

Usage and usability of seasonal forecasts in planning of operations in Croatian electric energy system

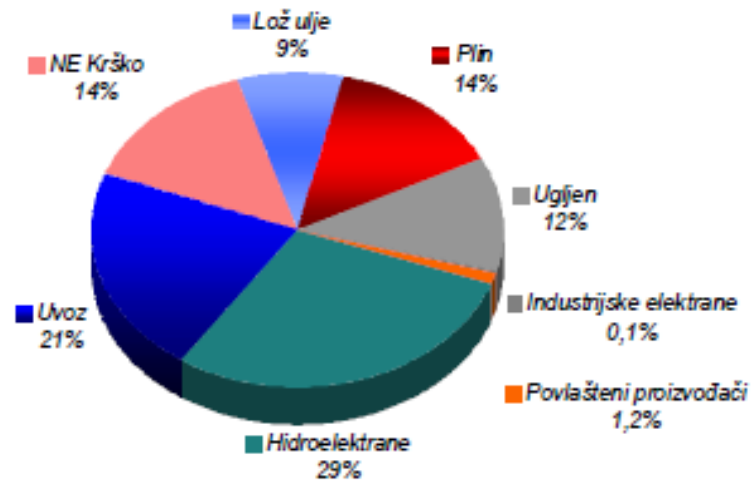
Nino Radetić

HEP d.d.

Sector for sustainable development

Basic data:

Structure of power production:



Data used:

- Energy reports
- Climatological reports
- Statistical data on energy production of hydro power plants
- Energy equivalent of inflow
- Etc.



Energy reports

HEP - Operator
prijenosnog sustava d.o.o.

NABAVA	[GWh]
PROIZVODNJA HE	859,94
PROIZVODNJA TE	365,55
RAZMJENA (UVOZ-IZVOZ)	412,23
NABAVA	1636,81
NABAVA s crpkama	1637,73



PROIZVODNJA HE	[GWh]
HE Varaždin	47,61
HE Čakovec	38,87
HE Dubrava	27,23
HE Gojak	39,90
HE Lešće	0,00
HE Rijeka	20,81
HE Golubić	1,76
HE Milička	14,45
PROTOČNE HE	190,64
HE Senj	152,84
HE Sklope	15,60
HE Vinodol	19,88
RHE Velebit	103,09
HE Orlovac	12,21
HE Peruća	7,95
HE Dale	22,35
HE Zakućac	254,82
HE Kraljevac	16,56
CHE BB+F+L	2,13
HE Dubrovnik	52,37
AKUMULACIJSKE HE	659,79
MALE HE	9,51
UKUPNO HE	859,94

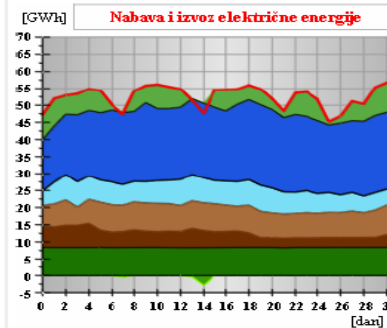
ELEKTROENERGETSKO IZVJEŠĆE HEP GRUPE za razdoblje od 1. do 31. prosinca 2008.

PLAN. (OSTVARENA) ENERGIJA	[GWh]
Uvoz	0,00
Izvoz	0,00
Posudba (prirodna razmjena)	1,32
Povrat (prirodna razmjena)	1,44
Kompenzacija	-1,77
Planirana regulirana razmjena	415,70
Regulirana razmjena	409,22
Ostapanje	-6,48
Plan. proizvodnja (1/2 Krško)	0,00

PROIZVODNJA TE	[GWh]
TE Sisak	0,00
TE Rijeka	0,00
TE-TO Zagreb blok C	58,09
TE-TO Zagreb CCGT K	109,10
TE-TO Zagreb CCGT L	0,00
EL-TO Zagreb A,B	11,13
EL-TO Zagreb H,J	34,94
PTE Jertovec	3,67
TE Jertovec	1,23
TE-TO Osijek	15,99
PTE Osijek	0,00
TE na TEK. GORIVO I PLIN	234,14
TE Plomin 1	36,07
TE Plomin 2	95,35
TE na UGLJEN	131,41
UKUPNO TE	365,55
NE Krško (1/2 proizvodnje)	260,69

STANJE GORIVA	Pričuva	Utrošak	Dobava
Ugljen (t)	231,71	54,33	67,06
Prirodni plin (x1000m ³)	-/-	61,32	-/-
Lož ulje (t)	229,66	20,63	41,56
Ekstra lako ulje (t)	8,14	0,05	0,00

STANJE AKUMULACIJA	Max (GWh)	Stanje (GWh)	Ispunjenje (%)
Buško Blato+Lipa	1209,5	567,4	47
Peruća	416,0	349,6	84
Kružić+Gusić P+Selište	135,9	127,7	94
Lokve+Basjer+Lepenica	62,1	44,0	71
Štikada	13,0	7,9	61
Sabljaci+Bukovnik	1,0	0,3	33
Lešće	1,7	0,0	0
UKUPNO	1839,1	1097,0	60



