

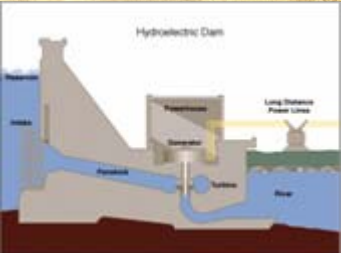
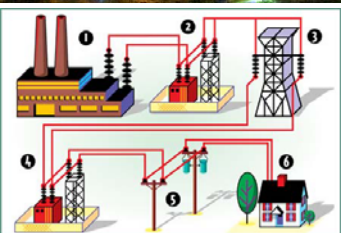


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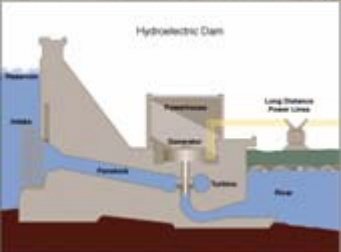
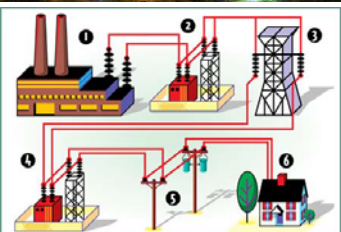
ENERKON

'Toplifikacija naselja na obnovljive izvore energije'

Sisak, 27.-28.11.2008.

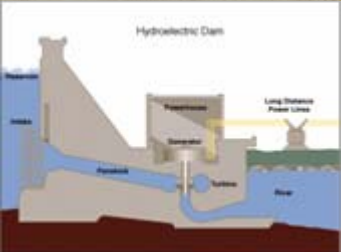
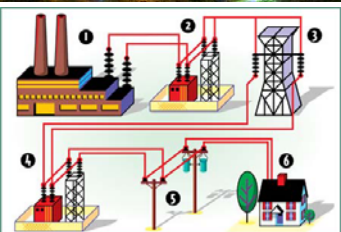


R. Popović, dipl.ing str.
Primjena kogeneracijskog modula
1 MWel
za toplifikaciju naselja

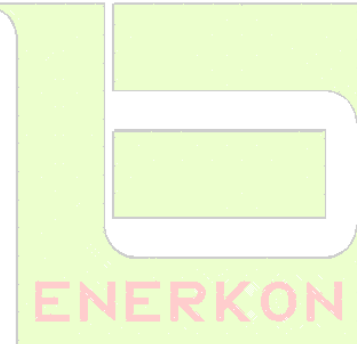


Enerkon d.o.o. Zagreb

Primjena kogeneracijskog modula
1 MWe
za toplifikaciju naselja



Enerkon d.o.o.

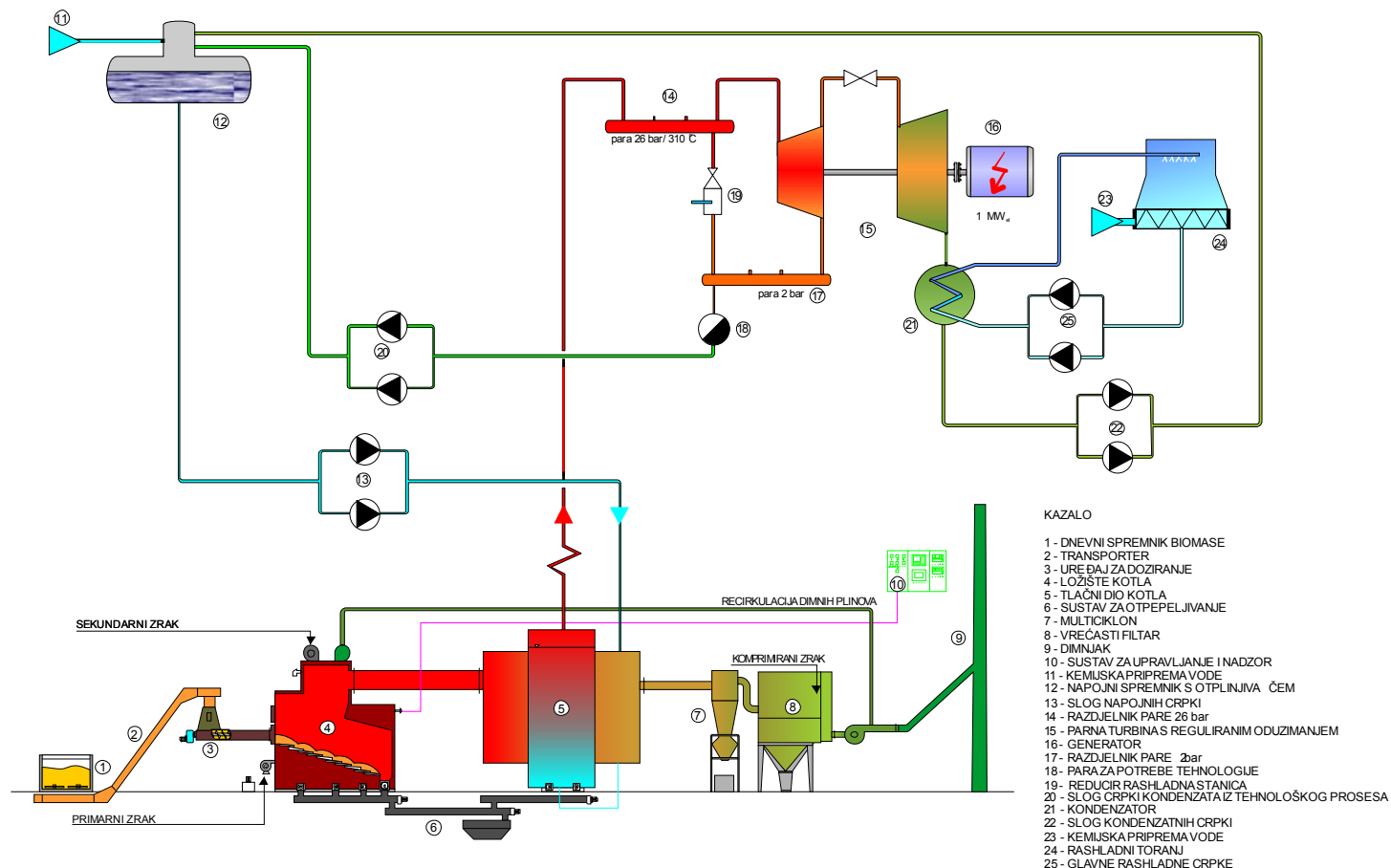
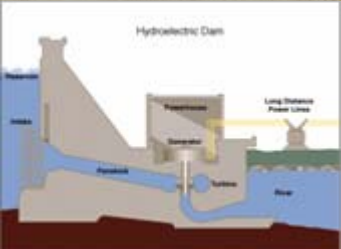
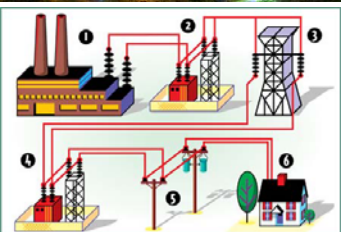


