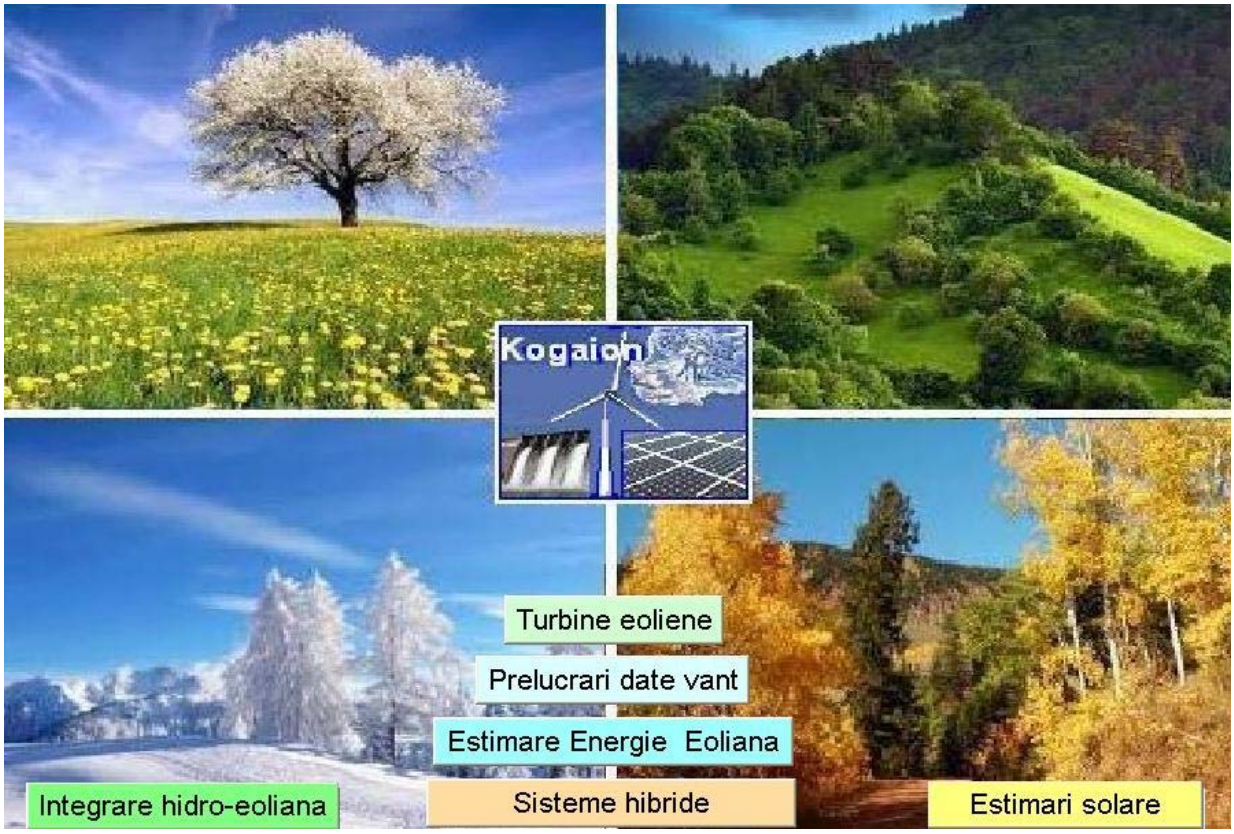
KOGAION V1.09

KOGAION is a computer model application that simplifies the task of designing distributed renewable energy generation systems - both on and off-grid. It doesn't cover biofuel, hydrogen domains. KOGAION's optimization and sensitivity analysis algorithms allow you to evaluate the economic and technical feasibility of a photovoltaic, wind and hydro turbines technology options and to account for variations in technology costs and energy resource availability. Kogaion was designed at the IPA in 2010, and is permanently developed and enhanced according with the Romanian rules and laws regarding incentives for renewable.

KOGAION provides the detailed simulation and optimization in a model that is relatively simple and easy to use. It's adaptable to a wide variety of projects like wind, photovoltaic and hybrid for large on grid projects or small hybrid isolated projects (for a village, community-scale power system or individual system). KOGAION can model both the technical and economic factors involved in the project. For larger systems, KOGAION can provide an important overview that compares the cost and feasibility of different configurations.



KOGAION is accessible to large kind of users, including financial decision makers. Time references simulation is crucial for modeling variable resources, such as wind power. More than other software application Kogaion supports all kind of wind description (Weibul, pdf, TS). KOGAION's sensitivity analysis helps determine the potential impact of uncertain factors wind speed on a given system, over time. KOGAION models and simulations are referring to:

Renewable potential estimation:
- wind
- solar

Energy yield:
- solar photovoltaic (PV)
- wind turbine
- run-of-river hydro power

Data base:
- panels, turbines, batteries, inverters, chargers

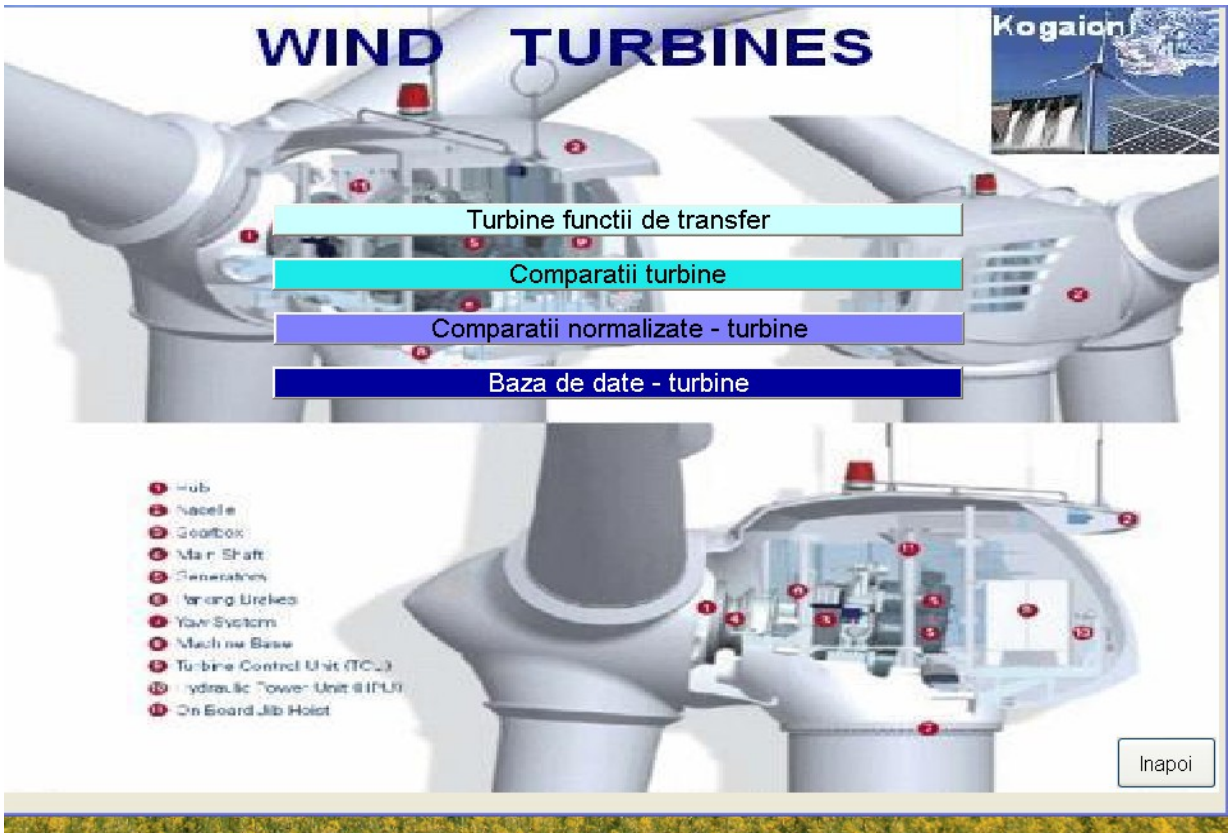
Loads:
- electric utility with daily profiles
- "on grid"

