
Savo-Solar Ltd

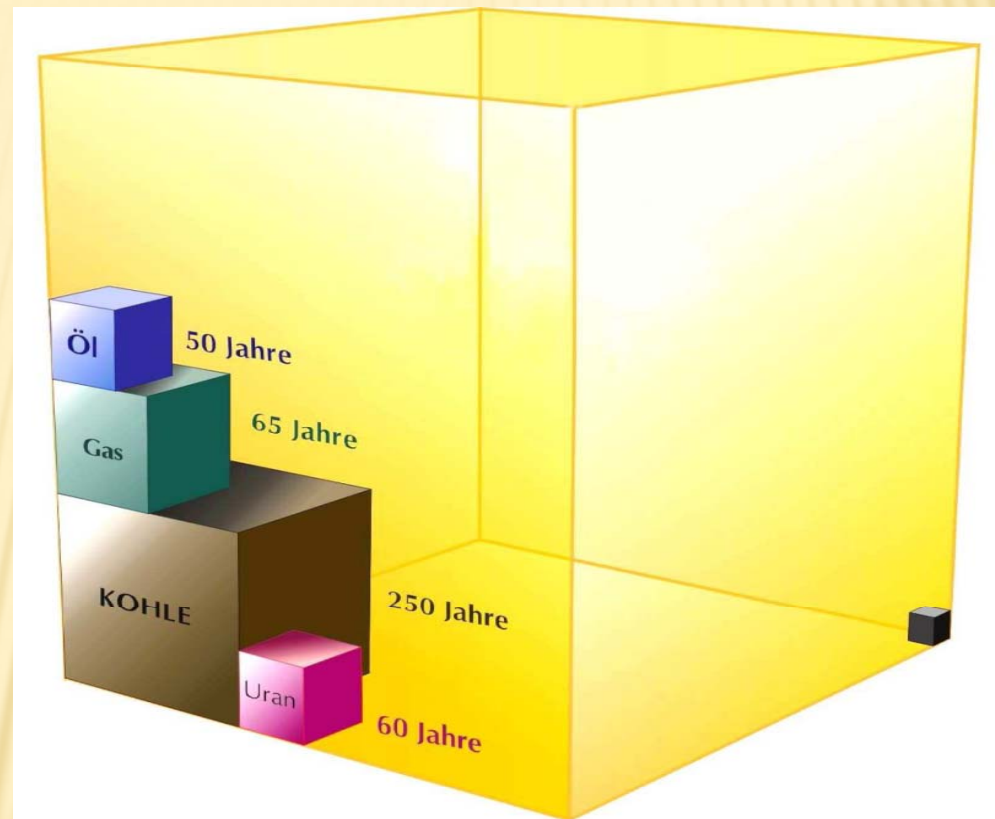
**Solar Thermal Energy
Solutions**

**MIICS 2010, Mikkeli 17.3.2010
CEO Vesa Sorasahi & CTO Kaj Pischow**

Available energy resources

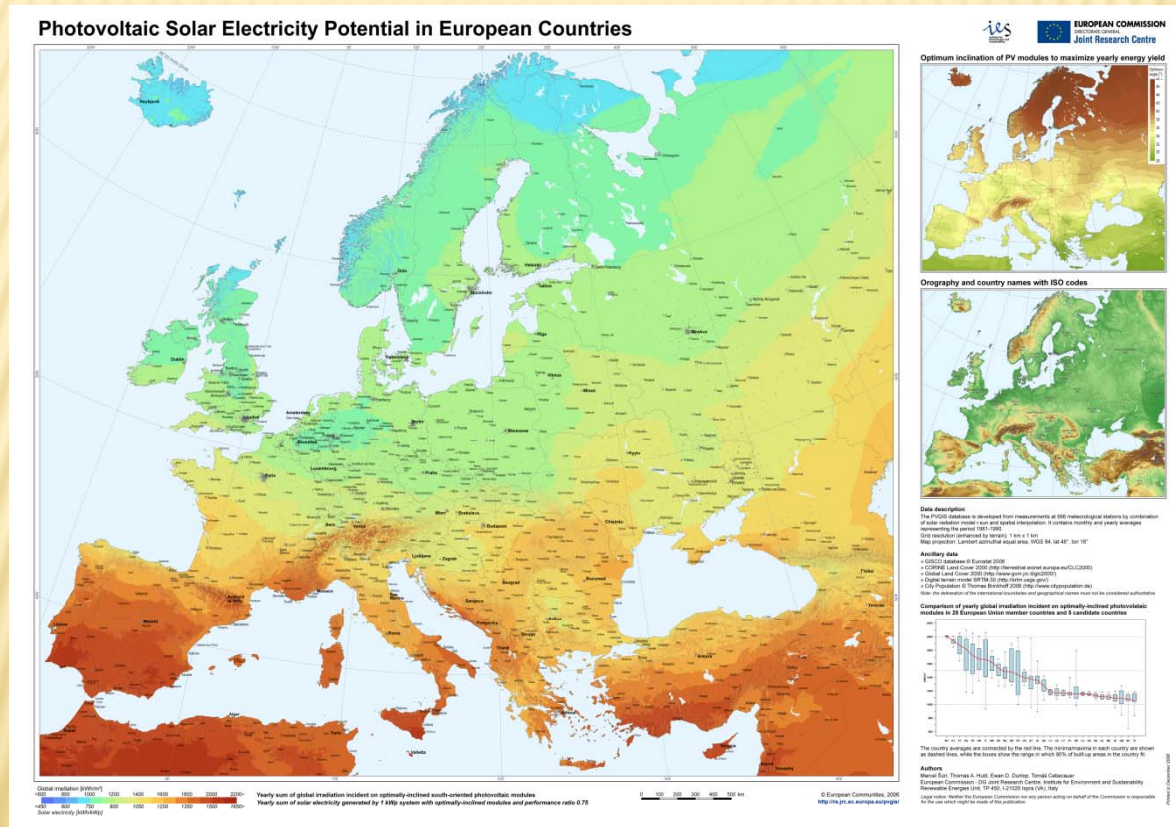
Yearly Solar Energy

Each year, over 1,080,000,000 terawatt hours of power arrive at the earth from the Sun – 60,000 times the world's electricity requirement. Thus solar power has the biggest potential of all renewable energies.