Category	Percentage
Potrošnja	96,4%
TE Ugljen(8,0%)	8,0%
Prot. imale HE (12,2%)	12,2%
Razmjena bezNEK(9,2%)	9,2%
NE Krško (NEK) (15,9%)	15,9%
TE tek.gor.i plin (14,3%)	14,3%
Akumul. HE(40,2%)	40,2%
Izvoz bez NEK(0,2%)	0,2%

Najveće opterećenje: 56,85 GWh (31. dan)
Najmanje opterećenje: 45,19 GWh (25. dan)

NAJVAŽNIJI MJESEČNI POGONSKI DOGAĐAJI:

POTROŠNJA	[GWh]	%
KUPCI	1579,20	96,4
GUBICI PRIENOSA	57,61	3,5
CRPKE	0,92	0,1
POTROŠNJA s crpkama	1637,73	100,0

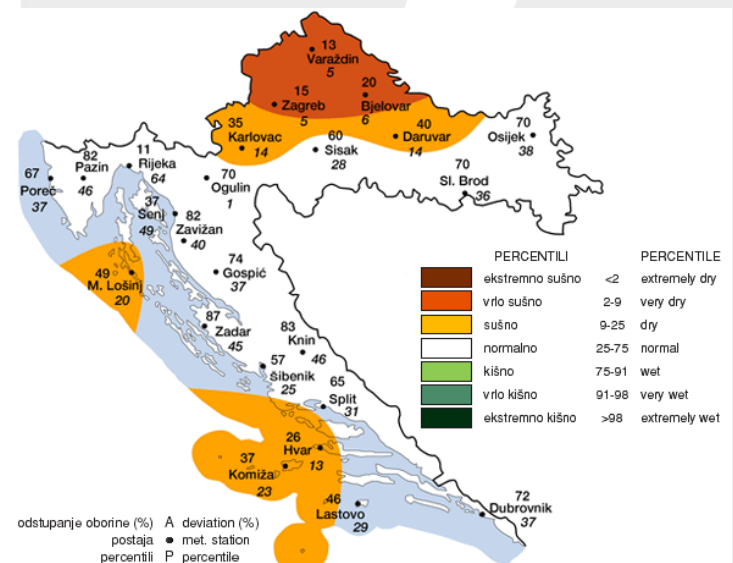
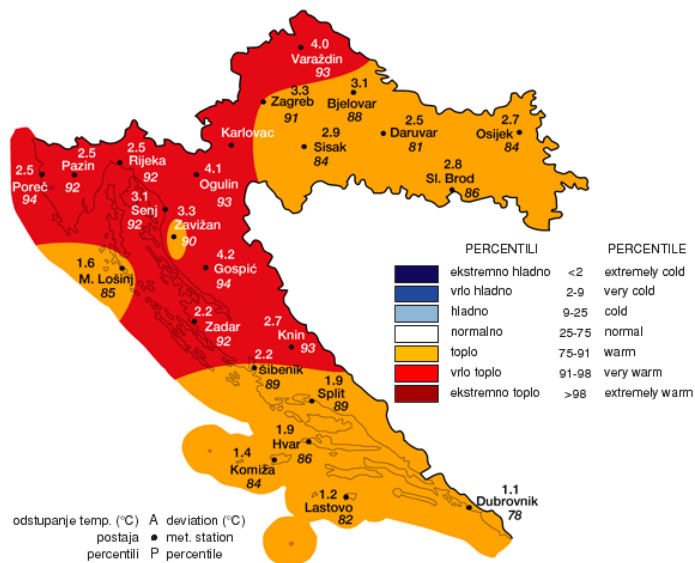


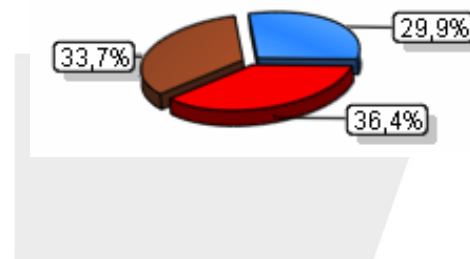
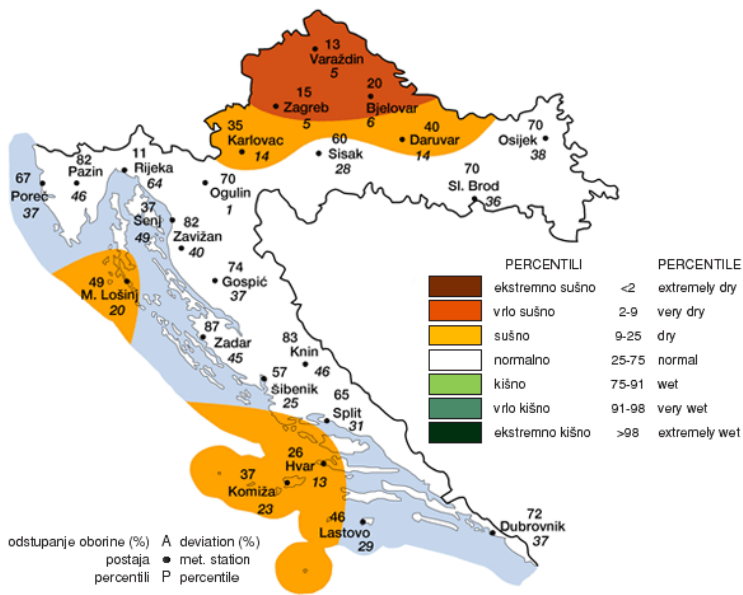
POVLAŠTENI KUPCI na 110kV	[GWh]
Belišće d.d.	4,77
Našicecement d.d.	7,52
Petrokemija d.d.	3,63
CMC Sisak d.o.o.	8,19
DINA Petrokemija d.d.	2,83
HOLCIM (Hrvatska) d.o.o.	4,50
HŽ Infrastruktura d.o.o.	12,58
UKUPNO POVL. KUPCI	50,26

