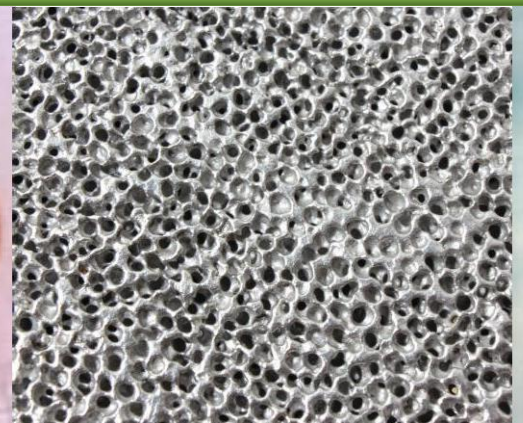
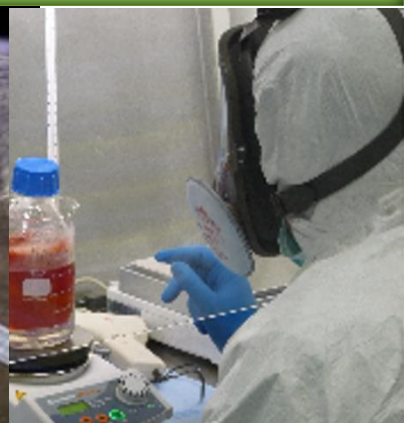
INNOBAY @ EUROGIA PO Days
Material-Based Long-Duration Energy Storage

Company Introduction + Project Proposal

Budapest • 05 March 2026

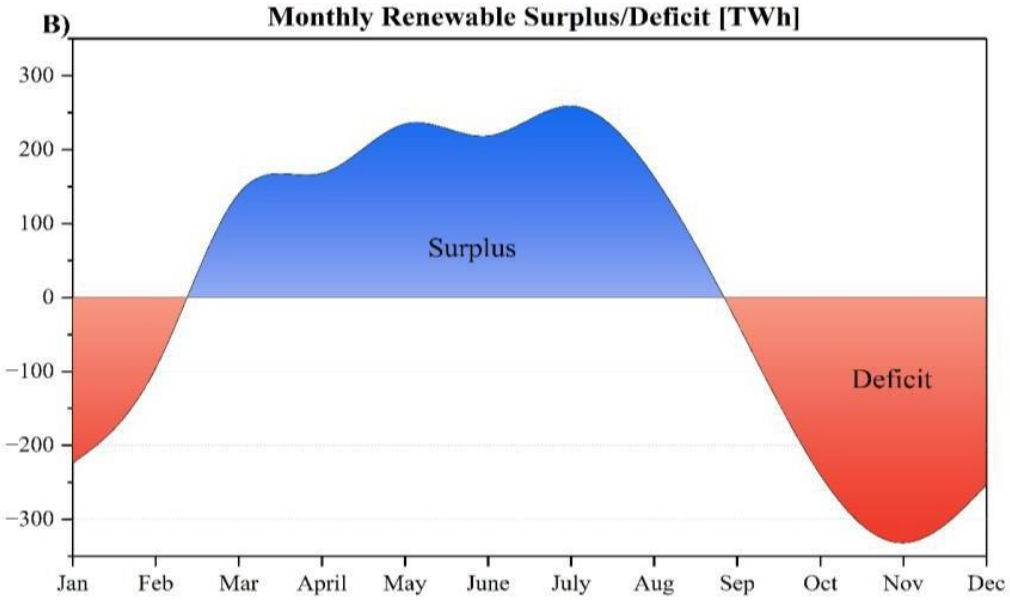
Creative, Authentic, Trustable

The Missing Layer in Europe's Energy Transition

- Short-duration storage is progressing fast — but industry needs multi-day and seasonal buffering
- Renewables + electrified industry create a long-duration storage gap
- Europe needs solutions that are: scalable, bankable, circular, and strategically autonomous



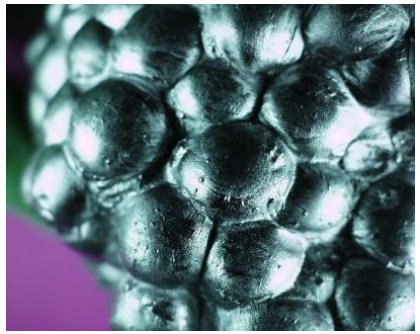
~ 1300 TWh long-term energy storage capacity need

L. Barelli et al., Potential of Aluminium as a Metal Fuel for Supporting EU Long-Term Energy Storage Needs, (2024)Advanced Materials Technologies,9(15), doi: 10.1002/admt.202302206

Who We Are: Innobay Hungary Ltd.