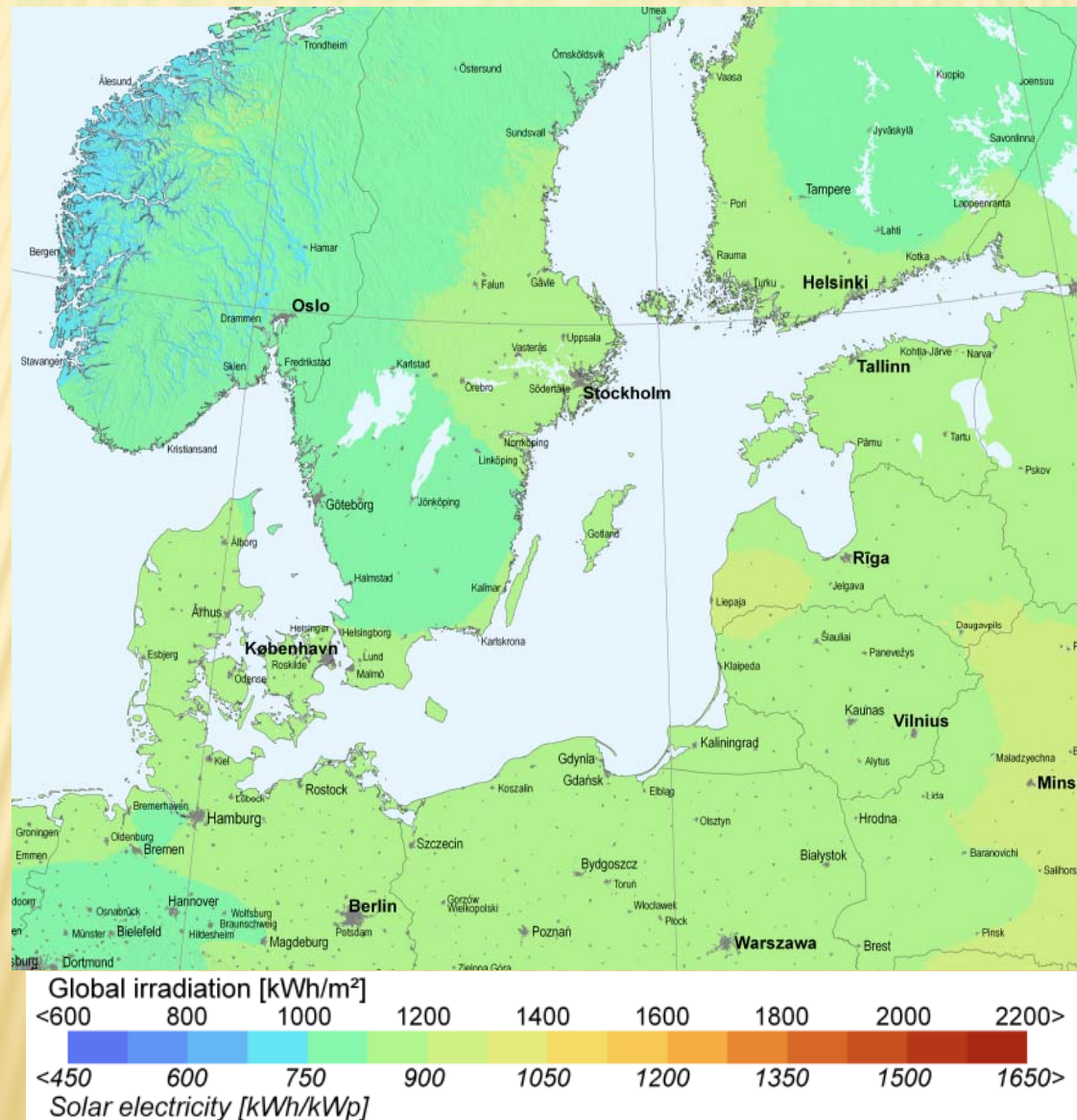


World Yearly Energy
Consumption

SOLAR POTENTIAL IN EUROPE



SOLAR POTENTIAL IN SOUTHERN FINLAND



Main market Drivers

- Concern about the global warming and environment
 - EU 20-20-20 targets
 - National incentive programs
 - Rising energy prices
-

