Transfer of experience for the development of solar thermal products

Specific Information Package

Romania

Project TRANS SOLAR
Transferul de Experienta pentru Dezvoltarea Sistemelor Termice Solare

Intelligent Energy Europe

Proiect TRANS SOLAR – IEE Agency

Transferul de Experienta pentru Dezvoltarea Sistemelor Termice Solare

Autori:
Catalin Flueraru, Valentina Barbu, Ciprian Chisega
Elisabeta Pasculete, Tatiana Toma

Seminar National

Energia Solara si Metode de Integrare in Cladiri

Bucuresti, Romania, 29 - 30 Octombrie 2009

OVM-ICCPET SA
Institut OVM ICCPET Oskar von Miller - Institut de Conceptie Cercetare Proiectare Echipamente Termoenergetice

Telefon: +4021 405.77.65 Fax: +4021 405.77.77
E-mail: flueraru@ovm-iccpet.ro
Web: www.ovm-iccpet.ro

TRANSFER DE EXPERIENTA

CRES in coperare cu ARSENAL, ESTIF si centrele energetice:

- ***SEC in Bulgaria,***
- ***OVM-ICCPET in Romania,***
- ***KAPE in Polonia,***
- ***UNI-LJ in Slovenia,***
- ***EIHP in Croatia,***
- ***CITYPLAN in Republica Ceha si***
- ***Innoterm in Ungaria,***

implementeaza Energia Inteligenta pentru proiectul european TRANSOLAR "Transferul de experienta pentru dezvoltarea sistemelor termice solare".

TRANSFER DE EXPERIENTA

Partenerii cu experienta deosebita in domeniul instalatiilor solare din Europa au asigurat informarea partenerilor cu nivel incipient al pietelor de sisteme solare, asigurand transferul de cunostinte in domeniul tehnic si al marketingului cu privire la tehnologia si fabricarea produselor termice solare, aspecte cu o importanta semnificativa pentru dezvoltarea diferitelor piete Europene ale sistemelor solare, in contextul noii Directive Europene pentru utilizarea energiilor regenerabile, in special a energiei solare.

TRANSFER DE EXPERIENTA

Principalele obiective ale acestei actiuni, sunt de a transfera experienta de la cele mai dezvoltate tari Europene in domeniul termic solar, catre tarile mai putin dezvoltate, precum si de a disemina informatiile cele mai recente cu privire la standardele europene, schema certificarii solare Keymark si politicile de promovare aferente.

Project TRANS SOLAR
Transferul de Experienta pentru Dezvoltarea Sistemelor Termice Solare

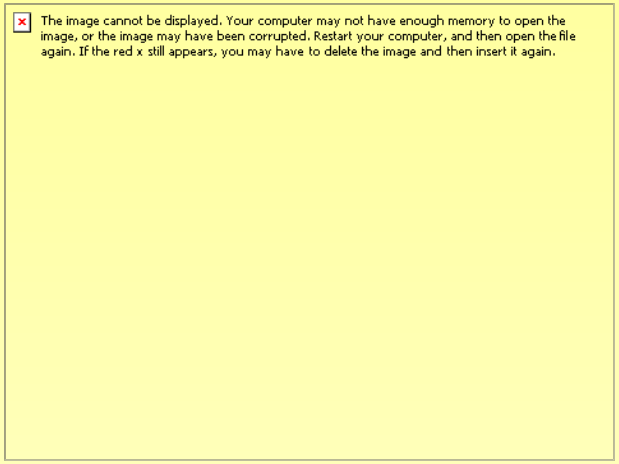
Intelligent Energy Europe

EVENIMENTE DE INFORMARE

Fiecare partener a organizat cate un Seminar International tematic, de cate doua zile, in tarile partenere: Romania (29-30 Octombrie 2009), in care se prezinta utilizarea pe scara larga a energiei solare in contextul European si necesitatea de extindere a instalatiilor solare pe plan national in conformitate cu Directiva Europeana 2009/28/EC si strategia nationala pentru utilizarea energiei regenerabile, in special a energiei solare.

Bulgaria, Polonia, Slovenia, Ungaria, Republica Ceha si Croatia au organizat seminarii internationale in contextul acestor obiective.

Prima zi a fiecarui eveniment a fost dedicata unui workshop a inclus prezentari privind fabricarea, tehnologia, dezvoltarea produsului, politici de promovare si vanzare pe piata – probleme de stimulente precum si Standarde Europene si proceduri solare de certificare Keymark.



Acesta a vizat in principal, instalatorii inclusiv dezvoltatorii de proiect, producatorii locali (de sisteme sau parti ale acestora), experti in sisteme termice solare, autorii selectati ai politicii, din guvern sau institutii publice care se ocupa cu standardele nationale.

Project TRANS SOLAR
Transferul de Experienta pentru Dezvoltarea Sistemelor Termice Solare

Intelligent Energy Europe

Ziua a II-a a fost organizata sub forma unei misiuni de afaceri cu sprijinul ESTIF si al membrilor sai, cu scopul de a examina posibilele colaborari la nivel european. Aceasta a prezentat interes pentru dezvoltatorii de afaceri si producatorii care doresc sa-si extinda afacerile in tarile partenere ale proiectului TRANS SOLAR.

Seminarul este dedicat informarii grupurilor de decizie ai administratiilor publice nationale si locale, organizatiilor neguvernamentale, asociatiilor profesionale, proprietarilor si administratorilor de cladiri publice si sociale, hoteluri, blocuri locuinte, scoli, spitale, arhitecti, specialisti, proiectanti, cercetatori, experti instalatii solare si publicului larg.

VA MULTUMIM FOARTE MULT

PENTRU ATENTIE

TRANS SOLAR

www.cres.gr/trans-solar

Partener no. 5: OVM-ICCPET SA

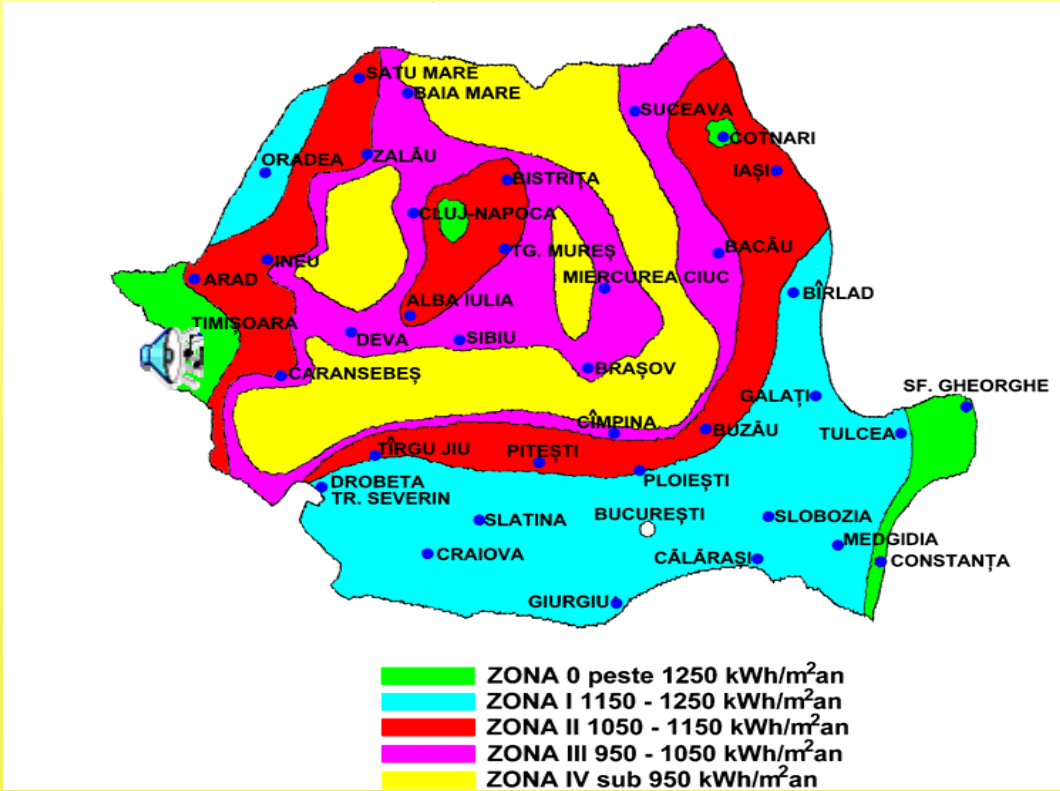
Address: 266-268 Rahovei Street,
Bucharest 5, ROMANIA
Tel: + 40 21 405 77 67
Fax: + 40 21 405 77 77
E-mail: *flueraru@ovm-iccpet.ro*

Potentialul National si Rezultatele unui Sistem de Incalzire Solara Aferent unei Cladiri din Romania

Autori:
Catalin Flueraru
Valentina Barbu, Ciprian Chisega
Elisabeta Pasculete
Tatiana Toma

OVM-ICCPET S.A. - BUCHAREST

266-268 Rahovei Street, Sector 5
BUCHAREST, ROMANIA
Office: +4021 405 77 65
Fax: +4021 405 77 77
e-mail: flueraru@ovm-iccpet.ro
Web: www.ovm-iccpet.ro

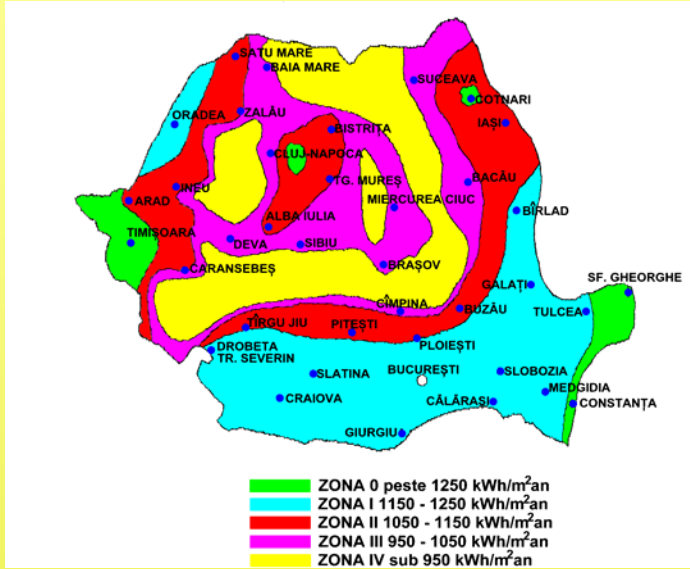


Radiația solară medie anuală în România

Radiația solară medie anuală în România variază între 1,100 şi 1,300 kWh/m2 pentru mai mult de jumătate din suprafața țării. Potențialul termic al energiei solare este estimat la 60 PJ/an (1400 ktoe/an). De aceea radiația solară pe suprafață orizontală pentru România este de aproximativ 200 milioane de GWh pe an (potențialul teoretic solar).

O hartă a radiației solare a fost întocmită de Institutul Național de Meteorologie şi Hidrologie. Există bune posibilități pentru dezvoltarea utilizării energiei solare, iar experiența anterioară poate fi exploatată.

In evaluarea Energiilor Regenerabile, se estimează că sistemele bazate pe utilizarea energiei solare pentru încălzirea apei calde menajere pentru clădiri, sistemele pe bază de energie solarăşi sistemele individuale pentru locațiile izolate sunt promițătoare aplicații



Source: National Agency of Meteorology and Hydrology

Radiatia medie totala globala

Regiunea	Radiatia medie totala globala [MJ/m2/an]/ [kWh/m2/an]	Potentialul solar real disponibil
Campia de Vest	4815 / 1338 *1 MJ = 0,278 kWh*	Medie-Mare (MH)
Transilvania	4.666 / 1297	Medie (M)
Subcarpati	4.982 / 1385	Medie-Mare (MH)
Campia de Sud	5.147 / 1431	Medie-Mare (MH)
Moldova	4.773 / 1327	Medie (M)
Dobrogea	5.384 / 1497	Mare (H)
Delta Dunarii	5.046 / 1403	Medie-Mare (MH)
Carpati	4.687 / 1303	Medie (M)

Romania: regiuni istorice

Estimarea Potentialului Solar

In conditiile din România, pe o suprafata de 1m2, se poate receptiona energie termica solara de la:
900 kWh (0,072 toe) la 1450 kWh (0,117 toe) pe an,

sau pe 1km2 energie solara cu valori pe an intre:
900000 MWh (0,072 Mtoe) -1450000 MWh (0,117 Mtoe) in functie de anotimp, altitudine, localizare geografica.
Potentialul energiei solare pe an la scara de 1% (2375 km2) din intreaga suprafeta a tarii (237,500 km2) intre:
2137,5 TWh (171 Mtoe) - 3443,75 TWh (277 Mtoe)
Radiatia solara medie zilnica poate sa fie de pâna la 5 ori mai intensa vara decât iarna, desi, pe timp de iarna, în conditii favorabile (cer senin, altitudine joasa etc.), se pot atinge valori de aproximativ 4-5 kWh/m2/zi, radiatia solara fiind practic independenta de temperatura aerului din mediului înconjurator (principiul transferului de caldura prin radiatie).
Comparand potentialul energiei solare cu:
- Gross Inland Consumption (Consumul energetic anual) de: 40,90 Mtoe (mil.tep - tone echivalent petrol), 2006
- Final Energy Consumption (Consumul final de energie) de: 24,71 Mtoe (mil.tep - tone echivalent petrol), 2006
obtinem o cantitate de energie solara care ar acoperi de cca. 4,2 la 6,8 ori Gross Inland Consumption sau de cca 6,9 la 11,2 ori Final Energy Consumption

Contextul Legislativ

Hotararea de Guvern 1535/2004 privind Strategia de utilizare a resurselor regenerabile
Strategia este mai mult un document de intentie, nu foarte convingator.
Cateva informatii in legatura cu productia din resurse regenerabile :

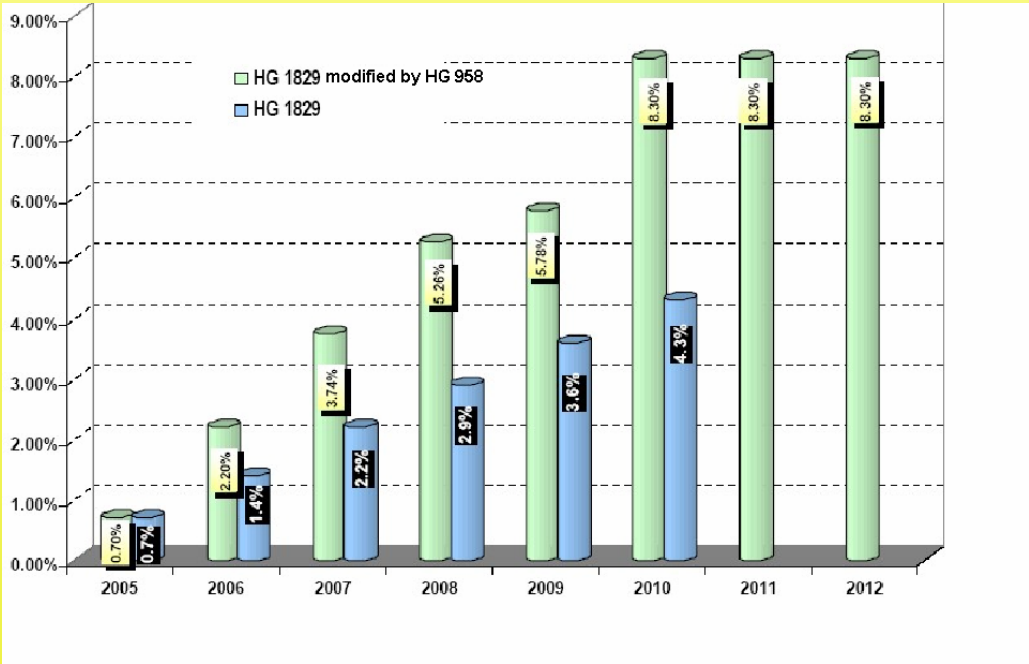
	Capacitati prevazute 2003 - 2010
Solar - termal	7.34 ktep
Biomasa-termal	3 249.8 ktep
geotermal	17.50 ktep

Legea 220/2008 stabileste sistemul de promovare a producerii energiei din surse regenerabile de energie si stipuleaza ca mecanismele de promovare a energiei din RES trebuie sa fie pe de o parte sustinere pe baza de procente si pe de alta parte piata Certificatelor Verzi (CV).
Cota de electricitate produsa din RES, din productia nationala bruta de energie reprezinta procentul de energie din RES pentru care producatorii de energie termo achizitioneaza CV.

Anul	**Procentul, %**
2008	5,26
2009	6,78
2010-2012	8,30
2018 (an final conf. legii 220/2009)	14,40

Contextul Legislativ

Legea 220/2008 pentru stabilirea sistemului de promovare a producerii energiei din surse regenerabile de energie este un efort in plus de a promova resursele regenerabile, asa cum a fost cerut de politica europeana a energiei.
Cota de RES a crescut cu 33%, iar penalitatile pentru neindeplinirea acestor cote au fost ridicate la valorea de 70€/CV.
Pentru a acoperi aceste cote, fiecare producator trebuie sa produca sau sa cumpere energie din RES. In prezent, singurele forme de producere a energiei verzi sunt centralele hidro mici.



Contextul Legislativ

Cu aceeasi Lege 220/2008 au fost fixate pentru perioada 2008 – 2014:

Valoarea minima pentru Certificatul Verde	**27 Euro/MWh** (de la 25 anterior)
Valoarea maxima pentru Certificatul Verde	**55 Euro/MWh** (de la 48 anterior)

Pretul minim al Certificatelor Verzi este reglementat de lege sa actioneze ca un pret garantat de “tarif feed in”.
Astfel, in 2007/2008, pretul obtinut pe 1 MWh produs din regenerabile este compus din:
pretul energiei pe piata conventionala de energie.....cca 38 Euro/MWh
pretul certificatului verde pe piata certificatelor verzi……...cca 40-48 Euro/MWh
Aceasta estimare duce la un pret in 2007/2008 de aproape 80 Euro pentru 1 MWh produs din energie regenerabila, depinzand atat de piata energiei electrice cat si de cea a certificatelor verzi.
Art. 21 din lege, prevade ca Persoanele fizice care utilizeaza surse regenerabile pentru producerea a minimum 20% din consumul propriu de energie electrica au dreptul la deducerea din venitul anual global a unei sume de pana la 50% din valoarea echipamentelor si instalatiilor achizitionate in scopul producerii de energie electrica din surse regenerabile, in functie de venitul lunar

Contextul Legislativ

Legea 220/2008 prevede urmatoarele Certificate verzi pentru sursele regenerabile:

Art. 5 (2) Producatorii de energie electrica din surse regenerabile primesc:

a) 1 (un) certificat verde pentru fiecare 1 MWh produs si livrat in reteaua de energie electrica din centrale/grupuri hidroelectrice noi sau centrale/grupuri hidroelectrice de maximum 10 MW, retehnologizate;

b) 1 (un) certificat verde pentru fiecare 2 MWh livrati in reteaua de energie electrica din centrale hidroelectrice cu o putere instalata cuprinsa intre 1 si 10 MW, care nu se incadreaza in conditiile prevazute la lit. a);

c) 2 (doua) certificate verzi pentru fiecare 1 MWh livrat in reteaua de energie electrica din centralele hidroelectrice cu o putere instalata de pana la 1 MW/unitate;

d) 2 (doua) certificate verzi, pana in anul 2015, si un certificat verde, incepand cu anul 2016, pentru fiecare 1 MWh livrat in reteaua de energie electrica de producatorii de energie electrica din energie eoliana;

e) 3 (trei) certificate verzi pentru fiecare 1 MWh livrat in reteaua de energie electrica de producatorii de energie electrica din biomasa, biogaz, biolichid, gaz de fermentare a deseurilor, energie geotermala si gazele combustibile asociate;

f) 4 (patru) certificate verzi pentru fiecare 1 MWh livrat in reteaua de energie electrica de producatorii de energie electrica din energie solara.

Abordarea sectoriala - Sectorul hotelier

Utilizarea energiei solare nu este necunoscuta pe litoralul romanesc, aici a fost instalata intre anii 1986-1989 un sistem care insuma o suprafata de 180.000 m2 Sistemul individual a fost mai mare de 9.000 m2 (exemplu 9126 m2 in Venus si 9800 m2 la hotelul Delta-Mangalia). Asa cum a fost mentionat inainte, calitatea slaba a instalatiei si mentenanta slaba a condus in acele momente la performante care au dezamagit.
In ultimii ani au fost semnalate cateva aparitii ale sistemelor de incalzire solara cu aplicatii la hoteluri dar de data aceasta folosindu-se tehnologie europeana.
In ultima decada, masiva privatizare a hotelurilor si noile constructii, de dupa 1990 a facut ca proprietarii hotelurilor sa fie atrasi de tehnologiile noi, ca de exemplu energia solara.

O privire sugestiva a litoralului romanesc poate fi obtinuta din figura alaturata, unde hotelurile sunt concentrate in statiunile prezentate. Tintele sunt statiunile (de la Nord la Sud): Costinesti, Olimp, Neptun, Jupiter, Aurora, Venus, Saturn, Mangalia. Aceste statiuni sunt presarate de-a lungul a 25 Km de litoral romanesc. Mangalia este orasul cu o populatie locala, pe cand celelalte statiuni sunt populate numai in sezonul estival.

Abordarea sectoriala - Sectorul hotelier

Statiunile Litorale la Marea Neagra - Hoteluri

Arhitectura hoteliera este extrem de variata. Marea majoritate a hotelurilor este construita in anii ’80, dupa un sistem centralizat, drep urmare a rezultat o panorama “liniara” Aceasta aranjare este putin benefica pentru obtinerea energiei solare si transformarea in apa calda menajera. Dupa privatizarea hotelurilor, au fost efectuate multe modernizari. Dar din pacate pentru incalzirea solara s-a facut foarte putin, cele mai multe hoteluri folosind petrol la incalzire. Hotelurile mari au cate 350 de camere, unele avand si 11 etaje.

Un hotel tipic de dimensiuni medii are 3-4 etaje si in jur de 80 de camere

Pe cand hotelurile mari au si cate 11 etaje.

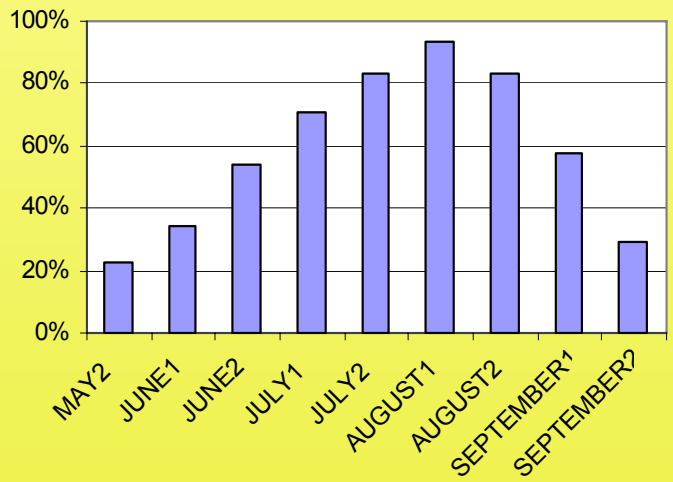
Abordarea sectoriala - Sectorul hotelier

Statiunile Litorale la Marea Neagra - Hoteluri

O lista completa a statiunilor si hotelurilor analizate, cu datele cele mai importante este prezentata in continuare.
Date sintetice sunt prezentate mai jos :

Numarul statiunilor	8
Numarul hotelurilor	125
Capacitatea totala (persoane)	40 700
Suprafete de acoperis disponibile	69 500 m2

Figure 11. HOTELS RATE OF OCCUPANCY



Aproape toate hotelurile pe Litoral sunt deschise numai in timpul estival. Perioada incepe de la 15 Mai si se sfarseste pe 1 Octombrie.
Nevoia de apa calda menajera urmareste acest sezon, deci este foarte important sa se stie raportul dintre numarul de paturi si numarul de paturi ocupate.

Programul National Casa Verde – Ministerul Mediului

Dupa 1990 in Romania precum in toate tarile membre EU preturile surselor de energie au crescut considerabil in timpul ultimului an si tendinta este ca aceasta crestere va continua, de la 70 USD/barrel in 2007 la 137 USD/barrel in iunie 2008.

Pentru a sprijini investitiile pentru sisteme de incalzire cu utilizarea surselor de energie regenerabile Ministerul Mediului a dezvoltat Program national Casa Verde, inceput in anul 2009 care asigura subventii administratiilor locale orasenesti pentru pentru modernizarea cladirilor publice, scoli, spitale si cladiri administrative cu instalatii si sisteme pe surse regenerabile, precum si asociatiilor de proprietari din blocurile de locuinte pentru instalatii solare pentru asigurarea apei calde de consum..

Acest program are scopul de a spijini si favoriza obtinerea energiei termice din surse regenerabile cum ar fi solare, dar si geotermice, si biomasa. In special pentru instalatiile solare noi, bugetul de stat va suporta pana la 70% din pretul total al instalatiilor solare, pentru sectorul de locuinte si cladirile publice.

Prin acest program,
statul a prevazut initial un buget de
400 mil. lei (105 mil. euro) pentru anul 2009, din care circa 50% vor fi disponibili pana la sfarsitul anului 2009, urmand sa continue in 2010.

