

Ivica Vukelić ▶
HEP Proizvodnja d.o.o.
Sektor za termoelektrane
TE Plomin

DOBRODOŠLI U TE PLOMIN

Sadržaj:

- ▶ 1. Povijest ugljenarstva i energetike na Labinštini
- ▶ 2. Tvrtke na lokaciji – odnosi / vlasništvo
- ▶ 3. Tehnika, tehnologija, ekologija, proizvodni rezultati

Zahvaljujem što ćete tijekom prezentacije mobitele držati na bešumnom radu !



1. Povijest ugljenarstva i energetike na Labinštini:

POVIJEST UGLJENARSTVA I ENERGETIKE U ISTRI / LABIN

- 1626. spominje se ugljen na Labinštini (Arhiv Venecije) – neenergetska namjena 
- 1785. početak kontinuiranog kopanja
- 1926. TE Koromačno 1,2 MW
- 1929. TE Štrmac 1,2 MW
- 1937. TE Vlaška 10 MW
- 1970. TE Plomin 1 125 MW
- 2000. TE Plomin 2 210 MW
- **???? TE Plomin 3 (500)MW**



2. Tvrtke na lokaciji – odnosi / vlasništvo :



TE Plomin 1

Vlasnik : HEP-Proizvodnja d.o.o.

Snaga : 125 MW

Gorivo : ugljen

Godina: 1970.

Odsumporavanje: NE

 **TE Plomin** d.o.o.

TE Plomin 2

Vlasnik : TE Plomin d.o.o.

Snaga : 210 MW

Gorivo: ugljen

Godina : 2000.

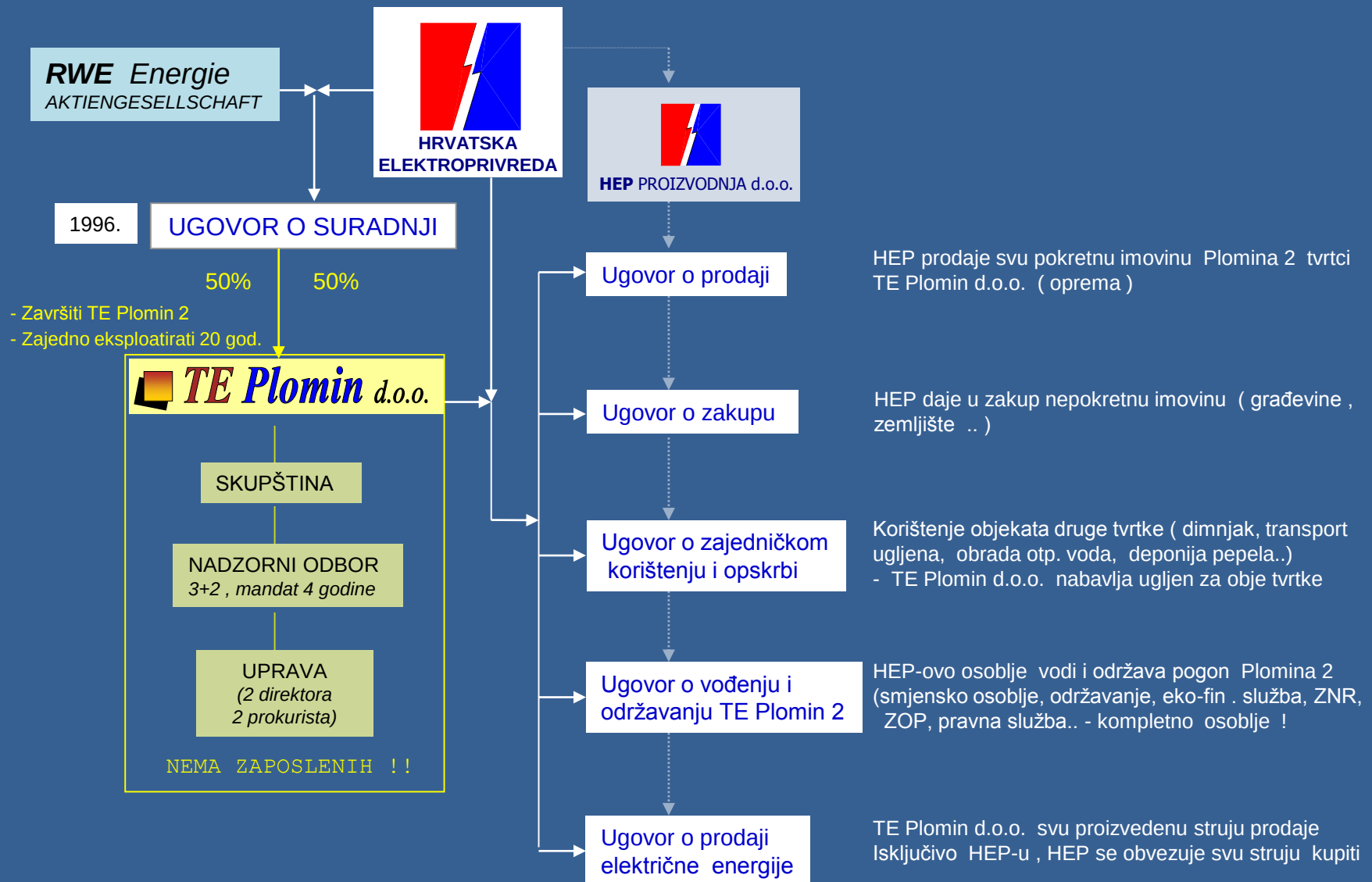
Odsumporavanje : DA

TE Plomin d.o.o. nabavlja ugljen za obje elektrane





2. Tvrtke na lokaciji – odnosi / vlasništvo :



NAČELNA SHEMA RADA TERMOELEKTRANE - OSNOVNI TEHNOLOŠKI SUSTAVI



DIMNJAK

FOTO
pogled s
dimnjaka

POSTROJENJE ZA ODSUPORAVANJE

SUSTAV VOĐENJA BLOKA

DOPREMA UGLJENA DO BUNKERA

ISKRCAJ I DOPREMA UGLJENA

KOTAO

CJEVOVODI

ELL ZA POTPALU

PRIPREMA I DOPREMA UGLJENA

DEPONIJA UGLJENA



DALEKOVODI

TURBINA-GENERATOR

SUSTAV PROČIŠĆAVANJA I ISPUŠTANJA DIMNIH

PLINOVA

SUSTAV ZBRINJAVANJA OSTATNIH PROIZVODA

SUSTAV ZA
MJERENJE,
REGULACIJU,
UPRAVLJANJE

KRUG
VODA
PARA

SUSTAV
ODVODA E.E.

ZBRINJAVANJE OSTATNIH PRODUKATA

PROIZVODNJE

ČIŠĆENJE
TURBINSKOG
KONDENZATA

KEMIJSKA
PRIPREMA
VODE

IZVOR SLATKE VODE

VAPNENO
BRAŠNO

GIPS

SUSTAV DOPREME

I IZJEVA RASHLADNE MORSKE VODE

OBRADA
OTPADNIH
VODA

SUSTAV RASHLADNE MORSKE VODE - USIS

IZLJEV RASHLADNE MORSKE VODE

KRUG VODA PARA

TEHNOLOŠKI SUSTAVI - MODEL

TIJEK MEDIJA NA LOKACIJI

ZAŠTITA OKOLIŠA

VAŽNOST TE Plomin 2
U EES RH

PROIZVODNI PODACI
2002. - 2014.

PHOTO IZGRADNJA

SVE

ČEPIĆ JEZERO

FOTOGRAFIJE - GLOBAL

DIMNJAK

1 MW ?

KAKO SE PROIZVODI E.E.

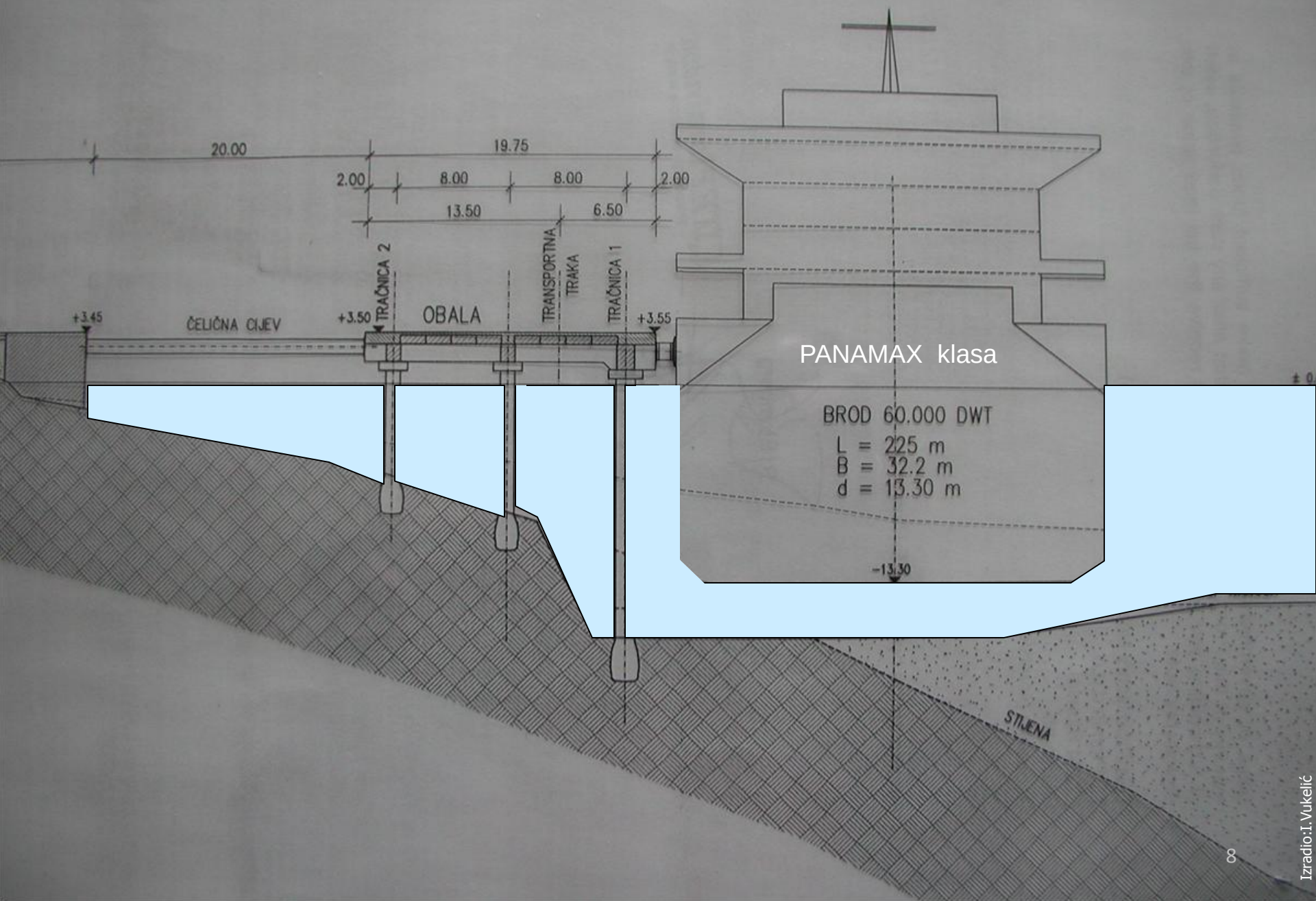
KRAJ

Tehnološke značajke lokacije – TIJEK MEDIJA

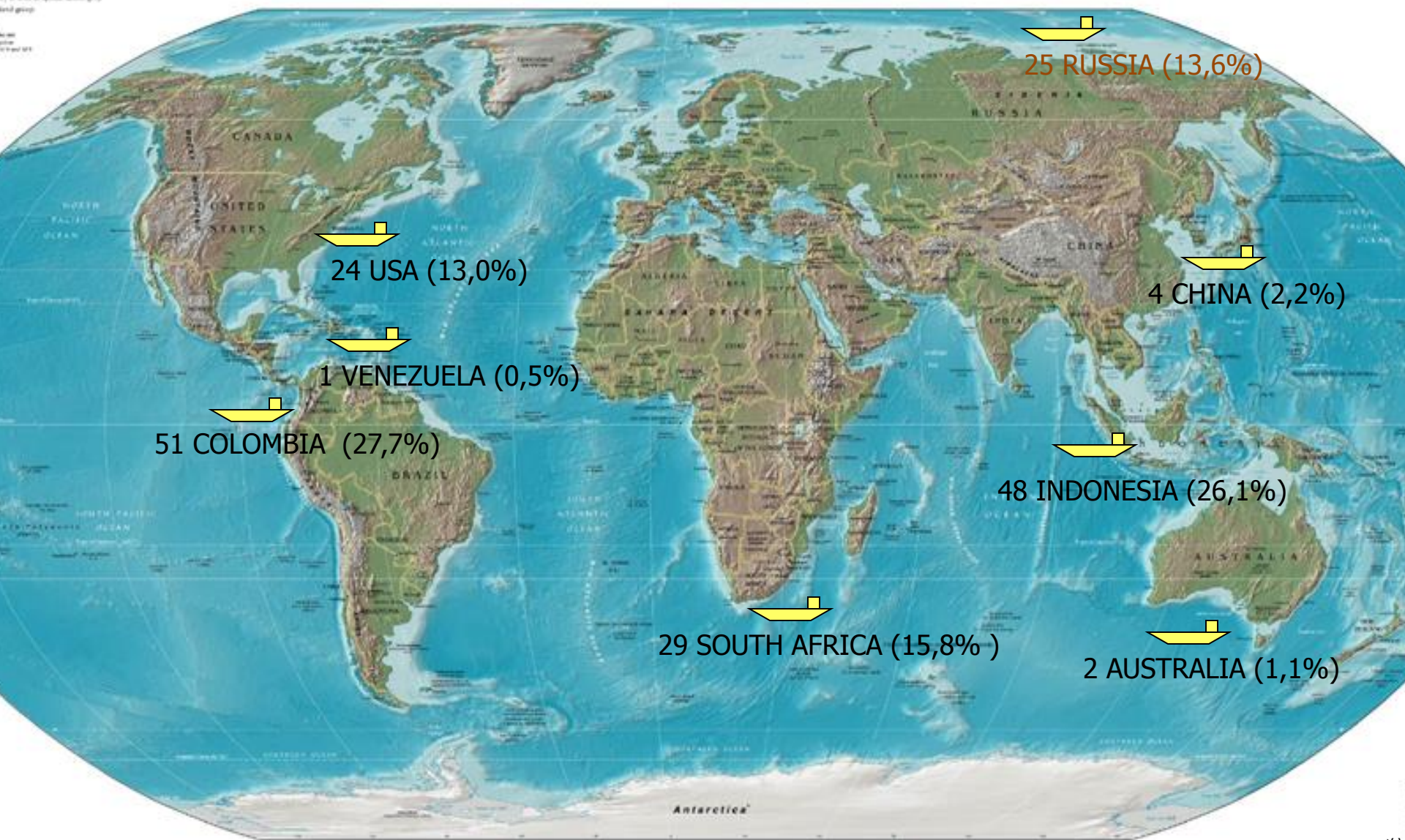


SUSTAV ISKRCAJA I DOPREME UGLJENA

- pravni status luke : “industrijska luka zatvorenog tipa”
- godina izgradnje 1999.
- vlasništvo HEP-a (zemljište, koncesija na pomorsko dobro)
- vlasništvo TE Plomin d.o.o. (brodoiskrcivač, transportni sustav)



COAL PER ORIGINS (period 1999.- 1.1.2014.)