- **ENER**getski **KON**zalting
- poduzeće osnovano 1992. u Zagrebu
- osnovna djelatnost:
 - projektiranje, konzalting i gradnja energetskih i procesnih postrojenja
- više od 150 referenci



Osnovna shema postrojenja

ENERKON

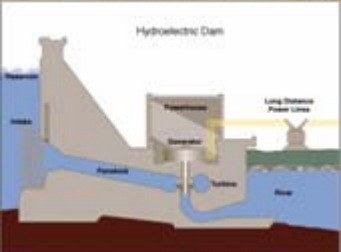
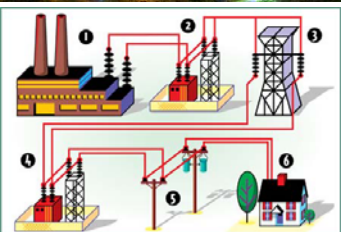
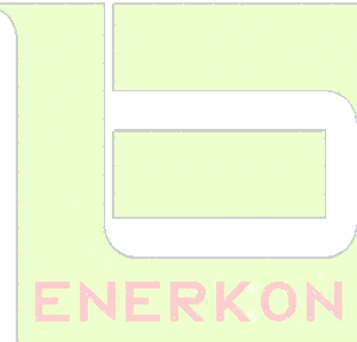


KAZALO

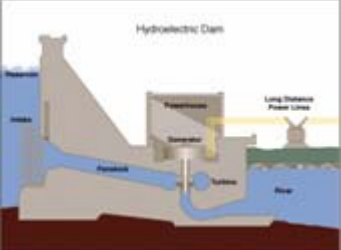
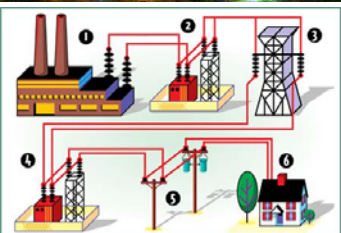
- 1 - DNEVNI SPREMIK BIOMASE
- 2 - TRANSPORTER
- 3 - UREĐAJ ZA DOZIRANJE
- 4 - LOŽIŠTE KOTLA
- 5 - TLAČNI DIO KOTLA
- 6 - SUSTAV ZA OTOPELJIVANJE
- 7 - MULTICIKLON
- 8 - VREĆASTI FILTAR
- 9 - DIMNJAK
- 10 - SUSTAV ZA UPRAVLJANJE I NADZOR
- 11 - KEMUSKA PRIPREMA VODE
- 12 - NAPOJNI SPREMIK S OTPLINJIVA ČEM
- 13 - SLOG NAPOJNIH CRPKI
- 14 - RAZDIELNIK PARE 26 bar
- 15 - PARNI TURBINA S REGULIRANIM ODUZIMANJEM
- 16 - GENERATOR
- 17 - RAZDIELNIK PARE 2 bar
- 18 - PARA ZA POTREBE TEHNOLOGIE
- 19 - REDUCIR RASHLADNOSTANICA
- 20 - SLOG CRPKI KONDEZATA IZ TEHNOLOŠKOG PROSESA
- 21 - KONDEZATOR
- 22 - SLOG KONDEZATNIH CRPKI
- 23 - KEMUSKA PRIPREMA VODE
- 24 - RASHLADNI TORANJ
- 25 - GLAVNE RASHLADNE CRPKE



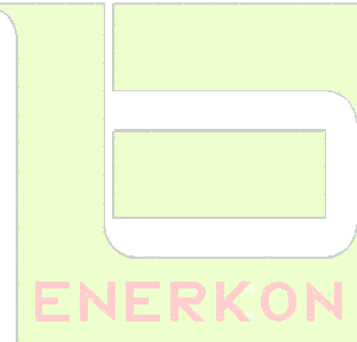
Osnovne značajke postrojenja



- Ložište na biomasu (drvni ostatak)
- Parni kotao 26 bar / 310°C / 10 t/h
- Kondenzacijska parna turbina s reguliranim oduzimanjem na 4 bar (0,5 – 8 t/h tehnološke pare)
- Vodom hlađeni kondenzator
- Mokri rashladni toranj



Stupanj djelovanja postrojenja



- Režim rada „LJETO“ – (6.000 h/god)

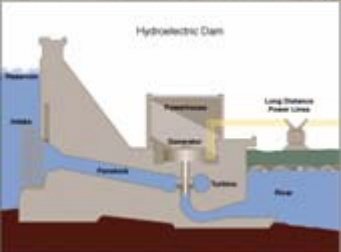
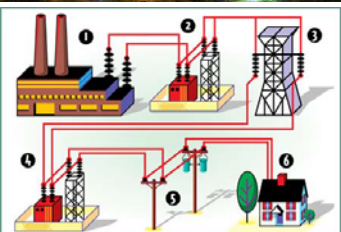
$$\eta_L = 0,21$$

