

# Long Lasting BATteries (LOLABAT) and Energy Harvesting Technologies

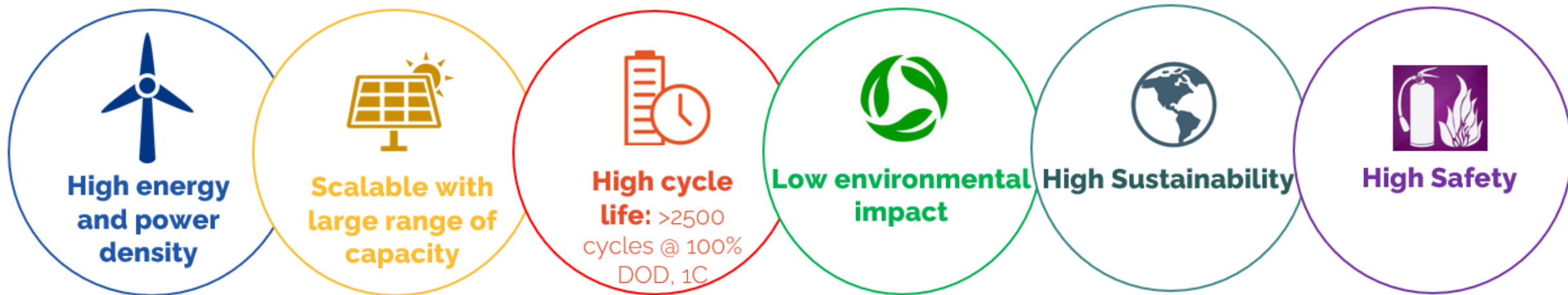
**LEAP Workshop November 2021**

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# • Focus on Ni-Zn battery system

- Main advantages



An excellent technology for **Stationary Energy Storage** applications

	Li-ion (High energy)	Lead acid	NiZn (Prismatic)
Nominal Voltage	3V - 3,9V	2V	1.65V
Energy Density	350-550Wh/L	65-120Wh/L	100-200Wh/L
Specific Energy	150-250Wh/kg	40-60Wh/kg	50-90Wh/kg
Safety	Poor	Medium	Excellent
Recycling	Only high-value elements	95% recycled	85-90% recycled
Operating Temperature	0°C - +45°C	-40°C - +60°C	-40°C - +75°C



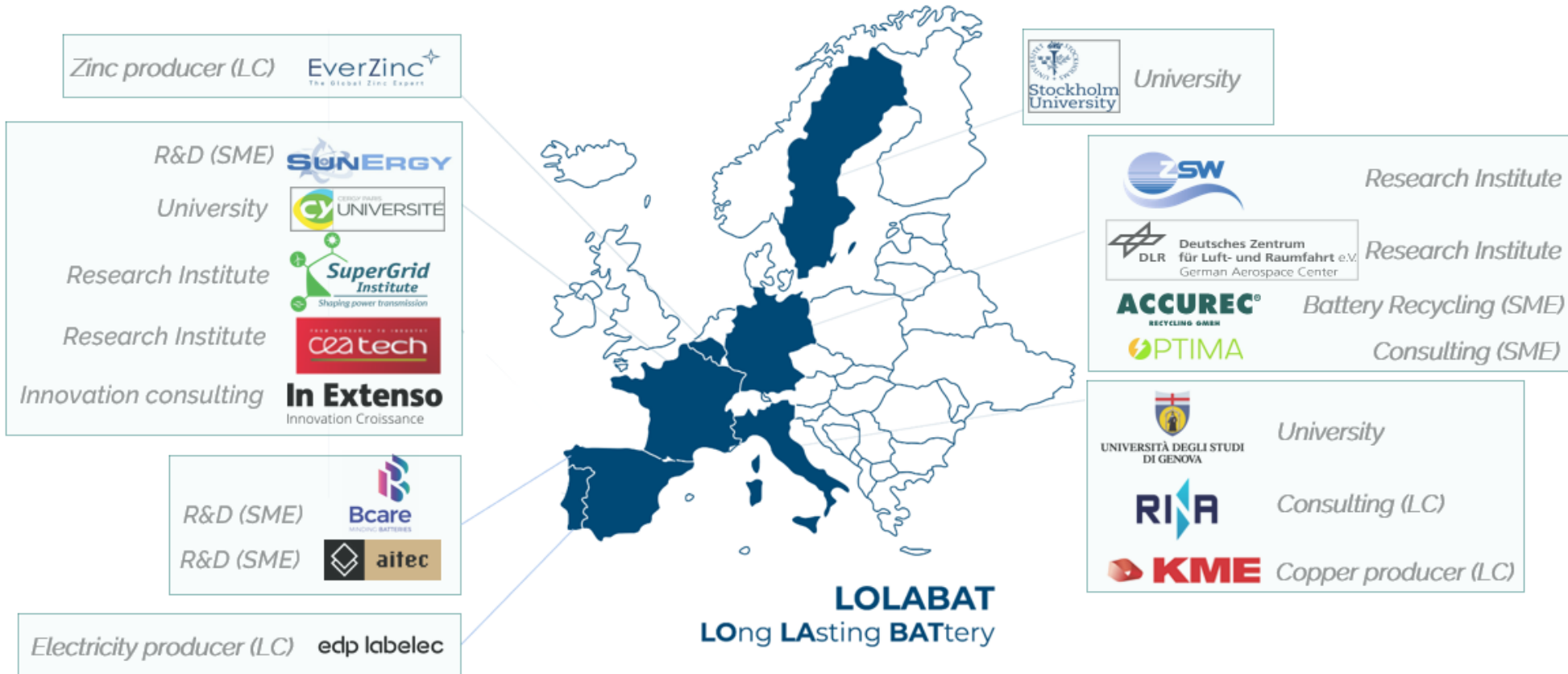
# • H2020 LOLABAT (Sunergy: Scientific technical coordinator)

