



**SZENT ISTVÁN
EGYETEM**



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**NEMZETKÖZI NAPENERGIA HELYZETKÉP
A NEMZETKÖZI NAPENERGIA TÁRSASÁG (ISES)
MEXIKÓI KONFERENCIÁJA TÜKRÉBEN**

**IV. Napenergia-hasznosítás az épületgépészetben
konferencia és kiállítás**

Budapest, 2013. november 26.

Prof. Dr. Farkas István

Szent István Egyetem, Fizika és Folyamatirányítási Tanszék
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Tartalom

Bevezetés

ISES Világkongresszus programja

Kiadványok

- Renewables 2013 – Global Status Report
- RE-thinking 2050

A 100% Renewable Energy Vision for the EU

- Strategic research priorities for solar thermal technology
- Solar district heating – 2012
- Current status of solar thermal application worldwide
- Solar Heat Worldwide – 2011



Termikus napenergia-hasznosítás európai helyzetkép

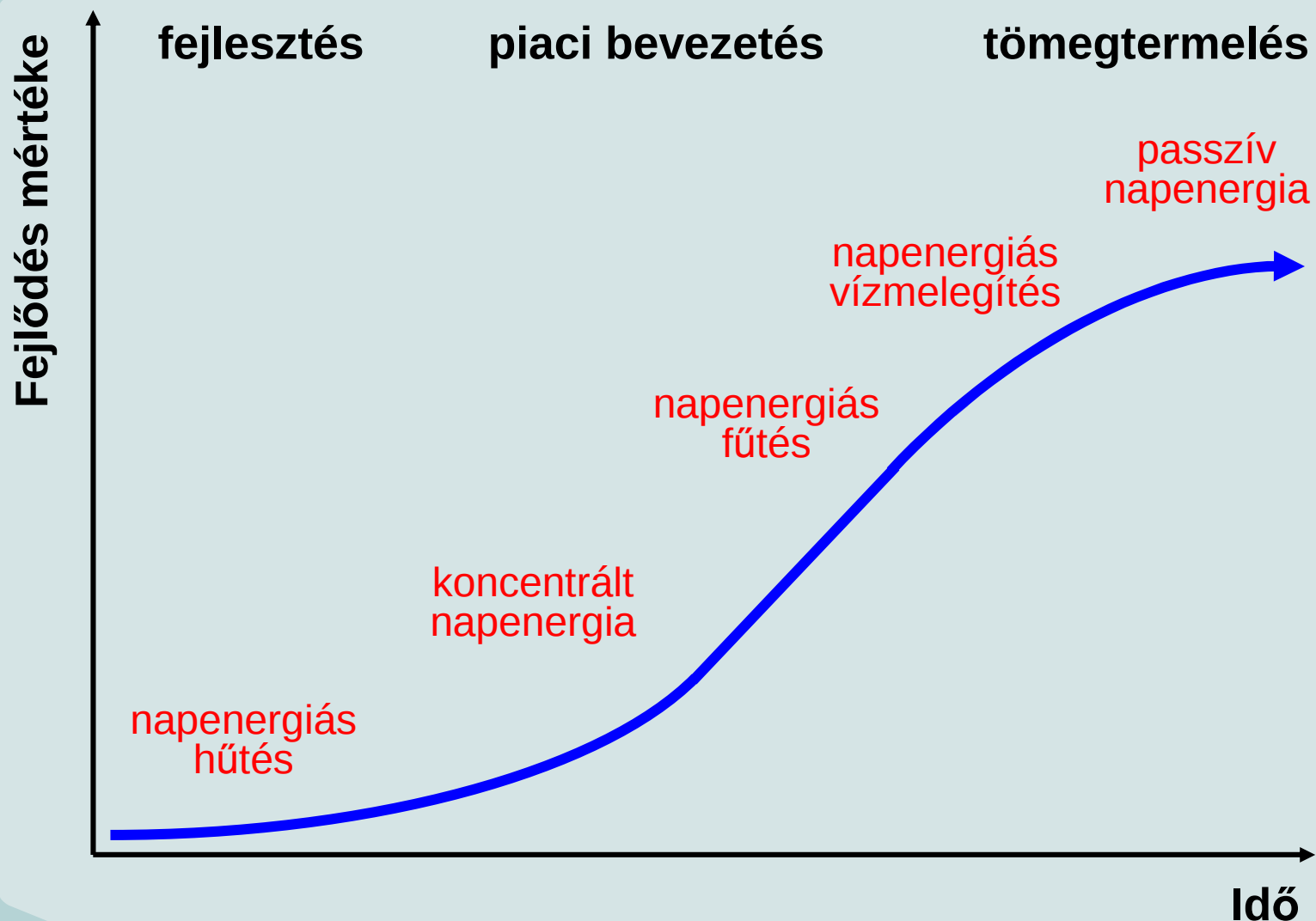
Összefoglalás



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A termikus napenergia hasznosítás





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PLENARY SESSIONS

TUESDAY, 5 NOVEMBER 8:30 - 10:30

Developments in the Americas [Cozumel]

- Mark Lambrides - Division Chief Energy & Climate Change, Organization of American States
- Odon de Buen - Director General, National Commission for Energy Efficiency (CONUEE), SENER
- Ken Westrick - Westeva & Board Member of the Latin American and Caribbean Council on Renewable Energy (LAC-CORE)
- Sean Whittaker - Senior Industry Specialist, Renewable Energy, Climate Business Dept, International Finance Corporation

WEDNESDAY, 6 NOVEMBER 8:30 - 10:30

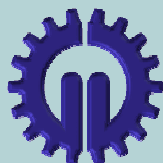
Global Perspectives [Cozumel]

- Werner Weiss - Chairman IEA Solar Heating & Cooling Program
- Rana Adib - Research Coordinator, Renewable Policy Networks for the 21st Century (REN21)
- Michael Eckhart - Global Head of Environmental Finance of Citigroup

THURSDAY, 7 NOVEMBER 8:30 - 10:30

Sustainable Energy For All (SE4ALL) in Latin America and the Caribbean [Cozumel]

- Susan McDade - Country Action Leader, UN Sustainable Energy For All Initiative (SE4ALL)
- Efraín Villanueva Arcos - General Director of Sustainability - Mexican Secretary of Energy (SENER)
- Mrs. Mercedes Araoz Fernandez - Mexico Representative Inter-American Development Bank
- United Nations Development Program (UNDP) representative (TBC)
- Dr. Richard Hansen - President of Soluz Inc.