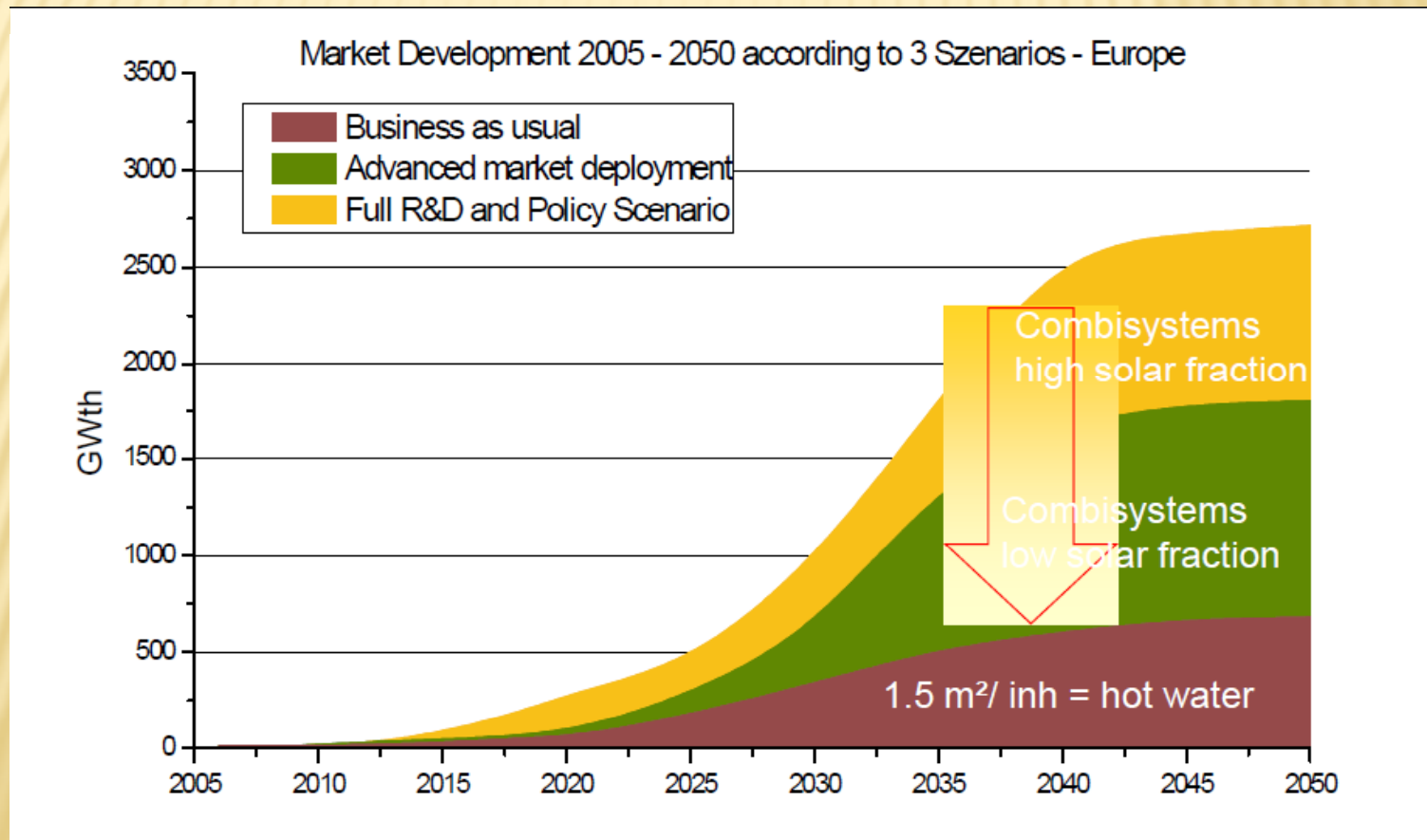
EUROPEAN UNION'S CLIMATE CHANGE PACKAGE

- ✘ Europe commits to 20-20-20 target but with get out clause for big polluters
- ✘ The European Union's [climate change package](#), including 20% cut in emissions, 20% improvement in energy efficiency and 20% increase in renewables by 2020
- ✘ Binding national targets for [renewable energy](#) which collectively will lift the average renewable share across the EU to 20% by 2020 (more than double the 2006 level of 9.2%).
The national targets range from a renewables share of 10% in Malta to 49% in Sweden. The targets will contribute to decreasing the EU's dependence on imported energy and to reducing greenhouse gas emissions. .