- Consortium of 17 European partners

▶ **LCBAT8:** Next Generation Batteries for Stationary Energy Storage  
Selected among **45** candidate projects

- ▶ Kicked off in January 2021
- ▶ 17 Partners (7 European countries)

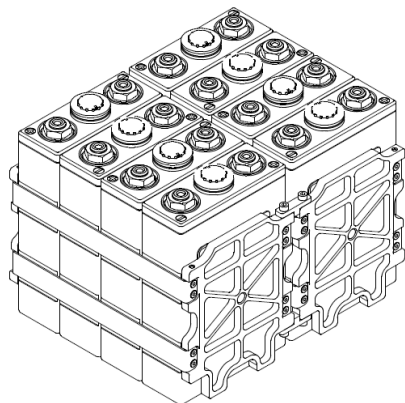
- ▶ 5 Advisory Board companies



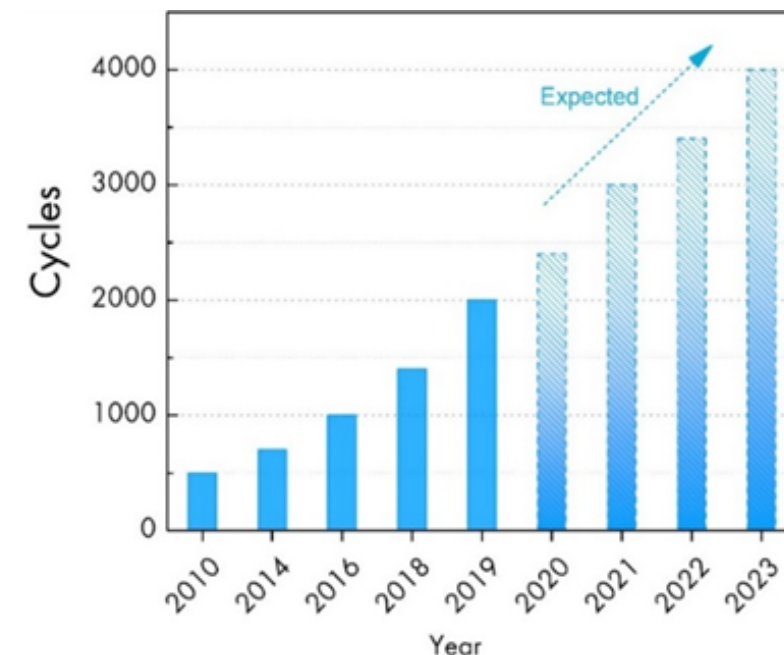
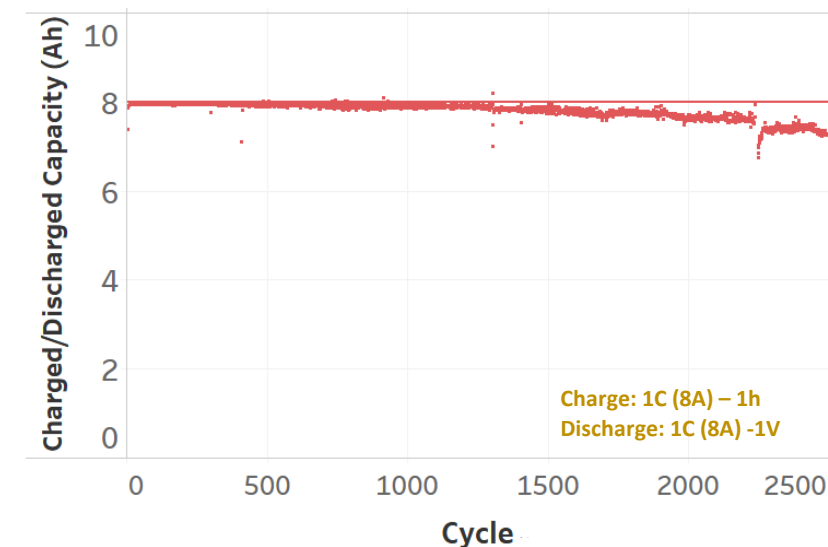