Sistem de Incalzire Solara Aferent Hotelului Belvedere

Hotel Belvedere – Brasov

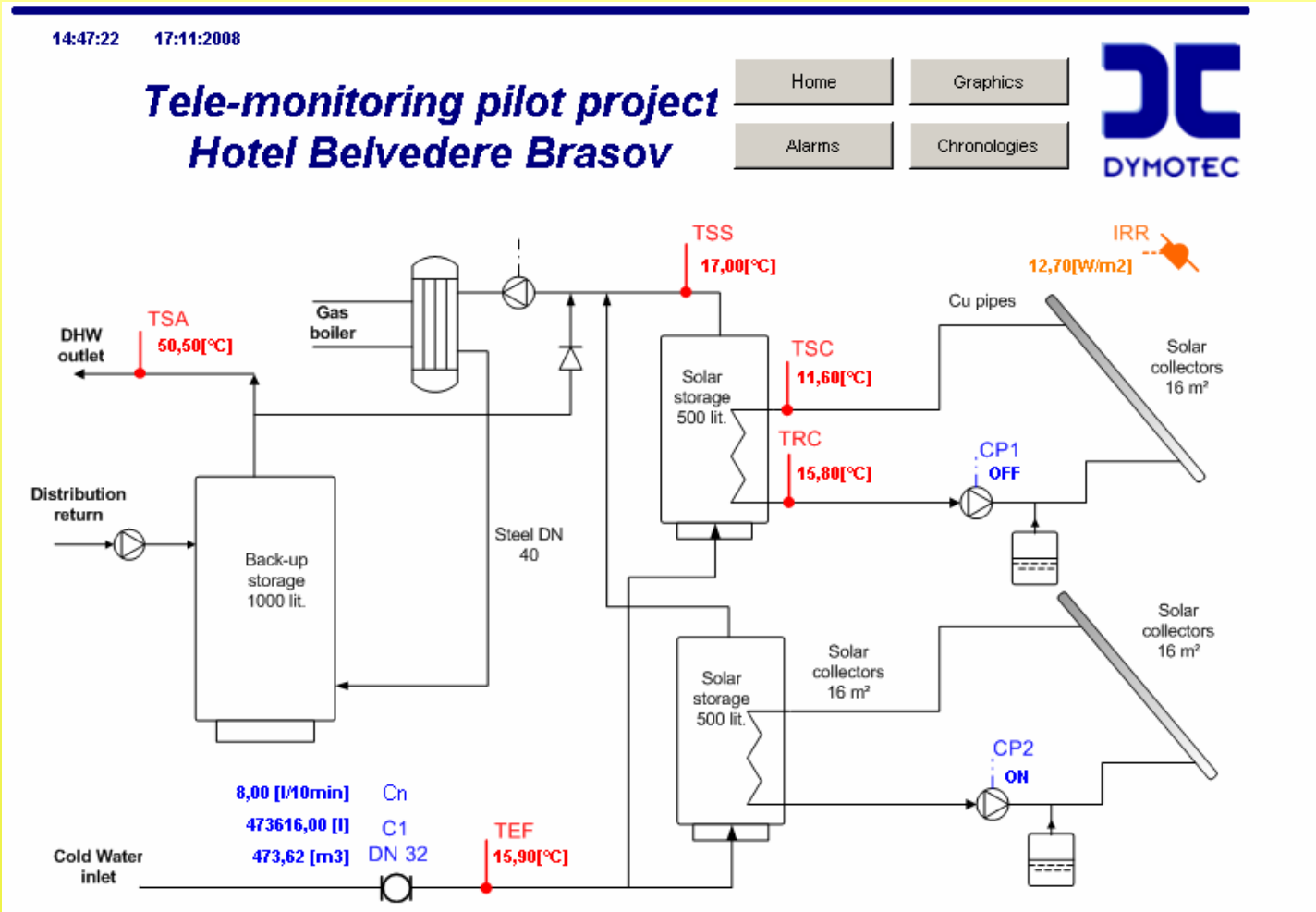
Hotel: 25 camere + restaurant

Anul instalarii sistemului solar: 2005

Suprafata panourilor solare: 32 m2 in 2 sisteme paralele

2 rezervoare de stocare termice: 500 l fiecare

Schema de Tele-monitorizare



Valori Inregistrate

Values

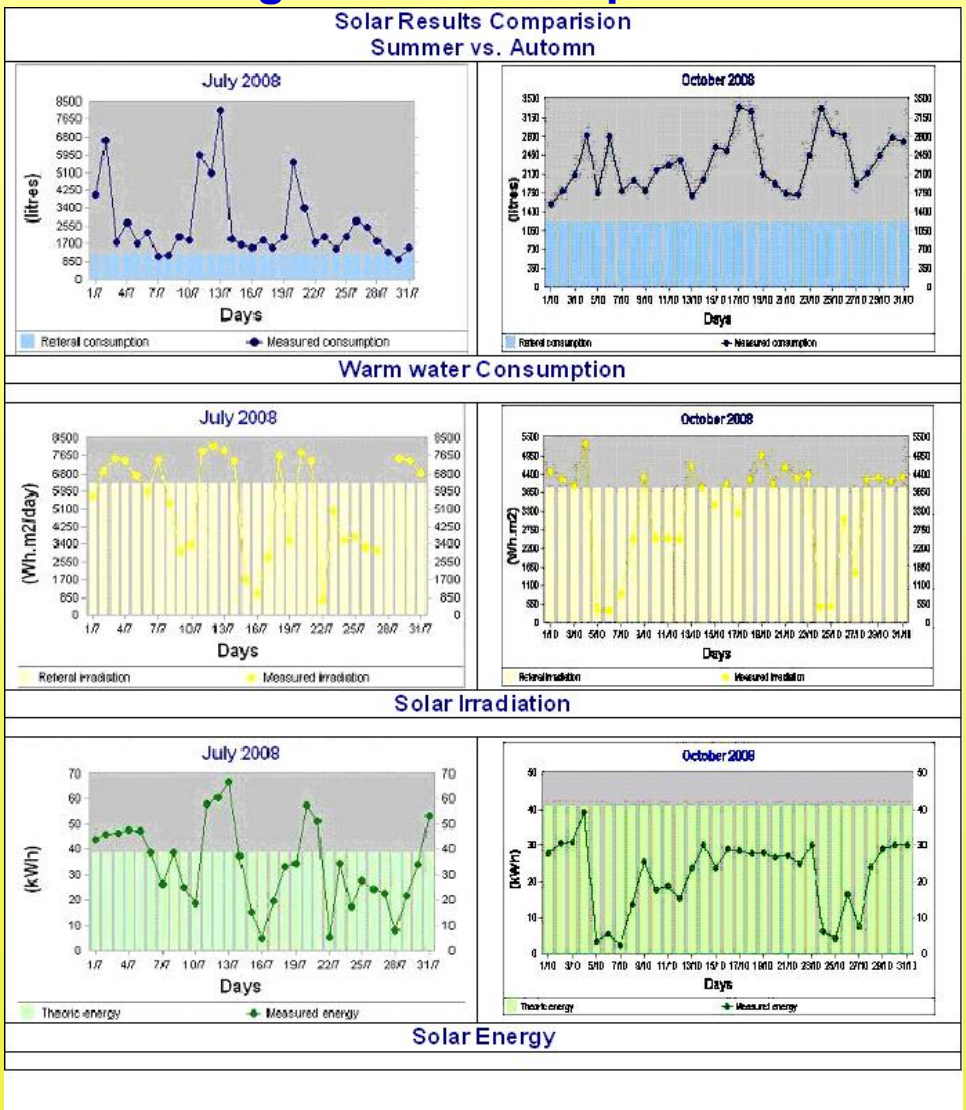
Digital Values

		State
1. State of main pump CP1 (on/off)	1	OFF
2. State of secondary pump CP2 (on/off)	2	ON

Analog values

		Value
1. T1_TSC-temperature on solar colector output [°C]	1	13,10 [°C]
2. T2_TBB - Rezerva	2	9999,00 [°C]
3. T3_TEF-temperature on solar tank inlet [°C]	3	15,90 [°C]
4. T4_TSS-temperature on solar storage tank [°C]	4	16,80 [°C]
5. T5_TSA-backup output temperature [°C]	5	48,50 [°C]
6. T6_TRC-temperature on solat colector inlet [°C]	6	14,30 [°C]
7. IRR-Irradiation sensor [W/m2]	7	12,15 [W/m2]
8. C1-Flowmeter Cold Water [l]	8	473613,00 [l]
9. Esol-useful solar energy [KWh]	9	0,01 [KWh]
10. Eaux-auxiliar energy [KWh]	10	0,29 [KWh]

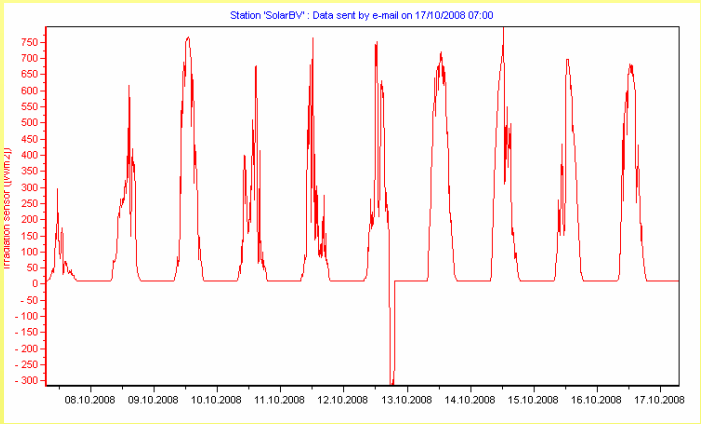
Rezultate Energie Solara Comparate intre Vara si Toamna



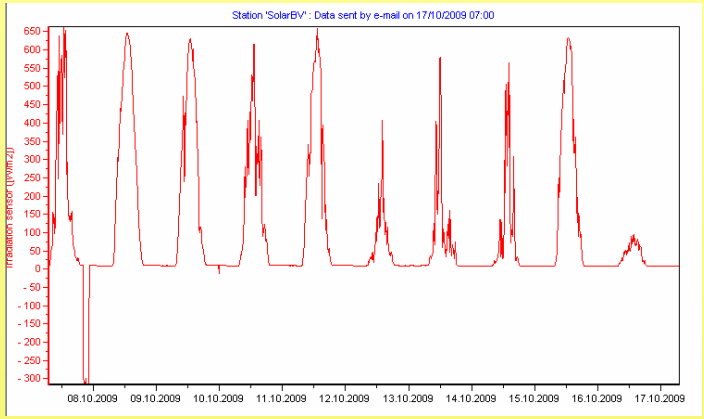
Project TRANS SOLAR

Transferul de Experienta pentru Dezvoltarea Sistemelor Termice Solare

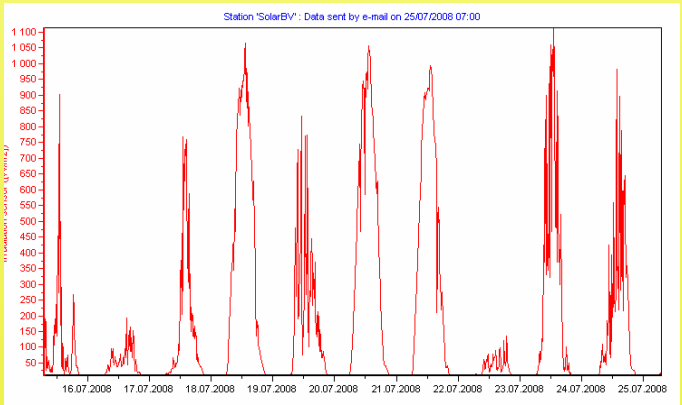
Rezultate Energie Solara Comparate intre Vara si Toamna



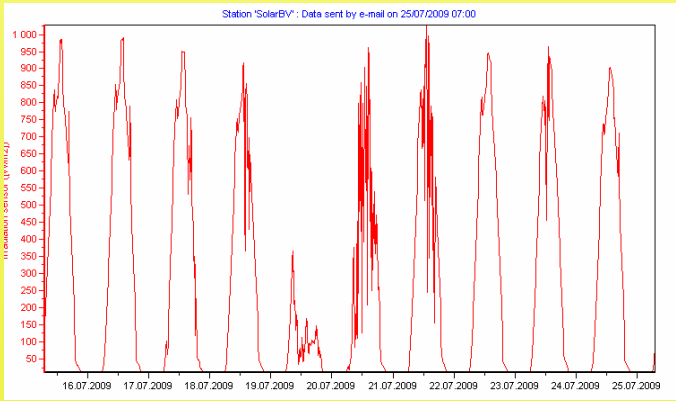
Data from 17.10.2008



Data from 17.10.2009



Data from 25.07.2008



Data from 25.07.2009

VA MULTUMIM FOARTE MULT PENTRU ATENTIE

TRANS SOLAR

www.cres.gr/trans-solar

Partener no. 5: OVM-ICCPET SA

Address: 266-268 Rahovei Street,
Bucharest 5, ROMANIA
Tel: + 40 21 405 77 67
Fax: + 40 21 405 77 77
E-mail: *flueraru@ovm-iccpet.ro*

ENERGIA SOLARĂ ...

DATE SI FAPTE PENTRU

POTENȚIALI UTILIZATORI

Gaia – spiritul Pământului

Ing. Ciprian-Gabriel CHISEGA-NEGRILĂ

Dr. ing. Elisabeta PASCULETE

Ing. Catalin FLUERARU

Ing. Valentina BARBU

SC OVM-ICCPET SA

Energia solară este aproape inepuizabilă. Este cea mai curată formă de energie de pe pământ şi este compusă din radiații calorice, luminoase, radio sau de altă natură emise de soare. Cantitățile uriaşe din această energie stau la baza aproape tuturor proceselor naturale de pe Pământ. Cu toate acestea, este relativ dificilă captarea şi stocarea ei într-o anumită formă (în principal căldură sau electricitate) care să permită utilizarea ulterioară a acesteia.

Energia solară poate încălzi locuințele în mod pasiv, datorită construcției acestora (casele pasive) sau poate fi stocată în acumulatoare termice sub formă de energie termică. Căldura generată din surse solare se poate folosi mai ales la prepararea apei calde menajere, încălzirea agentului termic necesar pentru asigurarea temperaturii ambiante a casei sau pentru încălzirea piscinei. Există chiar şi instalații de aer condiționat bazate pe energie solară, unde aceasta reprezintă energia principală necesară răcirii aerului.

In România se pot defini 4 zone de însorire, de la un maxim de 1600 kWh/m2 în Dobrogea la 1250 kWh/m2 în nordul țării, anual.

De ce energie solară?

- ✓ Este gratuită!
- ✓ Instalațiile nu necesită practic nici un fel de întreținere.
- ✓ Nu consumă nici un fel de combustibil.
- ✓ Este total nepoluantă.

Utilizarea energiei solare reprezintă la nivel global cea mai eficientă metodă de a aduce căldura în locuințe. în general, cantitatea de căldură solară ce cade asupra acoperişului unei case este mai mare decât energia totală consumată în casă.

Cu mijloace simple, eficiente constructiv, se poate utiliza energia solară pentru a reduce sau chiar pentru a înlocui total celelalte surse de energie necesare traiului dintr-o locuință modernă

Sisteme de încălzire solară

Colectoare solare
Sisteme de încălzire solară
Sisteme pasive directe cu termosifonare
Sisteme pasive indirecte
Sisteme active directe
Sisteme active indirecte

ÎNTREBĂRI PUSE FRECVENTE DE POTENȚIALI UTILIZATORI AI ENERGIEI SOLARE

❑ Este soare suficient în România ca să se justifice investiția într-o instalație de încălzire solară?

Da. România se află în zona B europeană din punct de vedere al însoririi (1250 - 1600 kWh pe metru patrat pe an), între țări cu o industrie solară puternică dar cu o însorire considerabil mai mică (Germania, Suedia, Danemarca) şi țările Europei de sud (Portugalia, Spania, Italia, Grecia).

ÎNTREBĂRI PUSE FRECVENTE DE POTENȚIALI UTILIZATORI AI ENERGIEI SOLARE

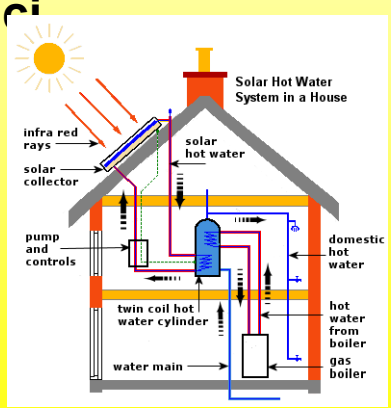
- **Instalația solară produce numai apă caldă sau poate produce şi căldura necesară încălzirii locuinței?**

Dacă este corect dimensionată şi numărul de panouri (tuburi) este suficient, instalația solară poate asigura integral sau în cea mai mare parte necesarul de căldură în locuință. Totul depinde de modul în care este construită casa (expunere sudică, vânturi exterioare, dar mai ales modul în care este realizată izolația termică a construcției).

ÎNTREBĂRI PUSE FRECVENTE DE POTENȚIALI UTILIZATORI AI ENERGIEI SOLARE

- **E mai bună o instalație solară decât una pe gaz sau alt combustibil?**

Instalația solară ar trebui văzută ca partener al unei instalații convenționale, mai ales la o construcție existentă, al cărei grad de izolație termică nu permite încălzirea întregii case doar cu energie solară. Chiar dacă nu e soare în fiecare zi, energia solară colectată corect va asigura 60-70% din costurile combustibililor clasici



ÎNTREBĂRI PUSE FRECVENTE DE POTENȚIALI UTILIZATORI AI ENERGIEI SOLARE

- **Instalațiile de încălzire solară funcționează şi iarna?**

Da. Datorită construcției tuburilor din sticlă, temperatura exterioară nu influențează funcționarea instalației, ea va produce apă caldă absorbind radiația solară în orice anotimp. Desigur, iarna ziua fiind mai scurtă perioada de însolație zilnică este mai mică, dar se calculează necesarul de panouri astfel încât să se asigure în acumulatorul termic o temperatură de 50-65°C.

ÎNTREBĂRI PUSE FRECVENTE DE POTENȚIALI UTILIZATORI AI ENERGIEI SOLARE

- **Care este principiul de funcționare al instalației?**

Un agent termic încălzit de panourile solare transmite căldura apei din acumulatorul termic. De aici căldura este preluată atunci când este nevoie pentru a încălzi apa caldă menajeră, locuința, etc. Un controler specializat analizează temperaturile din casă şi din instalație şi controlează deschiderea automată a valvelor şi pornirea pompei de recirculare a agentului termic atunci când este nevoie.

ÎNTREBĂRI PUSE FRECVENTE DE POTENȚIALI UTILIZATORI AI ENERGIEI SOLARE

- **Ce temperatură asigură instalația?**

Agentul termic din instalația solară poate ajunge la 120°C. Temperatura apei din acumulatorul termic poate ajunge până la 80°C. Prin urmare, apa caldă menajeră poate fi furnizată la 75-85°C pe timp de vară şi la 45-55°C pe timp de iarnă. Totuşi e bine să se limiteze temperatura apei calde menajere la 55°C pentru a evita depunerile de calcar şi din motive de siguranță în utilizare.

ÎNTREBĂRI PUSE FRECVENTE DE POTENȚIALI UTILIZATORI AI ENERGIEI SOLARE

- **Se poate utiliza instalația solară la încălzirea apei din piscină?**

Este chiar recomandat ca pe timp de primăvară - vară - toamnă surplusul de căldură pe care îl asigură instalația să fie folosit astfel. Din proiectare se va dimensiona instalația astfel încât surplusul de căldură să încălzească apa piscinei, după ce a fost asigurată o cantitate suficientă de apă caldă pentru uz menajer.

ÎNTREBĂRI PUSE FRECVENTE DE POTENȚIALI UTILIZATORI AI ENERGIEI SOLARE

- **Ce se întâmplă dacă se sparge un tub?**

Nimic grav. Prin tuburile superconductoare din sticlă nu circulă apa şi nici agentul termic al instalației. Instalația poate funcționa şi fără acest tub, fiindu-i afectată numai puterea de încălzire. Tubul se înlocuieşte cu un altul similar, procurabil de la firma constructoare, ca piesă de schimb.

ÎNTREBĂRI PUSE FRECVENTE DE POTENȚIALI UTILIZATORI AI ENERGIEI SOLARE

- **Care este durata normală de utilizare a instalației?**

Durata medie de viață a colectoarelor este de 15 ani. Desigur, aşa cum sunt aparate a căror durată medie de viață este de 5-8 ani (frigidere, maşini de spălat) şi care funcționează chiar şi după 10-15 ani, tot aşa colectoarele solare pot funcționa 25-30 de ani fără probleme deoarece nu conțin piese în mişcare iar materialele din care sunt fabricate sunt, în principal, oțel inoxidabil şi sticlă.

ÎNTREBĂRI PUSE FRECVENTE DE POTENȚIALI UTILIZATORI AI ENERGIEI SOLARE

- **Unde se montează instalația? Suportă acoperişul greutatea acesteia?**

Panourile solare se montează pe acoperiş, înspre sud (sau într-un loc în care să fie soare cât mai mult timp din zi), la un unghi de aprox. 45 grade. Greutatea panourilor este mică (câteva zeci de kilograme) sau medie (în cazul instalațiilor cu rezervor integrat). Panourile cu tuburi se pot monta şi pe verticală pe peretele sudic al clădirii, în situațiile în care construcția nu permite o altă soluție.

ÎNTREBĂRI PUSE FRECVENTE DE POTENȚIALI UTILIZATORI AI ENERGIEI SOLARE

- **Care este pericolul cel mai mare al defectării colectoarelor solare?**

O cădere de grindină de mari dimensiuni. Fabricantul asigură rezistența tuburilor aşezate la 45 de grade la impact cu bucăți de grindină de până la 35 mm diametru. Oricum, acestea pot fi înlocuite imediat cu tuburi de schimb. Tuburile sunt asigurate la valoarea lor de piesă de schimb pe perioada de garanție. Cumpărătorul poate continua această asigurare achitând anual rata poliței de asigurare.

ÎNTREBĂRI PUSE FRECVENTE DE POTENȚIALI UTILIZATORI AI ENERGIEI SOLARE

- **Ce cantitate de apă încălzeşte un colector?**

Un colector cu rezervor pentru apă caldă menajeră încălzeşte zilnic, în medie, o cantitate echivalenta cu capacitatea rezervorului la o temperatură de 60 - 65°C. Desigur, în lunile de iarnă, fiindcă ziua este mult mai scurtă, temperatura apei nu va fi de 60°C, dar colectorul funcționează şi ridică temperatura la 35-40°C. La fel cum vara, dacă e o zi însorită, temperatura poate ajunge la peste 80°C. Din acest motiv se ia în considerare o medie.

ÎNTREBĂRI PUSE FRECVENTE DE POTENȚIALI UTILIZATORI AI ENERGIEI SOLARE

- **Cine îmi asigură montajul?**

Instalațiile sunt uşor de montat, orice instalator ar trebui să ştie să lege apa caldă - apa rece la țevile corespunzătoare ale instalației din casă. Firma constructoare asigură toate informațiile necesare în documentația tehnică.

DORIȚI INFORMAȚII SUPLIMENTARE?

COLEGII MEI VĂ STAU LA DISPOZIȚIE!

OVM-ICCPET SA

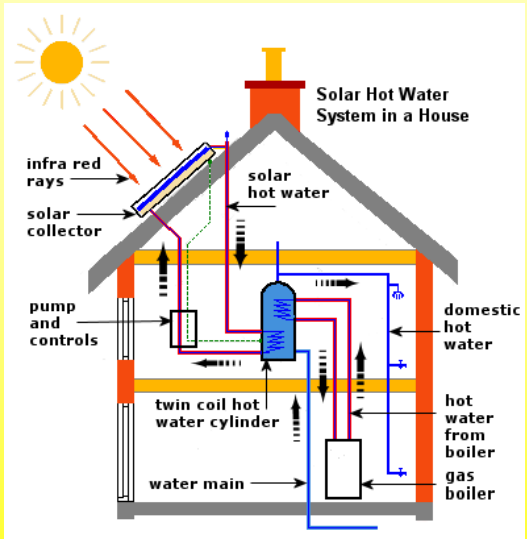
Intelligent Energy Europe

MULȚUMESC PENTRU ATENȚIE!

Ing. Ciprian-Gabriel CHISEGA-NEGRILĂ

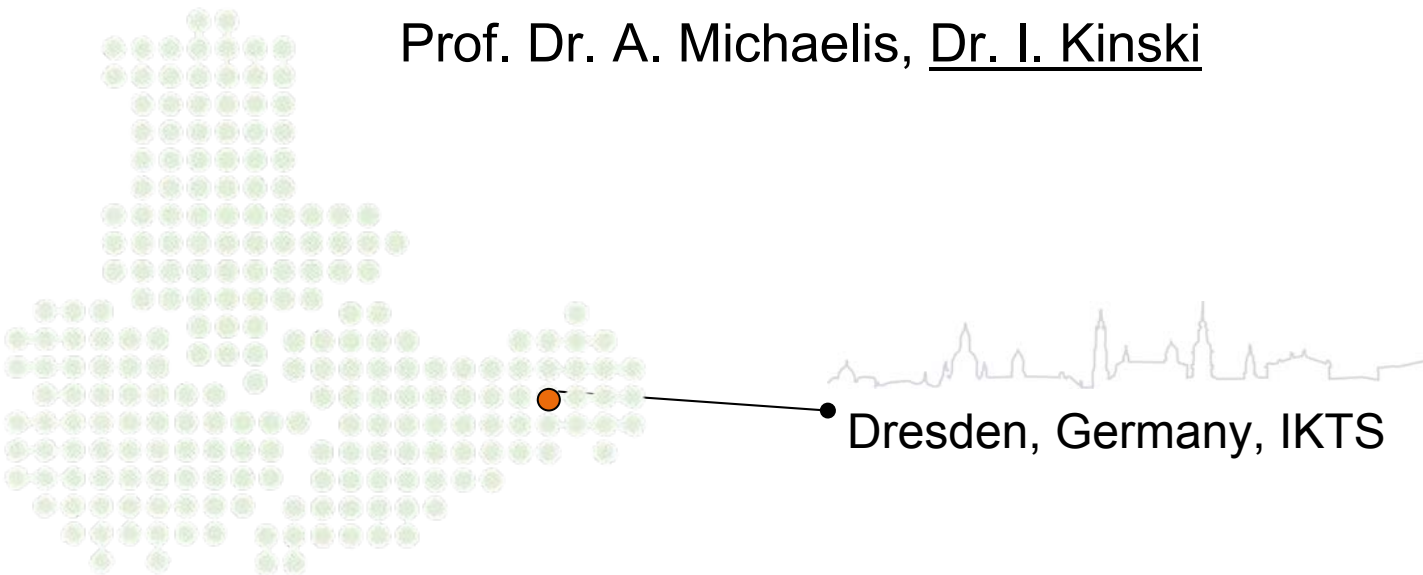
Tel: 021 405 77 85

e-mail: chisega@ovm-iccpet.ro



Solarvalley Central Germany and Renewable Energies and Energy-Efficiency Systems at Fraunhofer IKTS

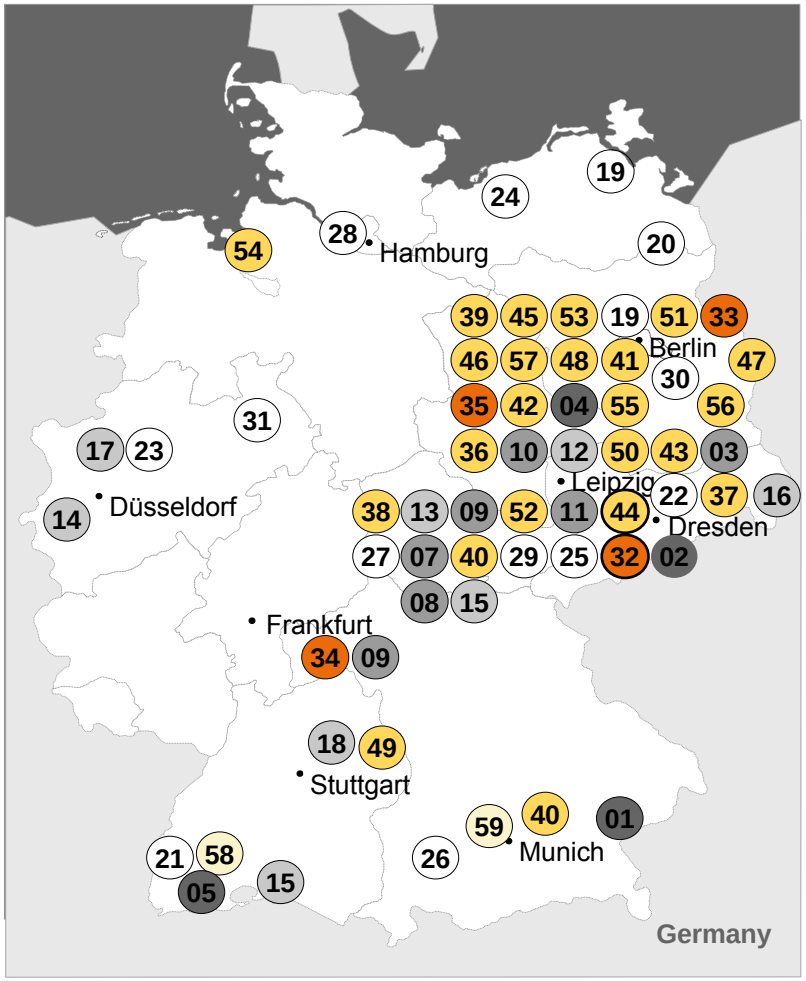
Prof. Dr. A. Michaelis, Dr. I. Kinski



solarvalley mitte | deutschland

Fraunhofer IKTS

Solarvalley Central Germany – Technological advance by regional collaboration



- **65%** PV companies located in Central Germany
- Research, development, production
- **18%** of worldwide solar cell production
- 4 companies listed in world top 10
- **8500** direct employees in PV industry
- growth rate of companies **> 30%**

