Solar Mobility on Water

Roland Reichel, Bundesverband Solarmobil e.V. (German Solar Mobility Federation) www.solarmobil.net, roland@solarmobil.net

- *"Thomic R., Roland R. and Herbert J. travelled over 660 km along the Elbe from Dresden to Hamburg (Germany) in August 2003 in an 8-seater solar boat".*
- *“In previous years, Heinz H. had already travelled along the Nile (Egypt) in a solar boat from Alexandria to Aswan twice."*

Solar boats are electrically-powered boats with photovoltaic modules on the boat roof. Such boats can completely power themselves during the daytime. Batteries held on board can store energy from the sun, so that the boats can be safely brought back home even in bad weather or at night. Solar boats are 100% emission-free and don't pollute our lakes and rivers.

Solarcat 21 at the Dresden-Hamburg Trip August 2003

small Solarboot of the Kopf GmbH

“Chassalli Solar”, solar powered boat for 23 people in Berlin

1. Technology:

Solar boats are powered by electricity. Together with energy-saving hull constructions, the solar boat is a highly developed concept for mobility on water.

Solar energy:

PV systems on board charge the batteries and supply power directly to the motor when the sun shines. For small boats between 4 and 6 m long, solar power of 200 to 500 Watts is adequate. Even larger boats for 60 to 120 passengers can be run using 3 to 10 kW worth of solar panels.

Existing Examples:

1. **Small boat (catamaran)** “Cat 23”
   7.5 m, up to 8 passengers, max. 12 kph, 24 Volt system, approx. 360 Ah battery capacity, approx. 60 to 80 km range without sunshine, unlimited range during the day in solar-only mode at 5 to 6 kph. Motor power approx. 1 to 2 kW.
   Internet: **www.solarwaterworld.de**

2. **Saloon ship "Chassali Solar",**
   9.5 m long, 23 passengers,
   approx. 12 kph with 3 to 5 kW of motor power, 750 W of PV on the cabin roof,
   battery: 108 V 180 Ah,
   range on battery only of 60 to 80 km,
   unlimited range at sunlight at 4 kph.
   Internet: **www.solarwaterworld.de**

3. **Large inland passenger boat**, max. 125 passengers, 10 kph, 10 hours of use, 10 to 40 kW motor power, approx. 60 to 100 km range from the batteries without solar input. In solar-only mode unlimited range at up to 5 kph, the solar panels are perfectly adequate for boat use.
   (The picture shows a similar 66 passenger boat at the Maschsee, Hannover, Germany)
   Internet: **www.kopf-solardesign.com**

2. Ecological viewpoint

Energy efficiency of solar boats is extremely high:

- The electric motor operates at 80 to 90 % efficiency, produces very little heat, no emissions and almost no noise.
- System integration of the solar generator on board leads to a higher transparency of energy supply, which tends to work against wasting energy. In boat hire use, it has been seen again and again that the hirers prefer to travel slowly and with battery power = zero, i.e. in solar-only mode. This still allows for extensive round trips and surprisingly long daily ranges.
- Optimised boat construction reduces drag and thus energy consumption. Energy efficiency is the key to solar mobility on water: lower energy consumption, almost no wave building and thus almost no disturbance of the water (good for aquatic animals and nature and almost no wash).

3. Economic viewpoint

The complete lack of fuel and lubricant costs, as well as the very low maintenance costs for batteries and electric motors stand against the extra costs of the solar panels and batteries. An electric motor can, if using for example simple or second hand units, be cheaper than a normal diesel engine. High quality AC drive units are generally more expensive than diesels. AC motors are considered to be very long-lasting.

In (sunny) climes where fuel supplies are problematic and expensive, solar boats can work out as being much cheaper. The conversion of an existing vessel will always pay off if the diesel engine has to be replaced in any case. One should, for ecological reasons, convert to electric propulsion anyway.

Solar boats in front of the solar pavillon at Berlin Köpenick, Internet: www.solarwaterworld.de