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PARALLEL KEYNOTES

MONDAY, 4 NOVEMBER

11:00 - 11:30

R. Pitchumani - Sunshot Program on CSP

[Cozumel 1]

J. L. Fernandez - Solar Desalination

[Cozumel 2]

14:00 - 14:30

J. Luis Peña - Recent Trends in PV

[Cozumel 1]

Klaus Vajen - Solar Heating & Cooling Technology Updates

[Cozumel 2]

TUESDAY, 5 NOVEMBER

R. Perez - Solar Resource Availability

[Cozumel 1]

Richard Hansen - Photovoltaics for Rural Energy Supply

[Cozumel 2]

11:00 - 11:30

S. Ubbelohde - Daylighting and PVs: The Zero Energy Connection

[Cozumel 1]

E. Stefanakos - Energy Storage for PV and CSP

[Cozumel 2]

14:00 - 14:30

WEDNESDAY, 6 NOVEMBER

11:00 - 11:30

L. Kazmerski

"Ashes to Ashes, Dust to Dust: Averting a Showstopper for Solar"

[Cozumel 2]

K. Kappel - Solar Cities

[Xcaret 3]

14:00 - 14:30

K. Lovegrove -

Concentrated Solar Power and the Value of Energy Storage

[Cozumel 2]





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FORUMS

MONDAY, 4 NOVEMBER

- 11:30 - 13:00** Building a National Solar Mission for Mexico - Moderator: F. Zuniga [Cozumel 1]
IRENA Renewable Energy Learning Platform - Moderator: H. Lucas [Cozumel 2]
- 14:30 - 16:00** CSP Developments Worldwide - Moderator: Y. Goswami [Isla Mujeres 1 & 2]
- 16:15 - 17:45** Perspectives of PV Projects in Mexico - Moderator: ProMexico [Isla Mujeres 1 & 2]

TUESDAY, 5 NOVEMBER

- Sustainable Transportation - Moderator: F. de Winter [Xcaret 1] **11:30 - 13:00**
Solar Energy Education - Moderator: Y. Goswami [Isla Mujeres 1]
- Indigenous Architecture - Moderator: L. Wagner [Xcaret 1] **14:30 - 16:00**
Developing Hybrid Renewable Microgrids - Moderator: P. Lilienthal [Cozumel 2]
- Mexican Standards for Sustainable Buildings - Moderator: R. Lacomba [Xcaret 1] **16:15 - 17:45**
ISES-ISCI Solar Cities - Moderator: M. Oliphant [Isla Mujeres 1]

WEDNESDAY, 6 NOVEMBER

- 11:30 - 13:00** US Government Finance Opportunities for Renewable Energy Financing in Latin America - R. Guthrie [Xcaret 1]
Best Practices in Accreditation, Training & Certification - Moderator: J. Weiss [Isla Mujeres 1&2]
- 14:30 - 16:00** Using Innovative Software Tools to Help Grow Solar Energy in Mexico - Moderator: S. Dise [Cozumel 2]
RE Opportunities through USAID's Mexico Low Emissions Development Strategies Program - Moderator: TBC [Xcaret 1]
- 16:15 - 17:45** Rural Energy Access Through Holistic Community Development - Moderator: A. Zahnd [Xcaret 1]
International Renewable Energy Alliance - Moderator: H. Lucas [Cozumel 2]

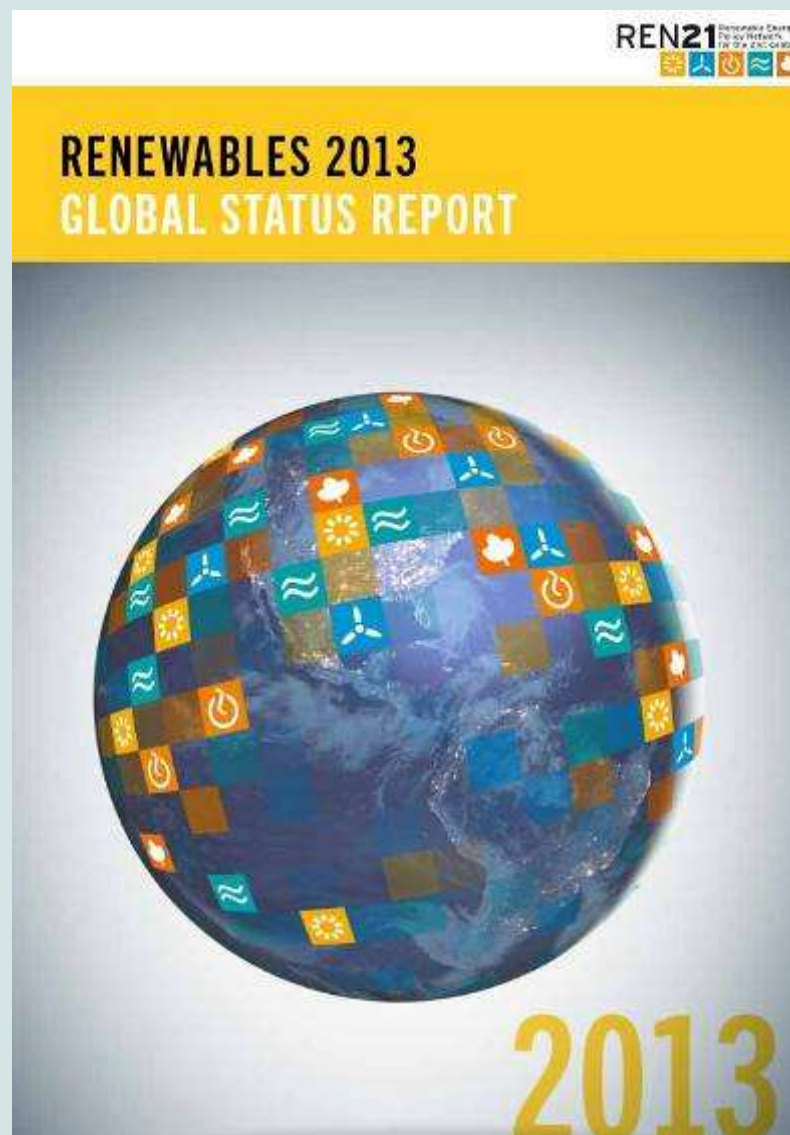




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Renewables 2013 - Global Status Report