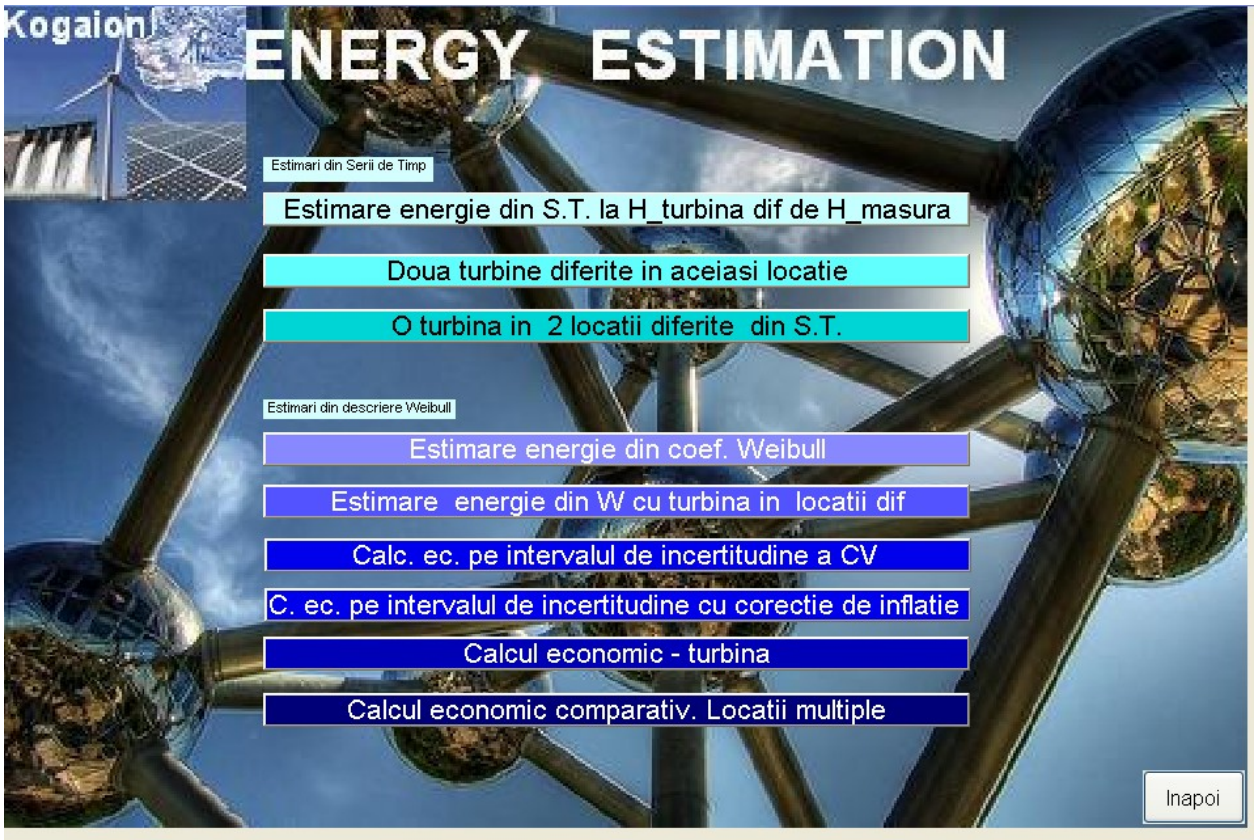
Storage:
- pumping water
- battery bank

Hybrid system CAD:
- chain equipment verification

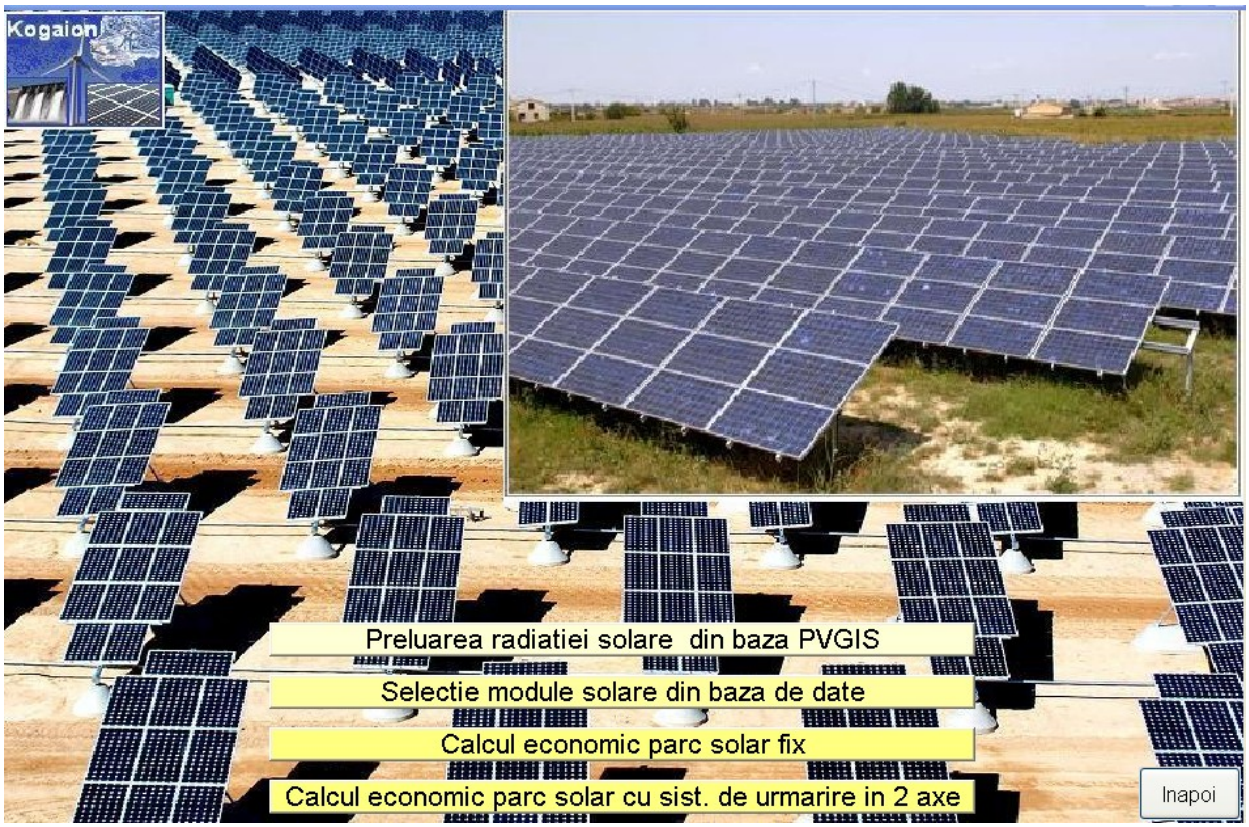
Economical outputs

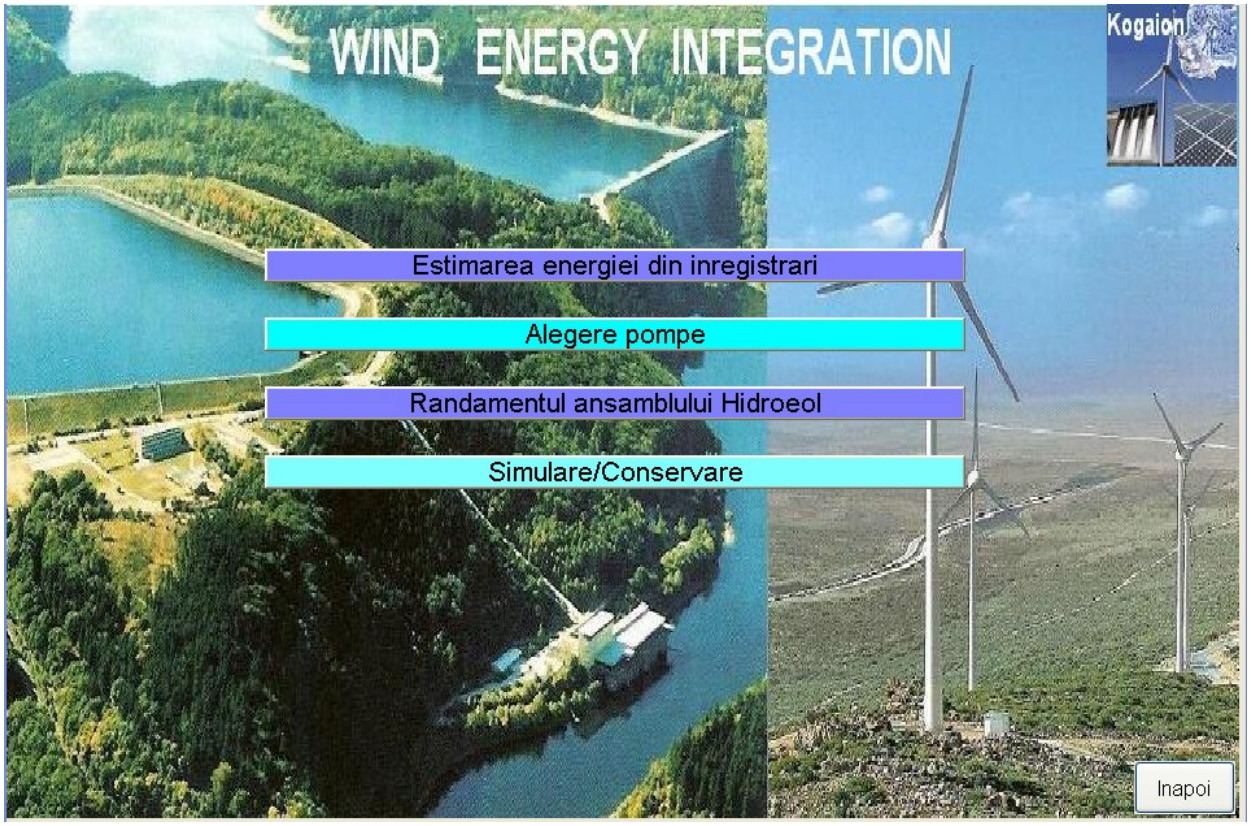
The user interfaces are organized on 6 chapter, as it can be seen forward:



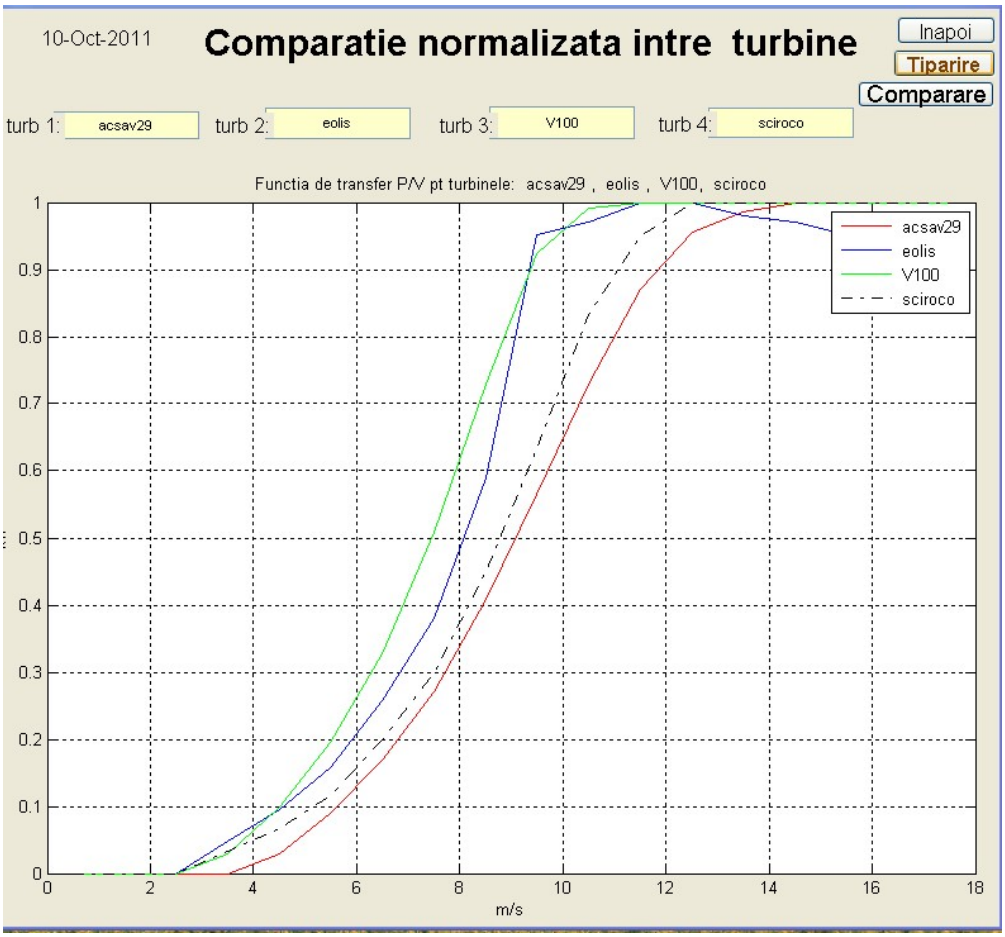

Kogaion
ENERGY ESTIMATION
Estimari din Serii de Timp
Estimare energie din S.T. la H_turbina dif de H_masura
Doua turbine diferite in aceiasi locatie
O turbina in 2 locatii diferite din S.T.
Estimari din descriere Weibull
Estimare energie din coef. Weibull
Estimare energie din W cu turbina in locatii dif
Calc. ec. pe intervalul de incertitudine a CV
C. ec. pe intervalul de incertitudine cu corectie de inflatie
Calcul economic - turbina
Calcul economic comparativ. Locatii multiple
Inapoi