# • New NiZn technology breakthroughs

## • SUNERGY

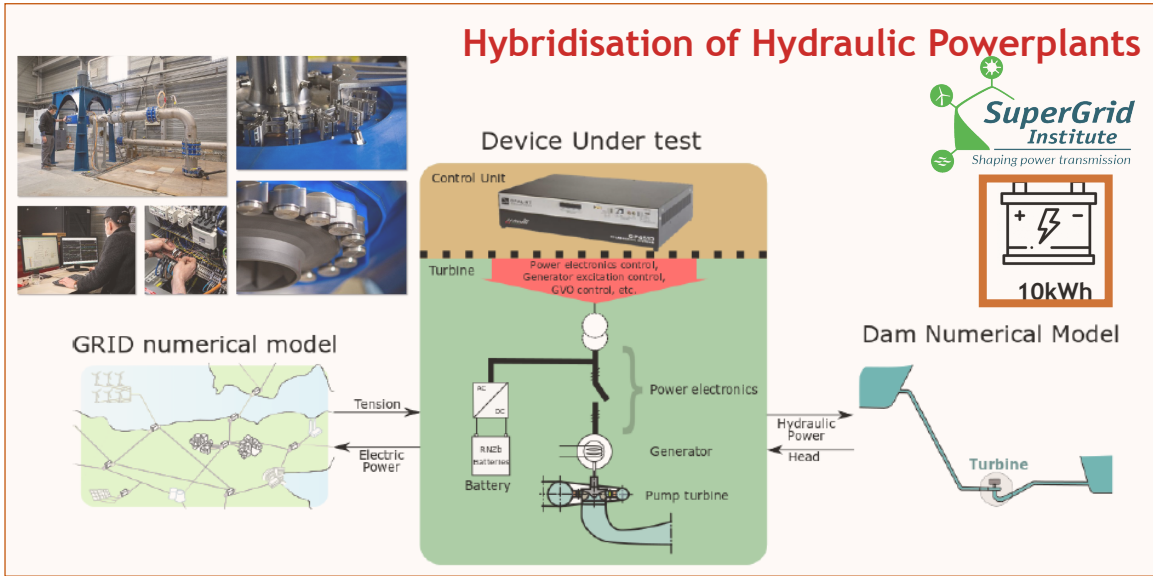


LOLABAT Month	M0	M39
KPI-1: cyclability		+100%
cyclability @ 100% DOD	2000	4000
KPI-2: cell cost		-30%
cell cost (€/kWh)	200-260	140-180
cycled cost (€/kWh/cycle)	0.12-0.15	0.04-0.05