OSTALI KUPCI	[GWh]
Područje Osijek	187,49
Područje Rijeka	259,29
Područje Split	353,38
Područje Zagreb	728,80
UKUPNO OSTALI KUPCI	1528,96
UKUPNO KUPCI	1579,20

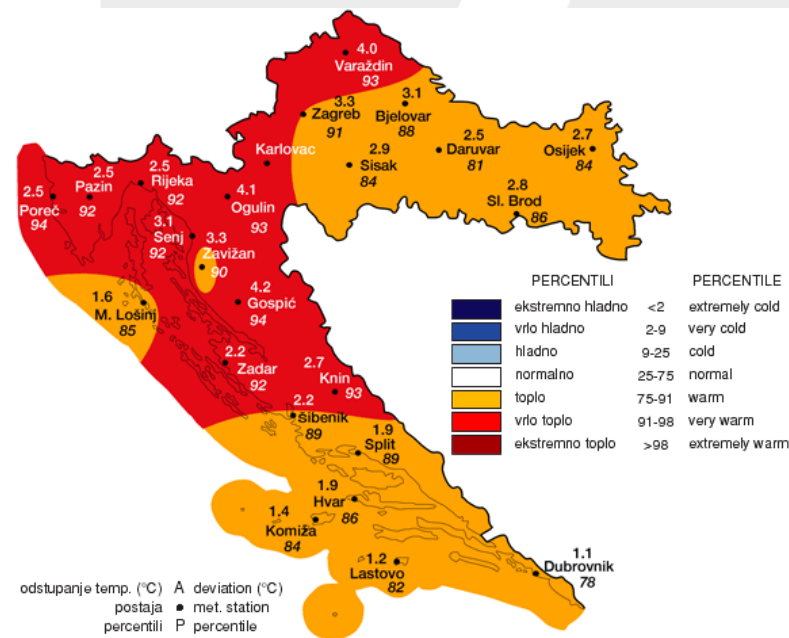
CRPKE I VL. POTROŠNJA TE	[GWh]
RHE Velebit	0,18
CHE BB+F+L	0,74
UKUPNO CRPKE	0,92
VLASTITA POTROŠNJA TE	0,19

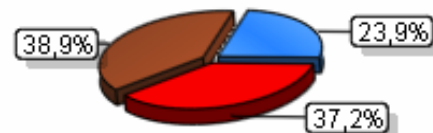
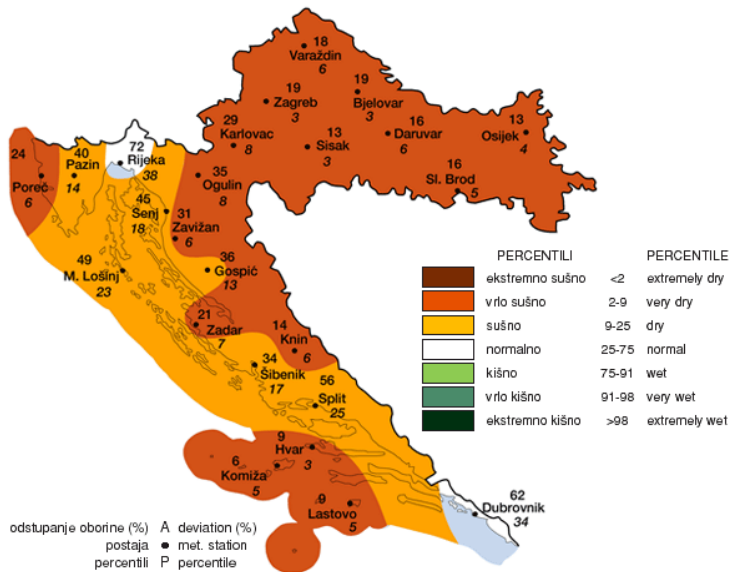
Climatological reports issued by DHMZ