Source: Invest in Germany Research 2008, EuPD 2008, Photon 2008

solarvalley mitte deutschland

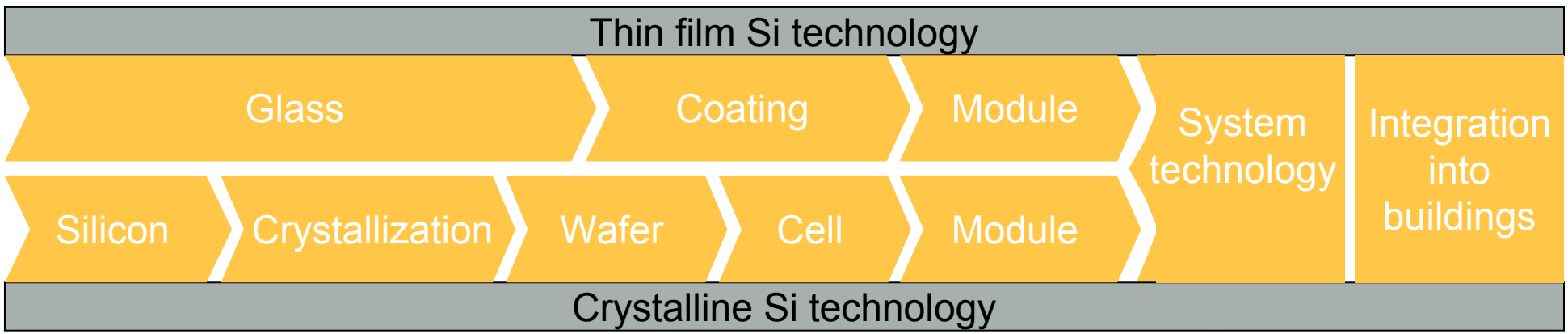
Fraunhofer IKTS

Solar Energy –
Crucial factor on the energy market

Innovation strategy

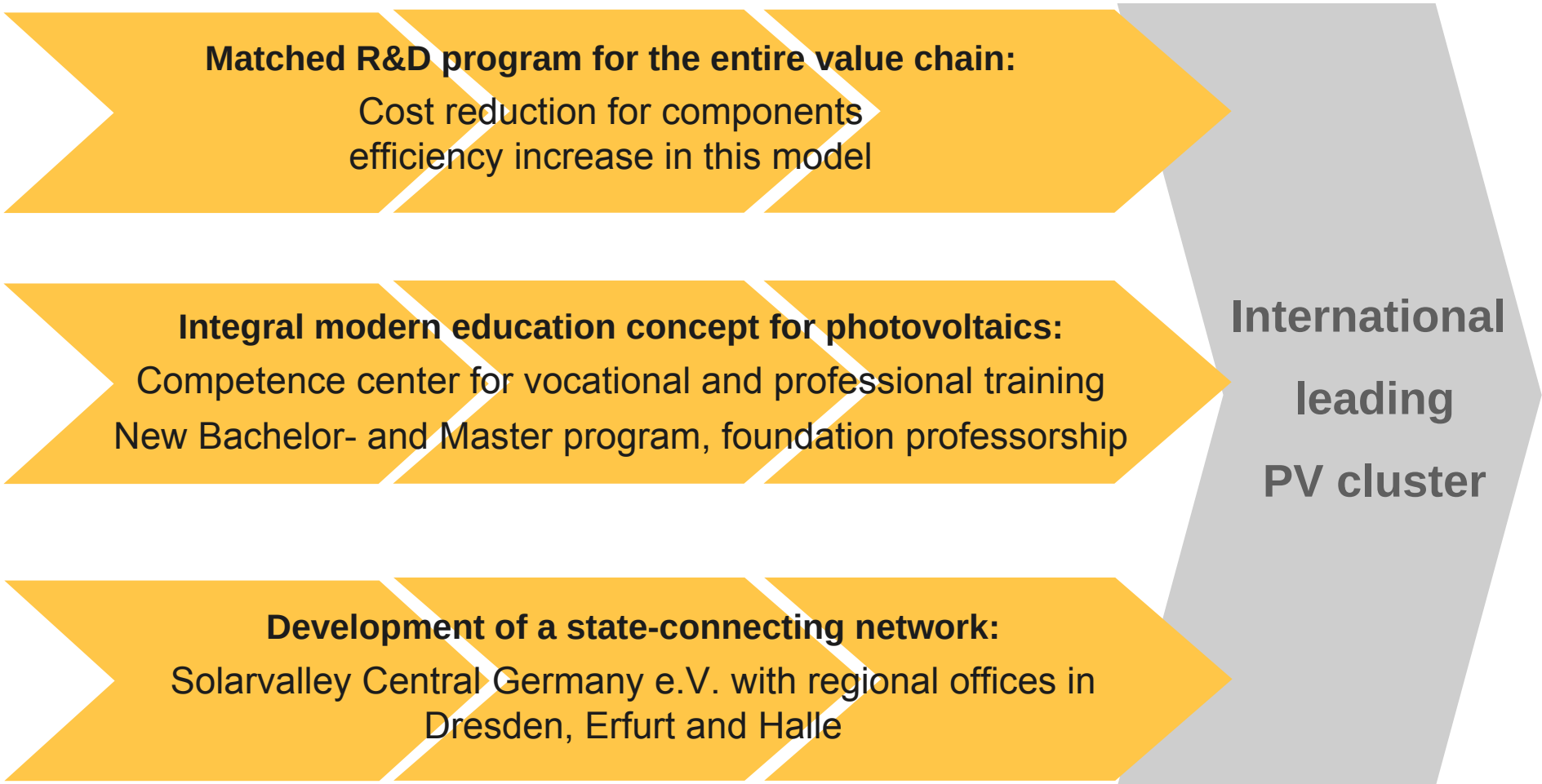
- Cooperation along the entire PV value chain
- Concept of development from fundamental research to innovative application

→ 27 Global operating companies
→ 7 Renowned Research Institutes
→ 4 Universities
→ 3 Federal states

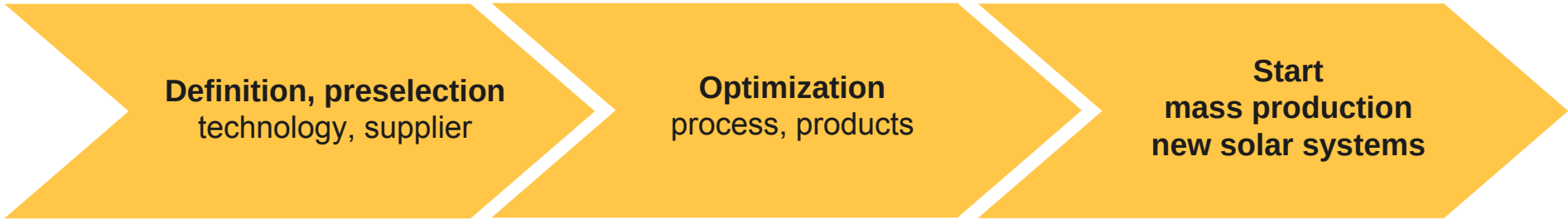


solarvalley mitte | deutschland
Fraunhofer IKTS

Acceleration of Innovations –
Integral concept throughout cluster of excellence solarvalley



Electricity for future generations – Technology and products leading to net parity



Milestones 2011

- Materials cost reduction > 30%
- Efficiency crystalline solar cell > 20 % (equates with 25% increase)
- Thin film > 10 % (equates with 30% increase)
- Reliability and module warranty ≥ 30 years (equates with 20% increase)

Political conditions in Thuringia

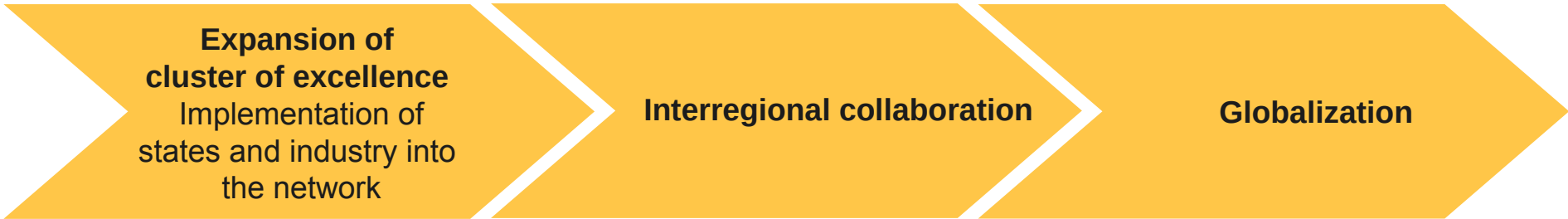
- 10 million € R&D joint projects
- SolarZentrum Erfurt as additional institute of TU Ilmenau
- Center of Spectroscopy at IMN Ilmenau
- Focus on thin film at IPHT

Economic growth by vocational and professional training – new jobs

Milestones 2011

- Professional qualification: 5.000 skilled workers
- Recruiting of experts outside of Central Germany: 2000
- Network of academic education (Bachelor, Master): 400 graduations / year
- Doctor‘s degree: 40 graduations / year
- National and international partner

High-Tech in Central Germany – Region for PV with high attractiveness for economy & society



Milestones 2011

- PV communication platform, monitoring of success of the innovation process
- New PV applications
- Cross-linked research infrastructure
- Set-up and establishment for suppliers, allocation of areas for building development

Fraunhofer – Institute for Ceramic Technologies and Systems IKTS Dresden

Regular staff:	218
Student workers:	47
Total budget:	€ 20.8 million
Industrial revenues:	41.3 %
Public research revenues:	38.9 %
Core financing:	20.6 %
Area:	102 laboratories and pilot plants of approx. 9400 m^2
Institute director:	Prof. Dr. Alexander Michaelis

TÜV CERT
DIN EN ISO 9001:2000
Zertifikat: 01 100 005194

www.ikts.fraunhofer.de

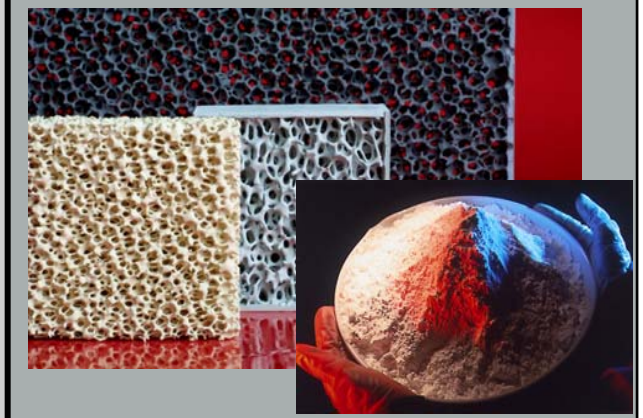
Fraunhofer IKTS

Profile of Fraunhofer IKTS – Business Units

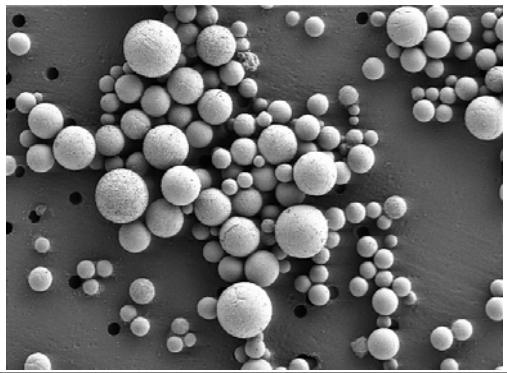
Structural Ceramics

Functional Ceramics

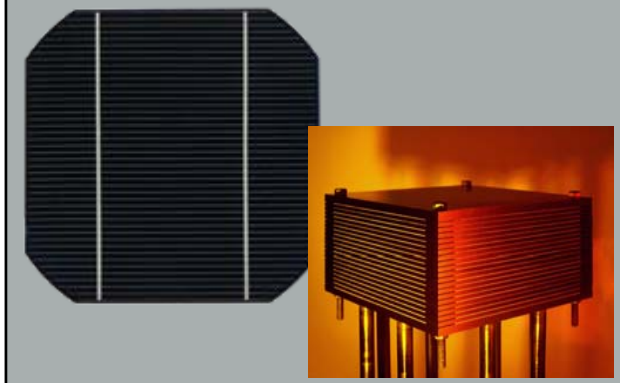
Materials



Sintering / Characterization

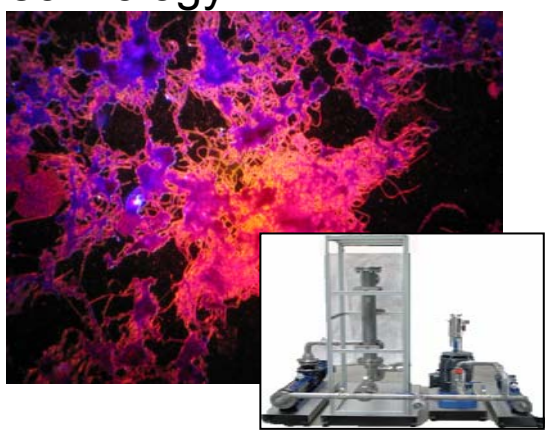


Micro and Energy Systems

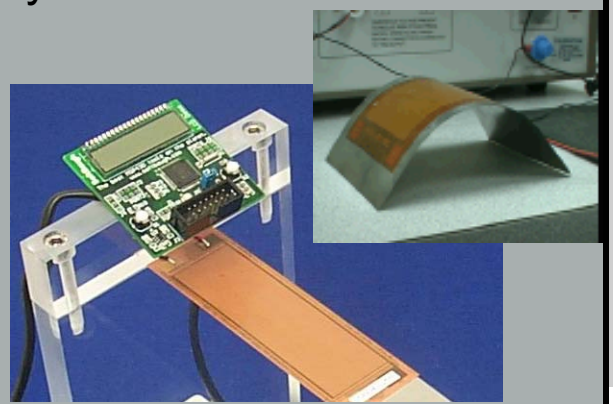


Process/Components

Environmental Processing Technology



Smart Materials and Systems

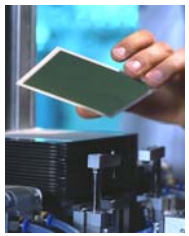


Fraunhofer IKTS

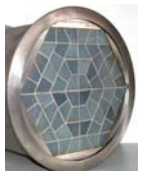
Renewable Energy at IKTS

Research Activities:

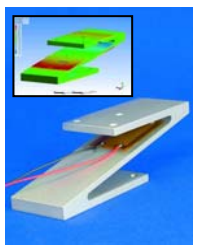
- Development of Materials and Processes for PV application
- System solution for efficient biogas production
- SOFC: from mW to kW application
- Development of small fuel cell systems (SOFC, PEM)
- Membrane and Filter Technology (Diesel Particulate Filter)
- TEG (Thermoelectric Generators)
- „energy harvesting“ (Piezoceramics)
- Battery Technology (Li-Ion)



Ceramic fuel cell stack



Filter segment with specific filter design

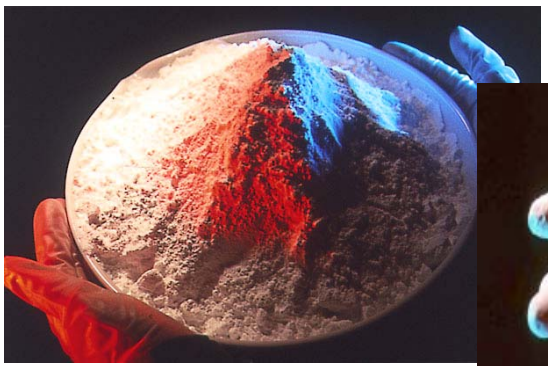


Force transducer for small, dynamical forces

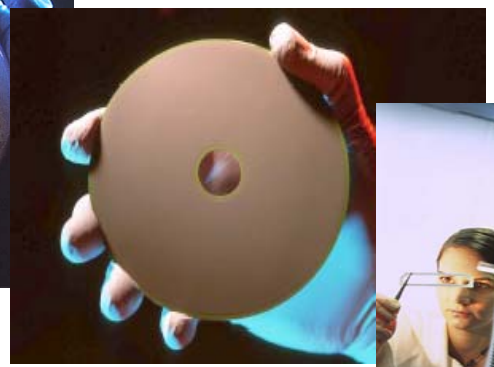
Fraunhofer IKTS

IKTS – SOFC Systems
Competency on entire production line

Materials (raw materials:
Sintered ceramics)

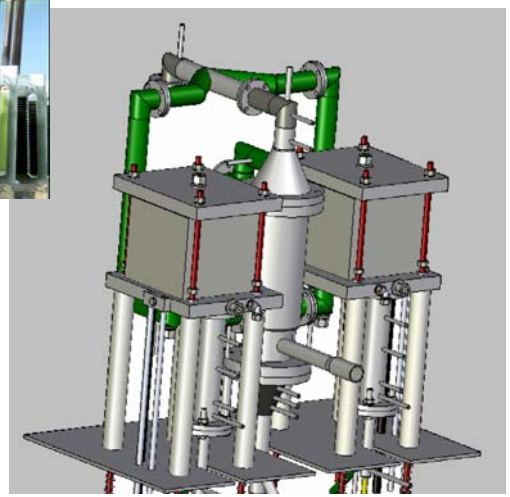


Membrane **E**lectrode
Assembly



Stack

System
(Reformer [H_2+CO],
stack and burner)



- over 20 Patents
- > 30 Industrial projects since 1992
- Take-over of planary SOFC technology of Siemens AG in 1998

From materials to systems – From laboratory scale to small batches

Fraunhofer IKTS

IKTS – LTCC-based micro fuel cell charging station

Cameras

Camcorders

Laptops

PDA

Mobile Phones

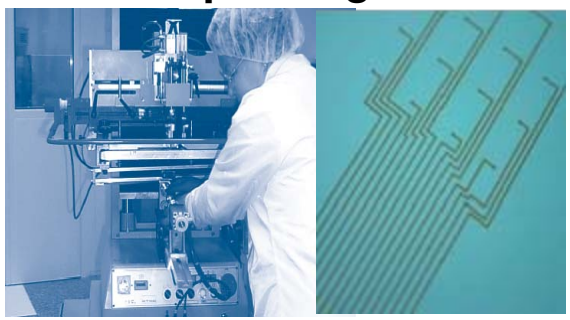
From materials to systems – From laboratory scale to small batches

Fraunhofer IKTS

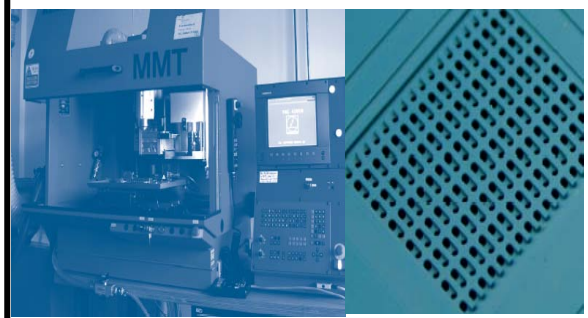
IKTS – Functional materials

1 Pastes / thick film technology

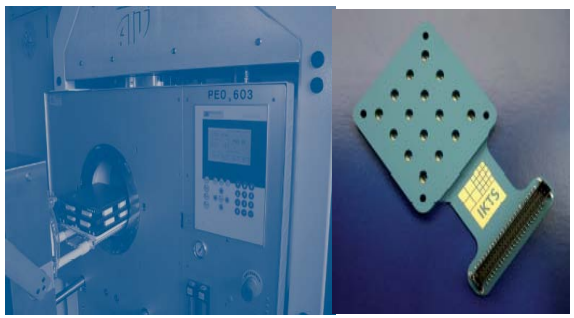
2 Tape casting, screen printing



3 Stacking

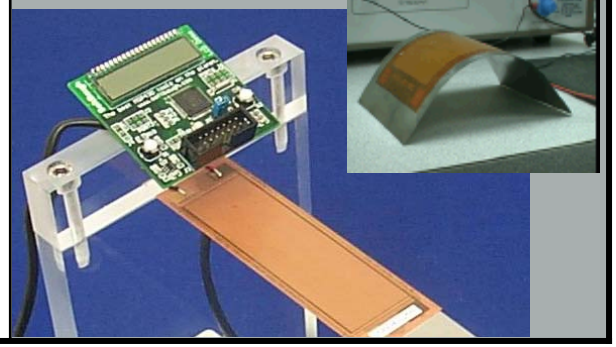


4 Lamination / co-firing



Micro and energy systems

Smart materials and systems



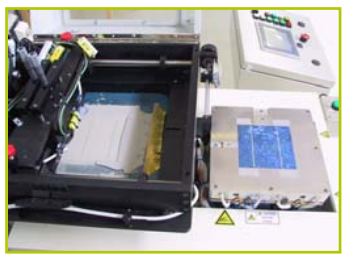
From materials to systems – From laboratory scale to small batches

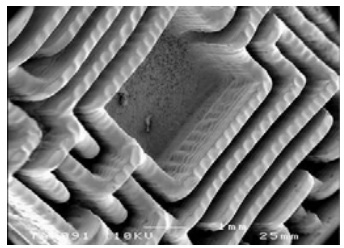
Fraunhofer IKTS

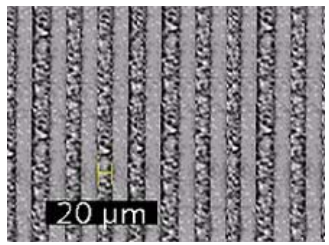
IKTS – Photovoltaics: Metallization

Si substrate

	Hot-Melt	Ink-Jet	Fine line screen printing	Aerosol printing (5-fold print)
	30 µm	2 µm	15 µm	5 µm
	30 µm	20 µm	25 µm	30 µm
AR	1	0.1	0.6	0.1



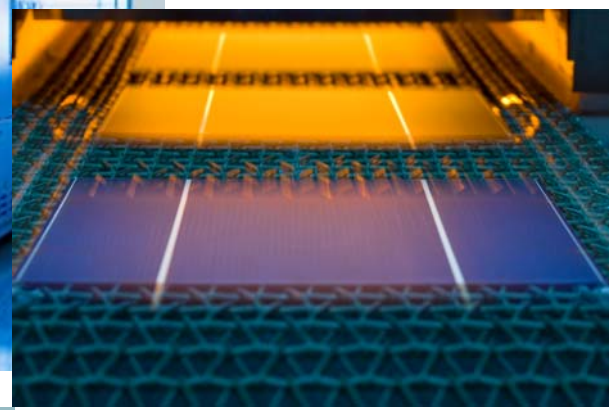




From materials to systems – From laboratory scale to small batches

Fraunhofer IKTS

IKTS – Photovoltaics: processing and characterization



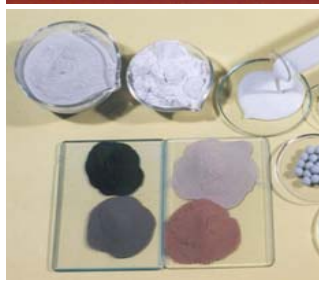
- BTU firing furnace
- IR firing furnace continous line
- Automated 2x4 point probe for resistivity measurements
- Solar simulator

Fraunhofer IKTS

IKTS – Material development – battery production

Powder – suspension - paste

- Materials for Cathodes
  Li-Mn-Co-Ni Oxides
- Development and production of pastes for anodes and cathodes
- Ceramic membrane materials
- → Functionality, stability, processing

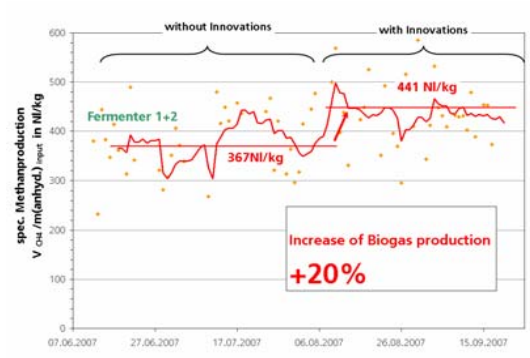


From materials to systems – From laboratory scale to small batches

Fraunhofer IKTS

IKTS – Renewable energy generation: biogas production

- Development of methods and systems for municipal and industrial wastewater treatment plants
- Successive utilization of organic substances for energy production by special educt treatments
- Fermentation of biogenous remnants (straw)
- Efficiency improvement of plants biogas



IKTS – Renewable energy generation: from biomass to heat and electrical power

Biomass Input

Biogas Production

Mechanical Milling

Disintegration

Fermentation

Biogas

Biogas Conditioning

Desulfurization

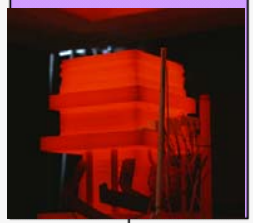
Heat

Conditioned Biogas

Fuel Cell System

Reformer

SOFC Stack



Afterburner

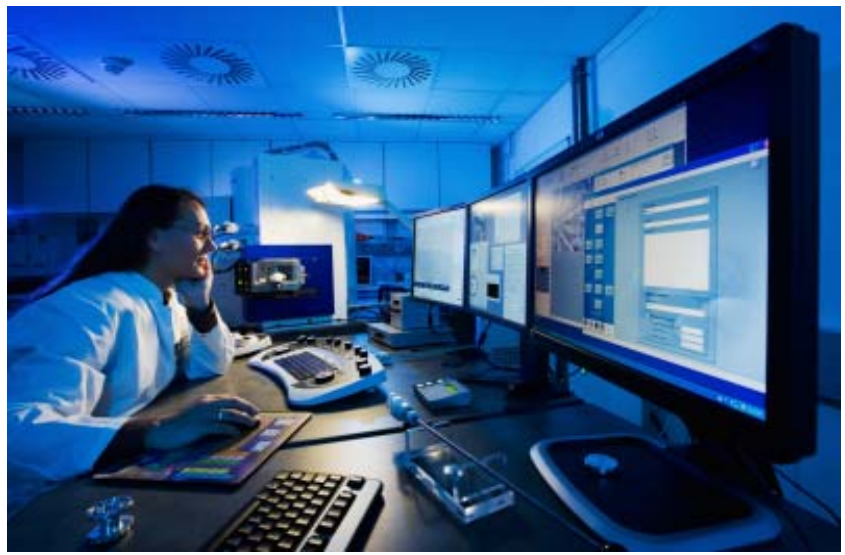
Electric Power

Heat

Fraunhofer IKTS

IKTS – High-end characterization methods

- Powder characterization (PSD, BET, Zeta-Potential)
- XRD (Hot-Stage-XRD)
- Simultanous thermal analysis (DTA/TG/MS)
- Impedance spectroscopy (in situ)
- Rheological characterization
- Chemical stability
- FTIR / Raman spectroscopy (in situ)
- FESEM coupled with EDX equipped with FIB
- Ultrasonic microscope
- Computed tomography
- Ellipsometry
- Reflectometry