193 vessels , aprox. 12.600.000 t

ISKRAJ



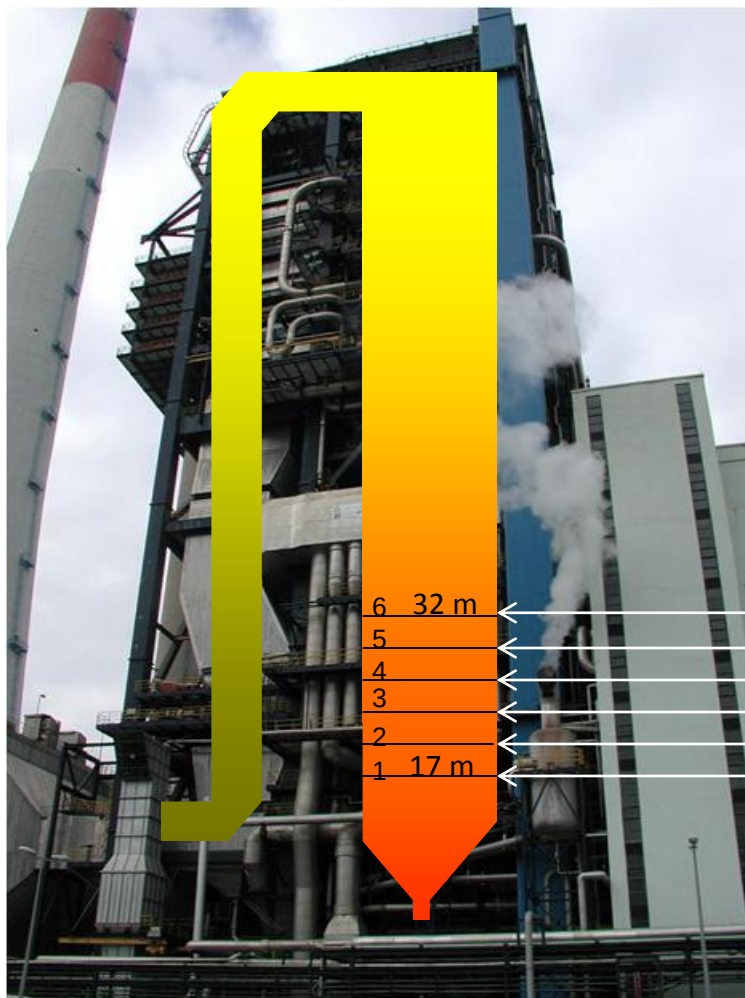


DEPONIJJA UGLJENA

KOTAO - DIMENZIJE

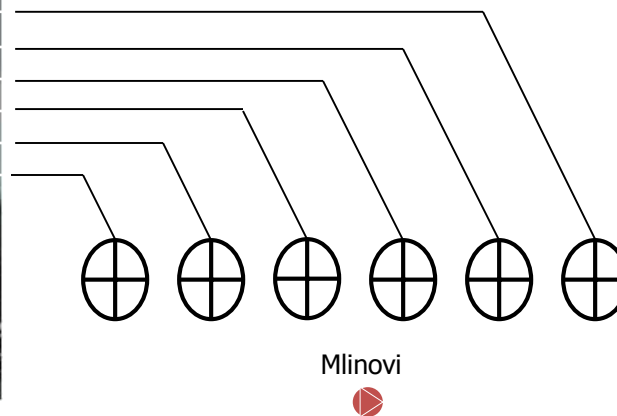
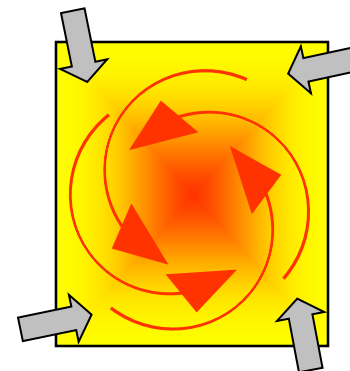


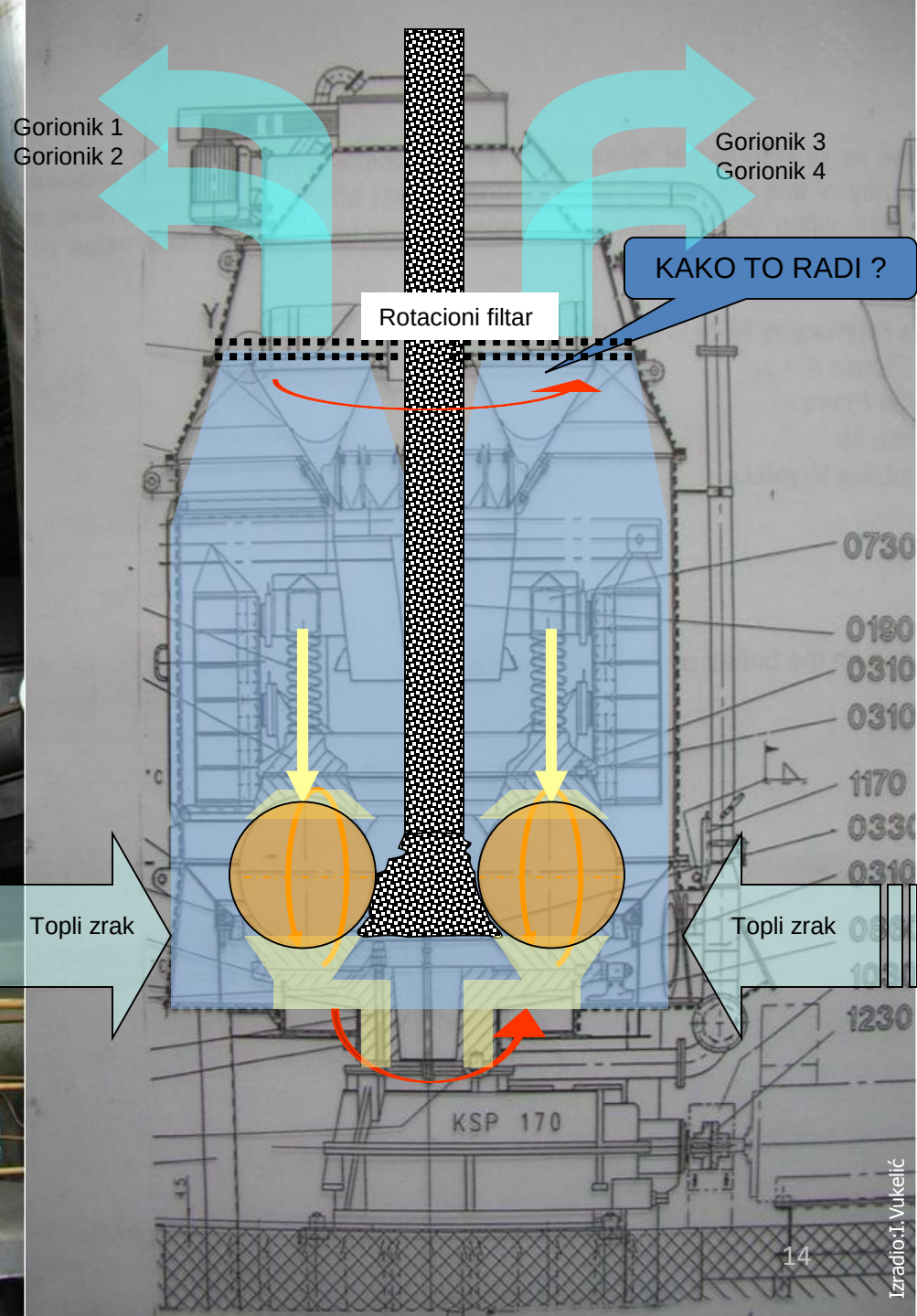
KOTAO – OBLIK – SUSTAV LOŽENJA



Broj gorionika
 Ugljen : 24
 ELLU : 12

Položaj gorionika u jednom nivou
 - Tangencijalno loženje - ciklon

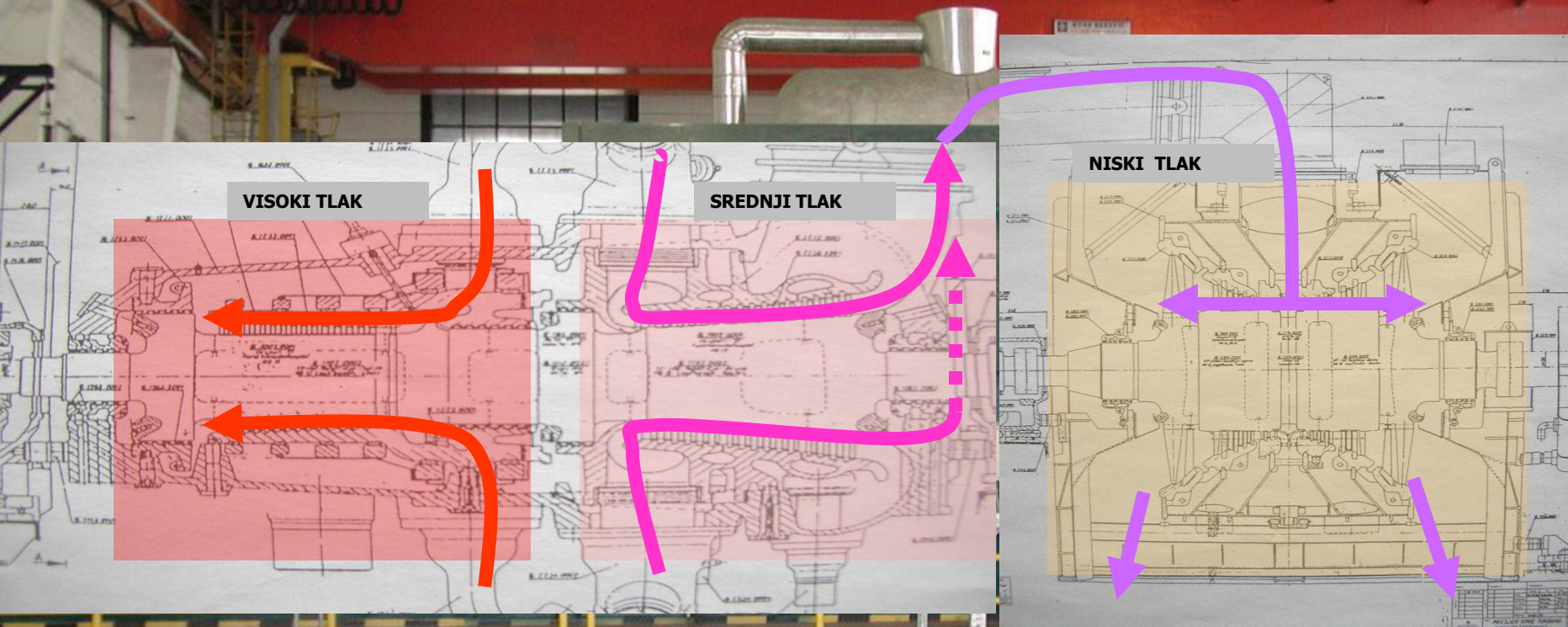




KOTAO – POGLED U LOŽIŠTE



TURBINA – POGLED - PRESJEK



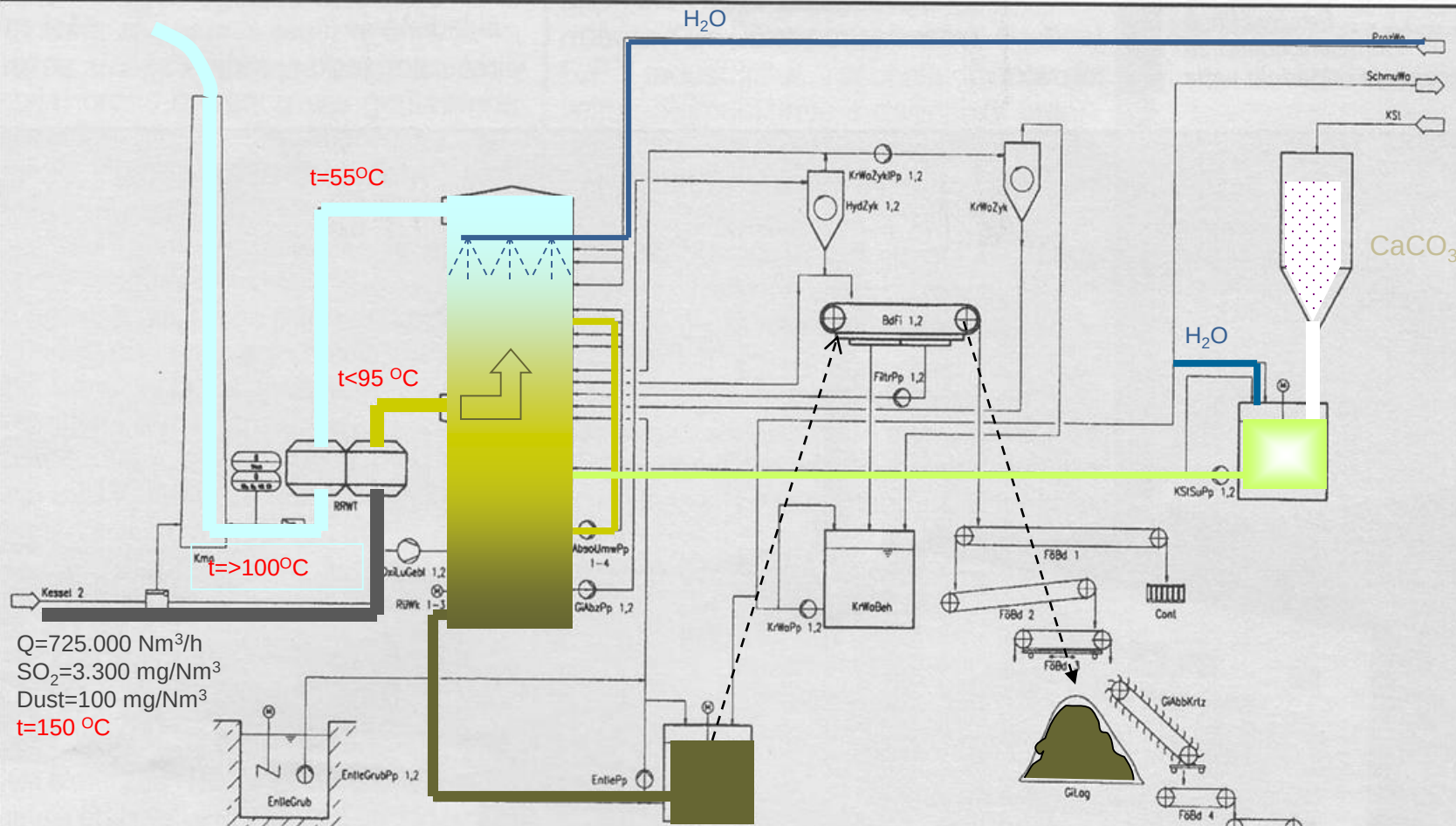
- kondenzacijska s međupregrijanjem
- reakcijska, dvokučijsna, trotačna
- 7 oduzimanja
- max. snaga 219,5 MW
- tlak VT / ST 140 bar / 38 bar
- temperatura VT 535°C
- paroprotočnost 649,5 t/h
- kondenzator - tlak 0,046bar
- kondenzator - hlađenje – 30.240 m³/h mora



POSTROJENJE ZA ODSUMOPRAVANJE DIMNIH PLINOVA

- Jedino postrojenje u RH
- Samo za TE Plomin 2
- Mokri postupak IFO (Insitu Forced Oxidation)
- Kapacitet proizvodnje gipsa 6,9 t/h (max)
- Potrošnja vapnenca 4 t/h
- 2003. proizvedeno gipsa 26.000 t i prodano tvornici cementa (deponirano 0 t)

Ilustracija 8
Shema toka
u postrojenju



Legenda

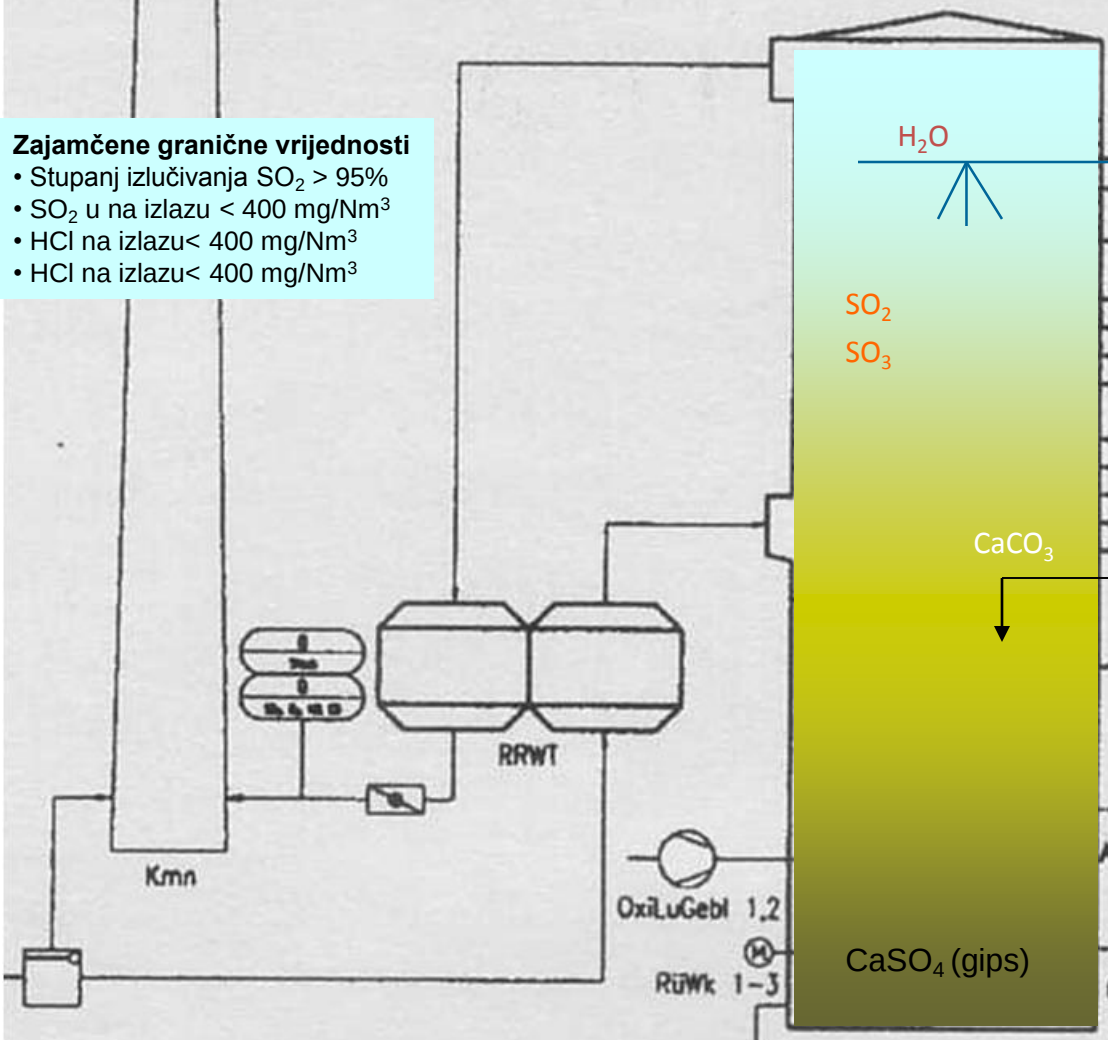
Abso	- Apsorber
AbsoUmwPp	- Optočna crpka apsorbera
BdFi	- Tračni filtar
Cont	- Kontejner
DrErhPp	- Crpka za povišenje tlaka
EntleBeh	- Spremnik za pražnjenje
EntleGrub	- Jama za pražnjenje
EntleGruBPp	- Crpka za pražnjenje jame
EntlePp	- Crpka za pražnjenje
FiltrPp	- Crpka filtrata