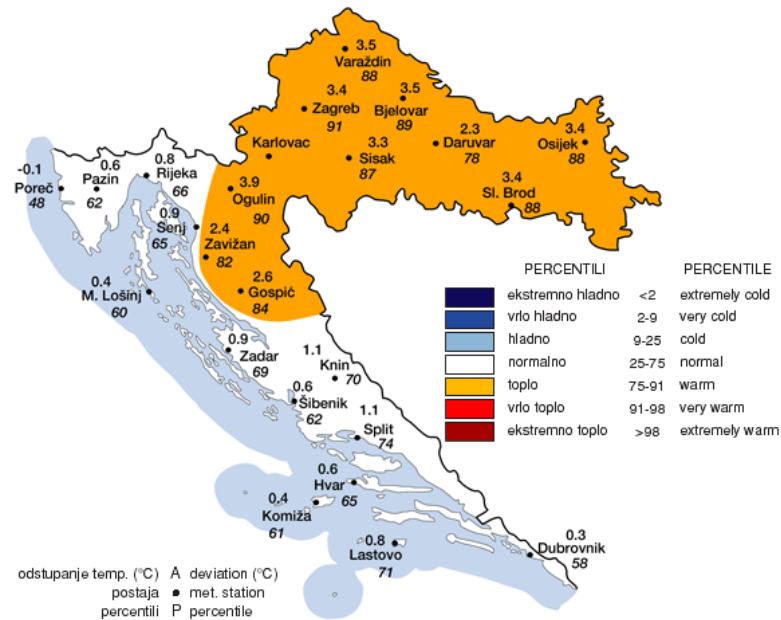


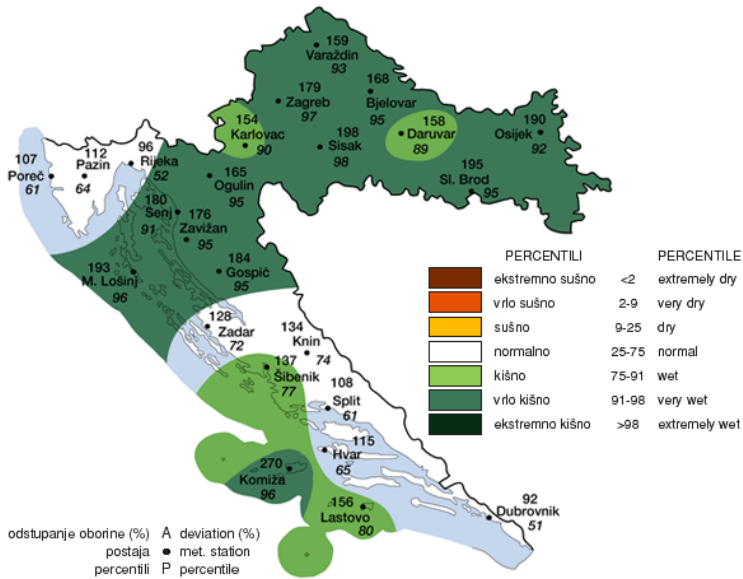
hydro energy
thermal energy
other (import)



