




## Making renewables visible!

Canvassing at schools, pedagogical consulting, continuation of a climate action school atlas, regional conferences and augmenting the visibility of solar power systems

 Education | **Information** Consulting Qualifications  
**Participation**

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### Project information

#### Support programme

Innovative climate action projects

#### Project duration

1 November 2008 to 31 December 2010 and  
1 January 2011 to 30 September 2014

#### Project leader

Unabhängiges Institut für Umweltfragen e.V. (UfU)  
and Deutsche Gesellschaft für Sonnenenergie (DGS)  
Landesverband Berlin Brandenburg e.V.

#### Project funding reference number

03KS0104A to B and 03KSE016A to B

#### Grant sum

1,277,332 euros and 1,502,076 euros

#### Project contact

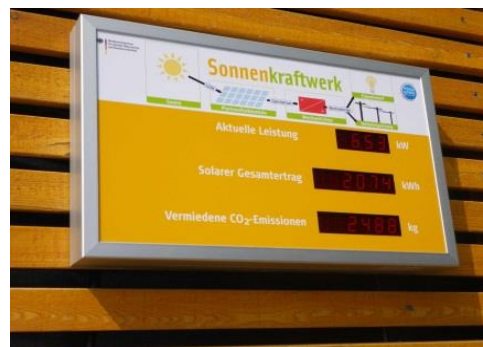
info@klimaschutzschulenatlas.de  
www.ufu.de/projekt/ee-sichtbar-  
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www.klimaschutzschulenatlas.de  
www.dgs-  
berlin.de/de/projekte/bundesweitabgeschlossen/e-  
sichtbarmachen.html

## Using schools' solar power systems as teaching material

Photovoltaic systems at schools are ideally suited as viewing and learning objects in class and could serve as a means to raise public awareness for climate action. However, often this potential is wasted when the facilities are hidden on inaccessible roofs and when the pedagogical knowledge is lacking to integrate them in the classroom.

### At a glance

The project partners – the Unabhängiges Institut für Umweltfragen e.V. (UfU) and the Deutsche Gesellschaft für Sonnenenergie e.V. (DGS) – recognised this un-earthed potential. The aim of the project was therefore to expand the use of school-based photovoltaic systems to impart practical knowledge and increase acceptance. For this, the project team provided all participating schools with a display panel for the incoming data as well as a data logger for storing the data. At the same time, the schools received teaching materials for integrating the topic into the curricula and other educational activities. The project thereby enabled the schools to present their photovoltaic systems within and outside the school community as well as to use them as a topic in class. Finally, the project participated in the 'Klimaschutzschulenatlas' – an online portal that showcases schools' climate action activities – feeding it with the data from many of the over 700 participating schools.



Panel showing the energy yield and the avoided CO<sub>2</sub> emissions



## How it started

Surprisingly many schools in Germany have photovoltaic panels. For years these have been producing climate-friendly electricity, which the schools either use themselves or feed into the public grid. Although these facilities were often acquired with a view to using them for educational purposes within as well as beyond the school, only a few schools ended up taking advantage of that potential. There are two reasons for this. First, the display panels were sometimes installed in inaccessible places or were missing completely, whereby the yield and impact of the solar facility was difficult to convey. Secondly, there was a lack of teaching materials for teachers and educators without prior technical knowledge of or experience with solar energy.

### What were the project goals?

- In each of the two project phases, the participating 400 schools were to give the impacts and yields of their existing photovoltaic systems more visibility.
- The participating schools were to use the practice-oriented teaching materials developed by the project team.
- In the second phase of the project, 20 additional schools without a photovoltaic system were to receive free support in setting one up.

## Needs recognised; deficiencies avoided

To increase the acceptance of renewable energies, the independent research institute UfU and the special interest group for renewable energy consumer interests DGS developed, published and disseminated technical and educational aids that could easily be integrated into the classroom. In addition, they encouraged pupils to exchange about their schools' energy conservation and climate action activities through the online portal of the Klimaschutzschulenatlas.

## Getting the schools on board

As a first step, the project partners had to recruit suitable schools for the project. To this end, they informed all the school authorities as well as schools which they knew to have photovoltaic systems about the project, namely with brochures and cover letters. Through an online questionnaire, interested schools were able to apply for participation and provide initial key data on their photovoltaic system. The project team then selected the schools to include in the project on the basis of the information provided in the questionnaire as well as with a view to having an even regional distribution and a balanced mix of school types. In order to secure a sense of commitment from the schools, each selected school was then asked to again declare their wish to participate in the project in writing.

The first phase aimed at equipping some 400 schools with solar display panels and teaching materials – a goal that was achieved early on. In the second phase, the number of schools that applied was slightly lower than expected, such that only around 340 schools were ultimately equipped. However, in this phase, the DGS also supported 20 additional schools in setting up a photovoltaic system on their premises for the first time.

## From roof to entrance hall to the web

By setting up the display panel where there is high-volume people traffic, such as the school's entrance hall, the project ensured visibility, from the outset and up to today. The panel shows the real-time performance, total energy yield and the thus avoided CO<sub>2</sub> emissions. A data logger records the data and transfers the values of the photovoltaic system to an internet portal. There, students can monitor the system's activity across dates, months and seasons and do more complex calculations. The portal can also be linked to the school's own website, as an additional means of sharing the data.



