

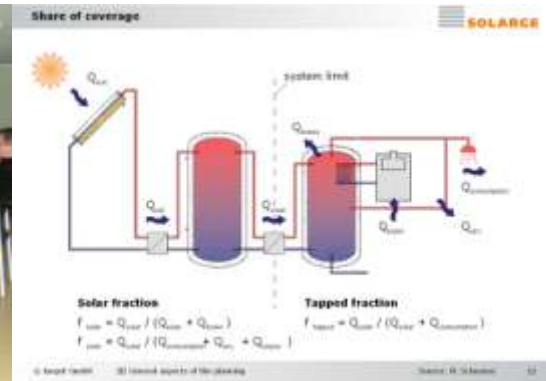


# SOLARGE

Enlarging Solar Thermal Systems  
in Multi-Family Houses, Hotels,  
Public and Social Buildings in Europe

EIE/04/082/S07.38178

[www.solarge.org](http://www.solarge.org)



# Main Features of the Project

- ▶ Collective solar thermal systems (CSTS): 30 to 100 m<sup>2</sup> collector area for multi-family houses, hotels, public and social buildings, ...
- ▶ Market analyses, identification of barriers:
  - Lack of motivation on the part of the housing industry
  - Critical approach due to bad practice experiences
  - Cost-benefit discussion on the part of the housing industry
  - Level of quality assurance and output control
- ▶ Removal of market barriers:  
Availability and transparency of system concepts provided by supply side as suitable technical solutions for typical investors' applications
- ▶ Development of national strategies and instruments for market stimulation
- ▶ National and Europe-wide dissemination of project results

# Project Results: www.solarge.org



- ▶ 8 languages
- ▶ Good practice database
- ▶ General information
- ▶ Newsletter
- ▶ Download area
- ▶ Partner login

# Good Practice Database (I)

- ▶ At least 100 comparable good practice examples from 10 countries
- ▶ Project summary allows first overview
- ▶ More details in data sheet give insight into success of:
  - Technology
  - Financing
  - Project development
  - Motivations



**SOLARGE**  
Enlarging Solar Thermal Systems in Multi-Family-Houses,  
Hotels, Public and Social Buildings in Europe

**Project summary**  
WBG Nibelungen, Amalienstr.  
Braunschweig  
Germany



**Description**  
In this particular case, the solar system is used for tap water and space heating. The system is an integrated solar heating system, an industrially prefabricated construction unit with direct control for the complete heat production and distribution. The solar operating method is as follows: priority of solar and direct heating is to the consumption points, whereas storage is subordinated. An optimal heat management and controlling, as well as an online operating management is effected. Due to the cooling of the solar system flow, the efficiency of the solar system is increased. The solar system is a...

**Building**

Type of building	Multi-family house
Number of users / dwellings, floors	approx. 100 users 40 dwellings 8 floors
Year of construction	1952
Total effective area heated	1,943 m <sup>2</sup>
Hot tap water consumption (measured)	660 m <sup>3</sup> /a
Whole energy consumption for heating purpose after CSTS implementation	204,200 kWh/a

**System engineering**

Year of construction of CSTS	2003
Type of collectors	Flat plate collectors
Thermal power	32.5 kW <sub>th</sub>
Aperture area of collectors*	46.5 m <sup>2</sup>
Buffer storage	1.3 m <sup>3</sup>
Hot tap water storage	0.6 m <sup>3</sup>
Total capacity of boilers (district heating)	160 kW <sub>th</sub>
Type of hot tap water heating	Central
Type of heating system	Central

**Costs**

Total cost solar system	47,500 €
Cost of CSTS / gross area of collector	94 € / m <sup>2</sup>
Subsidies	

