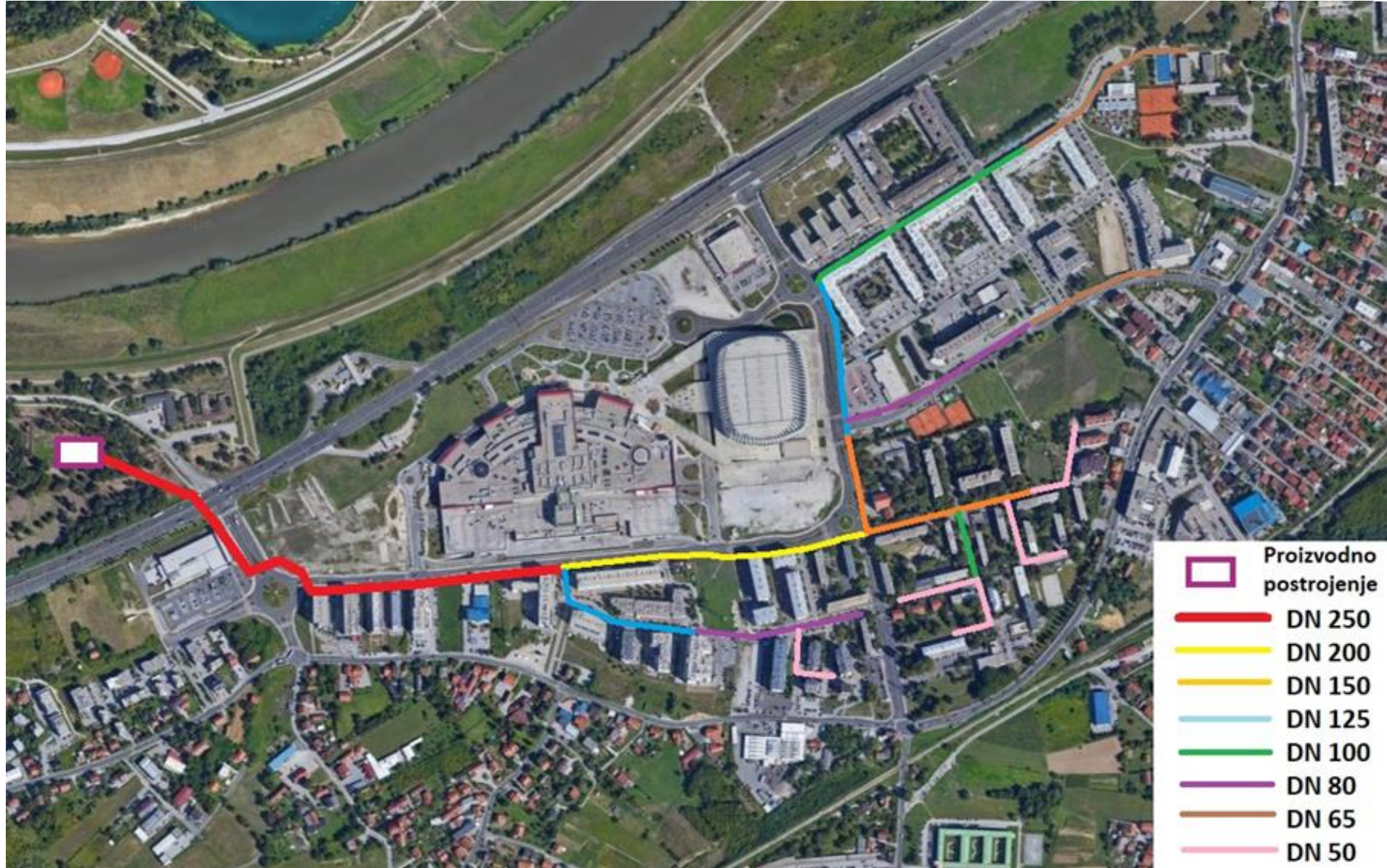
$$Q_{PTVsat} = \frac{Q_{PTVgod} \cdot \mu}{365 \cdot 100}$$

Toplinske potrebe

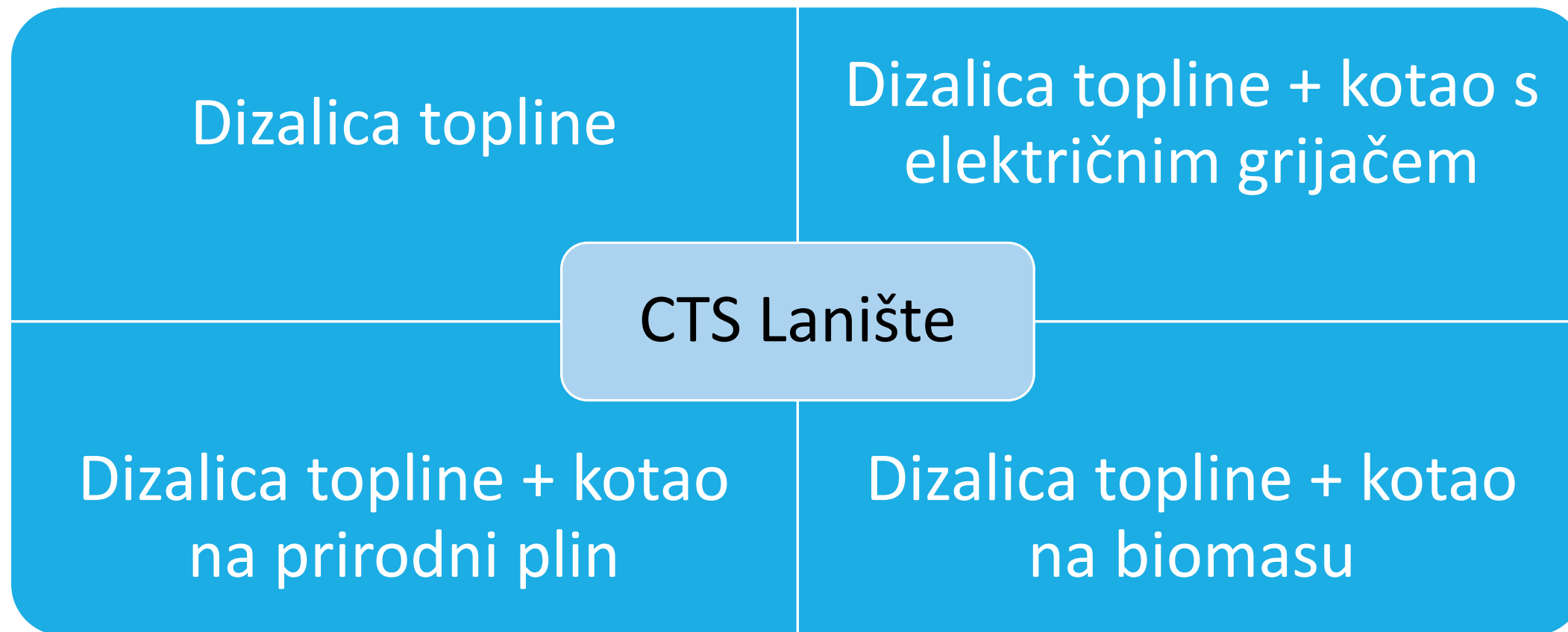
Veličina	Iznos	Jedinica
Toplinske potrebe	37,58	GWh/god
Dostavljena toplinska energija u mrežu	42,93	GWh/god
Vršno opterećenje	23,18 (20,28)	MW
Toplinski gubitci	12,5	%