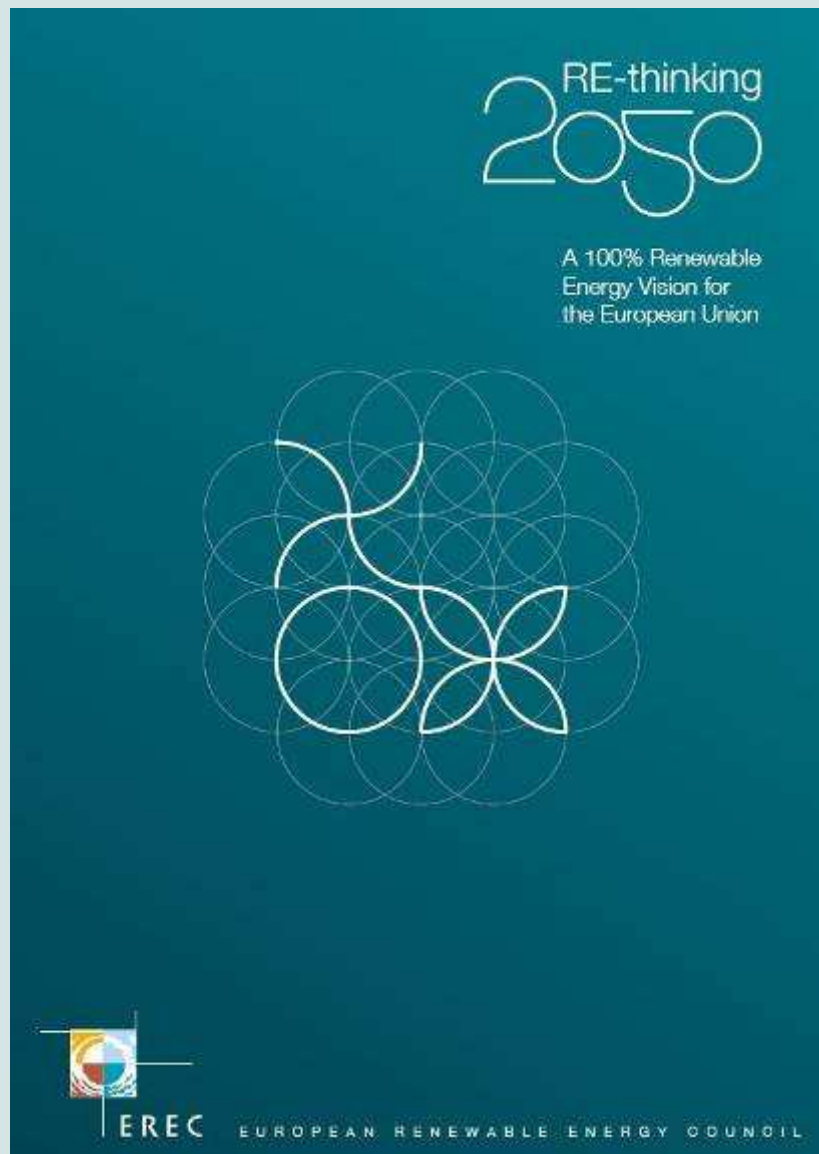
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RE-thinking 2050

A 100% Renewable Energy Vision for the EU

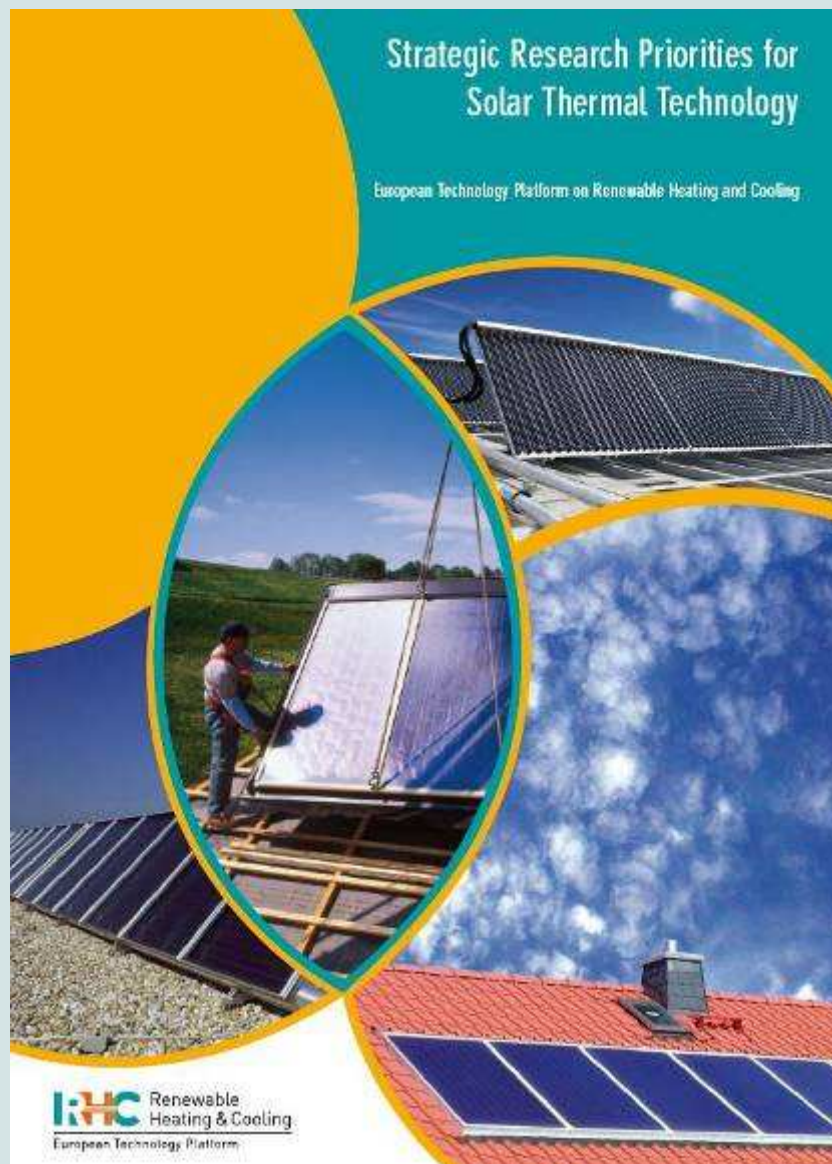




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Strategic research priorities for solar thermal technology





