SABO energy

5 companii 1 grup

De la cercetare si proiectare pana la constructia si finalizarea cu succes a proiectului final.

SABO S.A.

-Proiecte industriale de anvergura si instalatii la cheie.
-Proiectare, constructie si instalare de utilaje pentru industria de caramida si tigla.
-Sisteme de ambalare, paletizare, manevrare si transport a produselor.

SABO ELECTRIC

-Instalatii electrice pentru utilaje industriale-linii de productie, cladiri industriale si cablare structurata.
-Placi de distributie de medie si joasa tensiune.
-Automatizari folosind PLC, SCADA, sisteme de control.

SICAP S.A.

-Construirea de noi unitati industriale.
-Intretinerea si modernizarea cladirilor industriale existente.
-Construirea de drumuri publice si private, porturi, sisteme hidraulice de drenaj cu utilizarea de masini moderne, cum ar fi echipamente asfalt si excavatoare.

SABO FILIERE S.A.

-Filiere pentru augers, matrite si nuclee.
-Strat anti-uzura, cromarea partilor de metal care prezinta uzura si rupturi.

SABO energy

-Proiectare si montare de instalatii de energie solara la cheie, acoperisuri industriale si sisteme solare rezidentiale.

5 companies 1 group

From research and design to the construction and successful completion of the final project.

SABO S.A.

-Large industrial scale projects & turn key plants.
-Design, construction and installation of machinery for the brick &tile industry.
-Systems for packaging, palletizing, handing and conveying products.

SABO ELECTRIC

-Electrical installation of industrial machinery-production lines, industrial buildings and structured cabling.
-Medium and low voltage distribution boards.
-Automation using PLC, SCADA, control systems.

SICAP S.A.

-Construction of new industrial units.
-Maintenance and modernization of existing industrial buildings.
-Construction of public and private roads, ports, hydraulic drainage systems with the use of modern machinery such as asphalt equipment and excavators.

SABO FILIERE S.A.

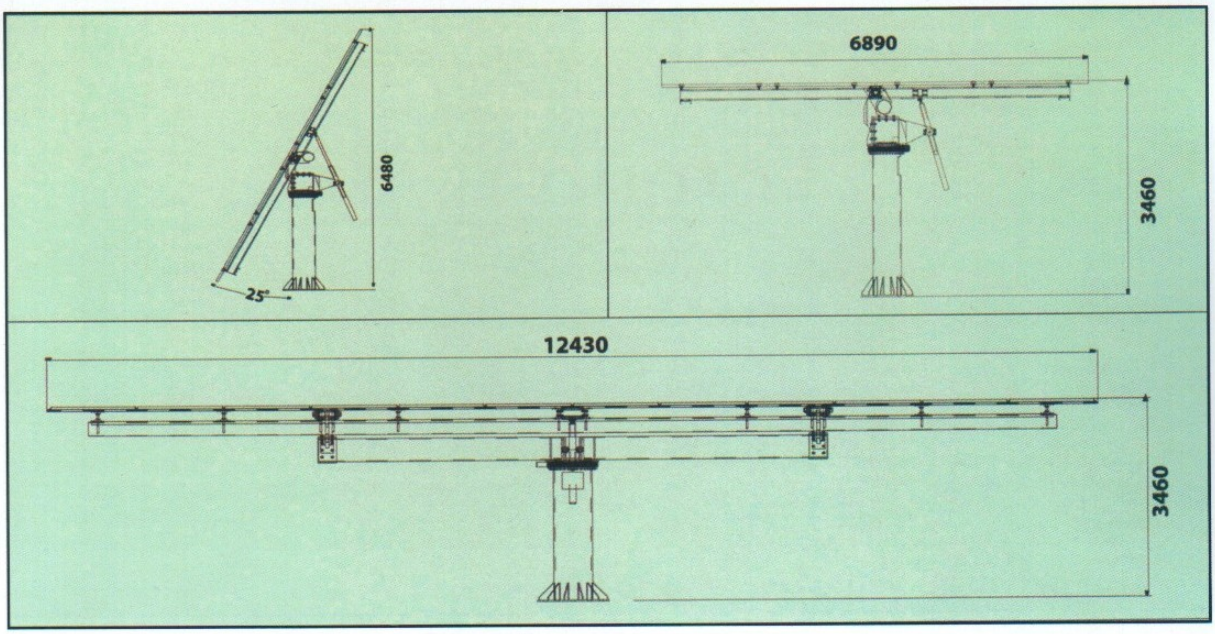
-Dies for augers, moulds and cores.
-Anti wear coating, hard chrome plating to metal parts showing wear and tear.

SABO energy

-Design and installation of turn key solar power plants, industrial roofing and residential solar power systems.

