

ZIE2024

Baanbrekende technologische oplossingen  
toegepast in het dagelijks leven



**Corneel Bogaert**

ESA Technology Broker

Solve industrial challenges using space technology (spin-off)

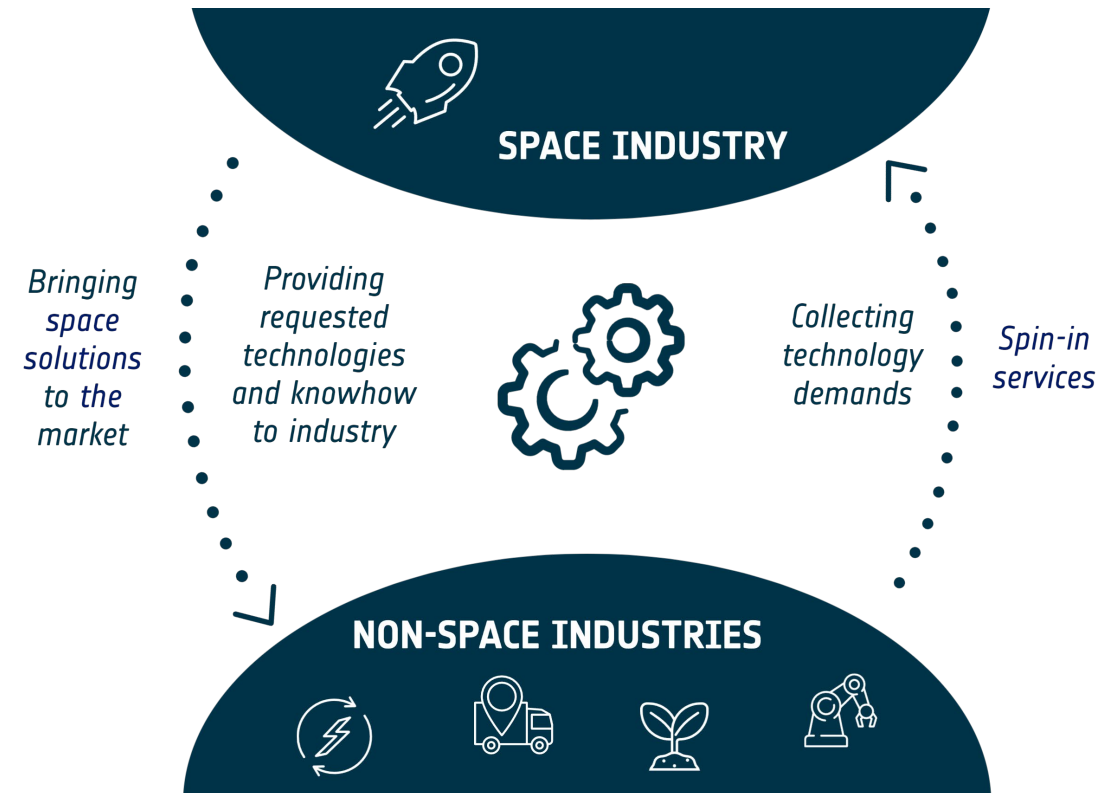
Support companies to bring their terrestrial innovations into the space domain (spin-in)

- Technology scouting
- Linking space solutions to industrial challenges
- Brokering introductions (space & non-space)
- Business & marketing support
- Guidance in funding opportunities