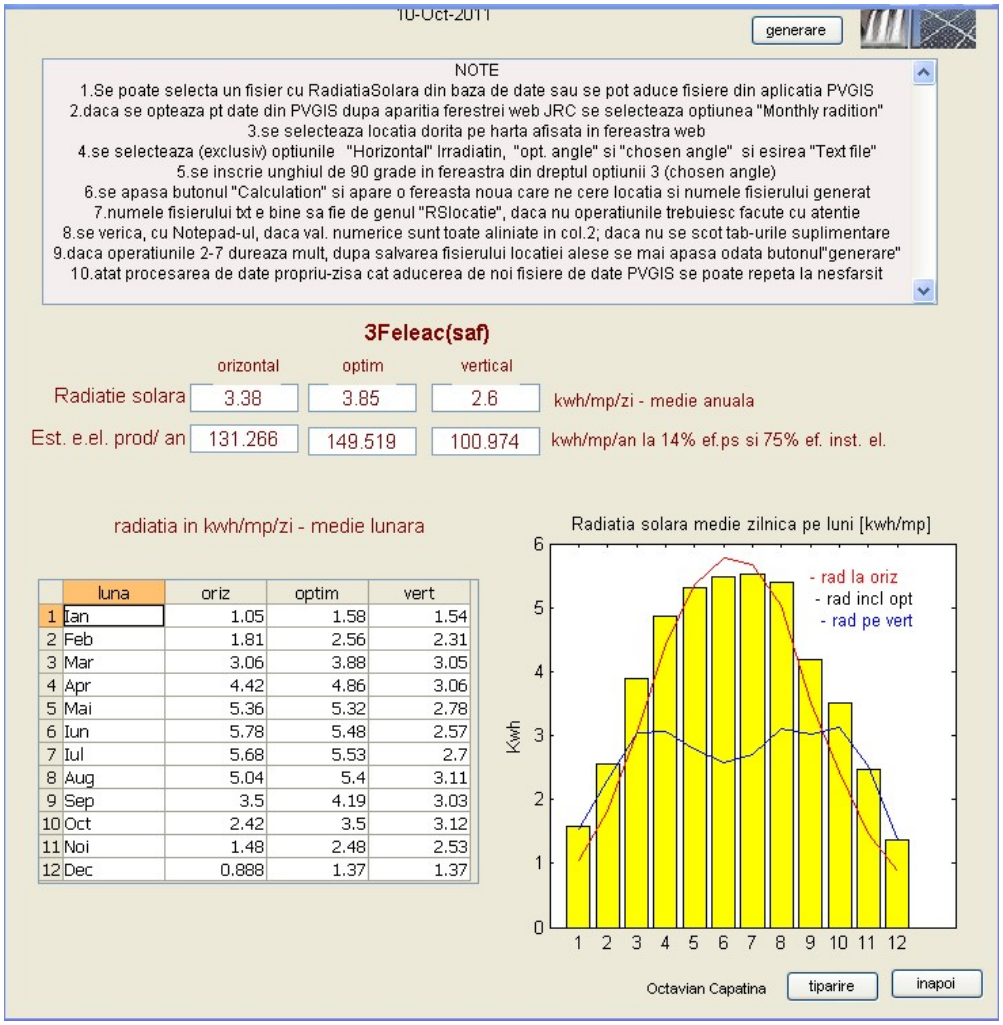

Small hybrid renewable systems design
Curba de consum
Configurator sistem hibrid izolat
Configurator sistem hibrid
Baza de date pentru sisteme hibride
Inapoi





Forward there are presented several design interfaces to outline the Kogaion possibilities:


10-Oct-2011
Comparatie normalizata intre turbine
Inapoi
Tiparire
Comparare
turb 1: acsav29
turb 2: eolis
turb 3: V100
turb 4: sciroco
Functia de transfer P/V pt turbinele: acsav29 , eolis , V100, sciroco
acsav29
eolis
V100
sciroco
m/s


10-Oct-2011
generare
NOTE
1.Se poate selecta un fisier cu RadiatiaSolara din baza de date sau se pot aduce fisiere din aplicatia PVGIS
2.daca se opteaza pt date din PVGIS dupa aparitia ferestrei web JRC se selecteaza optiunea "Monthly radition"
3.se selecteaza locatia dorita pe harta afisata in fereastra web
4.se selecteaza (exclusiv) optiunile "Horizontal" Irradiatin, "opt. angle" si "chosen angle" si esirea "Text file"
5.se inscrie unghiul de 90 grade in fereastra din dreptul optiunii 3 (chosen angle)
6.se apasa butonul "Calculation" si apare o fereasta noua care ne cere locatia si numele fisierului generat
7.numele fisierului txt e bine sa fie de genul "RSlocatie", daca nu operatiunile trebuiesc facute cu atentie
8.se verica, cu Notepad-ul, daca val. numerice sunt toate aliniate in col.2; daca nu se scot tab-urile suplimentare
9.daca operatiunile 2-7 dureaza mult, dupa salvarea fisierului locatiei alese se mai apasa odata butonul"generare"
10.atat procesarea de date propriu-zisa cat aducerea de noi fisiere de date PVGIS se poate repeta la nesfarsit
3Feleac(saf)
orizontal
optim
vertical
Radiatie solara 3.38 3.85 2.6 kwh/mp/zi - medie anuala
Est. e.el. prod/ an 131.266 149.519 100.974 kwh/mp/an la 14% ef.ps si 75% ef. inst. el.
radiatia in kwh/mp/zi - medie lunara
luna oriz optim vert
1 Ian 1.05 1.58 1.54
2 Feb 1.81 2.56 2.31
3 Mar 3.06 3.88 3.05
4 Apr 4.42 4.86 3.06
5 Mai 5.36 5.32 2.78
6 Iun 5.78 5.48 2.57
7 Iul 5.68 5.53 2.7
8 Aug 5.04 5.4 3.11
9 Sep 3.5 4.19 3.03
10 Oct 2.42 3.5 3.12
11 Noi 1.48 2.48 2.53
12 Dec 0.888 1.37 1.37
Radiatia solara medie zilnica pe luni [kwh/mp]
- rad la oriz
- rad incl opt
- rad pe vert
Kwh
Octavian Capatina
tiparire
inapoi

10-Oct-2011

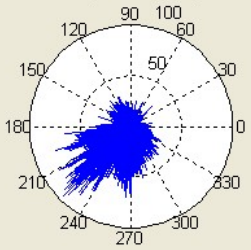
Extragere coef. W., densit. putere din S.T.

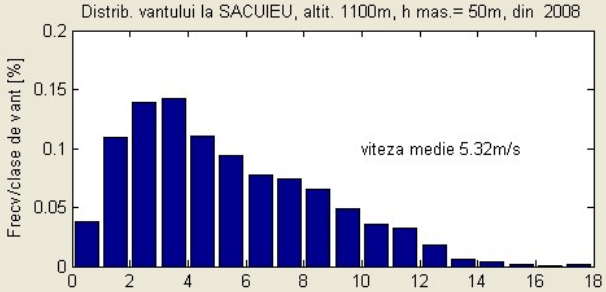
Locatie	Altitudine	Temperatura	h mas	T.esant.(min)	Perioada	viteza vant	directie vant
SACUIEU	1100	6.5	50	10	2008	sacuieu50	sacuieu50

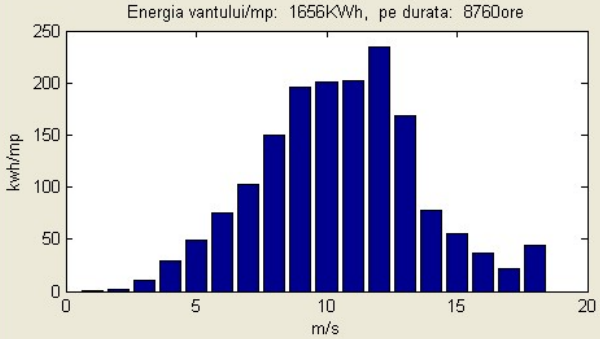
Generare

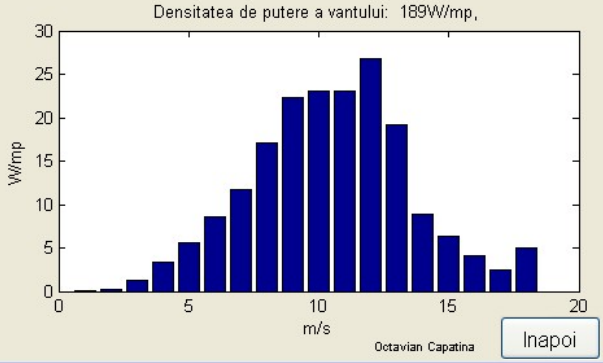
Tiparire

A(m/s)= 5.97 K= 1.69









Octavian Capatina

Inapoi

10-Oct-2011

Vant, locatie, turbina, costuri, venituri, VNA, RIR

Turbina: V100

locatia	altitudine	temp / an	h butuc	h masura	fac. scara	coef. forma	Dim. obst
SACUIEU	100	7	100	50	6.82	1.69	0.4

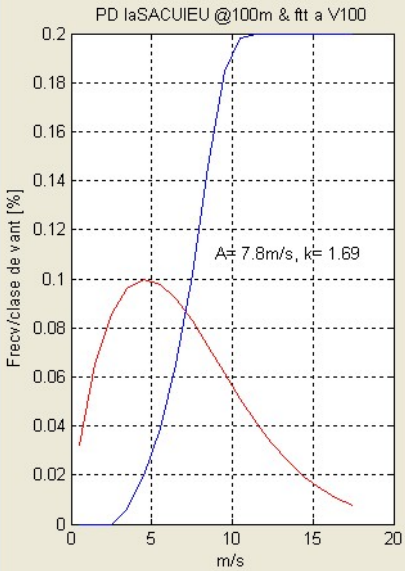
cost echip	% instalare	% O&M	cost autoriz	durata pr	rata disc	pret MWh	pret CV	an PIF
1.2	30	1.3	0.15	20	5	52	54.6	2012