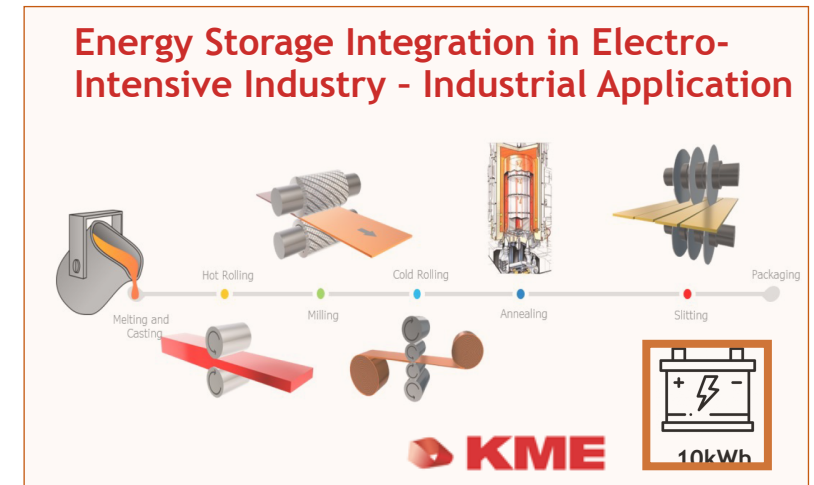
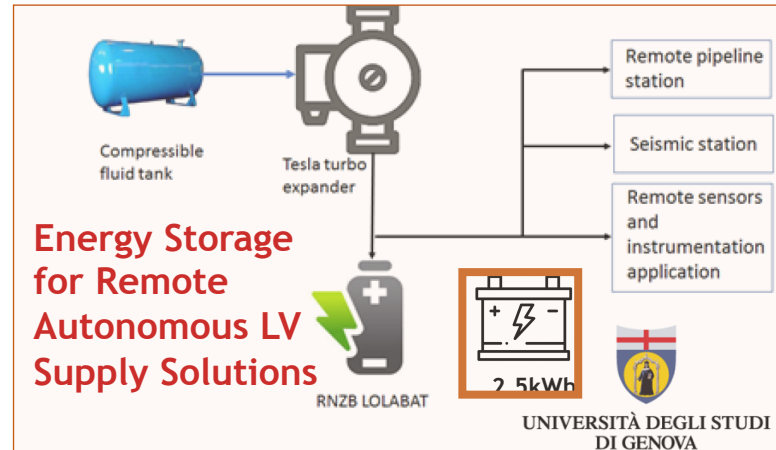
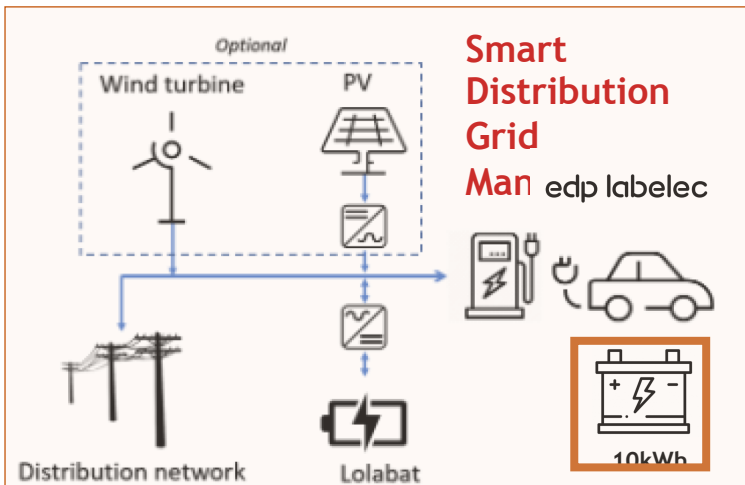
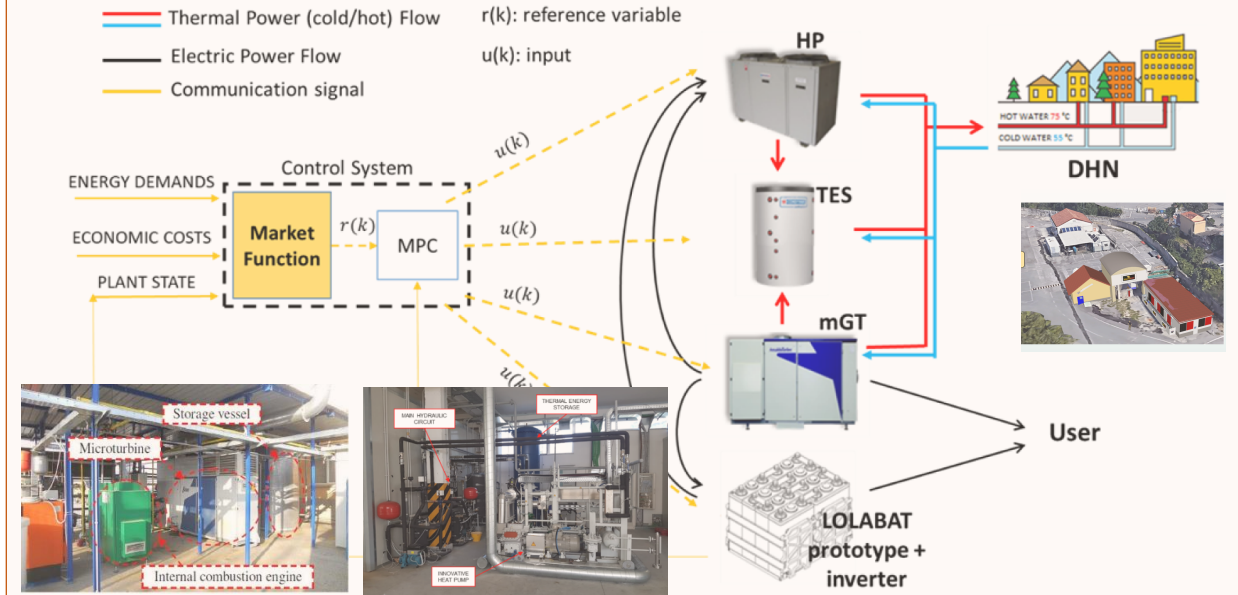
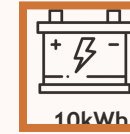