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Solar district heating - 2012



Market for Solar District Heating

by
CIT Energy Management AB

This project is supported by:





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Current status of solar thermal application worldwide



Current Status of Solar Thermal Application Worldwide

Werner Weiss

AEE - Institute for Sustainable Technologies
A-8200 Gleisdorf, Feldgasse 2
AUSTRIA

www.aee-intec.at AEE - Institute for Sustainable Technologies

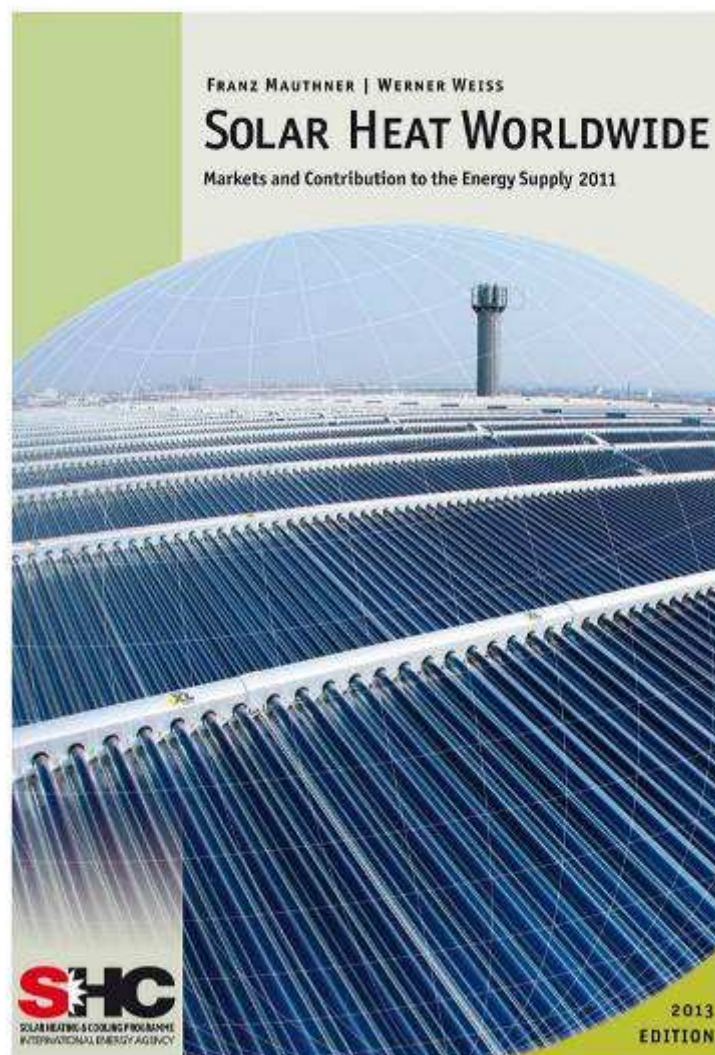




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Solar Heat Worldwide - 2011

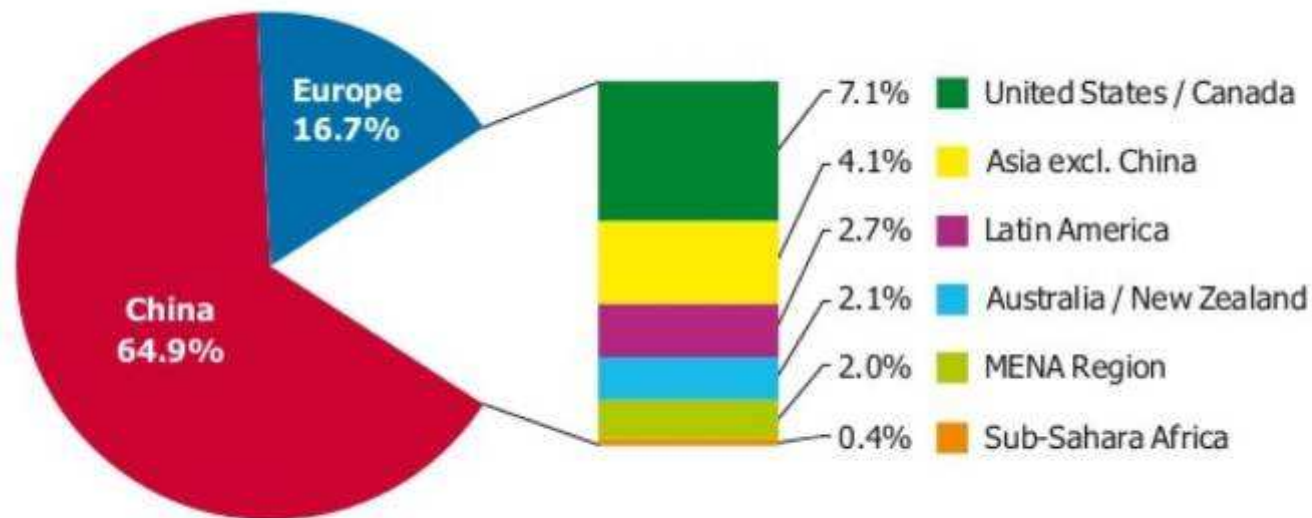




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Solar Heat Worldwide - 2011



Asia excluding China:

Latin America:

Europe:

MENA Region:

Sub-Sahara Africa:

India, Japan, Korea South, Taiwan, Thailand

Brazil, Chile, Mexico, Uruguay

EU 27, Albania, Macedonia, Norway, Switzerland, Turkey

Israel, Jordan, Lebanon, Morocco, Tunisia

Mozambique, Namibia, South Africa, Zimbabwe

Share of the total installed capacity in operation (glazed and unglazed water and air collectors)
by economic region at the end of 2011





