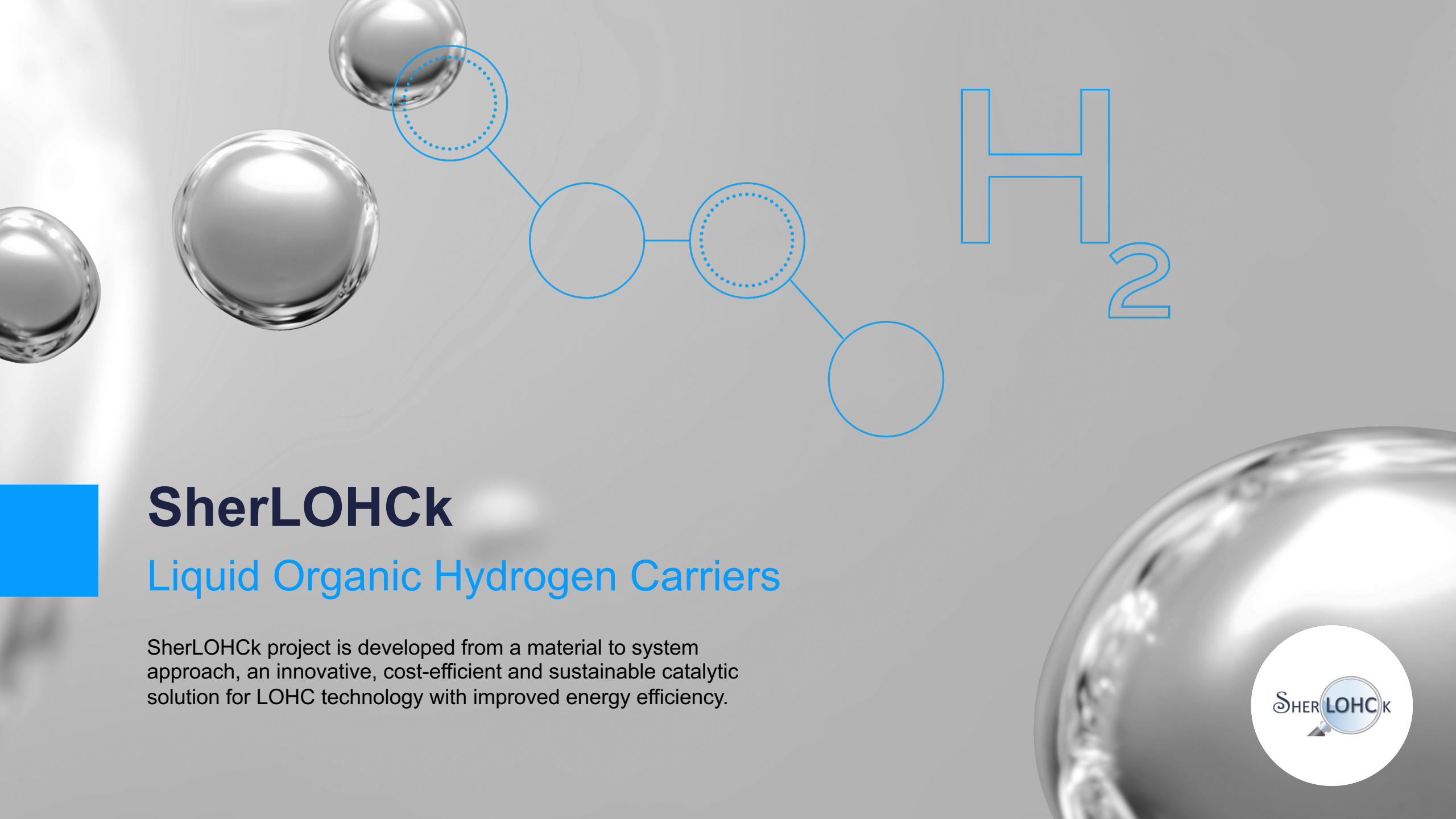


SherLOHCk

Liquid Organic Hydrogen Carriers

SherLOHCk project is developed from a material to system approach, an innovative, cost-efficient and sustainable catalytic solution for LOHC technology with improved energy efficiency.

Liquid Organic Hydrogen Carriers (LOHC)

Consisting on a reversible transformation catalytically activated of a pair of stable liquid organic molecules integrated on hydrogenation/dehydrogenation cycles, are attractive due to their ability to store safely large amounts of hydrogen (up to 7 %wt or 2.300 KWh/ton) during long time and release pure hydrogen on demand.

