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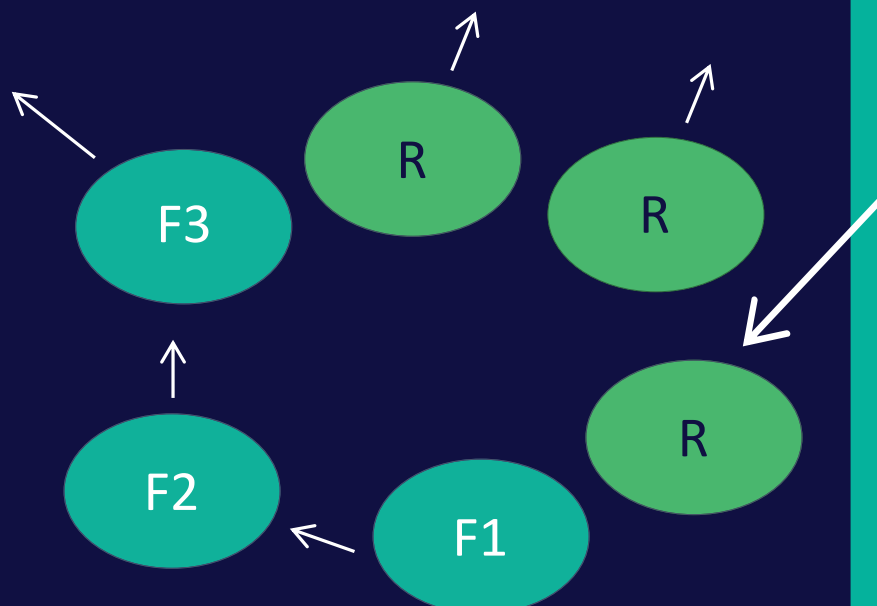
CROFT
Filters

Filtering Innovation with Croft Filters

A Hidden Risk To Clean **Energy** Engines

When developing our subsurface energy technology, Geo-Engines worked closely with Lloyd's Register to review system risks. One critical point emerged. Without effective filtration, our engines could be exposed to contaminants that might cause damage under extreme conditions. This was the falling-down point. To move forward, we needed a partner who could deliver a filtration system that didn't yet exist.

Figure 1: System diagram highlighting the role of filtration in protecting Geo-Engines' technology.



3 OFF RECHARGING ELEMENTS

3 OFF FILTERING ELEMENTS

In each of the filters, 2 total

FILTRATION

Sour gas Charged F1

Bedding In of Depth Media, some filtration

Sour Gas Flow to F2

F2 still bedding in, some filtration

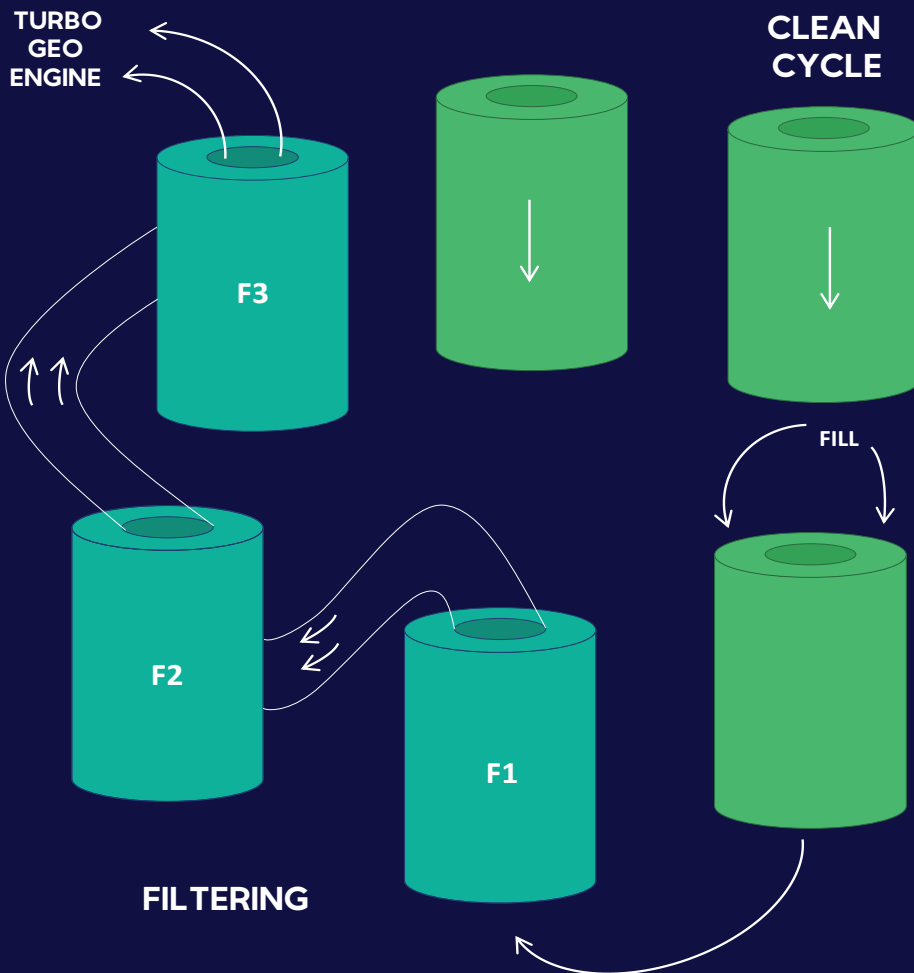
**Sour Gas Flow to F3, full filtration
THEN TO TURBO EXPANDER**