Summary

Solarvalley e.V. business office Dresden: EESA and Fraunhofer IKTS

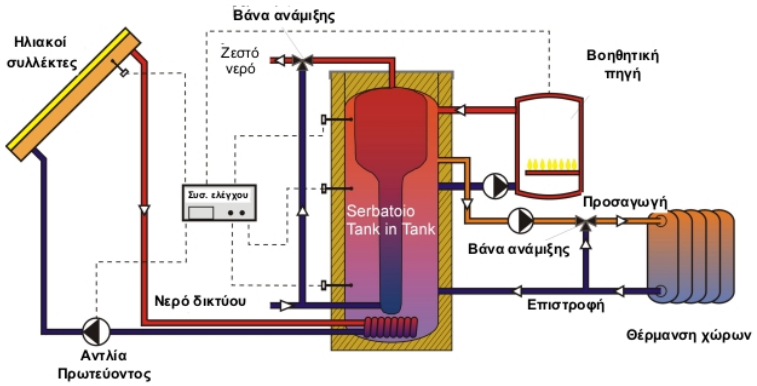
solarvalley mitte | deutschland

eesa Industrielles Netzwerk Erneuerbare Energien Sachsen

Fraunhofer IKTS

Renewable energy research projects at Fraunhofer IKTS

- Development of materials and processes for PV application
- System solution for efficient biogas production
- SOFC: from mW to kW application
- Development of small fuel cell systems (SOFC, PEM)
- Membrane and filter technology (Diesel particulate filter)
- TEG (Thermoelectric generators)
- „energy harvesting“ (Piezoceramics)
- Battery technology (Li-Ion)



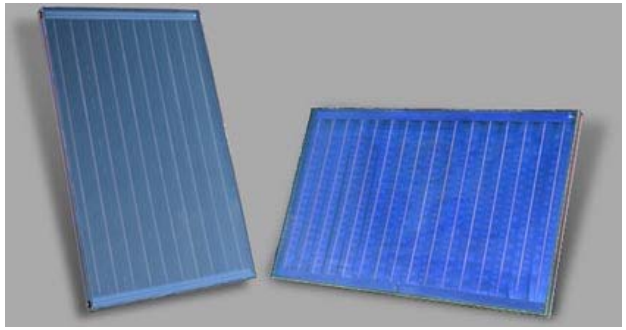
Solar Combi Systems

Trans-solar Workshop

Romania, Bucurest

Ioannis Santzaklis
Mechanical Engineer &
Dimitrios Chasapis
R.E.S. Systems Technology Engineer
ΚΑΠΕ Τομέας Θερμικών Ηλιακών Συστημάτων

Solar Thermal Collectors



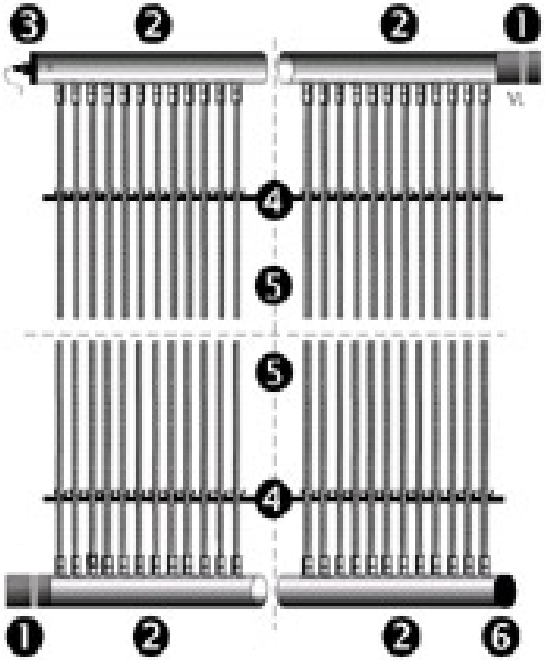
Flat Plate

Vacuum Tub

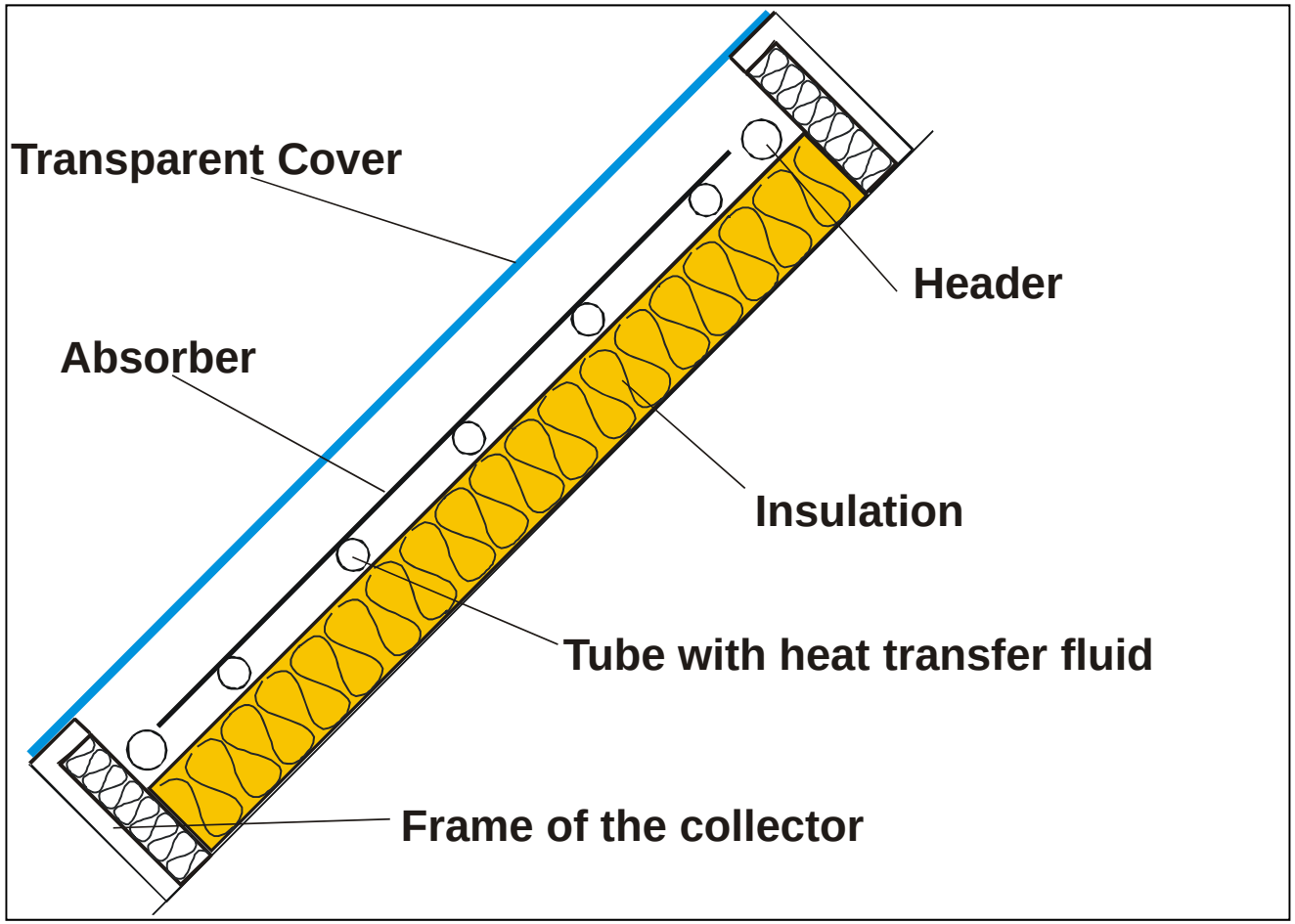
Unglazed

Plastic Absorber – Unglazed Collector

1. Inlet/Outlet
2. Header
3. Temperature sensor
4. Spacer
5. Absorber tube
6. Cap



Flat Plate Collector



Section of flat plate collector

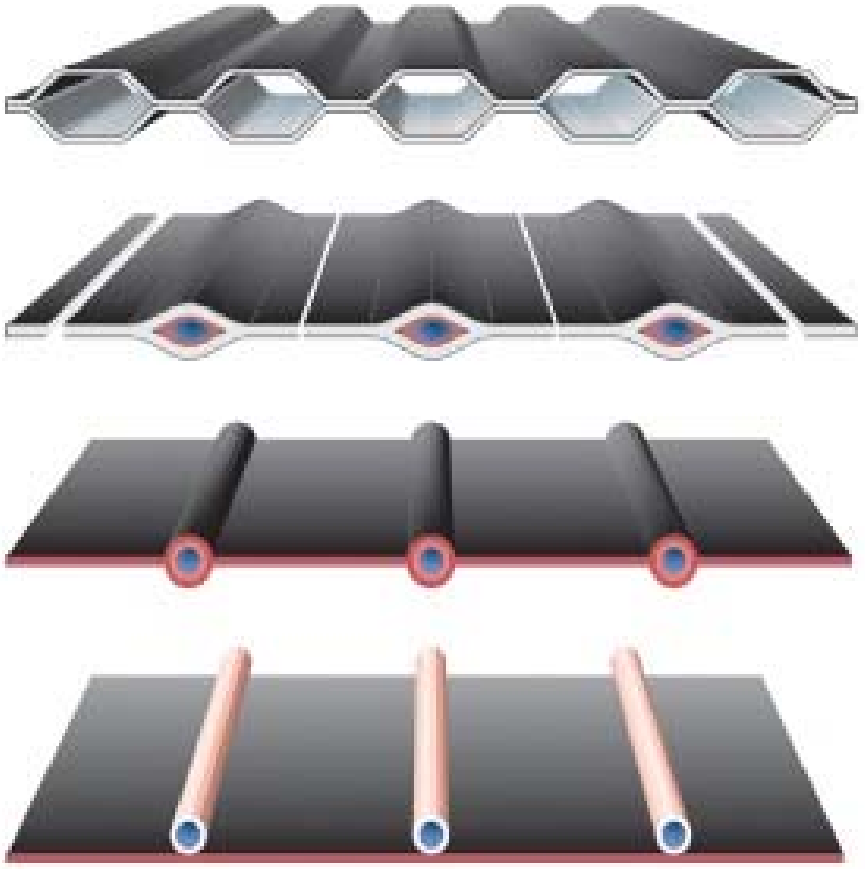
Flat Plate Collector

Aluminium Absorber

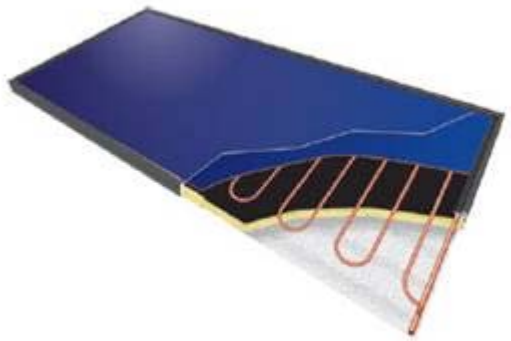
Aluminium absorber with pressed cooper tubes

Pressed tubes between 2 metal sheet

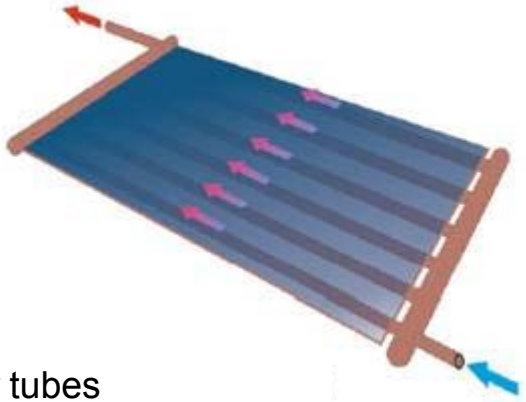
Tubes welded on metal sheet



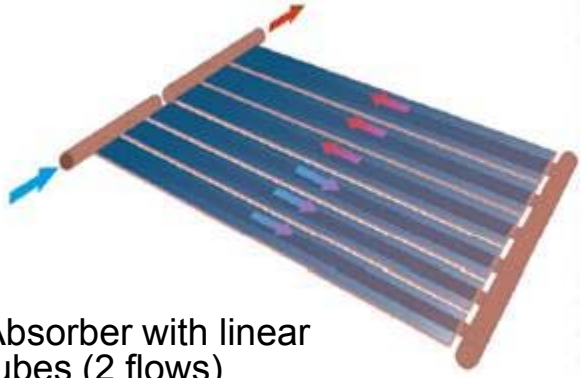
Flat Plate Collector



Absorber with serpentine tube (All surface cover)

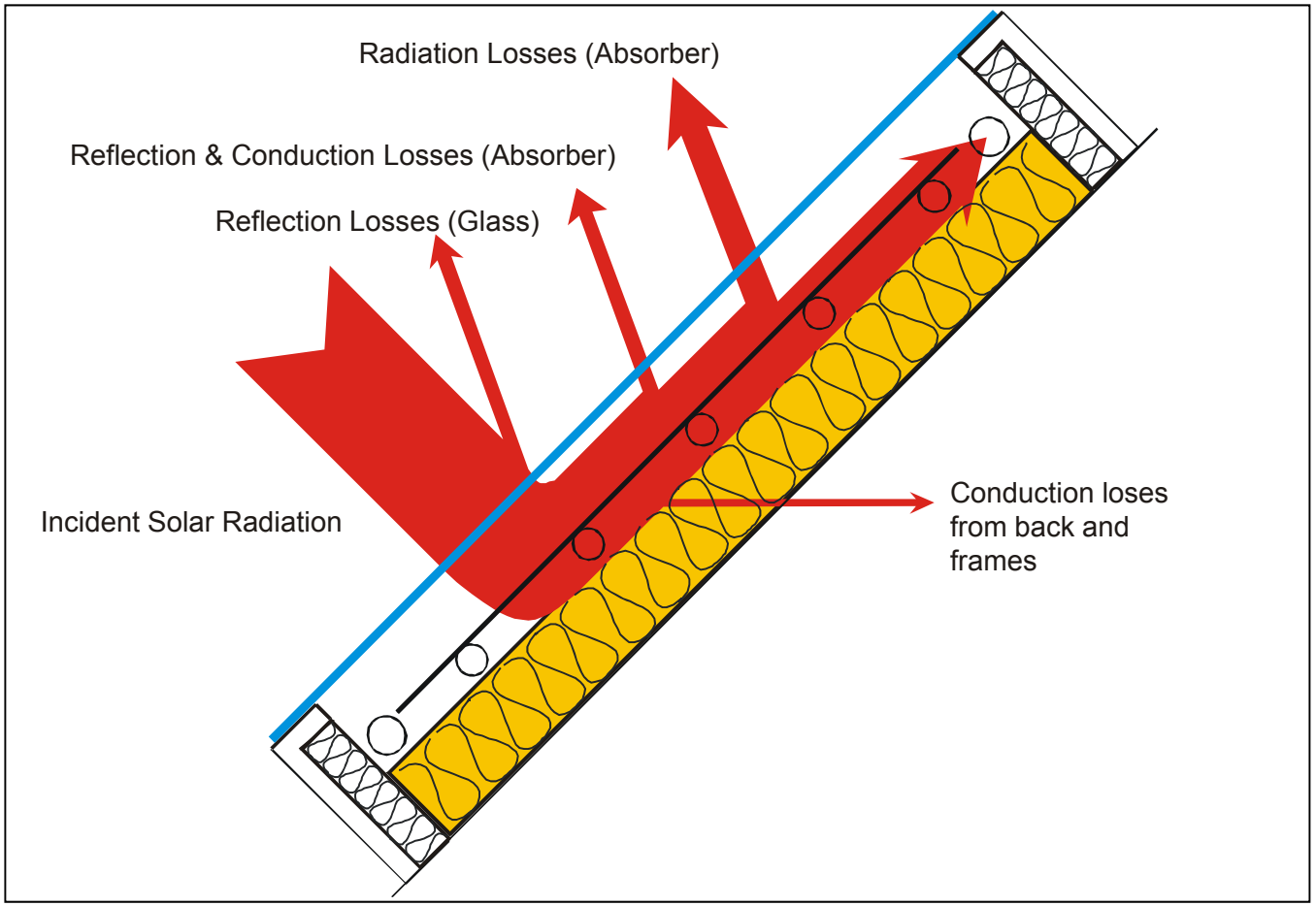


Absorber with linear tubes
(All surface cover)



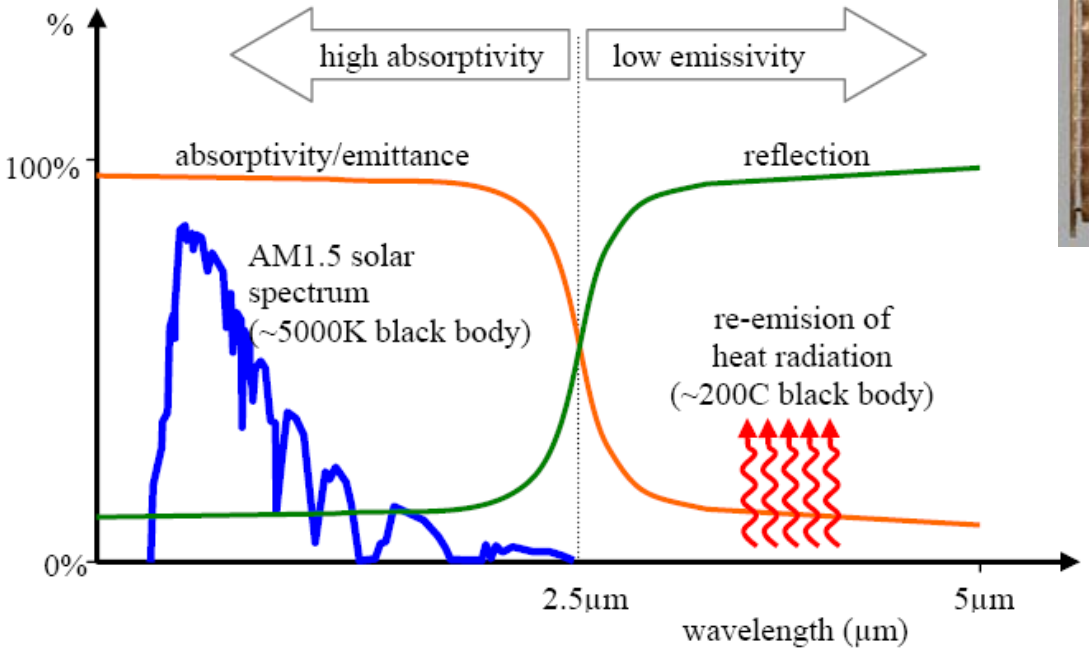
Absorber with linear
tubes (2 flows)