FöBd	- Transporter
GiAbbKrtz	- Oduzimač gipsa
GiVerlaStat	- Stanica za utovar gipsa
GiLag	- Skladište gipsa
GiAbzPp	- Crpka za odvod gipsa
HydZyk	- Hidroziklon
Kmn	- Dimnjak
KrWaBeh	- Spremnik za optočnu vodu
KrWaPp	- Crpka za optočnu vodu
KrWaZyk	- Ciklon za optočnu vodu

KSilo	- Silos vapnenca
KStSuBeh	- Sprem. za suspenziju vapnenca
KStSuPp	- Crpka za suspenz.vapn.
OxiLuGebl	- Ventilator oksidac.zraka
ReGaVo	- Regenerat. predgrijač plina
RüW	- Miješalica

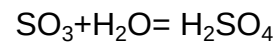
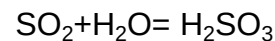
Zajamčene granične vrijednosti

- Stupanj izlučivanja $\text{SO}_2 > 95\%$
- SO_2 u na izlazu $< 400 \text{ mg/Nm}^3$
- HCl na izlazu $< 400 \text{ mg/Nm}^3$
- HCl na izlazu $< 400 \text{ mg/Nm}^3$

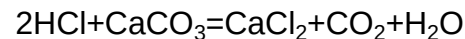
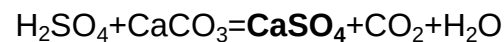
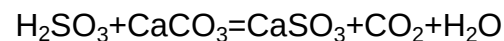


ODSUMPORAVANJA - KEMIJSKE REAKCIJE

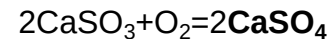
Apsorpcija



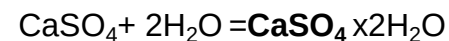
Reakcija s vapnencem



Oksidacija



Kristalizacija



ODSUMPORAVANJA – SKLADIŠTE GIPSA



Postrojenje za obradu otpadnih voda

Kapacitet : 50m³/h

Prihvatni spremnik : 1.200m³.

Vode koje se obrađuju:

- otpadne vode iz postrojenja za odsumporavanje
- otpadne vode strojarnice
- sanitarne otpadne vode

Kruti ostatak od obrade voda se prodaje cementnoj industriji



Deponija gipsa i pepela

Posjeduje sve dozvole za deponiranje

- pepela
- šljake
- gipsa
- ostatka obrade otpadnih voda

Bez obzira na legalnu mogućnost deponiranja, većina ostatnih materijali prodaju se građevinskoj industriji !
(Holcim, Matrix, Beton Lučko, Cemex ..)



Sanacija deponije pepela, šljake i gipsa

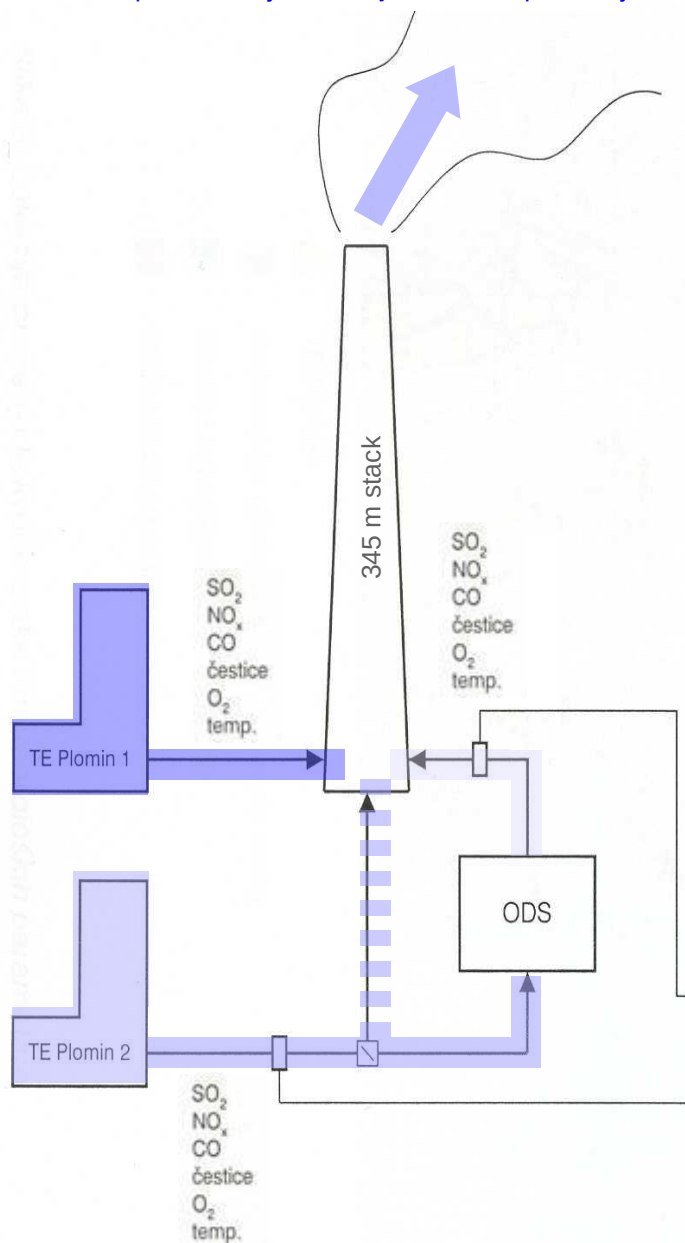


- Monitoring emisija
- Monitoring imisija



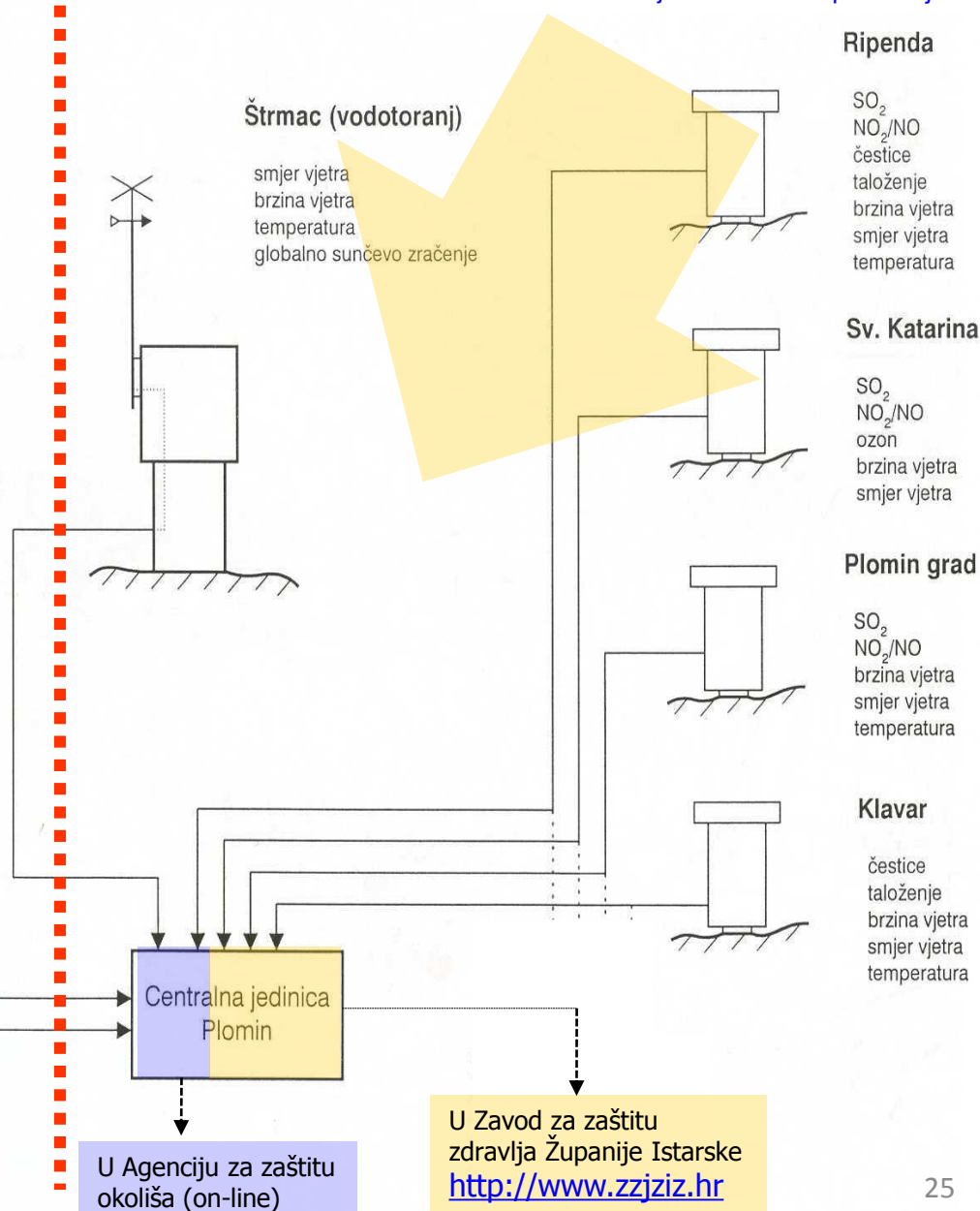
MONITORING EMISIJA – ispuštanje u zrak

GVE- granične vrijednosti emisija
 -zakonski određene za svako ložište
 -prekoračenje- sankcije – zna se “počinitelj”

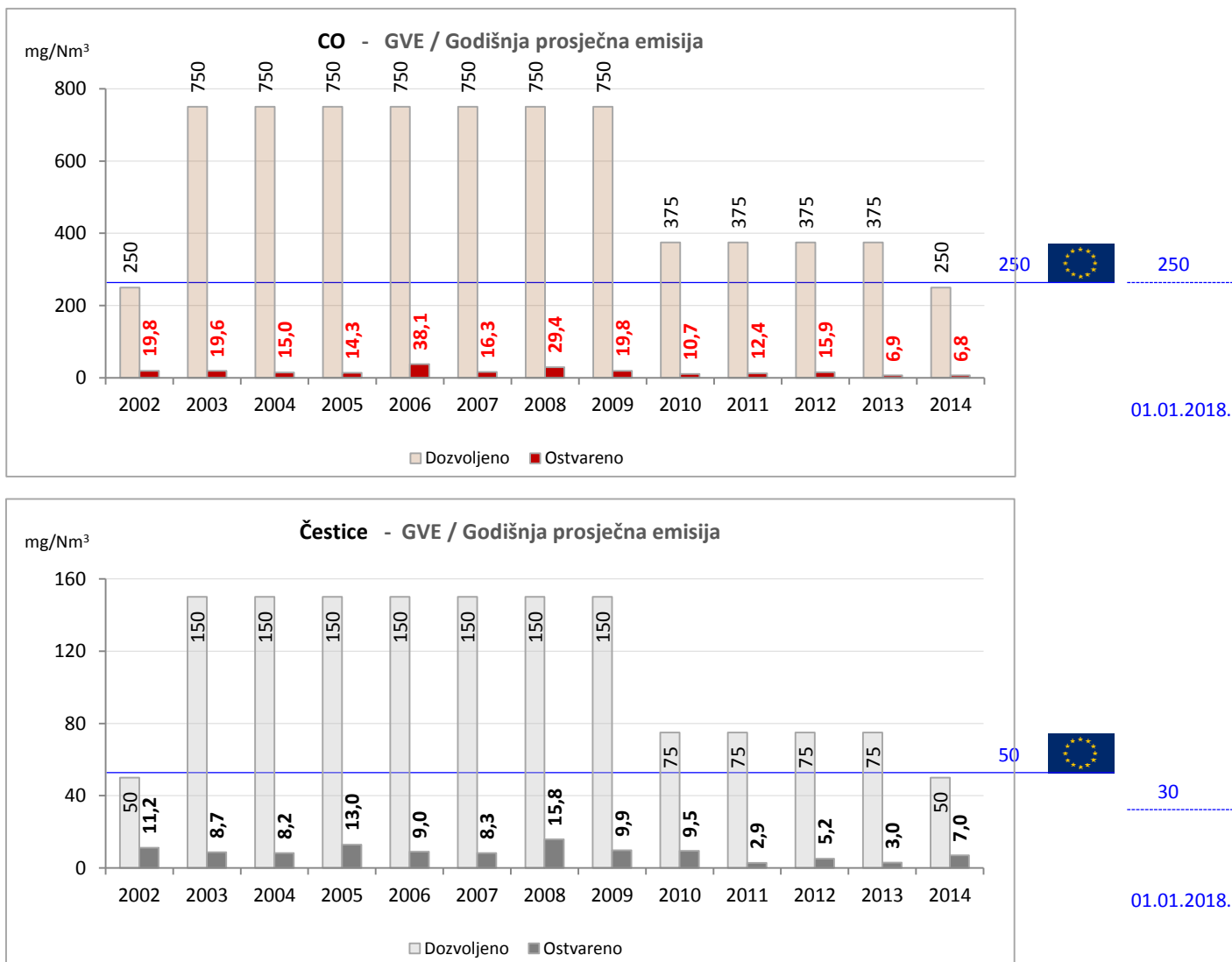


MONITORING IMISIJA – dolazi iz zraka

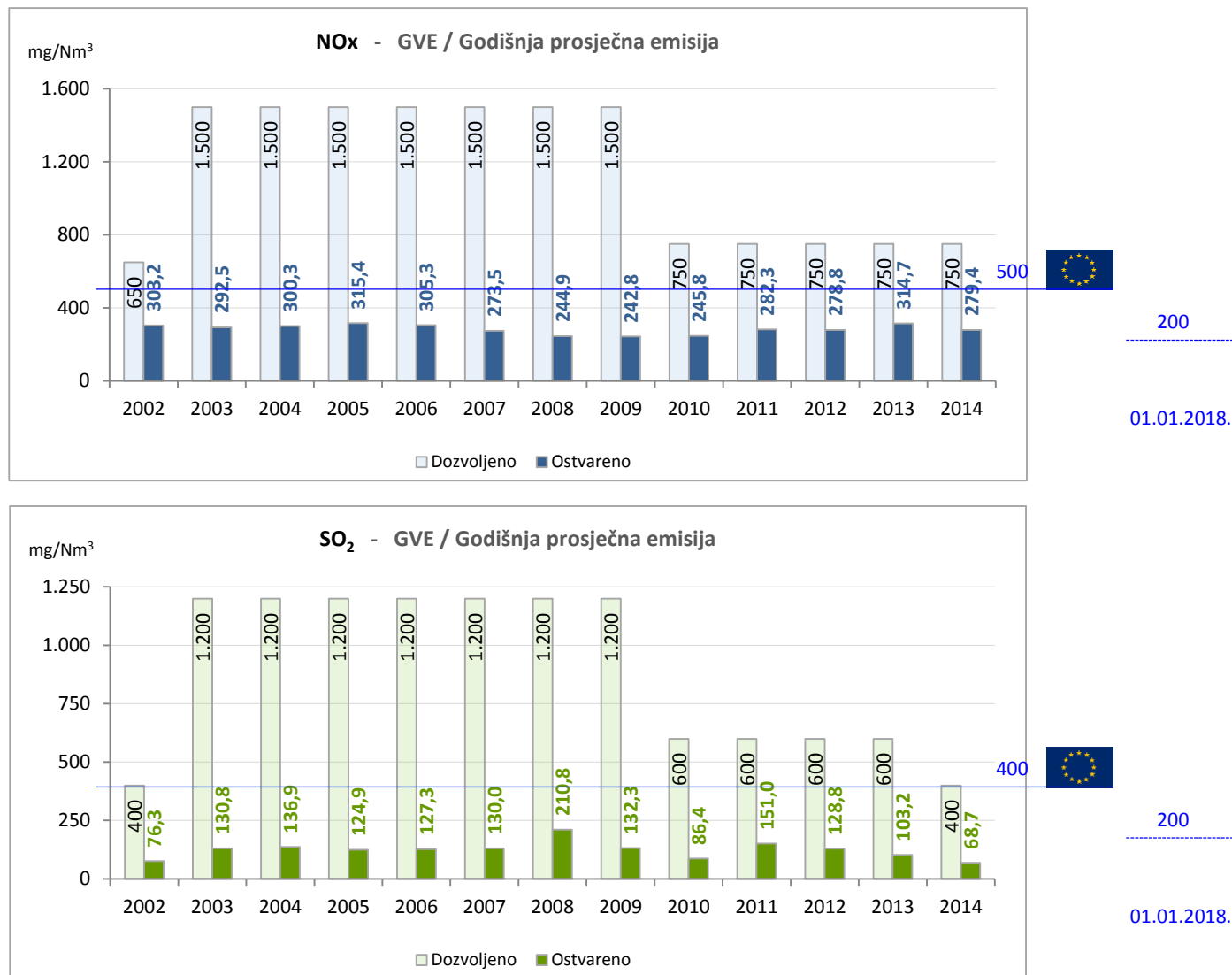
Preporučene vrijednosti u zraku
 - nema sankcija – ne zna se “počinitelj”