Solar Heat Worldwide - 2012

Teljes kapacitás: 268,1 GW

Beépített összes kollektor felület: 383 mill. m²

Éves energiahozam: 225 TWh

Olaj egyenérték megtakarítás: 24 mill. tonna

CO₂ kibocsájtás megtakarítás: 73,7 mill. tonna



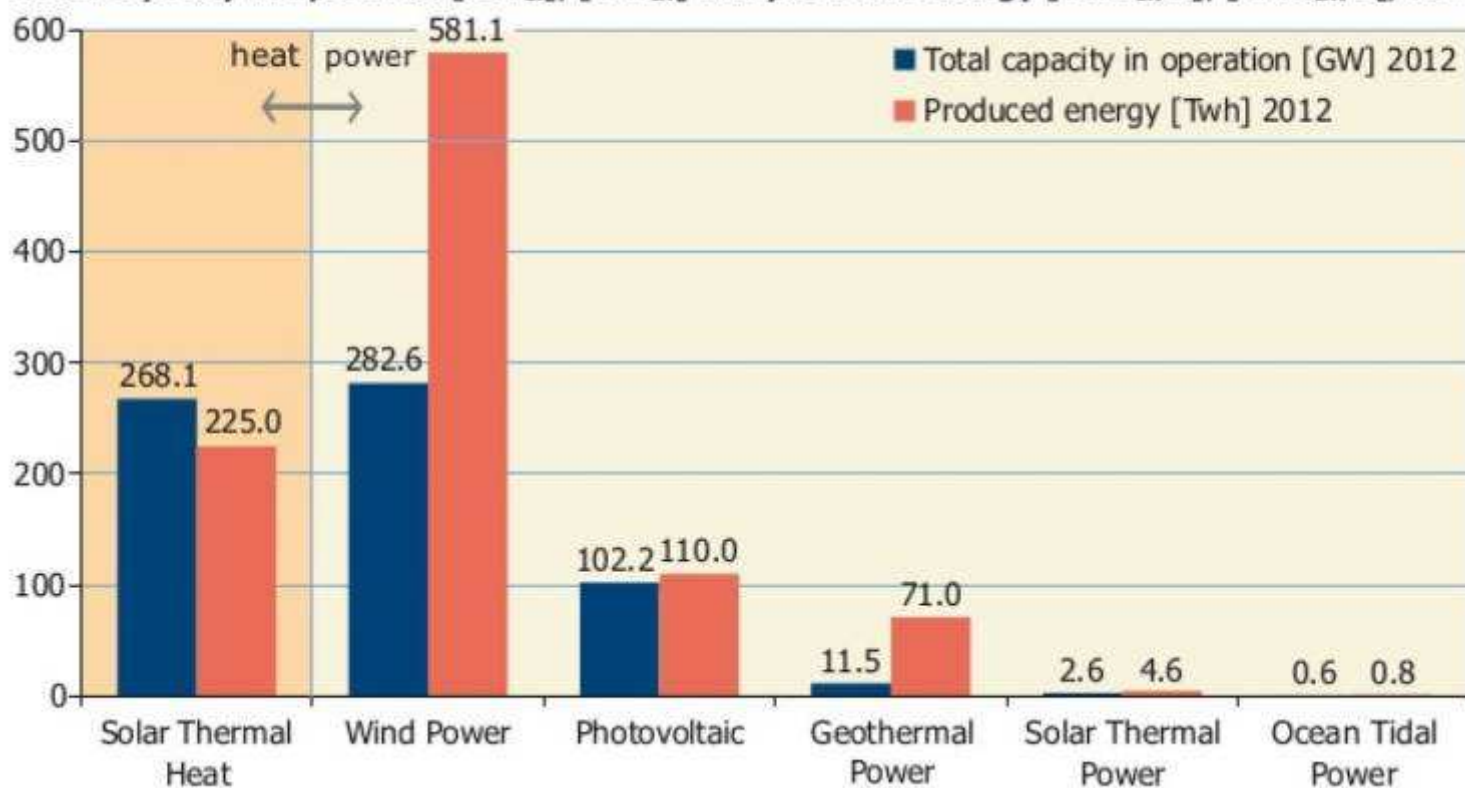


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Solar Heat Worldwide - 2012

Total capacity in operation [GW_{el}], [GW_{th}] and produced energy [$\text{TWh}_{\text{el}}/\text{a}$], [$\text{TWh}_{\text{th}}/\text{a}$], 2012