Beyond that, the 'Klimaschutzschulenatlas' also makes these data public and comparable. It presents all school projects supported by the National Climate Initiative (NCI, from Germany's Federal Ministry for the Environment, Nature Conservation and Nuclear Safety) online and is linked to the solar data of the participating schools.

project period, and the electronic version was downloaded 767 times.

In order to offer teachers and other school staff guidance in the practical and didactic handling of the photovoltaic system, the project offered half-day solar workshops where the technical, economic and legal basics as well as didactic methods were conveyed.



Presentation of the vocational school Osterode in the Klimaschutzschulenatlas

#### What did the project achieve?

- More than 740 schools were provided with display boards and teaching materials throughout the project phases.
- Some 20 additional schools received free support for setting up their own photovoltaic system.
- The 'Klimaschutzschulenatlas' maps the data of many of the systems.
- The participating schools implemented two different teaching modules, one for grades four to six and the other for grades seven to ten.

### Practice-oriented teaching modules

In addition to the enhanced visibility and data evaluation, the pedagogical integration of the photovoltaic system was another focus of the project. For this, all participating schools were provided with teaching materials for teaching grades four to six and/or seven to ten. The materials were interdisciplinary and modular, allowing each school to select those elements that fitted their needs. The modules are short (typically 20–30 minutes) and self-contained, and thereby flexibly applicable in the classroom and across various subjects.

The modules were designed to focus on the school's own photovoltaics system rather than adopting an abstract and theoretical approach to the topic. Even schools that could not participate in the project benefitted from the results, since the materials are still available on the UfU website. Schools can request that the teaching materials be sent to them for a fee, or download them from the internet free of charge. In total, 926 teaching modules were sent out during the

### Digital and person-to-person networking

The digital interconnection took place via the 'Klimaschutzschulenatlas'. Six regional conferences at which schools and other institutions presented their projects also gave participants the opportunity to engage in person-to-person networking.

### Guidance, advice and workshops for schools without solar energy panels

The project also attracted increasing interest from schools that did not yet have a photovoltaic system. For this group, the project developers developed a guideline for planning a school solar energy system that covers essential aspects such as space requirements, financing, installation and visibility.



The project team's free support of these schools in the initial phase of their plan consisted primarily of consulting about responsibilities and financing. The investment and installation costs, however, had to be borne by the schools themselves.

#### What happened next?

- The 'Klimaschutzschulenatlas' is available online at [www.klimaschutzschulenatlas.de](http://www.klimaschutzschulenatlas.de) and provides an overview of the solar energy data of the participating schools.
- The teaching materials are still available on the UfU website at [www.ufu.de/en/solarsupport/downloads-solarsupport.html](http://www.ufu.de/en/solarsupport/downloads-solarsupport.html) and can be ordered or downloaded.

## Contribution to climate action

Although the project did not achieve a direct avoidance of carbon emissions, it showcased the climate action contribution of the schools' already installed photovoltaic systems. The yield of all the solar energy panels involved in the project was in the order of 15,000,000 kilowatt hours for the total duration of the project period. These systems therefore replaced fossil fuels that would have emitted around 9,000 tonnes of CO<sub>2</sub>. The effects of the pedagogical aspects and the technical improvement of the installations are not quantifiable, yet should under no circumstances be underestimated. The project catered specifically to a generation of students that will, hopefully, foster the expansion of renewable energies in the future.

## Lessons learned

The overall project structure merits continuation and could well be applied to other energy-related measures. However, those interested in adopting it would do well to learn from the experiences made throughout the project as well.

### Doing good – and showing it

Schools, as places where children spend a large portion of their lives, can indeed be 'beacons' for climate action. Of course, their opportunities for enhanced visibility and pedagogic integration are not limited to solar energy. Among the many other areas that can be targeted are building energy efficiency, mobility and food services.

#### Checklist for success

- Advance climate action through 'beacon' school projects and technologies that incorporate learnings into the classroom and that ensure broader visibility;
- use internet platforms for supra-regional networking, the exchange of experiences and enhanced public visibility;
- integrate new means of visibility and technical expansions, such as configuring a display panel, to work with existing systems;
- develop practice-oriented teaching materials with the involvement of the teachers.

### The emphasis on exchange, all kinds

Interactive internet platforms allow for an ongoing exchange over long distances. When complemented with personal exchanges at workshops or conferences, the dialogue is brought to a higher level, since student and faculty bodies from different schools can get to know one another.



## Heeding technical details

The latest state-of-the-art technology is of no use if it is not compatible with the existing systems. For example, when selecting the data loggers, the project team had to ensure that they would be compatible with the photovoltaic system and the inverter. Such traps can and should be avoided with good technical preparation.

## Practice-oriented and interdisciplinary teaching approaches

The project partners combined technical and pedagogical competence. Early contact with schools and the consideration of teachers' experiences made it possible to design thorough yet nonetheless practice-oriented teaching modules.

### Climate action needs your initiative

Since its launch in 2008, the National Climate Initiative (NCI) of the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) has been supporting numerous projects that contribute to the reduction of greenhouse gas emissions. Funding has been given to a broad range of activities, from developing long-term strategies to providing practical assistance and investment aid. With a focus on advancing climate action on the ground, the Initiative benefits consumers, municipalities, businesses and educational institutions.

### Legal information

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**Sources:** This project summary is based on the final project report and publications in professional journals.