Solar Thermal Potential in Europe

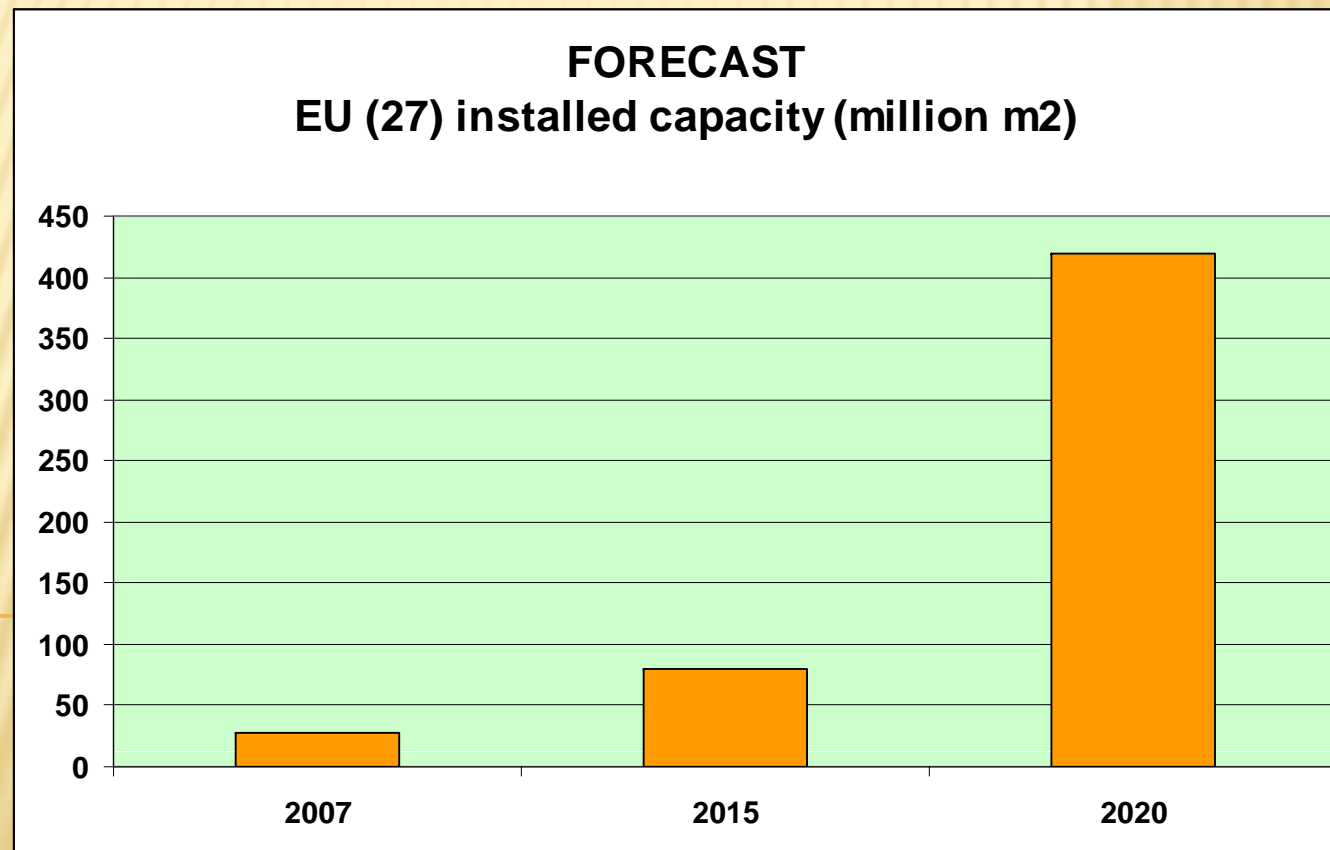
Solar Thermal Potential EU27 Contribution to the overall low temperature heat and cooling demand



Market Volume and Forecast

2008 Newly installed capacity 37 million m² worldwide

EU ~10 % of the total EU market

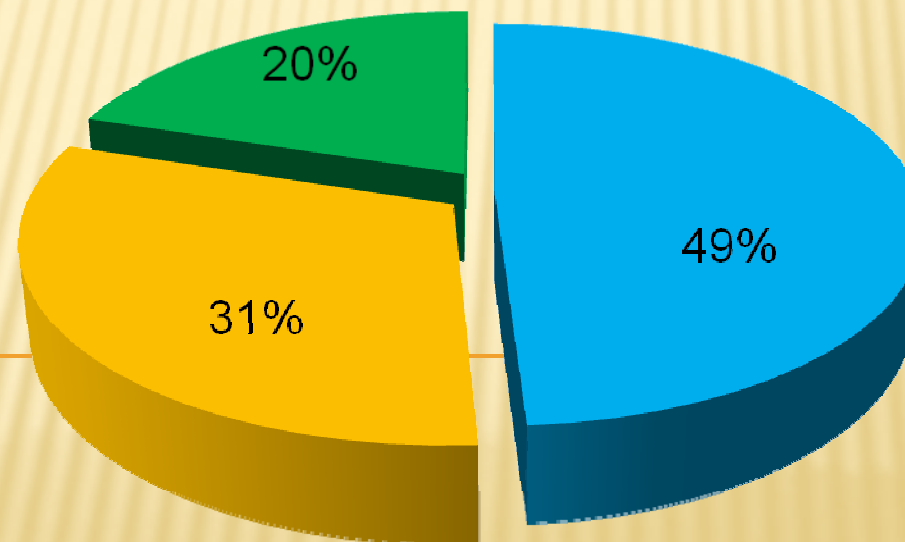


Just now

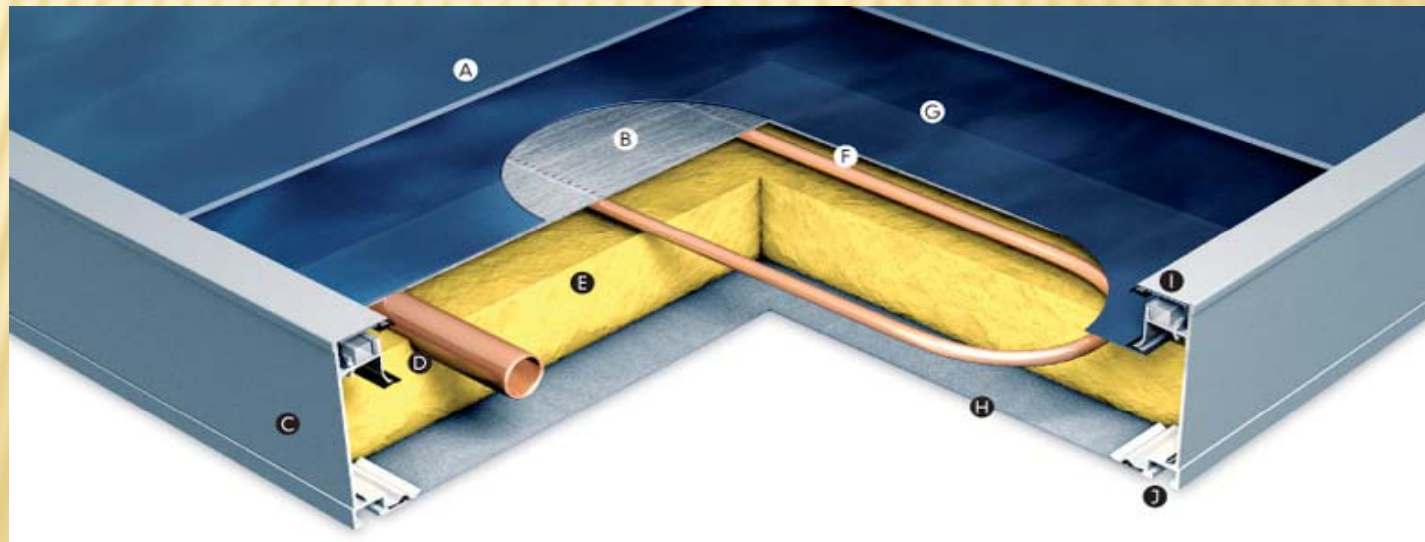
Heat accounts for almost 50% of the final energy demand in the EU
All EU 27 countries have to work out an Renewals Action Plan still this year.
Without the renewable heat sector, the targets will not be reached