Termikus napenergia-hasznosítás európai helyzetkép

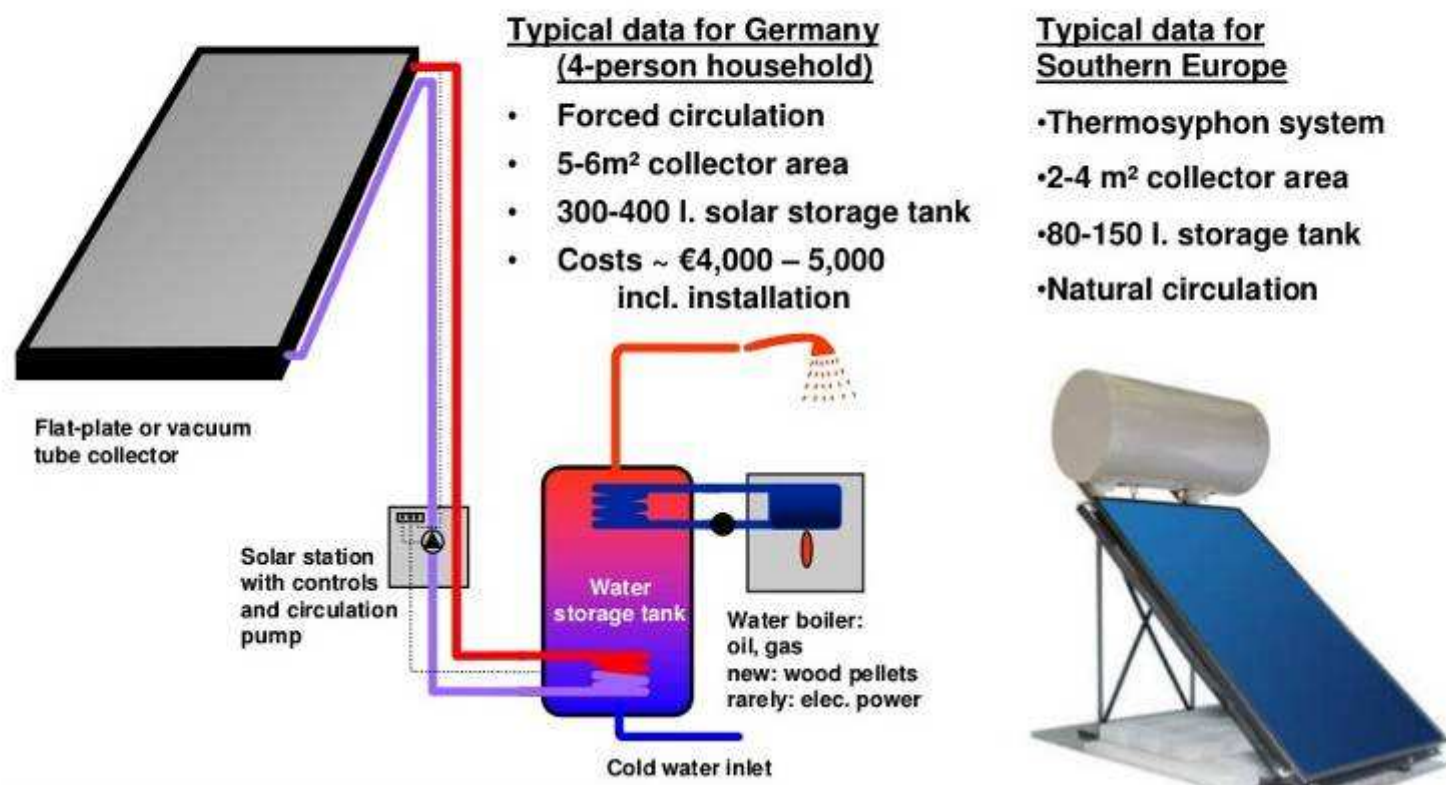
Status of the Use of Solar Thermal Energy in Europe

- Mainly in use in Europe:
solar domestic hot water systems
- Growing share of **combined systems** for DHW and room heating support in Central Europe (especially in Austria, Germany, France)
- Growing number of **Collective (large) systems** for multi family houses, hotels, hospitals etc.
- Plastic absorber for **swimming pools** are in use in Central Europe
- Several **solar district heating** systems with and without seasonal storage are used in Central and Northern Europe
- Some pilot plants for **process heating** are working
- About 200 pilot plants for **solar thermal assisted cooling** are installed in Europe



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Standard System for Domestic Hot Water Production





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DHW system with
flat-plate collectors (left) and
vacuum tube collectors (right)
in German single-family homes



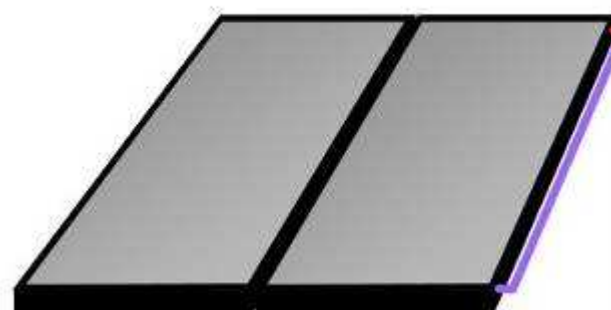


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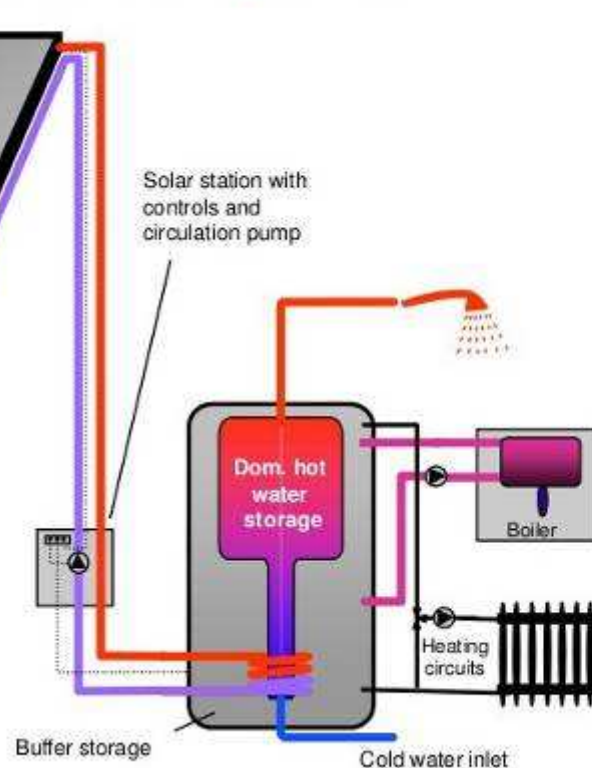
Typical Solar Thermal Combi System



Flat-plate or vacuum tube collector

Combined solar thermal system for DHW and auxiliary room heating (typical for Austria, Germany, France)

- 8-15m² collector area
- 500-1,000 liters combined storage
- Costs ~ €10,000 – 15,000
- Forced circulation system



Combi storage





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Left: combined solar thermal system for DHW and room heating support
Right: PV system, combined with skylights





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Special Know-how in Large Scale Solar Thermal Systems

Large solar thermal systems for multi family houses, hotels, hospitals, nursing homes etc. must to be designed well

German companies have a lot of experience and offer matured systems





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Old People's Home in Jena - 240 m² Collector Surface