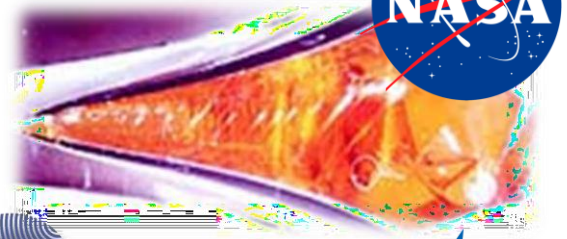
Innobay: Valuable Knowledge Centre of Innovations

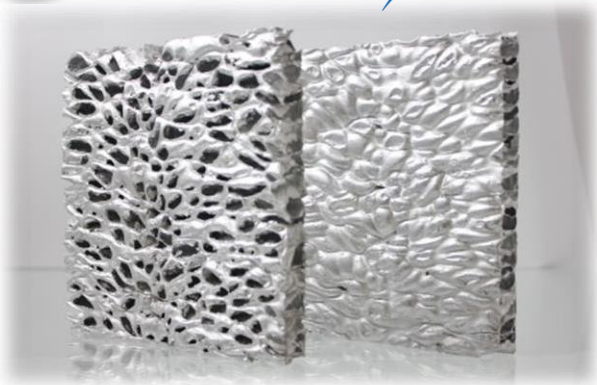
- Deep-tech, materials-driven innovation company
- Key competences (materials):
  - Metals & foams
  - Polymers & composites
  - Bio, energy, space & defence applications
- Full-stack innovation support: TRL 1 → 9 (from discovery to deployment)
- Science + engineering + business + IP under one roof



Our References and Customers

- Semiconductor crystal growth at NASA 1994-1996,
- Ferrites for TDK, 1997-1998,
- Hypo-G satellite concept with JAXA 2000,
- Nanomedical drug development (TRL5-TRL7) 2008-2011,
- L-malic acid production biotechnology 2009,
- Aluminium degassing technology for ALCOA 2009-2011,
- CT scanner 2013, Oil recovery technology 2013,
- Ultralight car materials 2015, Al composite and foam production technology (TRL1-TRL9) 2000-2017-,
- Herbal plants for functional foods 2012, aluminium battery 2016, steam generator 2017,
- Aluminium foam innovations 2017-,
- IP protection of aluminium products 2018-2022,
- CaCl2 production technology analysis 2020,
- Hungarian Material Industry Platform Study 2022
- Hungarian Non-Battery Electrical Energy Storage Study 2024.