- Režim rada „ZIMA“ – (2.000 h/god)

$$\eta_Z = 0,67$$

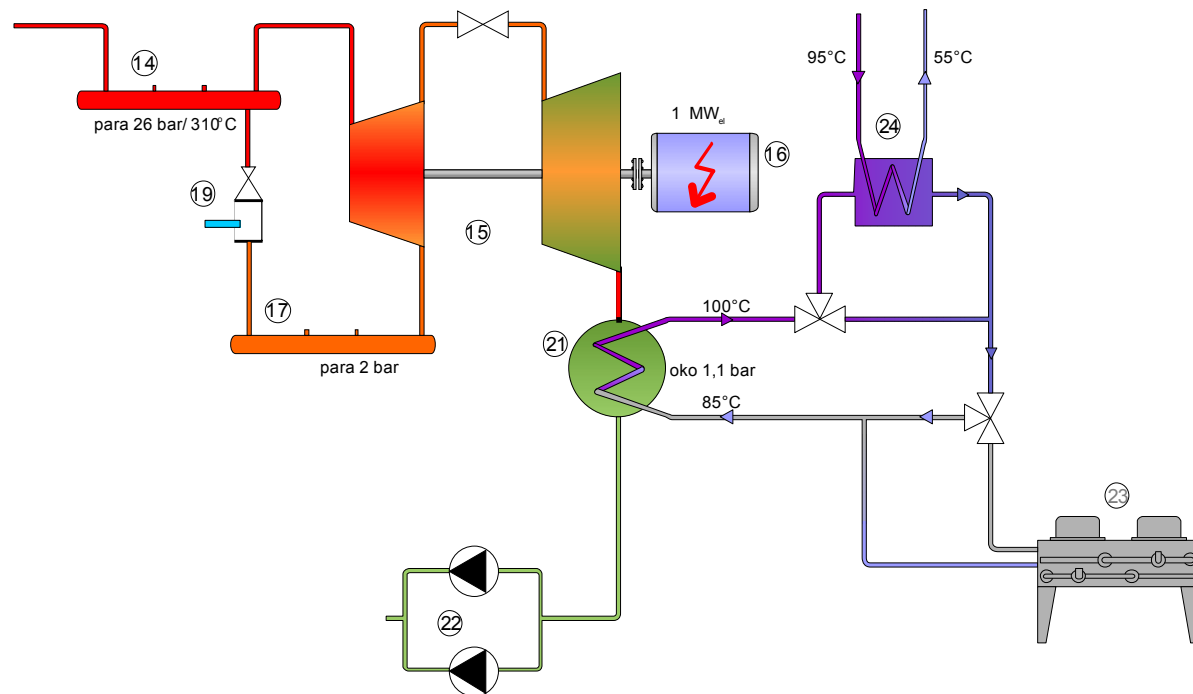
- Prosječni stupanj djelovanja tijekom godine:

$$\eta_p = 0,325$$



Zimski režim rada

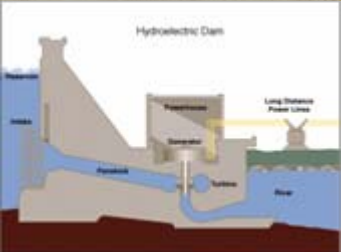
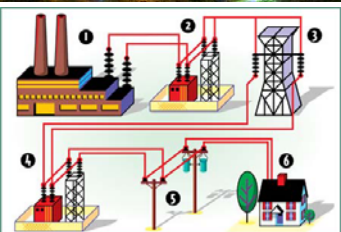
ENERKON



KAZALO

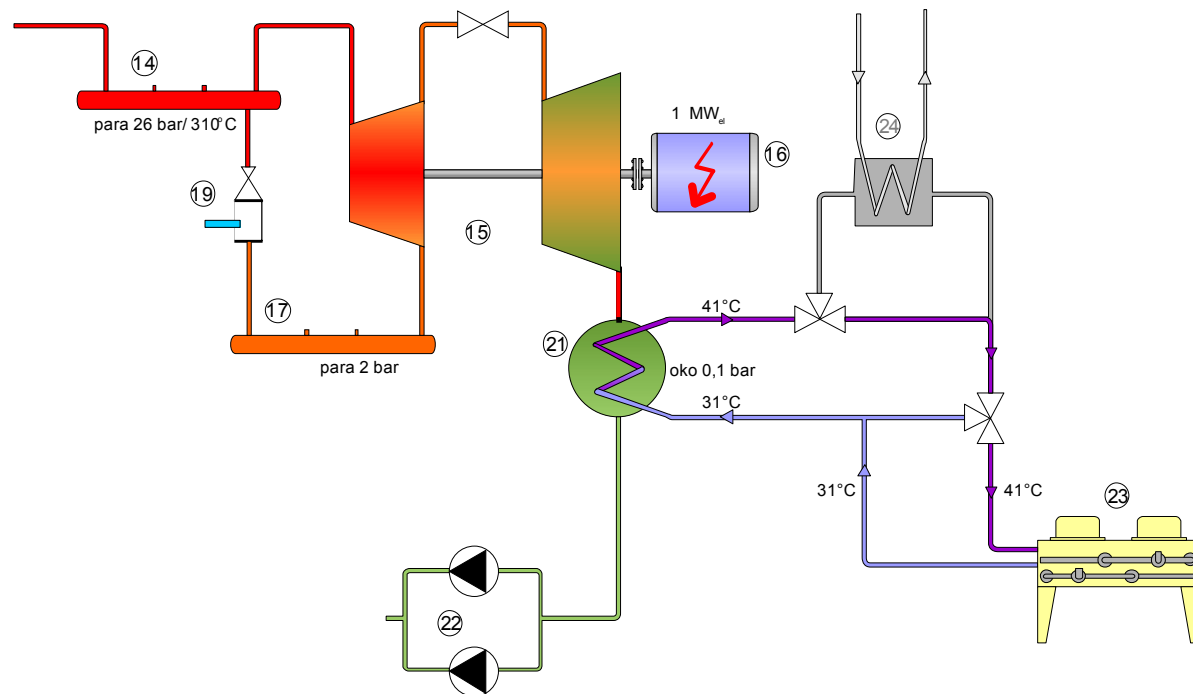
- 14 - RAZDJELNIK PARE 26 bar
- 15 - PARNA TURBINA S REGULIRANIM ODUZIMANJEM
- 16 - GENERATOR
- 17 - RAZDJELNIK PARE 2 bar
- 19 - REDUCIR RASHLADNA STANICA