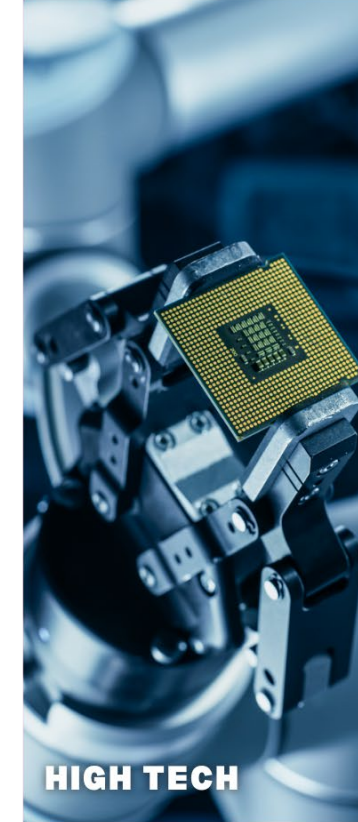
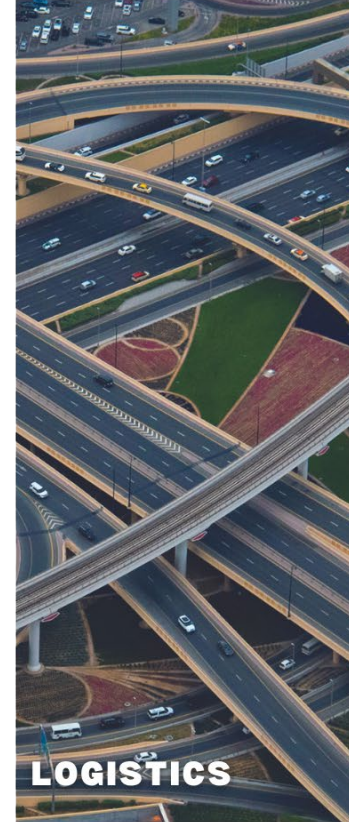
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Managed by:



# Target sectors with high socio-economic impact



# Technology transfer activities

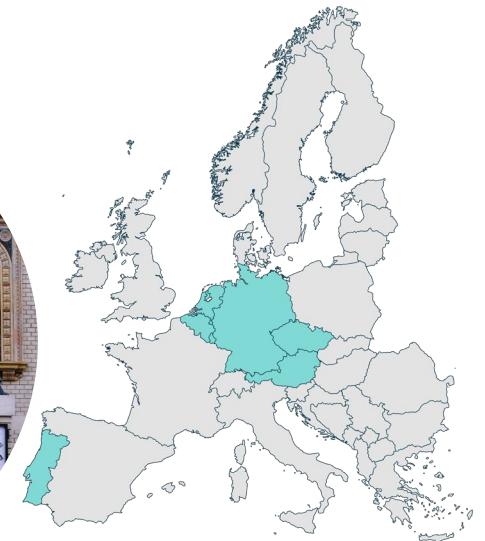
- Workshops/events
- Collecting technology needs from non-space
- Collecting technology descriptions from space
- Matching space solutions with terrestrial challenges
- Network of ESA Technology Brokers
- Competitions



## ESA TECHNOLOGY BROKERS MAP

### LEGEND

ESA Technology Broker



# Rocket science saves lives

(video)

# Cool gas generators

Solid rocket space technology developed by TNO, used by ESA

Non-pressurised gas storage (safe)

No maintenance (reliable)

Compact and lightweight

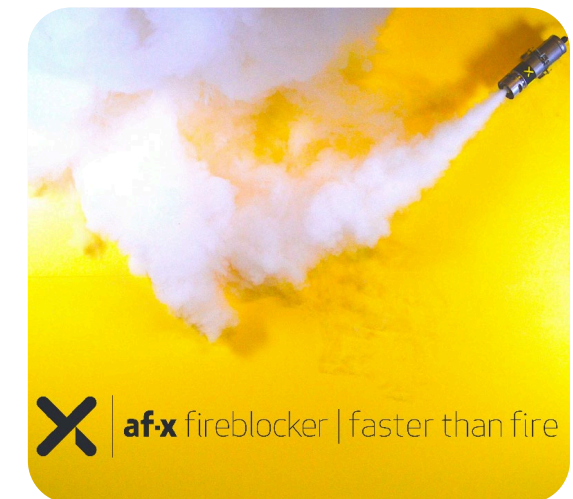
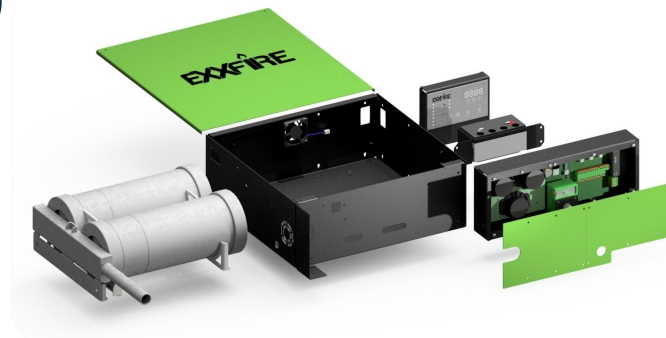
Well suited for rescue and safety systems