RECHARGE

**Remove and separate
contaminated media**

**Clean Media: surface backwash
with gas, depth with wash or burn**

Charge up clean filter with sour gas



Energy Meets Filtration With Croft

That challenge led us to Croft Filters. With nearly four decades of experience in bespoke filtration, Croft are known for solving problems that can't be addressed with standard solutions. Their ability to design from a blank canvas made them the right partner for our work, which required filtration at pressures up to 100 bar and particle capture down to just a few microns.

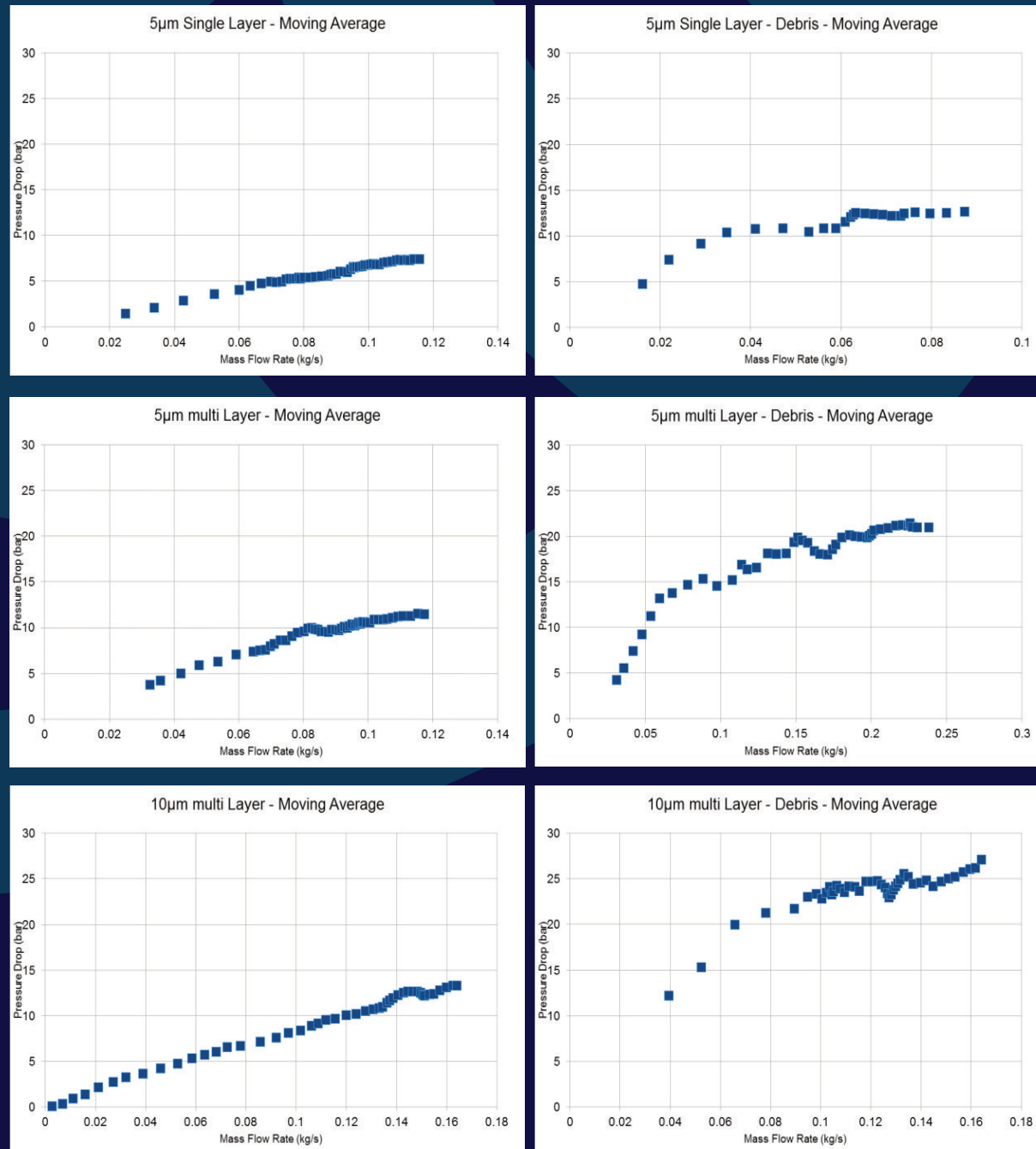
Designing Under Pressure

Together, we began with a SBRI grant to test what was possible. Croft designed and built an in-house gaseous flow test rig, operating up to 70 bar, where we trialled different particle sizes and filter disc designs. The goal was to generate a filter cake and achieve performance at a 4-5 micron level. The process was R&D heavy and required constant iteration, but it proved that high-pressure gas filtration at this scale could be achieved.



Figure 2: Croft Filters' custom-built flow test rig, designed to simulate high-pressure gas

Learning And Building Together



This project brought together two very different fields. Geo-Engines provided system requirements and energy expertise. Croft brought deep knowledge of materials and filtration design. Neither side could have solved the challenge alone. It was demanding, but it became a story of shared learning and collaboration, two teams working together to explore what had never been tried before.

Figure 2: Croft Filters' custom-built flow test rig, designed to simulate high-pressure gas conditions up to 70 bar technology.

5μm Single layer + debris



5μm Multi layer + debris



10μm Multi layer + debris



Value That Lasts Beyond Funding

Although the project did not move to a second funding phase, the partnership was far from wasted effort. We demonstrated feasibility, tested designs that had never been attempted in this context, and laid down a foundation for future development. For Croft, it was an opportunity to show how custom filtration can push boundaries across new industries. For Geo-Engines, it proved the value of collaboration in addressing challenges that stand between innovation and market readiness.

Filtration As A Foundation

The lesson from this work is clear. Advanced energy systems depend on reliable protection. Filtration may be unseen, but it is a foundation without which the clean energy transition cannot scale. Our work with Croft shows that solving these challenges requires openness, technical creativity, and a willingness to collaborate across industries.