Flat plate Collector– Losses

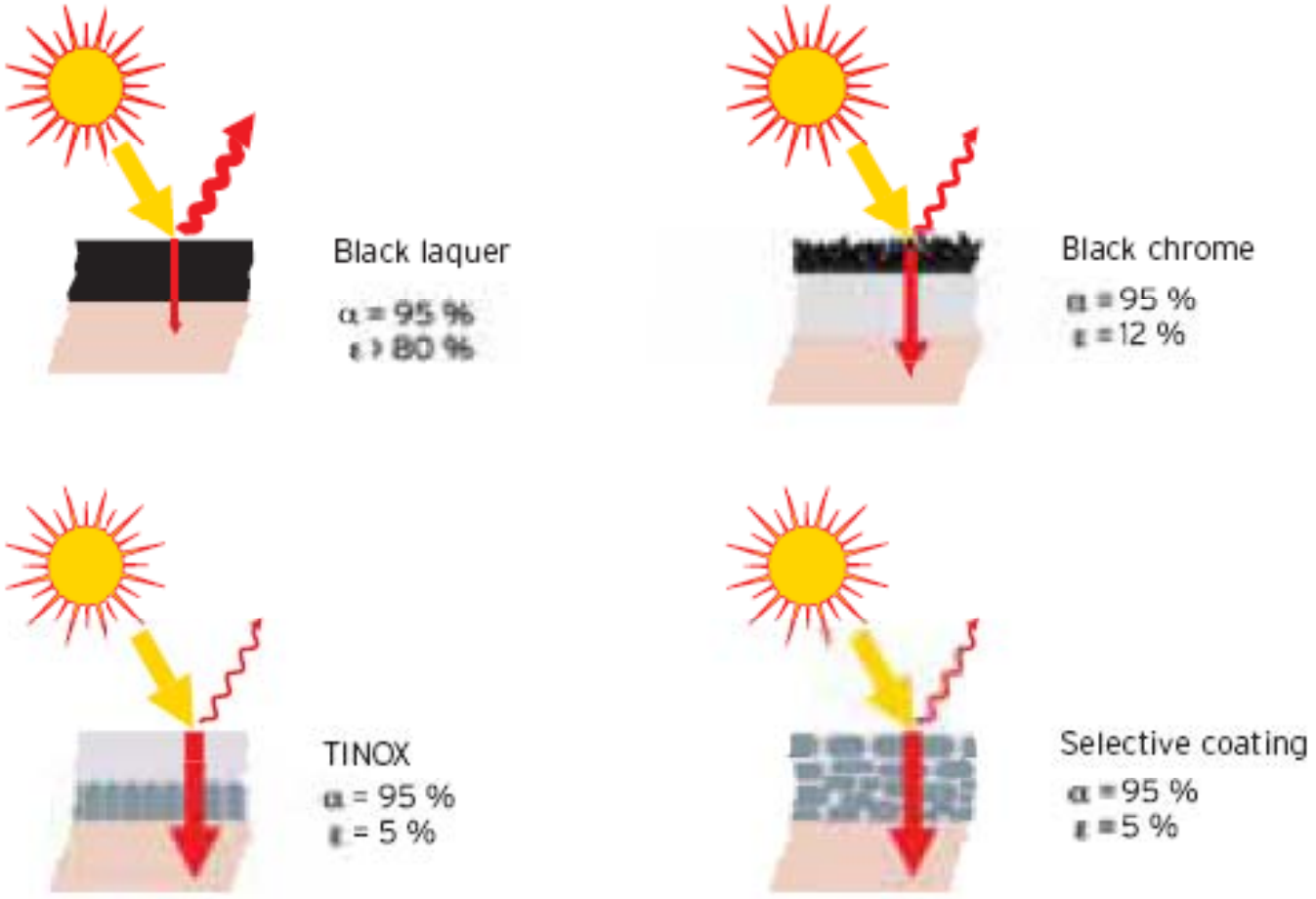


Thermal losses from flat plate collector

Selective surface

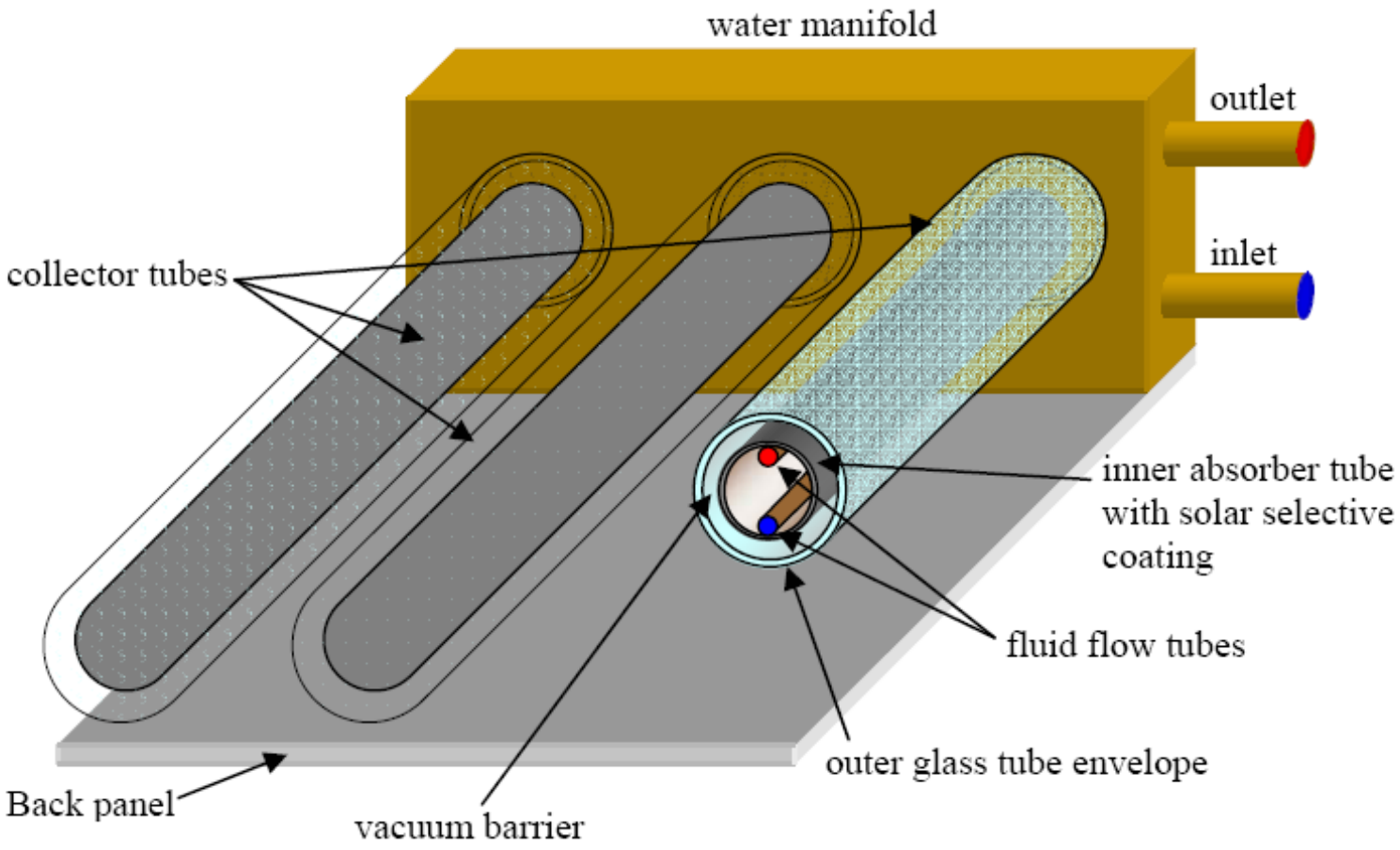


Selective surface

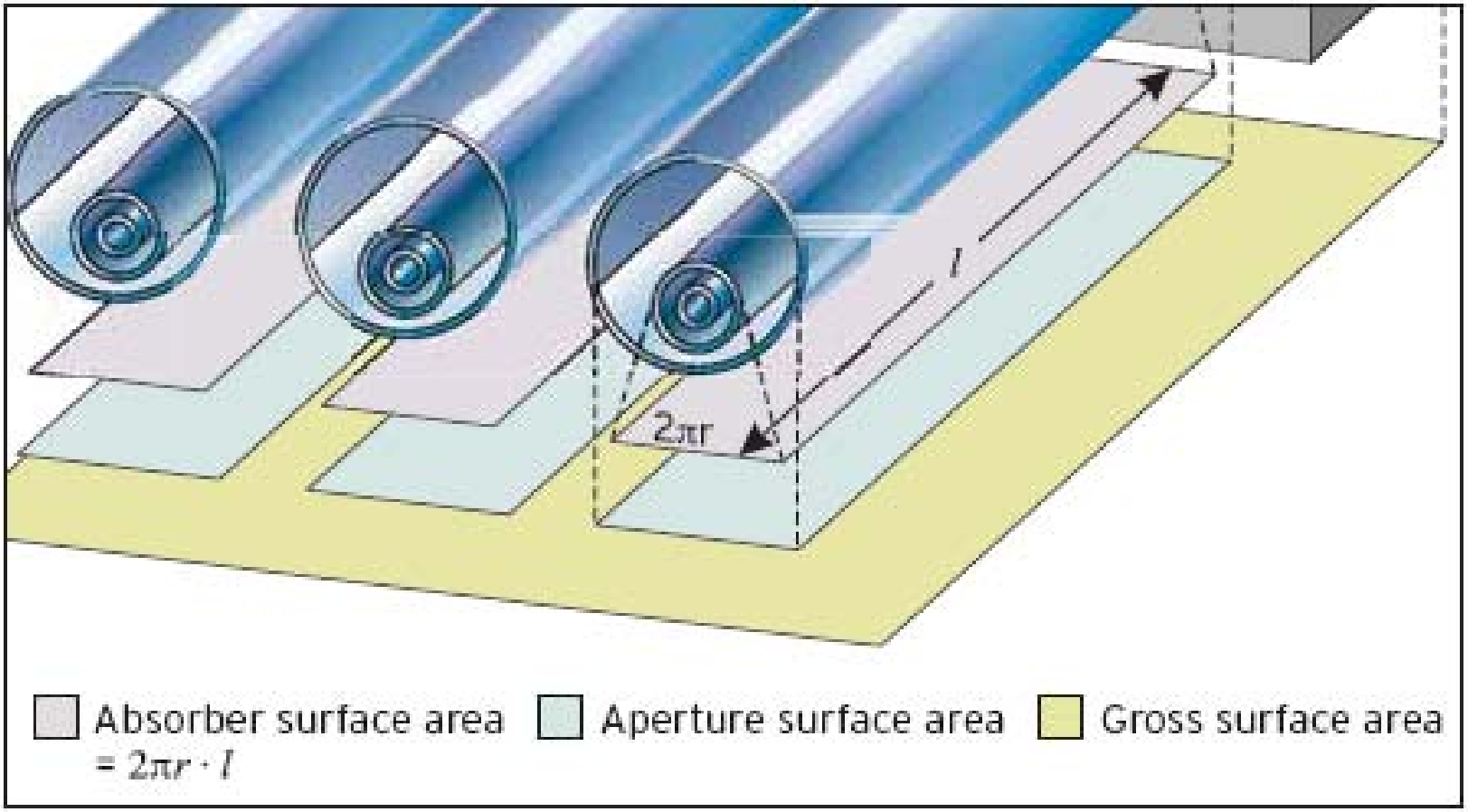


Source:Vaillant

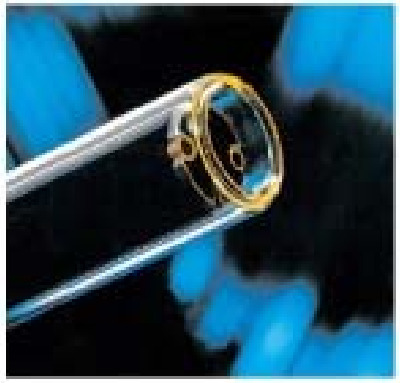
Vacuum tube collector

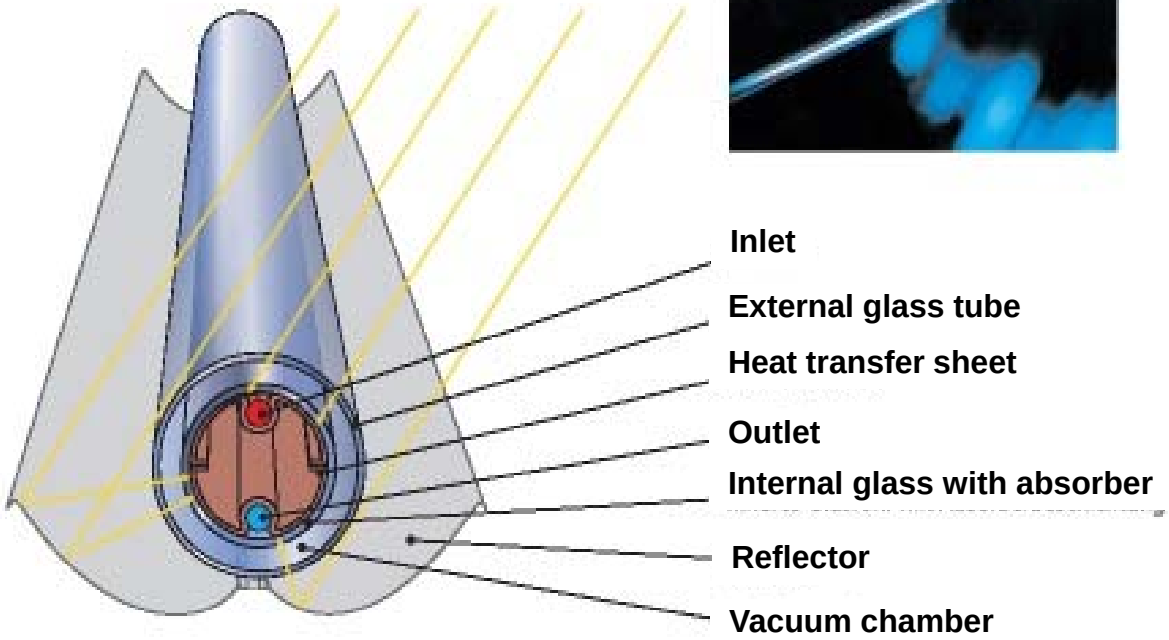


Vacuum tube collectors



Concentrated Parabolic Collector - CPC





Solar collector characteristics

Collector Type	Price	Performance (kWh/m²/year)	Typical use
Unglazed	Low	300	Pool heating
Flat plate (Black paint)	Mid	650	Pool heating, DHW
Flat plate (Selective absorber)	Mid	700	DHW, Space heating, Air conditioning
Vacuum tubes collector	Hi	850	Space heating, Air conditioning

Solar Key Mark

Way to guarantee the collector efficiency

-Randomly choose of the collector (Produce line or stored)

-Pass all the tests according to EN 12975/12976

-ISO certified production line

-Yearly inspection of the production line.

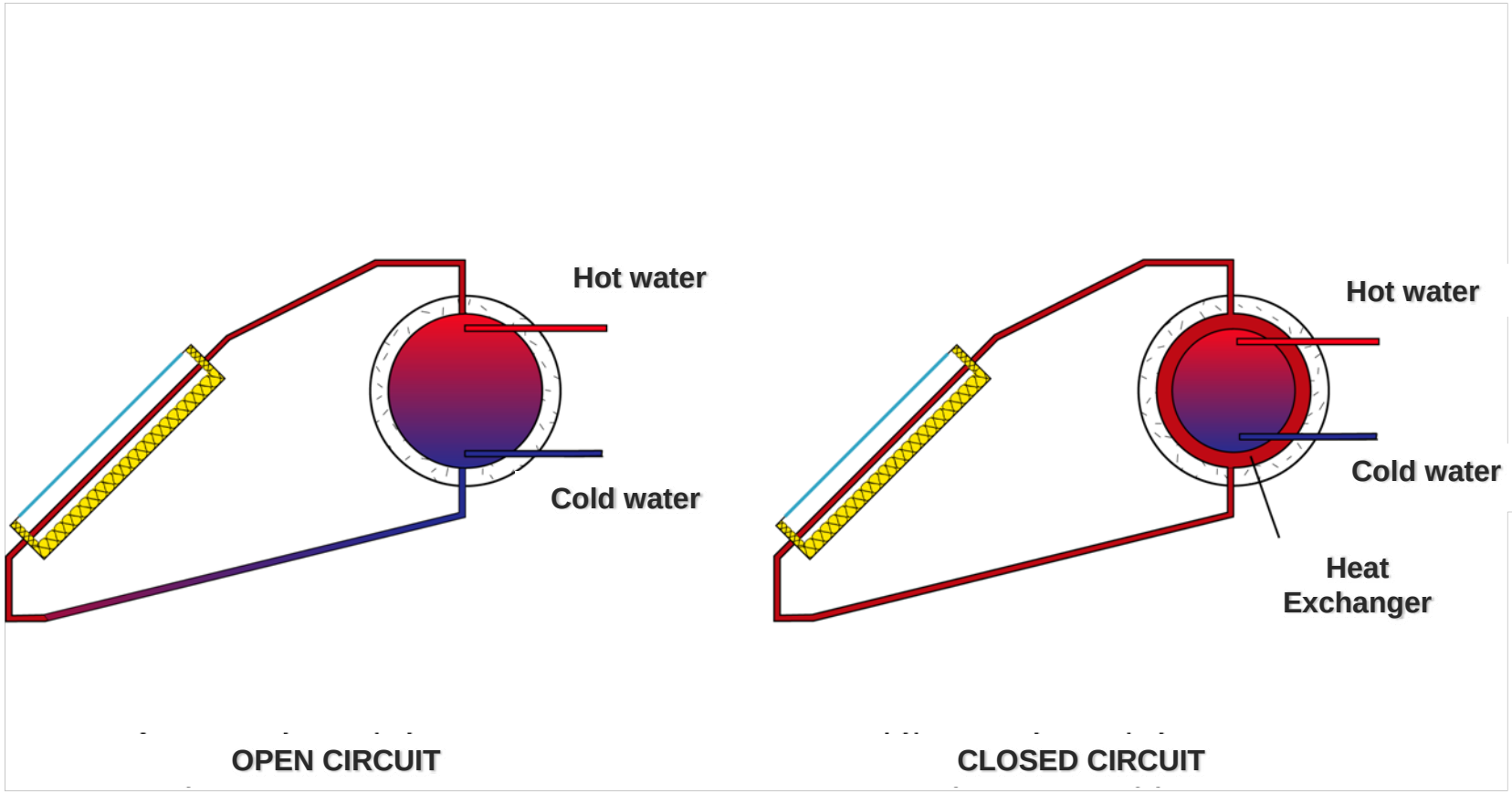
-Reinspection of the product every 2 years.

Domestic hot water heating

DHW heating system

Thermal solar systems

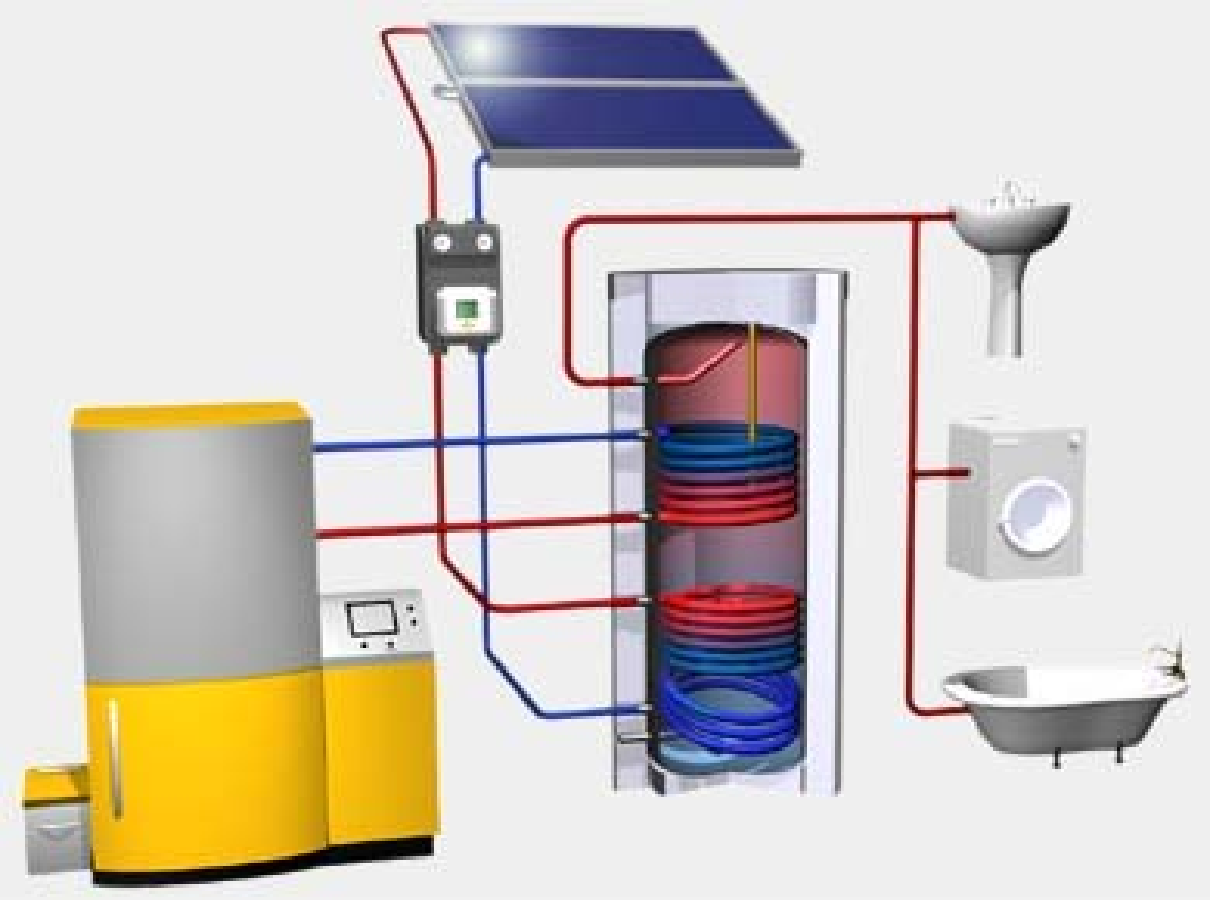
Thermosifonic



Source:Target/DGS

Thermal Soar Systems

Forced circulation



Source:IfaS

Combi Systems

– *Operational ways, characteristics and examples.*

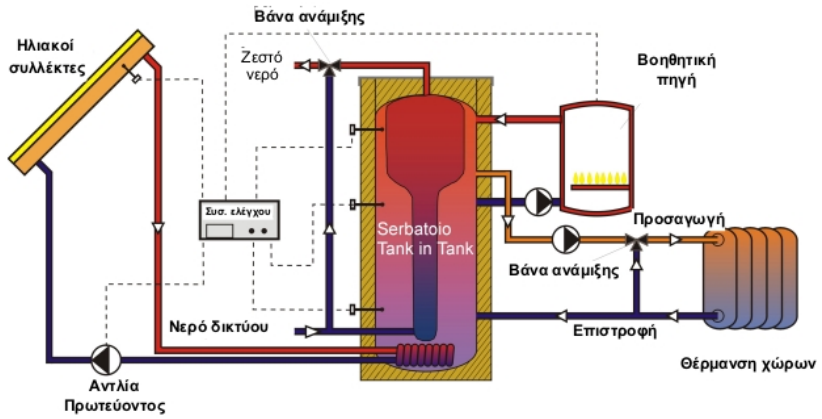
“Combi” Systems

General description

“Solar combisystems” or “combi”: Solar thermal systems used for DHW and space heating.

10 basic variations (International Energy Agency –IEA, Solar Combisystems, Solar Heating & Cooling Programme, Task 26).

"Combi" Systems
Properties



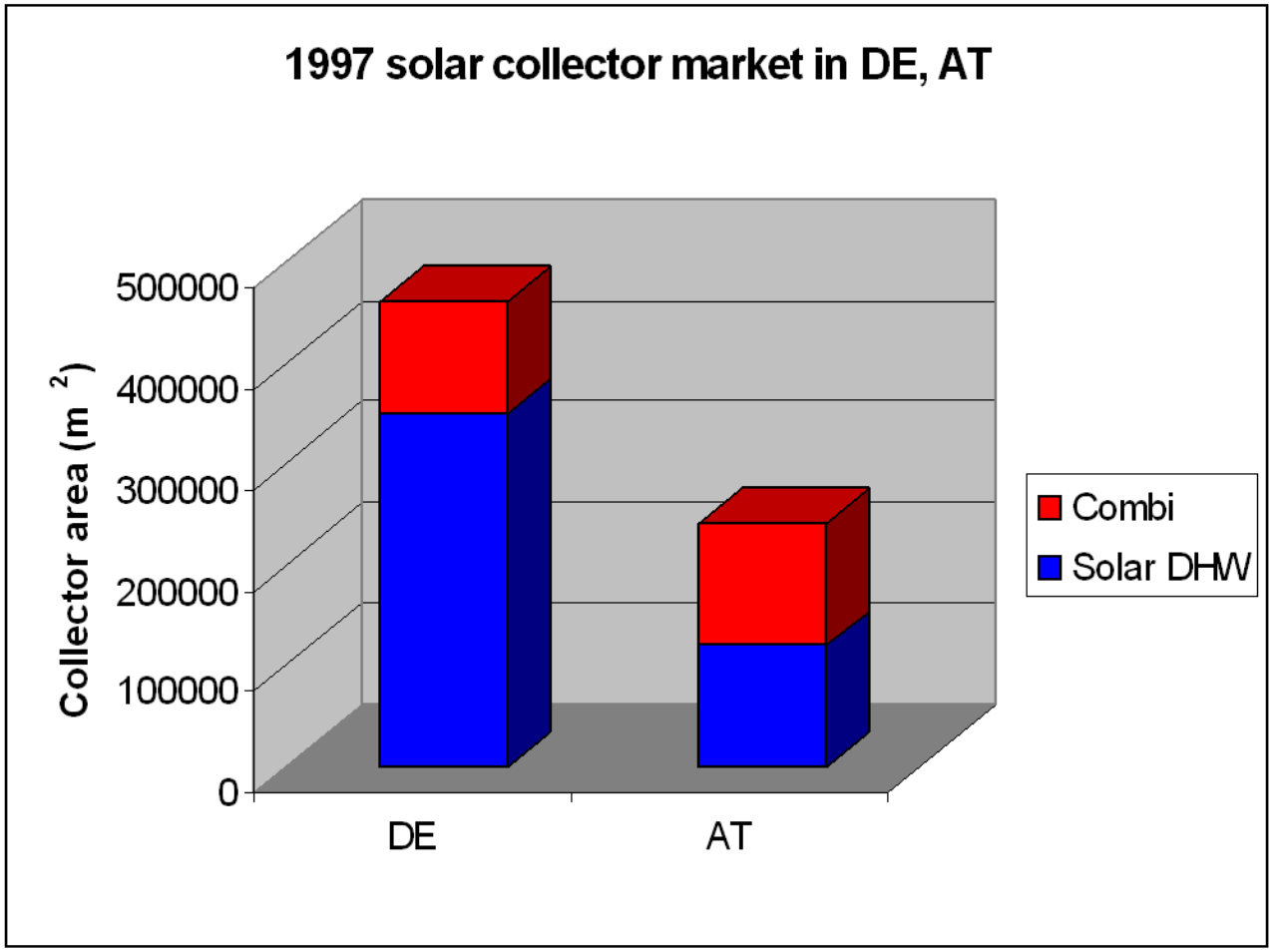
- High energy savings:
  - Introduction Solar technology in space heating
- Cost comparable with central solar systems.
- Possibility to combine with solar air condition units.

“Combi” systems

Advantages

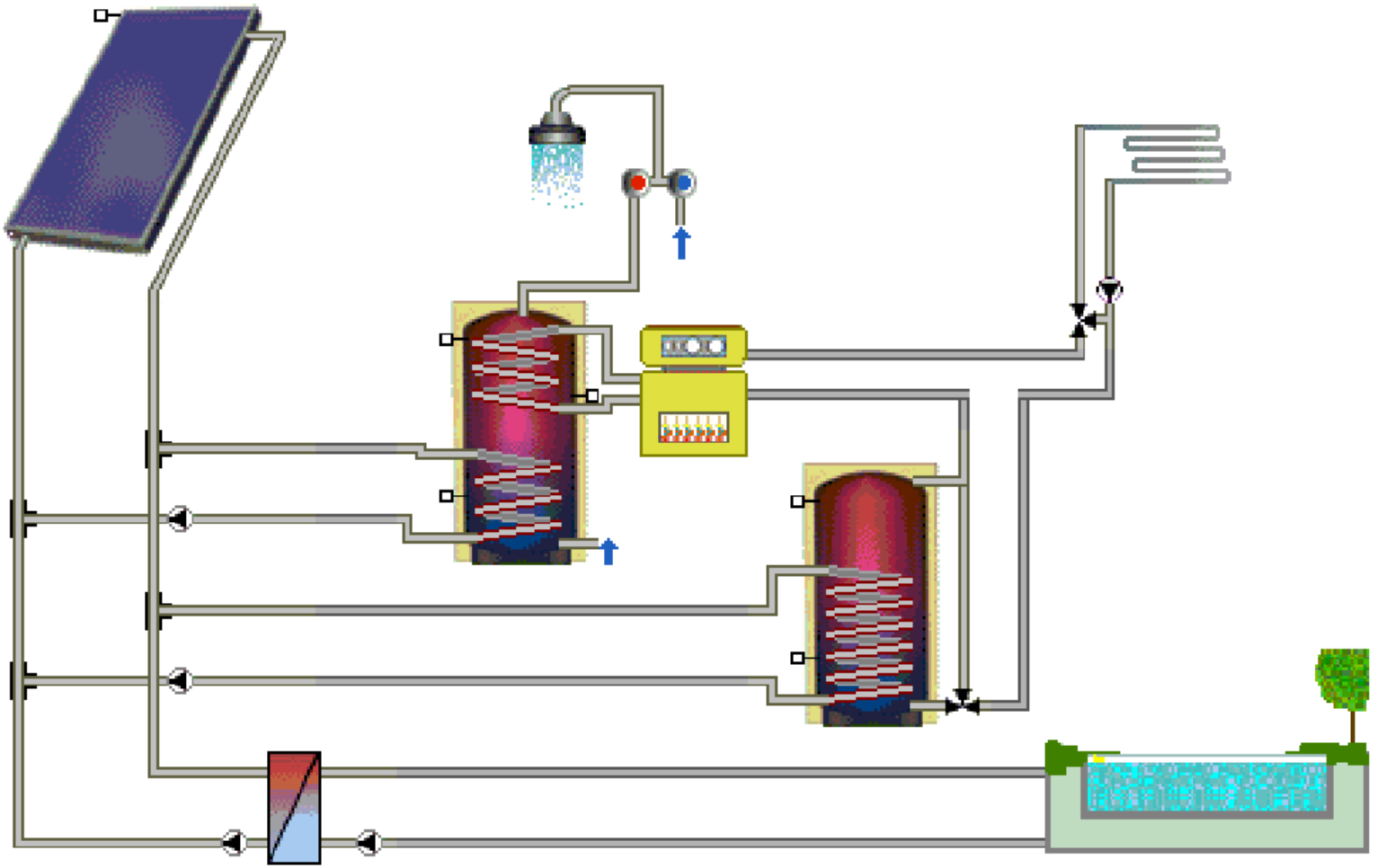
- Use at:
  - Homes
  - Hotels, Hospitals e.t.c.
  - Industry
- Already penetrated in European market
- Ability to cover high thermal load:
  - 30-50% only from sun
  - 100% (Combine with biomass)

Advanced market "Combi"



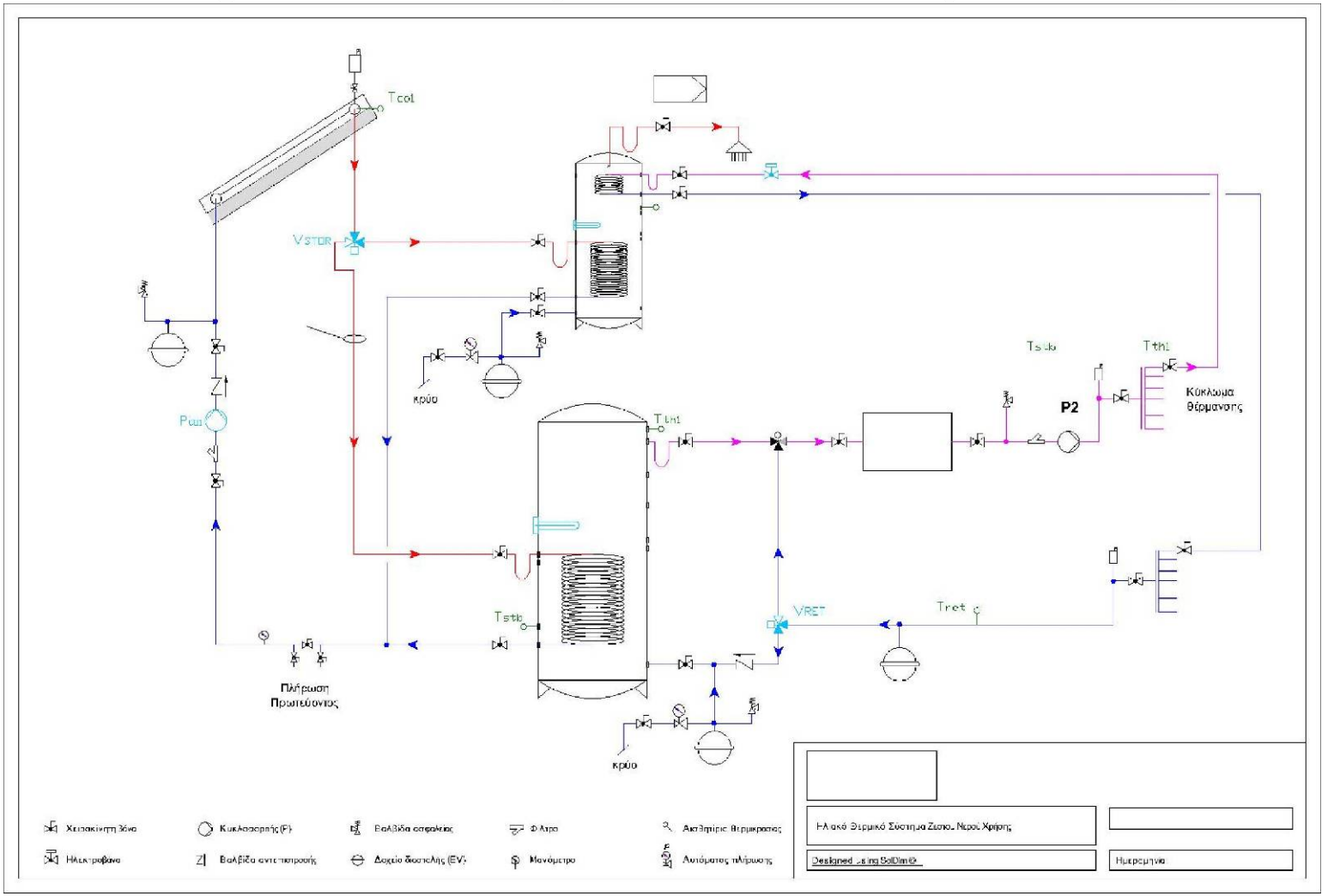
Combi Systems

Schematic diagram of a combi system for space heating, DHW and pool heating.