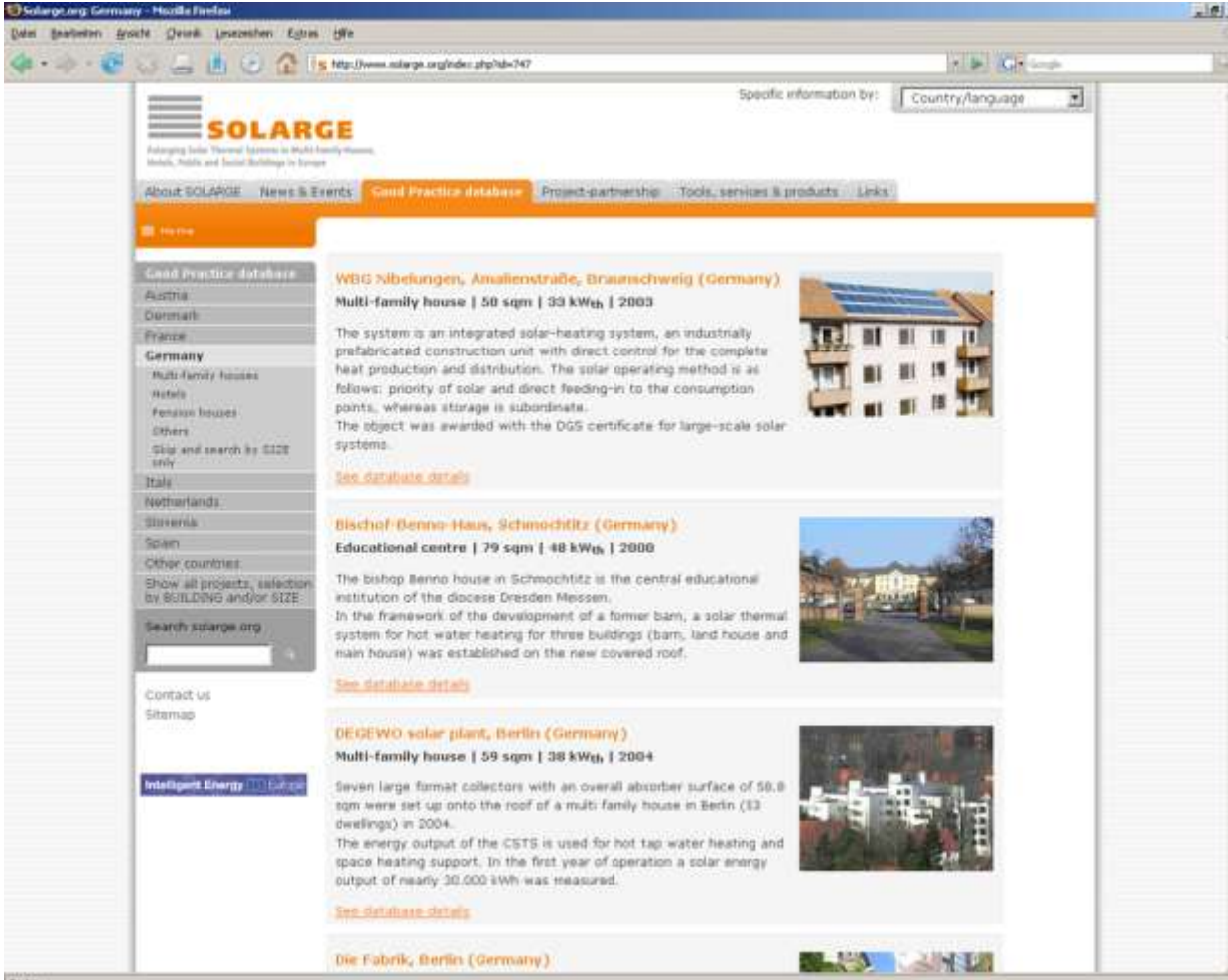
**Output**

Output of solar heat**	22,000 kWh/a
Reduction of final energy***	37,000 kWh/a
CO <sub>2</sub> emissions avoided	19 t CO <sub>2</sub> /a
Solar performance guarantee	Yes

**Questionnaire**  
Best Practice Analysis  
for Collective Solar Thermal Systems (CSTS)

**Operator**  
See owner

# Good Practice Database (II)



The screenshot shows the SOLARGE website interface. The browser address bar displays <http://www.solarge.org/index.php?id=747>. The website header includes the SOLARGE logo and navigation links: About SOLARGE, News & Events, Good Practice database (highlighted), Project-partnership, Tools, services & products, and Links. A search bar is located at the top right with the text "Specific information by:" and a dropdown menu set to "Country/language".