SABO GROUP

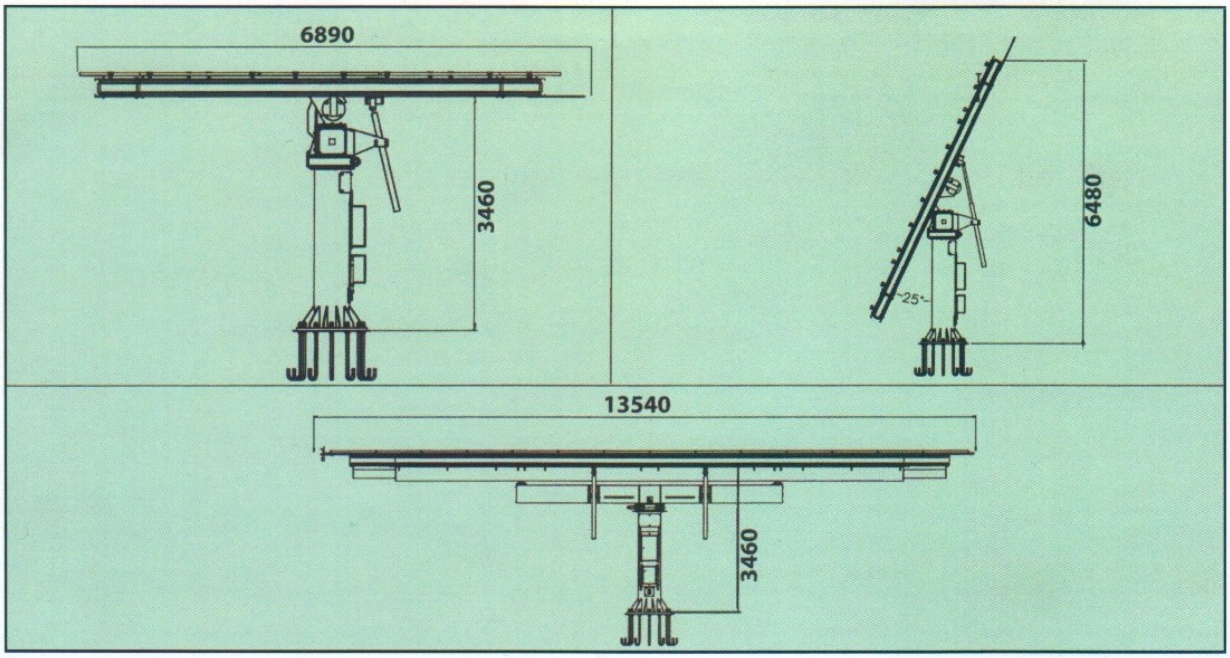
SR 80 SQM
DOUBLE AXIS SOLAR TRACKER



SR 80 SQM
TRAKER SOLAR CU DUBLU AXE

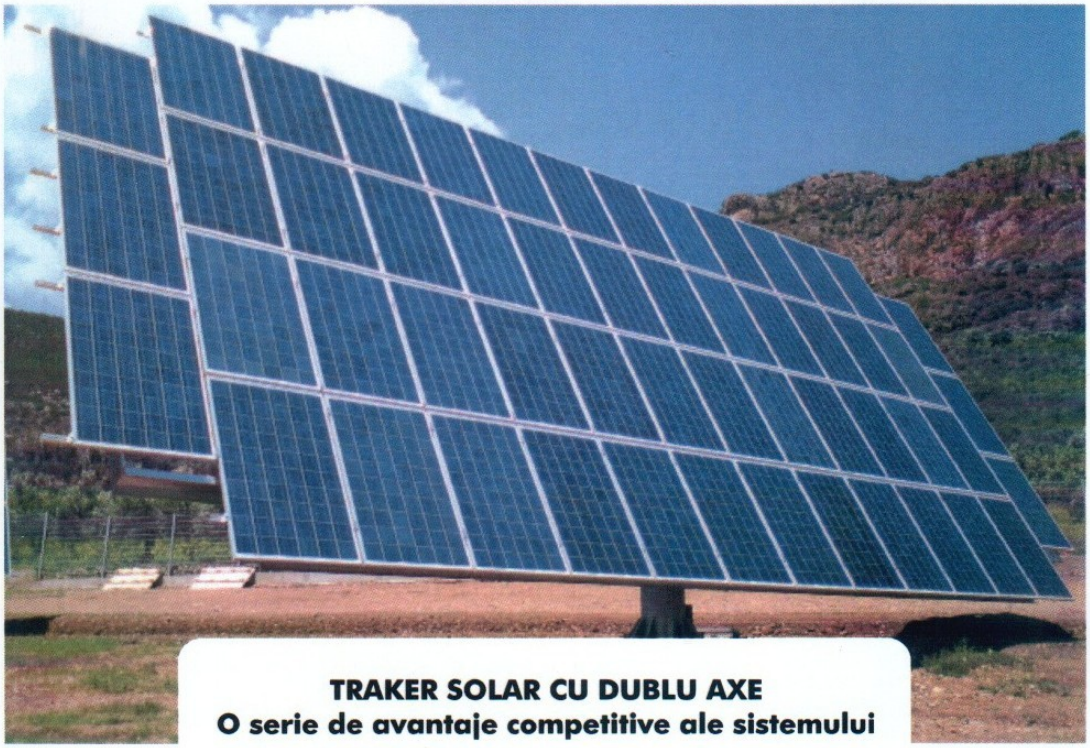
Caracteristici Fizice / *Physical Characteristics*	
Configuratie (linii-lungime) *Configuration (rows-length)*	4 X 12 linii-6.8 X 12.4 m *4 X 12 rows-6.8 X 12.4 m*
Suprafata (variaza in funtie de modul) *Area (varies according to the module)*	Pana la 85 m^2 Up to 85 m^2
Inclinatie reglabila unghi *Adjustable inclination angle*	25^0-90^0
Rotire Azimut *Azimuthally sweep*	300^0
Azimut Automat, Precizie *Azimuthally Automatic, Precision*	$\pm 0.5^0$
Tip monitorizare *Type of tracking*	
Inclinatie doua axe *Inclination second axis*	Automat, Motoreductor controlat de camera de control *Automatic, Gear motor, controlled by control room.*
Consum anual de energie *Annual energy consumption*	In jurul valorii de 60 kwh/an *Around 60 kwh/year*
Caracteristici Mecanice / *Mechanical Characteristics*	
Rezistenta la vant *Resistance to wind.*	Structura proiectata pentru a rezista pana la 140km/h in pozitia de siguranta *Structure designed to resist up to 140km/h in safety position*
Greutatea structurii fara module *Weight of the structure without modules*	4500 kg
Sistem monitorizare soare *Sun tracking system*	Date astronomice *Astronomical data*
Dimensiunea fundatiilor *Size of foundations*	~13 m^3

SR 90 SQM
DOUBLE AXIS SOLAR TRACKER



SR 90 SQM
TRACKER SOLAR CU DUBLU AXE

Caracteristici Fizice / *Physical Characteristics*	
Configuratie (linii-lungime) *Configuration (rows-length)*	54 panou - 6,8 x 14,2 m *54 panel - 6,8 x 14,2 m*
Suprafata (variaza in funtie de modul) *Area (varies according to the module)*	Pana la 95 m^2 Up to 95 m^2
Inclinatie reglabila unghi *Adjustable inclination angle*	25°-90°
Rotire Azimut *Azimuthally sweep*	300°
Azimut Automat, Precizie *Azimuthally Automatic, Precision*	±0.5°
Tip monitorizare *Type of tracking*	
Inclinatie doua axe *Inclination second axis*	Automat, Motoreductor controlat de camera de control *Automatic, Gear motor, controlled by control room.*
Consum anual de energie *Annual energy consumption*	In jurul valorii de 100 kwh/an *Around 100 kwh/year*
Caracteristici Mecanice / *Mechanical Characteristics*	
Rezistenta la vant *Resistance to wind.*	Structura proiectata pentru a rezista pana la 140km/h in pozitia de siguranta *Structure designed to resist up to 140km/h in safety position*
Greutatea structurii fara module *Weight of the structure without modules*	4500 kg
Sistem monitorizare soare *Sun tracking system*	Date astronomice *Astronomical data*
Dimensiunea fundatiilor *Size of foundations*	~13,5 m^3