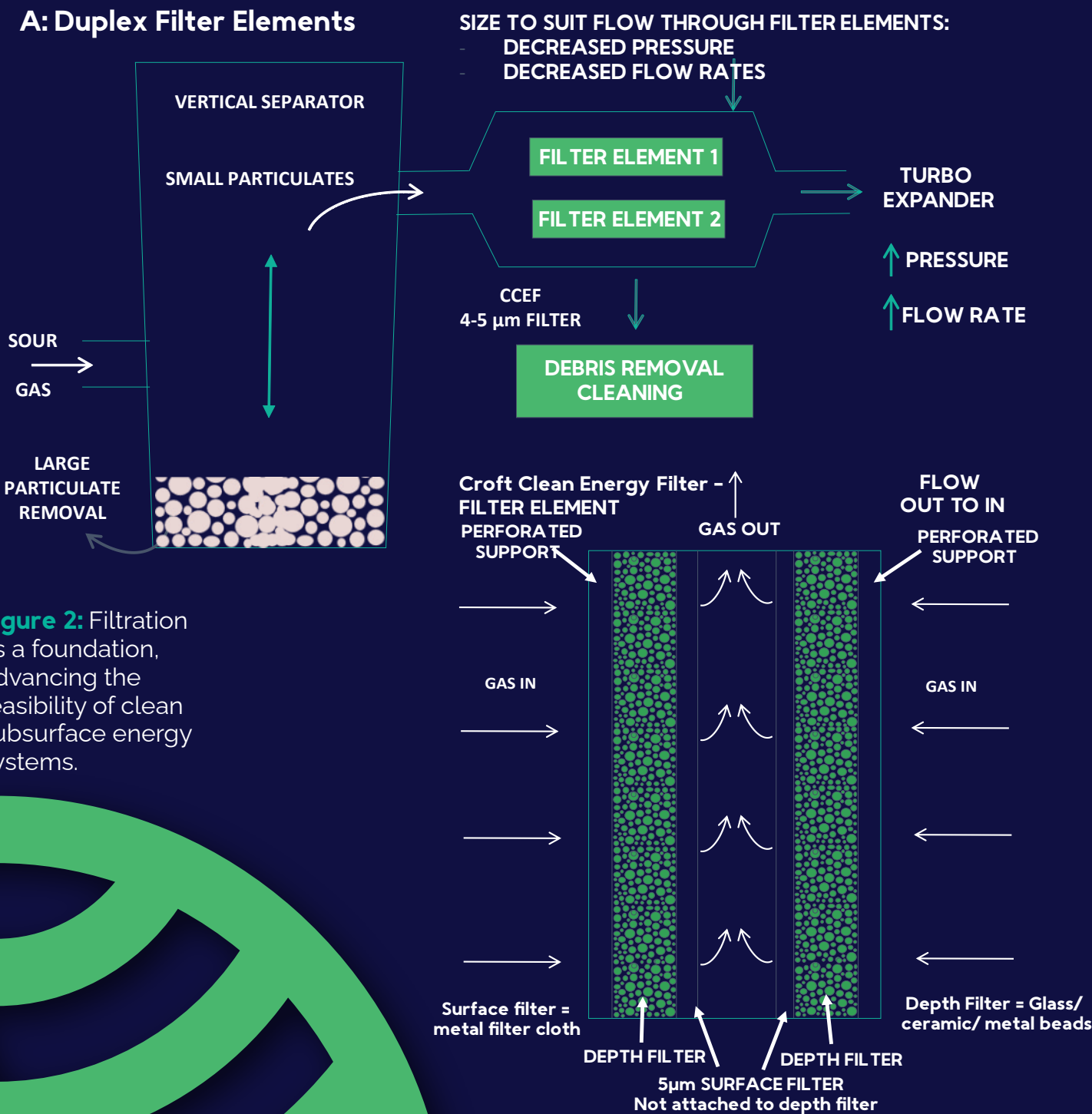


Figure 2: Filtration as a foundation, advancing the feasibility of clean subsurface energy systems.

About Croft Filters

Croft Filters is a UK-based specialist in bespoke filtration solutions with over 38 years of experience. Known for designing and manufacturing filters that can't be found off the shelf, Croft works across industries as varied as energy, healthcare, aerospace and food production. Their strength lies in problem-solving through custom design and close collaboration with clients.

For this project, Croft brought their expertise in high-pressure filtration and their ability to innovate from a blank canvas. The work with Geo-Engines reflects their commitment to supporting innovation and helping new technologies overcome complex challenges.



About Geo-Engines

Geo-Engines is a UK-based energy technology company developing subsurface systems that combine clean power generation with long-term carbon storage. By repurposing existing engine technology, Geo-Engines aims to create reliable, scalable solutions that contribute to a net zero energy future.

Collaboration is central to our approach. We work with partners across research, engineering, and manufacturing to solve the technical challenges that stand between concept and commercialisation. Our work with Croft Filters is one example of how open innovation helps us push boundaries and accelerate the clean energy transition.

"Filtration may not be the most visible part of an energy system, but it is **absolutely essential**. This project showed us that without the right filtration in place, our engines could not progress safely or reliably. Working with Croft gave us confidence that the clean energy transition can be built on **strong foundations**."

- **Julian Parker**, Geo-Engines

"Every project brings **new challenges**, but this collaboration with Geo-Engines was especially exciting. We were asked to design something that didn't exist and to test it under conditions few filtration systems ever face. It proved how custom filtration can **push boundaries** and how working closely with partners helps us create solutions that **drive innovation across industries**."

- **Louise Geekie**, Croft Filters