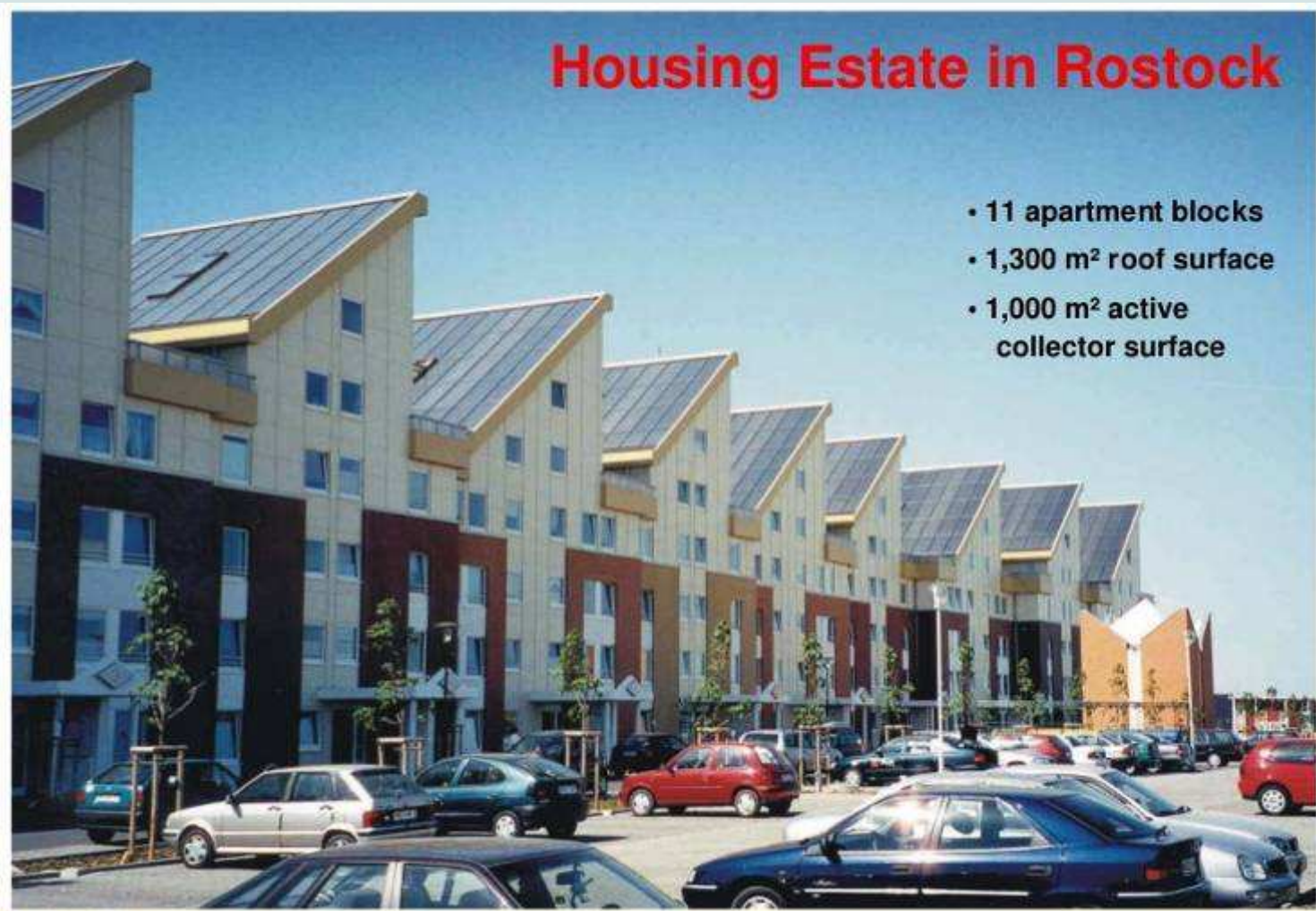




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Termikus napenergia-hasznosítás európai helyzetkép

Promising Technology: Solar Assisted Cooling

- Solar thermal driven cooling machines
- Cooling demand and solar supply are fitting well
- There are already more than 200 pilot systems installed in Europe
- Small systems for office buildings and one/two-family houses are under development



Adsorption cooling machine





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Solar Cooling System for the German BMVBW





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**Solar District Heating will
play a big role in the future**



Solar district heating, Marstal, Denmark
17,000 m² collector area

© Arcon



Semi-detached houses in Neckarsulm, Germany

© Soltes



12,000 m³ seasonal storage, Friedrichshafen, Germany

© Soltes





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Large Scale Solar Thermal Heating and Cooling



Example: Austria





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Solar Thermal Vision 2030

The European Renewable Heating & Cooling Technology Platform RHC-ETP developed following vision for solar thermal energy

New buildings

100% solar heated buildings will be the building standard

Existing building stock

Solar refurbished buildings,
> 50% solar heated, will be the most cost effective way to refurbish the building stock

Industrial and agricultural applications

solar thermal systems will cover
process heating and cooling demands

Overall goal:

Cover 50% of the low temperature need
up to 250 °C with solar thermal





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New Buildings

100% solar heated buildings
will become the building standard

Components:

- the entire roof is covered by solar collectors
 - Solar thermal and photovoltaics
- the facade is used to harvest solar energy
- seasonal heat storage
- active heating system
- compact units for solar heating and cooling
- very well insulated



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Vision Existing Building Stock: Active Solar Renovation

Cheapest way of renovation

- >70% of heat demand is covered by solar thermal energy
- Renovation with multi function modules for roof and facade:
 - Insulation and solar collector
 - Solar thermal (air and liquid) and Photovoltaic modules
- Seasonal storage
- Solar assisted cooling
- Remaining heat demand will be covered by wood pellets or district heating with renewable energy





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The aim for 2020: 1 m² collector per inhabitant in Europe

- Increase the market volume from 2 to 80 GWth
(3 to 110 Mio m², about 30 Bln Euro turnover)