- 21 - KONDENZATOR
- 22 - SLOG KONDENZATNIH CRPKI
- 23 - ZRAČNI HLANJAK
- 24 - IZMJENJIVAČ TOPLINE (DALJINSKO GRIJANJE)



Ljetni režim rada

ENERKON



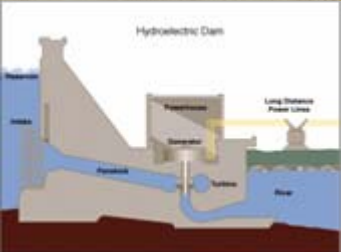
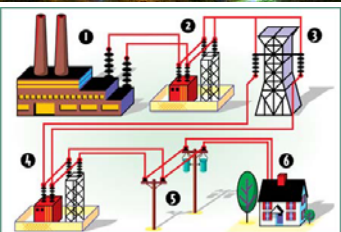
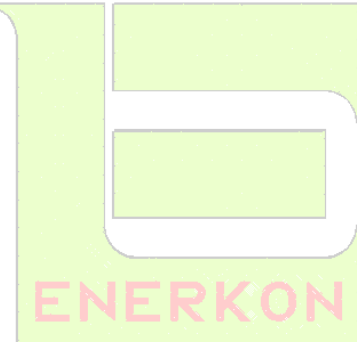
KAZALO

- 14 - RAZDJELNIK PARE 26 bar
- 15 - PARNA TURBINA S REGULIRANIM ODUZIMANJEM
- 16 - GENERATOR
- 17 - RAZDJELNIK PARE 2 bar
- 19 - REDUCIR RASHLADNA STANICA

- 21 - KONDEZATOR
- 22 - SLOG KONDEZATNIH CRPKI
- 23 - ZRAČNI HLANJAK
- 24 - IZMJENJIVAČ TOPLINE (DALJINSKO GRIJANJE)



Stupanj djelovanja postrojenja



- Režim rada „LJETO“ – (6.000 h/god)

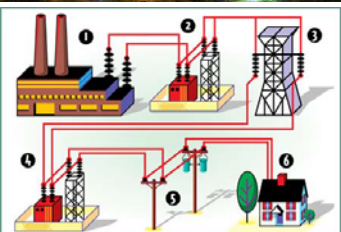
$$\eta_L = 0,21$$

- Režim rada „ZIMA“ – (2.000 h/god)

$$\eta_Z = 0,81$$

- Prosječni stupanj djelovanja tijekom godine:

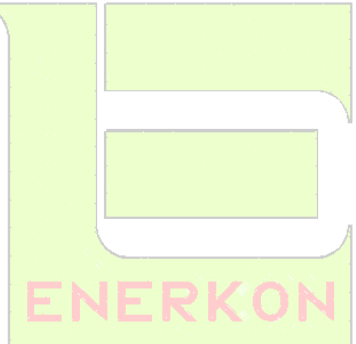
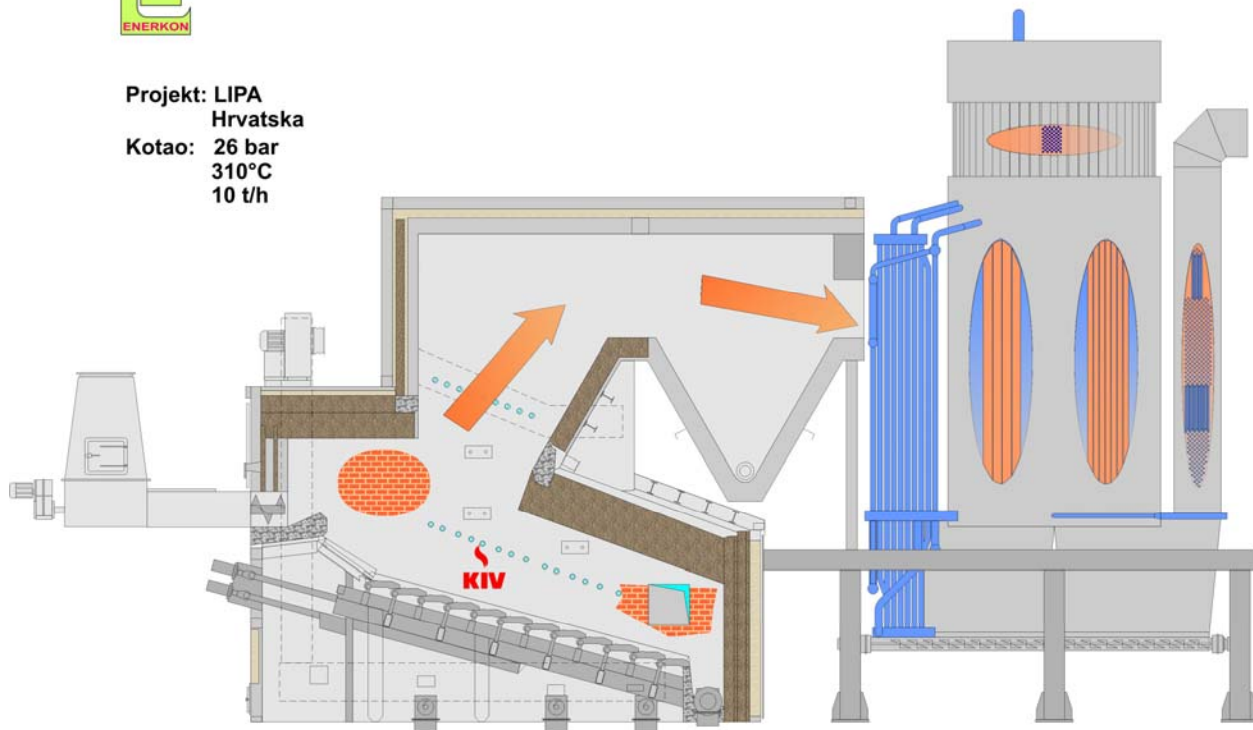
$$\eta_p = 0,36$$