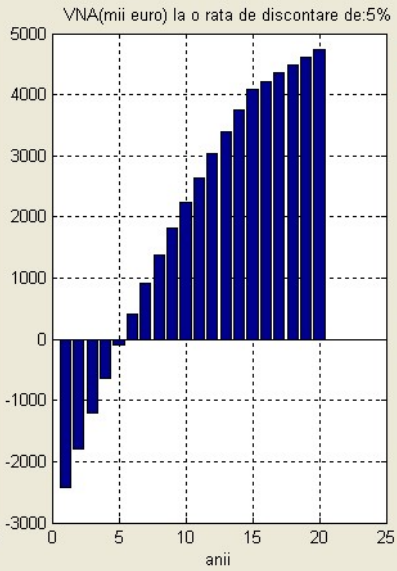
euro/w — din valoarea turbinei — euro/w — durata de stimulare cf L220 modif: 15ani

Tiparire

Generare

Inapoi





	anul	VNA(mii e...
1	an PIF	-3078.0
2	1.0	-2421.5
3	2.0	-1796.26
4	3.0	-1200.79
5	4.0	-633.68
6	5.0	-93.58
7	6.0	420.81
8	7.0	910.7
9	8.0	1377.26
10	9.0	1821.61
11	10.0	2244.79
12	11.0	2647.83
13	12.0	3031.67
14	13.0	3397.23
15	14.0	3745.39
16	15.0	4076.97
17	16.0	4220.42
18	17.0	4357.04
19	18.0	4487.15
20	19.0	4611.07
21	20.0	4729.09

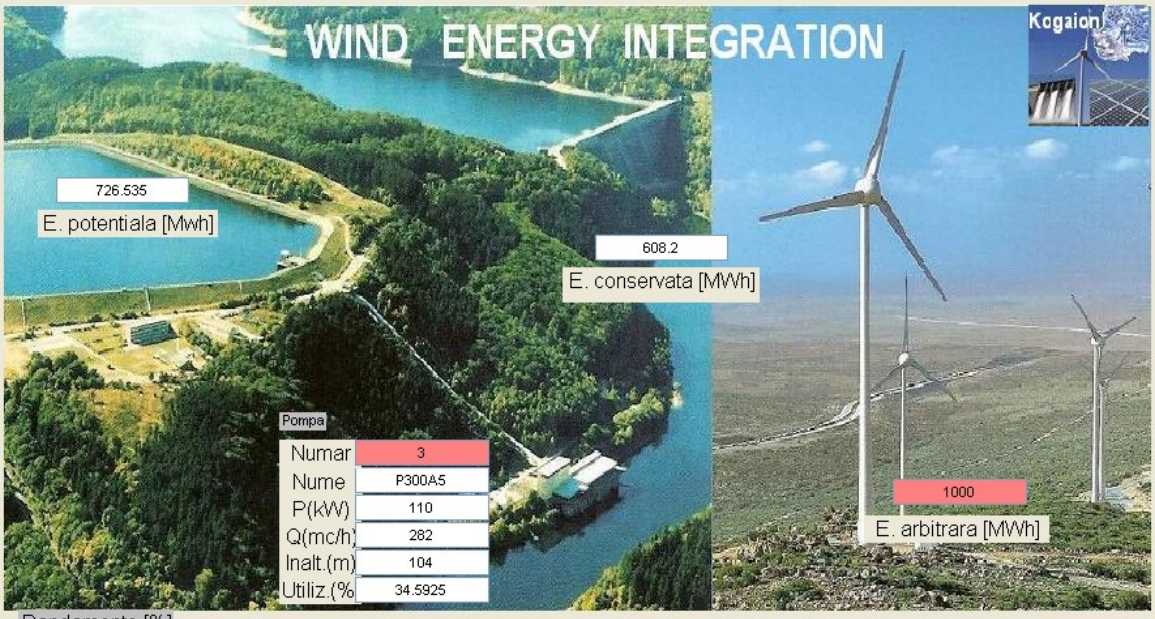
Octavian Capatina

Put turb. [Kw]	1800
cost initial (mii)	3078
fact capacitate %	41.61
energie MWh/an	6561.84
pret integral/Mwh	109.33
Venit net/an (mii)	689.326
RIR [%]	21.9737
recuperare [ani]	4.47
recuperare act [ani]	5.17
RVC	7.05

Ansamblul Hidro-Eol. Randamente

Generare | Tiparire | Inapoi

10-Oct-2011



Randamente [%]

Turbina hidro	91	Generator hidro	92	Pompa	72.65	Total	60.82

10-Oct-2011

DIAGRAMA de CONSUM DIURNA

BENEFICIAR: gospodarie

	putere [W	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11 (ante meridian)	11-12 (ante meridian)	0-1 (post meridian)	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12
b.incad.	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
b. fluor.	18	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	2	3	2	2	1
ilum DEL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
elcasnic1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
elcasnic2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
cuptor	1000	0	0	0	0	0	0	0	0	.1	0	0	0	.1	0	0	0	0	0	.1	0	0	0	0	0
TV	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0
calc	80	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	1	0	0	0	0	0
unelte 1	600	0	0	0	0	0	0	0	0	0	0	.5	.5	0	.3	.5	0	0	0	0	0	0	0	0	0
unelte 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

consum 1 24/24h: 100 | consum 2 24/24h: 50 | consum 3 24/24h: 0 | nume fisier csarcina: cs-

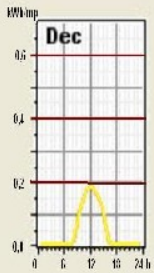
Decembrie | o. rasarit: 8 | o. apus: 16 | Rad. sol. la 12:00 [kW/mp]: 0.2 | Rad. diurna pe mp in dec. [kwh]: 1.05