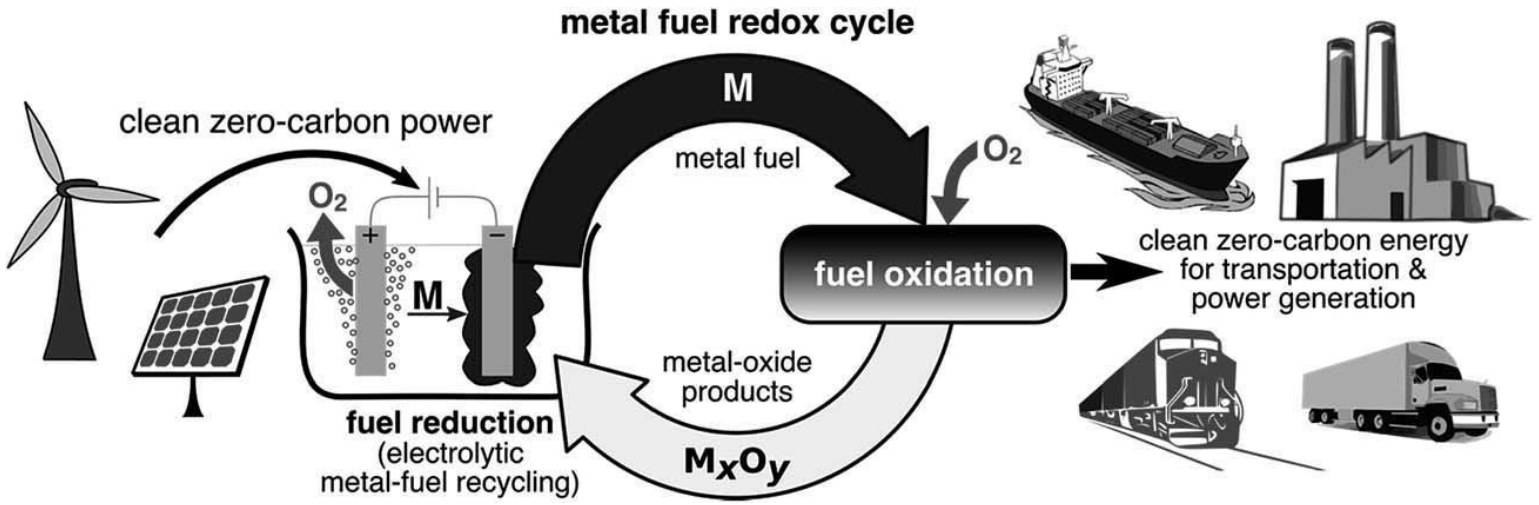


Why Innobay: Execution + Industrial Translation

- Real hardware, real testing, real results
- Track record with international partners (space, industry, advanced materials)
- Ability to structure projects for funding + deployment (IP strategy, market logic, partners)
- Strong European networks to build consortia

Energy Storage Landscape (Simplified)

- Seconds–hours: batteries, flywheels (grid services)
- Hours–days: pumped hydro, advanced batteries, thermal
- **Days–seasons: chemical and material-based storage vectors**
- **Conclusion: the long-duration layer is a materials + industrial systems challenge**



P. Julien, J. M. Bergthorson, SustainableEnergyFuels(2017) 1, 615.
D. J. DurbinandC. Malardier-Jugroot, Int. J. Hydrogen Energy(2013) 38, 14595–14617.

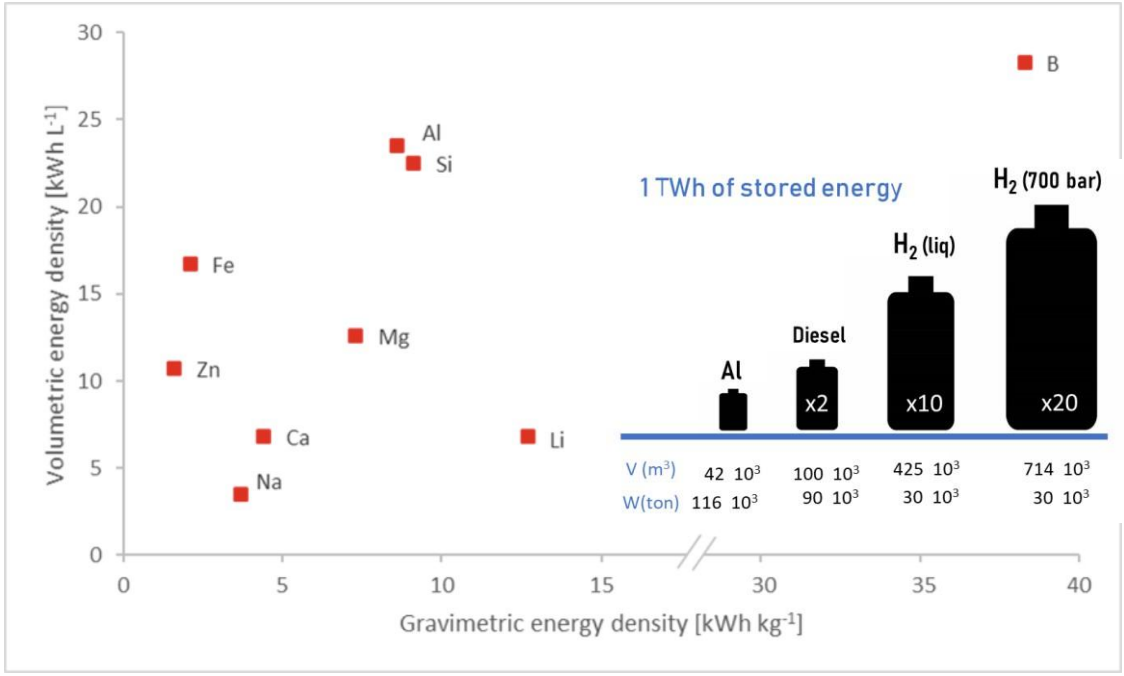
Requirements:

- Abundance
- High volumetric density
- High energy content
- High stability for storage
- No critical raw materials
- No toxicity or hazard risk
- CO2 emission free
- No PFAs
- Local availability & Transportability
- Recyclability

Abundant reactive metals (Al, Fe, Mg, Ca, Si, Na, …) can store large amounts of energy

Proposed EUROGIA Project (Concept)

- Industrial-Scale Material-Based Long-Duration Energy Storage
- Aim:
  - Demonstrate a bankable long-duration storage loop for industrial users
  - Enable seasonal buffering via circular materials
- Outputs:
  - TRL 6–7 demonstrator
  - Exploitable IP + roadmap to scale-up
  - European value chain and partners



Why Aluminium as an Energy Vector?

