Smart energy to power refugee camps

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Rolling out renewable and smart energy solutions in refugee camps could dramatically improve the well being of millions of refugees world-wide. Working in collaboration with the UNHCR, an EPFL Master's student is investigating how it could be done.

Imagine a network of smart solar streetlights that store energy to light up refugee camps at night and provide power to up to 25 families in shelters. Small-scale solar appliances such as solar lanterns have been popular in camps, but the potential of large-scale integration of renewables in refugee camps is becoming more of a reality. For his Master's project, Hamed Ziade, a student at EPFL, put together a power consumption model for refugee camps around the world, a first essential step in the battle against darkness in refugee camps.

In the developed world electricity is often taken for granted, but in refugee camps it can bring immense benefits in terms of increased safety, education, and prosperity. Today, most camps facilities are provisioned with power using diesel generators, and refugees use firewood in their homes for cooking, lighting, and heating. However, supply of electricity is often sporadic, and the use of these fuels has serious implications for the well being of refugees, and for sustainability. Renewable energy sources such as photovoltaic solar panels could offer a better solution, transforming the abundant sunlight in camps into much needed electricity.

An hourly power budget

"In refugee camps, electricity helps reduce violence and it extends working hours, allowing the youth to study when the sun goes down and promoting the pursuit of livelihood activities," explains Hamed Ziade, one of the first students to graduate from EPFL's new Master's program in Energy Management and Sustainability in October 2013.

Ziade's main objective was to find out how much power was being consumed in refugee camps, thus supporting the United Nations High Commissioner for Refugees (UNHCR) in their vision to provide refugees with a clean and reliable source of power. Working under the auspices of UNHCR, he had access to the data he needed to determine how much power is used for lights, medical and administration facilities, schools, mobile charging stations, and a wide range of other applications. This data allowed him to develop CAMPOW©, a tool with which demand for electricity can be predicted for every hour of the day in refugee camps

Smart refugee camps

The next challenge was finding ways to match the demand in electricity and provide sufficient power when it is needed. Solar panels produce most electricity when the sun is strongest, but refugees need it predominantly during the hours of darkness. Matching electricity supply and demand calls for a new generation of refugee camps. Inspired by the notion of smart cities, "Smart refugee camps" could be designed based on innovative technologies allowing camps to manage themselves in terms of energy, by combining renewable energy production, consumption monitoring, and energy storage. Ziade's work represents a first step in that direction.

"Hamed's work with UNHCR also comes at a time where the importance of energy access is being increasingly acknowledged, and coincides with the development of a UNHCR Strategy for Access to Energy, which will

support the design of new approaches to meeting energy needs in refugee camps," says Dr. Gebre Egziabher who supervised Ziade's project at UNHCR.

Ziade comes from Lebanon, a country faced with an influx of refugees following the crisis in Syria. There, he co-founded a social charity and obtained a Bachelor's degree in Civil and Environmental Engineering from the American University of Beirut. He then benefited from the varied curriculum in Energy Management and Sustainability Master's program at EPFL. "The multidisciplinary courses I attended in my Master's fully contributed to the realization of the project," he says, adding that this shift, from civil and environmental engineering to energy management, would have been impossible without it.

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