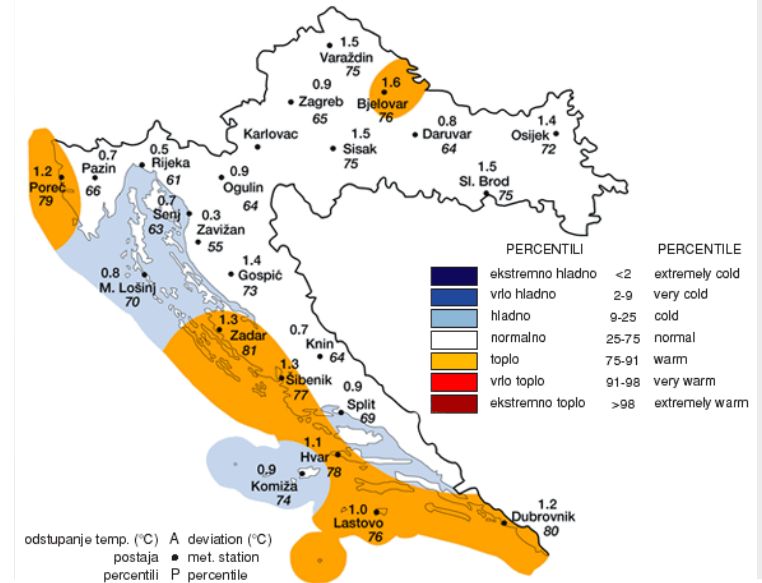


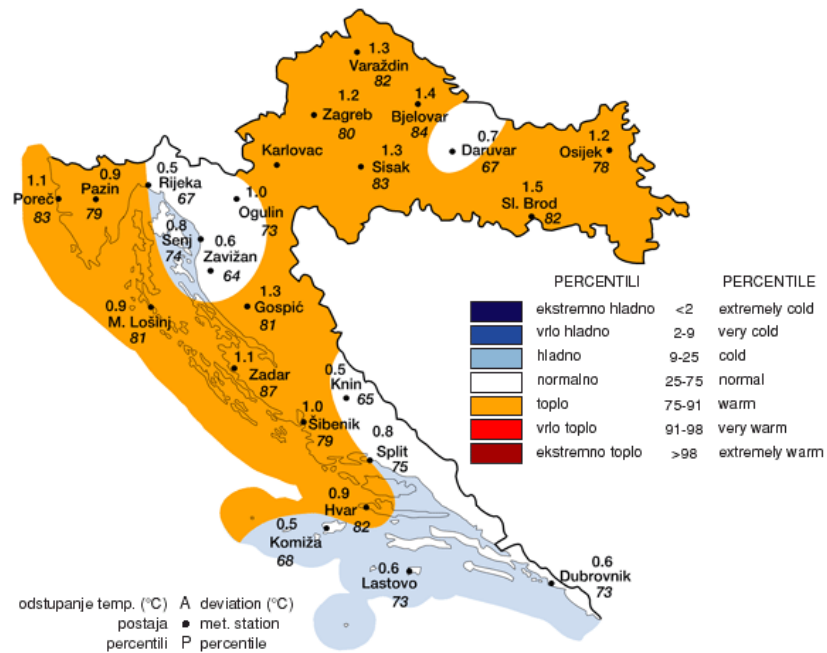
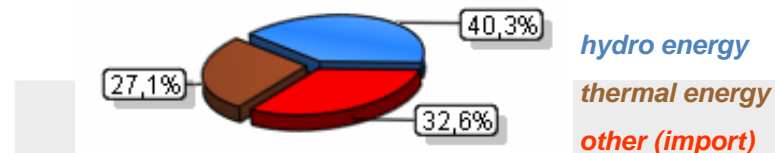
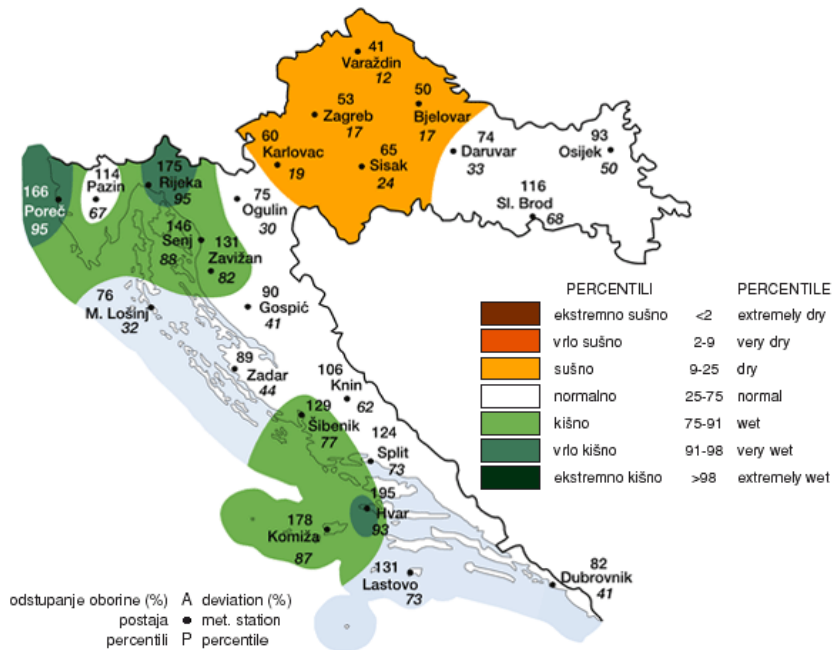
hydro energy
thermal energy
other (import)

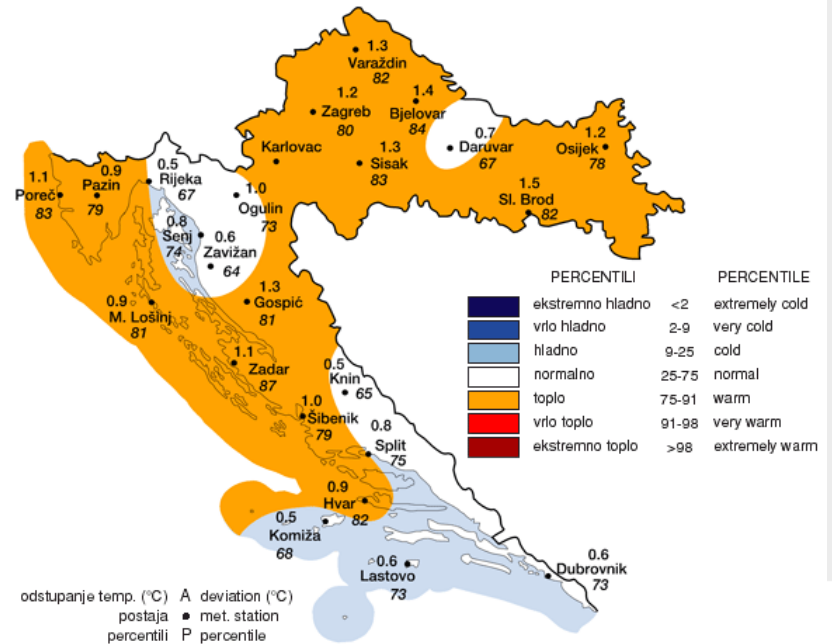
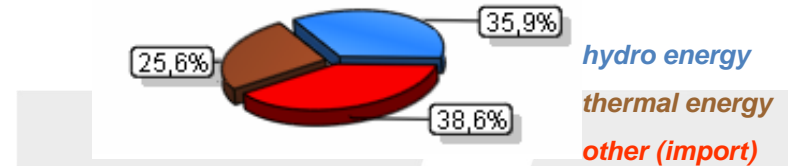
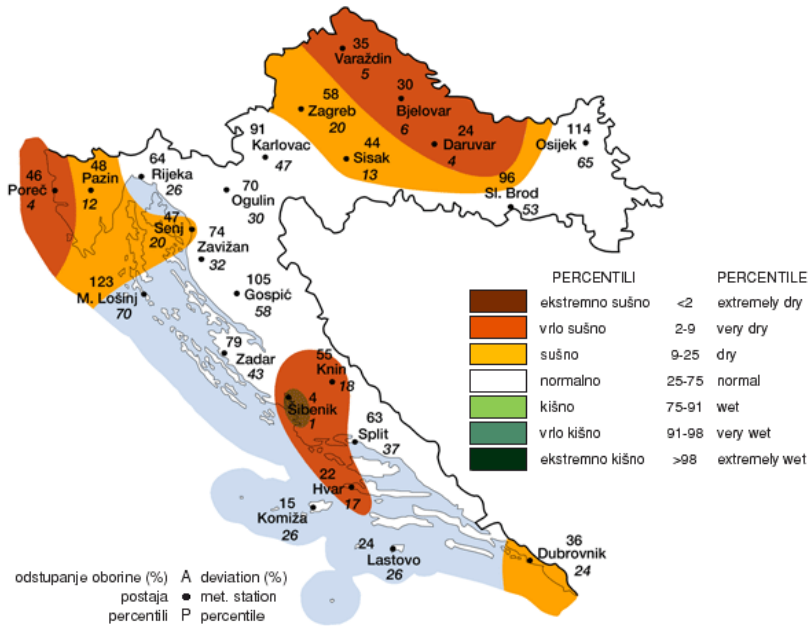