Mreža centraliziranog toplinskog sustava

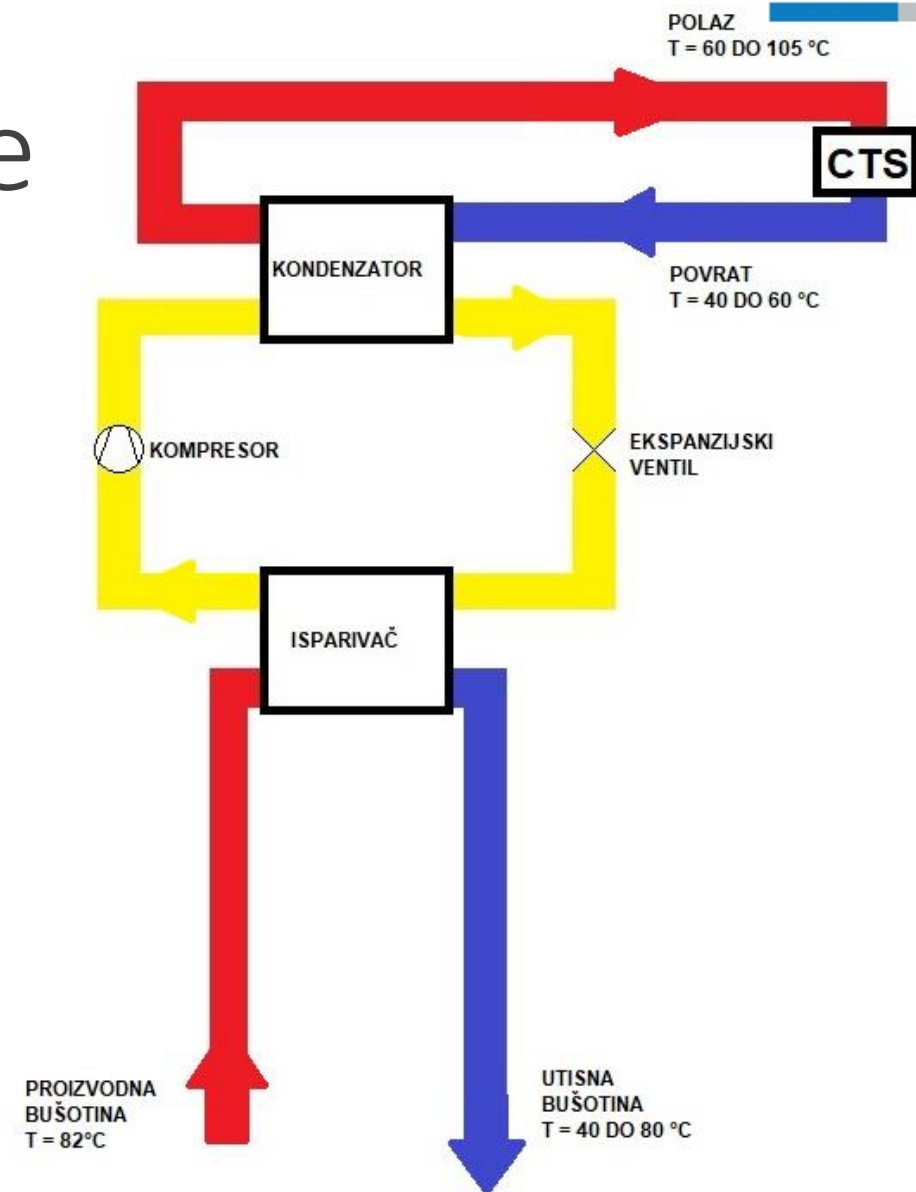


Razmatrani sustavi

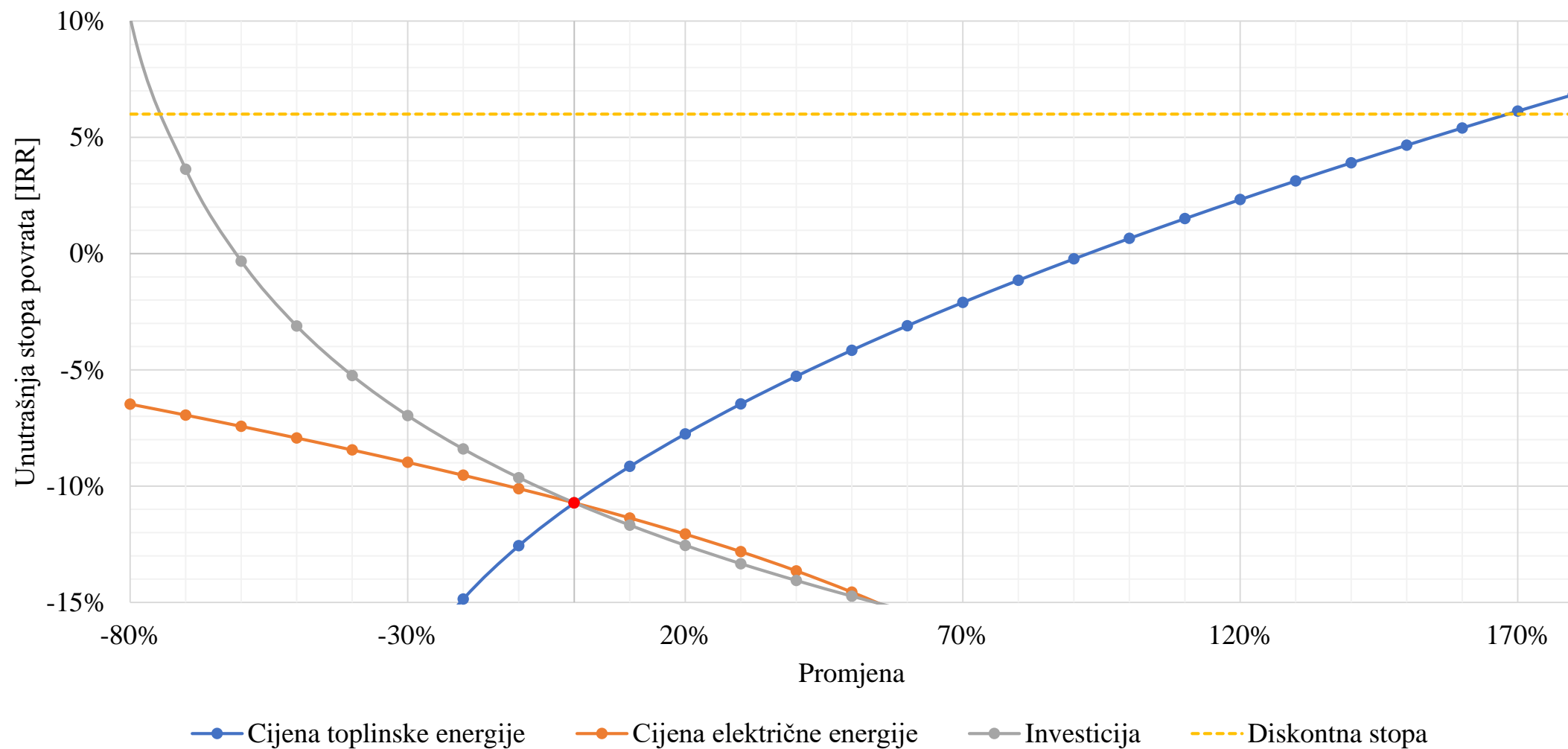


Sustav s dizalicom topline

Veličina	Iznos	Jedinica
Instalirana snaga dizalice topline	23,18	MW
Utrošena električna energija	7.549,5	MWh/god
Faktor grijanja - COP	6,55 do 7,88	-
Faktor opterećenja DT (load factor)	21,14	%