# • H2020 LOLABAT

- NiZn Demonstrators (GENII)



## Energy Balancing in Smart Buildings





# Energy Harvesting – Tesla Bladeless Expander

- ✓ Tesla claimed rotor efficiency up to 97%
- ✓ Reversible machine - turbine to compressor by just reversal of rotation of shaft

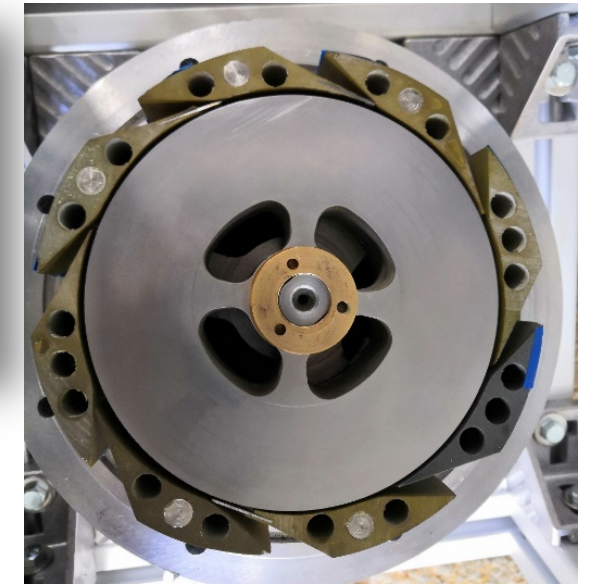
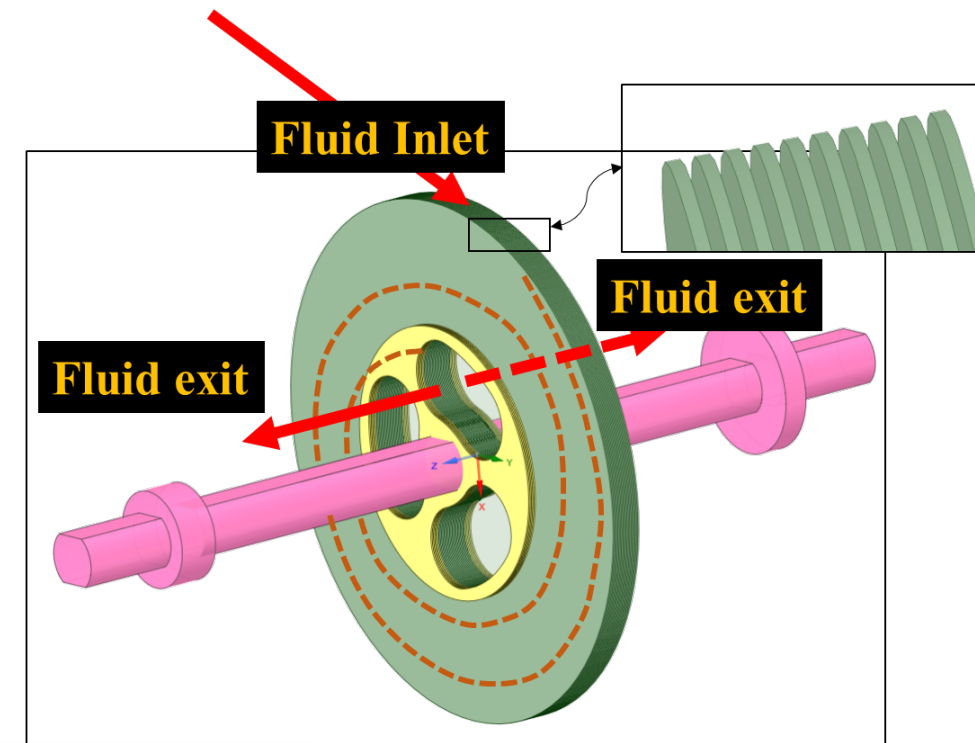
- No negative scale effects for smaller sizes

- High reliability/low maintenance costs

- High flexibility (air, natural gas, organic fluids..)