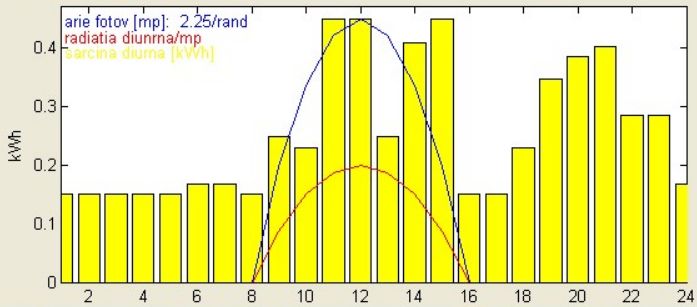
Puterea maxima momentana [kw]: 2.08

Puterea medie echiv. [kw]: 0.26

Puterea minima momentana [kw]: 0.15

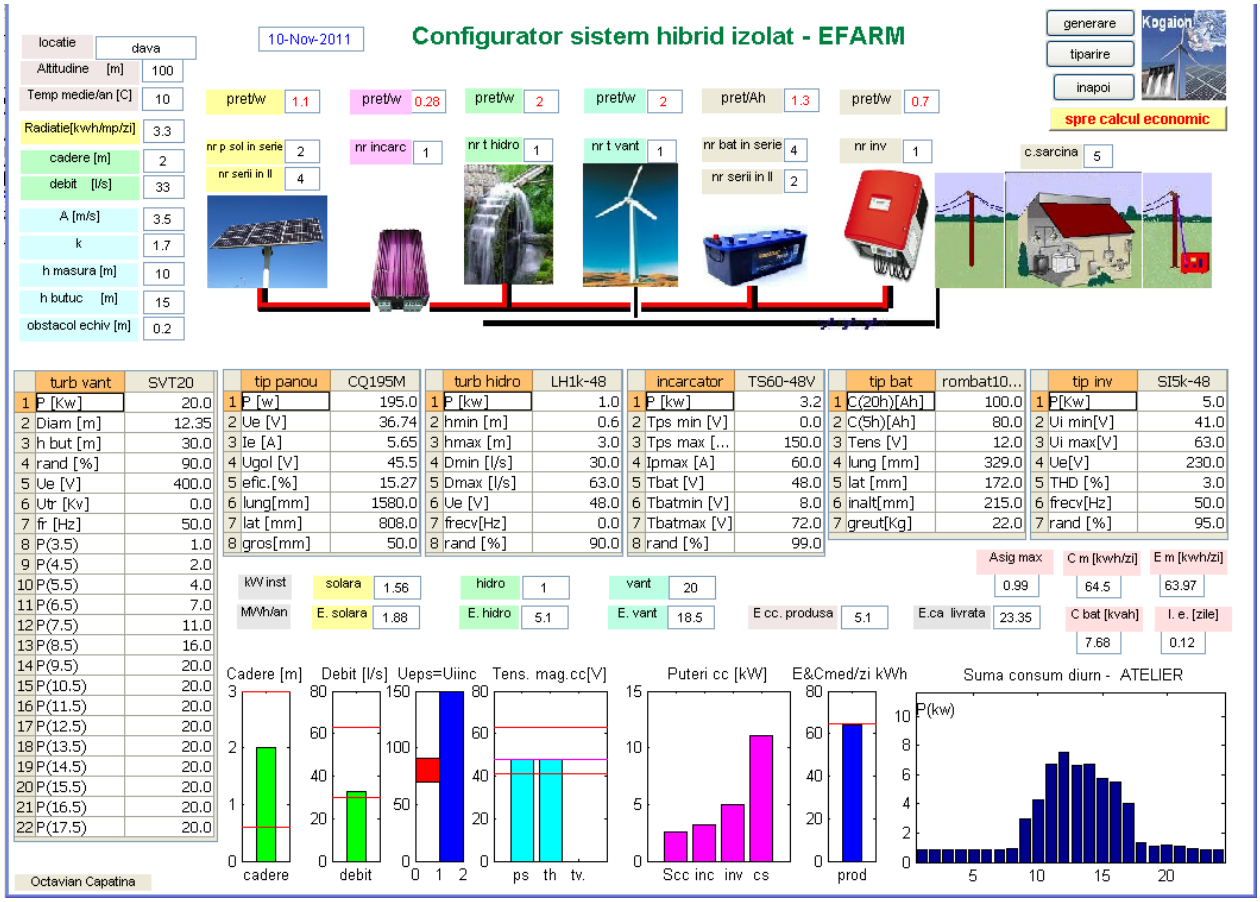
Energia medie diurna consum. [kwh]: 6.13

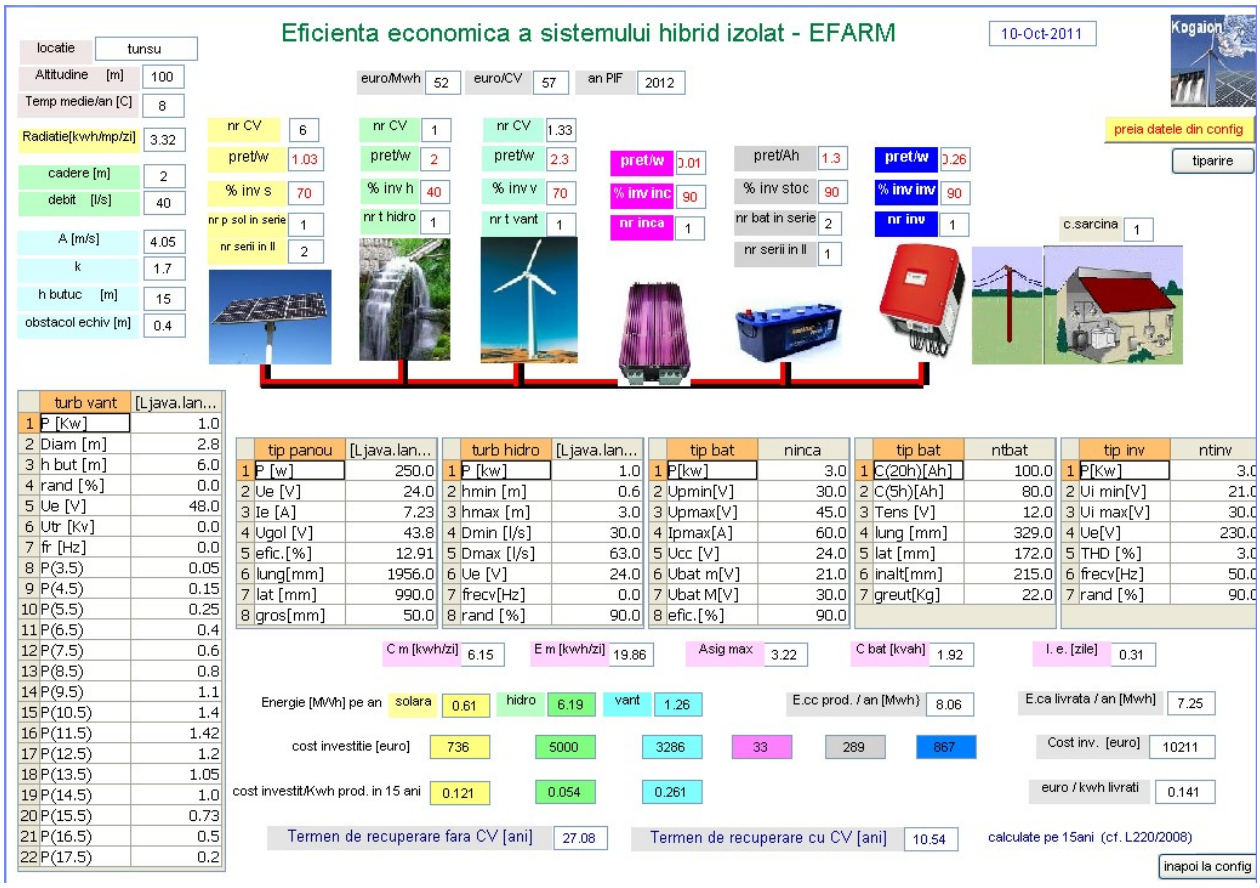




Energie [wh]	150	150	150	150	150	168	168	150	250	230	450	450	250	410	450	150	150	230	348	386	404	286	286	168