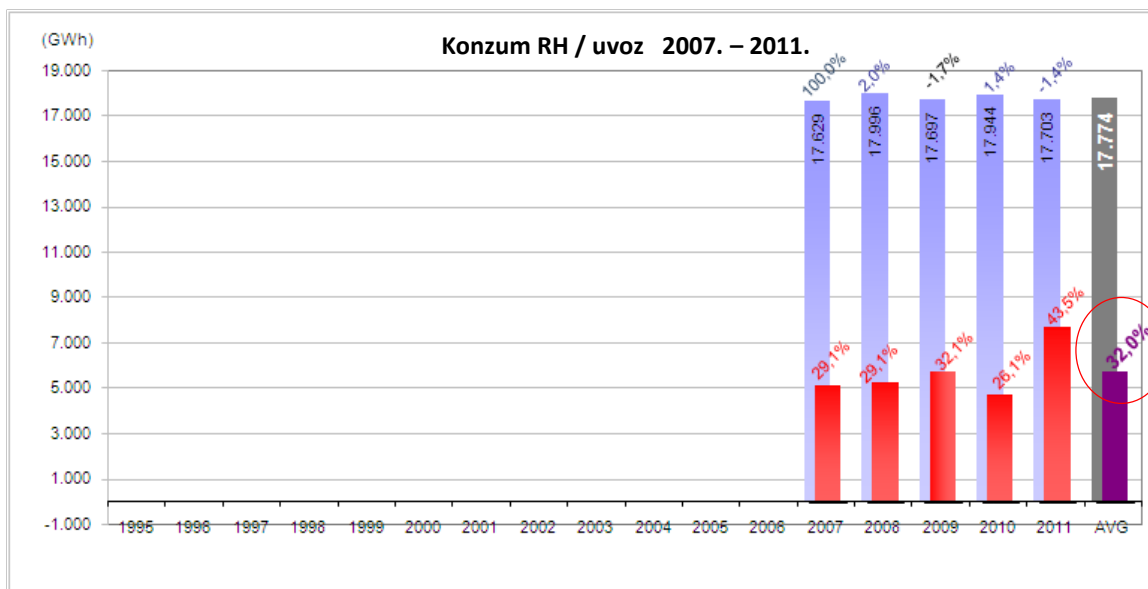
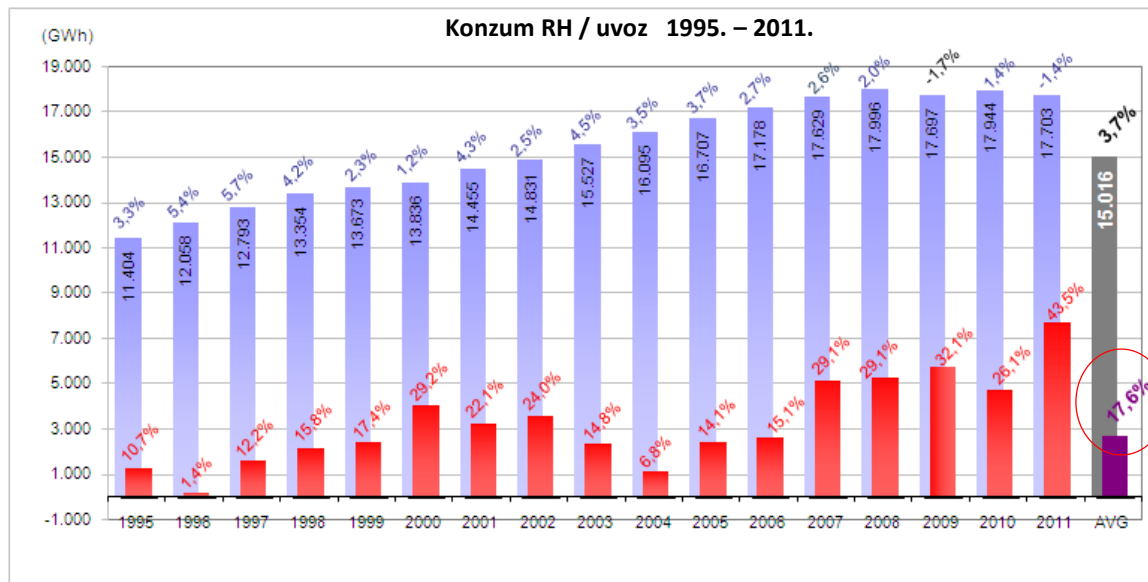
EMISIJE DIMNIH PLINOVA – Godišnji prosjeci



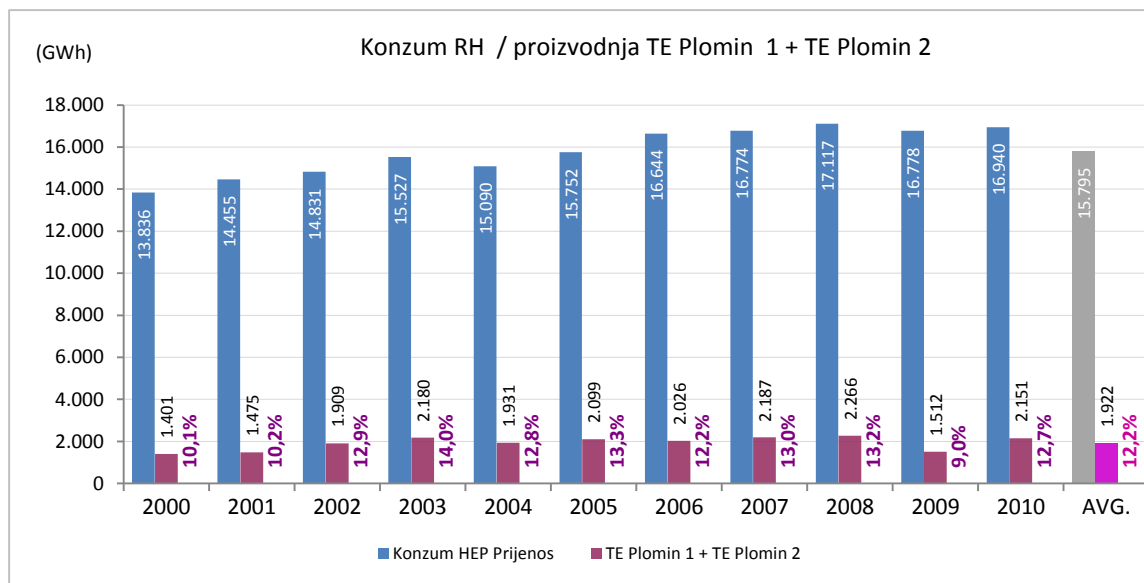
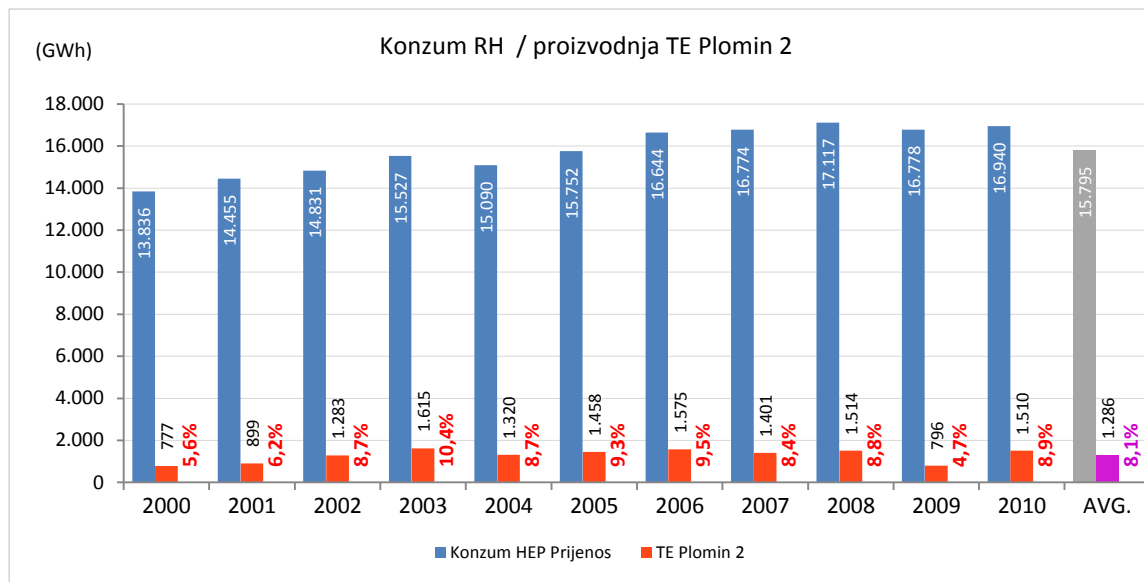
EMISIJE DIMNIH PLINOVA – Godišnji prosjeci



VAŽNOST TE Plomina 2 – udio uvoza u konzumu RH



VAŽNOST TE Plomina 2 – udio u konzumu RH



VAŽNOST TE Plomina 2 – cijena goriva pogona HEP Proizvodnje d.o.o.

Okvirni troškovi goriva u proizvodnji električne energije - ukupno 2011.

Sektor za termoelektrane

 TE Sisak

 TE Rijeka

 TE Plomin 1

 KTE Jertovec

 TE Plomin 2

 Sektor

Zbroj (uklj.str.5)

POTROŠNJA GORIVA

ZEMNI PLIN (1000m3)	29.796			15.611		697.459
LOŽ ULJE (tona)	21.122	37.224	0	0		149.203
PLINSKO ULJE (tona)	0	122	286	0	605	1.015
UGLJEN (tona)	0		340.810		616.249	957.059
PROIZVODNJA						
EL. ENERGIJA - PRAG (kWh)	99.793.000	143.692.000	785.656.015	45.097.800	1.545.045.700	5.149.451.835
TEHNOLOŠKA PARA (tona)	150.249					877.089
OGRIJEVNA TOPLINA (GJ)						6.154.424
GORIVO - ENERGIJA						
ENERGIJA - ELEKTRIČNA (GJ)	1.382.698	1.503.001	8.334.587	520.423	15.314.561	44.072.287
ENERGIJA - PARA (GJ)	450.747					8.785.691
ENERGIJA - UKUPNO (GJ)	1.833.445	1.503.001	8.334.587	520.423	15.314.561	52.857.978
SPECIFIČNI POTROŠAK						
ELEKTRIČNA ENERGIJA (kJ/kWh)	11.738	10.460	10.608	11.540	9.912	10.265
TROŠKOVI GORIVA - USD						
ZEMNI PLIN	13.797.412			7.177.959		228.584.076
LOŽ ULJE	8.417.985	16.118.255	0	0	0	45.267.300
PLINSKO ULJE		112.833	287.316	0	636.125	1.036.274
UGLJEN			41.954.054		75.843.545	117.797.599
UKUPNO	22.215.397	16.231.088	42.241.370	7.177.959	76.479.670	392.685.249
GORIVO/KWh €c (EUR)	9,74	8,56	4,07	12,06	3,75	5,78

Mazut+Plin

Mazut

Ugljen

Plin+ELLU

Ugljen

Izvor: Izvješće o proizvodnji Sektora za termoelektrane, prosinac 2011.

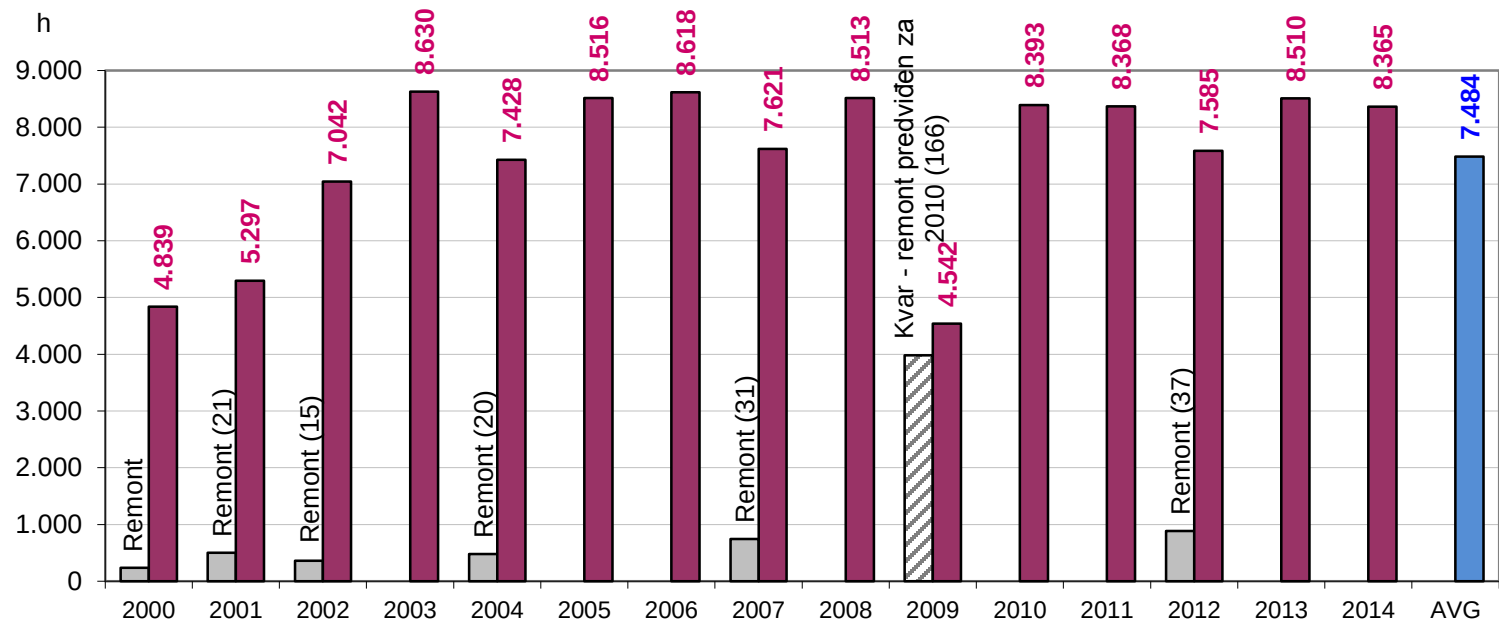
VAŽNOST TE Plomina 2 – cijena goriva pogona HEP Proizvodnje d.o.o.