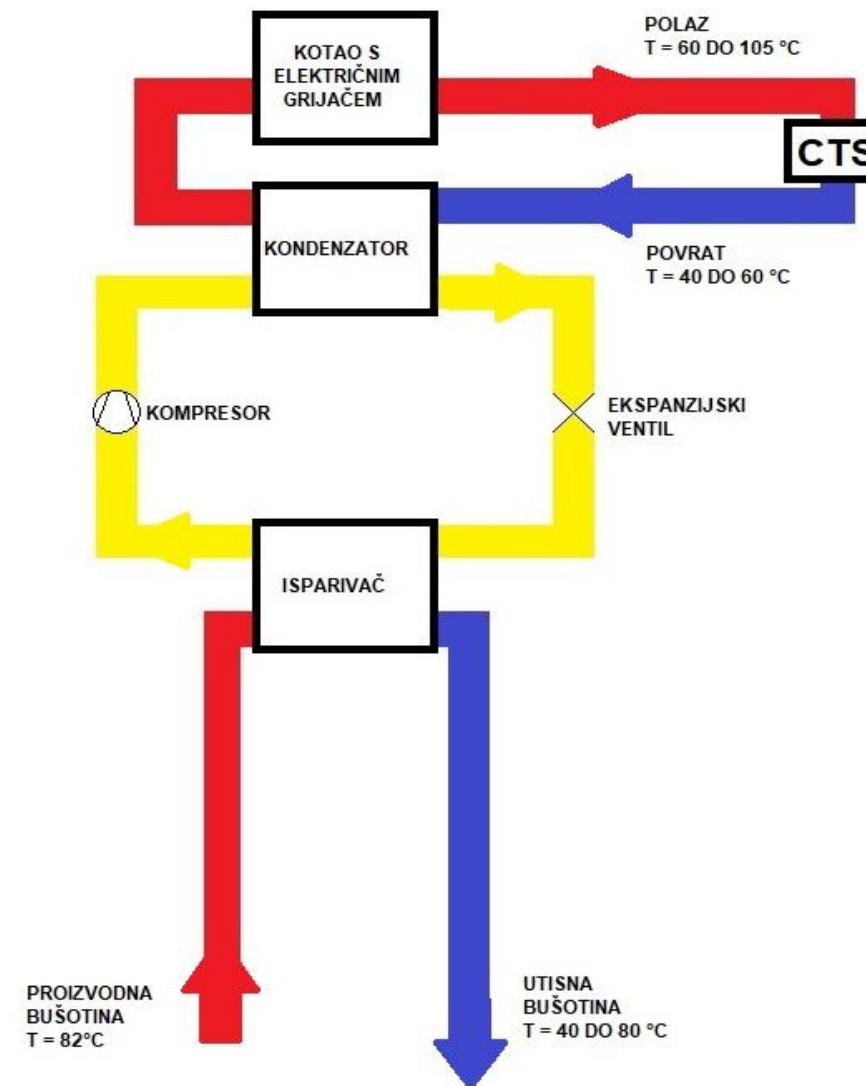


Analiza osjetljivosti

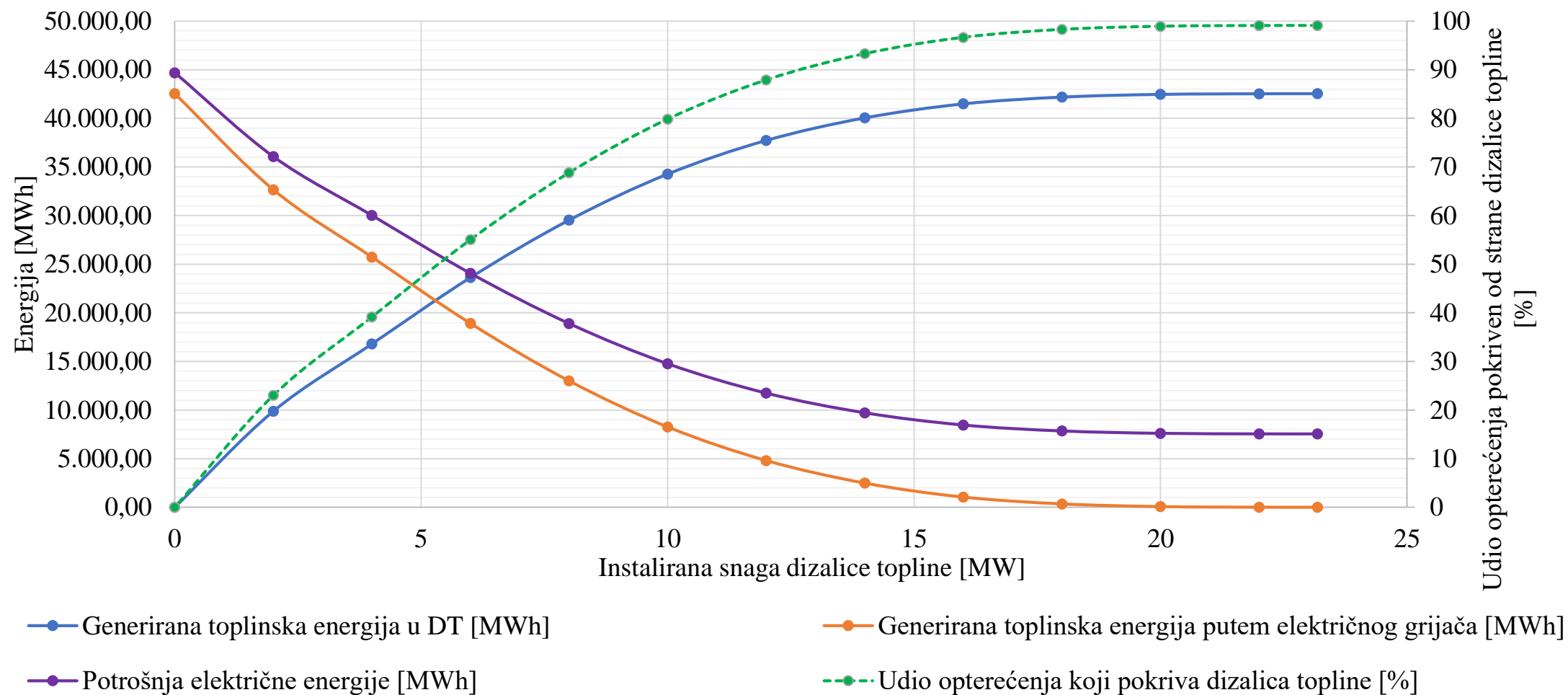


Dizalica topline i kotao s električnim grijačem

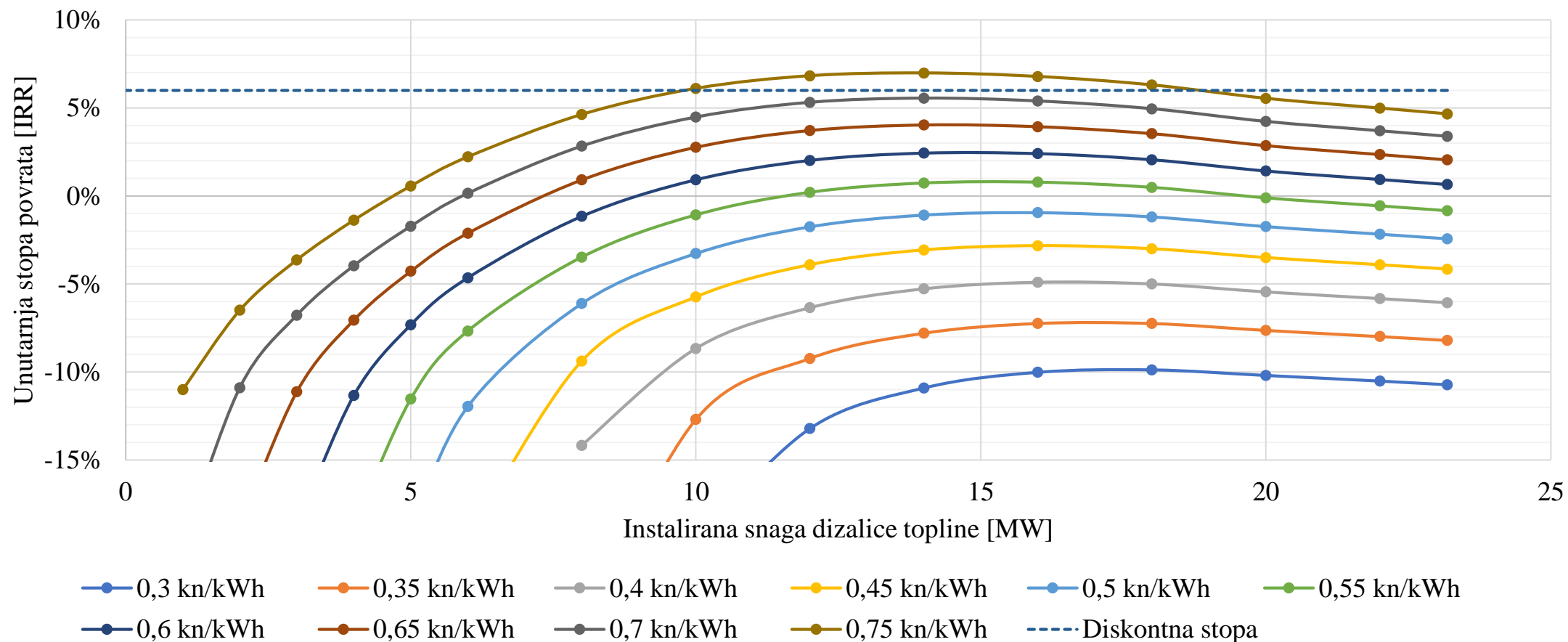
Veličina	Iznos	Jedinica
Instalirana snaga dizalice topline	0 - 23,18	MW
Instalirana snaga električnog grijača	0 - 23,18	MW
Utrošena električna energija	7.549,5 - 44.688,2	MWh/god
Faktor grijanja - COP	6,55 - 7,88	-
Faktor opterećenja DT (load factor)	21,14 - 56,39	%