generare | tiparire | inapoi


Configurator sistem hibrid izolat - EFARM
10-Nov-2011
generare
tiparire
inapoi
spre calcul economic
Kogaion
locatie dava
Altitudine [m] 100
Temp medie/an [C] 10
Radiatie[kwh/mp/zi] 3.3
cadere [m] 2
debit [l/s] 33
A [m/s] 3.5
k 1.7
h masura [m] 10
h butuc [m] 15
obstacol echiv [m] 0.2
pret/w 1.1
pret/w 0.28
pret/w 2
pret/w 2
pret/Ah 1.3
pret/w 0.7
nr p sol in serie 2
nr serii in ll 4
nr incarc 1
nr t hidro 1
nr t vant 1
nr bat in serie 4
nr serii in ll 2
nr inv 1
c.sarcina 5
turb vant SVT20
1 P [Kw] 20.0
2 Diam [m] 12.35
3 h but [m] 30.0
4 rand [%] 90.0
5 Ue [V] 400.0
6 Utr [Kv] 0.0
7 fr [Hz] 50.0
8 P(3.5) 1.0
9 P(4.5) 2.0
10 P(5.5) 4.0
11 P(6.5) 7.0
12 P(7.5) 11.0
13 P(8.5) 16.0
14 P(9.5) 20.0
15 P(10.5) 20.0
16 P(11.5) 20.0
17 P(12.5) 20.0
18 P(13.5) 20.0
19 P(14.5) 20.0
20 P(15.5) 20.0
21 P(16.5) 20.0
22 P(17.5) 20.0
tip panou CQ195M
1 P [w] 195.0
2 Ue [V] 36.74
3 Ie [A] 5.65
4 Ugol [V] 45.5
5 efic.[%] 15.27
6 lung[mm] 1580.0
7 lat [mm] 808.0
8 gros[mm] 50.0
turb hidro LH1k-48
1 P [kw] 1.0
2 hmin [m] 0.6
3 hmax [m] 3.0
4 Dmin [l/s] 30.0
5 Dmax [l/s] 63.0
6 Ue [V] 48.0
7 frecv[Hz] 0.0
8 rand [%] 90.0
incarcator TS60-48V
1 P [kw] 3.2
2 Tps min [V] 0.0
3 Tps max [... 150.0
4 Ipmax [A] 60.0
5 Tbat [V] 48.0
6 Tbatmin [V] 8.0
7 Tbatmax [V] 72.0
8 rand [%] 99.0
tip bat rombat10...
1 C(20h)[Ah] 100.0
2 C(5h)[Ah] 80.0
3 Tens [V] 12.0
4 lung [mm] 329.0
5 lat [mm] 172.0
6 inalt[mm] 215.0
7 greut[Kg] 22.0
tip inv SI5k-48
1 P[Kw] 5.0
2 Ui min[V] 41.0
3 Ui max[V] 63.0
4 Ue[V] 230.0
5 THD [%] 3.0
6 frecv[Hz] 50.0
7 rand [%] 95.0
kW inst
MWh/an
solara 1.56
E. solara 1.88
hidro 1
E. hidro 5.1
vant 20
E. vant 18.5
E cc. produsa 5.1
E.ca livrata 23.35
Asig max 0.99
C m [kwh/zi] 64.5
E m [kwh/zi] 63.97
C bat [kvah] 7.68
I. e. [zile] 0.12
Cadere [m]
Debit [l/s]
Ueps=Uiinc
Tens. mag.cc[V]
Puteri cc [kW]
E&Cmed/zi kWh
Suma consum diurn - ATELIER
P(kw)
cadere
debit
ps th tv.
Scc inc inv cs
prod
Octavian Capatina


Eficienta economica a sistemului hibrid izolat - EFARM
10-Oct-2011
Kogaion
locatie tunsu
Altitudine [m] 100
Temp medie/an [C] 8
Radiatie[kwh/mp/zi] 3.32
cadere [m] 2
debit [l/s] 40
A [m/s] 4.05
k 1.7
h butuc [m] 15
obstacol echiv [m] 0.4
euro/Mwh 52
euro/CV 57
an PIF 2012
nr CV 6
pret/w 1.03
% inv s 70
nr p sol in serie 1
nr serii in ll 2
nr CV 1
pret/w 2
% inv h 40
nr t hidro 1
nr CV 1.33
pret/w 2.3
% inv v 70
nr t vant 1
pret/w 0.01
% inv inc 90
nr inca 1
pret/Ah 1.3
% inv stoc 90
nr bat in serie 2
nr serii in ll 1
pret/w 0.26
% inv inv 90
nr inv 1
c.sarcina 1
preia datele din config
tiparire
turb vant [Ljava.lan...
1 P [Kw] 1.0
2 Diam [m] 2.8
3 h but [m] 6.0
4 rand [%] 0.0
5 Ue [V] 48.0
6 Utr [Kv] 0.0
7 fr [Hz] 0.0
8 P(3.5) 0.05
9 P(4.5) 0.15
10 P(5.5) 0.25
11 P(6.5) 0.4
12 P(7.5) 0.6
13 P(8.5) 0.8
14 P(9.5) 1.1
15 P(10.5) 1.4
16 P(11.5) 1.42
17 P(12.5) 1.2
18 P(13.5) 1.05
19 P(14.5) 1.0
20 P(15.5) 0.73
21 P(16.5) 0.5
22 P(17.5) 0.2
tip panou [Ljava.lan...
1 P [w] 250.0
2 Ue [V] 24.0
3 Ie [A] 7.23
4 Ugol [V] 43.8
5 efic.[%] 12.91
6 lung[mm] 1956.0
7 lat [mm] 990.0
8 gros[mm] 50.0
turb hidro [Ljava.lan...
1 P [kw] 1.0
2 hmin [m] 0.6
3 hmax [m] 3.0
4 Dmin [l/s] 30.0
5 Dmax [l/s] 63.0
6 Ue [V] 24.0
7 frecv[Hz] 0.0
8 rand [%] 90.0
tip bat ninca
1 P[kw] 3.0
2 Upmin[V] 30.0
3 Upmax[V] 45.0
4 Ipmax[A] 60.0
5 Ucc [V] 24.0
6 Ubat m[V] 21.0
7 Ubat M[V] 30.0
8 efic.[%] 90.0
tip bat ntbat
1 C(20h)[Ah] 100.0
2 C(5h)[Ah] 80.0
3 Tens [V] 12.0
4 lung [mm] 329.0
5 lat [mm] 172.0
6 inalt[mm] 215.0
7 greut[Kg] 22.0
tip inv ntinv
1 P[Kw] 3.0
2 Ui min[V] 21.0
3 Ui max[V] 30.0
4 Ue[V] 230.0
5 THD [%] 3.0
6 frecv[Hz] 50.0
7 rand [%] 90.0
C m [kwh/zi] 6.15
E m [kwh/zi] 19.86
Asig max 3.22
C bat [kvah] 1.92
I. e. [zile] 0.31
Energie [MWh] pe an
solara 0.61
hidro 6.19
vant 1.26
E.cc prod. / an [Mwh] 8.06
E.ca livrata / an [Mwh] 7.25
cost investitie [euro]
736
5000
3286
33
289
867
Cost inv. [euro] 10211
cost investit/Kwh prod. in 15 ani
0.121
0.054
0.261
euro / kwh livrati 0.141
Termen de recuperare fara CV [ani] 27.08
Termen de recuperare cu CV [ani] 10.54
calculate pe 15ani (cf. L220/2008)
inapoi la config

10-Oct-2011

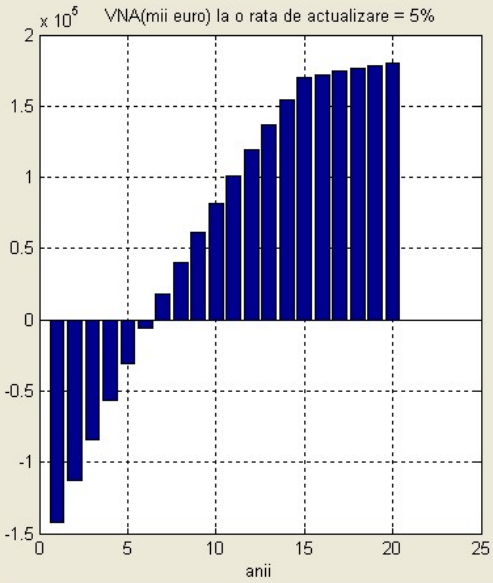
Parc solar cu orientare fixa, VNA, RIR, RoI

Put. parc kW	locatie	lat	lon	R.solara	modul solar	Put ms W	arie ms mp	efic. ms %
100000	Feleac			3.85	CS6P240	240	1.61	14.9

Cost echip.	% instalare	% O&M	cost autoriz.	durata pr	rata actualiz	pret MWh	pret CV	nr CV
1.5	6	1.5	0.15	20	5	52	50	4
euro/w	din valoarea panourilor		euro/w					

Tiparire

Generare



Date economice

	anul	VNA(mii e...
1	an PIF	-174000.14
2	1.0	-142432.42
3	2.0	-112367.94
4	3.0	-83735.09
5	4.0	-56465.71
6	5.0	-30494.87
7	6.0	-5760.74
8	7.0	17795.57
9	8.0	40230.16
10	9.0	61596.43
11	10.0	81945.26
12	11.0	101325.1
13	12.0	119782.09
14	13.0	137360.17
15	14.0	154101.2
16	15.0	170045.04
17	16.0	172360.32
18	17.0	174565.34
19	18.0	176665.37
20	19.0	178665.39
21	20.0	180570.17