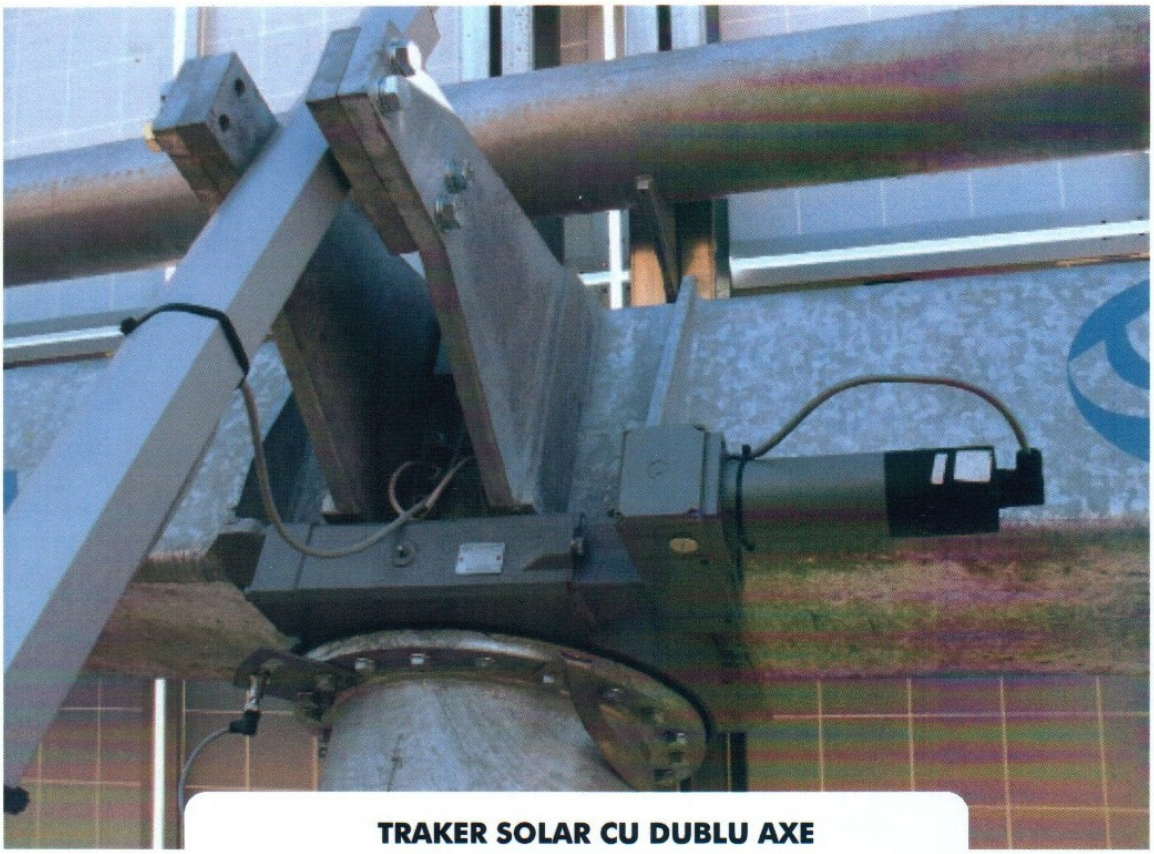


TRAKER SOLAR CU DUBLU AXE
O serie de avantaje competitive ale sistemului

DOUBLE AXIS SOLAR TRACKER
A range of competitive advantages of the system

Obiectivul nostru este acela de a garanta cele mai inalte nivele de libertate si flexibilitate in elaborarea proiectului vostru solar, cresterea productiei cu cele mai ridicate niveluri de viteza tehnologice si simplitate.
Our objective is to guarantee you the highest levels of freedom and flexibility when designing your solar project, increasing its production with the levels of technological speed and simplicity.

Avantaje Structurale / *Structural Advantages*	**Alte Avantaje** / *Other Advantages*
-Inaltimea redusa si impact vizual minim. *-Low height and minimum visual impact.*	**-Sistem astronomic de monitorizare pentru cresterea preciziei de focalizare.** *-Astronomical tracking system for increase focus precision.*
-Reducerea numarului de trackere pentru acelasi nivel de putere. *-Reduction of the number of trackers for the same level of power.*	**-Consum minim pe masina.** *-Minimum consumption per machine.*
-Optimizarea spatiului ocupat de cresterea densitatii puterii parcului. *-Opimization of occupied space by increasing the power density of the park.*	**-Independenta monitorizarii deplasarii, fara variatii de la retea: 2 zile de autonomie prevazute de la baterie in camera de control.** *-Independence of tracking movement, free from grid variations: 2 days autonomy provided from battery in the control room.*
-Infrastructura de economisire: cabluri, console, fundatii. *-Infrastructure savings: brackets cables foundations.*	**-Orientare sistem prin intermediul controalelor electronice, fara echipamente mecanice.** *-Orientation the system through electronic controls without mechanical equipments.*
-Cresterea fiabilitatii si robustetea sistemului de control in comparatie cu alte solutii de dimensiuni mai mici. *-Increased reliability and robustness of the control system compared with other smaller size solutions.*	**-Toate miscarile cu motoare de curent continuu DC.** *-All movements with DC motors.*
-Montaj rapid si start-up prin reducerea numarului de masini instalate. *-Rapid assembly and start-up by reducing the number of machines to install.*	**-Monitorizare disponibila a sistemului de urmarire.** *-Available monitoring of the tracking system.*
-Reducerea importanta a costurilor de intretinere pe viata a parcului solar, privind alte solutii bazate pe trackere mici. *-Important reduction of the whole life maintenance cost of your solar park, regarding the other solutions based on smaller trackers.*	



TRAKER SOLAR CU DUBLU AXE

DOUBLE AXIS SOLAR TRACKER

Avantaje Proiectare / *Design Advantages*

Dispunerea randurilor de module la diferite niveluri si pe doua pante.
Arrangement of module rows at different levels and on two slopes.

-Ventilatie imbunatatita pentru module, care creste eficienta acestora si durata utila de viata.
-Posibilitatea de a se adapta orice modul (proiect standard pentru panouri cu lungimea maxima de pana la 1700 mm). Alte lungimi va rugam sa contactati SABO.
-Improved ventilation for the modules, which increases their efficiency and useful life.
-Possibility of adapting any module (standard design for panels maximum length 1700 mm).
Other lengths please contact SABO.