The main content area is titled "Good Practice database" and features a sidebar on the left with a navigation menu. The sidebar includes a "Lead practice database" section with a list of countries: Austria, Denmark, France, Germany (selected), Italy, Netherlands, Slovenia, Spain, and Other countries. Below the list is a search box for "Search solarge.org" and links for "Contact us" and "Sitemap".

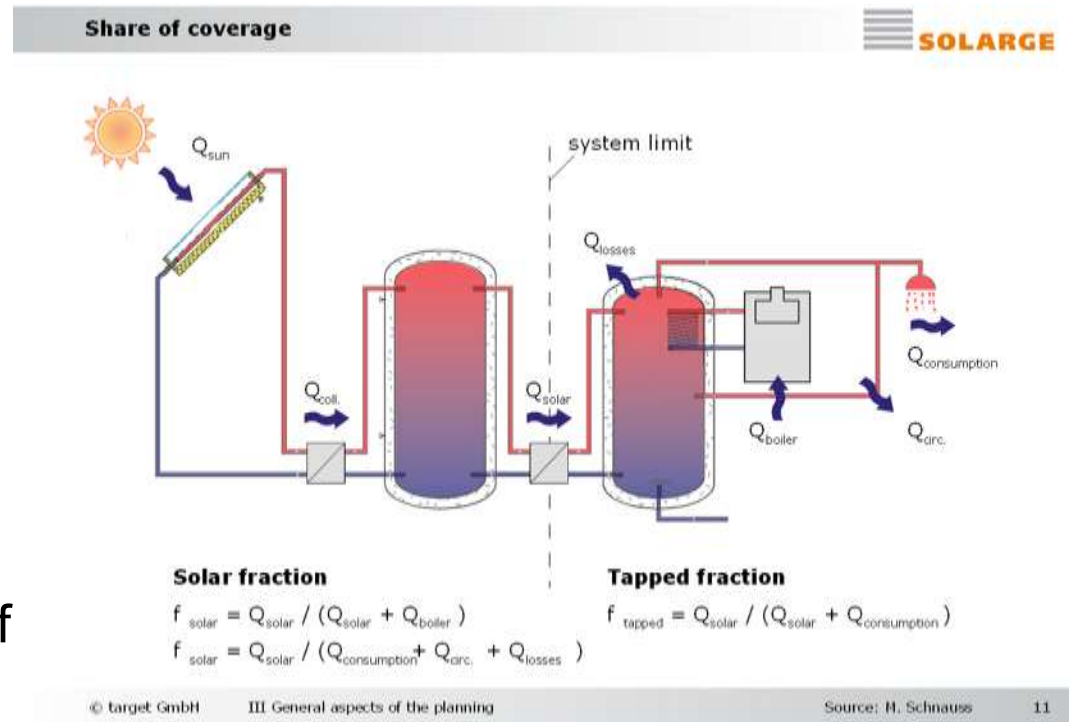
The main content area displays three project entries, each with a title, location, area, and year, followed by a brief description and a photograph:

- WBG Nibelungen, Amalienstraße, Braunschweig (Germany)**  
Multi-family house | 50 sqm | 33 kWh | 2003  
The system is an integrated solar-heating system, an industrially prefabricated construction unit with direct control for the complete heat production and distribution. The solar operating method is as follows: priority of solar and direct feeding-in to the consumption points, whereas storage is subordinate. The object was awarded with the DGS certificate for large-scale solar systems.  
[See database details](#)
- Bischof-Berno-Haus, Schmochlitz (Germany)**  
Educational centre | 79 sqm | 48 kWh | 2006  
The bishop Berno house in Schmochlitz is the central educational institution of the diocese Dresden Meissen. In the framework of the development of a former barn, a solar thermal system for hot water heating for three buildings (barn, land house and main house) was established on the new covered roof.  
[See database details](#)
- DEGEWO solar plant, Berlin (Germany)**  
Multi-family house | 59 sqm | 38 kWh | 2004  
Seven large format collectors with an overall absorber surface of 58.8 sqm were set up onto the roof of a multi family house in Berlin (13 dwellings) in 2004. The energy output of the CSTS is used for hot tap water heating and space heating support. In the first year of operation a solar energy output of nearly 30.000 kWh was measured.  
[See database details](#)