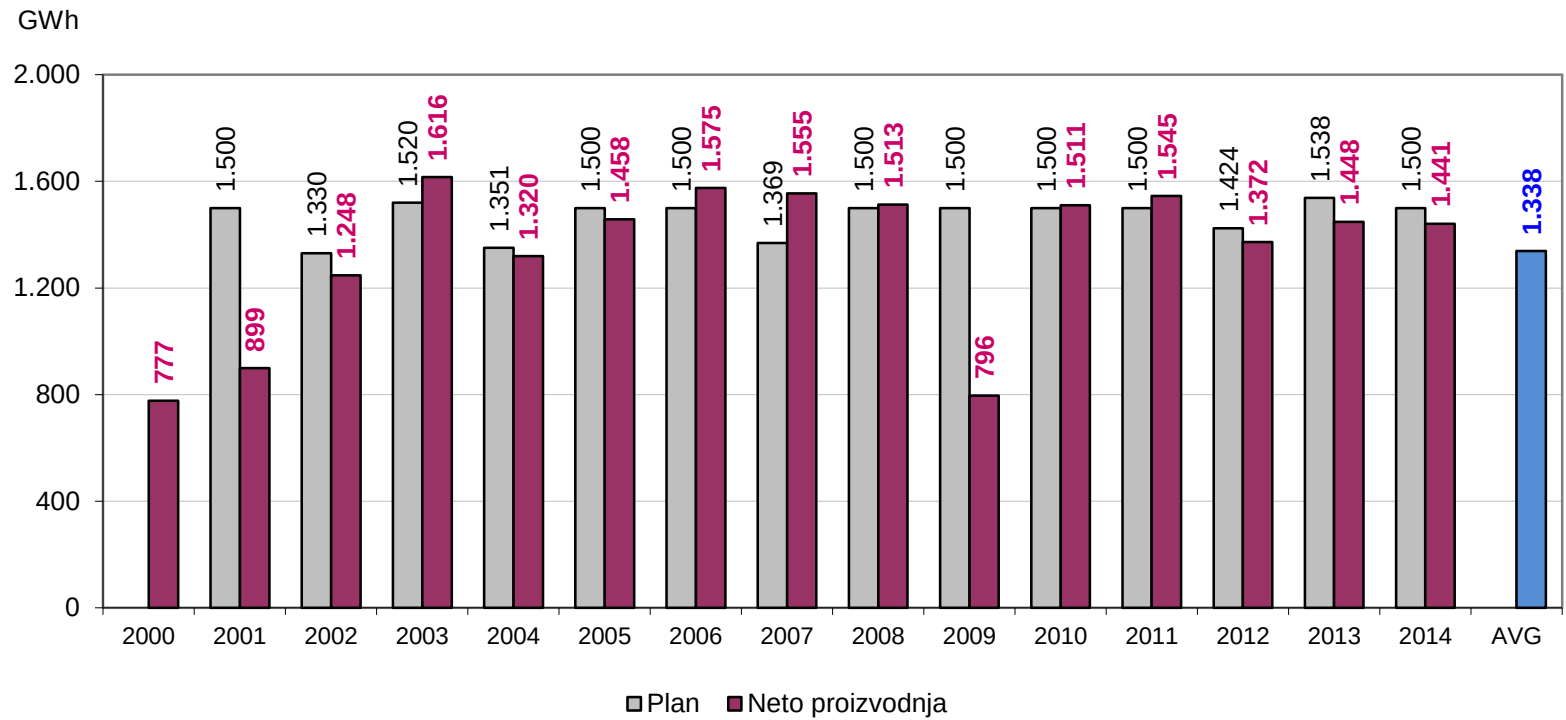
Okvirni troškovi proizvodnje u termoelektranama - toplanama

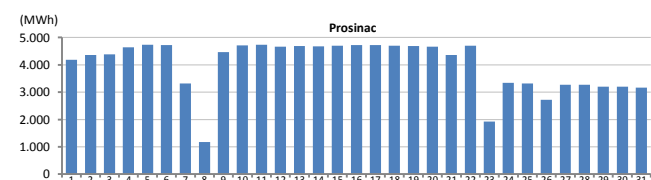
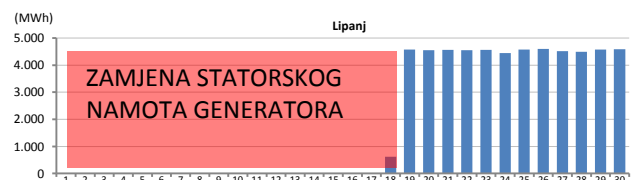
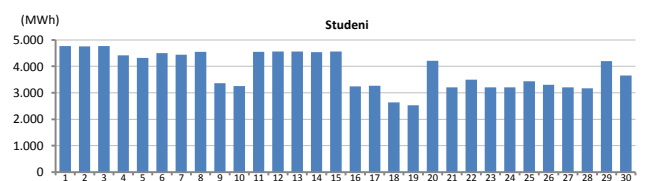
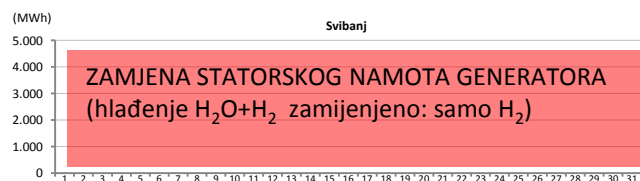
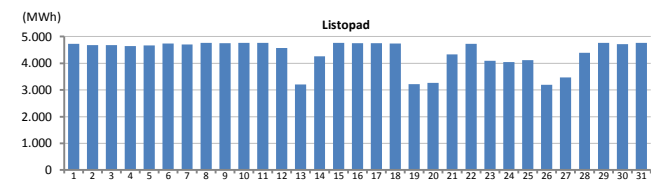
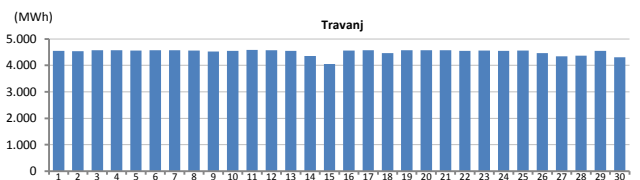
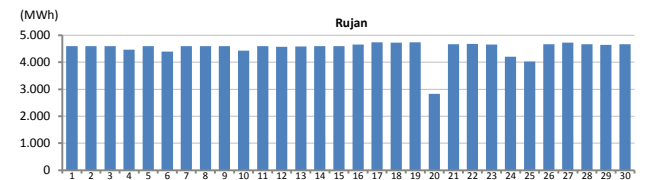
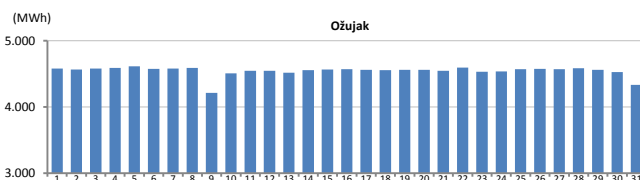
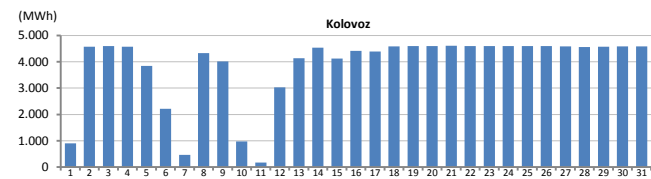
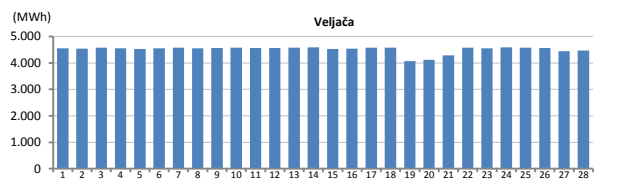
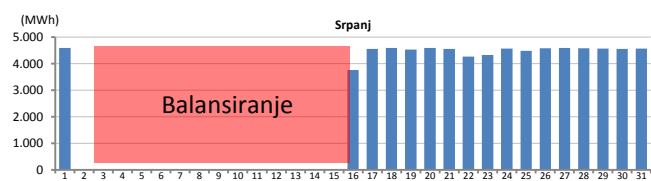
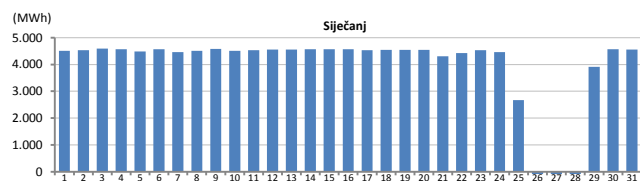
termoelektrane - toplane

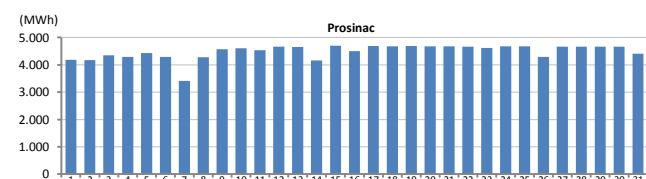
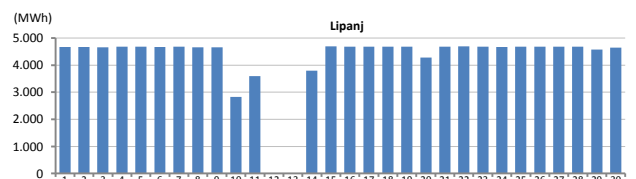
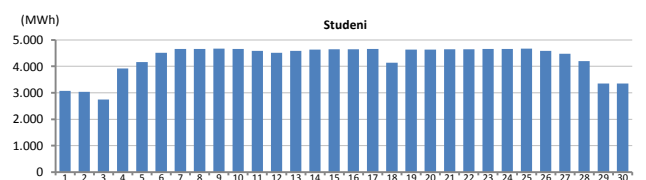
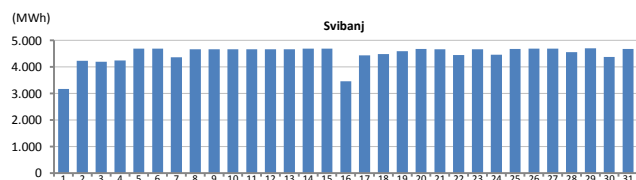
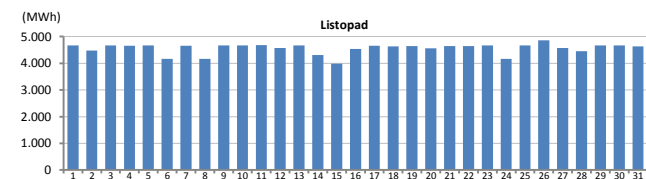
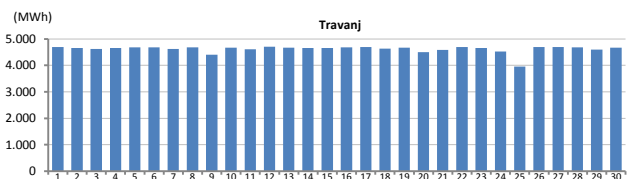
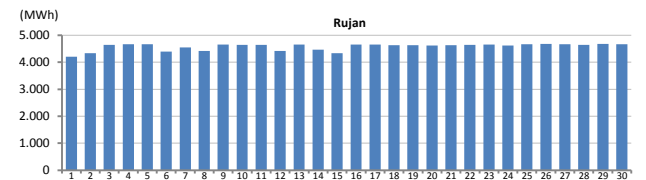
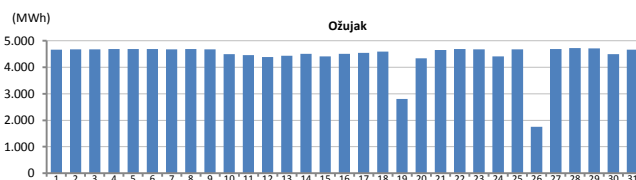
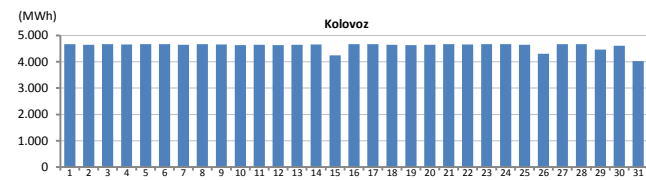
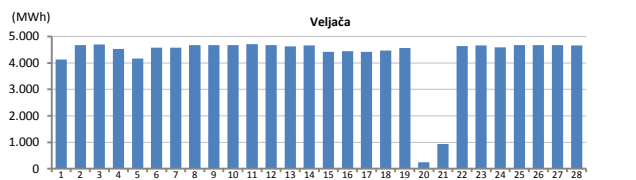
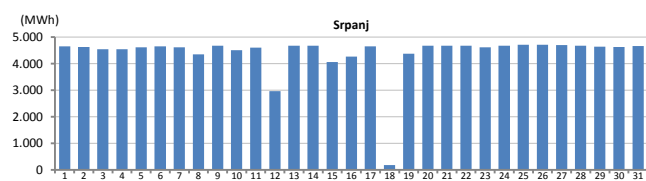
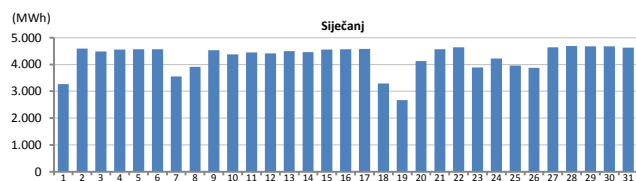
Sektor za termoelektrane											
	TE -TO Zg				TE-TO Os			EL -TO Zg			UKUPNO
	Blok K	Blok L	Blok C,VK...	Zajedno	Blok 45	PTA	Zajedno	PTA	Blok 1,2	Zajedno	
POTROŠNJA GORIVA											
ZEMNI PLIN (1000m3)	288.561	150.976	16.631	456.168	32.362	10.680	43.042	111.653	41.189	152.842	652.052
LOŽ ULJE (tona)	0	0	55.344	55.344	17.958	0	17.958	0	17.556	17.556	90.857
PLINSKO ULJE (tona)	0	0		0	0	2	2	0	0	0	2
PROIZVODNJA											
EL. ENERGIJA - PRAG (kWh)	1.240.881.000	646.342.000	169.929.000	2.057.152.000	87.688.600	26.215.500	113.904.100	288.230.580	70.880.640	359.111.220	2.530.167.320
TEHNOLOŠKA PARA (tona)	183.639	45.329	30.848	259.816	111.597	10.293	121.890	254.700	90.434	345.134	726.840
OGRIJEVNA TOPLINA (GJ)	1.107.598	780.584	1.198.789	3.086.971	676.069	69.646	745.715	1.021.565	1.300.173	2.321.738	6.154.424
GORIVO - ENERGIJA											
ENERGIJA - ELEKTRIČNA (GJ)	7.961.532	4.116.667	1.464.364	13.542.562	782.270	255.608	1.037.878	1.936.620	499.957	2.436.577	17.017.017
ENERGIJA - PARA + OGT (GJ)	1.658.515	916.571	1.291.333	3.866.419	1.010.860	100.525	1.111.385	1.785.665	1.571.475	3.357.140	8.334.944
ENERGIJA - UKUPNO (GJ)	9.620.047	5.033.238	2.755.697	17.408.981	1.793.131	356.132	2.149.263	3.722.284	2.071.433	5.793.717	25.351.961
SPECIFIČNI POTROŠAK											
ELEKTRIČNA ENERGIJA (kJ/kWh)	6,416	6,369	8,618	6,583	8,921	9,750	9,112	6,719	7,054	6,785	6,726
TROŠKOVI GORIVA - USD											
ZEMNI PLIN (1000m3)	109.256.539	56.120.406	1.186.480	166.563.425	6.670.883	3.630.862	10.301.745	26.286.249	4.457.287	30.743.536	207.608.705
LOŽ ULJE (tona)	0		14.868.603	14.868.603	3.802.577	0	3.802.577	0	2.059.880	2.059.880	20.731.060
PLINSKO ULJE (tona)	0			0		0	0				0
UKUPNO	109.256.539	56.120.406	16.055.083	181.432.028	10.473.460	3.630.862	14.104.322	26.286.249	6.517.167	32.803.416	228.339.766
GORIVO/KWh €c (EUR)	6,67	6,58	7,16	6,68	9,05	10,50	9,38	6,91	6,97	6,92	6,84
	Plin	Plin	Mazut		Mazut	Plin		Plin	Mazut		

Izvor: Izvješće o proizvodnji Sektora za termoelektrane, prosinac 2011.