- High energy density potential and industrial maturity
- Recyclable — fits circular economy logic
- Can act as both structural material and energy carrier
- Compatible with Power-to-X strategies and industrial cluster integration

Storage Media	Al	H_2 C (700 bar)	H_2 C (130 bar)
Seasonal energy storage demand (TWh)	~1280 TWh (36% RTE)	~1312 TWh (30% RTE*)	
Vol. en.density (kWh/l)	23.5	1.4	0.33**
STORAGE VOLUME (million m^3)	54.4	944	3900***

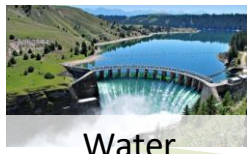
* alkaline water electrolyzer, PEM fuel cell stacks are considered
** minimum/maximum pressure 110/150 bar; energy density considered @ 130 bar (mean pressure)
***Caverns' volume further increased to garantee 110 bar internal minimum pressure

Primary energy consumption of a household per year (~ 20 MWh)

Primary energy consumption of a small city per year (~ 1 TWh)

Barelli, L.; et al.. ReactiveMetalsasEnergy Storage and Carrier Media: Use of Aluminum for Power Generation in Fuel Cell-Based Power Energy technology, 8 (9), Art. Nr.: 2000233. doi:10.1002/ente.202000233

Aluminium Infinite Circular Economy Establishment


Water


Solar


Geo


Wind


Tide

Renewable energy

Scrap


Carbon free **melting**


Carbon free **smelting**

Al_2O_3

Waste handling

Production

Reduction

Waste handling


Hybrid Al


Product

Materials


Al block


Energy Al

Energy

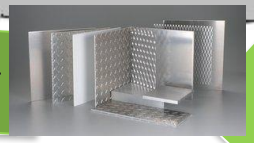

Al hydroxide

Manufacturing

Fabrication

Assembly

Oxidation

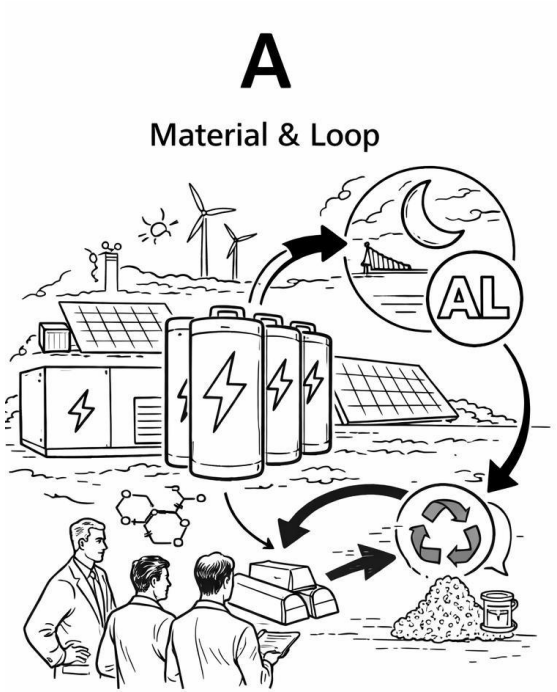

Semi finished product


Al battery

Project Approach (Work Streams)

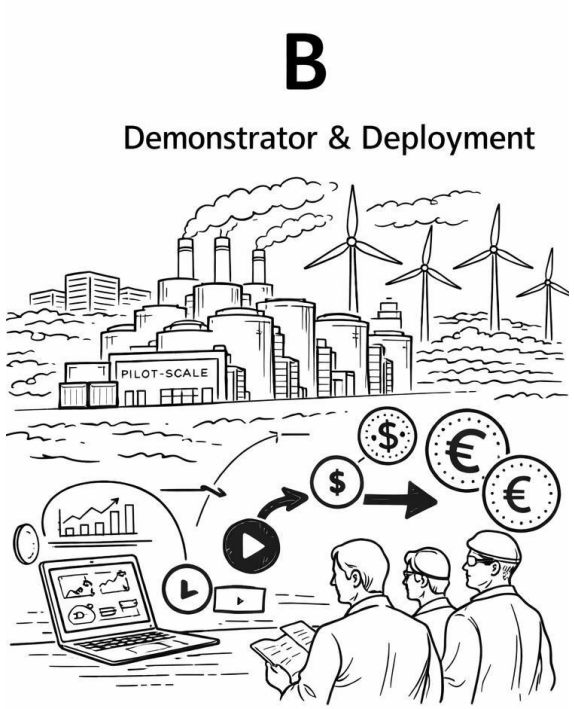
Work Stream A:

- Define the material-based energy loop (aluminium-centric)
- Assess pathways, efficiency drivers, and circularity
- Safety, sustainability, SSbD alignment



Work Stream B:

System architecture and integration in an industrial setting
Pilot-scale validation + monitoring & control
Business case, CAPEX/OPEX framing, exploitation plan



Innobay’s Role & What We Need from Partners

Innobay brings

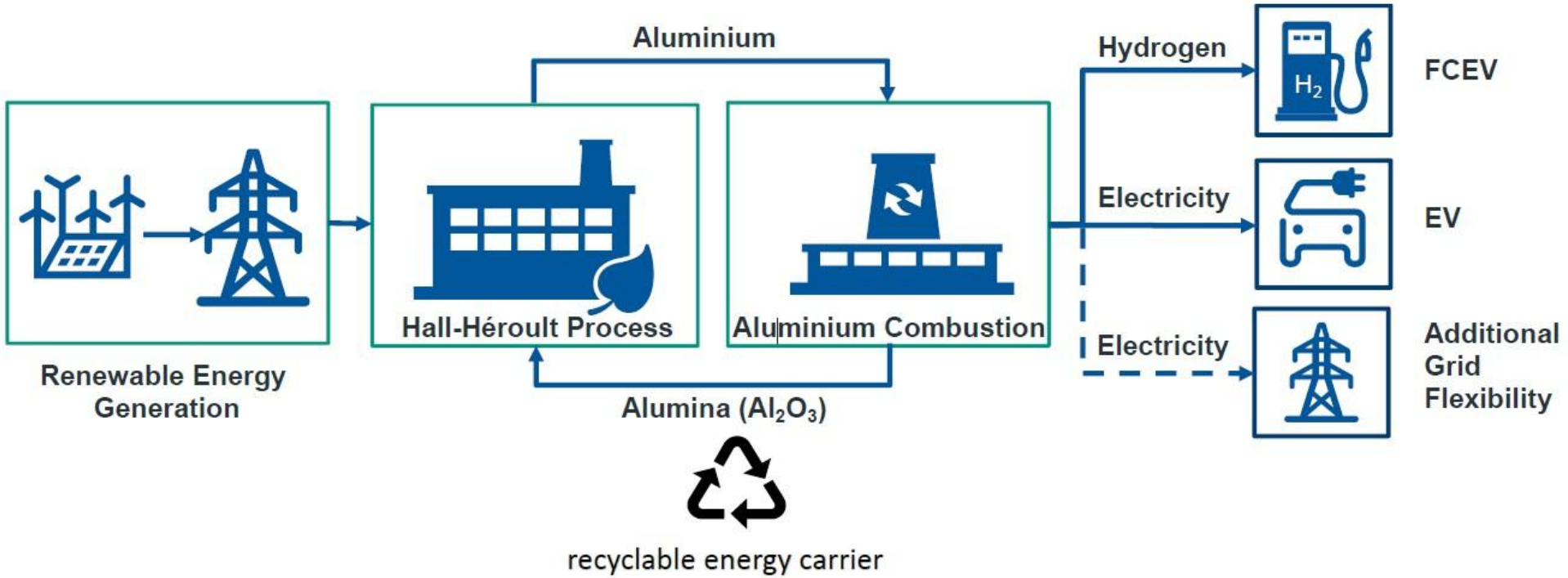
- Industrial system architecture & materials know-how
- Prototype/testing capability and project structuring
- IP & exploitation leadership
- Consortium-building networks

We are looking for

- Aluminium / metals industry partners
- Renewable developers & energy utilities
- Storage / process engineering integrators
- Industrial off-takers + deployment sites

Call to Action

- Let’s build a cross-border, industry-driven EUROGIA consortium
- Target: 3–5 countries • demonstrator-focused • scalable value chain
- Next step: partner meetings today + concept note alignment within 2–4 weeks
- Contact: Dr. Norbert Babcsán • Innobav Hungary Ltd.



H. Ersoy et al., “Hybrid Energy Storage and Hydrogen Supply Based on Aluminum—a Multiservice Case for Electric Mobility and Energy Storage Services” Advanced Materials Technologies, Jan. 2022, doi: 10.1002/admt.202101400

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