Solar thermal can contribute considerable

■ Heating and Cooling ■ Transport ■ Electricity



TODAY'S BASIC COLLECTOR TYPES



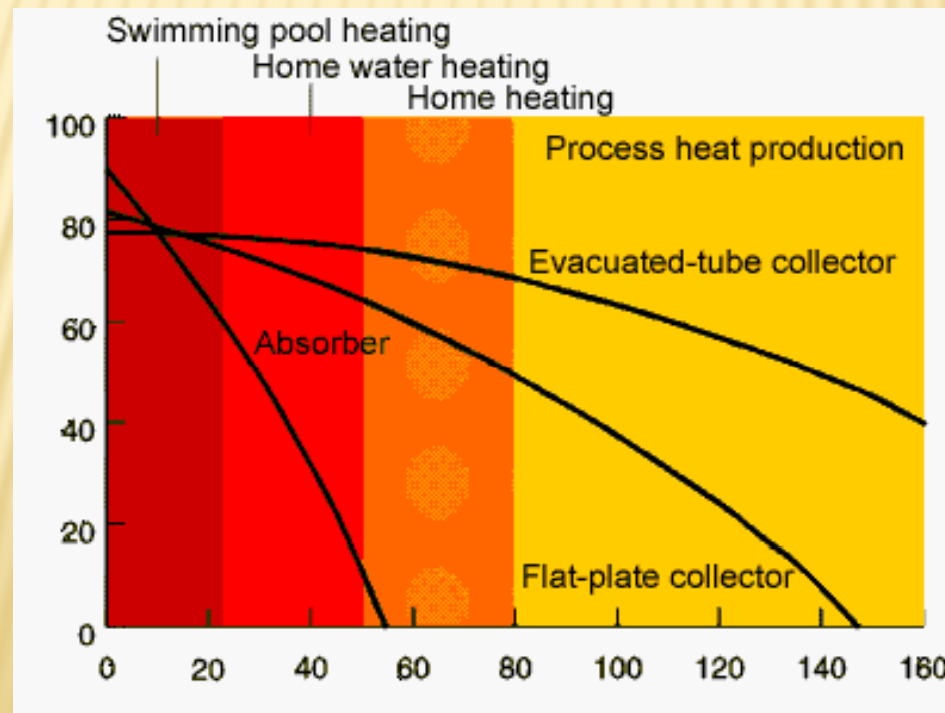
WHY TWO DIFFERENT COLLECTORS

Which collector is suitable for which situation?

The desired temperature range of the material to be heated is the most important factor in choosing the correct type of collector. An uncovered absorber is certainly not suitable for producing process heat. The amount of radiation on that spot, exposure to storms, and the amount of space must all be carefully considered when planning a solar array.

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[Deutschen Gesellschaft für Sonnenenergie e.V -- German Society for Solar Energy.](#)



Graph of efficiency and temperature ranges of various types of collectors (radiation: 1000 W/m²)

HOT WATER AND SPACE HEATING



Building integration:

Solar Architecture, defined by Georg Reinberg

Solar architecture is a design concept which understands the relatively new realization that, apart from the sun, our resources are limited. It is an architecture which expresses in built form that today we are looking for a new direction in the development of mankind. The sun is a synonym for a new opportunity here, a new opportunity for architecture too.



Ein Fassaden-Kollektor (ca. 100 m² für Warmwasser und Heizungsunterstützung mit 3500 Liter Tank) wird über der gesamten Südfassade ausgeführt, das Dach ist mit Photovoltaikkollektoren (die gleichzeitig die Pergola der Westterrassen bilden) ausgestattet.

Building integration:



*Building integration of solar thermal collectors in façades (to the left and in the middle) and of photovoltaics in solar screens (to the right).
(Photo: Schüco International KG).*

Solar Thermal Cooling

Wine store cooling

- Use: cooling of a wine store
- Site: Banyuls (south France)
- Solar thermal collector field: 130 m² evacuated tube collectors
- Chiller: absorption chiller with 52 kW cooling capacity
- Specifics:
 - no back-up system, the system operates autonomously and has no buffer storage
 - one of the oldest systems; operated more than 13 years without any problems



Solar Thermal Cooling

About 300 vacuum tube collectors support the largest adsorption cooling system of the world



Head offices of Festo AG & Co. KG in Esslingen-Berkheim before the installation of the solar thermal system; aerial photograph of the collector field with a gross surface area of 1.330 m² (Photos: Festo AG & Co. KG; Paradigma Energie- und Umwelttechnik GmbH & Co. KG.)