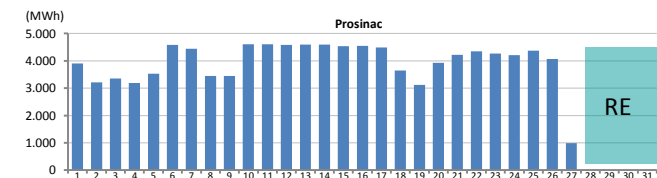
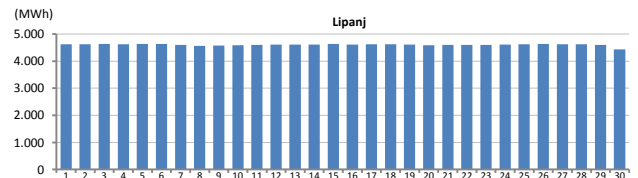
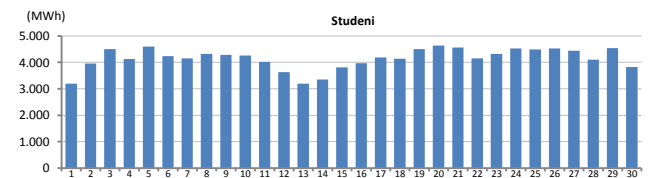
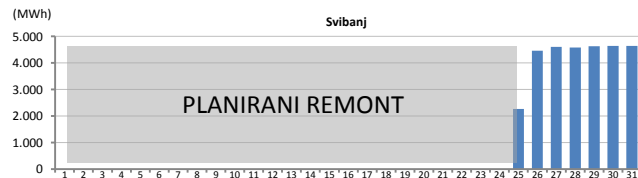
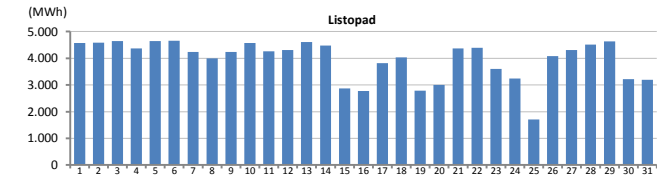
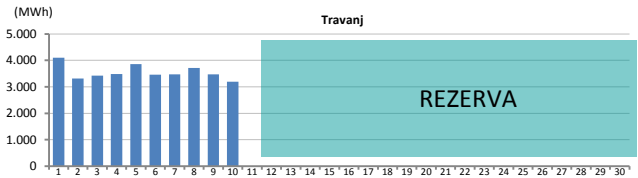
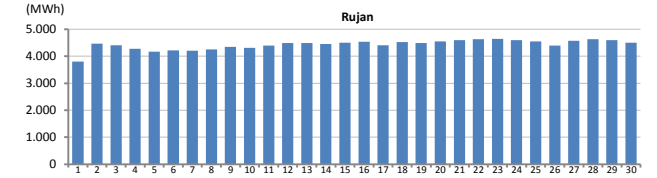
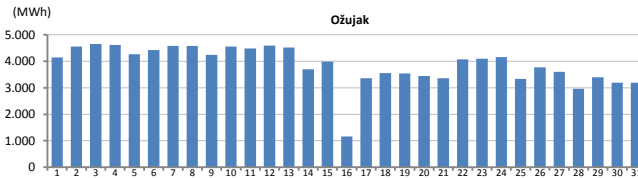
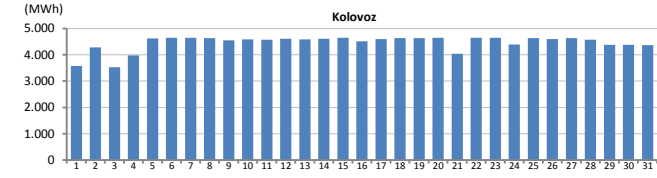
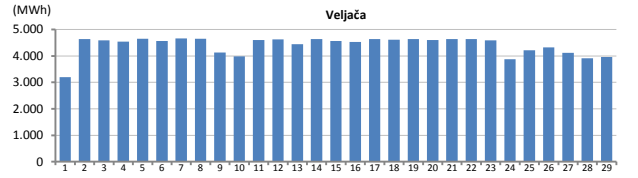
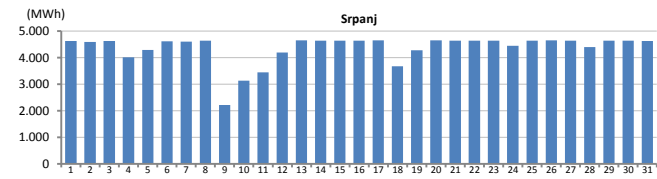
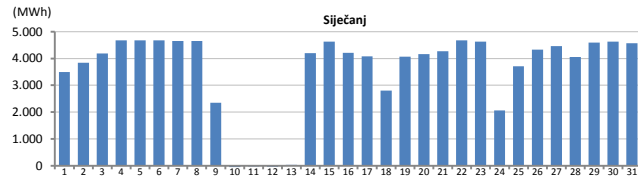


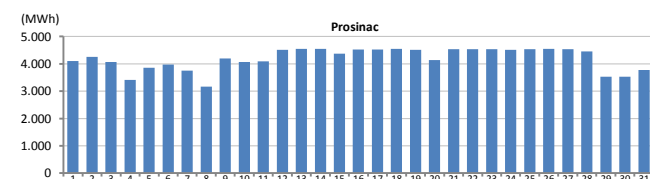
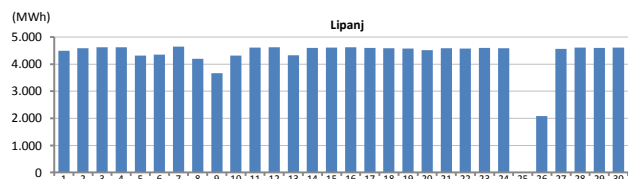
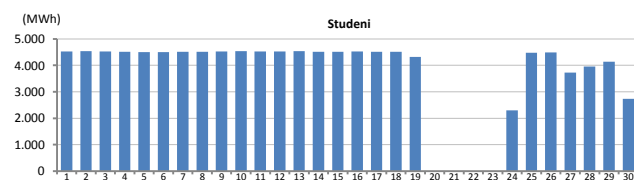
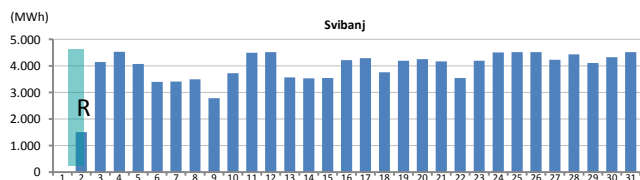
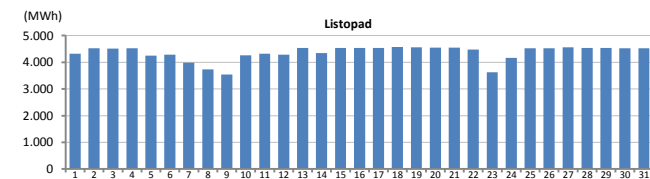
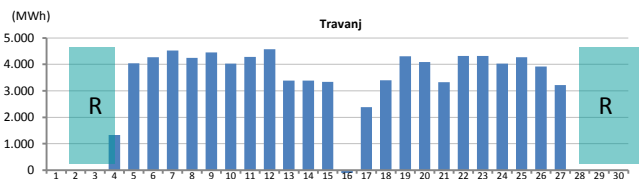
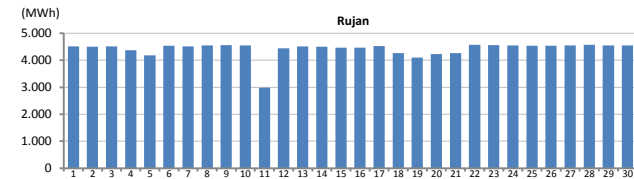
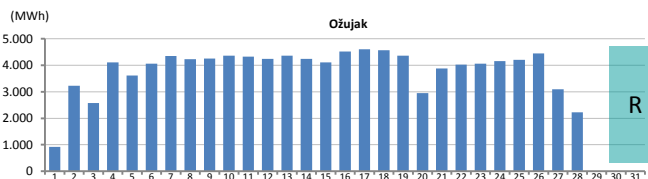
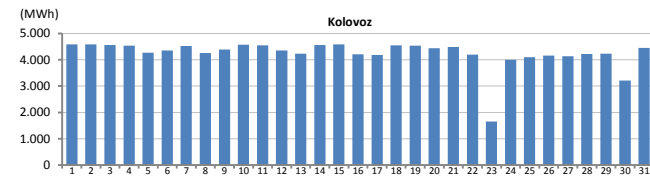
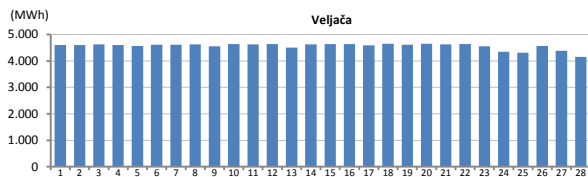
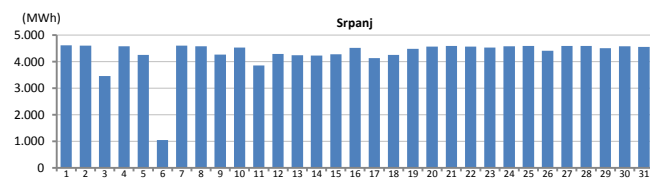
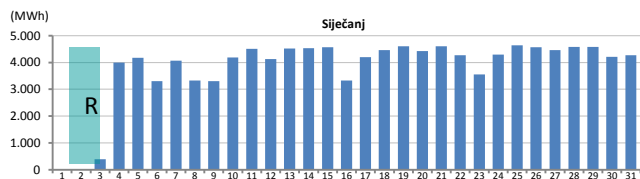




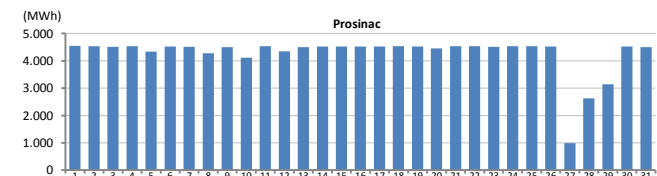
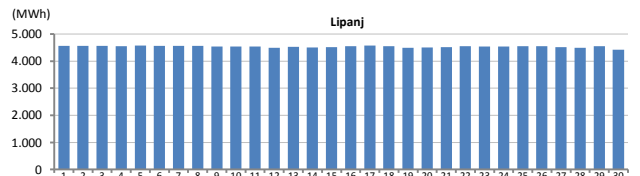
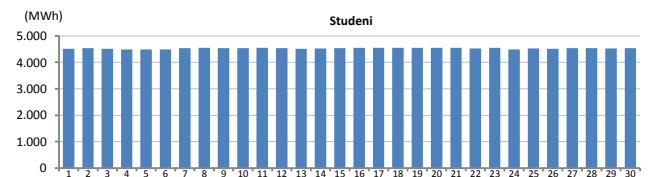
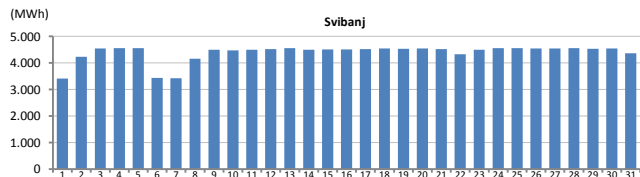
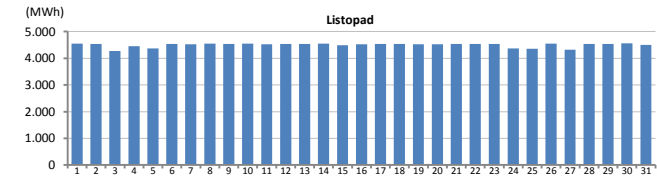
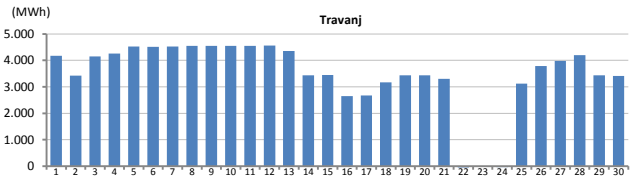
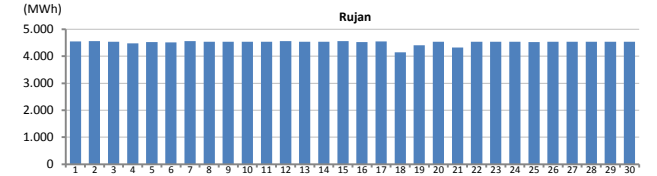
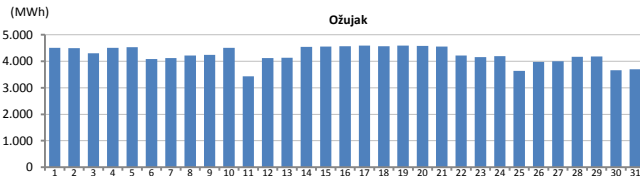
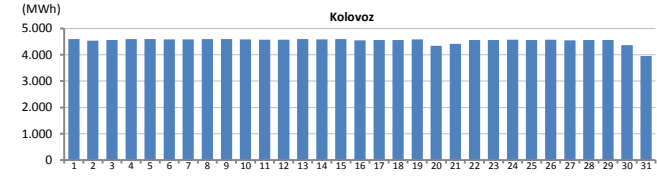
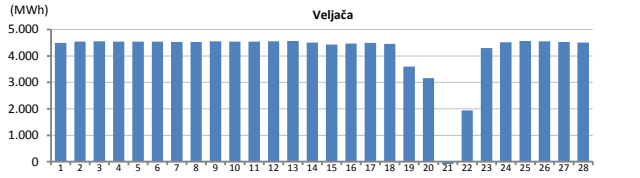
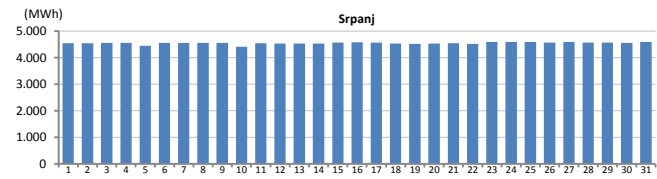
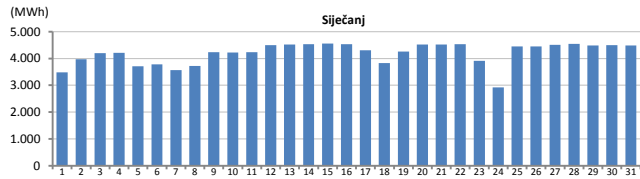


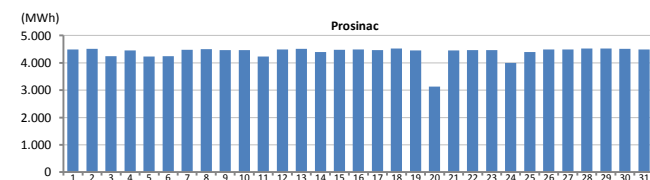
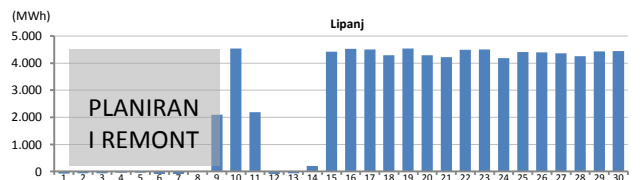
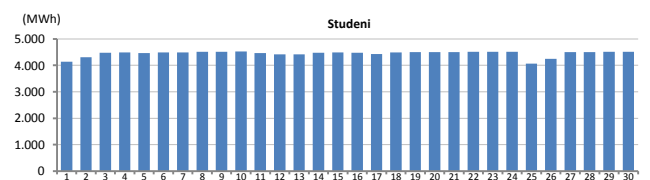
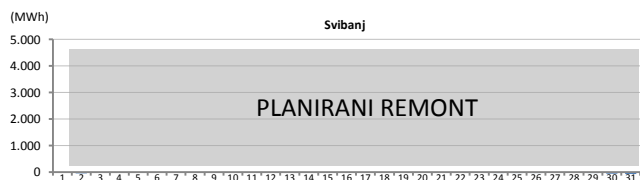
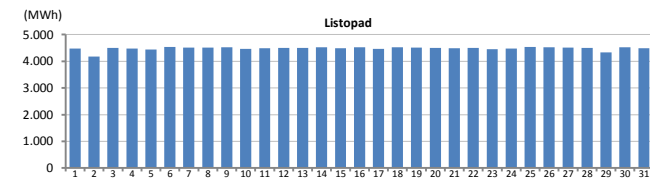
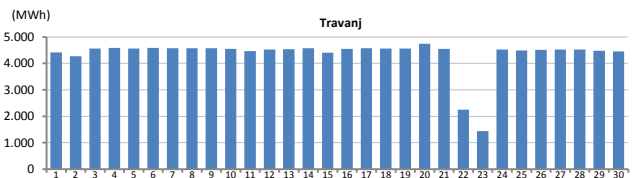
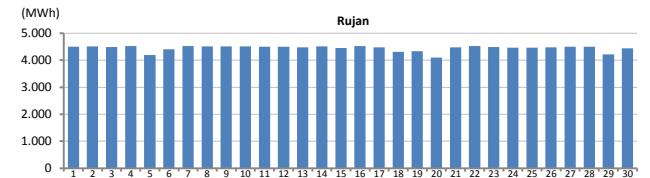
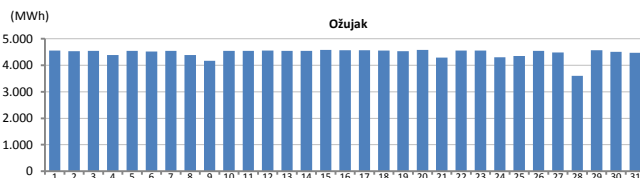
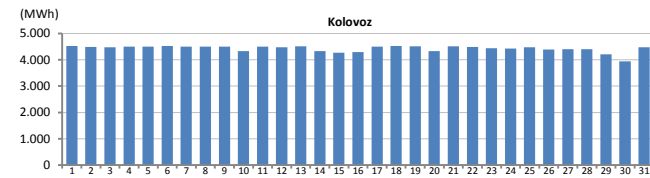
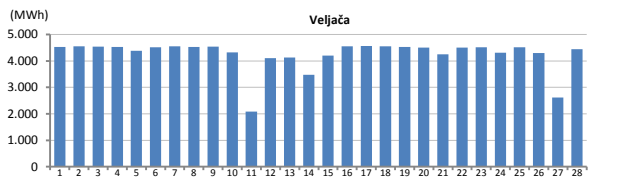
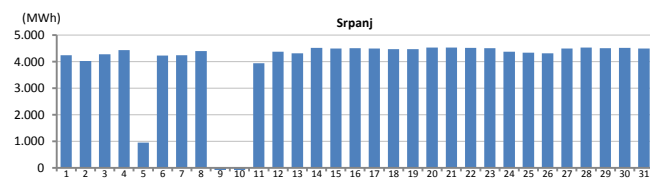
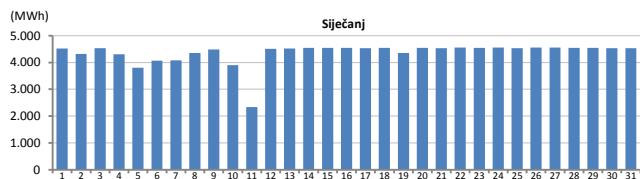
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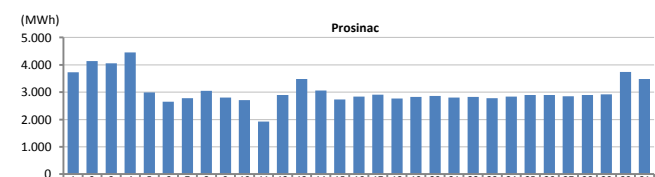
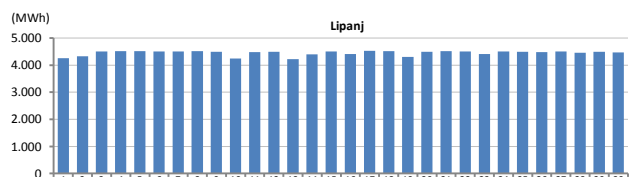
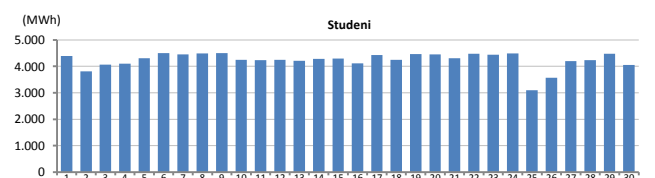
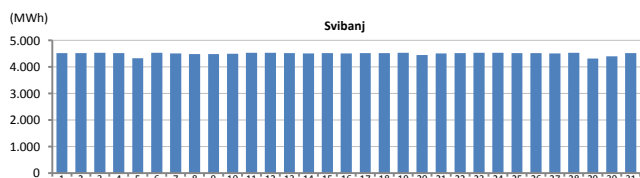
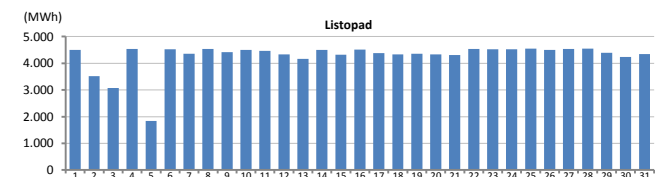
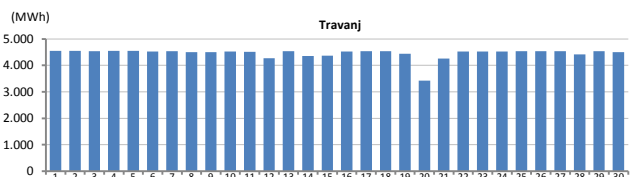
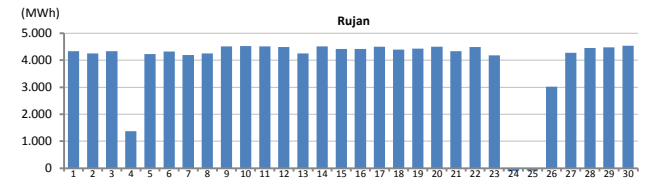
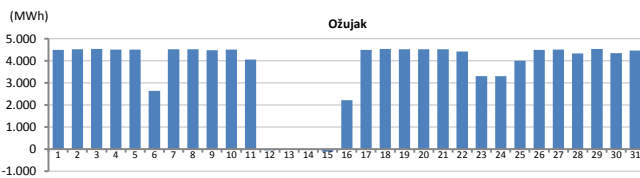
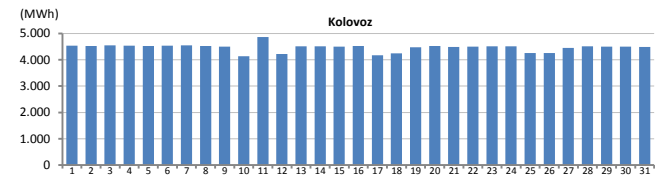
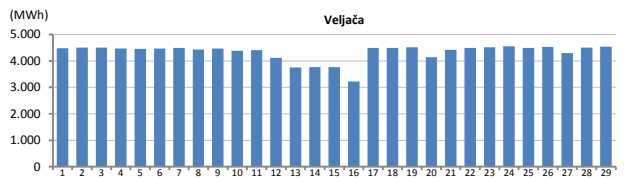
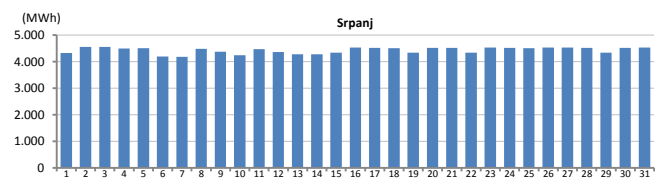
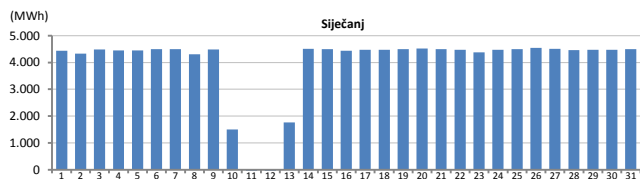