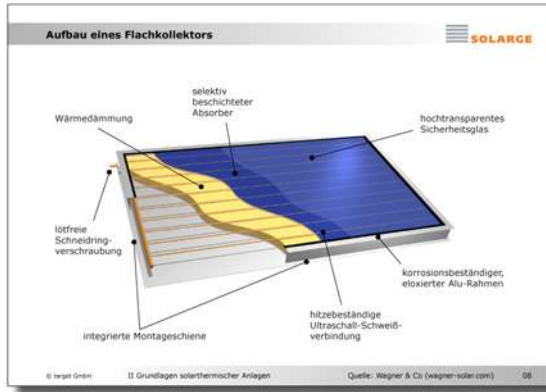
At the bottom of the page, a partial entry for "Die Fabrik, Berlin (Germany)" is visible.



- ▶ Training materials were developed for installers and planners of CSTS
- ▶ About 200 slides in 12 thematic chapters
- ▶ Slides with explanatory notes are compiled in a manual
- ▶ English master version of materials available for all project partners
- ▶ National adaptation and translation underway



*Slide sample of the English master version*

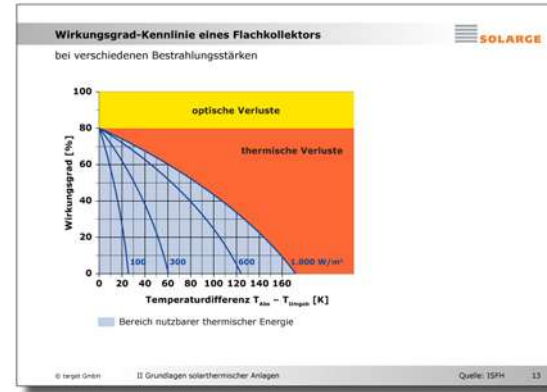


Flachkollektoren bestehen aus dem Absorber, einer frontseitigen Glasabdeckung sowie der Wärmedämmung auf der Rückseite und an den Seiten; diese Komponenten werden von dem leichten Kollektorgehäuse zusammengehalten.

Absorber werden üblicherweise aus Kupfer gefertigt, können jedoch auch aus Kupfer-Aluminium- oder Chrom-Nickel-Stahl-Verbindungen bestehen. Eine spezielle Beschichtung des Absorbers gewährleistet, dass die auftreffende Solarstrahlung fast vollständig absorbiert und nur zu einem geringen Teil reflektiert wird, woraus die dunkelblaue bis schwarze Farbe des Absorbers resultiert. Die absorbierte Strahlung erzeugt Wärme, die im Blech an die Absorberrohre geleitet wird. Durch die Rohre strömt die Wärmeträgerflüssigkeit (Wasser-Frostschutzmittel-Gemisch), die die Wärme aufnimmt und mit Hilfe der Kollektorpumpe zum Solarspeicher transportiert. Die Absorberrohre werden auf das Absorberblech gelötet, geschweißt oder anderweitig gut wärmeleitend mit diesem verbunden, um eine optimale Wärmeübertragung zu garantieren.

Der Absorber muss nicht nur die auftreffende Solarstrahlung sehr gut absorbieren, sondern soll auch möglichst wenig von der erzeugten Wärme wieder abstrahlen. Diese Abstrahlungsverluste werden auch Emissionsverluste genannt. Ein Absorber mit normal schwarzer Oberfläche strahlt Wärme fast ungehindert ab, das heißt, er hat einen sehr hohen Emissionsgrad. Diese Wärmeabstrahlung wird zwar als langwellige Strahlung von der Glasscheibe behin-

Raum für Notizen



Die Leistungsfähigkeit von Kollektoren wird in standardisierten Prüfungen bewertet (DIN EN 12975-2). Die entsprechenden Prüfzeugnisse enthalten folgende Angaben:

- Die so genannten Kollektorparameter, mit denen sich der Wirkungsgrad eines Kollektors bei bestimmten Betriebsbedingungen ausrechnen lässt.
- Angaben, die für Rechnungen mit Simulationsprogrammen wichtig sind, wie Wärmekapazität und standardisierte Angaben zu Reflexionsverlusten.
- Angaben, die für die Planung des Kollektorfelds wichtig sind: Abmessungen, Flächenlasten, Druckverlust, Durchmesser der Anschlüsse und nicht zuletzt die Temperatur bei Anlagenstillstand.