Parni kotao s ložištem na biomasu



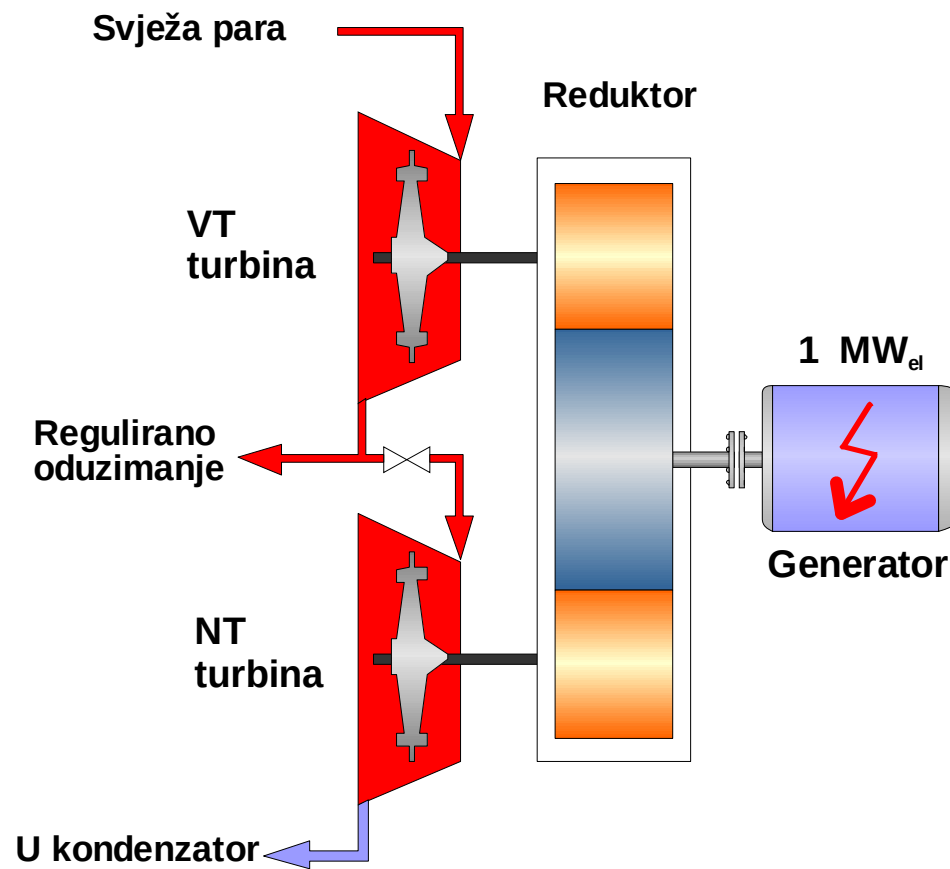
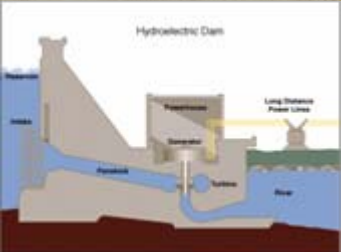
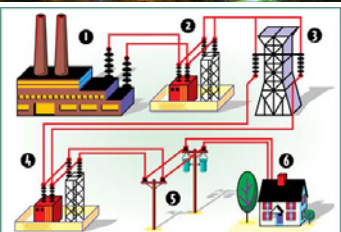
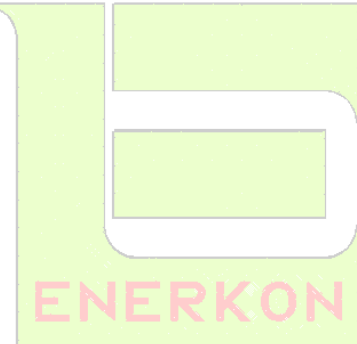
Projekt: LIPA
Hrvatska
Kotao: 26 bar
310°C
10 t/h

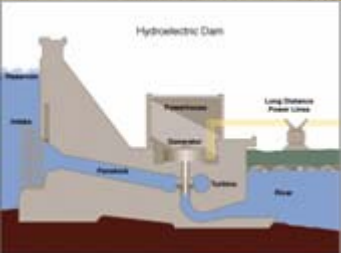
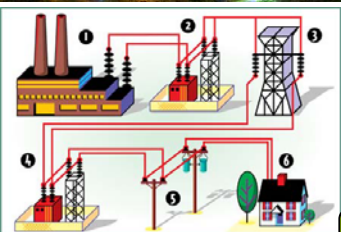


- $1 \text{ MW}_e + 5 \text{ MW}_t$
- kotao 10 t/h / 26 bar / 310°C
- 20.000 t/god. drvnog ostatka