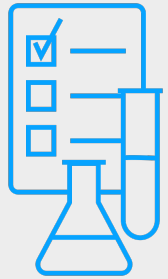
SherLOHCk project targets joint developments in order to reduce the system cost for LOHC technology to 3€/kg for large scale applications. For this purpose the following goals are faced:

01
Partial/total substitution of PGM catalysts

Highly active and selective catalyst with partial/total substitution of PGM and thermo-conductive catalyst support to reduce the energy intensity during loading/unloading processes.

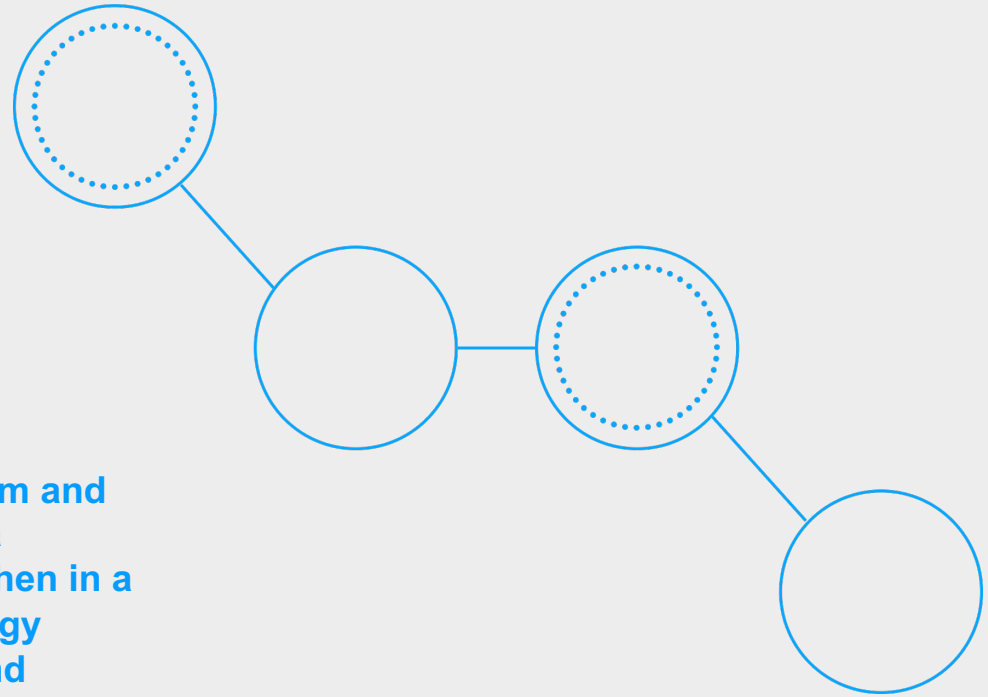
02
Higher efficiency through novel catalytic system architecture

Novel catalytic system architecture ranging from the catalyst to the heat exchanger to minimize the internal heat loss and to increase space-time-yield.



03
Prototype demonstration in a stationary unit (>10kW, > 200h)

Novel catalyst testing, system validation and demonstration in demo unit (>10 kW, >200h); to drastically improve their technical performances and energy storage efficiency of LOHCs.



A combination of challenges for the catalyst material, catalyst system and their related energy storage capabilities will constitute the core of a catalyst system for LOHC, that will be validated first at a lab scale, then in a demo unit > 10kW. As a whole they will enable the reduction of Energy intensity during loading/unloading processes, a higher efficiency and increased lifetime.

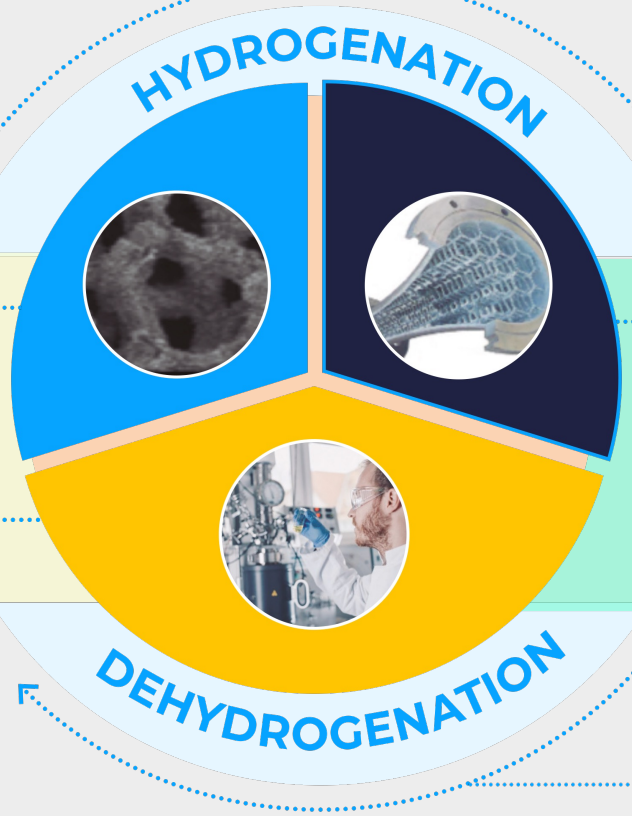
Technological, economical and social bottlenecks are considered to determine the economic viability, balance of energy and the environmental footprint of novel catalyst synthesis route.