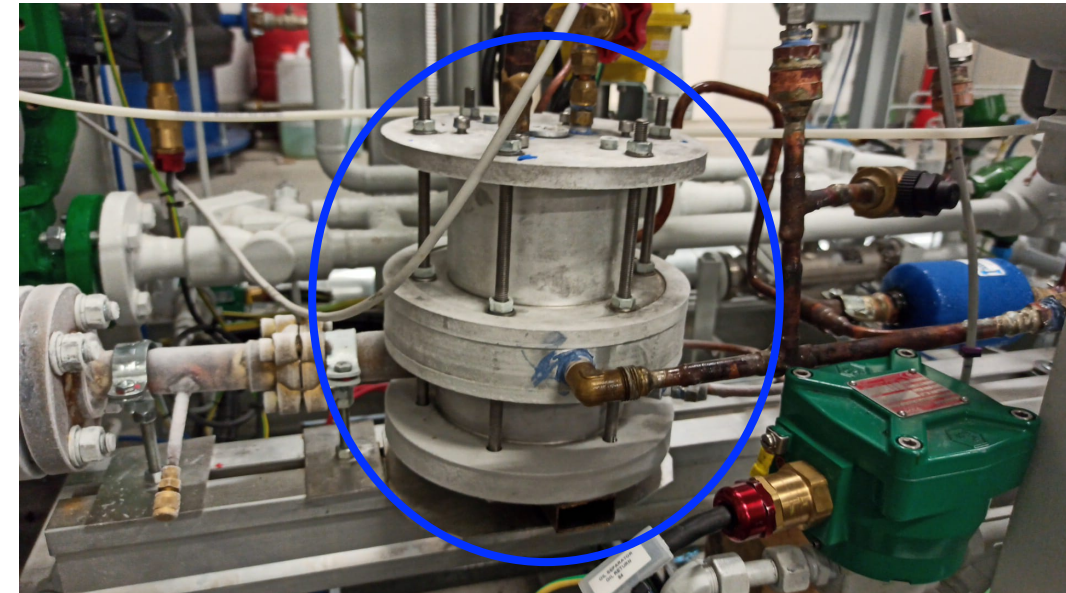
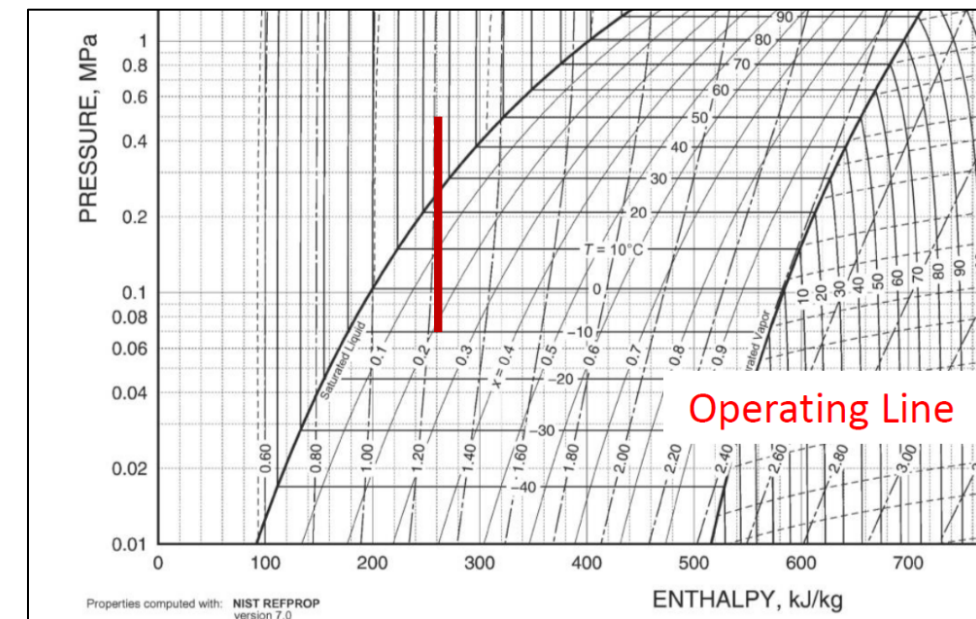