Stabilitate perfecta a ansamblului si coeficient imbunatatit de rezistenta la vant pentru masina, ca urmare a pasilor proiectului structurii modulelor.
Auto-ventilatie:
-Elemente cu modalitati de aerisire ce permit cailor respiratorii, sa permita caldura generata care urmeaza sa fie disipata peste parti ale masinii.
-Perfect stability of the assembly and improved coefficient of wind resistance for the machine, due to the "steps" design of our modules structure.
Self-ventilated arms.
-Elements with airways that enable the heat generated to be dissipated over the parts of the machine.

EFECTUL TRACKERULUI ASUPRA EFICIENTEI INVERTORULUI / *EFECT OF THE TRACKER ON THE EFFICIENCY OF THE INVERTER*

Trackerul solar are un impact pozitiv asupra castigului total al intregului sistem, facand invertorul sa lucreze de cate ori mai mult posibil, la un nivel mai bun de performanta.
Solar tracker has a positive impact on the total gain of the whole system, making the inverter to work as much time as possible at a better level of performance.

10 ani garantie pentru structura tracker. 2 ani garantie pentru componente si lucrari, cu optiunea de a extinde la 5 sau 10 ani (intretinere preventiva si corectiva efectuate de catre tehnicieni SABO)
De asemenea, oferim un serviciu de training pentru personalul dumneavoastra cu privire la intretinerea utilajelor. Contactati-ne pentru mai multe informatii.
10 years. guarantee for tracker structure. 2 year guarantee in components and works, with the option to extend to 5 or 10 years (preventative and corrective maintenance performed by SABO technicians).
We also offer a traning service for your staff regarding maintenance of the machines. Contact with us for more information.

TRAKER SOLAR CU DUBLU AXE

DOUBLE AXIS SOLAR TRACKER

Dispozitive Sistem de Siguranta: principala noastra obligatie

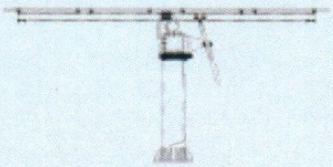
System Safety Devices: our primary obligation

Deplasari glisante garantate fara daune structurale in temeiul vantului puternic.
Reducerea de forte pe masina in circumstante de vant.
Proiectul solar include anemometre, in cadrul livrarilor.

Guaranteed sliding movement without structural damage under strong winds.

Reduction of strengths on the machine under windy circumstances.

Solar project includes anemometers, as part of supplies.



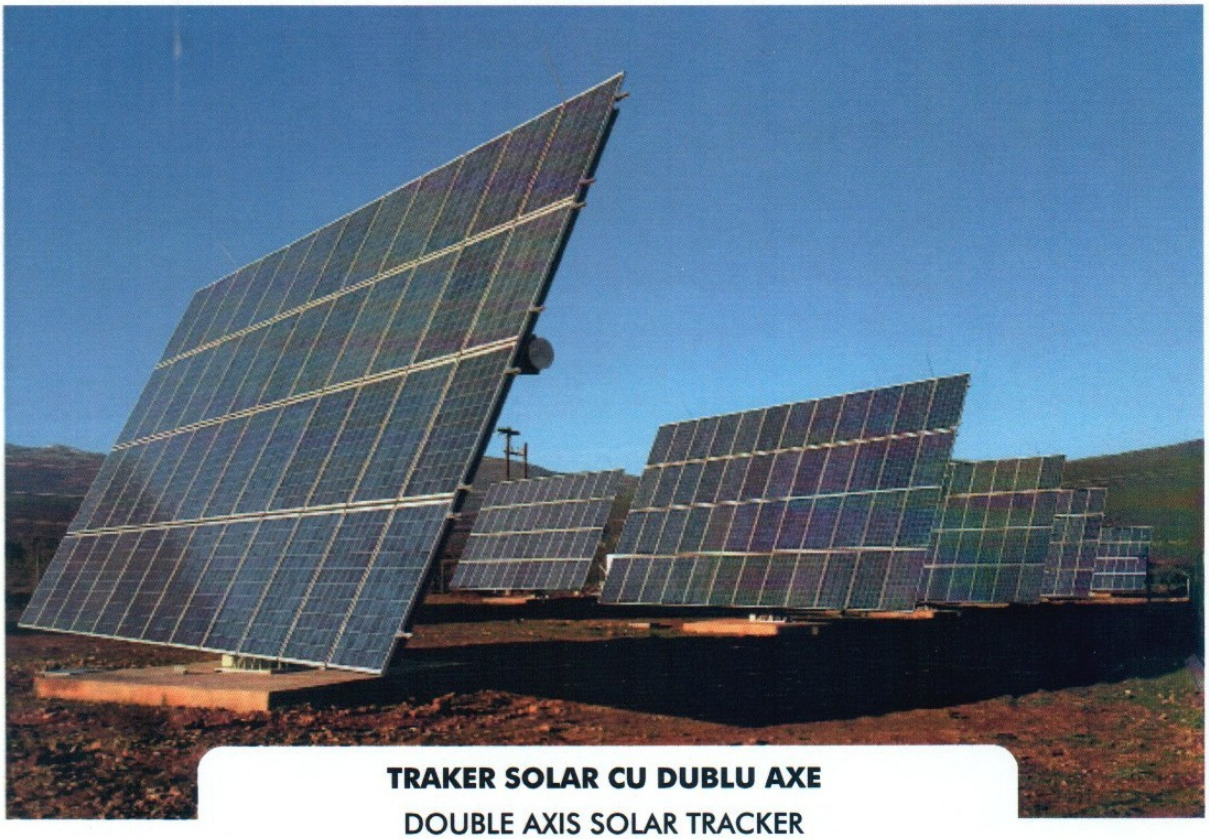
-Pozitionarea automata in pozitia de siguranta sub influenta vantului de peste 60 km/h.
-Trakerele iau pozitia orizontala in timpul noptii ceea ce le protejeaza deasemenea impotriva furtului.

-Automatic positioning in safety position under winds over 60km/h.

-Trackers take the horizontal position during the night wich also protects them from theft.

In conditii de vreme rea (vant din spatele masinii) si defectarea sistemului de siguranta al parcului, structura rezista pana la 140km/h..

Under worst weather conditions (wind from back of machine) and failure of park security systems, the structure supports up to 140km/h.



TRAKER SOLAR CU DUBLU AXE
DOUBLE AXIS SOLAR TRACKER

Proiect instalatie solara: maxima consultanta la dispozitia dvs.
Solar Plant Design: maximum consultancy at your disposal

Atunci cand proioectam instalatia, nu numai ca veti beneficia de planificare logistica SABO pentru livrarea de trakere, veti avea de asemenea acces la servicii de consultanta de la biroul nostru tehnic.