Scale-up of the obtained solutions will be carried out together with technology comparison with other hydrogen logistic concepts based on LCA and TCO considerations to finally improve economic viability of the LOHC technology.

SherLOHCk technologies

Viability for energy storage

UNSTEADY RENEWABLE ENERGY SOURCES



Lean LOHC

Improved catalyst

Testing & system validation

Rich LOHC

Novel catalyst system architecture

Applications on Energy storage under liquid media

Economic viability of LOHC technology

Catalyst system prototype demonstration in stationary unit (>10 kW, >200h)

SherLOHCk technologies

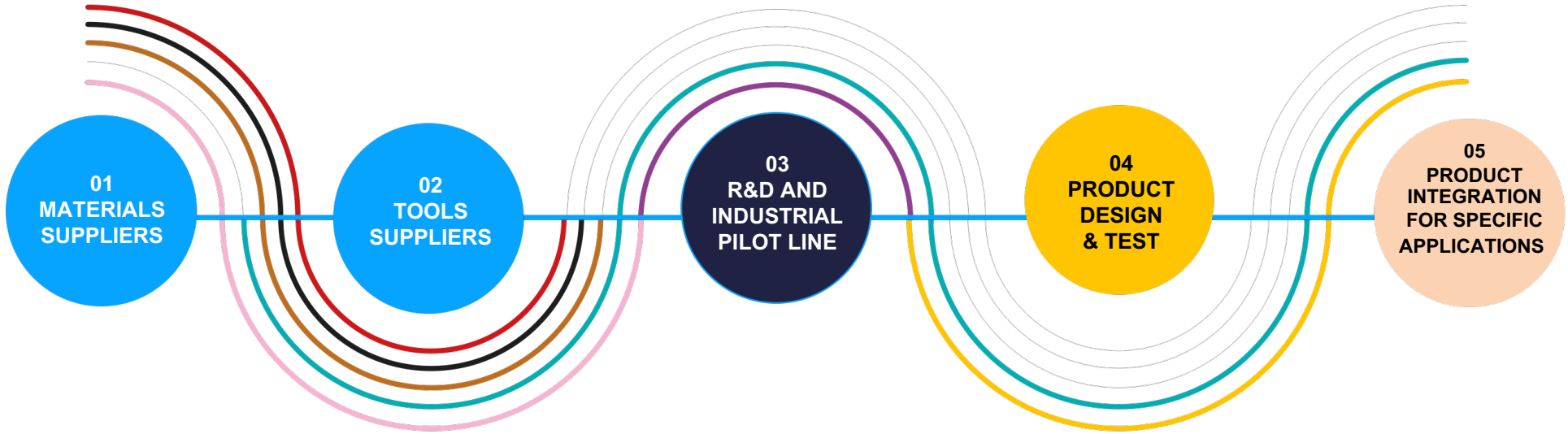
Viability for energy storage

Outcomes	Improvement of catalysts & catalyst support	Improving reaction efficiency and heat transfer	Validation of models & solutions through hydrogenation and dehydrogenation cycles	Improvement of economic viability & environmental footprint
	Highly **active and selective** catalysts with low or no PGM loading & optimal support	Novel catalyst system architecture	Testing, system validation and demonstration in stationary unit (>10 kW, >200h)	Scale-up, LCA, safety and techno-economic assessment
Activities & challenges	Catalyst predictive analysis New deposition processes	Porous and thermally conductive catalyst & system	In batch and continuous testing & operando observation	LCA & technology comparision

DIMENSIONING OF A LARGE-SCALE CATALYTIC REACTOR

Our Value chain

Research & innovation



01
Development & formulation of materials

02
Development of specific tools and equipment

03
Technology Dev. Process-flow & Device industrial specification

04
Specification, products design, specific quality assessment

05
Aplication, specification & integration

General Info

SHERLOHCK project has an overall budget of **2.5 M€** from the Fuel Cells and Hydrogen 2 Joint Undertaking under grant agreement number 101007223.

This Joint Undertaking receives support from the **European Union's Horizon 2020 research and innovation programme, Hydrogen Europe and Hydrogen Europe research**. The project is coordinated by **CEA Liten** (Commisassariat al energie atomique et aux energies alternatives).

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