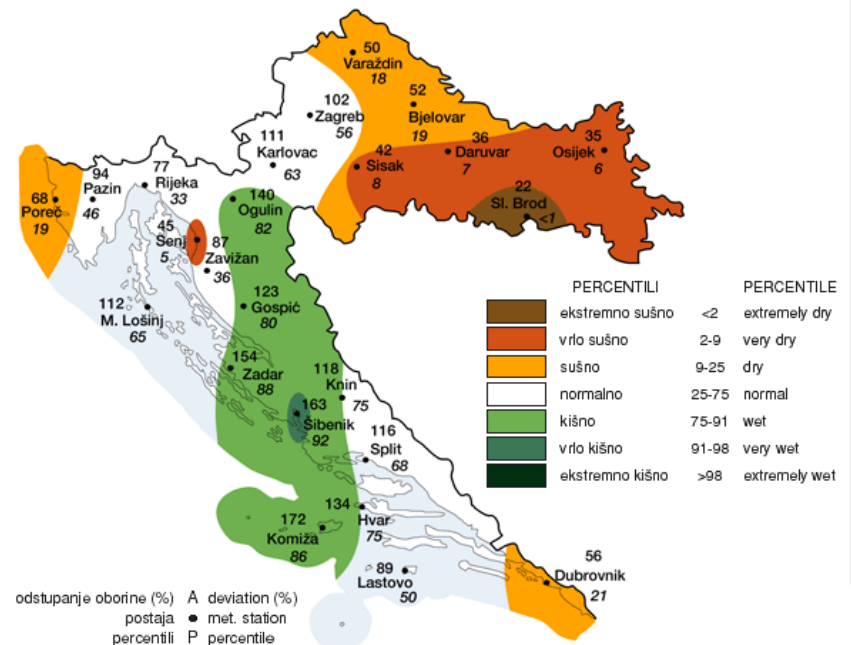
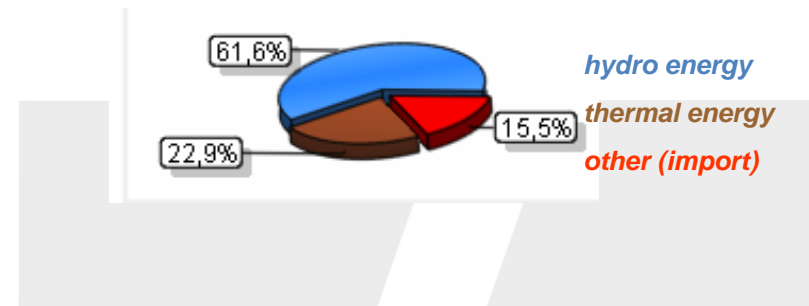
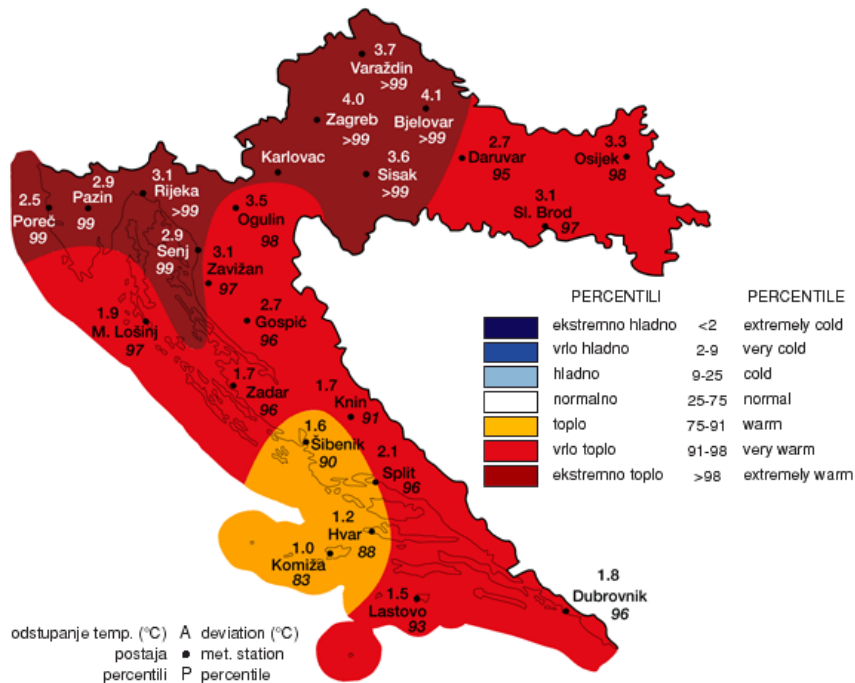


hydro energy
thermal energy
other (import)