TG set

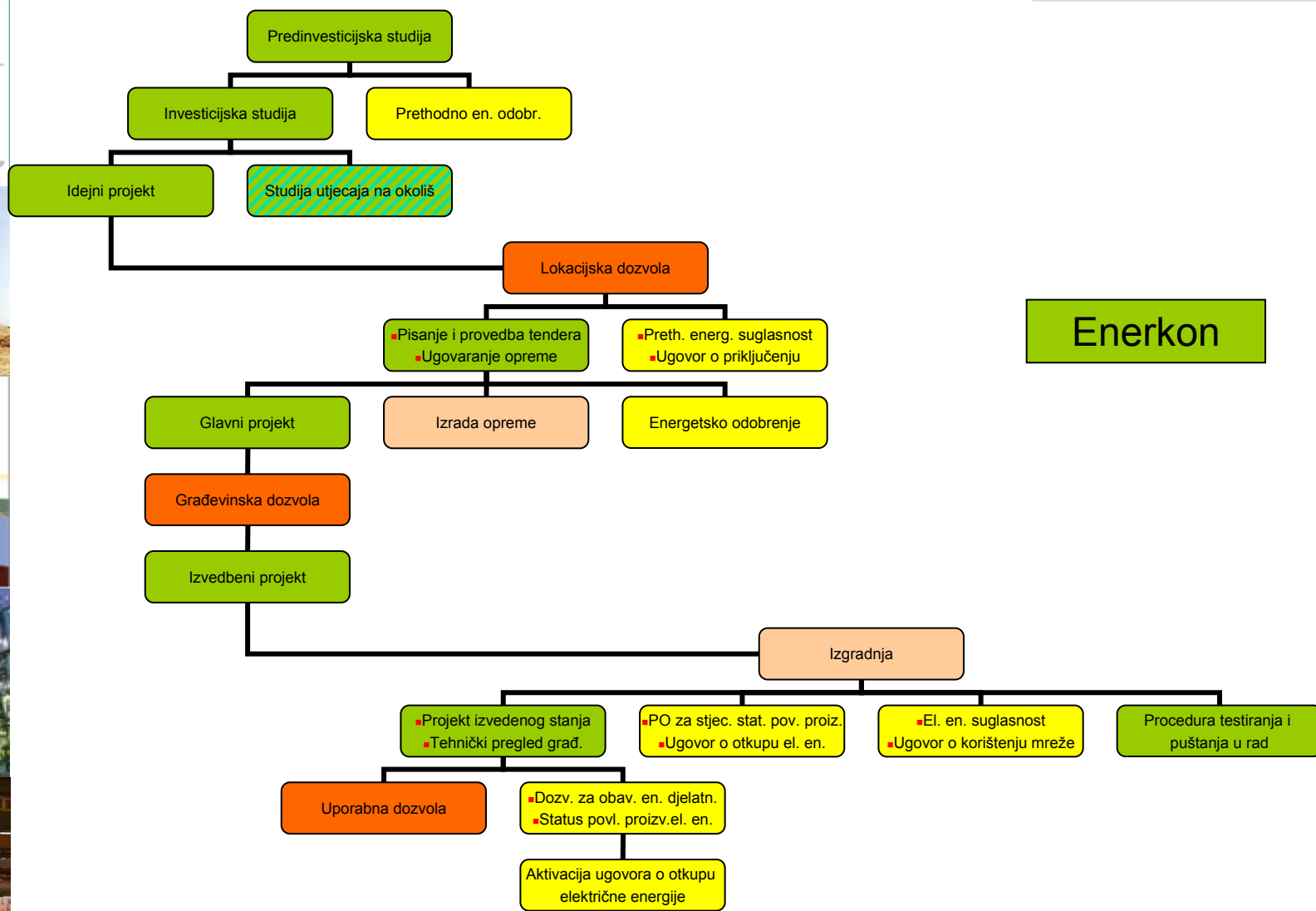




Dijagram toka za kogeneracije na biomasu

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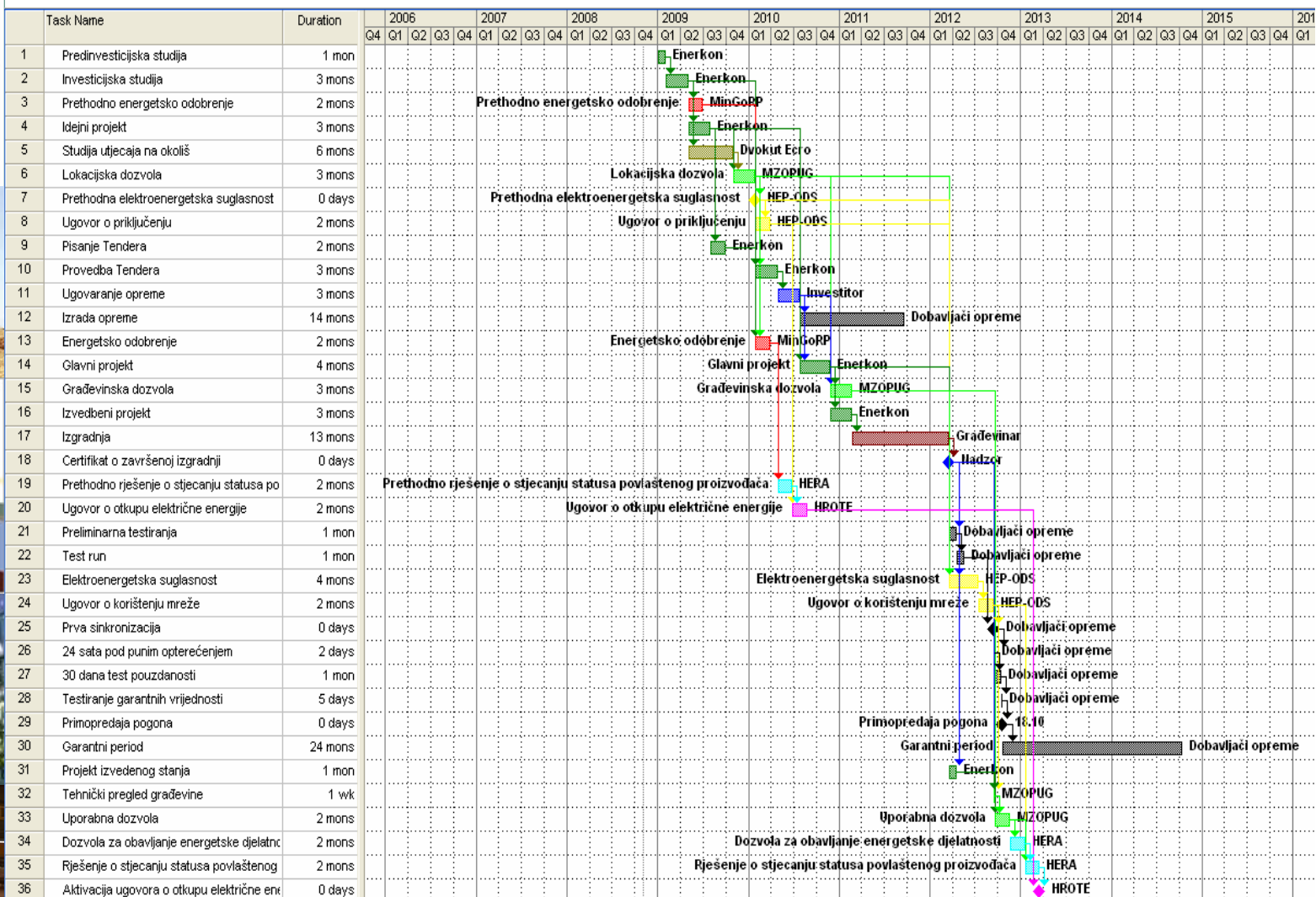
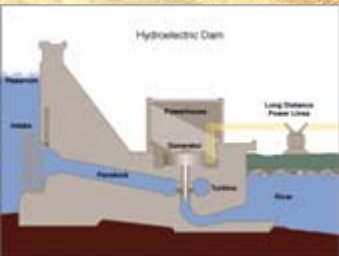
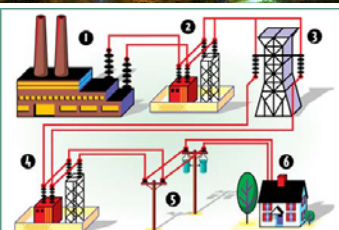
Enerkon

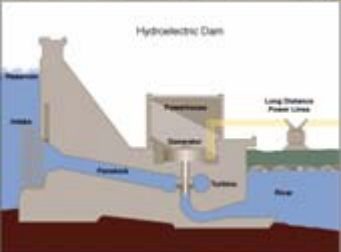
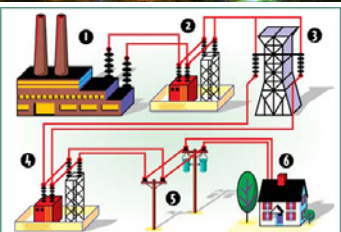