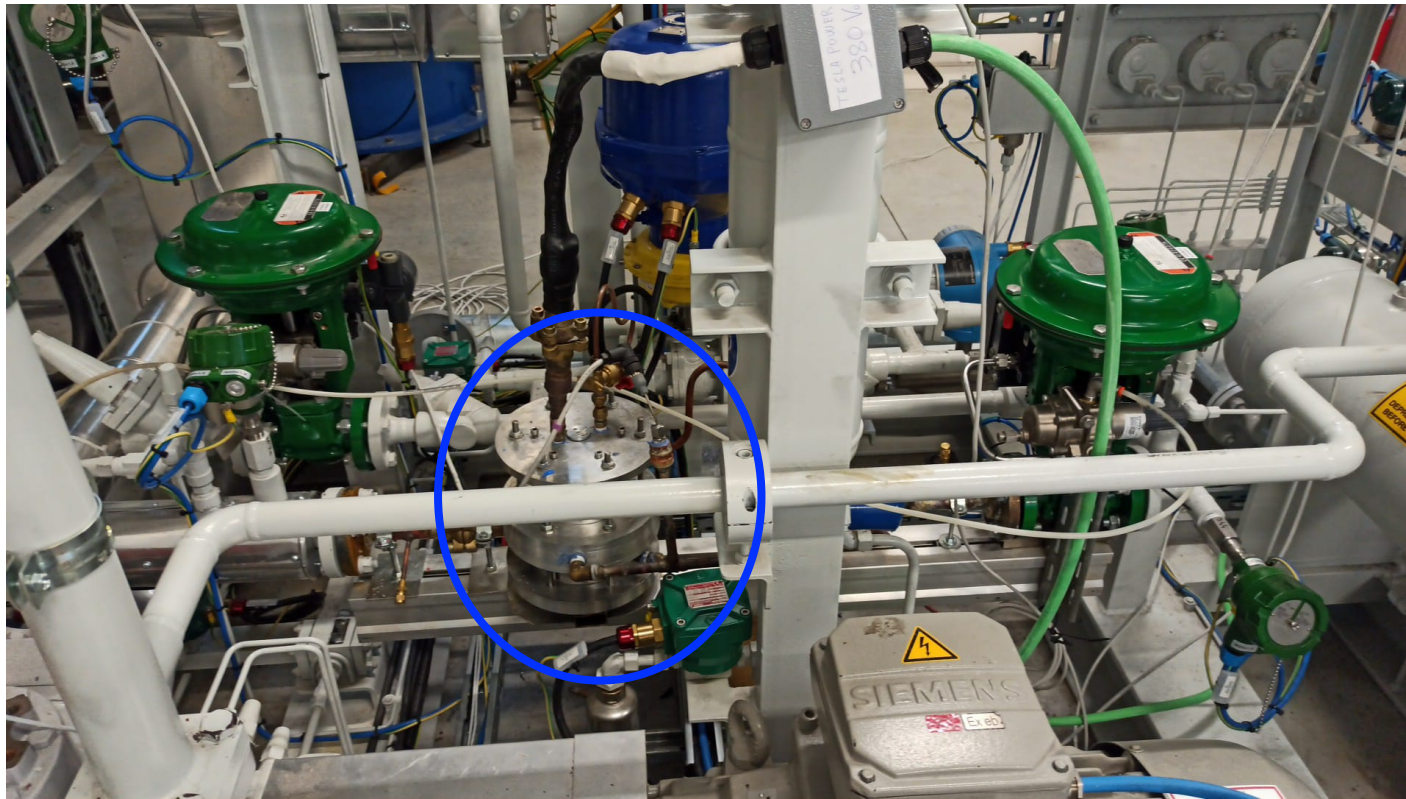
- Affordable performance