Mai jos sunt distantele pentru a evita pierderi semnificative in productie cauzate de umbre sau utilizarea necorespunzatoare a terenurilor.

Aceste cifre sunt aproximate iar proiectul trebuie sa fie adaptat la terenul si instalarea dvs.

Nu ezitati sa ne aratati hartile terenurilor, astfel incat sa va putem consilia cu privire la pregatirea instalatiei dvs. solare.

When designing your facility, not only will you benefit from the logistics planning of SABO for the delivery of your trackers but you will also have access to the consultancy services of our technical office.

Below are the distances for avoiding significant losses in production caused by shadows or the unsuitable use of land.

These figures are appeoximate as the design must be adapted to your land and your installation.

Feel free to show us your land maps so that we can advise you on the preparation of your solar plant.

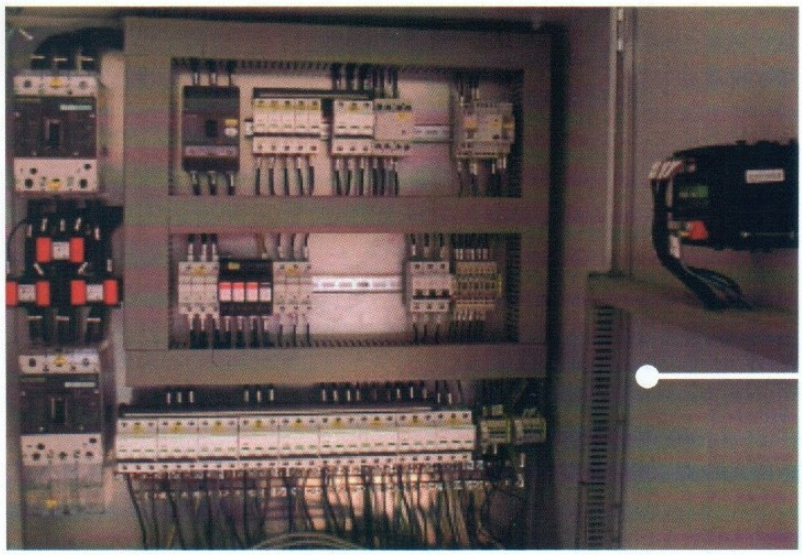
SR 90	SR 80
Recomandam o instalatie dreptunghiulara: Nord-Sud=18-21 m Est-Vest=23-26 m Pentru un teren plat si latitudine 40°, vom calcula, fara umbre pentru o inaltime de solar >20°	Recomandam o instalatie dreptunghiulara: Nord-Sud=16-18 m Est-Vest=21-25 m Pentru un teren plat si latitudine 40°, vom calcula, fara umbre pentru o inaltime de solar >20°
We recommend a rectangular installation: *North-South=18-21 m* *East-West=23-26 m* *For a flat terrain and latitude 40°, we calculate no shadows for a solar height >20°*	*We recommend a rectangular installation:* *North-South=16-18 m* *East-West=21-25 m* *For a flat terrain and latitude 40°, we calculate no shadows for a solar height >20°*

