

## **Solar Design “User Oriented Software Tool for Design Driven Applications on Thin-Film Solar Modules”**

**J. Garatea and I. Muñoz**  
GAIA, Spain

The demand for aesthetically integrated photovoltaic materials is increasing steadily in many industries. A growing number of designers, architects and industrial manufacturers across the world share a common interest in using Photovoltaics (PV) as a decentralized and sustainable source of energy in their product designs; solar modules are the only reasonable solution of renewable energy that can be directly integrated in smart and sustainable buildings, mobile devices, vehicles and textiles.

Customizable shapes, sizes, colors, transparencies or specific electrical properties are therefore required for solar powered products, having a decisive influence on the acceptance on the market. To achieve this goal new flexible and sustainable production processes and materials need to be developed.

At the moment, PV modules cannot be easily integrated in construction, tiles or electric devices as they are not flexible and have electric limitations. These modules are currently produced on a large-scale business model, following the idea that low costs can only be achieved by economies of scale, disregarding the inherent advantages of Thin Film.

Therefore, a novel sustainable manufacturing process that will enable the adjustment of all properties of a thin-film module on-the-fly and facilitate the production of customized photovoltaic modules with the desired voltage, size and shape is being developed within SolarDesign. Combined with the material characteristics given by the underlying thin-film solar cell technology a new-breed of design-led, sustainable and decentralized energy solutions can be realized (SOLARDESIGN 2013).

However, the designer or architect who wants to incorporate solar electricity into his or her work needs a service environment to be assisted in the creative process. Therefore, a new user oriented design software tool should support the designer in conceiving, planning and producing sustainable solar design products.

SolarDesign addresses the challenge of developing also the user oriented software tool following a living lab methodology approach where not only professionals but, also students participate in the creative development process; a system for building a future sustainable and innovative economy in which real-life user-centric research and innovation is the normal co-creation technique.

We look for sustainable and responsible innovation, focusing on what is needed rather than on what we can produce, offering a tool that enables users and stakeholders to take active part in the development an innovation process.

Therefore, our methodology consists on a parallel work together with other scientists and students to construct a sustainable ecosystem for the project and its further dissemination and, service and products exploitation through a joint co-creation, exploration, experimentation and evaluation; also monitoring and validation in order to enhance performance and reliability of the solar integrated products.

Developed technologies will be demonstrated in the following applications: tablet or PC solar cover, PV integrated on a smart textile surface and solar urban lighting, in an attempt of achieving great flexibility within four dimensions: mechanic, electric, size and shape; allowing a vast range of possibilities for PV integration. New technology ideas can only be considered innovative if they can be commercialized.