Solar Heat for Industrial Processes SHIP

EL NASR, Pharmaceutical Chemicals (Egypt)

Application: Production of process steam for a pharmaceutical company

Location: El Cairo, Egypt

Installed capacity: 1330 kW

Collector Area: 1900 m²

Collector type: parabolic trough

Heat transfer medium: steam (8 bar)

Operating temperature: 173 °C

Storage: not specified

Year of operation start: 2004 (January)

Owner: NREA (New and Renewable Energy Authority, Cairo);

financed by ADF (African Development Fund, Abidjan, Ivory

Cost); Contractor: Lotus Solar Technologies (Cairo, Egypt);

Engineering Consultant: Fichtner Solar GmbH (Stuttgart,



District Heating

Large-scale solar thermal plants are spreading like wild fire in Denmark. In June this year, the Danish collector manufacturer Arcon Solvarme inaugurated two solar thermal systems that were integrated into district heating plants: A 10,073 m² installation in the village of Gram in the region Syddanmark and a 8,019 m² system in the village of Strandby in North Jutland.



Site of System	Start of operation	Collector size	Number of connected households	Predicted specific annual solar yield	Predicted solar share
Strandby	2008	8,019 m ²	830	469 kWh/m ²	18 %
Gram	2009	10,073 m ²	1,095	482 kWh/m ²	17 %
Broager	2010	10,001 m ²	1,019	508 kWh/m ²	22 %

Solar Thermal Energy for Sea Water Desalination

The lack of clean drinking water will be one of the biggest challenges for the mankind in the future.

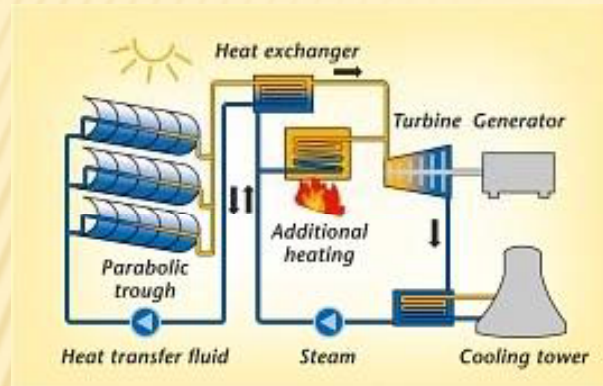
Concentrating solar power (CPS) offers a sustainable alternative to fossil fuels for large scale and smaller disintegrated seawater desalination. CSP can help to solve the problem, but market introduction must start immediately in order to achieve the necessary production rates in time.



Parabolic trough collectors and foundations for the molten salt tanks of ANDASOL 1.



Concentrated Collectors for Making Electricity



Line Focus: The Ausra Line Focus demonstration in Australia.