Der Wirkungsgrad eines Kollektors wird umso besser, je höher die Bestrahlungsstärke (G) und je kleiner die Temperaturdifferenz zwischen Kollektor und Umgebung (Übertemperatur  $\Delta T$ ) sind. Dies wird durch folgende Gleichung für den Wirkungsgrad ( $\eta$ ) ausgedrückt:

$$\eta = \eta_0 - \Delta T/G \cdot (k_1 + k_2 \cdot \Delta T)$$

Die Größe  $\eta_0$  ist der so genannte optische Wirkungsgrad – das ist der Wirkungsgrad, mit dem die einfallende Strahlung in Wärme umgewandelt werden kann, wenn Kollektor und Umgebung auf gleicher Temperatur sind, d.h. keine Wärmeverluste auftreten ( $\Delta T = 0$ ). Der optische Wirkungsgrad soll möglichst nahe bei Eins liegen; übliche Werte für Flachkollektoren liegen zwischen 0,75 und 0,8. Die effekti-

Raum für Notizen

- ▶ 8 comprehensive national studies providing detailed inventory of CSTS markets and political frameworks were prepared in 2005
- ▶ All partners used the same research design
- ▶ 5 key areas of research in each country:
  - Structure of the housing sector
  - Structure of the hotel sector
  - CSTS market development in the past
  - Economic and legislative framework for CSTS
  - Energy policy framework for CSTS

All national studies as well as a common market report brochure with an overall summary can be downloaded from [www.solarge.org](http://www.solarge.org).



# Seminars for Supply and Demand Side



CSTS training course, May 2006, Springe, Germany

CSTS symposium, June 2006, Hannover, Germany



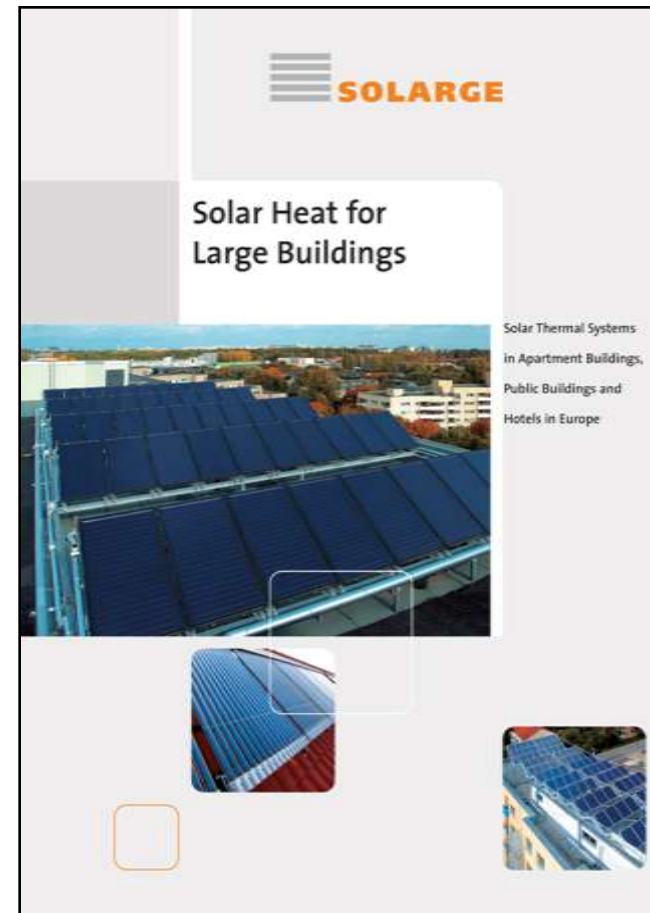
# European Expert Workshop

- ▶ Expert workshop on 8<sup>th</sup> and 9<sup>th</sup> of February 2007 in Strasbourg
- ▶ 30 highly qualified and experienced participants from all over Europe
- ▶ Discussion of market barriers, good practice and support strategies
- ▶ Presentations available on project website