⇒ Average market growth: 34% annually

- Increase the total installed ST power from 13 to 340 GWth

⇒ Factor 25 in power and energy production by ST

⇒ Capacity building in industry and R&D

⇒ Innovations

⇒ Cost reduction





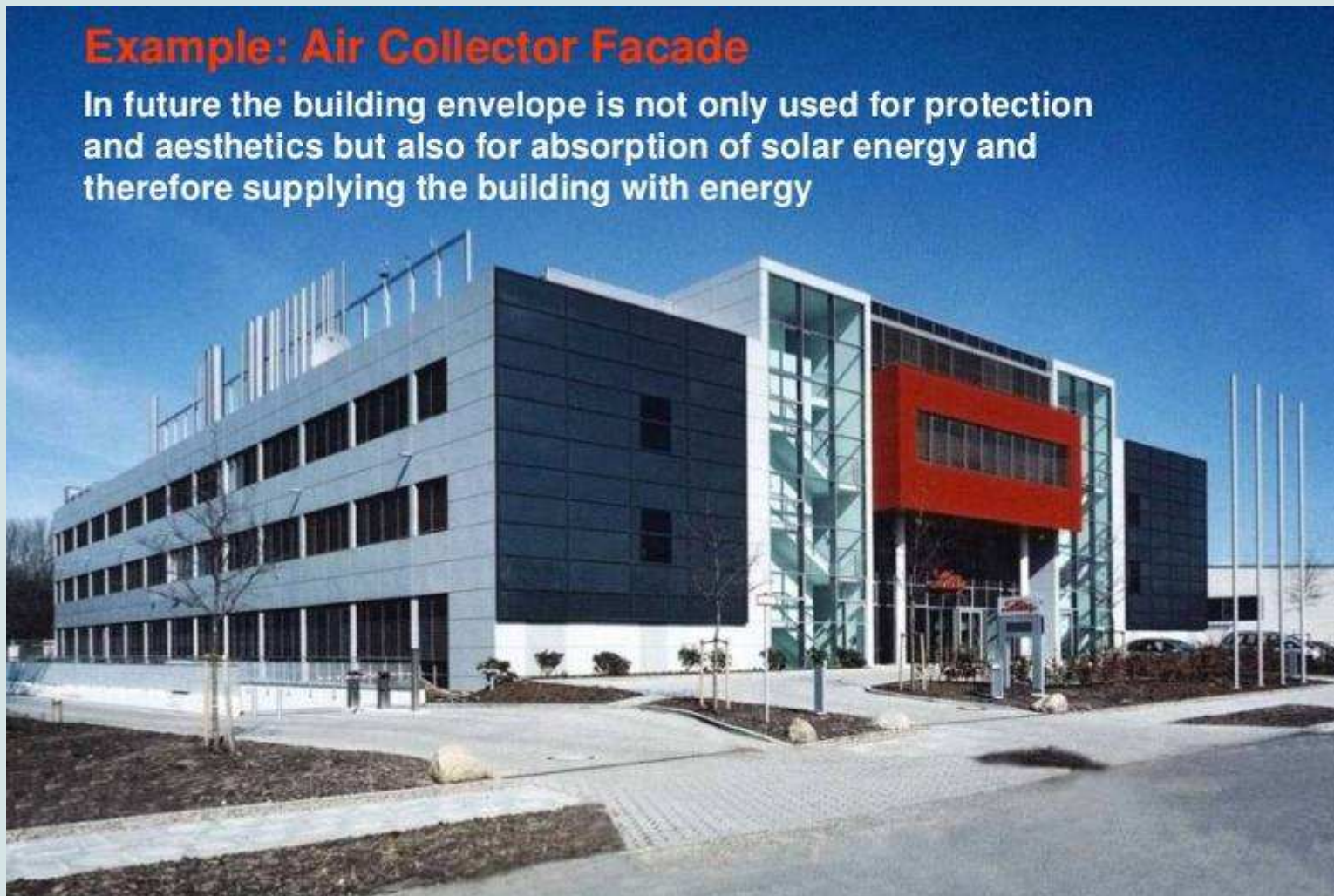
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Example: Air Collector Facade

In future the building envelope is not only used for protection and aesthetics but also for absorption of solar energy and therefore supplying the building with energy





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Key component: the solar thermal collector



Source:
Wagner & Co

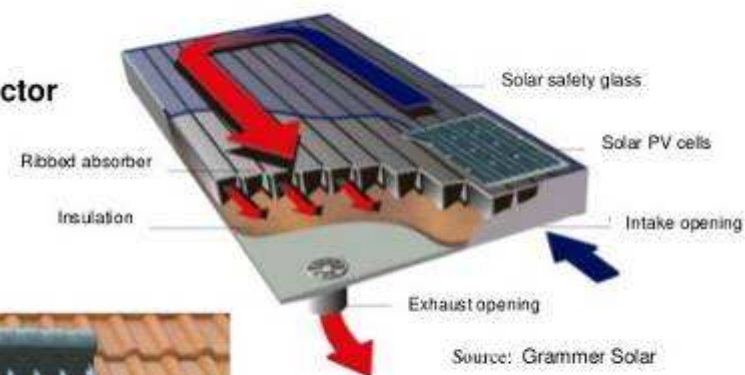
Flat plate collector



Source: Solvis

Evacuated tube collector

Air collector



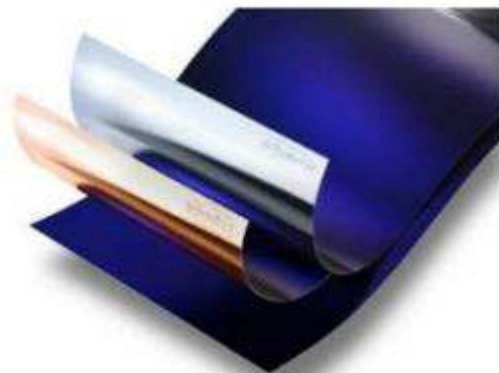


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Continuous improvements in the Solar Thermal Technology



© alarod, sunselect

Selective absorber coating



© Solarflex

© Aeroline tube systems

Improved piping



© KBB Kollektorbau

New collector design



© Wilo

High efficient solar pumps



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Solar Thermal Innovations in Europe

- Stratified, seasonal, and latent heat storage tanks
- Anti-reflective glass
- Sputter process for absorber coating
- New collector types (improved functionality and design)
- Improved piping connecting collectors and storage tanks
- Control system technology, heat transfer fluids, solar pumping
- Solar cooling, high-temperature collectors
- ...

Targets

- Higher solar fraction of heat supply in buildings
- Higher efficiency at lower costs
- Improved integration into the heating system and the building envelope



© FAI





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Transzparens szigetelésű fal (ISES, Freiburg, Németország)





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Napkollektoros úszómedence (SZIE, Gödöllő)





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Napenergiás szárító (SZIE, Gödöllő)





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Napkollektoros növényházi fűtés kiegészítés (SZIE, Gödöllő)





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Köszönöm a megtisztelő figyelmet!