✓TPG patent on “Reverse Cycle Machine Provided with a Turbine”  
(World patent application WO2018127445A1 by SIT Technologies Srl)



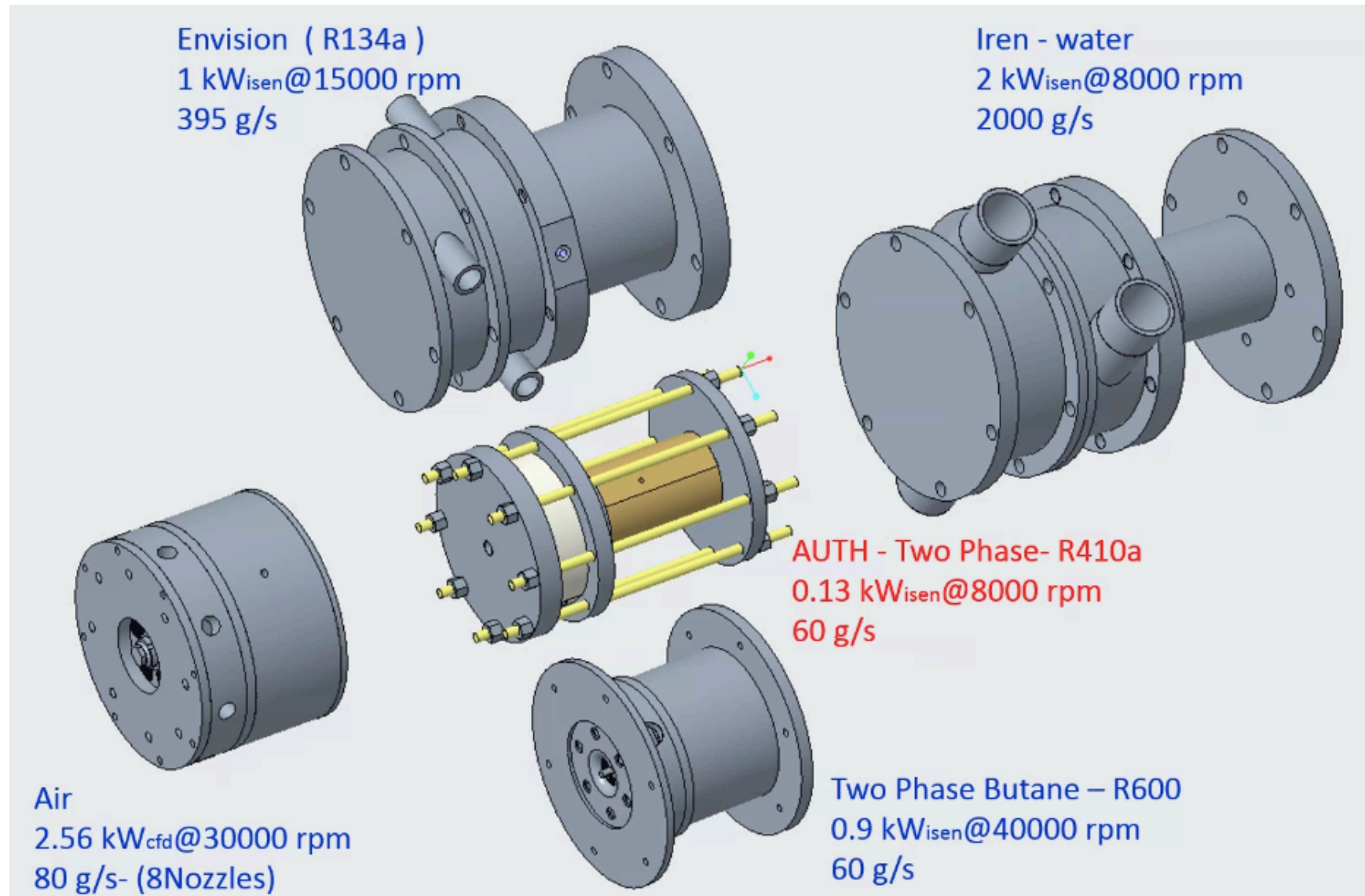
# Two Phase Bladeless Expanders @TPG

- ✓ Butane – Two phase expander first prototype
  - Testing is in progress
  - 5 bar dp, 60 g/s, ~ 300 W (Expected)





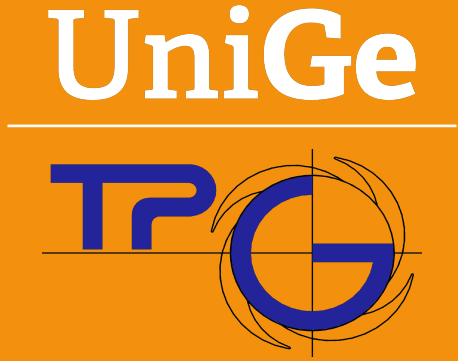
# Tesla expanders models @TPG UNIGE





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**Thank you**