PARC SOLAR

cost parc [mii euro]	174000
putere act.[kW]	100000
pret integral/Mwh	252
energie an [MWh]	140461
Venit/an/15ani [mii	33146.1
suprafata [mp]	2.0125e+006
RIR [%]	18.4
nr panouri	416667
recuperare [ani]	5.25
recuperare actualiz [ani]	6.24

Octavian Capatina

Inapoi

10-Oct-2011

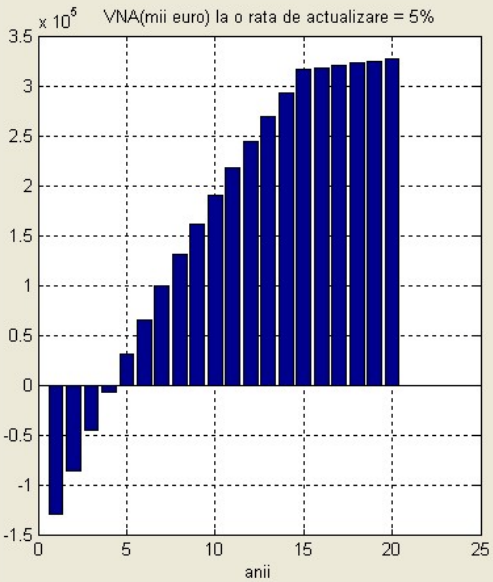
Parc solar cu orientare fixa, VNA, RIR, RoI

Put. parc kW	locatie	lat	lon	R.solara	modul solar	Put ms W	arie ms mp	efic. ms %
100000	Feleac			3.85	scheutenP250	250	1.82	13.73

Cost echip.	% instalare	% O&M	cost autoriz.	durata pr	rata actualiz	pret MWh	pret CV	nr CV
1.5	6	1.5	0.15	20	5	52	50	6
euro/w	din valoarea panourilor		euro/w					

Tiparire

Generare



Date economice

	anul	VNA(mii e...
1	an PIF	-174000.87
2	1.0	-129055.65
3	2.0	-86250.68
4	3.0	-45484.04
5	4.0	-6658.67
6	5.0	30317.87
7	6.0	65533.63
8	7.0	99072.44
9	8.0	131014.17
10	9.0	161434.86
11	10.0	190406.95
12	11.0	217999.42
13	12.0	244277.96
14	13.0	269305.14
15	14.0	293140.54
16	15.0	315840.93
17	16.0	318156.23
18	17.0	320361.27
19	18.0	322461.31
20	19.0	324461.34
21	20.0	326366.14

PARC SOLAR

cost parc [mii euro]	174001
putere act.[kW]	100001
pret integral/Mwh	352
energie an [MWh]	140462
Venit/an/15ani [mii	47192.5
suprafata [mp]	2.18401e+006
RIR [%]	26.89
nr panouri	400002
recuperare [ani]	3.69
recuperare actualiz [ani]	4.18

Octavian Capatina

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10-Oct-2011

Parc solar cu urmarire, locatie, VNA, RIR, RoI

Put. parc kW	locatie	lat	lon	R.solara
1000	Brasov			3.5

modul solar	Put ms W	arie ms mp	efic. ms %
GNGP295	295	1.94	15.2

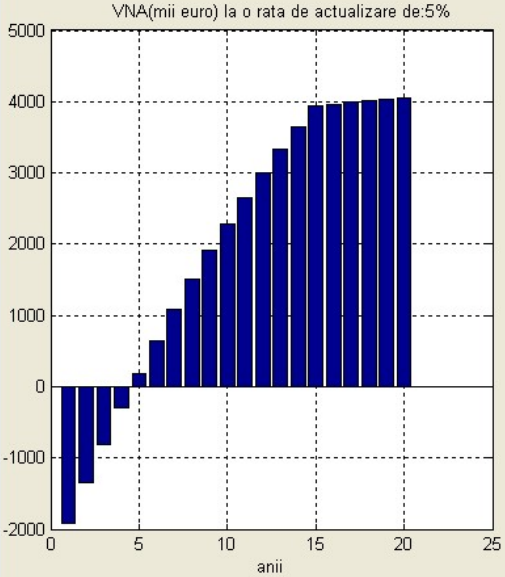
Tiparire

Generare

Cost echip. euro/w		% instalare	% O&M	cost autoriz.
1.7	0.5	7	1.5	0.15
panou, invertor	s.urmarire	din valoarea panourilor		euro/w

durata pr	rata actualiz	pret MWh	pret CV	nr CV
20	5	52	57	6

VNA(mii euro) la o rata de actualizare de:5%



Date economice

	anul	VNA(mii e...
1	an PIF	-2504.13
2	1.0	-1912.6
3	2.0	-1349.24
4	3.0	-812.71
5	4.0	-301.73
6	5.0	184.92
7	6.0	648.39
8	7.0	1089.8
9	8.0	1510.19
10	9.0	1910.55
11	10.0	2291.86
12	11.0	2655.0
13	12.0	3000.85
14	13.0	3330.24
15	14.0	3643.93
16	15.0	3942.69
17	16.0	3967.12
18	17.0	3990.39
19	18.0	4012.55
20	19.0	4033.65
21	20.0	4053.75

PARC SOLAR

cost parc [mii euro]	2504.13
pret integral/Mwh	394
Venit/an/15ani [mii euro]	621.101
RIR [%]	24.49
recuperare [ani]	4.03
recuperare act [ani]	4.62

putere act.[kW]	1000.05
energie an [MWh]	1660.16
suprafata [mp]	28938
nr panouri	3390

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10-Oct-2011

INVERTOARE

Selectie | D-foss3k-265 | RefuS4k8-525 | SMA3k-300 | ULX1k8-265 | Victron5k-48 | RefuS5k-529 | inv-SI5k-48

Tiparire

	modulul	putere [W]	Ui min [V]	Ui max [V]	Ue	THD[%]	fr [Hz]	rand [%]	euro/w
1	D-foss3k-...	2.7	180.0	350.0	230.0	5.0	50.0	92.9	0.5
2	RefuS4k8...	4.9	350.0	710.0	230.0	1.0	50.0	96.8	0.3
3	SMA3k-300	2.7	200.0	400.0	230.0	0.0	50.0	94.4	0.5
4	ULX1k8-265	1.8	180.0	350.0	230.0	3.0	50.0	91.6	0.3
5	Victron5k...	5.0	38.0	66.0	230.0	0.0	50.0	95.0	0.252
6	RefuS5k-...	5.06	349.0	710.0	230.0	1.0	50.0	97.4	0.25
7	inv-SI5k-48	5.0	41.0	63.0	230.0	3.0	50.0	95.0	0.7

Ordonare dupa putere

	modulul	putere [W]	Ui min [V]	Ui max [V]	DUi/Ui max	Ue	THD[%]	fr [Hz]	rand [%]	euro/w
1	ULX1k8-265	1.8	180.0	350.0	49.0	230.0	3.0	50.0	91.6	0.3
2	D-foss3k-...	2.7	180.0	350.0	49.0	230.0	5.0	50.0	92.9	0.5
3	SMA3k-300	2.7	200.0	400.0	50.0	230.0	0.0	50.0	94.4	0.5
4	RefuS4k8...	4.9	350.0	710.0	51.0	230.0	1.0	50.0	96.8	0.3
5	Victron5k...	5.0	38.0	66.0	42.0	230.0	0.0	50.0	95.0	0.252
6	inv-SI5k-48	5.0	41.0	63.0	35.0	230.0	3.0	50.0	95.0	0.7
7	RefuS5k-...	5.06	349.0	710.0	51.0	230.0	1.0	50.0	97.4	0.25

Inapoi

SC IPA sucursala Cluj Napoca
Str. Zorilor nr 15 CP 400435
Tel 0264-596155
Fax 0264-590558

Octavian Capatina
0745-106900
oct.capa@gmail.com