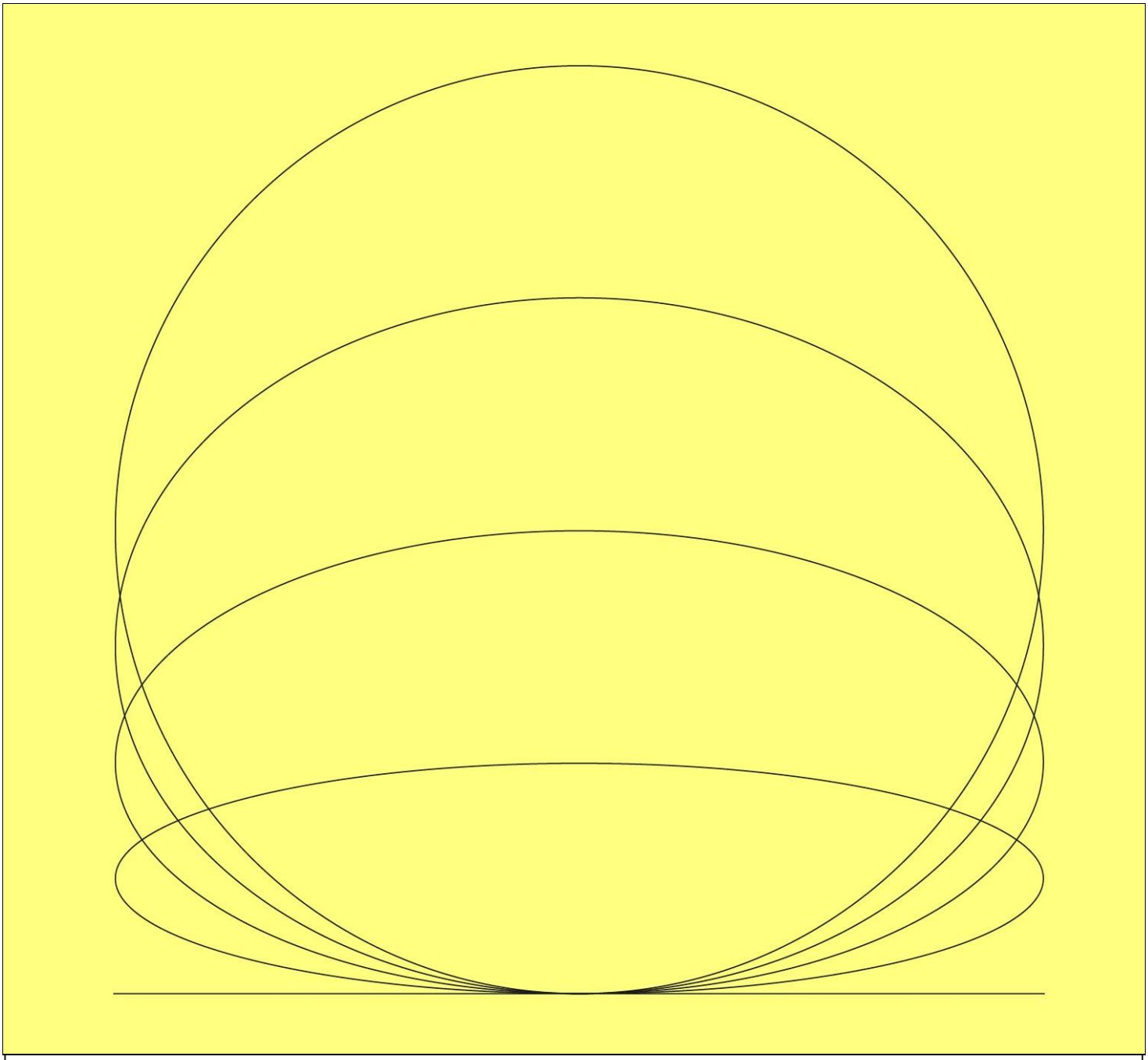

H2UpClose #9: LEITAT

Inside the Minds Driving Hydrogen Innovation

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H2UpScale

Clean Hydrogen Partnership

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H2UpClose #9: LEITAT

H2UpScale Project is happy to present the H2UpClose interviews' cycle.
Below the tenth interview with LEITAT.

In one sentence, what problem are you obsessed with solving in this project?
Efficient hydrogen management and thermal control are two of the biggest barriers to scaling fuel cell systems to high power. At Leitat, we are tackling both challenges simultaneously within H2UpScale.

Finish this: "If we get this thing right, _____ will change for _____."
If we get this right, high-power fuel cell systems will become more efficient, reliable, and ready for deployment in heavy-duty applications.

What's the most surprising thing people get wrong about Fuel Cells' cooling fluids?
A common misconception is that you can use conventional automotive coolants without major adaptation. In reality, fuel cell systems impose strict requirements on electrical conductivity, corrosion behavior, and material compatibility that significantly limit fluid formulation.