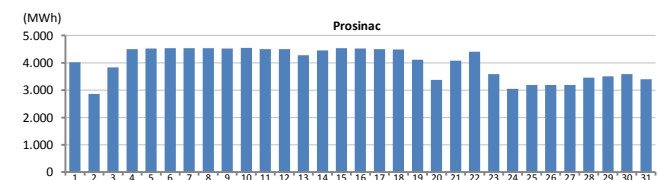
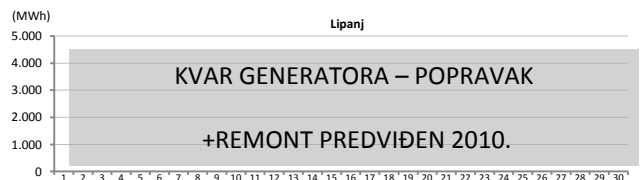
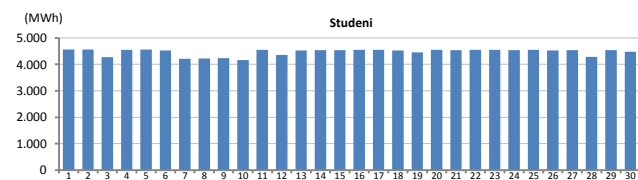
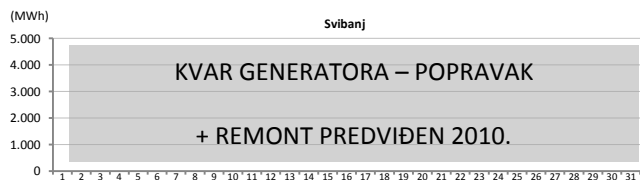
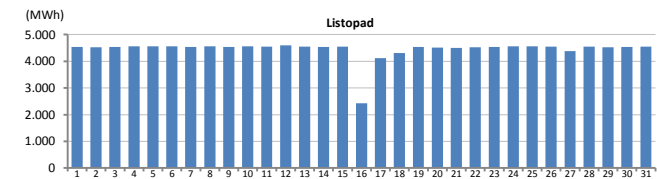
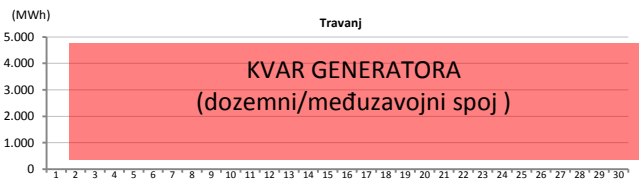
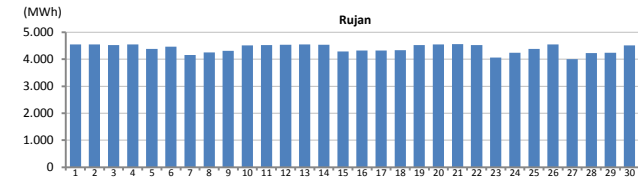
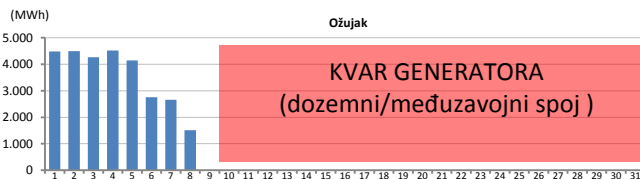
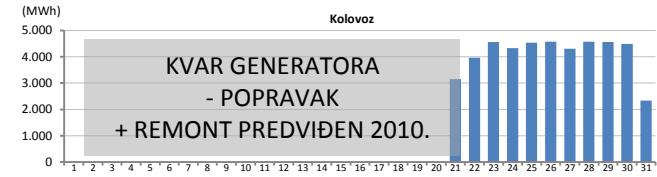
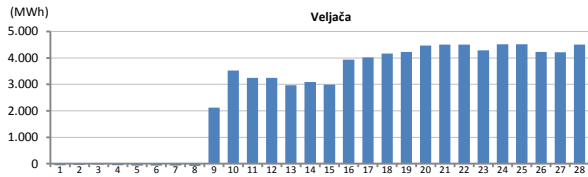
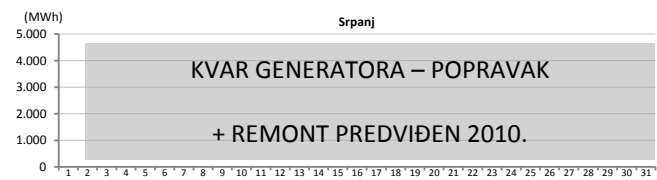
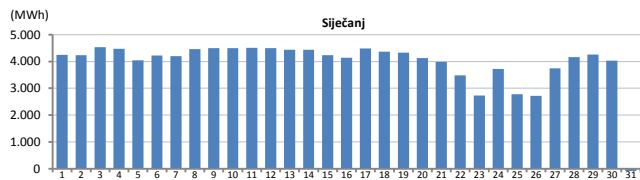


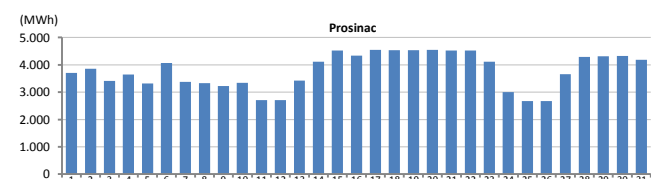
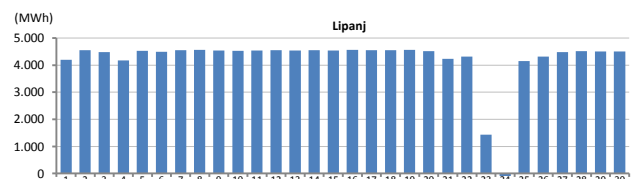
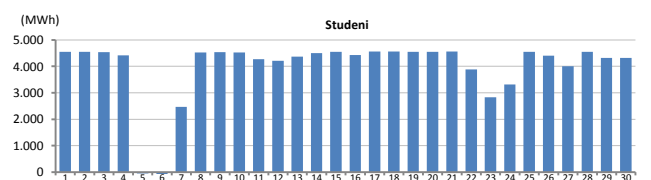
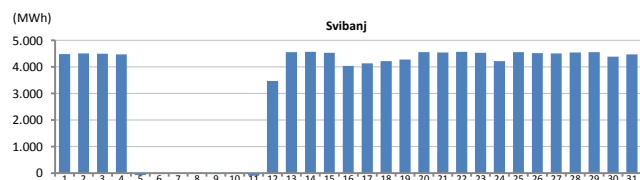
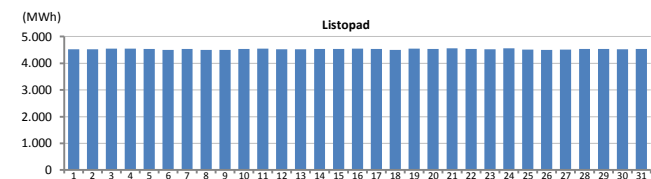
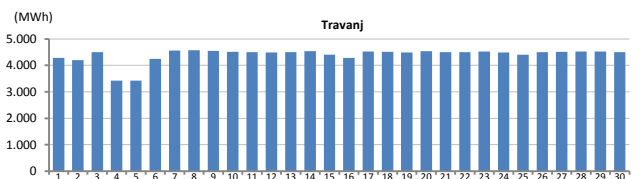
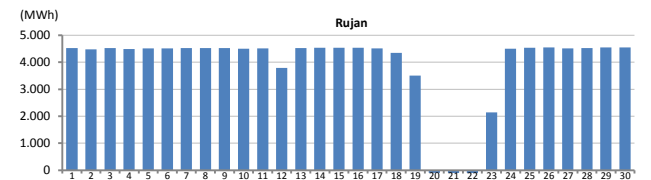
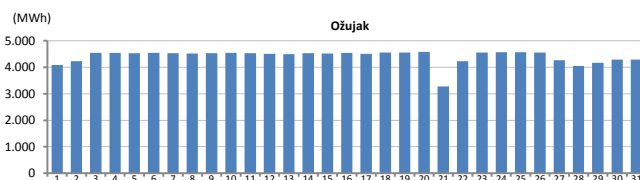
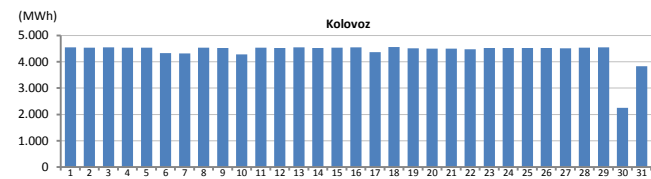
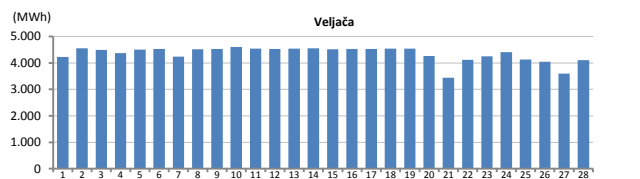
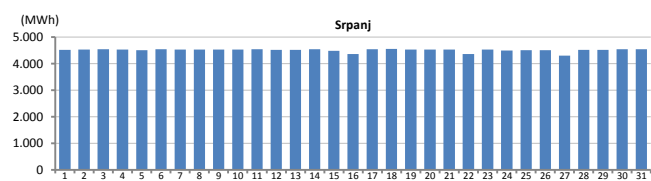
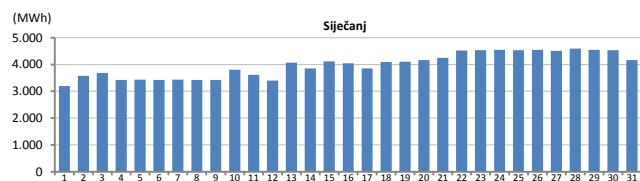
PROIZVODNI PODACI :dani / mjeseci / godina 2006.

