FlowGen

A built-in power source for low-maintenance connected water flow monitoring and control devices

What it is

The main component of these in-pipe power generators is a miniature device that harvests energy from drinking water and other water flows. These compact systems can generate enough power to charge a rechargeable battery, or, in some cases, provide energy to a low-power device like a flow meter. The goal is to either extend battery life or enable completely batteryless systems.

The solution is ideal for IoT devices used in piping monitoring and control systems in severe environments or difficult-to-access locations. Maintenance operations, such as replacing batteries, are reduced, saving time and costs.

What it can do

The micro-hydrogenerator can be integrated into any kind of piping network that has water or another fluid flowing through it.

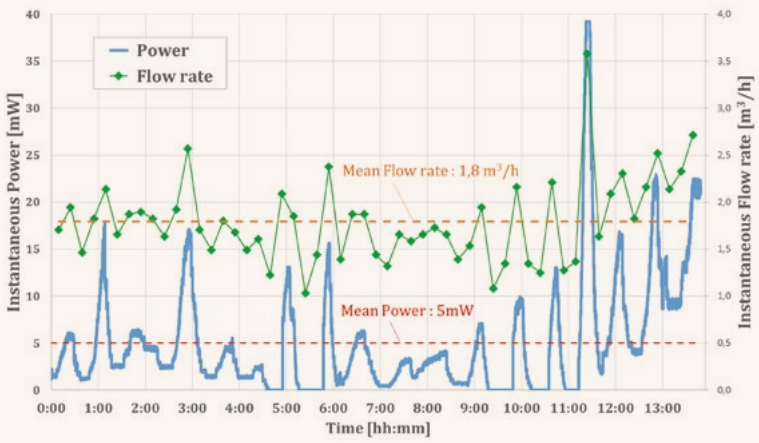
- CEA-Leti partner SOLEM integrated the system into a wireless connected irrigation timer ideal for buried irrigation networks. SOLEM's system has water metering, flow metering, and leak detection features built in. The micro-hydrogenerator extends the life of a 9-volt battery to 2 to 3 years for this type of use.
- The micro-hydrogenerator is suitable for all domestic irrigation systems; it can be sized up for agricultural irrigation systems and municipal water networks.

What makes it unique

Micro-hydrogenerators are generally characterized by high power losses due to friction, drastically reducing output and efficiency.
The micro-hydrogenerator developed by CEA-Leti is virtually zero-loss, with performance beyond the current state of the art for energy harvesters of this size made possible by CEA-Leti's advanced design, modelling, simulation, and characterization capabilities.

CEA-Leti also developed the micro-hydrogenerator's low-power electronics and mechanical integration architecture to ensure that the final component was extremely robust for use in severe environments. The research behind this innovation began as part of the EU InDeal project and continued with CEA-Leti partner SOLEM.

Measurement results in a real environment: instantaneous power and flow rate as a function of time ▼



At a glance

- TRL: 9
- Dimensions:
  - CEA prototype: DN25 (1"); DN50 (2"); DN80 (3")
  - SOLEM product: DN25 (1")
- Power output: 20 mW
- Losses: less than 0.1 bar

▲ SOLEM product with integrated micro-hydrogenerator

What's next

CEA-Leti has developed a similar energy harvesting system for air flows that could be used to power monitoring and control devices in HVAC ducts, for example.

Interested in this technology?

Contact:
Swan Gerome
swan.gerome@cea.fr
+33 438 784 624

CEA-Leti, technology research institute
17 avenue des Martyrs, 38054 Grenoble Cedex 9, France
cea-leti.com

@CEA-Leti

Research for industrial innovation