Radni parametri

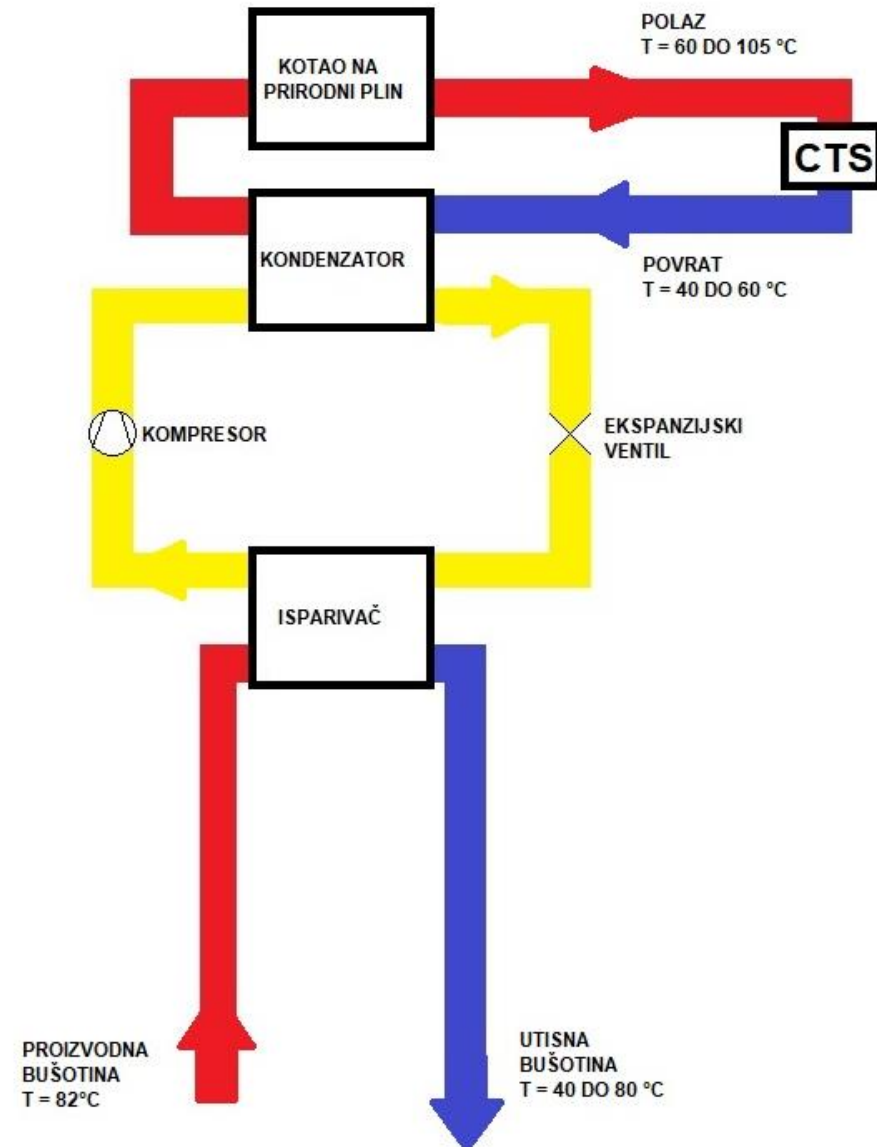


Rezultati tehno-ekonomske analize

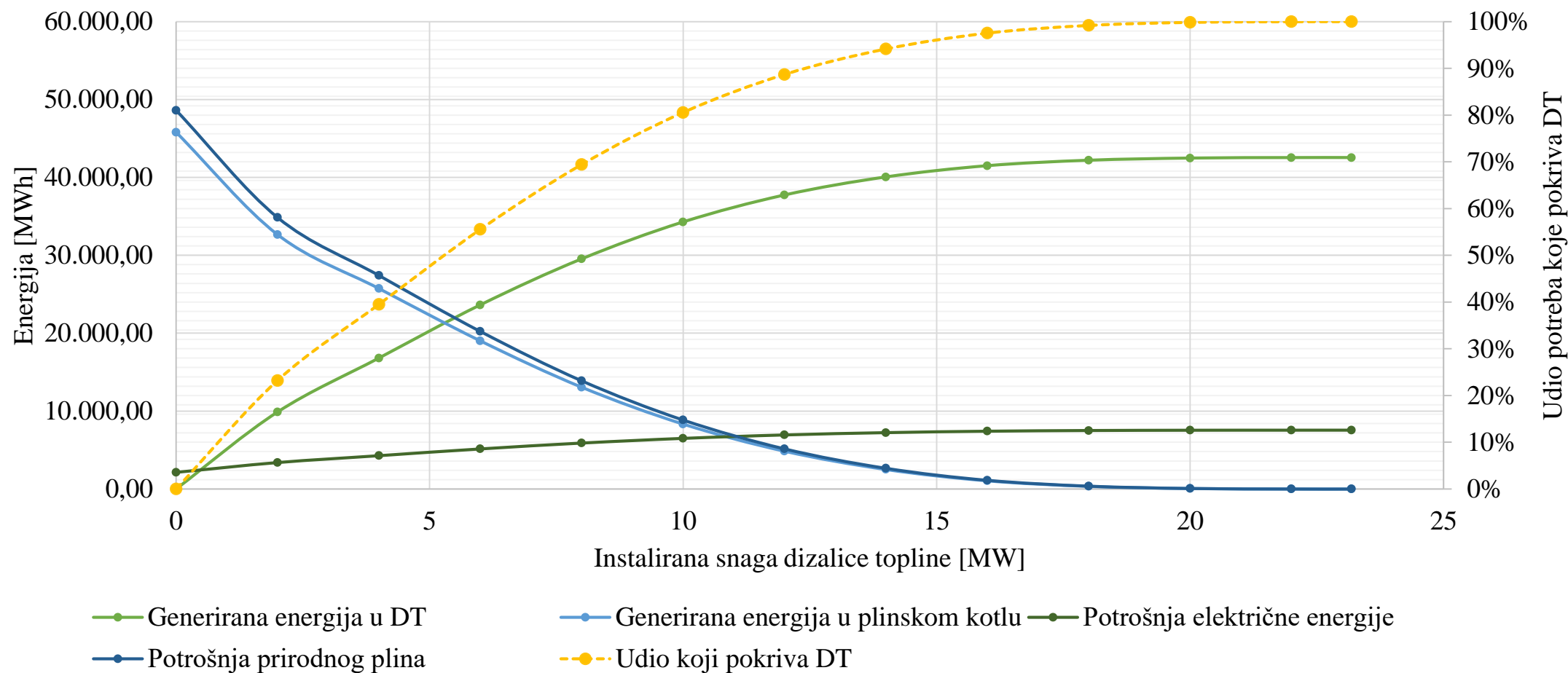


Dizalica topline i kotao na prirodni plin

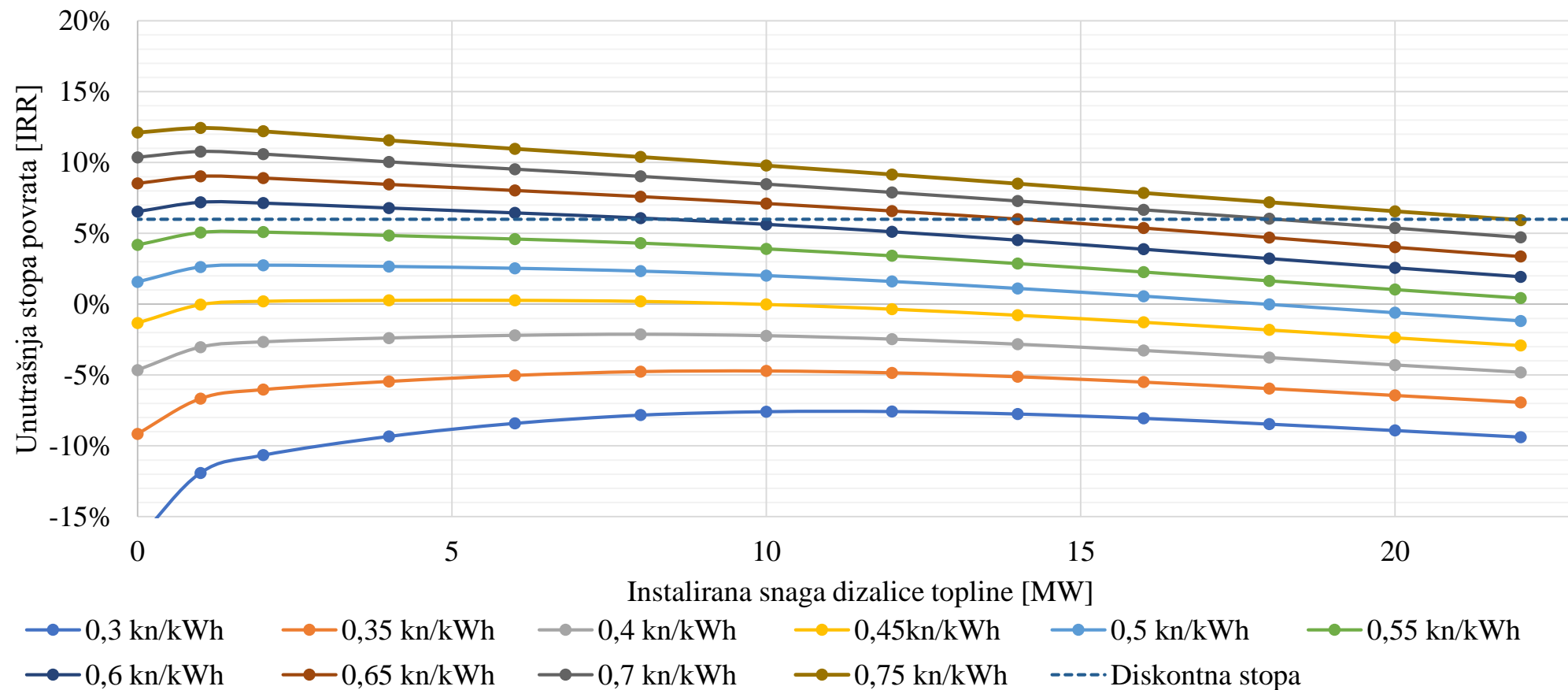
Veličina	Iznos	Jedinica
Instalirana snaga dizalice topline	0 - 23,18	MW
Instalirana snaga kotla na prirodni plin	0 - 23,18	MW
Utrošena električna energija	2.146,6 - 7.549,5	MWh/god
Potrošnja prirodnog plina	0 - 45.801,6	MWh/god
Faktor grijanja - COP	6,55 - 7,88	-
Faktor opterećenja DT (load factor)	21,14 - 56,39	%