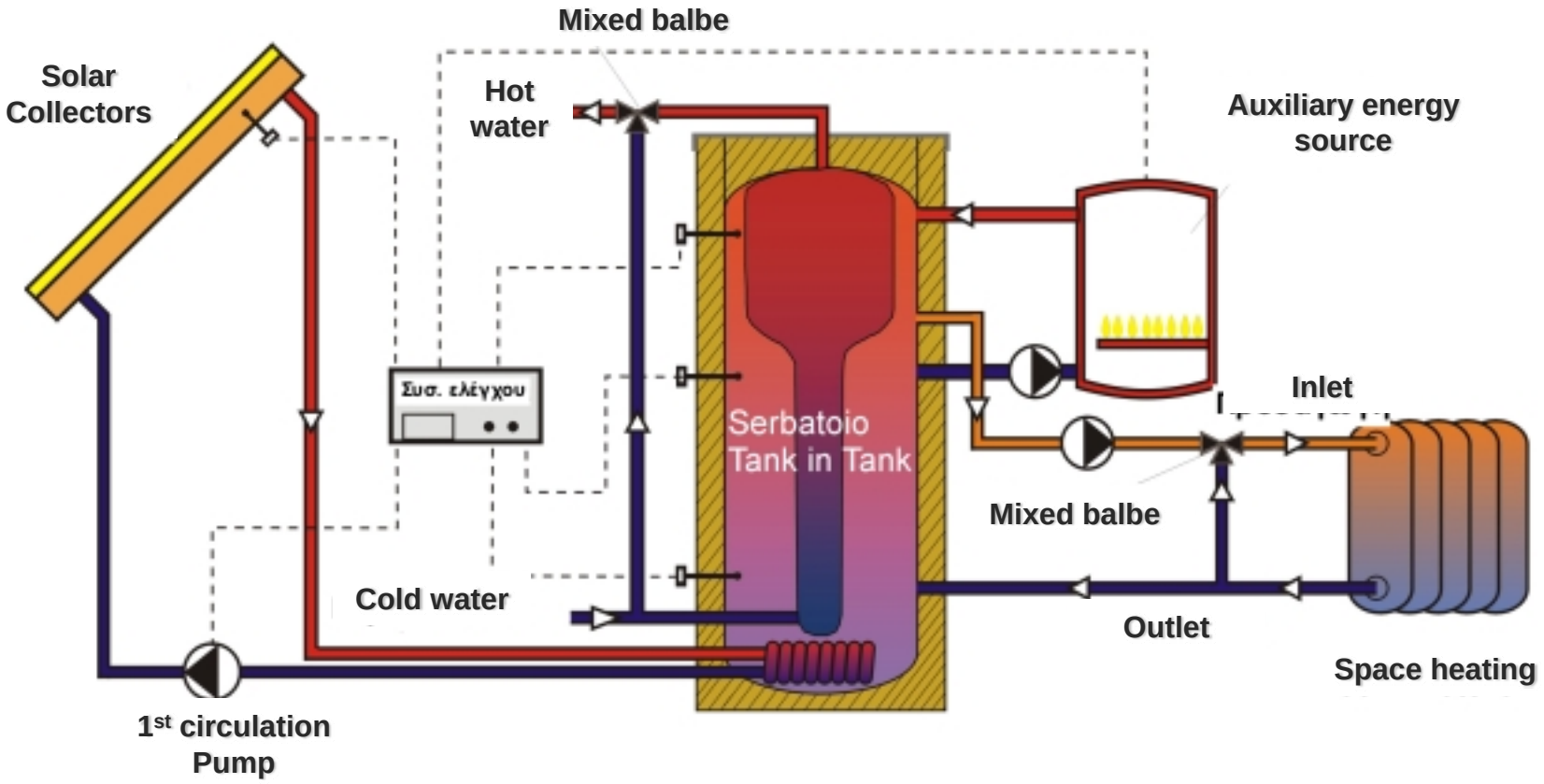


Combi System

Schematic diagram of a combi system for DHW and space heating



Combi Systems – tank in tank



“Combi” systems

Dimensioning

- Domestic Consumption (at 45°C):
  - Low Consumption: 20 - 30 l /person/day
  - Mid Consumption: 30 - 50 l /person/day
  - High Consumption : 50 - 70 l /person/day
  - Washing Machine: 20-40 l / washing
  - Dishwasher: 20 l / washing
  - Example house with 4 persons total

    4*40 = 160 l /day
- Storage tank for DHW = 0,7 - 1,5 x water requirement

  120-240lt storage tank
- Daily energetic load:
  - E = m x cp x (ΔT) =>
  - E = 160 l x 1,16 Wh/ (l K) x (45-15)K =>
  - E = 5.6 kWh
- Add energy required for space heating (about 70kWh/100m²)* coverage factor
  - E=70*0.4+5.6=33.6kWh
- Collector output: 1kWh/m² so 33.6/1=33.6m² collector area
- Space Heating Storage 40lt/m² collector = 1350lt

The installation of "SOLLET" project at C.R.E.S

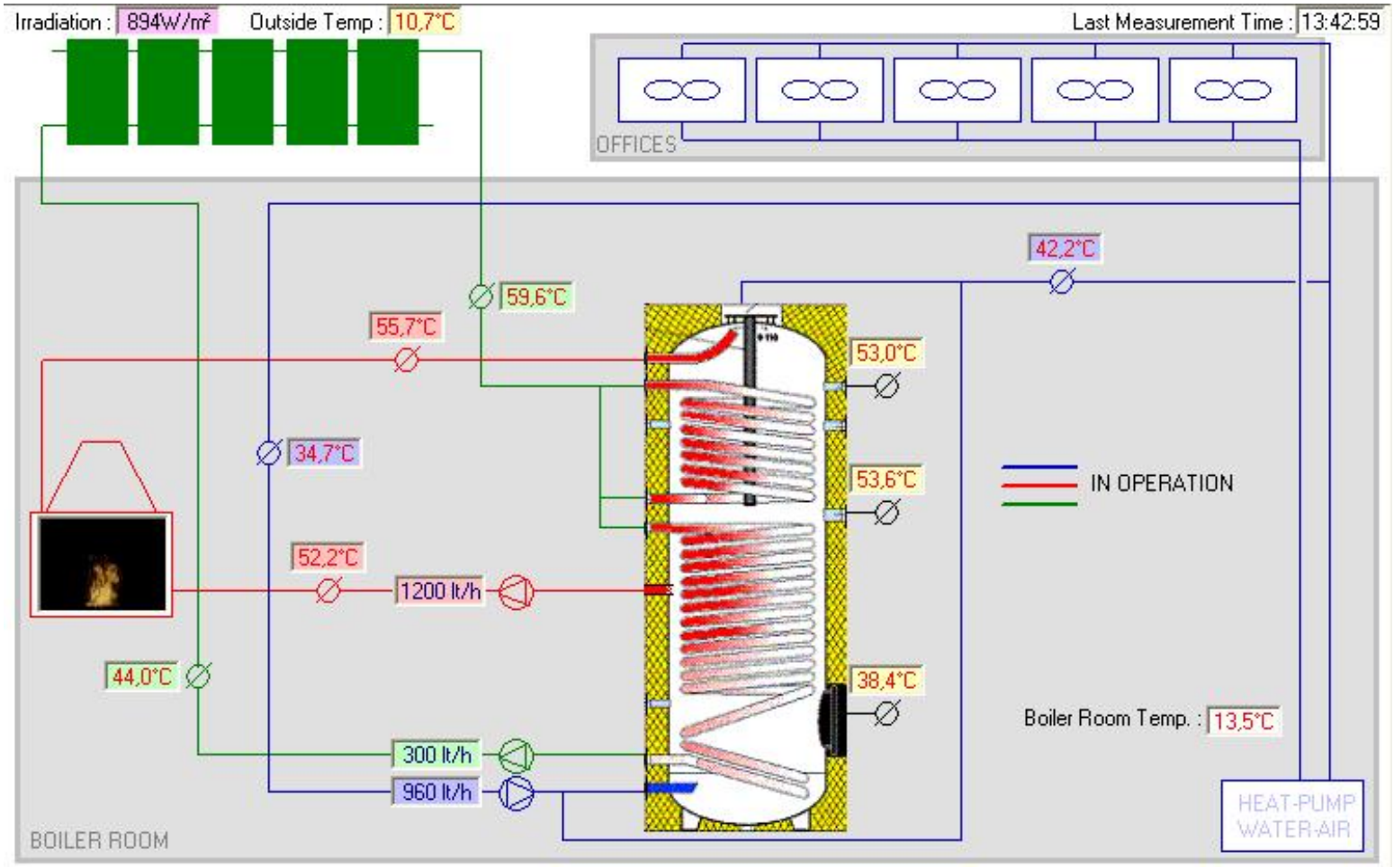
Heated Offices, 60m^2

Collector area, 13.5m^2

Storage tank, 500lt

Biomass burner, 35kW

Schematic diagram of the project



European project SOLLET (2):
Germany, House, Dormagen

Solar Collectors

- ***Heating area 400m²***
- ***Pellets burner 10 KW with heat exchanger air/water***
- ***Fire place 10 KW with air/water heat exchanger***
- ***105 m² collector area.***
- ***Water tank 3000 l***
- ***Auxiliary heating system with natural gas.***

Backup fire place

European project SOLLET (3):
Germany, House, Cologne

- ***Heating area 140m²***
- ***Pellets burner 10 KW with heat exchanger air/water***
- ***28 m² collector area***
- ***Water tank 1000 l***

Solar collectors

Pellet Burner

Combi : Home (FR)

Source: IEA Task 26

Combi : Apartments (AT)

Source: GSWB

Combi : Apartments – Solar village (GR)

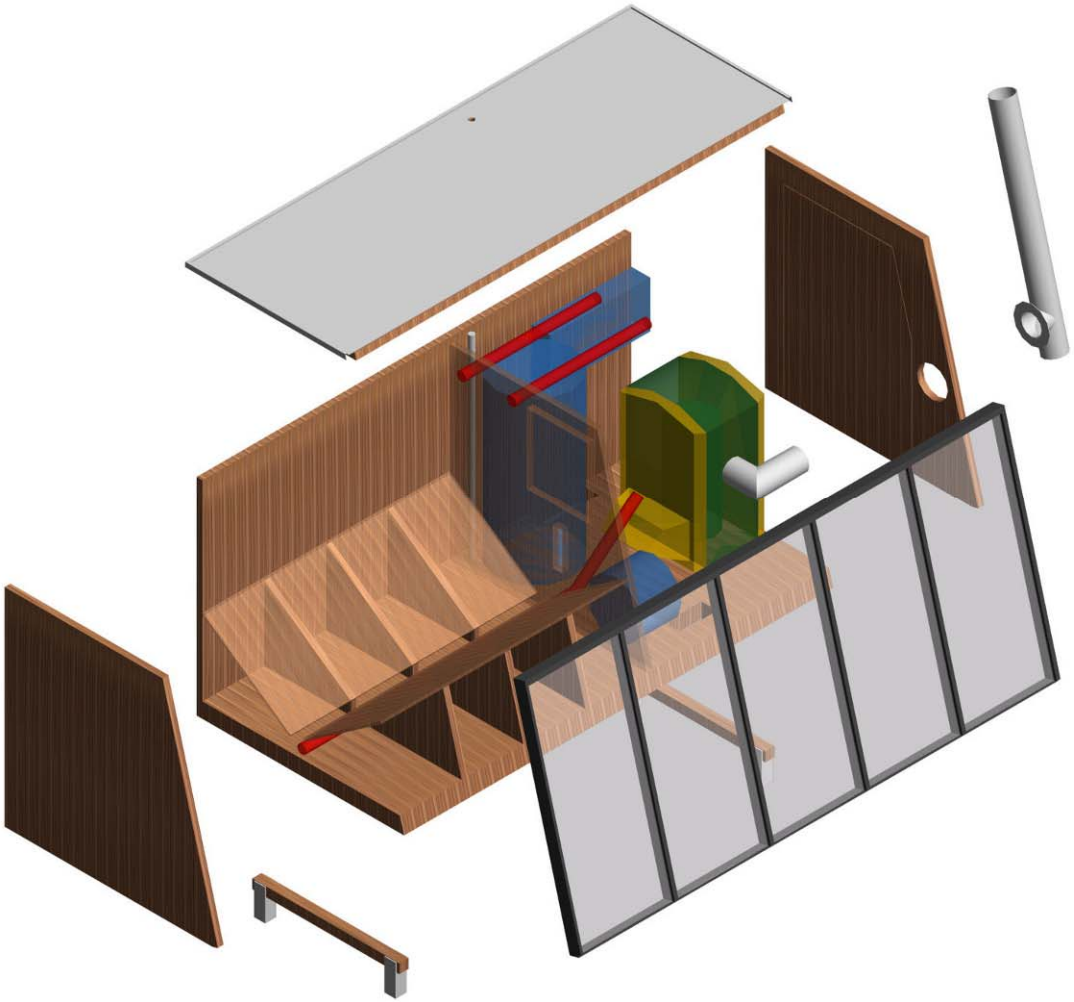
Ready Made Systems

Καυστήρας Pellet

Source: Buderus

Compact Systems:
Plug n' play

Compact systems:
Plug n’ play



General Observations

- Solar heating systems can be combined with conventional space heating systems – Integration with already installed systems.
- Combination with solar chillers to cover cooling loads (Use of excess energy).
- Cost: ≈400€/m²
- Collector area: 28% of the heated area for 40% load coverage (ex. 28m² flat plate collectors for 100m² house).
- Hot water Storage Volume: 10x heated area
  (1000lt tank for 100m² house)
- Must give emphasis at planning.
  ex. Dimensioning of expansion tank of solar circuit. (stagnation temperatures).

European Solar Thermal markets

Estimation of Solar (thermal) Potential in Europe

Bucharest, 29 October 2009

Pedro Dias- ESTIF Deputy Secretary General

European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

Introducing ESTIF

- European Solar Thermal Industry Federation
- Representing the solar heating and cooling sector at EU level
- 100 members, representing >95% of the market
- A founding member of EREC
- Based in the Renewable Energy House, Brussels

European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

Thanks!!!

This conference is supported by the European Commission under their Intelligent Energy-Europe Programme

Intelligent Energy Europe

TranSolar Transfer of experience for the developement of Solar thermal products

The sole responsibility for the content of this presentation lies with the authors. It does not necessarily reflect the opinion of the European Communities. The European Commission is not responsible for any use that may be made of the information contained therein.

European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

Solar Thermal Potential in Europe

- Renewable Heating and Cooling
- Innovation
- Market Development
- Executing the potential

European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

Renewable Heating and Cooling

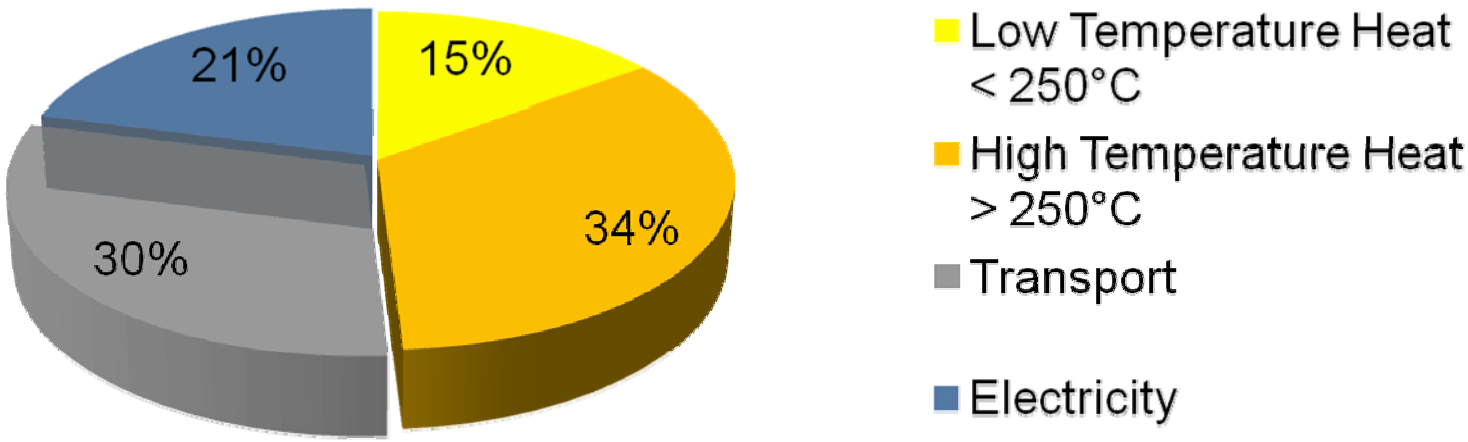
- Includes
  - Solar Thermal
  - Geothermal
  - Biomass
- Represents 49% of the total energy consumption in EU27
- Solar Thermal Energy ≠ Solar (Thermal) Power

European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

Total Final Energy Consumption in EU 27 and share of heat - 2006

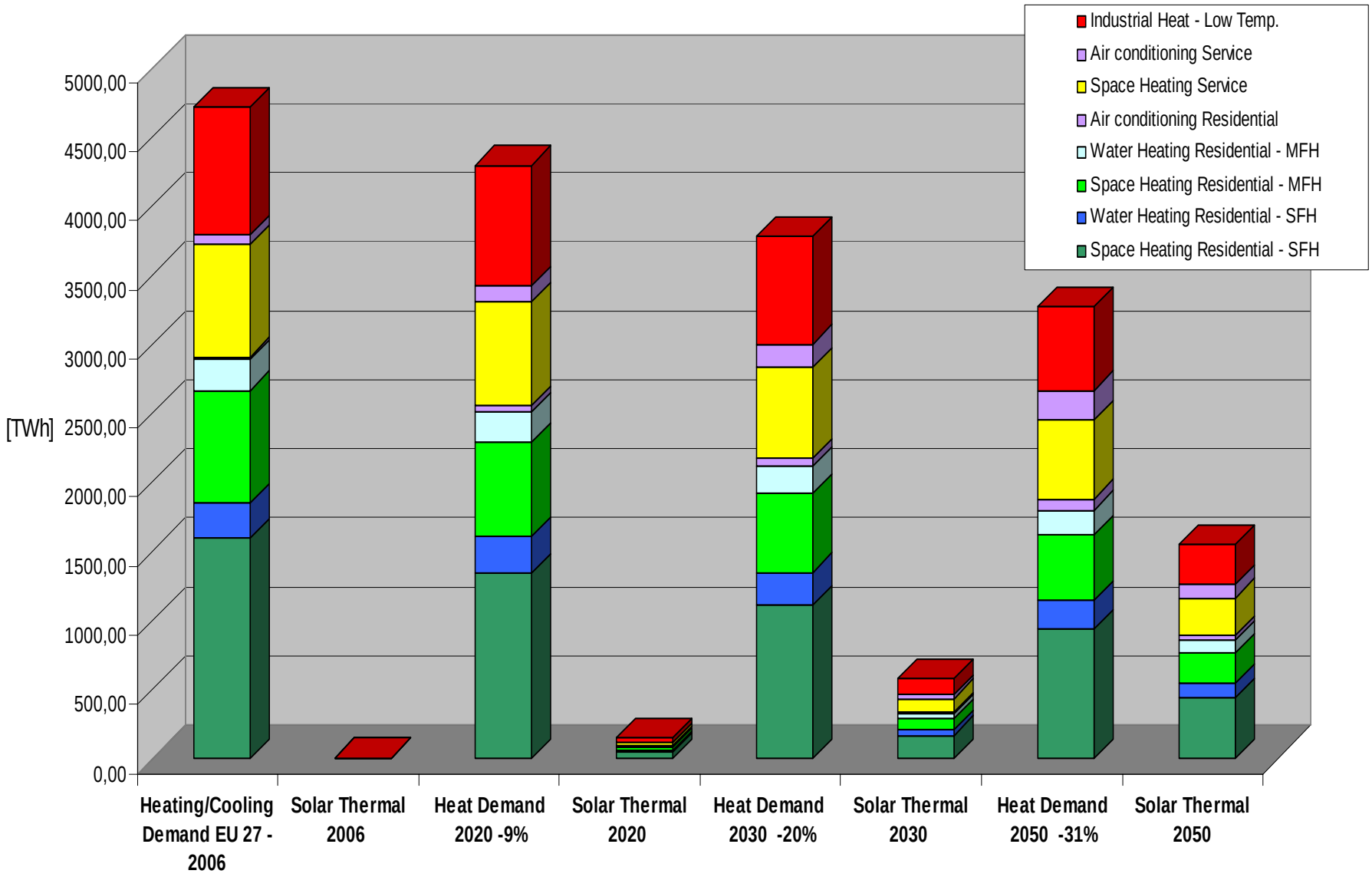
[Total: 13,609 TWh]



European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

Contribution of Solar Thermal to the EU 27 Heating and Cooling Demand by Sector



Innovation

- Much more than …
  …Domestic Hot Water
- Or even
- Space Heating (Combi Systems)

Velux/ESTIF

It's also…

» Industrial Process Heat
» Solar Cooling
» Water Treatment (desalination)

S.O.L.I.D./ESTIF

European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

New applications

- Much more than …
  …conventional add-on approach *(on-roof mounting)*

It's also…

New and developed forms of integration into the buildings

European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

Integrating solar thermal into buildings

European Solar Thermal Industry Federation

Integrating solar thermal into buildings

European Solar Thermal Industry Federation

Market Development

- A booming market
  - Strong industry
  - Constant steady growth
  - Huge growth potential

European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

A strong and growing industry

- 3.3 GWth of newly installed capacity in 2008
- 19 GWth of capacity in operation
- Turnover above 3.000 mEUR/year
- 40.000 full time jobs (most in small and medium size installation businesses)

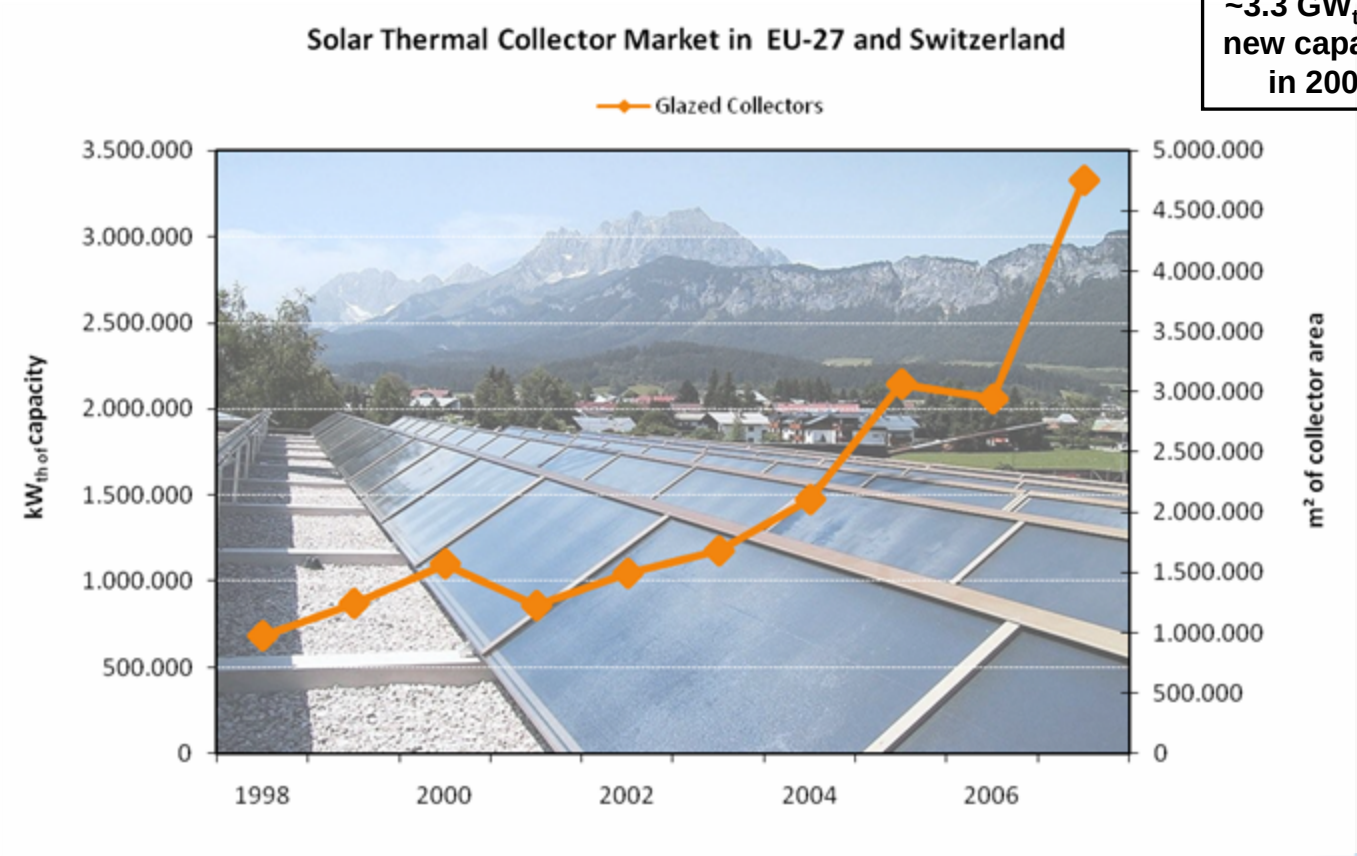
GASOKOL/ESTIF

European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

EU Solar Thermal market 1990-2008

~3.3 GW_{th} of new capacity in 2008



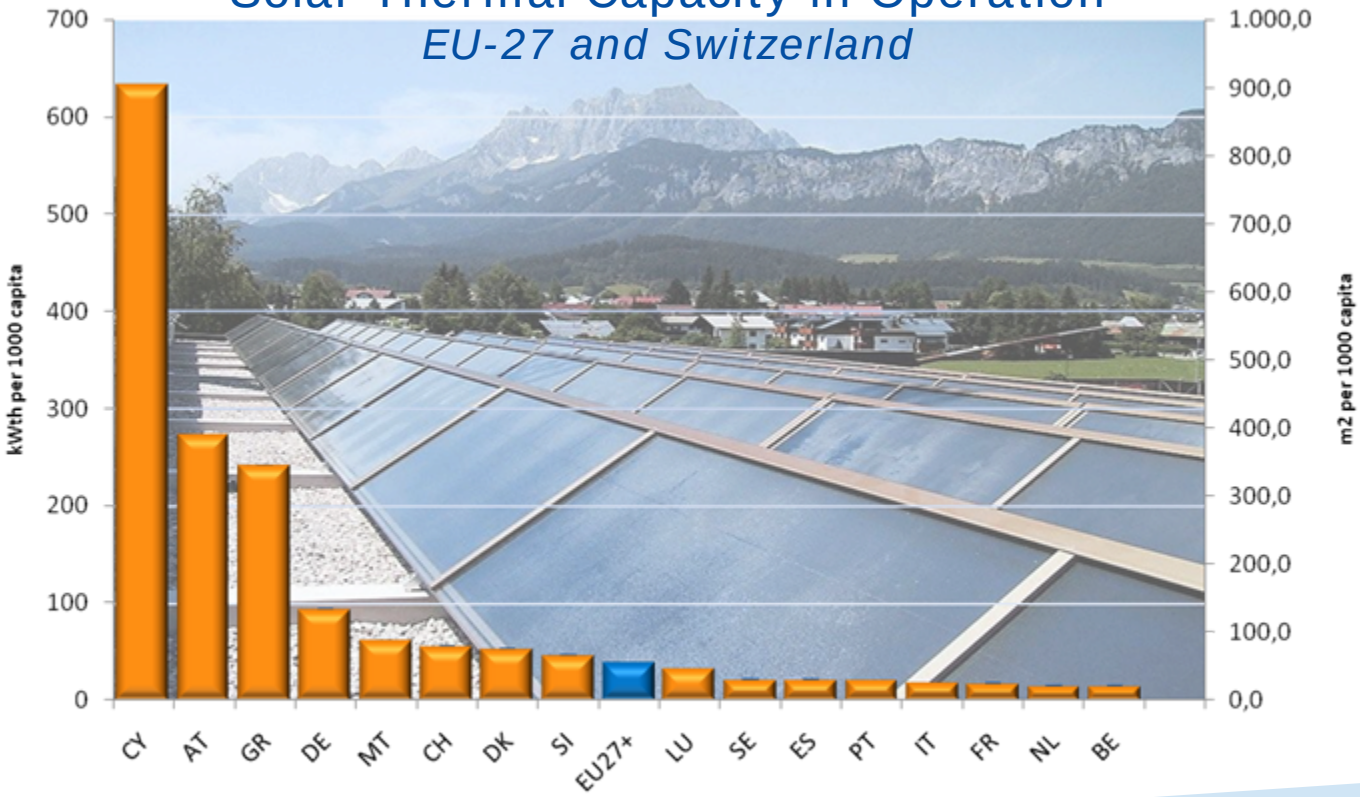
European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