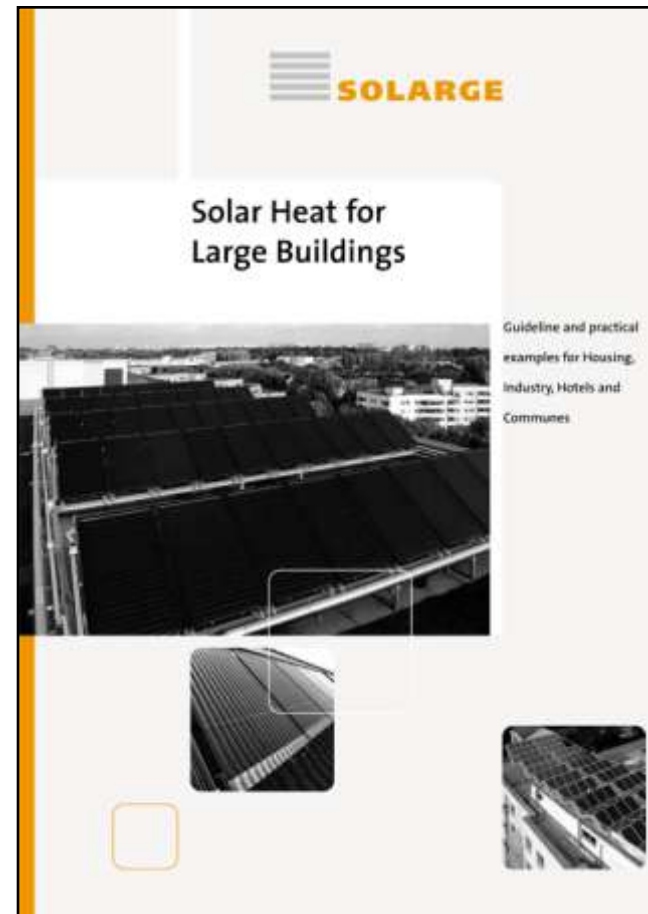


# CSTS Image Brochure

- ▶ High-quality image brochure presenting arguments and advantages of CSTS to potential investors
- ▶ Available in Danish, Dutch, English, German, Italian, Slovenian and Spanish
- ▶ Downloadable from [www.solarge.org](http://www.solarge.org)



- ▶ High-quality catalogue presenting CSTS technology and 21 best practice examples from all over Europe
- ▶ Available in English, German, and Spanish
- ▶ Soon downloadable from [www.solarge.org](http://www.solarge.org)



- ▶ English PDF newsletter
- ▶ Disseminated to relevant stakeholders throughout Europe
- ▶ Issue 3: June 2007



Enlarging Solar Thermal Systems in Multi-Family-Houses, Hotels, Public and Social Buildings in Europe

Issue 3 - June 2007
**NEWSLETTER**

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**German CSTS Policy Advice Report Handed Over to Ministry**

The German market for solar thermal systems is well-known for its strong and continuous growth. At present more than 900,000 systems with a collector area of approx. 9 million square metres are installed on German roofs. But this positive situation is not valid for larger solar thermal systems. A Policy Advice Report on status and possible improvements for the CSTS market has now been submitted by SOLARGE partners in Germany to the German Environmental Ministry. Here are some of the conclusions.

**Status and potential of the market for large systems**

The analysis of statistical data showed that only 1% of all solar thermal systems in Germany have a collector area larger than 30 square metres. But technical feasibility is not the key barrier, states the Policy Advice Report. Numerous positive examples of large-scale solar thermal applications are well documented in fields as diverse as multi-family houses, district heating, car washes, laundries, bakeries or industrial cooling. And the technically feasible potential for CSTS in Germany is huge: 50% of the gross energy consumption for heat is found in the temperature and building segment relevant for CSTS. If energy efficiency measures are used consistently, solar thermal energy could – theoretically – supply 25% to an overall reduced energy consumption.