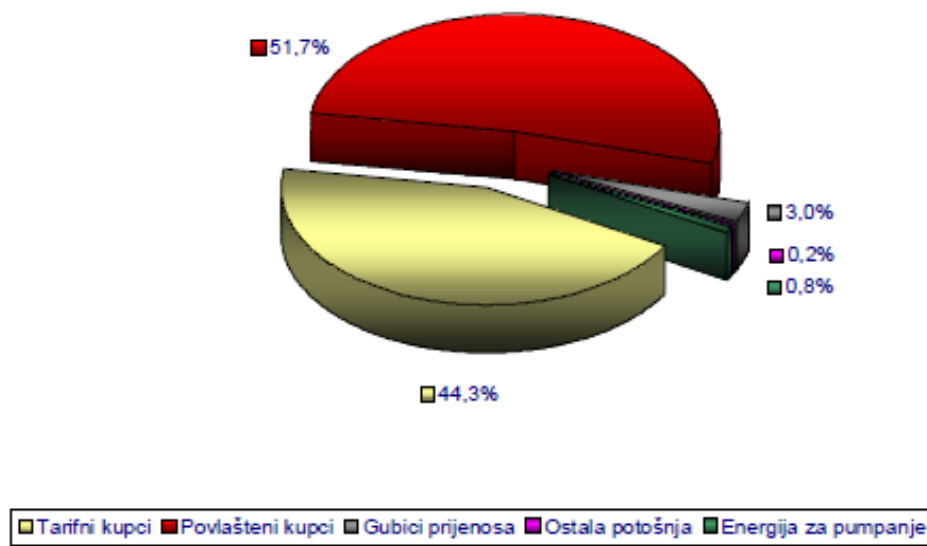








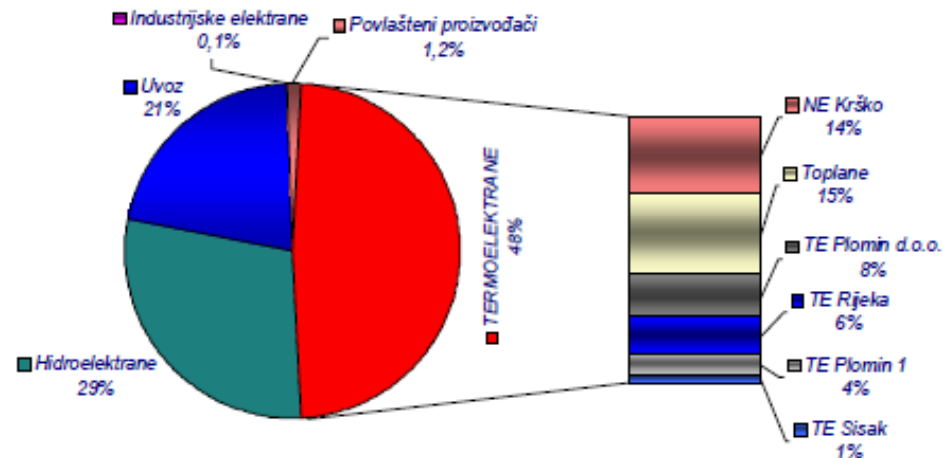
Structure of consumption:



Structure of available energy

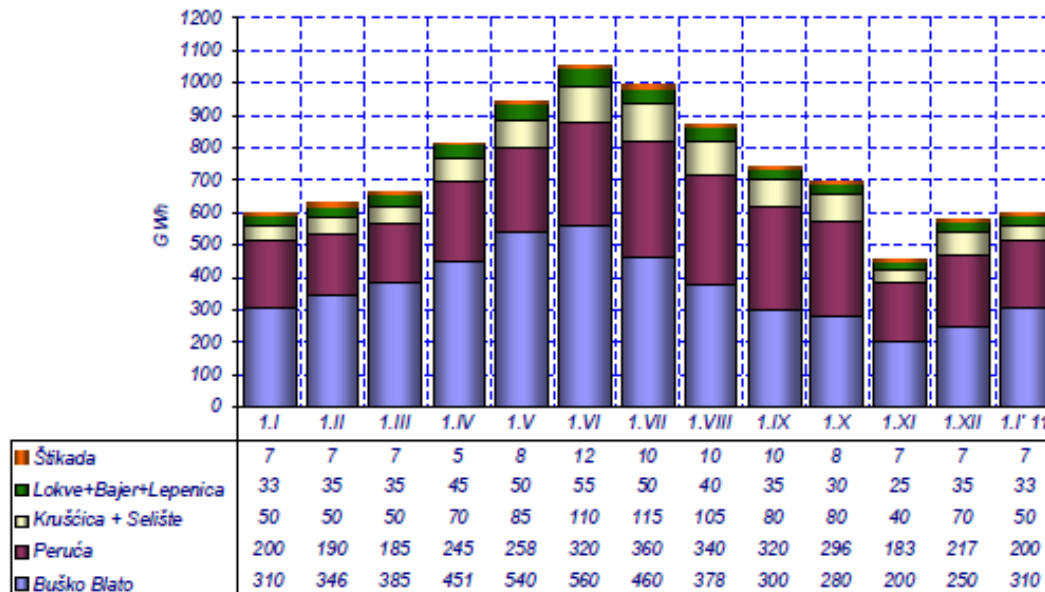
Planning phase

Struktura raspoložive električne energije



Dinamika popunjenosti akumulacijskih bazena

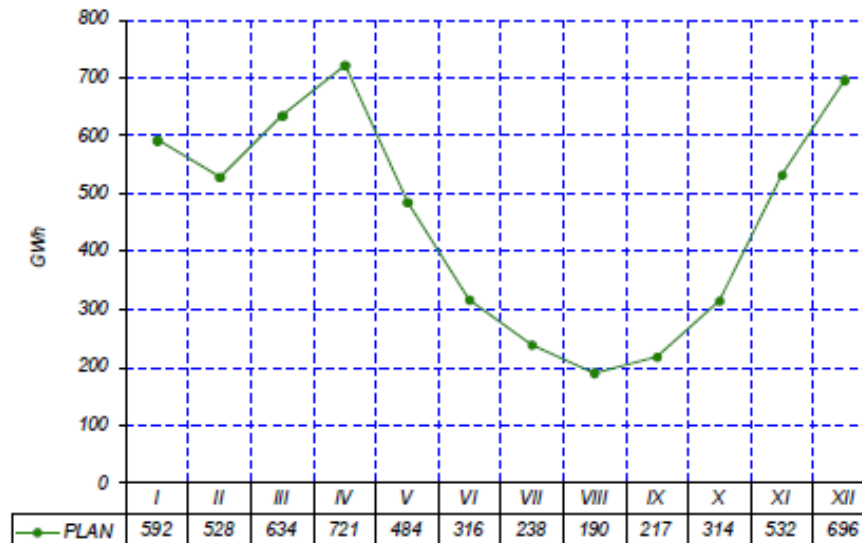
Planning phase



Dynamics of eq. energy in storage basins

Planning phase

Dinamika energetske vrijednosti dotoka



Dynamics of energetic equivalent of inflows

Planning phase

	OSNOVNA (GWh)	VLAŽNA (GWh)	Δ (GWh)	Δ %
<i>Hidroelektrane</i>	5462	7165	1703	31,2
<i>Termoelektrane</i>	4917	4383	-534	-10,9
<i>TE Plomin d.o.o.</i>	1500	1500	0	0,0
<i>NE Krško</i>	2695	2695	0	0,0
<i>Industrijske elektrane</i>	21	21	0	0,0
<i>Povlašteni proizvođači</i>	228	228	0	0,0
<i>Uvoz električne energije</i>	4010	2880	-1130	-28,2
UKUPNO RASPOLOŽIVO	18834	18873	39	0,2
<i>Izvoz električne energije</i>	288	327	39	13,6
<i>Prodaja unutar RH</i>	876	876	0	0,0
SALDO (uvoz - izvoz - prodaja)	2847	1677	-1169	-41,1
UKUPNI VOLUMEN TRGOVINE	5174	4083	-1091	-21,1
POTROŠNJA GORIVA				
<i>Potrošnja lož ulja (tona)</i>	482.301	352.829	-129.472	-26,8
<i>Potrošnja prir. plina (x10⁶m³)</i>	700.000	700.000	0	0,0
<i>Potrošnja ugljena (tona)</i>	881.715	881.715	0	0,0

Planning phase

	OSNOVNA (GWh)	SUŠNA (GWh)	Δ (GWh)	Δ %
<i>Hidroelektrane</i>	5462	3930	-1532	-28,1
<i>Termoelektrane</i>	4917	5220	303	6,2
<i>TE Plomin d.o.o.</i>	1500	1500	0	0,0
<i>NE Krško</i>	2695	2695	0	0,0
<i>Industrijske elektrane</i>	21	21	0	0,0
<i>Povlašteni proizvođači</i>	228	228	0	0,0
<i>Uvoz električne energije</i>	4010	5215	1205	30,0
UKUPNO RASPOLOŽIVO	18834	18809	-25	-0,1
<i>Izvoz električne energije</i>	288	263	-25	-8,7
<i>Prodaja unutar RH</i>	876	876	0	0,00
SALDO (uvoz – izvoz – prodaja)	2847	4076	1230	43,2
UKUPNI VOLUMEN TRGOVINE	5174	6354	1180	22,8
POTROŠNJA GORIVA				
<i>Potrošnja lož ulja (tona)</i>	482.301	560.139	77.838	16,1
<i>Potrošnja prir. plina (x10⁶ m³)</i>	700.000	700.000	0	0,00
<i>Potrošnja ugljena (tona)</i>	881.715	881.715	0	0,00

Scenarios background

- 40 years of continuous measurements (1970-2010.)
- Sorted monthly averages based on average contribution to the yearly total
- The driest one is 100%, the wettest one is 0%
- 58% probability is Normal (was 70%)
- 30% is wet scenario, 85% is dry scenario
- Difference between scenarios is 3233 GWh

Some conclusions:

Electrical Energy Balance

- basic document for Economic Plan
- done for three scenarios: normal (58%), wet (30%) and dry (85%)
- timescale is: Year, Month
- produced in September for the next year, corrected in November
- corrections are done monthly, for the rest of the year
- Year 2010, 10% over wet scenario!

That's all!

Thank you!