CAMERA ISOBOX PENTRU INVERTOARE SI ECHIPAMENT AC

ISOBOX ROOM FOR INVERTERS AND AC EQUIPMENT

SISTEM ALIMENTARE DEPLASAREA MONITOARELOR

POWER BACK UP SYSTEM FOR THE MOVEMENT OF TRACKERS

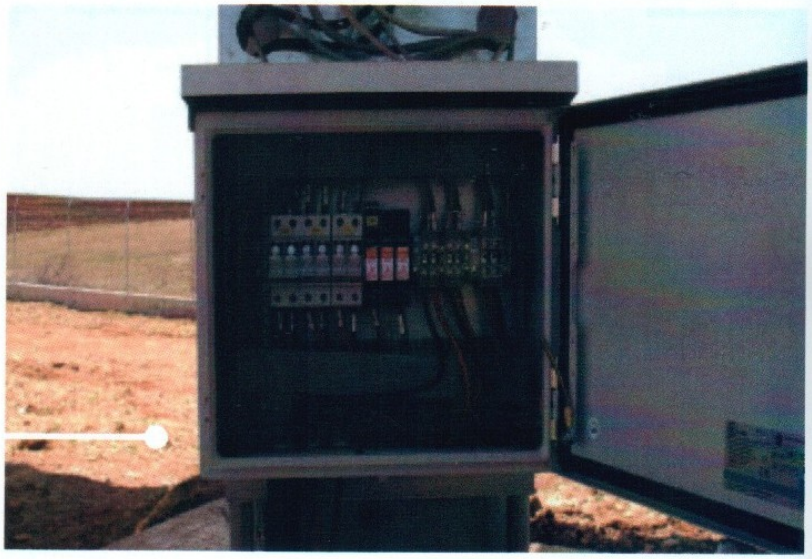


AC TABLOU CONTROL

AC SWITCH BOARD

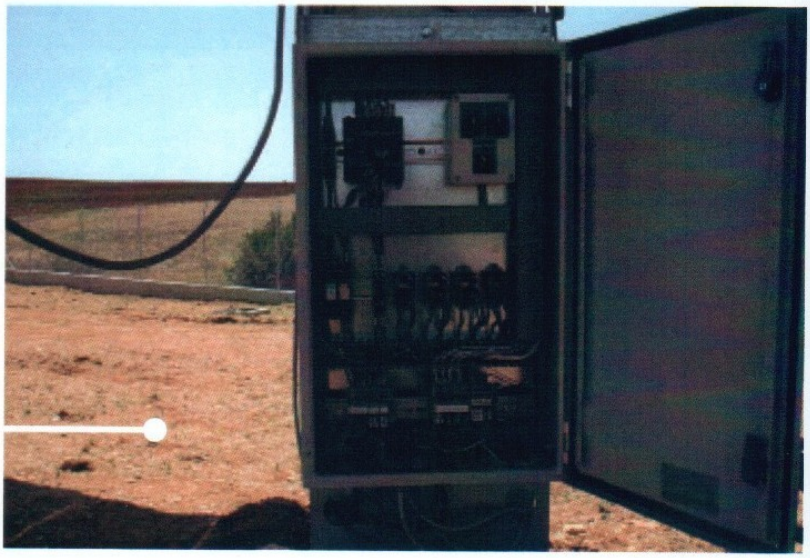
DC
TABLOU CONTROL

DC SWITCH BOARD



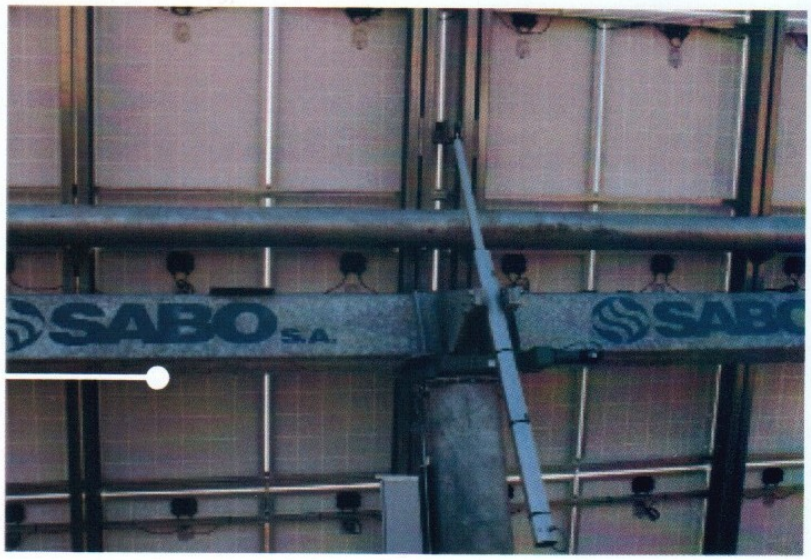
SISTEM DE CONTROL
AL MONITOARELOR

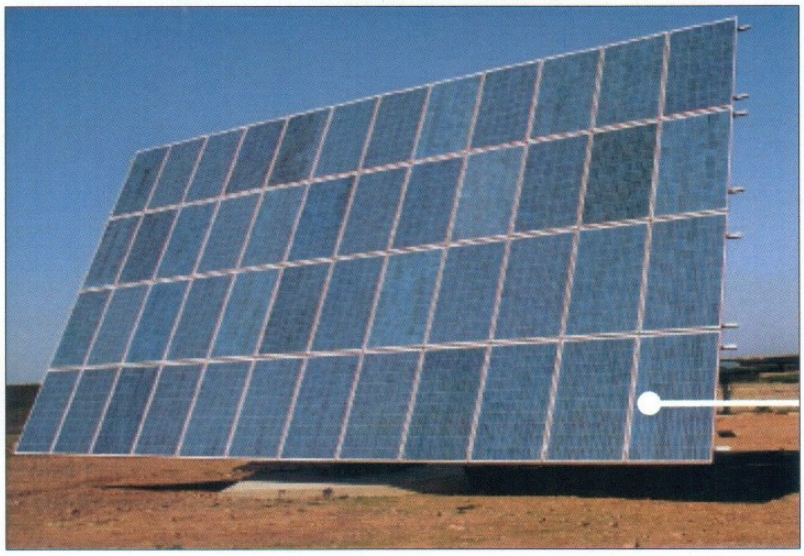
CONTROL SYSTEM
OF TRACKERS



SISTEM MONITORIZARE
FUNCTIONARE

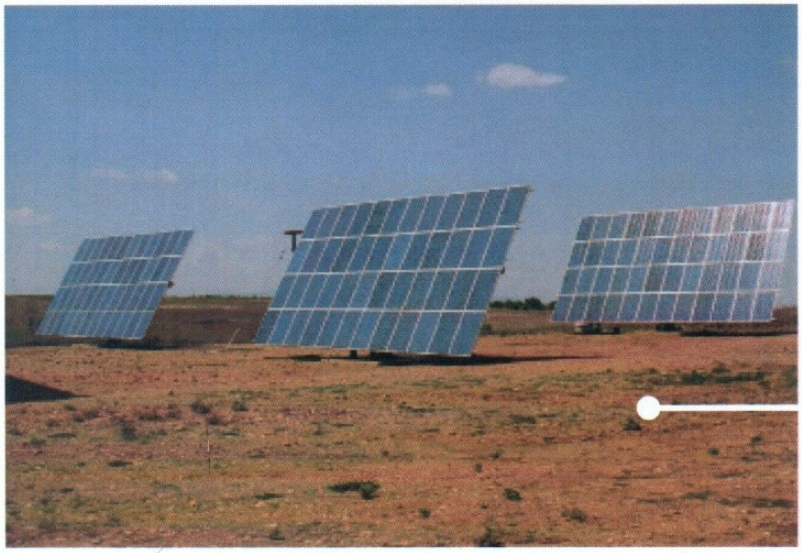
TRACKING
MOVEMENT SYSTEM





TRACKER-MONITOR SABO SR 80

TRACKER SABO SR 80



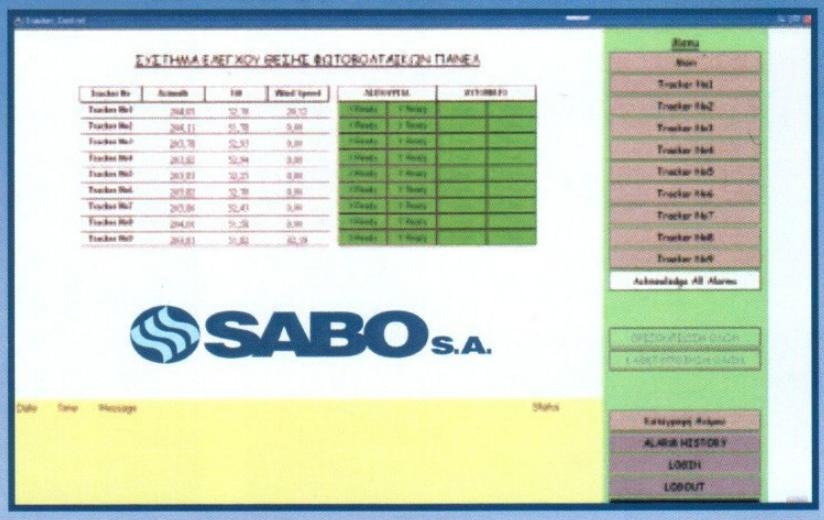
PARC PV IN FUNCTIUNE

PV PARK IN OPERATION

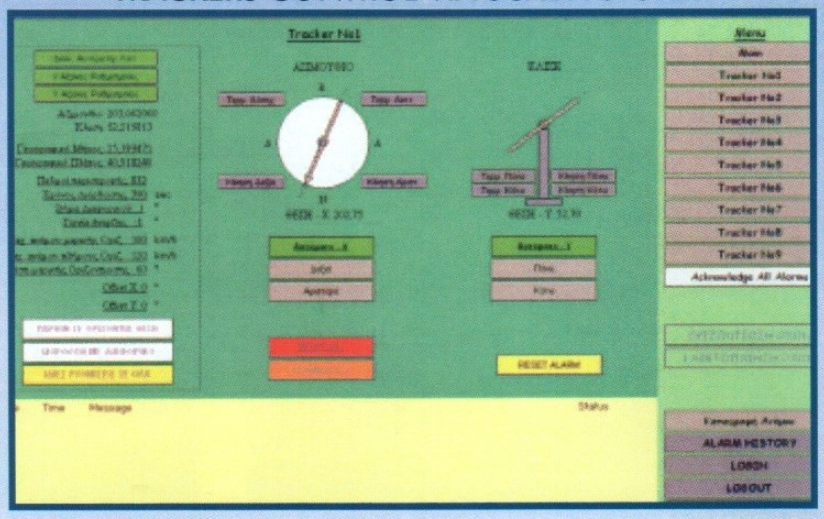
TRACKERS-MONITOARE IN POZITIA DE SIGURANTA

