

## TEKNOLAND - POPULAR SCIENCE PARK WITH SOLAR ENERGY EXHIBITS

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**Abstract** - The new Popular Science Park TEKNOLAND in Falun contains a number of interactive solar energy exhibits, including The Solar Heated Chess Board, The Solar Electric Playhouse, The Sudanese Solar Oven, and Solar Collector Optics. The TeknoTrix tutored children activities include solar thermal activities. Some related interactive exhibits are planned to be included during the summer and during coming years.

### 1. INTRODUCTION

The author has a rather long experience of working with interactive exhibitions and with Science Centers. Over a decade ago, he and a colleague built a Solar Energy Traveling Exhibition (Broman and Gustafsson, 1991), that for several years toured Swedish museums, and after many years was permanently put on display at Grönhögen Energy Center on the island of Öland in southern Sweden.

At the time of submitting this paper, I am engaged in a new interesting educational project: the creation of the Popular Science Park TEKNOLAND at the Swedish National Ski Stadium Lugnet in Falun. The park, which will be inaugurated on 13 May 2000 and then be open daily until 8 September (during the off-ski season!) is planned to be a yearly event and a major tourist attraction of Sweden. The park is inspired by two similar parks that I visited in 1988 (Broman, 1988) and 1999, respectively: Nehru Science Park in Bombay, India, and Clore Garden of Science in Rehovot, Israel.

With its over 100 hands-on and the-whole-body-on (!) exhibits spread over 30 000 m<sup>2</sup>, TEKNOLAND will, as far as I know, become the world's largest popular science park and unique of its kind in Europe. Information about the park is available in English, German, French, and Swedish at [www.teknoland.se](http://www.teknoland.se).

Preliminary results from a recent enquiry study (Broman), questioning science major students from three different Swedish gymnasium schools (high schools) clearly indicate that students regard previous science center visits as important for their interest in science and technology. I believe that visits to a popular science park like TEKNOLAND may have an even larger impact.

### 2. SOLAR ENERGY EXHIBITS AT TEKNOLAND

TEKNOLAND will have a number of interactive solar energy exhibits already at the opening day. Others will be added later on, during the first season and during coming seasons.

#### 2.1 *The Solar Heated Chess Board*

This exhibit consists of 64 40×40 cm<sup>2</sup> squares, half of them white and half of them black. The squares are made as shallow boxes with top and sides of plastic coated steel sheet, and filled with concrete. Made in this way, the thermal conductivity and capacity of the squares are well balanced, so the temperature difference between black and white surfaces is quite noticeable, but they don't get so hot so they hurt - at least not at Swedish latitudes. It is interesting and enjoyable to note that when the sun is shining, bare-foot players prefer walking on the white squares, while they prefer to walk on the black squares on cloudy days. Both this and the following exhibits are accompanied with an explanatory text.

#### 2.2 *The Solar Electric Playhouse*

This exhibit will have a PV panel on its roof, a bank of high-capacity capacitors for storage of electricity, and a radio. The panel can be covered with a lid (to simulate night) but the storage will keep the radio playing for a minute - not too long for impatient young visitors to miss the effect.

#### 2.3 *The Sudanese Solar Oven*

This 1×1 m<sup>2</sup> semi-parabolic mirror (Broman and Broman, 1997) consists of ten parallel single-bent aluminum strips on a supporting plywood grid. It will be used from time to time for baking Swedish style pancakes, demonstrating the power of the sun.<sup>1</sup>

#### 2.4 *Solar Collector Optics*

This is a slightly elaborated version of an exhibit that has been designed by Kjell Gustafsson. A stand has a small roof with the two sides tilted towards north and south. On each side five pieces of absorber strip are attached. One is painted white, one has a pure aluminum surface, and one is painted black; these are not covered. One more is painted black and one has a selective surface; these are covered with a clear plastic glazing.

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<sup>1</sup> The Sudanese Solar Oven and the S(c)olar Collector are manufactured by Orsa Sol- & Energijänt, Kallmora 3285 B, SE 794 93 Orsa, Phone and Fax +46 525 550 356.

### 2.5 TeknoTrix

TeknoTrix is a lap type teepee, where daily a group of children has the possibility to experiment, guided by a teacher. In one of the planned activities, they work with the S(c)olar Collector<sup>1</sup> (Broman and Gustafsson, 1997). This is a small school laboratory solar thermal device. It consists of a 4 dm<sup>2</sup> Sunstrip<sup>®</sup> absorber connected to an 80 cm<sup>3</sup> storage tank in such a way that it works as a thermo siphon. The absorber has one surface painted flat black and one covered with a selective coating. It will be used by children who design, make, use and compare the performance of their solar thermal systems.

### 2.6 Other related exhibits

Some related exhibits will be added later. These include: The Elvis Ström's Electric Workshop with dozens of low-voltage electric experiments to do; this will become completely powered by a stand-alone PV system. The Large Sun Dial that by taking the equation of time into account always in clear sunshine shows the correct time. The Day & Night Globe that by being lined up with the real earth shows where on the earth the sun at the instance of observation is above or below the horizon - providing it is clear weather. And, finally, the vacuum tube collector Solar Espresso Cooker.

## 3. CONCLUDING REMARKS

Solar scientists visiting Scandinavia in the summer are invited to a different and active day at TEKNOLAND,

experiencing these and many other interactive science and technology exhibits. The author would appreciate communications regarding solar energy exhibits, both such that presently exist in Science Centers and such that so far exist only in your imagination.

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