Great potential for Growth

Solar Thermal Capacity in Operation

EU-27 and Switzerland



Glazed collectors in kW_{th} and m^2 and per 1000 capita

European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

Future development and potential

- Forthcoming study shows:
  - Heating and cooling responsible for almost 50% of final energy demand in Europe; 75% of this in low-temperatures
  - 50% of low-temperature heating and cooling could come from solar thermal (long-term)
  - >450 000 sustainable full-time jobs could be created by 2020

Wagner & Co/ESTIF

European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

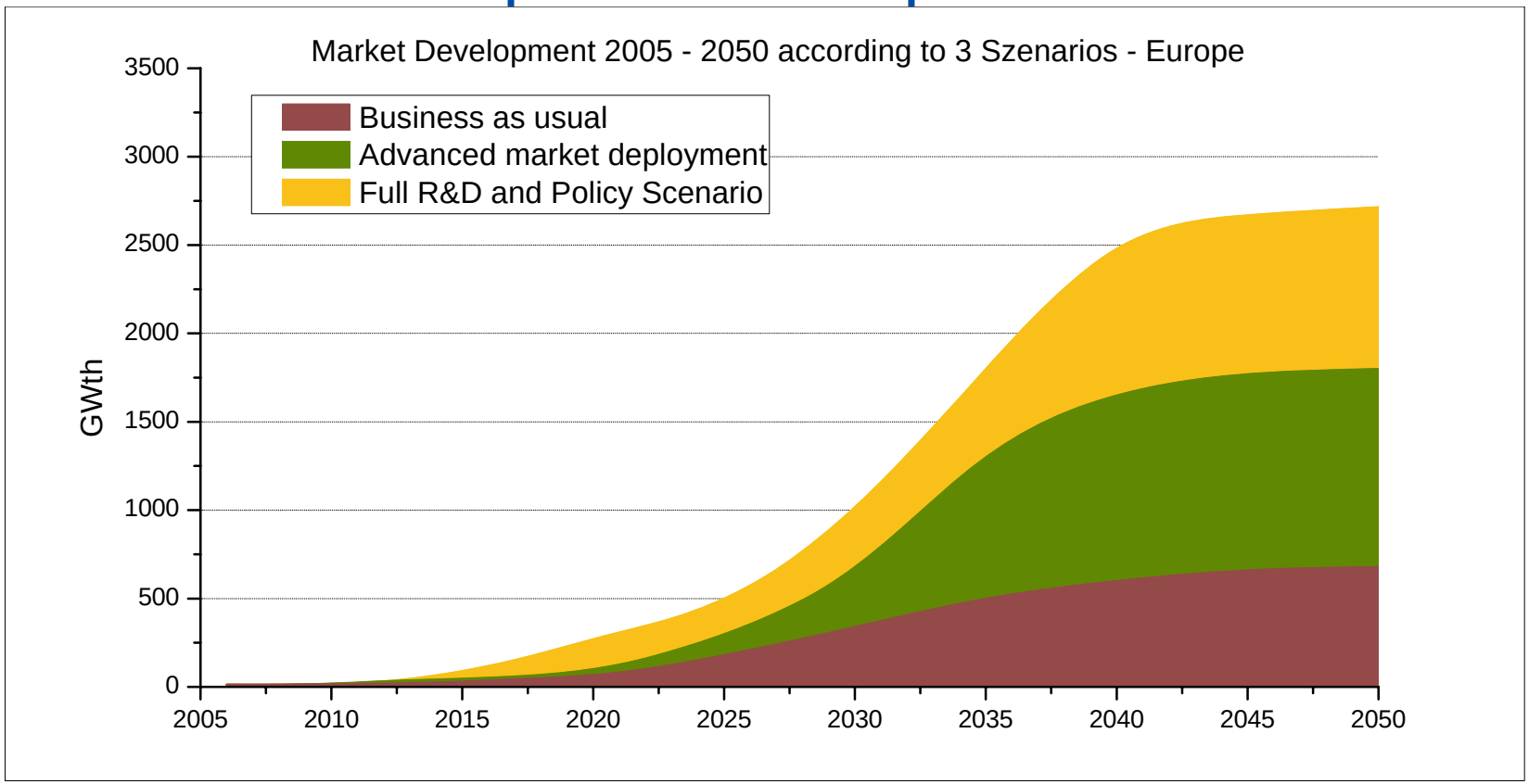
Solar Thermal Potential Study

- 3 milestones
  - 2020 / 2030 / 2050
- 3 Scenarios
  - BAU: Business as Usual
  - AMD: Advanced Market Deployment
  - RDP: Full R&D and Policy

European Solar Thermal Industry Federation

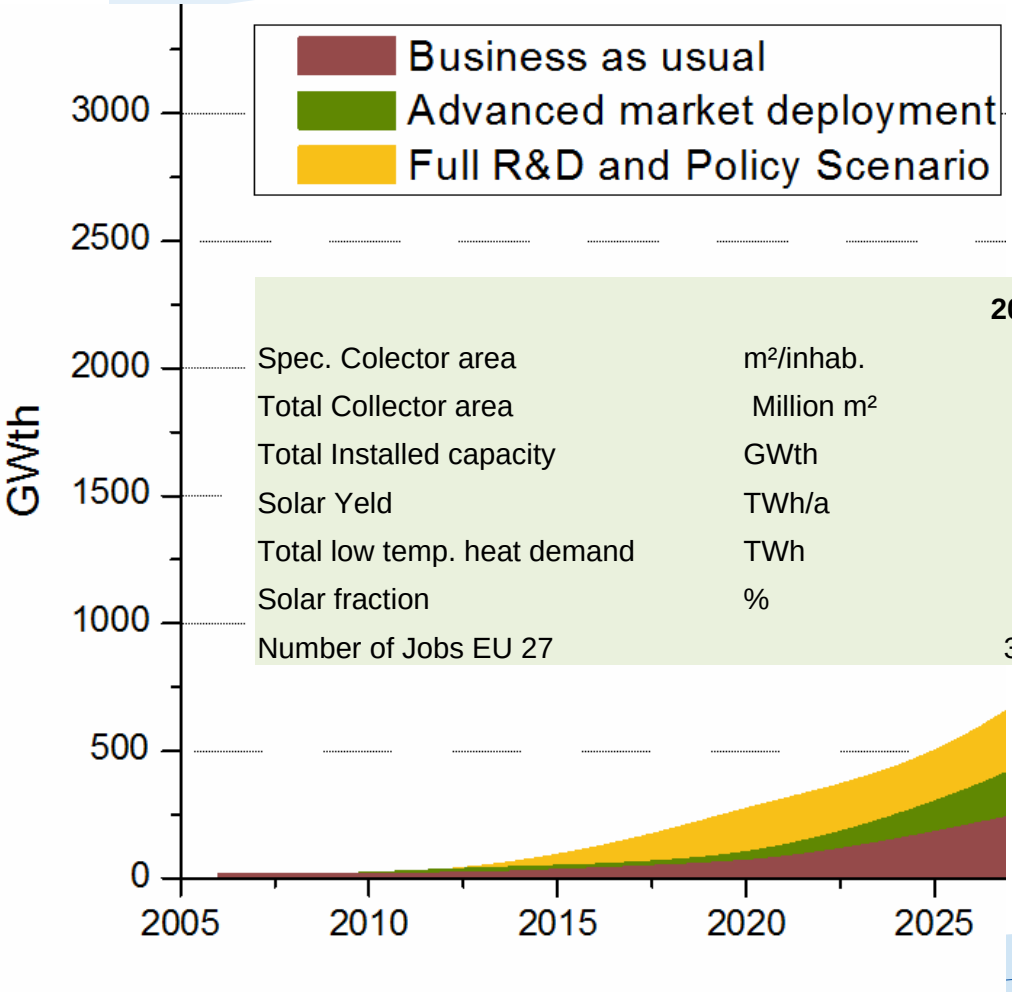
Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

Future development and potential



European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org



		2006	2020 BAU	2020 AMD	2020 RDP
Spec. Colector area	m²/inhab.	0,04	0,2	0,3	0,8
Total Collector area	Million m²	20,25	97	145,5	388
Total Installed capacity	GWth	14,17	67,9	101,9	271,6
Solar Yeld	TWh/a	8,5	38	59	155
Total low temp. heat demand	TWh	4715	4715	4506	4297
Solar fraction	%	0,18%	0,81%	1,31%	3,61%
Number of Jobs EU 27		31.400	46.900	103.200	470.000

European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

Executing the potential

- Promoting Market Growth
  - Ambitious National Targets
  - Coherent measures
  - European approach (...Solar Keymark...)
  - Not an EU exclusive
  - Not only at National level

- Transposing to National legislation the 'Renewables Directive' (20/20/20)

European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

Ambitious Targets & Coherent Measures

European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

European Solar Thermal Markets

- Awareness Raising
  - Accessible technology
  - Practical/effective
  - Not miraculous

European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

European Solar Thermal Markets

- Financial Incentives
  - Continuity
  - Coherence of parameters
  - Clear target
  - Quality criteria
  - Monitoring and evaluation
  - Financial resources
  - Simplicity
  - Flanking measures – alone not enough!!!

European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

European Solar Thermal Markets

- Financial Incentives
  - Options in place
    - Grants
      - Most of the countries (per sqm, per system)
    - Tax reductions
      - France
    - Loans at reduced rates
      - Germany (building renovation)

European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

European Solar Thermal Markets

- Regulations
  - Solar ordinances (Barcelona model)
  - Energy perfomance of buildings
    - Efficiency and renewables

  www.solarordinances.eu
- Training
  - Quality assurance – sustainability
  - Efficiency and satisfaction
  - Local jobs

  www.qualicert-project.eu

European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

Ambitious Targets & Coherent Measures

European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

Useful Links

- Renewables Directive

  REPAP 2020

  www.repap2020.eu

- Financial Incentives

  www.estif.org/

- Regulations

  www.solarordinances.eu

- Training

  www.qualicert-project.eu

European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

Please do not hesitate to contact me:

- European Solar Thermal Industry Federation (ESTIF)
  Renewable Energy House
  Rue d'Arlon 63-67
  B-1040 Brussels

  Tel: +32 2 400 10 80
  Fax: +32 2 546 19 39

  Email: pedro.dias@estif.org
  Website: www.estif.org

European Solar Thermal Industry Federation

RES Directive

Implementation of the RES-D at National Level in European Member States (solar thermal perspective)

Bucharest, 30 October 2009

Pedro Dias- ESTIF Deputy Secretary General

European Solar Thermal Industry Federation

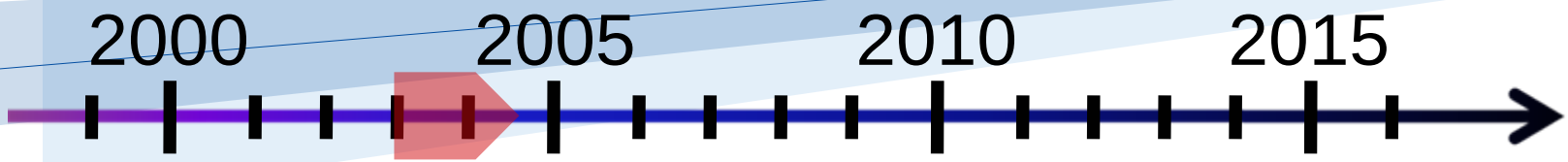
Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

Proposed agenda

- Overviewof the RES-Directive
  - Process
  - Goals
  - Next steps
- Main concepts
- Your oportunity
- Following stage: National lobbying
- Current status

European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

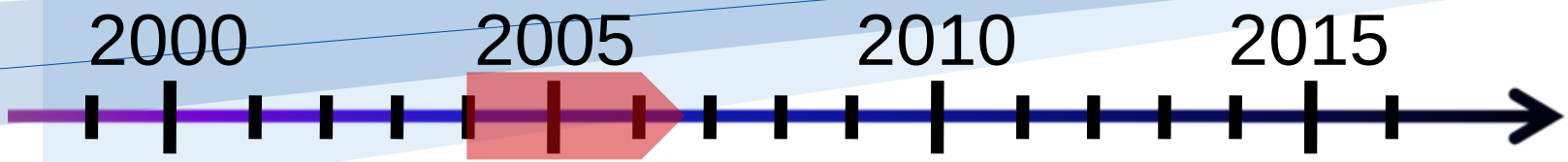


The RES-Directive: Process

- RES-E Directive (2001)
- Biofuels (RES-T) Directive (2003)
- In 2003, ESTIF starts campaign for RES-H Directive
- 2004/2005: Joint Declarations
  - specific target(s) + monitoring (reliable statistics)
  - coherent support policies
  - removal of administrative barriers
  - R&D

European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

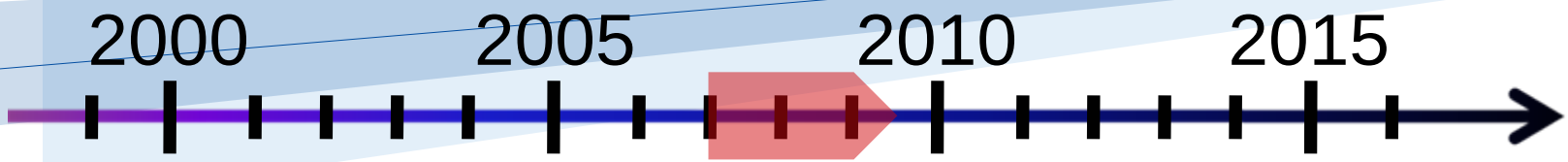


The RES-Directive: Process

- 2004: Supporting arguments from European Commission – ”extra action needed in [the heating and cooling] sector”
- 2006: Support from European Parliament (Rothe-Report) – call for a RES-H Directive
- Commission works out draft (unpublished)
- Member States against separate Directive

European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org



The RES-Directive: Process

- 2007: Commission and Member States agree on overall RES-Directive
- Heads of States of MS agree on binding 20% RES target for 2020
- 2008: Commission publishes RES-Directive proposal
- 2009: Adoption of RES-Directive
- 06/2009: Commission agrees National Action Plan templates

European Solar Thermal Industry Federation

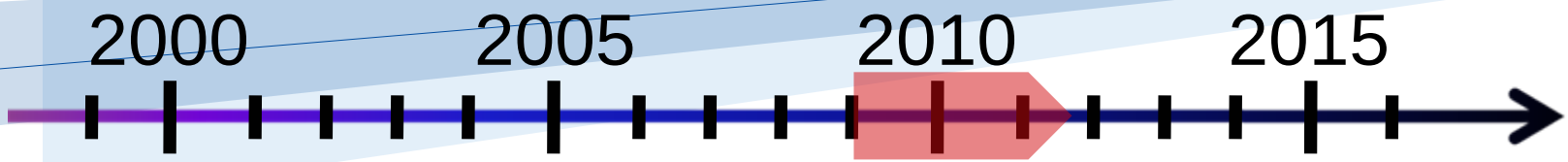
Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

RES-Directive: Main goals

- 20% RES-target by 2020
- Mandatory national targets; indicative trajectory
- national Renewable Energy Action Plans:
  „shall set out Member States' national targets for the shares of energy from renewable sources in transport, electricity and heating and cooling in 2020" ... "adequate measures to be taken to achieve these national overall targets"

European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org



The RES-Directive: Next steps

- 12/2009: Member States forecast excess production of RES
- 06/2010: Member States publish National Action Plans
- 12/2011: Member States report on progress

European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

Main concepts:
Binding targets/effective measures

- Article 3
  "Each Member State shall ensure that the share of energy from renewable sources [...] in gross final consumption of energy in 2020 is at least its national overall target for the share of energy from renewable sources [...]."

  "Member States shall introduce measures effectively designed to ensure that the share of energy from renewable sources equals or exceeds that shown in the indicative trajectory."

European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

Main concepts:
Binding targets/effective measures

A. *National overall targets*

	Share of energy from renewable sources in gross final consumption of energy, 2005 (S_{2005})	Target for share of energy from renewable sources in gross final consumption of energy, 2020 (S_{2020})
Belgium	2,2 %	13 %
Bulgaria	9,4 %	16 %
(…)		
Portugal	20,5 %	31 %
Romania	17,8 %	24 %
Slovenia	16,0 %	25 %

European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

Main concepts:
Reporting about progress

- Article 22
  "Each Member State shall submit a report to the Commission on progress in the promotion and use of energy from renewable sources by 31 December 2011, and every 2 years thereafter."

European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

Main concepts:
RES obligation in buildings

- Article 13.4
  "By 31 December 2014, Member States shall, in their building regulations and codes or by other means with equivalent effect, where appropriate, require the use of minimum levels of energy from renewable sources in new buildings and in existing buildings that are subject to major renovation."

European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

Main concepts:
Examplary role of public bodies

- Article 13.5:
  “Member States shall ensure that new public buildings, and existing public buildings that are subject to major renovation, at national, regional and local level fulfil an exemplary role in the context of this Directive from 1 January 2012 onwards. “
- Article 13.3:
  “Member States shall, in particular, encourage local and regional administrative bodies to include heating and cooling from renewable energy sources in the planning of city infrastructure, where appropriate."

European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

Main concepts:
Link to standards & certification

- Article 13.2:
  "Where European standards exist, including eco-labels, energy labels and other technical reference systems established by the European standardisation bodies, such technical specifications shall be expressed in terms of those standards. Such technical specifications shall not prescribe where the equipment and systems are to be certified and should not constitute a barrier to the operation of the internal market."

European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

Main concepts:
Information on support measures

- Article 14.1:
  “Member States shall ensure that information on support measures is made available to all relevant actors, such as consumers, builders, installers, architects, and suppliers of heating, cooling and electricity equipment and systems and of vehicles compatible with the use of energy from renewable sources."

European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

Main concepts: Training/certification of installers

- Article 14.3:
  "Member States shall ensure that certification schemes or equivalent qualification schemes become or are available by 31 December 2012 for installers of small-scale biomass boilers and stoves, solar photovoltaic and solar thermal systems, shallow geothermal systems and heat pumps."

European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

RES-Directive: Your opportunity!

- „European“ work paved the way: it‘s on paper!
- Now depends on national implementation:
  - fast/slow
  - clear or vague
  - ambitious or fall behind
  - effective or badly implemented

European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

RES-Directive: Your opportunity!

NEEDED:

- national engagement of main actors
  - Solar thermal
  - All Renewables
- exchange of information between national associations
- ESTIF & EREC to contribute expertise

European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

Following stage: NATIONAL LOBBYING

- Identification of key priorities
- Formulate concrete positions – exchange with other sectors & countries
- Identification of possible allies
- Lobby decision makers and those who influence them!

European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

Current status

- Do you know the status of implementation in Romania?
- Which part of the government is in charge?
- Are you directly/indirectly involved?
- What will you do after this workshop?

European Solar Thermal Industry Federation

Rue d'Arlon 63-67 • B-1040 Bruxelles • Belgium • Email: info@estif.org • Web: www.estif.org

Please do not hesitate to contact me:

- European Solar Thermal Industry Federation (ESTIF)
  Renewable Energy House
  Rue d'Arlon 63-67
  B-1040 Brussels

  Tel: +32 2 400 10 80
  Fax: +32 2 546 19 39

  Email: pedro.dias@estif.org
  Website: www.estif.org

European Solar Thermal Industry Federation

Solar Keymark in Europe

DI (FH) Gundula Tschernigg
AIT – Austrian Institute of Technology

What may have the following things in common?

- floor heating
- waste water pipe
- thermal insulation
- cast iron pipes
- sun glasses
- ladders

- They may **fulfil** the requirements of the relevant **European Standards**
- They may be produced in a factory where an **quality management** is implemented.
- Both aspects are **controlled by an independent party** periodically**.**

- So they can be granted are **Keymark**

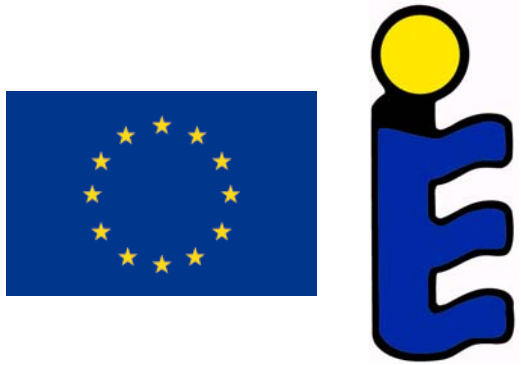
KEYMARK

- The Keymark is the pan-European voluntary third-party certification mark, demonstrating to users and consumers that a product is in conformity with the relevant European Standard.

- At the moment **25 certification bodies** located in 15 different European countries already operate Keymark schemes on the basis of almost **150 European Standards** for 28 product groups.

- The Keymark should not be confused with CE marking.

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung



.. the key to the European market!

What is the “**SOLAR**” Keymark?

- CEN/CENELEC European Mark Scheme, called also a KEYMARK Scheme specially for
- Solar thermal collectors (EN12975)
- Factory made solar thermal systems (EN12976)

- Product certification
- independent factory inspection / QMS (periodically)
- independent testing according to EN standards (test samples to be sampled by independent inspector)
- biannual “surveillance test”, detailed inspection of products

The Solar Keymark History

- Before 2003: If you wanted to sell one collector to different countries in Europe, you had to undergo several different tests and gain additional certificates and approvals.

  = very complicated, expensive and cumbersome

- → in 2003 the European Solar Thermal Industry and major testing institutes formulated the Solar Keymark Scheme rules

- **major goal:** to reduce the wild growth of testing requirements, establishment of certificates in order to reduce the trade barriers and open the European market for solar thermal products

Current standards

- **Collectors – EN 12975:**
  - Durability, reliability, safety, performance of liquid heating collectors, glazed & unglazed, “low” temperature
  - Not included: tracking concentrating collector, acc. ageing, air collectors

- **Factory made systems – EN 12976:**
  - Durability, reliability, safety, performance of “kits”
  - Not included: combisystems, air systems, cooling

EN 12975 – Scope of application

- liquid heating collectors
  - flat plate
  - evacuated tubes
  - uncovered absorbers (i.e. for swimming pools)
- validating the durability, reliability and safety requirements
- 3 test methods for the thermal performance characterisation
- not applicable to:
  - collectors in which the thermal storage unit is an integral part of the collector to such an extent that the collection process cannot be separated from the storage process. EN12976 – Premanufactured Systems
  - not applicable to tracking concentrating collectors

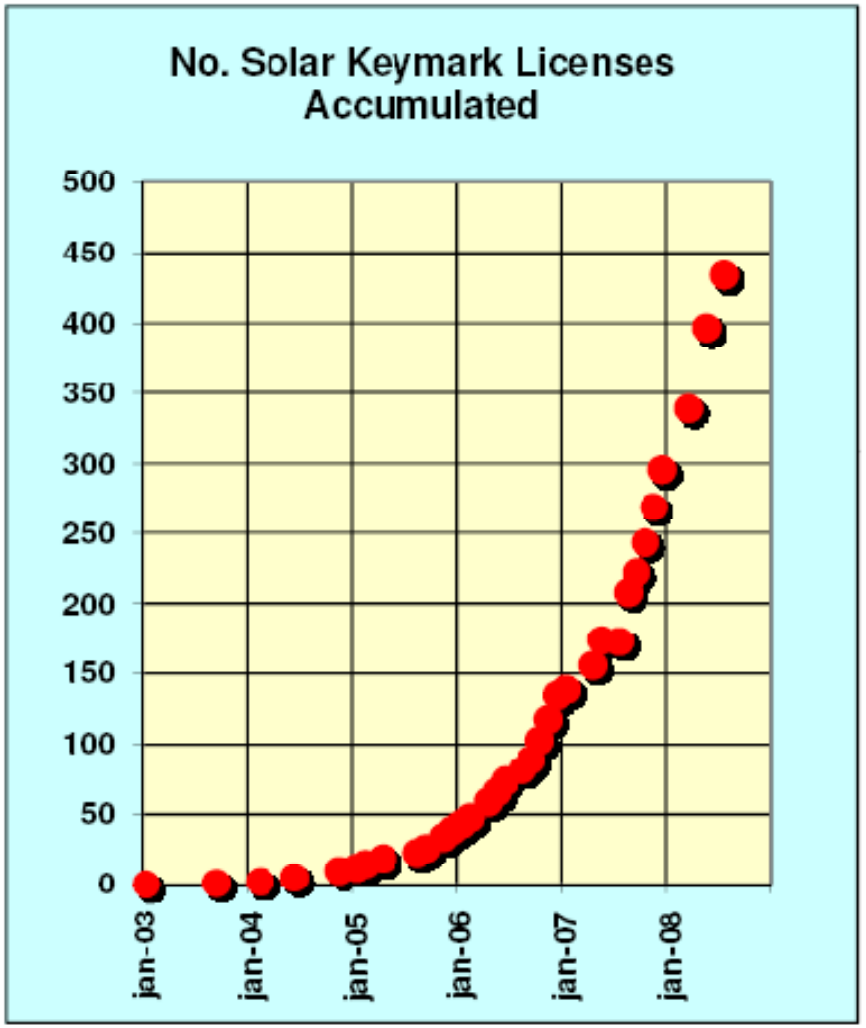
EN 12975 – Tests to be performed

- Internal pressure
- High-temperature resistance / Stagnation temperature
- Exposure
- Internal & External thermal shock tests
- Rain penetration
- Freeze resistance (if freeze resistant collector)
- Mechanical load
- Thermal performance
- Impact resistance (optional)
- Final inspection
- Thermal performance test

The trend

- strong increase of certified products
  - over 500 products
- all national subsidy schemes and regulations in EU accept Solar KEYMARK

- only exceptions:
  - Spain: ISO 9001 certificate
  - Germany: „Blue Angel“ declaration (525 kWh/a)
  - France: some insurance companies ask for CSTBat)



How can I get one?