TRACKERS IN SAFETY POSITION

CONTROL CENTRAL AL SISTEMULUI
CENTRAL CONTROL OF THE SYSTEM

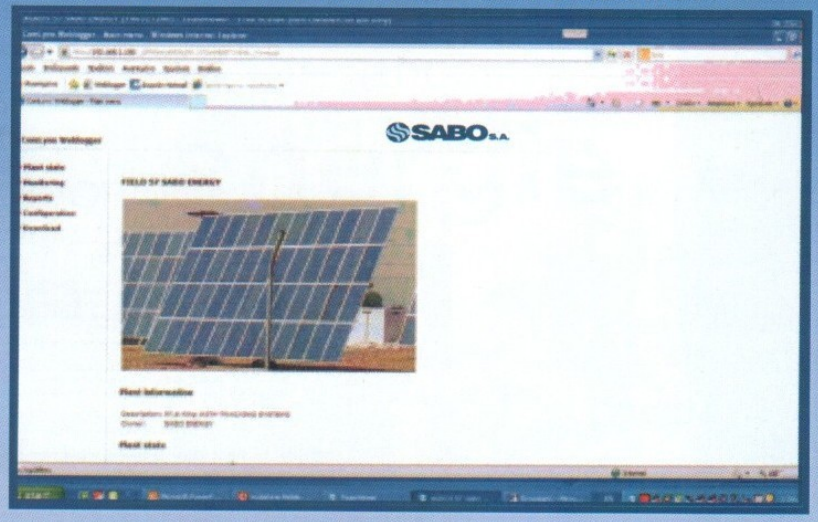


MONITOR DE CONTROL PRIN INTERMEDIUL SISTEMULUI SCADA
TRACKERS CONTROL VIA SCADA SYSTEM

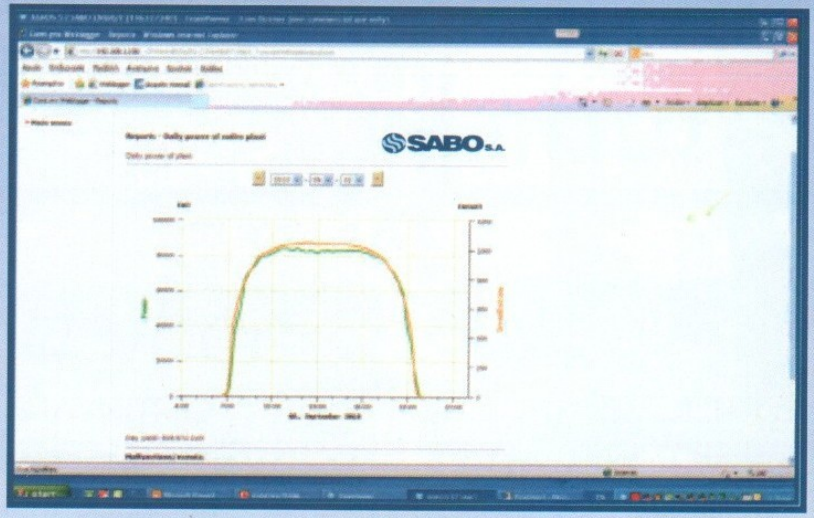


DATE CONDITII CLIMATICE - VIZUALIZATE IN JURNAL
CLIMATIC CONDITIONS DATA LOG VIEWER

MONITORIZAREA PRODUCTIEI INSTALATIEI
MONITORING OF PLANT'S PRODUCTION



GRAFICUL ZILNIC DE PUTERE
DAILY POWER GRAPH



RANDAMENTUL ZILNIC AL INSTALATIEI
DAILY YIELD OF THE PLANT

TÜV NORD

CERTIFICATE

Management system as per
EN ISO 9001: 2008
in accordance with **TÜV NORD CERT procedures, it is hereby certified that**

SABO HELLAS S.A.
Vasiliko Halkidos
34002 Evia
Greece

applies a management System in line with the above standard for the following scope

Design & manufacturing of bricks & tiles machinery, handling & packaging machinery - Manufacturing of solar trackers - Installation of P/V parks

Certificate Registration No 04 100 064525
Audit Report No.GR - 1808/2010

Valid until 2012-03-06
Initial certification 2006

Certification Body
at TÜV NORD CERT GmbH

Athens 2010-11-16

This certification was conducted in accordance with the TÜV NORD CERT auditing and certification procedures and is subject to regular surveillance audits.

TÜV NORD CERT GmbH Langemarckstrasse 20 45141 Essen www.tuev-nord-cert.com

---

TÜV HELLAS
Member of TÜV NORD Group

CERTIFICATE

This is to certify that the static design of the metallic structure
"Monoassial Tracker18 m2"
of the company:

SABO S.A.
ELECTROMECHANICAL CONSTRUCTIONS
INSTALLATIONS,PLC AUTOMATIONS
VASILIKO CHALKIS, EVIA
34002 GREECE
complies with the requirements of the codes:

Eurocode 1, 3, 7, 9 and
EAK 2000 (as it was amended in 2003)
which define the requirements for the design of the constructions in Greece.

Certificate No: TUV H-1180/11
TUV HELLAS order No : 02.07.438

The range of validity and details of the inspection can be seen in our

Report no: 1180/11
(This certificate is valid in conjunction with the Reports mentioned)

Place, Date

Athens, 03/06/2011

Responsible for Certification

I. Konstantaropoulos

Headquarters
TÜV HELLAS (TÜV NORD) S.A.
24, El. Venizelou Str, 153 41, Ag. Paraskevi - Greece
Phone : +30-210-6540195, Fax : +30-210-6528025
info@tuvhellas.gr - www.tuvhellas.gr

TÜV HELLAS
Member of TÜV NORD Group

CERTIFICATE

This is to certify that the static design Fix System Report V01-03.06.2011 of the Photovoltaic Frame Supports 16 m2
of the company:

SABO S.A.
ELECTROMECHANICAL CONSTRUCTIONS
INSTALLATIONS,PLC AUTOMATIONS
VASILIKO CHALKIS, EVIA
34002 GREECE
complies with the requirements of the codes:

Eurocode 1, 3, 7, 9 and
EAK 2000 (as it was amended in 2003)
which define the requirements for the constructions design in Greece.