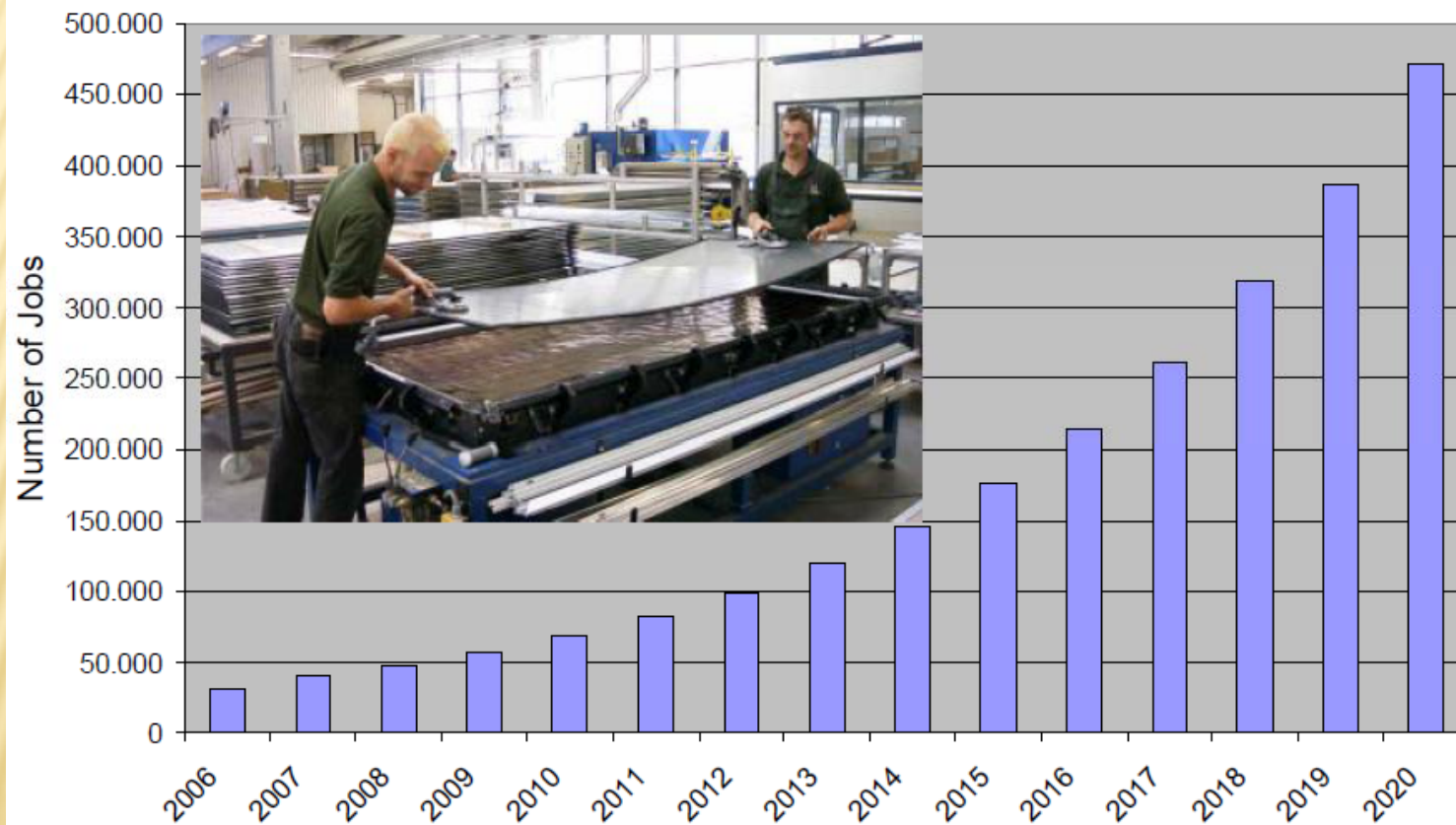


SavoSolar Opportunity: Composite mirrors with innovative coating solutions (AR self cleaning and scratch resistant coatings with PE-CVD); new high temperature absorption coating on and anticorrosive heat transfer coating inside the tube. AR self cleaning and scratch resistant coating on the vacuum tube.

Employment Impacts

Jobs in Solar Thermal EU 27

RDP Scenario



Savo-Solar in Mikkeli



PVD Coating line for efficient Industrial scale coatings



Reserved collector assembly line area



Factory building total area ab 6.000 m², Savo-Solar ab. 3.000 m² including space needed by the existing coating line.



SAVO-SOLAR TEAM



CEO Vesa Sorasahi, industrial and financing experience over 30 years. Investment Director in OKO Bank Group. CEO and CFO in several international industrial companies and entrepreneur of high tech start up company.

CTO Kaj Pischow, 35 years experience in the development processes of new technologies, and coating technologies specialist. Founder of Surfcoat -> Savcor Coatings Oy. Has organized the global expansion of Savcor from Finland to USA, Brazil China and Hungary, and thus facilitated Savcor becoming the global supplier of coating solutions for the international telecom industry.

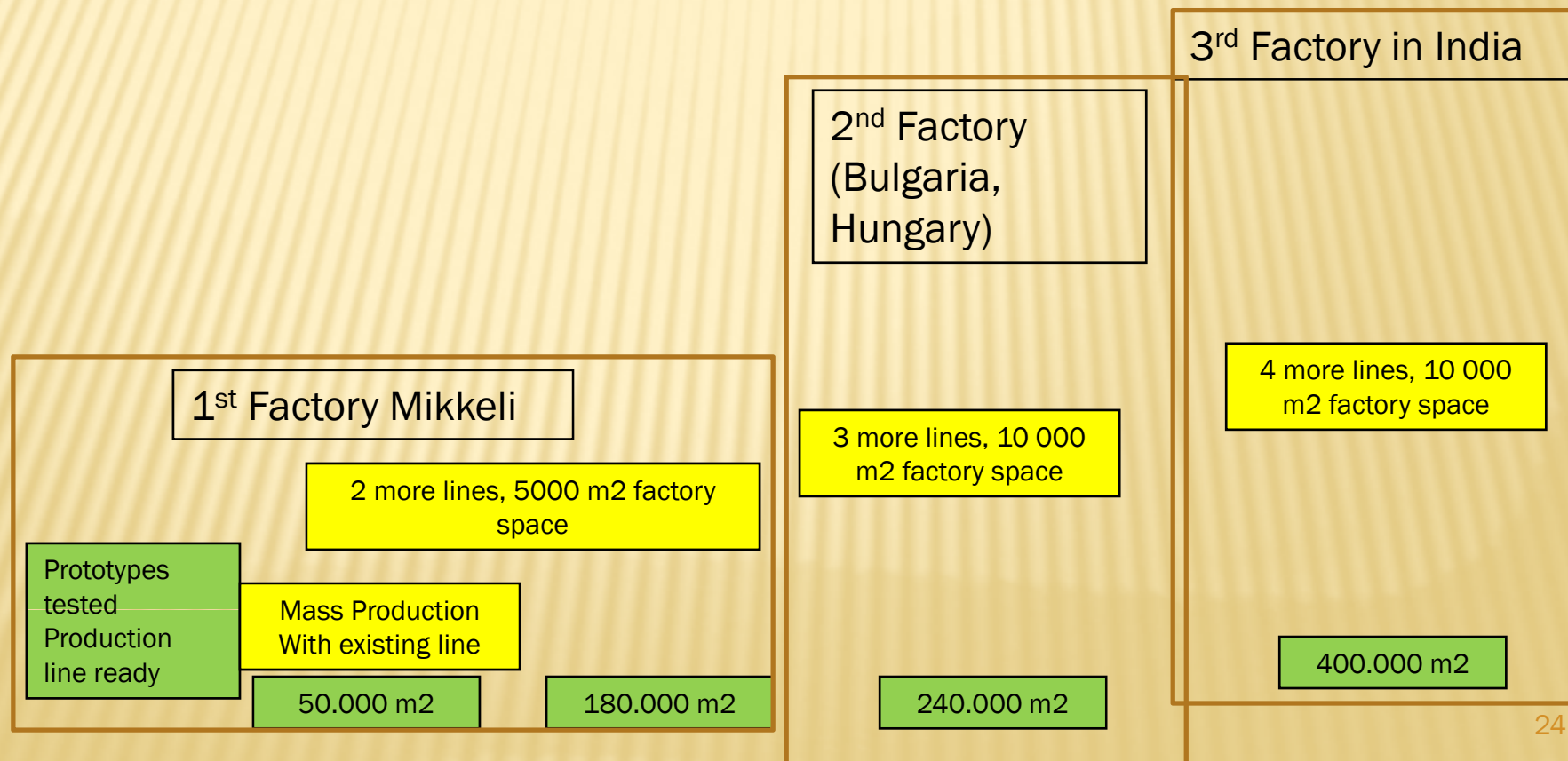
Technical Director, Martin Andritschky, professor (PhD Technology) is a material scientist specialized in functional coatings. He has been the GM of Savcor Dallas and has set up coating factories in US and Brazil