Why does solving this problem matter now and not in five years?
As fuel cell systems scale up, two critical challenges emerge:

- Efficient hydrogen recirculation to maximise fuel utilisation
- Effective thermal management to ensure durability and performance

Both are tightly linked to system efficiency, cost, and reliability.
If industry does not address these challenges now, large-scale deployment—especially in heavy-duty applications—will face limitations in performance, increased operational costs, and reduced system lifetime.

What is your role and what are your goals in the project?
Leitat contributes to H2UpScale through WP5 and WP7, combining expertise in hydrogen systems, additive manufacturing, and thermal management.

Our role focuses on developing hydrogen balance-of-plant solutions (WP5) and advancing thermal technologies, including 3D-printed heat exchangers and advanced coolant formulations (WP7).

We bring a unique combination of component design, LPBF manufacturing, and tailored fluid development, enabling integrated and scalable solutions. Our key approach is the co-design of hydrogen systems and thermal management, working closely with partners to ensure effective system integration.

Leitat is developing advanced cooling fluid formulations that provide an added value beyond current solutions, specifically tailored to meet the stringent requirements of fuel cell applications. These novel formulations enhance heat transfer, improving the overall system performance.

What added value does your activity bring?
Leitat's work in WP5 and WP7 brings added value by addressing hydrogen management and thermal control in an integrated way, enabling more efficient and scalable fuel cell systems.

In WP5, the novelty lies in the system-level optimisation of hydrogen recirculation, combining component definition (pumps, ejectors, sensors) with the assessment of advanced architectures, such as hybrid ejector + pump configurations. Compared to the state of the art, the focus is on maximising hydrogen utilisation and system efficiency,

while enabling modular and scalable designs for high-power applications. The key trade-off we address is between efficiency, system complexity, and control, ensuring practical integration into real fuel cell systems.

In WP7, innovation is driven by combining additive manufacturing, advanced materials, and fluid engineering. The development of 3D-printed heat exchangers, designed using CFD and generative approaches, enables improved heat transfer performance and compactness. In parallel, we are advancing tailored coolant formulations, including non-toxic nanofluids, to optimise and improving thermal properties, stability over time, and material compatibility. This goes beyond conventional cooling approaches by co-designing geometry, materials, and fluids to meet fuel cell-specific requirements, representing a clear advancement over traditional design strategies

Success at the next TRL (TRL 3 à TRL 5) will be demonstrated through the validation and integration of these technologies into representative systems. The main challenge remains ensuring long-term reliability and compatibility while maintaining performance gains at scale..

What metric should people track to judge progress, and why?
Progress is mainly tracked through hydrogen utilisation and thermal performance, as these directly reflect overall system efficiency.

Key indicators include:

- Hydrogen system performance metrics (efficiency, utilisation, control)
- Thermal performance (heat transfer capability, conductivity)
- Material compatibility and corrosion behaviour

So far, the work has established:

- Validated hydrogen system architectures and component specifications
- Promising heat exchanger materials and optimised geometries
- Feasible coolant formulations, with ongoing optimisation for stability and performance

Who benefits first if this works?
Leitat's work contributes directly to increasing fuel cell efficiency, durability, and scalability, helping to reduce operational costs and energy losses. In the long term, this supports the deployment of fuel cell systems in heavy-duty transport and industrial applications, accelerating the transition toward a competitive hydrogen economy.

The first beneficiaries are OEMs, system integrators, and operators, while broader impact requires stronger engagement with end-users, infrastructure providers, and policymakers. The collaboration with international partners is a key added value, bringing together complementary expertise to address complex system-level challenges.

The most credible deployment scenario is heavy-duty mobility, where high energy demand and long operating cycles make hydrogen a strong solution. By delivering validated components and integrated approaches, the project helps de-risk scale-up to multi-MW and fleet-level applications, with a clear focus on improving total cost of ownership through efficiency and reliability gains.

Ultimately, this work benefits engineers and operators who rely on robust and efficient systems in demanding conditions. It also reinforces a key message: innovation in fuel cells goes beyond the stack, requiring integrated advances in balance-of-plant and thermal management.

What is the next big milestone you're trying to hit?
The next milestones include:

- Further optimisation and validation of hydrogen recirculation components (WP5)
- Refinement and testing of heat exchanger designs and coolant formulations (WP7), including performance validation, stability assessment, and material compatibility studies.
- Integration and validation of components at system level

What kind of partner or data do you want to attract with this post?
We are particularly interested in collaboration with partners working on:

- Fuel cell system integration
- Advanced manufacturing and materials
- Thermal system modelling and validation

Progress will continue toward the integration and validation of the developed solutions.

Where can people follow progress or get involved right now?
People can follow progress and get involved by visiting the H2 Upscale project website, connecting with consortium partners on LinkedIn, or subscribing to project updates and newsletters shared by the participating organizations.

Website: www.h2upscale.eu
LinkedIn: https://www.linkedin.com/company/h2upscale

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