Radni parametri

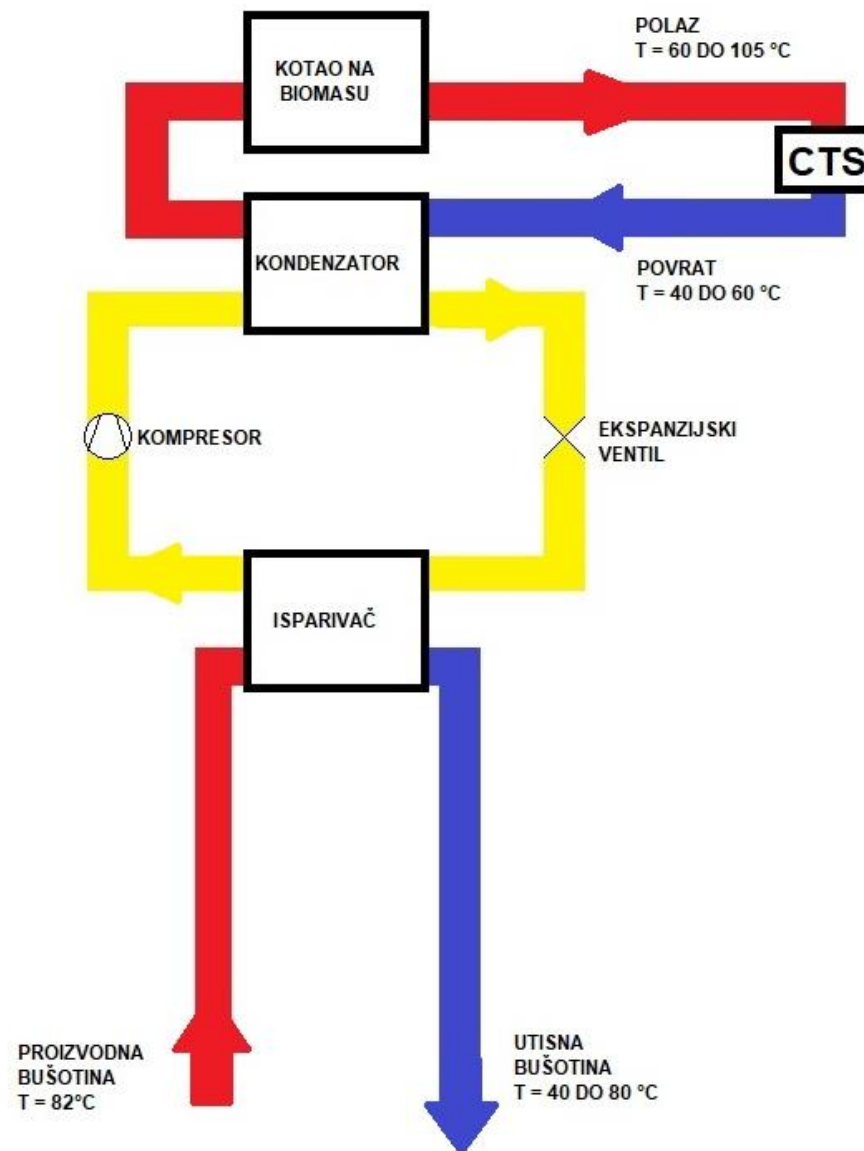


Rezultati tehno-ekonomske analize

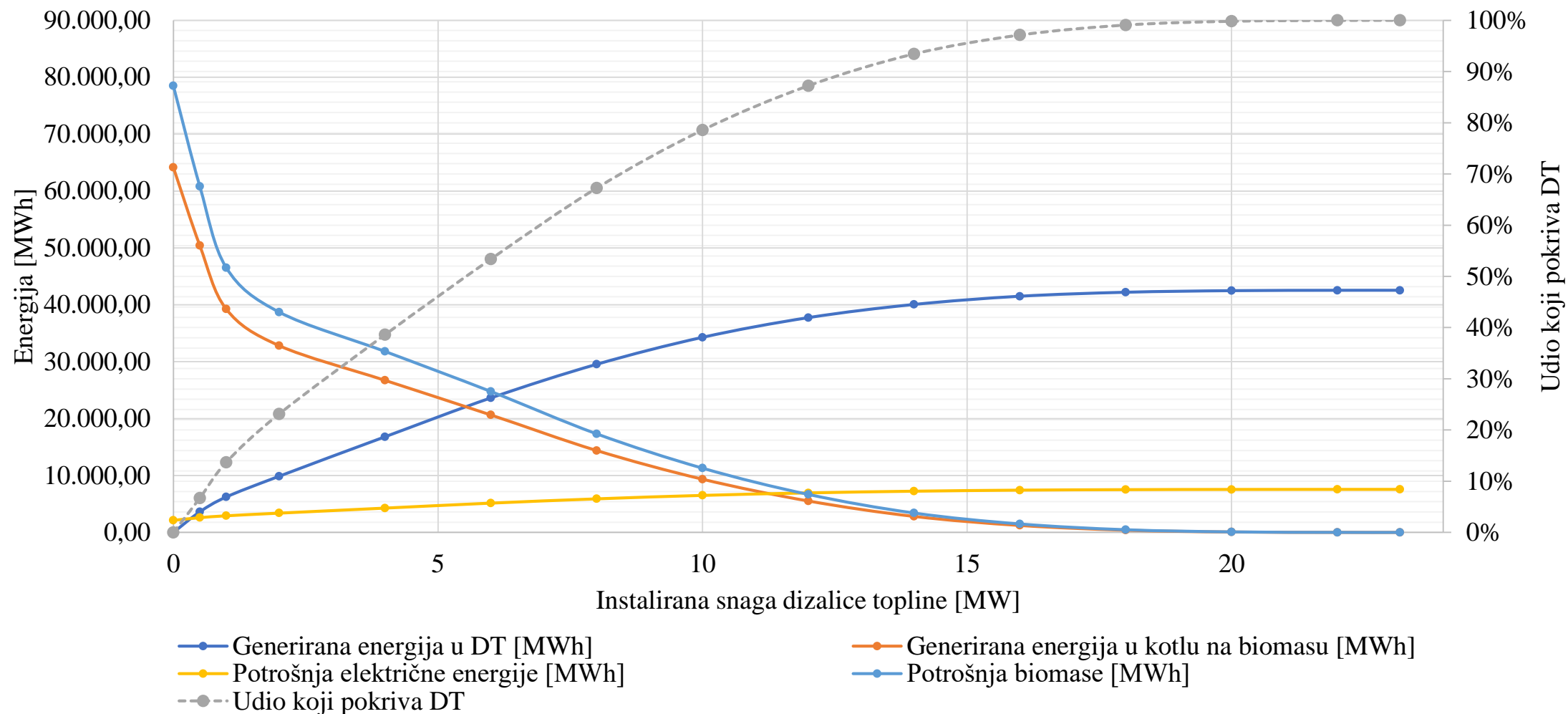


Dizalica topline i kotao na biomasu

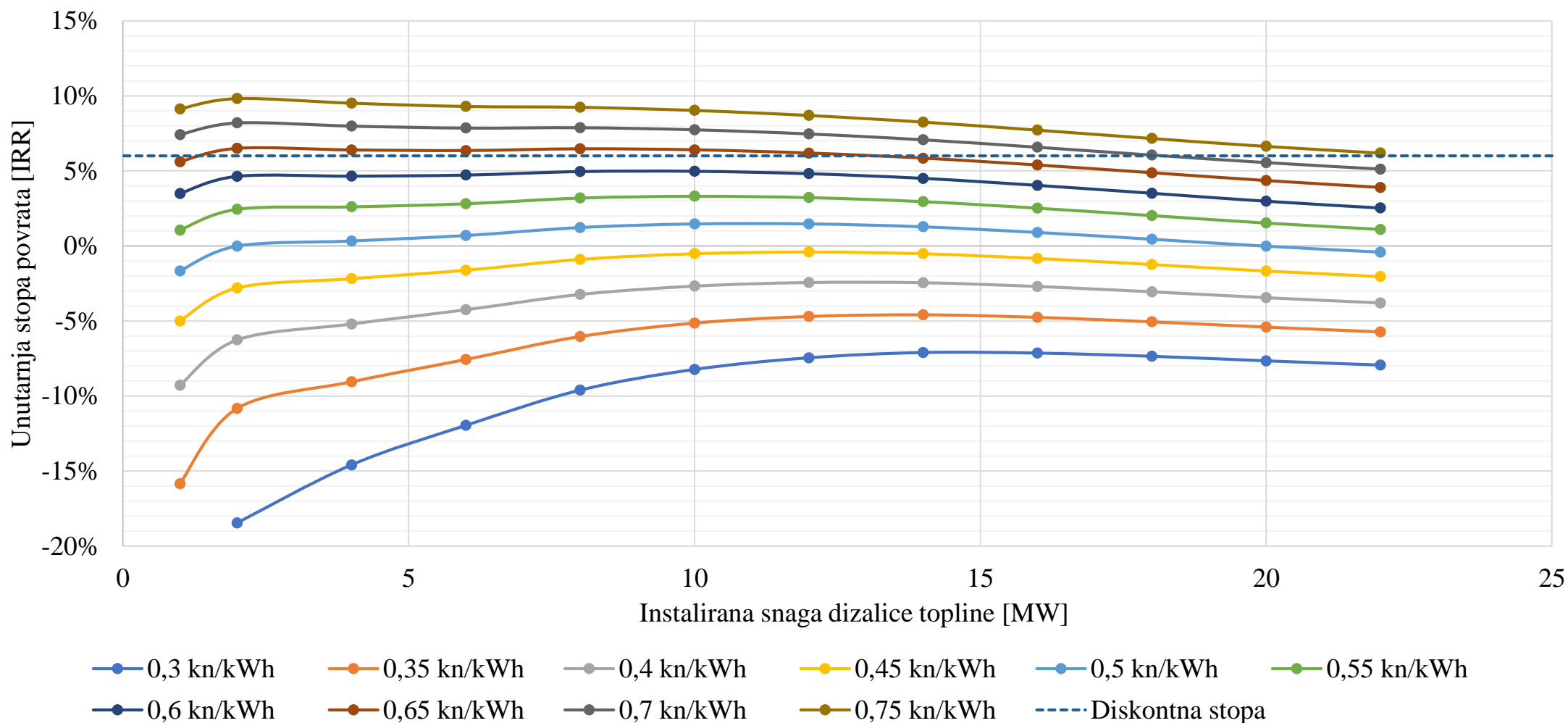
Veličina	Iznos	Jedinica
Instalirana snaga dizalice topline	0 - 23,18	MW
Instalirana snaga kotla na prirodni plin	0 - 23,18	MW
Utrošena električna energija	2.146,6 - 7.549,5	MWh/god
Potrošnja biomase	0 - 78.476,7	MWh/god
Faktor grijanja - COP	6,55 - 7,88	-
Faktor opterećenja DT (load factor)	21,14 - 56,39	%



