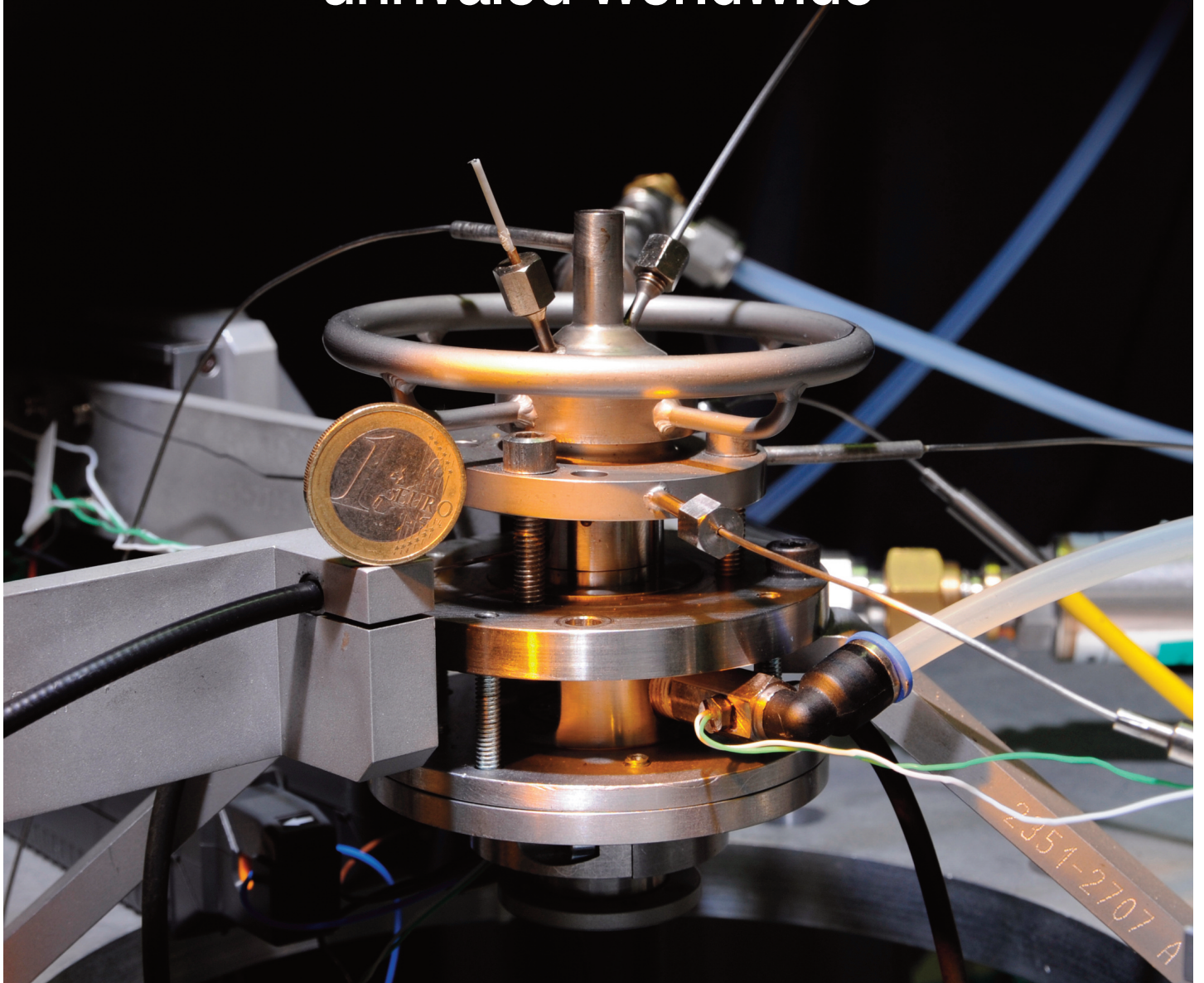


# Decawatt

## A micro-turbine unrivalled worldwide



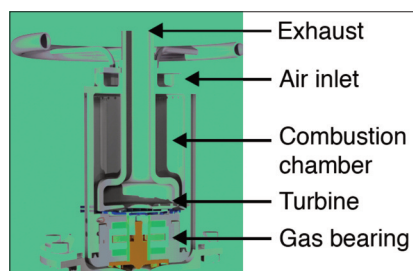
**O**NERA has developed a micro-turbine demonstrator dubbed Decawatt, at the cutting edge of technology. This gas micro-turbine, two million times smaller than an A380 jet engine, generates at least 600 Wh/kg of power, versus only 200 Wh/Kg for today's best batteries. Light, yet extremely powerful and offering long endurance, this micro-turbine could well be used to power tomorrow's miniature mobile or onboard systems.

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Micro-turbine layout



Micro-compressor

## The Decawatt demonstrator

Decawatt is a gas micro-turbine, designed and developed by ONERA, which generates 100 watts from a volume of only 20 cm<sup>3</sup>. Offering high power in a tiny package, it could be used to power various electrical systems or platforms for several hours continuously. It also reduces system size and weight in comparison with those powered by current batteries.

ONERA's micro-turbine first ran in mid-2014. It reflects ONERA's technological expertise in combustion, micro-turbine and micro-compressor design (1 cm diameter), micro-generators and gas bearings.

## Advantages

The Decawatt micro-turbine offers certain characteristics that makes it an excellent alternative to today's batteries or fuel cells:

- Constant power during operation, without having to recharge and even in very cold conditions (-40° to -50°C)
- Compact design: 20 cm<sup>3</sup> for the turbine itself, and 6 liters including fuel and electronics
- Lightweight: 650 grams
- Robust: no friction (gas bearings)
- Fuels: gas or liquid

## Applications

The micro-turbine concept is especially well suited to power requirements from about 100 W to 3 kW, and for long endurance (1.5 to 8 hours).

Possible applications include

- Drones, especially micro-drones
- Robotics (exoskeletons)
- Autonomous surveillance systems
- Portable energy sources
- Electric vehicles
- Co-generation for individual heating systems
- Battery chargers.

## ONERA: proven expertise in miniature energy sources

- Custom-tailored design of micro-turbines
- Cycle analysis
- Multi-factor computation
- Micro-combustion