**Motivation and barriers of investors in Germany**

There is a broad variety of potential investors for CSTS. Private house-owners and amateur landlords as well as residential building cooperatives are less profit-oriented than professional housing companies. A key barrier in the field is the "investor-occupant-dilemma" (see figure 1):



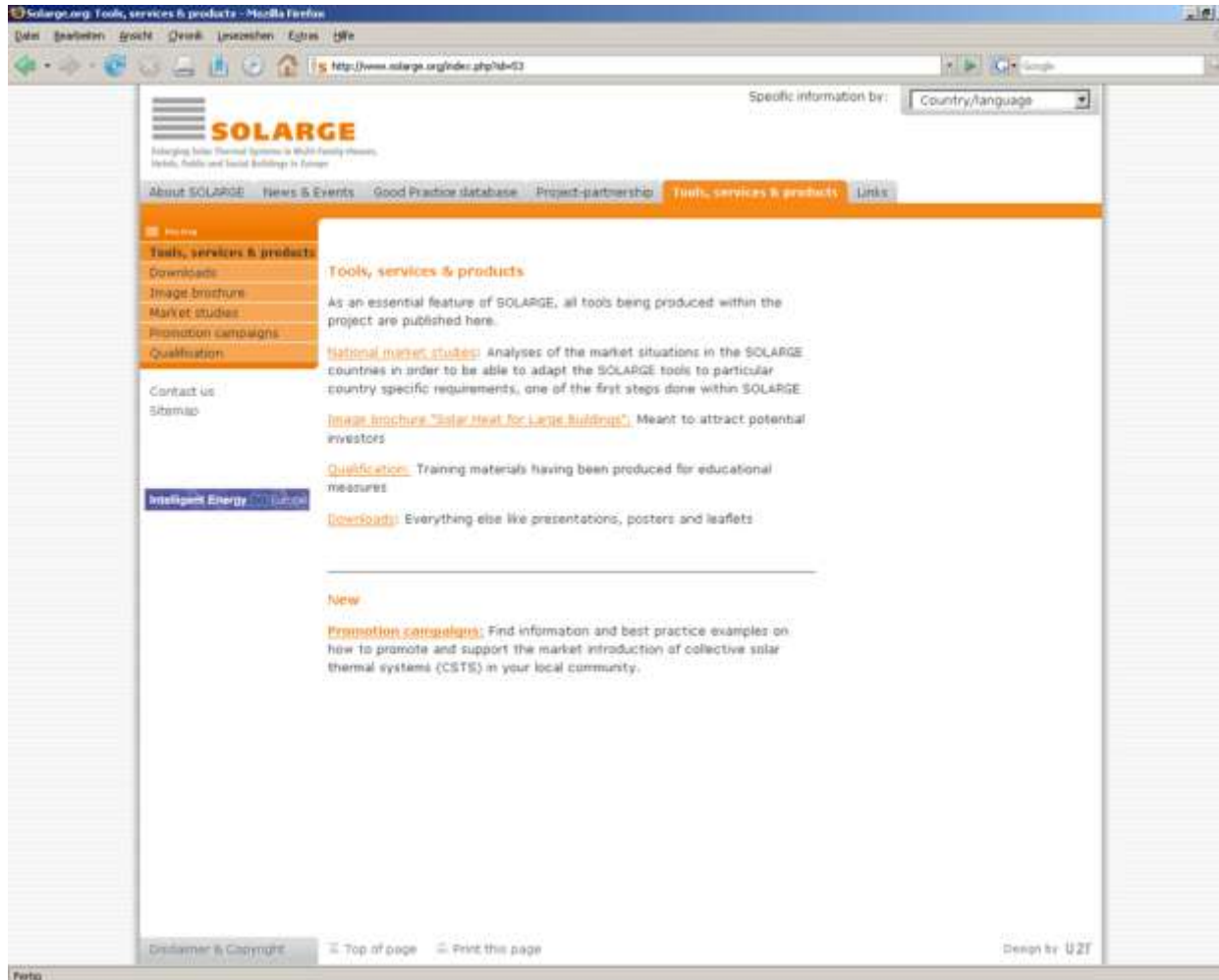
Figure 1:  
Investor-Occupant-Dilemma

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- ▶ Improving the policy framework conditions
- ▶ Launching a target group specific promotional campaign
- ▶ Proactive capacity building of installers and planners
- ▶ Further developing and standardising the technology
- ▶ Geographic extension

# Information and Contact



[www.solarge.org](http://www.solarge.org)