Driving innovation in lunar water purification technology

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Learn about how the UK Space Agency's International Bilateral Fund (IBF) supported the UK-Canada Aqualunar Challenge to promote advancements in lunar water purification technology

Later this decade, humans are expected to set foot on the Moon once again. This time, the aim is not a short visit but longer stays – weeks, perhaps months – to carry out scientific research and prepare for exploration beyond our celestial neighbour. These ambitions bring new challenges, and one of the most fundamental is also the most familiar: water.

Water sustains life, supports agriculture, and enables key industrial processes. On Earth, it is often taken for granted; on the Moon, it is a precious and limited resource. Transporting it from Earth is expensive and logistically complex. For longer missions, astronauts will need to rely on water found on the Moon itself – locked up as ice beneath its surface. But lunar ice is far from ready to drink. It contains contaminants and is buried in an environment where every kilogramme of equipment must be justified.

That's why the UK-Canada Aqualunar Challenge has been such an important step. Funded partially by the UK Space Agency's International Bilateral Fund (IBF), the competition brought together engineers, scientists, and entrepreneurs to develop practical solutions to support sustainable human habitation on the Moon while unlocking technologies with potential benefits here on Earth. It's a textbook example of how international partnerships can accelerate innovation and tackle challenges that no single country can solve alone.

Watch Video At: https://youtu.be/-U4DSbYkaeA

As Professor Anu Ojha, International Director at the UK Space Agency, explains, “The Aqualunar Challenge is a prime example of how the International Bilateral Fund drives innovation and strengthens collaboration between the UK and Canada’s space sectors. Introducing the prize challenge mechanism was a fresh and exciting approach for the UK Space Agency, generating far more public interest and engagement than we initially anticipated. Beyond fostering cutting-edge technology development, the programme has been instrumental in building international partnerships and boosting capacity within the UK space sector.”

Holly Jamieson, Executive Director, Challenge Works said, “Challenge prizes, like the Aqualunar Challenge, shine a spotlight on an unsolved problem and attract bright minds to develop solutions. Rather than specifying how a problem should be solved, we open it up to the creativity and ingenuity of multiple innovators, frequently attracting innovators to a sector they may never have worked in before.

“Supporting these diverse approaches to develop and progress not only increases the chance of uncovering an impactful winner, but also multiple solutions where none previously existed.

“Since the Aqualunar Challenge, the winner – Naicker Scientific – has gone on to develop a number of new technologies, all with their origins in the Sonochem System, which it is now seeking to commercialise.

“Collaborating with the UK Space Agency, the Canadian Space Agency and Impact Canada on the prize has been an incredibly rewarding process for Challenge Works, and we are now developing more prize concepts for space-based innovation. More than that,

it was rewarding for the competing teams who are now part of an international community of innovators and inventors developing game changing technologies for life on the moon, and here on Earth too.”

The Aqualunar Challenge

The Aqualunar Challenge was jointly funded by the UK Space Agency and the Canadian Space Agency, and delivered by Challenge Works (part of Nesta) and Impact Canada respectively. The UK track was supported by a £1.2 million investment through the UK Space Agency’s International Bilateral Fund (IBF), which supports collaboration between the UK and international partners, strengthens UK capabilities, and drives economic growth.

The Challenge invited scientists, engineers, entrepreneurs, and students to develop lightweight, robust, low-power purification systems capable of processing lunar ice, with seed funding, expert mentoring, and financial rewards on offer.

The competition ran in parallel in the UK and Canada, each with its own teams and timelines. For the UK track, ten teams received funding, access to testing facilities, and mentoring to refine their ideas, with three ultimately selected for further support to advance their concepts from early-stage designs to systems ready for future deployment.

From concept to capability

Out of ten shortlisted UK teams, three were selected as winners, receiving additional funding to take their ideas from concept towards fully operational systems capable of supporting long-term lunar exploration.

- Naicker Scientific Ltd claimed first place (£150,000) with the aptly named SonoChem system, which uses high-energy sound waves to create microscopic bubbles in ice, triggering chemical reactions that remove contaminants.
- RedSpace Ltd secured second place (£100,000) with FRANK (Filtered Regolith Aqua Neutralisation Kit), which heats lunar regolith and ice in a sealed chamber, filters harmful particles, and distils clean water.
- A team from Queen Mary University of London took third place (£50,000) with AquaLunarPure, which uses supercritical water – created by heating and pressurising ice – to oxidise and eliminate impurities in a single step.

All three approaches are very different, but each reflects the power of targeted funding to unlock creativity and technical expertise.

International collaboration driving real-world solutions

While the primary aim of the Aqualunar Challenge is to enable sustainable human habitation on the Moon, the technology developed by the winners also has immediate and significant applications here on Earth. Water purification innovations are urgently needed

in regions where clean water is scarce, and these advances can mitigate contamination from industrial and agricultural activities, safeguarding both communities and ecosystems.

The innovative methods pioneered for lunar water purification offer valuable insights across scientific fields and for practical solutions beyond space exploration. Strategic funding like the IBF – with international partnerships and collaborative innovation at its heart – plays a crucial role. By working together across borders, we not only advance humanity's reach into space but also bring tangible benefits back home, turning the promise of space technology into real-world impact.

UK Space Agency

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