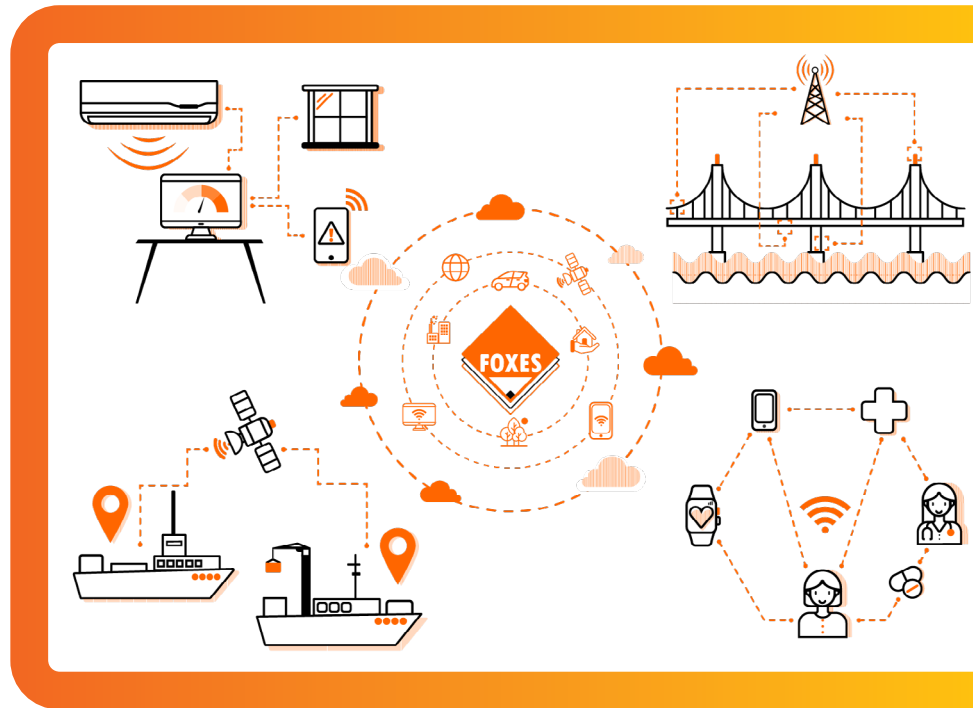


FOXES: A clean and sustainable way to power wireless IoT devices

The Internet of Things (IoT) is a network of physical objects, or 'things', embedded with sensors, software and connectivity that enable them to collect and exchange data. It is the backbone of many forward-looking concepts such as Smart Homes and Industry 4.0. The range of IoT devices is extremely broad – from smartphones to GPS tracking systems, from environmental sensors to medical devices, to structural-health monitors on large infrastructure.

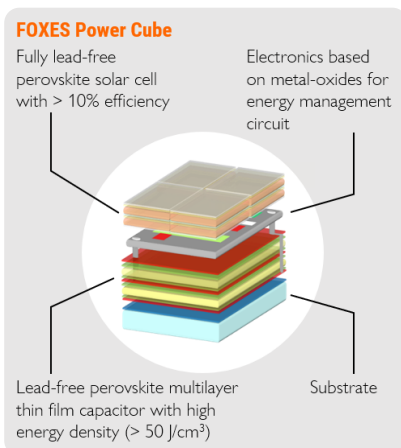
For many applications, IoT devices need to be completely wireless and self-powered. The current solution is to rely on batteries, with or without energy harvesting sources such as photovoltaic cells. But batteries have a limited lifetime – often shorter than the device itself – and a significant environmental footprint. The project FOXES addresses the challenge of developing a clean and sustainable way to power wireless IoT devices.

The goal is to realize what has been dubbed the Power Cube: a self-contained and portable energy-harvesting and storage system, consisting of an array of photovoltaic cells, a capacitor with high energy-



density and an energy management circuit. The system is designed to power an IoT device with solar energy during the day, and to store the surplus energy in the capacitor for retrieving it during nights. All three components of the Power Cube are based on low-cost processes that minimize the use of harmful chemicals, toxic elements and critical raw materials.

can be customized according to the needs of the application. Stand-alone power systems could be made up of multiple Cubes connected in parallel. This opens up endless application possibilities, especially in areas where lightweight IoT devices and low-cost power generation are critical, such as autonomous driving sensors, aeronautics, industrial process automation, GPS and wearables.



The second innovation developed within the project is a low-power sensor node for air-quality monitoring, which represents also the first test bed for the Power Cube. At the end of the project, the combined system Power Cube plus sensor node will be tested in the lab against gas mixtures under variable irradiation conditions, as well as in a real urban environment for monitoring pollution levels.

FOXES is a project of Materials Center Leoben Forschung GmbH (AT), Bergische Universität Wuppertal (DE), AMO GmbH (DE), UNINOVA – Instituto de Desenvolvimento de Novas Tecnologias (PT), and of the Universitat de Barcelona (ES). The project is funded by the European Union's Horizon 2020 Research and Innovation Programme, under grant agreement Nr. 951774. ●

The long-term vision is to produce the Power Cube as a modular system that

More information on www.foxes-project.eu