Okvirni termin plan za kogeneracije na biomasu

ENERKON





Reference

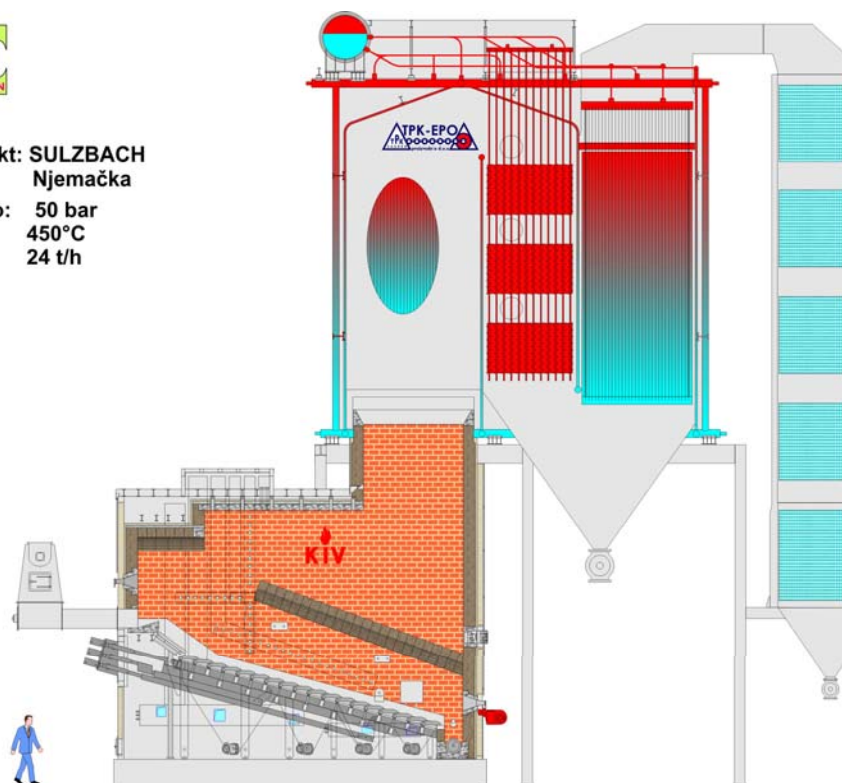
Kotao na biomasu Sulzbach, Njemačka

ENERKON



Projekt: SULZBACH
Njemačka

Kotao: 50 bar
450°C
24 t/h



- kotao 24 t/h / 50 bar / 450°C

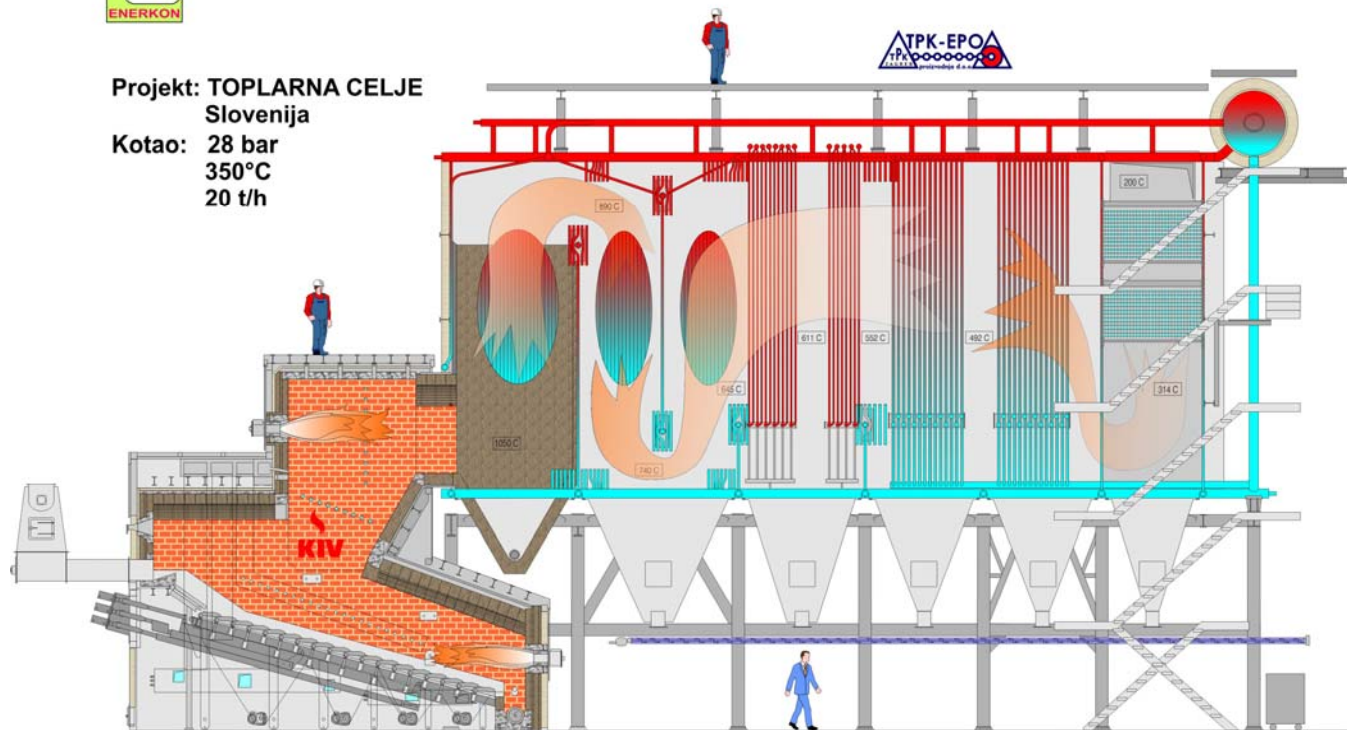
Reference

Kogeneracija na komunalni otpad Toplarna Celje, Celje, Slovenija

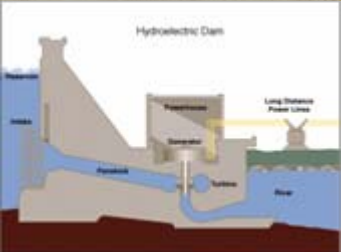
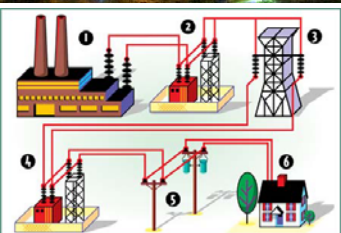


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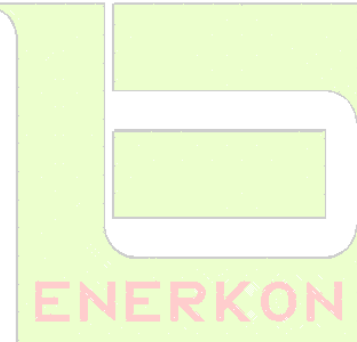
Projekt: TOPLARNA CELJE
Slovenija
Kotao: 28 bar
350°C
20 t/h



- $2 \text{ MW}_e + 13 \text{ MW}_t$
- kotao 20 t/h / 28 bar / 350°C
- 20.000 t/g predobrađenog komunalnog otpada



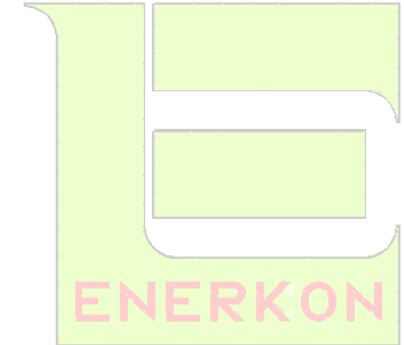
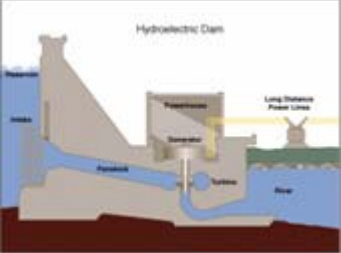
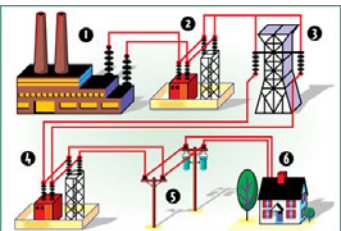
Kontakti



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stanko.plevnik@enerkon.hr

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 +385 1 6171 585
 +385 1 6171 579
- Fax: +385 1 6171 590



Hvala na pažnji!