

The use of copper in solar thermal systems



Teun Bokhoven has 25 years experience in the European Solar Industry. In addition to being Director of Zen Renewables, he is involved as a market expert in global initiatives like the UNDP.

Teun was one of the founders of the trade association Holland Solar and the European Solar Thermal Industry Federation (ESTIF). He is also President of the Dutch Renewable Energy Foundation (DE Koepel), an umbrella organisation for all renewable energy associations (solar, wind, bio-energy).

At Zen Renewables, we design and manufacture a broad range of innovative renewable energy solutions, including solar water heating, PV systems, heat pumps, district heating systems and sophisticated heat-exchanger systems. In particular, we specialise in large scale domestic, commercial and industrial projects for renewable energy and energy efficiency.

One material, above all, has proven to be fundamental to the efficient generation and transmission of renewable energy across our product range – copper. I would like to share with you its importance in solar thermal energy systems.

Typical solar thermal, hot water systems are composed of a solar collector, a storage tank, a pump and controller and the connecting piping. In the collector, a fluid is heated in an “absorber” due to the absorption of (sun) light. The heated fluid is piped to the storage tank. This whole process is controlled by a temperature difference controller which switches on the pump at the

moment there is useful solar energy to be harvested. Some systems in milder (non-freezing) climate zones can operate on a natural thermo-syphon basis with a pump and controller.

While there are other material options for the absorber plate, such as steel and aluminium, copper is the preferred material as well as for the piping material.

The conditions under which an absorber needs to operate, year after year, are severe. In ZEN renewables, the choice to use copper, as the basic material for absorbers, was made more than 25 years ago. The main reasons for this remain valid today:

- the material has excellent conductivity,
- it is fully capable of handling a constant heating and cooling of the material (ranging from freezing conditions up to 200°C) year after year,
- has the properties to deal with large temperature differences within a distance of a few centimetres,

- the absorber sheet can transfer its accumulated heat quickly to a copper pipe in order to heat the transfer fluid,
- the connection (welding or roll form) between the copper pipe and the absorber sheet needs to be homogeneous and robust because it has to be able to resist the long term effects of humidity or aggressive vapour conditions (like we can find in coastal locations). This is a critical aspect when considering the use of two different material types.

Despite the fact that it is more expensive than some other alternatives, ZEN Renewables therefore decided to use copper. The risks associated with using an alternative material, or absorbers which consist of 2 metals, are too high for any other decision.

Copper is therefore making a vital contribution, not only to conventional energy generation and transmission, but is absolutely central to the renewable energy revolution.