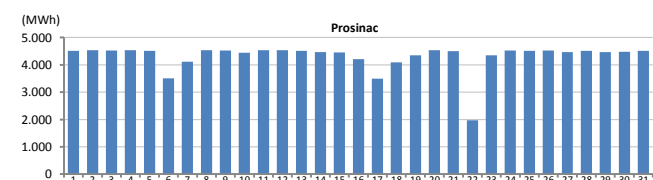
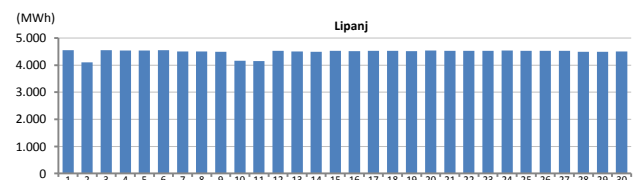
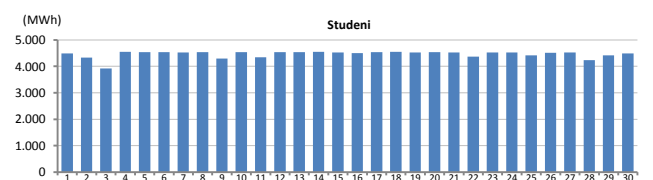
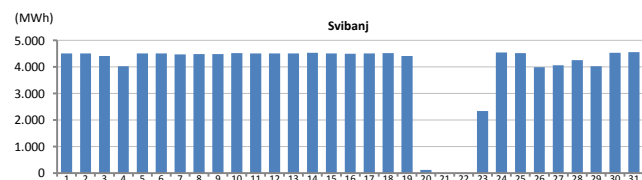
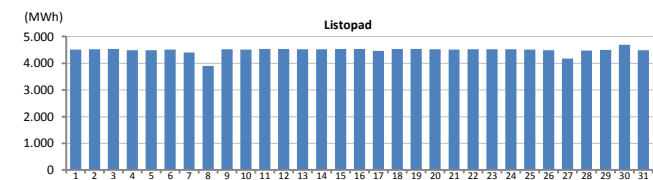
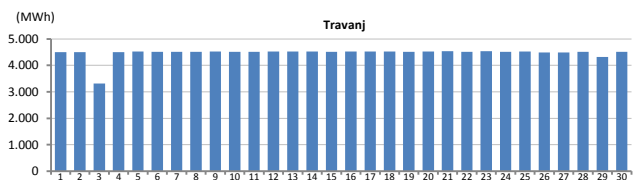
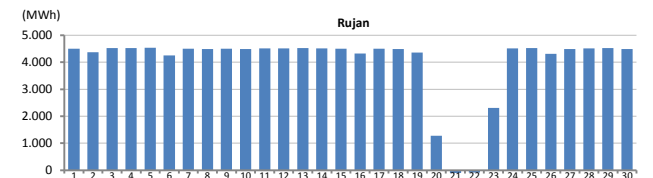
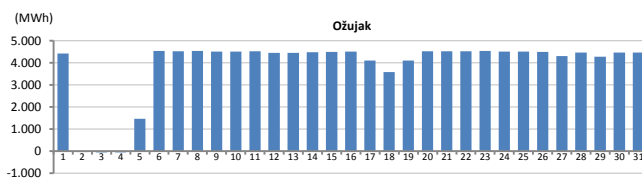
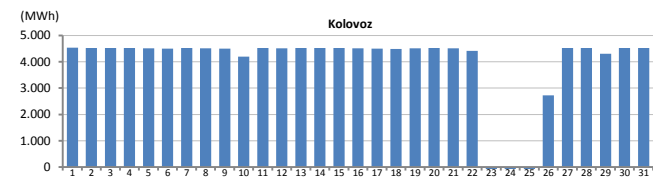
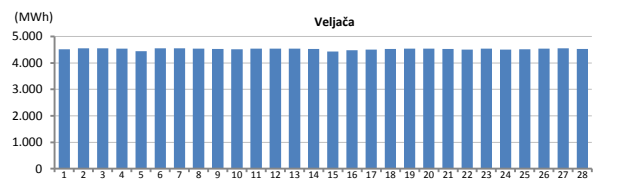
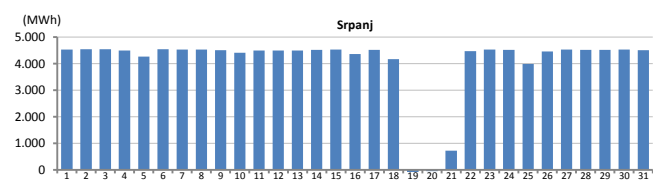
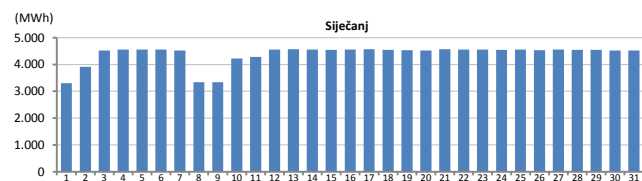


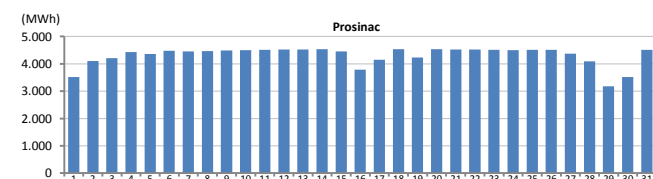
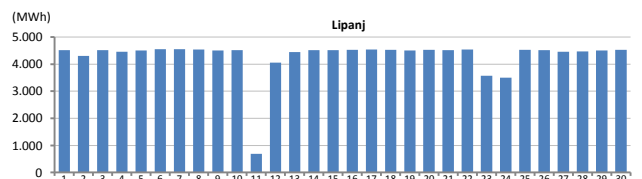
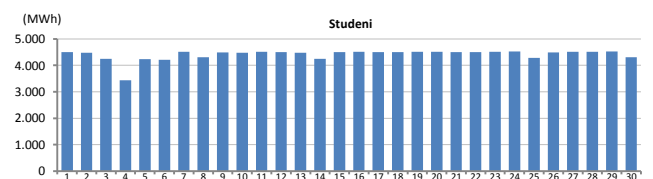
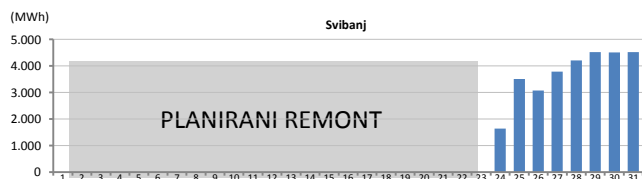
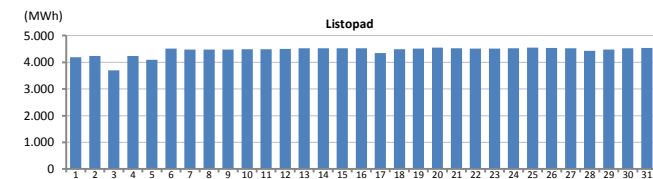
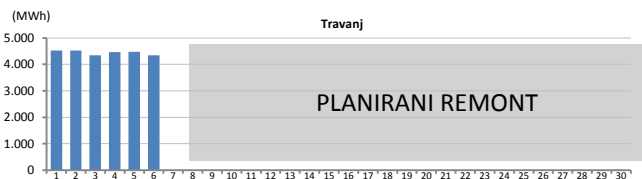
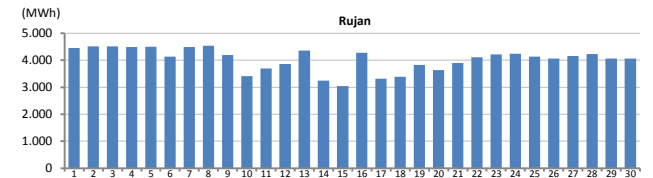
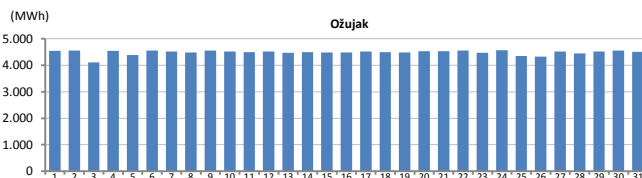
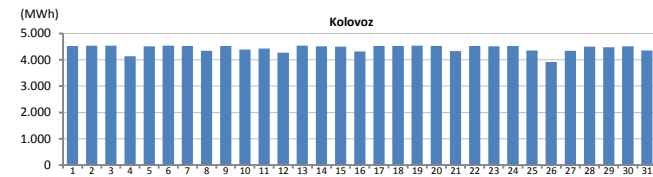
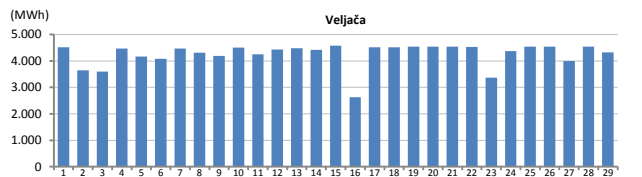
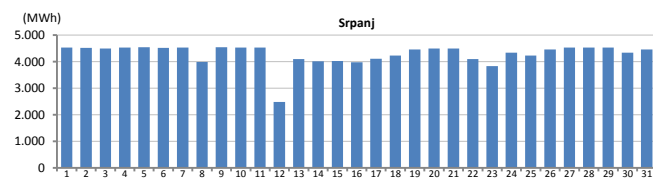
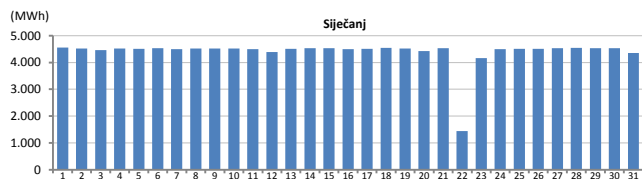


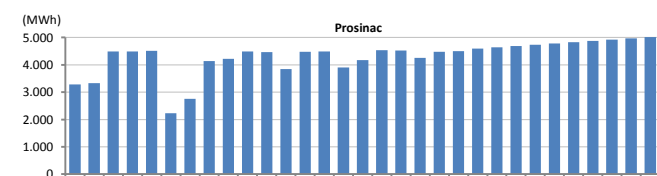
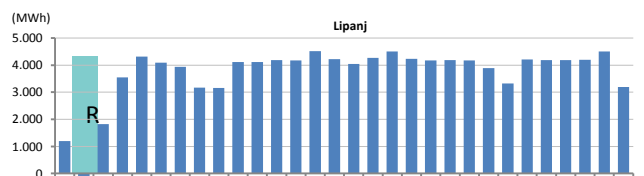
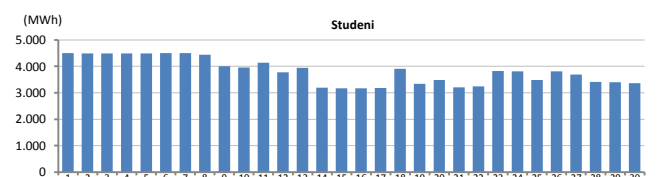
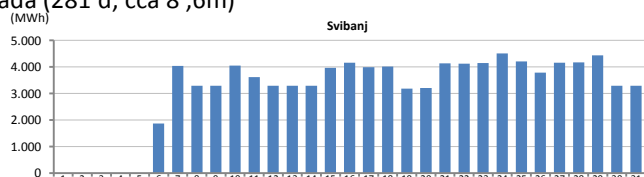
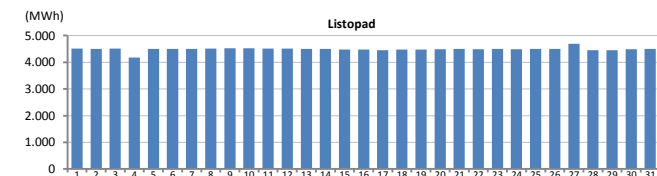
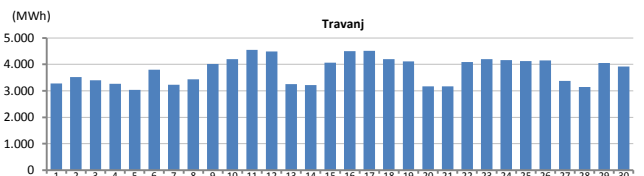
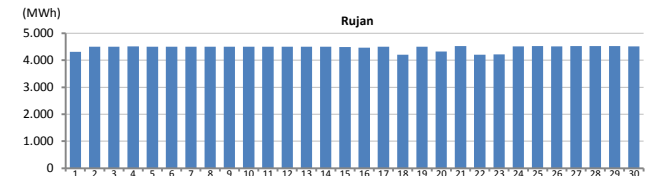
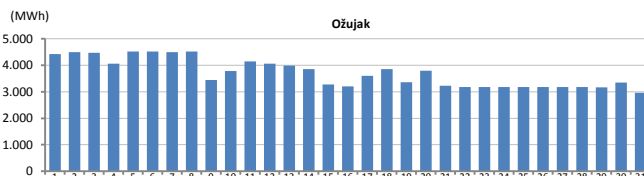
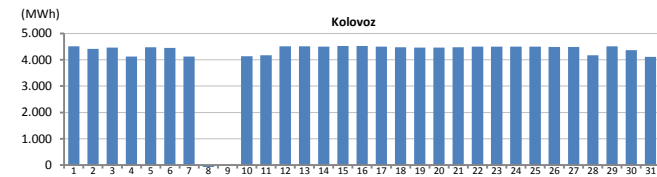
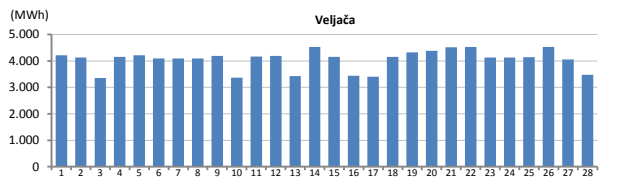
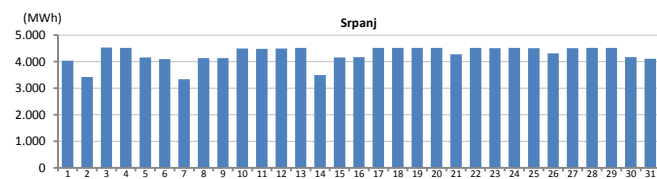
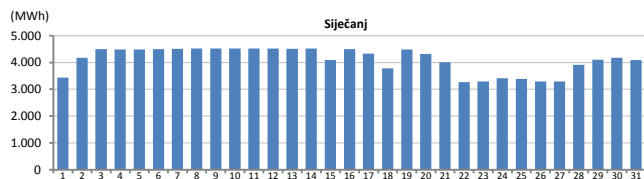




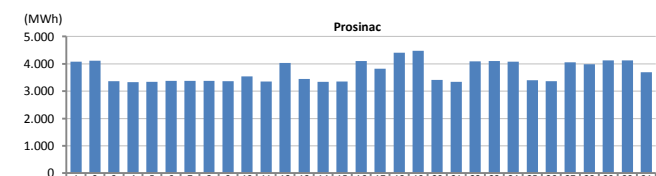
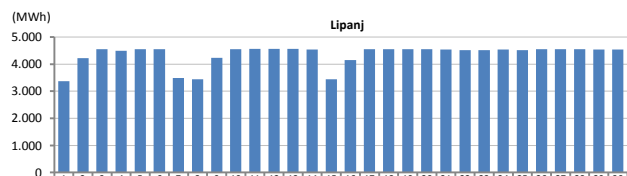
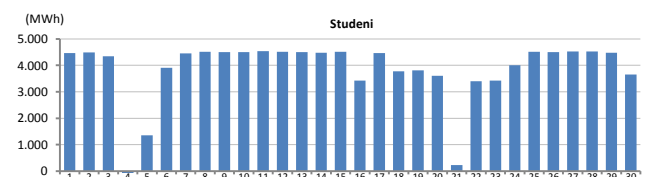
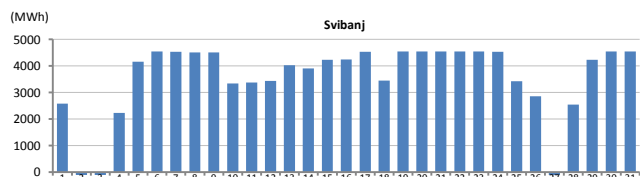
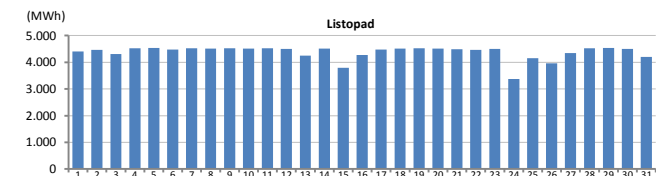
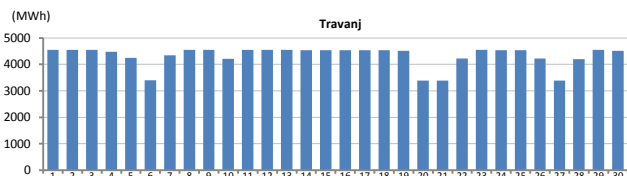
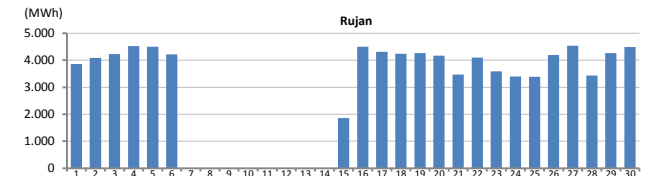
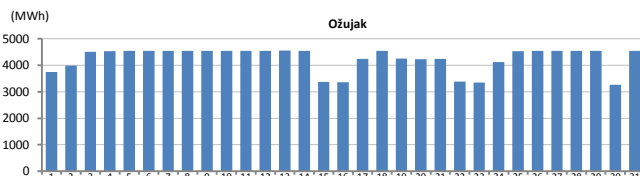
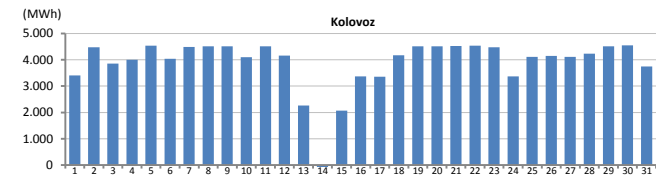
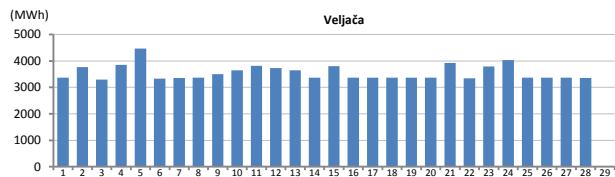
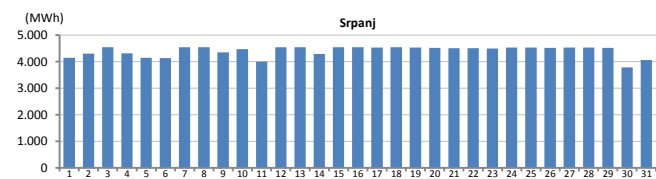
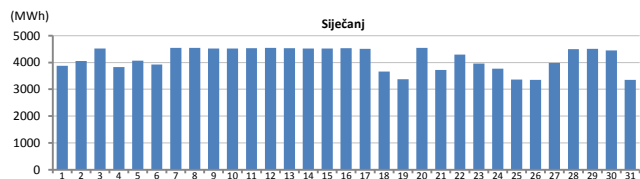








6.767 h kontinuirnog rada (281 d; cca 8,6m)





KRAJ PREZENTACIJE

HVALA NA PAŽNJI