Applications:

Emergency supply & rescue systems (CO<sub>2</sub> & oxygen)

Emergency energy supply (hydrogen)

Fire extinguishing system (nitrogen)



# Rocket science saves energy

(video)

# Space for Energy

## 1. Metalot Future Energy Lab B.V.

Idea: From research on metal powders as fuel for space missions where traditional fossil fuels are not viable to introducing iron powder a circular energy storage medium on Earth.

Space for Energy 20K

Funding 40K Metropool Regio Eindhoven

Follow-up funding (Topsector Energie)

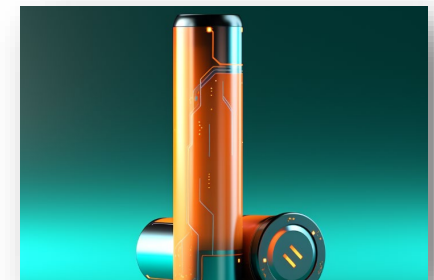


## 2. ZemQuest B.V.

Idea: Sustainable electrification for industrial mobility and long-range electrical aviation with aluminium-oxygen batteries developed for space applications.

Space for Energy 10K

RSM Space Business Challenge



## 3. Solidflow B.V.

Idea: hydrogen storage in cool gas generators for emergency power supplies (hospitals, emergency services, logistics, etc.).

Space for Energy 5K

Space proven technology with terrestrial applications





# Other examples of technology transfer

## Challenge:

- CO<sub>2</sub> supply chains for greenhouses are predominantly reliant on fossil fuels (industrial plants like oil refineries and fertiliser producers)
- Reduce CO<sub>2</sub> in the greenhouse horticulture sector

## Solution:

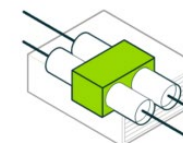
ESA technology to capture CO<sub>2</sub> exhaled by astronauts in spacecraft

→ Skytree's onsite direct air capture technology capturing atmospheric CO<sub>2</sub>



Skytree

### Decentralized Direct Air Capture



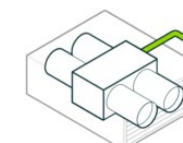
#### Adsorption

Our filter captures CO<sub>2</sub> from ambient air.



#### Desorption

The sorbent is heated, releasing the CO<sub>2</sub>.



#### Release

The CO<sub>2</sub> stream is pressurized in a buffer tank, allowing it to be used for multiple applications.

# Spacecraft life-support systems boosting sustainability

Minimise launch cost per kilogram

Astronaut consumes nearly 5 kg per day in the form of oxygen, food, and water

→ MELISSA (Micro Ecological Life Support System Alternative): international collaborative effort of 15 partners led by ESA

E.g. BlueCity water treatment in Rotterdam



'Closed-loop' mobile water treatment



SEMiLLA Sanitation

# Food freshness inspection with hyperspectral imaging

Cosine develops optical measurement systems for the aerospace industry

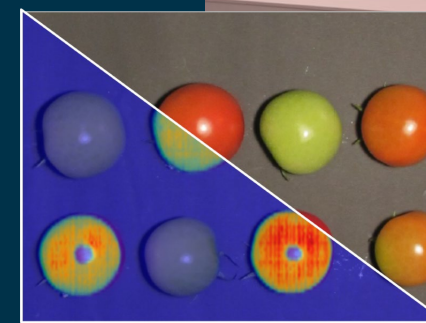
Earth observing satellites equipped with hyperspectral imagery measure vegetation, algae, snow, droughts and more

Hyperspectral imaging camera splits the spectrum into tens or hundreds of different spectral bands

→ Subsidiary Condifood:

Utilise hyperspectral technology to determine food quality

Ripeness and flavour of an individual fruit, or the freshness of fish



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## Flow Control Unit for gas regulation and transportation

Reference: TD-NL-1003



### TECHNOLOGY DESCRIPTION

In partnership with the European Space Agency (ESA) and the University of Stuttgart's Institute of Space Systems, Stellar Space Industries is engaged in the development of a state-of-the-art electric propulsion thruster system for small satellites. This venture is characterised by its innovative Flow Control Unit, designed to ensure precise gas flow in challenging conditions of space. The flow control unit's core component is a novel piezo-based micro machined valve, engineered for high accuracy and efficiency.