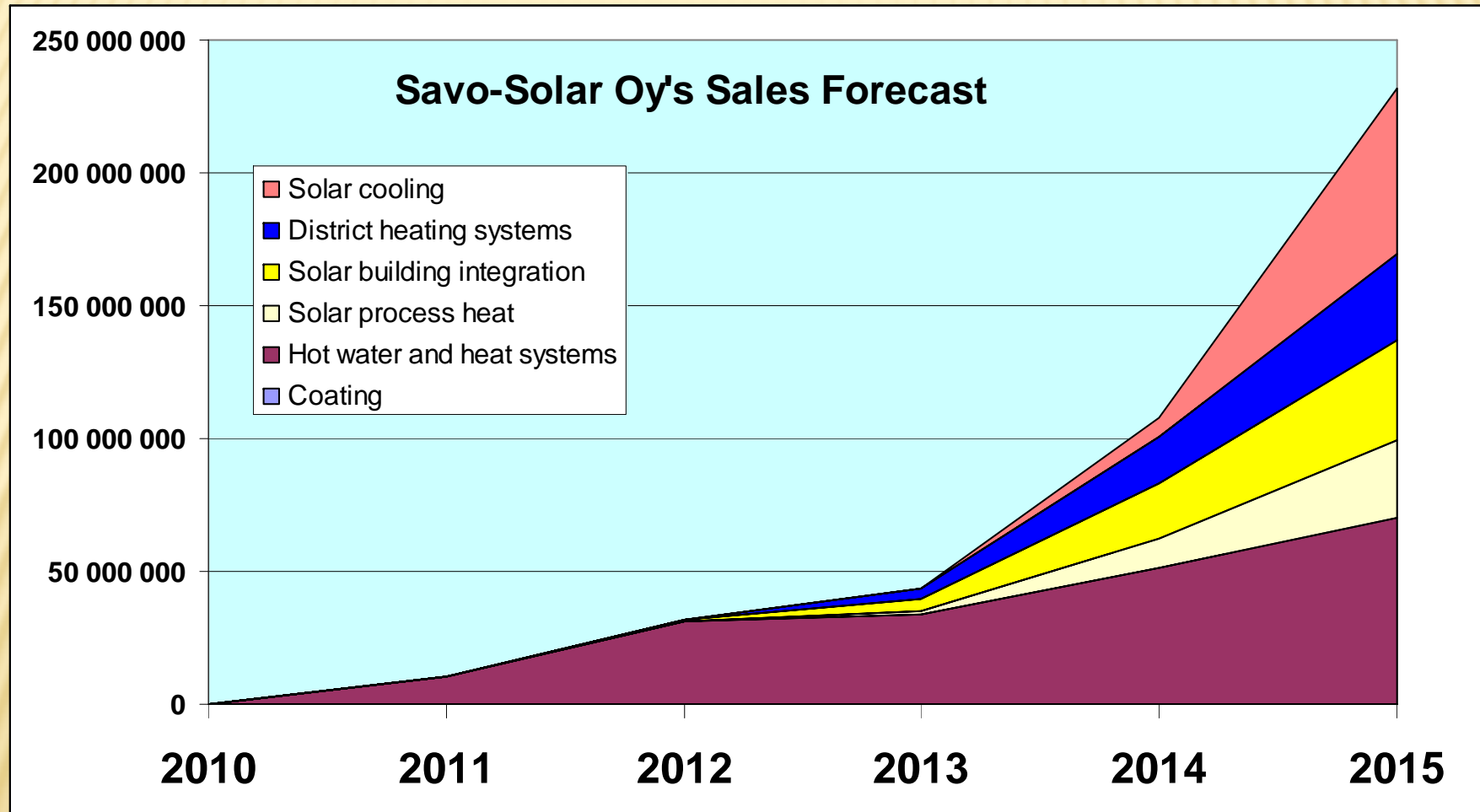
Management Executive Assistant , Rosa Aimo, founder of Surfcoat having 15 years experience in Savcor R&D, has been responsible for incubating Savcor's Guangzhou and Beijing factories. Project Manager, Italy and China.

Researcher Aki Matilainen, Ph.D at Sungkyunkwan University, South Korea and specialist in Coatings and Plasma Physics.

Production Implementation Plan

Year	2011	2012	2013	2014	2015
Personnel	25	75	120	250	500
Production(m2)	50 000	120 000	180 000	420 000	820 000





THANKYOU

Savo-Solar Ltd

WWW.SAVO-SOLAR.FI