Certificate No : TUV H-1196/11
TUV HELLAS order No : 02.07.438

The range of validity and details of the inspection can be seen in our

Report no:1196/11
(This certificate is valid in conjunction with the Reports mentioned)

Place, Date

Athens, 07/06/2011

Responsible for Certification

I. Konstantaropoulos

Headquarters
TÜV HELLAS (TÜV NORD) S.A.
24, El. Venizelou Str, 153 41, Ag. Paraskevi - Greece
Phone : +30-210-6540195, Fax : +30-210-6528025
info@tuvhellas.gr - www.tuvhellas.gr

TÜV HELLAS
Member of TÜV NORD Group

CERTIFICATE

This is to certify that the static design of the metallic structure
"Solar Tracker 80QM-Drawing T-29444-0001.00"
of the company:

SABO S.A.
34002 Vassiliko
Chalkida Greece
complies with the requirements of the codes:

Eurocode 1, 2, 7, 9 and
EAK 2000 (as it was amended in 2003)
which define the requirements for the design of the constructions in Greece.

Certificate No : TUV H-**1807/10**
TUV HELLAS order No : 02.07.438

The range of validity and details of the inspection can be seen in our

Report no: 1807/10
(This certificate is valid in conjunction with the Reports mentioned)

Place, Date

Athens, 10/09/2010

Responsible for Certification

I. Konstantaropoulos

Headquarters
TÜV HELLAS (TÜV NORD) S.A.
24, El. Venizelou Str, 153 41, Ag. Paraskevi - Greece
Phone : +30-210-6540195, Fax : +30-210-6528025
info@tuvhellas.gr - www.tuvhellas.gr

Împreună

putem

economisi

energie

putem reduce

emisiile poluante

putem asigura

un **viitor**

mai **bun**

All together

we can

save

energy

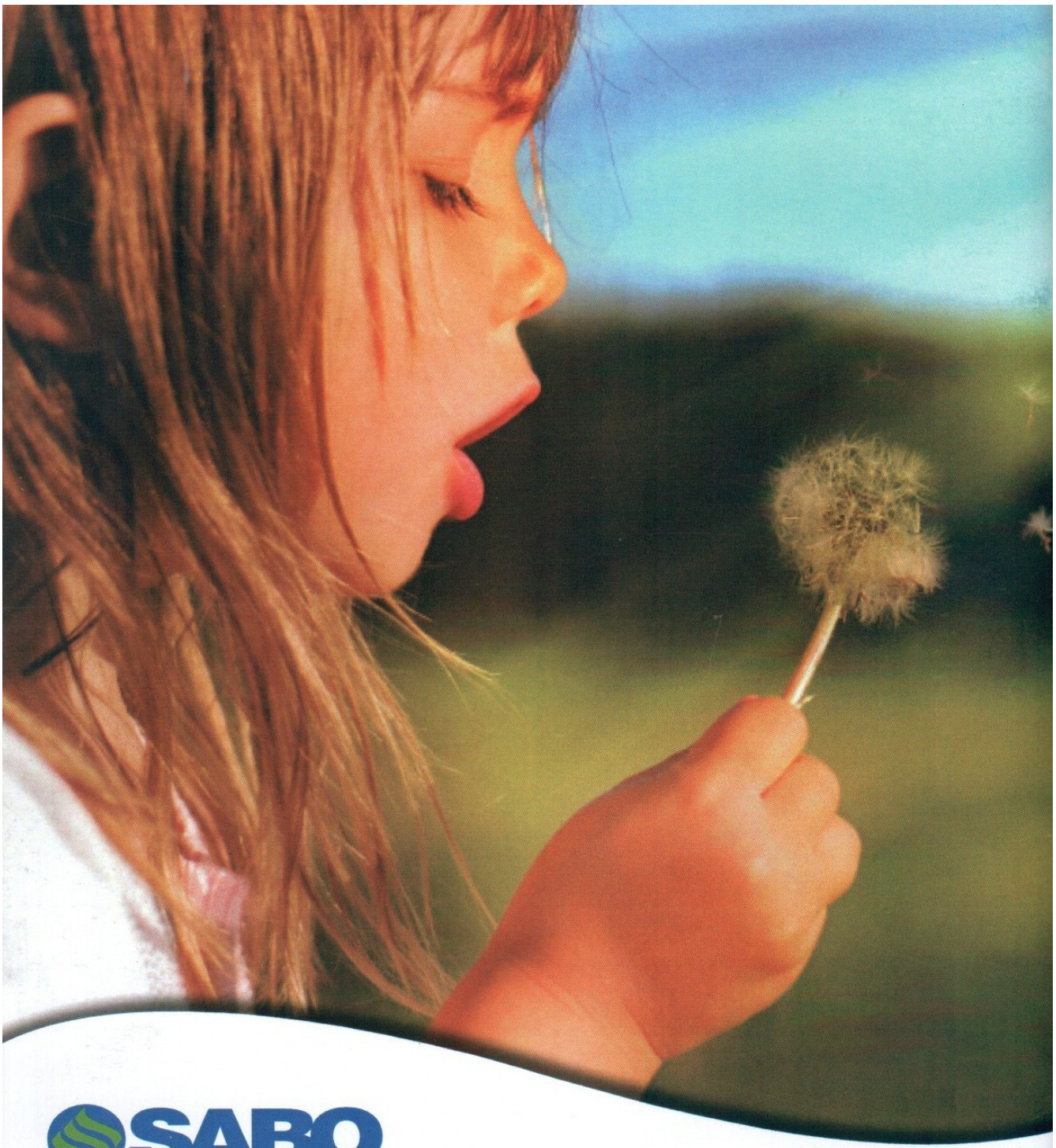
reduce

pollutant emissions

ensure

a better

future



SABO energy

Șos. București-Urziceni nr.291
Afumați - ILFOV
Tel./Fax:+4 031 438 70 46
Mobil:+4 0723 984 321
e-mail: sabodallarivasrl@gmail.com
www.sabodallariva.ro

SABO GROUP