### INNOVATIVE ASPECTS

- Superior leakage performance compared to existing market alternatives.
- Rapid response times (within microseconds).
- High precision control of gas flows and pressures (within flow ranges of  $0.1-10.0 \pm 0.01$  mg/s).
- Compact design and minimal power consumption/heat generation.
- Accurately and efficiently controlling various gases within specific flowrate ranges, maintaining an unprecedented level of precision.
- Capability to handle various gas mediums.
- Longevity: Specially engineered for extended life endurance, the valves minimise maintenance and replacement costs.



### TECHNOLOGY READINESS

TRL 3 (2024)



### COUNTRY OF ORIGIN

The Netherlands

### LATEST UPDATE

02/2024

### TAGS

#propulsion

#flow control

#valve

#gas regulation

#accuracy

#thruster

### APPLICATION AREAS

Energy

Mechanical  
engineering

Space  
technologies

Chemical  
Engineering &  
Biotechnology



TECHNOLOGY  
BROKER

SPACE  
FOR BUSINESS  
BUSINESS  
FOR SPACE

## CONTACT



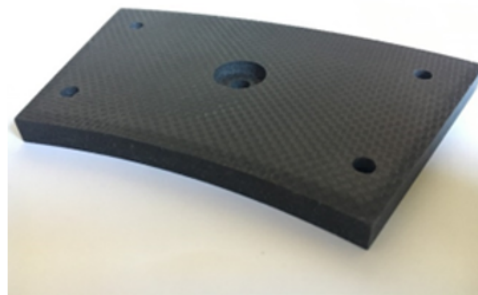


## Ceramic matrix composite materials for ultra-high-temperature applications Reference: TD-NL-1002



### TECHNOLOGY DESCRIPTION

Arceon, a Dutch engineering company, offers ceramic matrix composite materials, combining ceramics and composites. These have unique properties: low density, high temperature resistance, low CTE and high strength. It is applied in among others rocket nozzles, precision telescope tubes and thermal protection systems. It can often replace heavy, metal, alternatives, increasing performance and decreasing weight. Arceon is open to costumers, as well as collaborative and research projects.



### INNOVATIVE ASPECTS

- Low density (1.9-2.1 g/cm3).
- High temperature resistance (stable up to at least 1600 °C).
- Low thermal expansion (-1 – 2.5 10<sup>-6</sup> K<sup>-1</sup>) and high strength (flexural strength up to 300 MPa).
- High-temperature stability and scratch resistance.
- Density is 25% lighter than aluminum.



### TECHNOLOGY READINESS

TRL 5 (2023)

### COUNTRY OF ORIGIN

The Netherlands

### LATEST UPDATE

11/2023

### TAGS

#thermal protection

#lightweight

#ceramic

#ablation resitant

#wear

#nozzle

### APPLICATION AREAS

Aeronautics

Automotive

Refractory industry

Energy

esa TECHNOLOGY BROKER

SPACE FOR BUSINESS  
BUSINESS FOR SPACE

## CONTACT



# Deployment device for parachutes on space missions

- Safety system to support soft landings
- Aerospace
- Aircraft recovery
- Safety parachute
- Defence projects
- Cargo droppings
- Other





# Cross pollination at Agronautics

**WORKSHOP**

## AGRONAUTICS: MERGING SPACE & AGRIFOOD

Where Space Meets Soil

 Monday, April 22 | 10:00 – 16:00

 Wageningen Campus Plus Ultra II



TECHNOLOGY  
BROKER

THE NETHERLANDS

**STARTLIFE**  
Agrifoodtech Accelerator

  
Research Center



**Got a real-world problem that needs a solution?**  
**Maybe space tech can help...**



**Tap into the realm of space technology and share your needs and innovation challenges**