- apply for Solar Keymark at Certification Body
- factory inspection – quality management system at production site
  - ISO 9001 recommended but not strictly required
- sampling of items to be tested out of production or stock
- testing of items in independent laboratory according to EN standards

- Certification Body grants Keymark


DIN CERTCO
Gesellschaft für Konformitätsbewertung mbH

ZERTIFIKAT

Der Firma

SPANIEN

wird für das im Herstellwerk

hergestellte Produkt

Sonnenkollektoren

vom Typ

die Konformität mit

DIN EN 12975-1:2006-06
DIN EN 12975-2:2006-06
CEN-KEYMARK-Programmregeln Solarthermische Produkte

bestätigt und das Nutzungsrecht für die Zeichen

in Verbindung mit der unten genannten Registriernummer erteilt.

Registernummer: 01

Dieses Zertifikat ist unbefristet gültig, solange die erforderlichen Überwachungen mit positivem Ergebnis durchgeführt werden.

DAP-ZE-2460.00

DIN CERTCO Gesellschaft für Konformitätsbewertung mbH
Alboinstraße 56, 12103 Berlin

2007-12-06

Dipl.-Ing. Dipl.-Wi.-Ing. Sören Scholz
- Stellv. Leiter der Zertifizierungsstelle -

geprüft von

arsenal research
Ein Unternehmen der Austrian Research Centers

… and then?

- **start marketing**
  the Solar Keymark states to the buyer:
  - reliable quality
  - reliable performance information
- **start exporting**
  - The Solar Keymark works almost all over Europe
  - No need for the doing the same tests in the different countries

- **regular inspection of product and factory**
- **paying annual certification fee**
- **report changes in product**

Resume of benefits

- **reduced testing for producers**
  - one test for all countries
  - freedom of choice with testing centres
  - type testing instead of testing of all possible collectors (different sizes,..)

- **high quality products on the market**
  - e.g. no Chinese products have passed the testing so far at arsenal research

- **improved quality**
  - through factory inspection the standard of production processes improves

- **gives financing institutions confidence to support high quality**

→ **keeps financing schemes alive**

Are there any problems?

- no valid EN standard → no Keymark
  - solar air collectors, collectors made of polymers, ..
- duration: 3-6 months
  - mostly due to long duration of durability testing which depends on the actual weather
- still some additional requirements
  - Germany, Spain, France
- Solar Keymark scheme rules and standard need rework to be more efficient and open for new developments

Solar Keymark Network

- to ensure a smooth process of Solar Keymark certification
- Updating the Solar Keymark certification scheme
- promotion to make it accepted in all national building regulations and renewable energy subsidy schemes
- quality assurance measures such as round robin tests are performed

Participants:

- empowered certification bodies
- accredited test labs
- inspection bodies
- solar Keymark secretariat (ESTIF)
- official representative from CEN
- chairman of TC 312
- chairman of ISO 180
- **One representative of each national trade association that is a member of ESTIF**
- **Industry participants raising issues being discussed at the meeting.**

Outlook

- Revision of standard series EN 12975 Part 1 & 2
- Solar Keymark for solar storages according to EN 12977-3
- IEA-SHC Task 43 on testing and certification
- IEE project on updating standards for solar thermal applications (QAiST – Quality assurance in solar thermal heating and cooling technology)

- more countries will make Solar Keymark a requirement for financial incentives
- nonEU countries (Australia, US,..) will accept the Solar Keymark

Further information

DI (FH) Roland Sterrer, BSc
(roland.sterrer@ait.ac.at)

AUSTRIAN INSTITUTE OF TECHNOLOGY

www.solarkeymark.org

- list of certified products
- list of testing laboratories
- list of certification bodies
- download of brochures detailed country reports

www.estif.org

ESTIF

Keymark versus CE marking

The Keymark is very often confused with CE marking.

- The Keymark is a demonstration that the product is in conformity with the relevant European Standard.
- The Keymark can help to choose between products conforming to the legally required minimum characteristics in the European Economic Area, and products conforming to the complete European Standard.
- The Keymark is a Quality mark.
- The Keymark addresses users and consumers.
- The Keymark is a voluntary certification mark.
- The Keymark can only be granted by certification bodies, who are responsible to ensure continued compliance of the product with the requirements.

- **CE marking** is an indication that the product should be in conformity to the provisions of all applicable European Directives.
- **CE marking** can be based on compliance of the product with the characteristics mentioned in Annex ZA of the relevant harmonised European Standard. Some characteristics in that standard may not be included in Annex ZA.
- **CE marking** is a passport for the EU market.
- **CE marking** addresses the responsible market surveillance authorities.
- **CE marking** is mandatory.
- The affixing of **CE marking** may require the intervention of Notified Bodies, but always remains the responsibility of the manufacturer or his authorised representative.

Greek Solar Thermal Market

TRANSOLAR – Bucharest

ROMEXPO "Balcescu Conference Hall – Pavilion no. 18"

Friday, 30 October 2009

Market Development in Greece Tools Awareness & International Trade

PANOS KONSTANTINIDES

- DIRECTOR OF CALPAK COMPANY
- PERMANENT MEMBER OF EBHE

Greek Solar Thermal Market

- One of the most successful countries worldwide in Solar System installations
- First European country where solar thermal technology became a commercially viable application

Greek Solar Industry Association

EBHE

ΕΝΩΣΗ ΒΙΟΜΗΧΑΝΙΩΝ ΗΛΙΑΚΗΣ ΕΝΕΡΓΕΙΑΣ

Acharnon 315, GR-111 45 Athens

Tel. +30 210 2112591 / Fax. +30 210 2112592

www.ebhe.gr

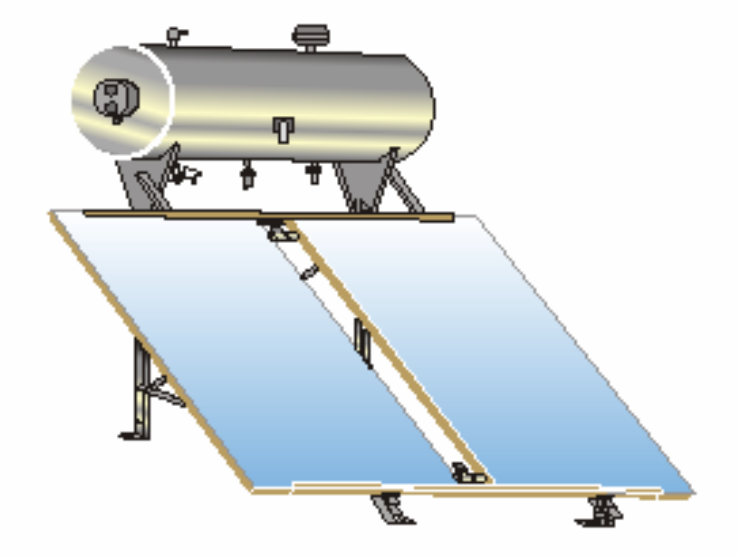
Email : info@ebhe.gr

GSIA (EBHE) Members **Est.1979**

Products in Greece

- Solar water heater Thermosiphonic 85% (stable market)
  - multi-apartment buildings
  - small houses
- Central pump systems 15% (positive trend)
  - big houses (DHW and space heating)
  - swimming pools
  - solar cooling
  - hotels
  - hospitals
  - industries

Thermosiphonic Water Heater



Thermosiphonic Water Heater

WHY thermosiphonic systems are so popular in Greece?

- Can be easily installed in either flat roof or slope roof
- Inexpensive and fast installation
  - installers are very well trained and skilled
- Low acquisition cost
- Low maintenance cost
- High energy performance
- Positive net present value

Thermosiphonic system 160/3M

Economic Efficiency Calculation

System

System Yield :	1 577,43 kW/h
Annual Fuel Savings :	184,93 m³

Economic Efficiency Parameters

Life Span :	25 years
Interest on Capital :	2,5 %
Price Increase Rate – Energy Use :	3,3 %

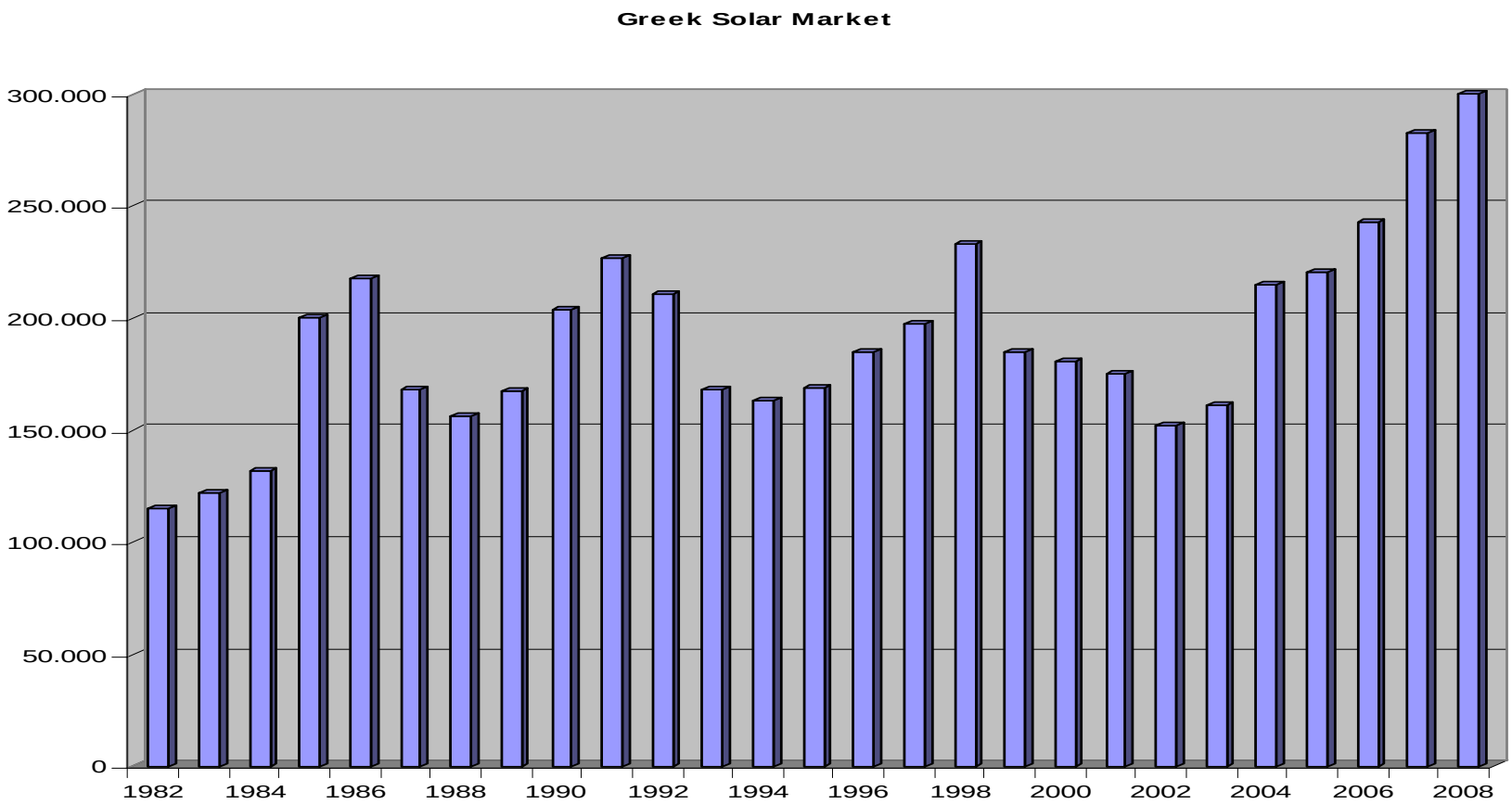
Costs (Cash Value)

Investments :	- 1250 €
Saving :	3 472 €
Running Costs :	- 478 €
Net Present Value :	**1743 €**
Cost of Solar Energy :	**0,06 € / kWh**

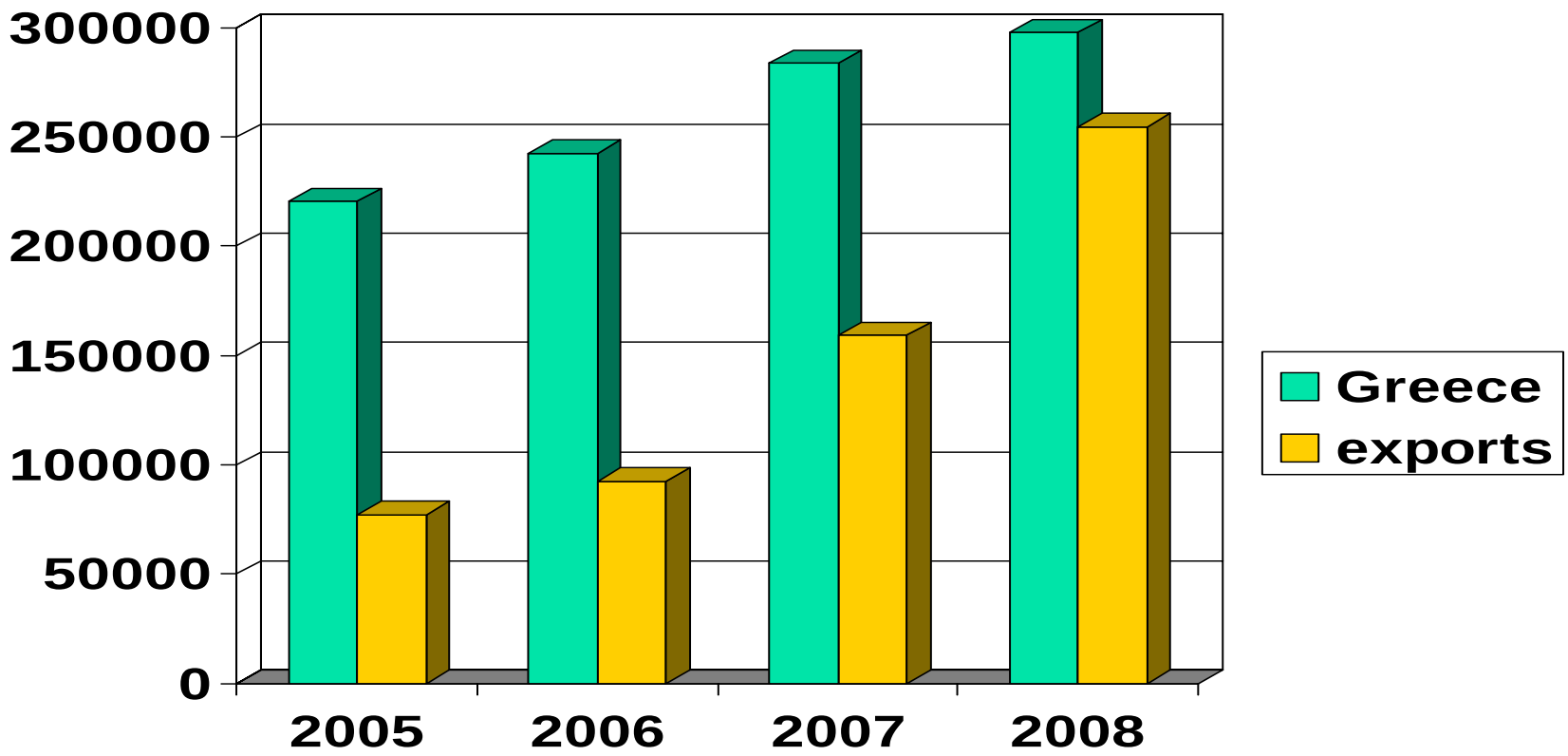
DHW Pump System

Bigger Pump Systems

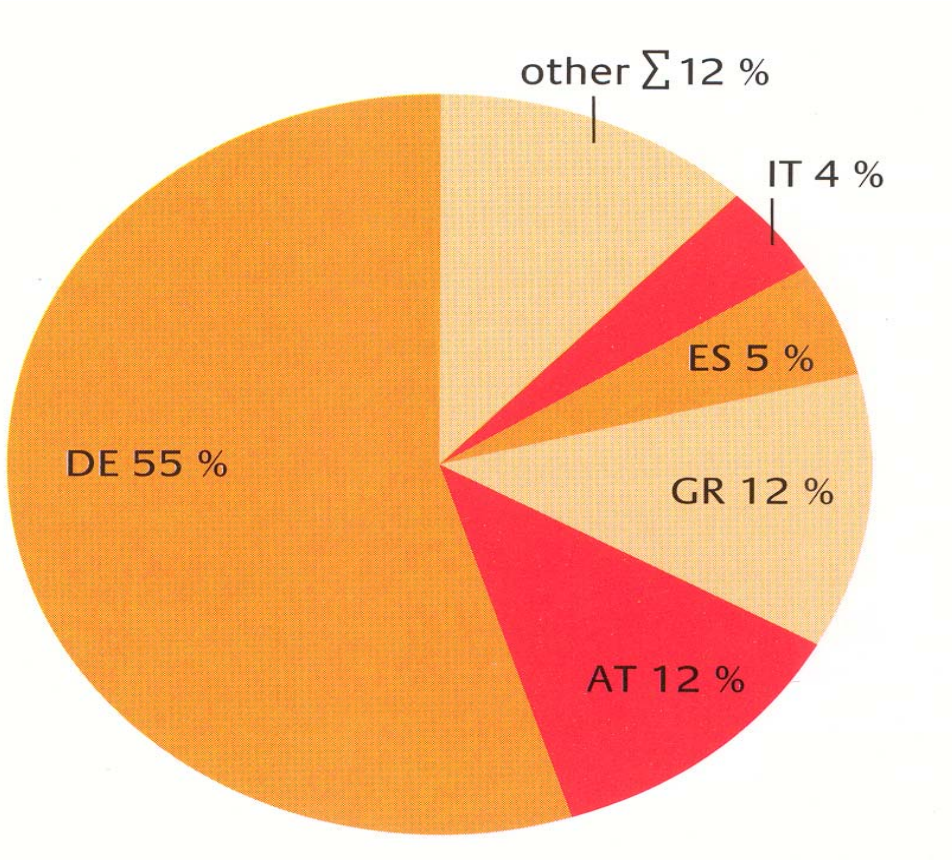
GREEK SOLAR MARKET SALES



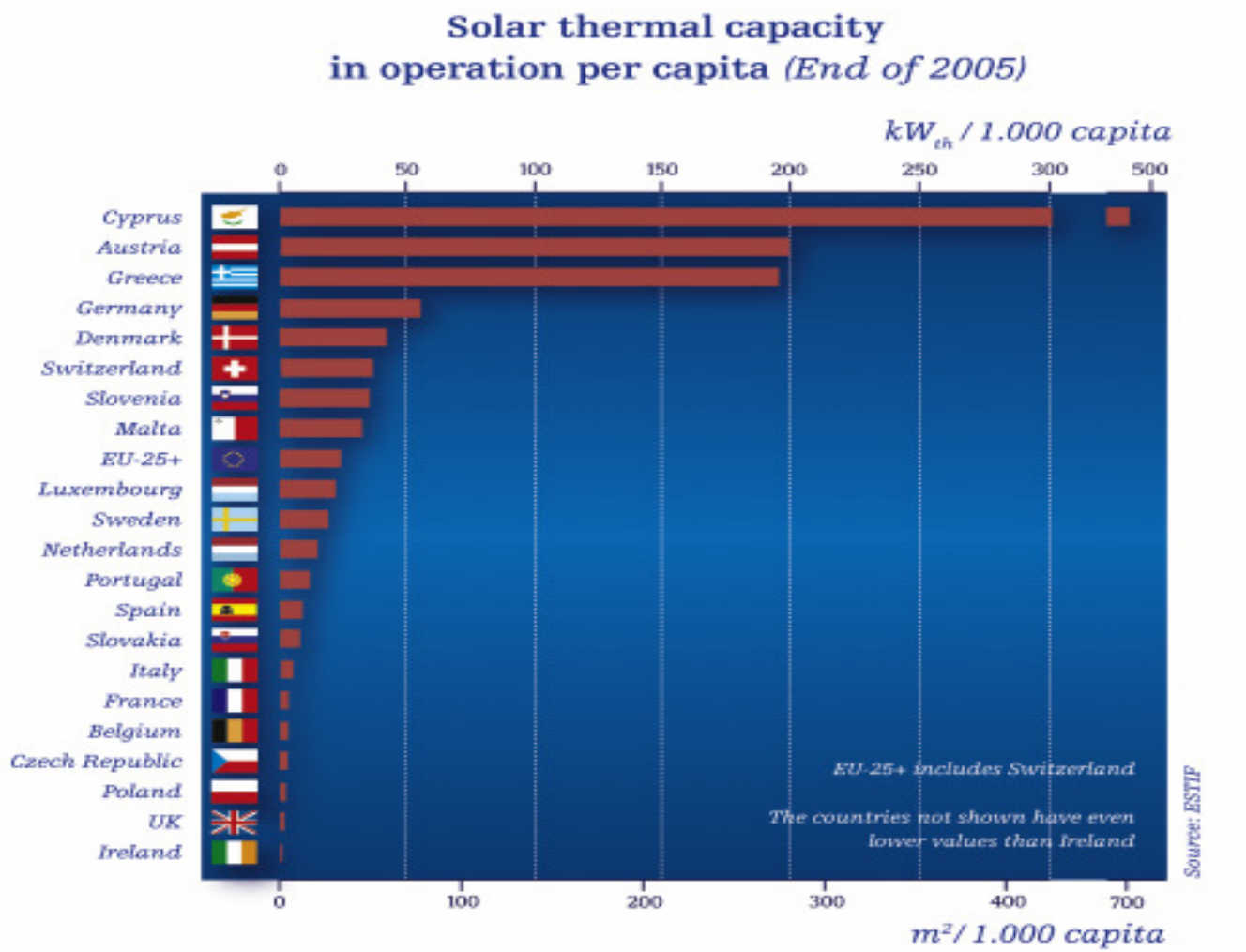
TOTAL GREEK PRODUCTION



EUROPEAN SOLAR THERMAL MARKET AS OF 2008



World Solar Thermal Market in m^2/1000 habitants as of 2008



GREEK FIGURES - 2008

Installed collector area

- 3.550.000 m^2 or 2.485.000 kW

Yearly savings

- 1.952.500 MWh
- 2.000.000 tn CO_2

- 3.300 jobs
- 250.000.000 € turnover/year

COMPARISON BETWEEN GREEK SOLAR MARKET & THE REST OF EUROPE -2008

	GREECE	EUROPE
SOLAR COLLECTOR IN USE (m2)	3,5 mil.	21 mil.
OIL CONSERVATION (TONS/YEARS)	310 th	1820 th
DIMINATION OF POLLUTION (TONS/YEARS)	800 th	5200 th
INSTALLED POWER (MW)	2485	15200

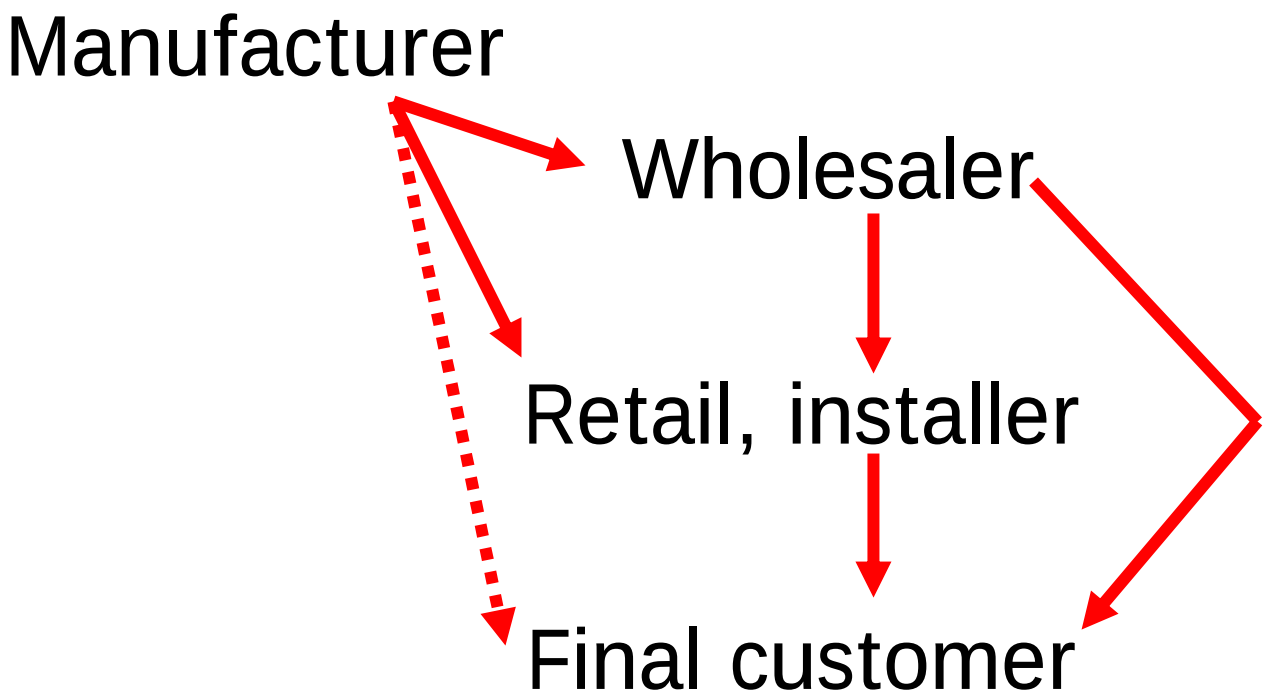
Critical success factors

- Initialization of the market by well established companies (Calpak-BP, Siemens, Stiebel Eltron)
- Subsidies given by the State
- Credit policy of the Banks
- National promotional campaigns for public awareness
- Competition

Advertising & Awareness Campaigns in Greece

- 1979-1981 Industry, State
  (benefits of solar energy)
- 1984-1985 Industry, State
  (benefits on the economy)
- 1995 Public Power Corporation

Market Structure Nowadays



Till Now Awareness for Solar

- Hot water : Is Completed
- Process heat : Not satisfactory yet
- Space heating : Only ‘futuristic’
- Solar cooling : ‘Startup phase’
- Other in project level (drying, etc.)

International Trade

Positive

- Incentives given (tax credit, subsidies etc)
- New European directive for thermal renewable energy (RES-H)
- European standards & safety requirements (CE mark)
- Solar Keymark

Negative

- National & regional requirements (barriers to entry)
- Low public awareness
- High installation cost (Lack of experienced installers)

Exported Products

- Solar water heaters (Mediterranean region, 37 countries all over)
- Complete DHW central systems (Western and Central Europe)
- Solar collectors (Globally, mainly Europe)
- Solar tanks and floor standing boilers- (Mediterranean region)
- Absorbers, etc. (Eastern Europe)

Key to Enlarge Solar Market

Simple and long term rules for subsidies

MEMBERS OF EBHE

VISIT OUR WEB SITE :

WWW.EBHE.GR