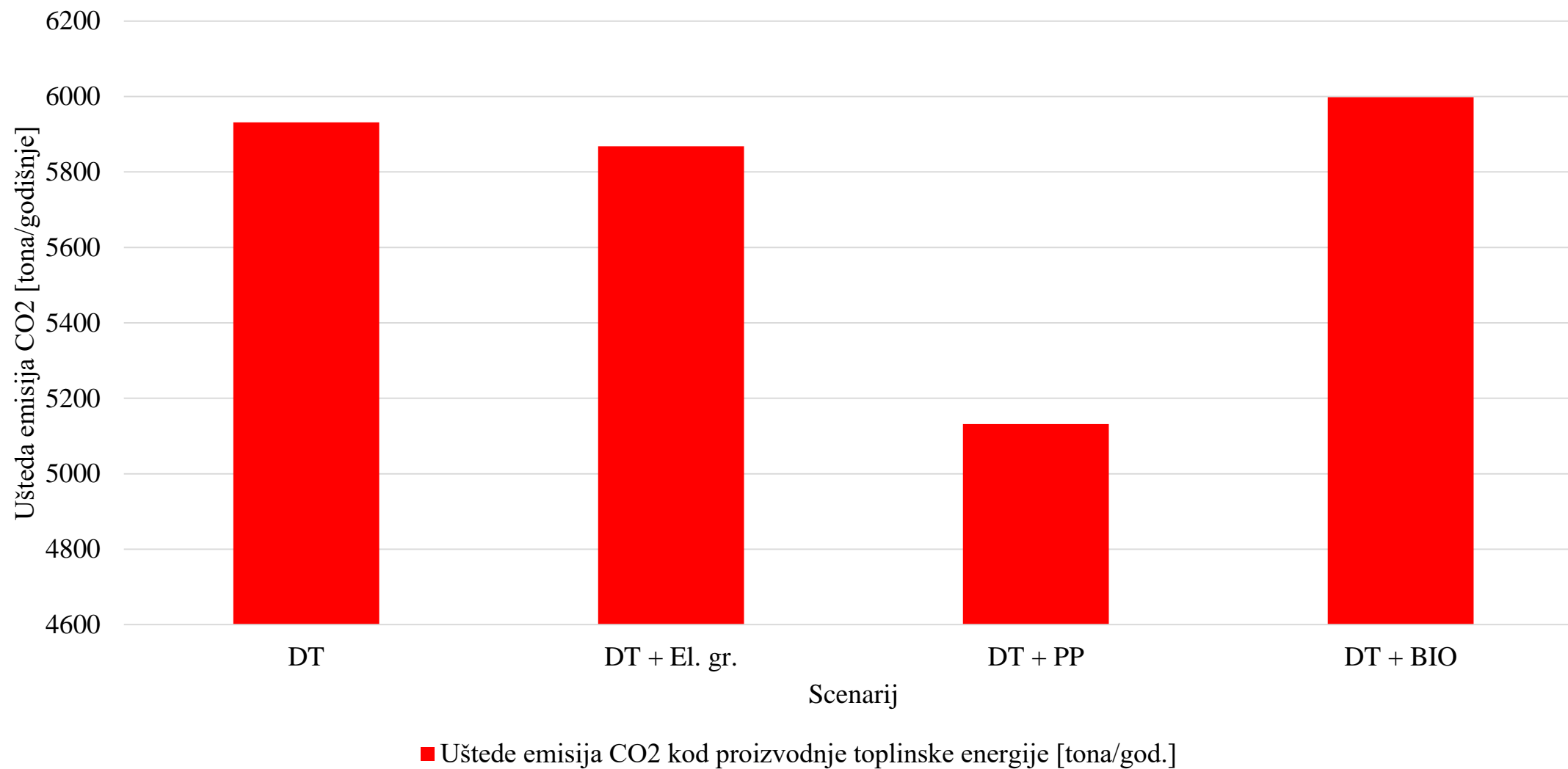
Radni parametri



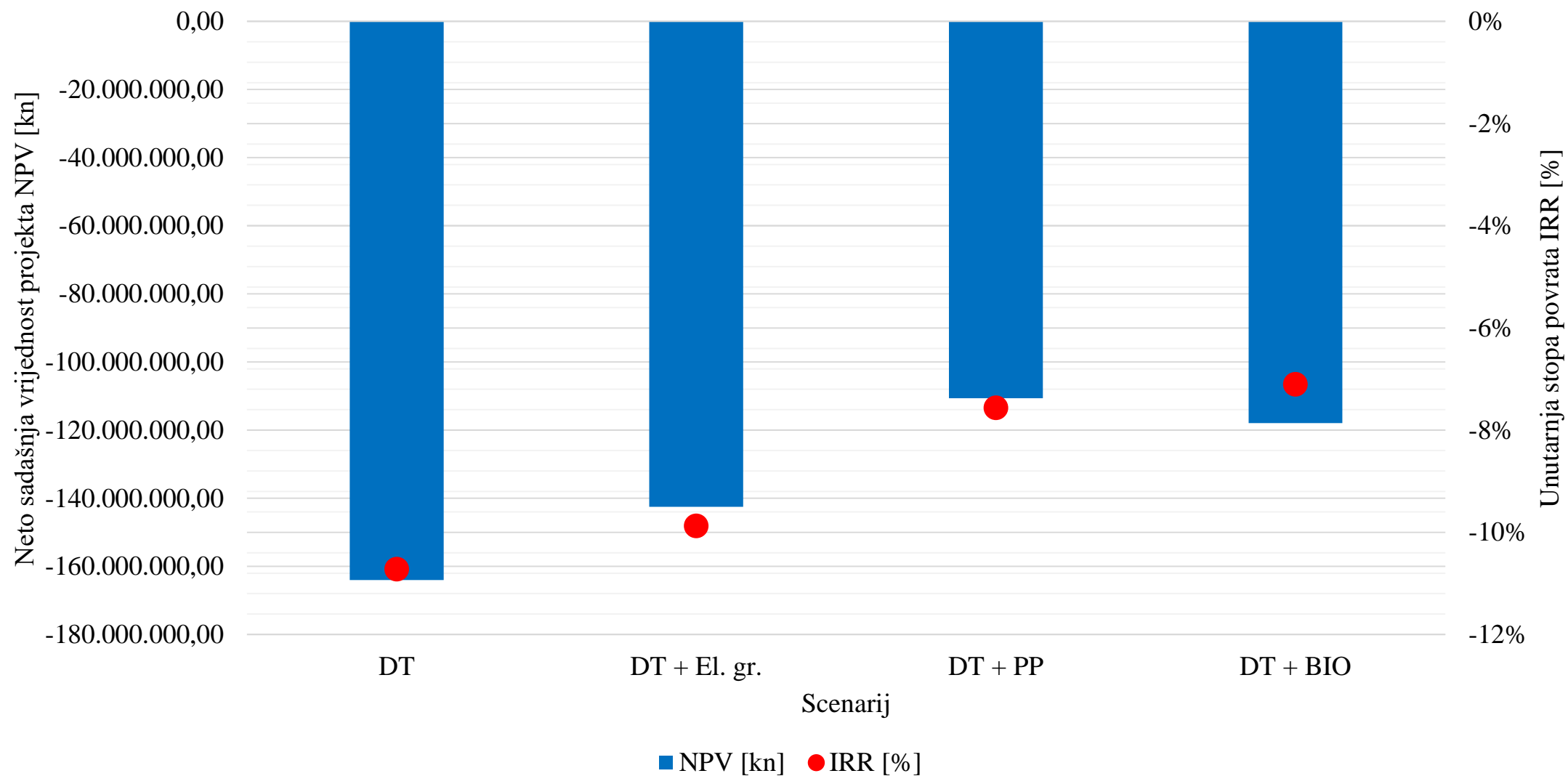
Rezultati tehno-ekonomske analize



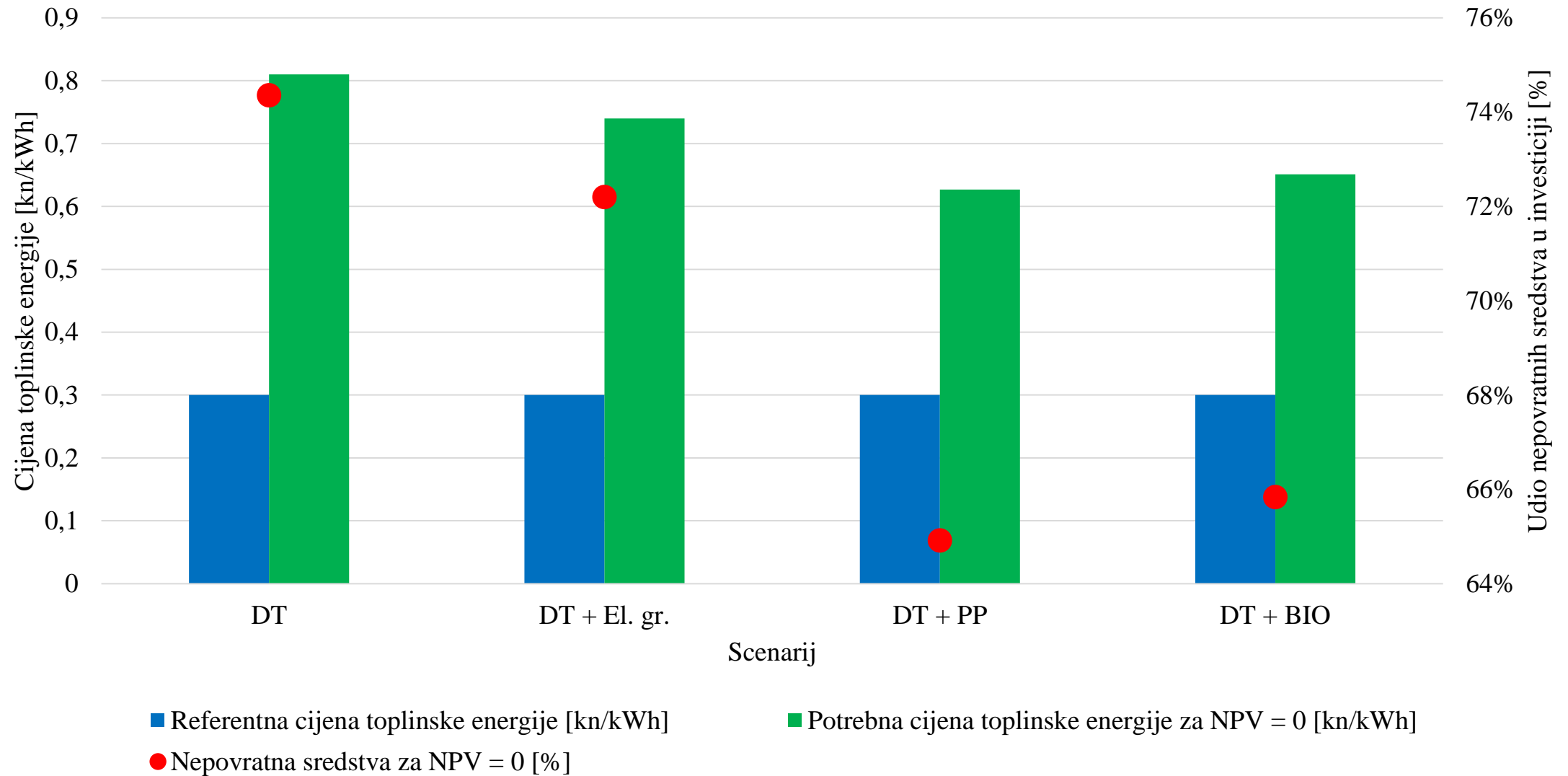
Ušteda emisija CO₂



IRR i NPV



Potrebne cijene i nepovratna sredstva



Zaključak

- Ekonomski najbolje rješenje – DT + kotao na PP
- Optimalno rješenje – DT + kotao na biomasu
- Moguće značajno smanjenje emisija CO₂
- Potrebno uložiti nepovratna sredstva ili povećati cijenu toplinske energije
- Energetska neovisnost

HVALA NA PAŽNJI!