

2023

Engineering and R&D Activities
SME - Spike Renewables Srl



Florence, Italy

Spike Renewables SrL

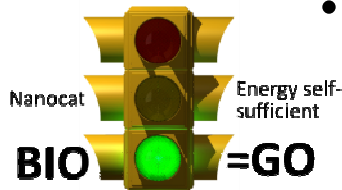


Spike Renewables S.r.l. is an Engineering Company focused on system engineering that deals with all aspect of a project from design to construction and integration.

- Spike is founder member of RE-CORD (Renewable Energy Consortium for Research and Demonstration), University of Florence no profit Spin-off.
- We have ongoing R&D projects in the H2020 and HORIZON EUROPE CE programs on Geothermal Energy and in Hydrogen storage by MOF and ACs.
- Technologies on which Spike, through its R&D activities, has a specific expertise are Scaling Reductio System in Geothermal Power Plants and Hydrogen production, storage and utilization.



EU Research Projects Biofuels and Heat recovery in Industry



- **BIOGO-for-production (FP7) - www.biogo.eu :**
Catalytic Partial Oxidation of Bio Gas and Reforming of Pyrolysis Oil (BioOil) for an Autothermal Synthesis Gas Production and Conversion into Fuels.



- **SMARTREC (H2020) - www.smartrec.eu :**
Developing a standard and modularized solution for flexible and adaptive integration of Heat Recovery and Thermal Storage for high grade waste heat by Molten Salts as Heat Transfer Fluid.

Ongoing EU Research Projects Geothermal



- GeoSmart (H2020) - www.geosmartproject.eu :
Technologies for geothermal to enhance competitiveness in smart and flexible operation.



- GeoHex (H2020) - www.geohehexproject.eu :
Developing high performance heat exchangers for Geothermal applications

Ongoing EU Research Projects Hydrogen Storage



- **MAST3RBoost (Horizon Europe) -**

<https://mast3rboostproject.eu>

Maturing the Production Standards of Ultraporous Structures for High Density Hydrogen Storage Bank Operating on Swinging Temperatures and Low Compression

Engineering – Renewable Energies

Yeghegnadzor, Armenia; 1MW Photovoltaic Power Plant in Vayots Dzor.



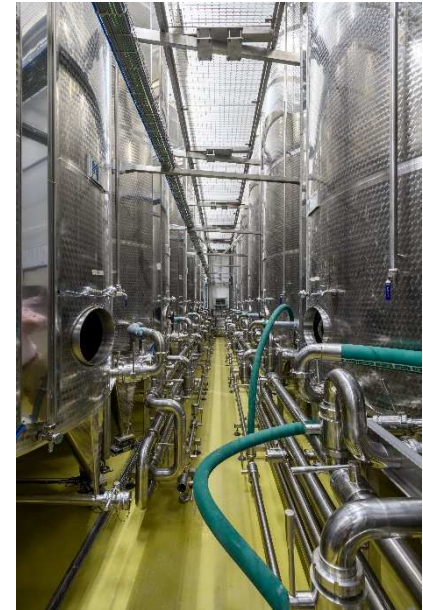
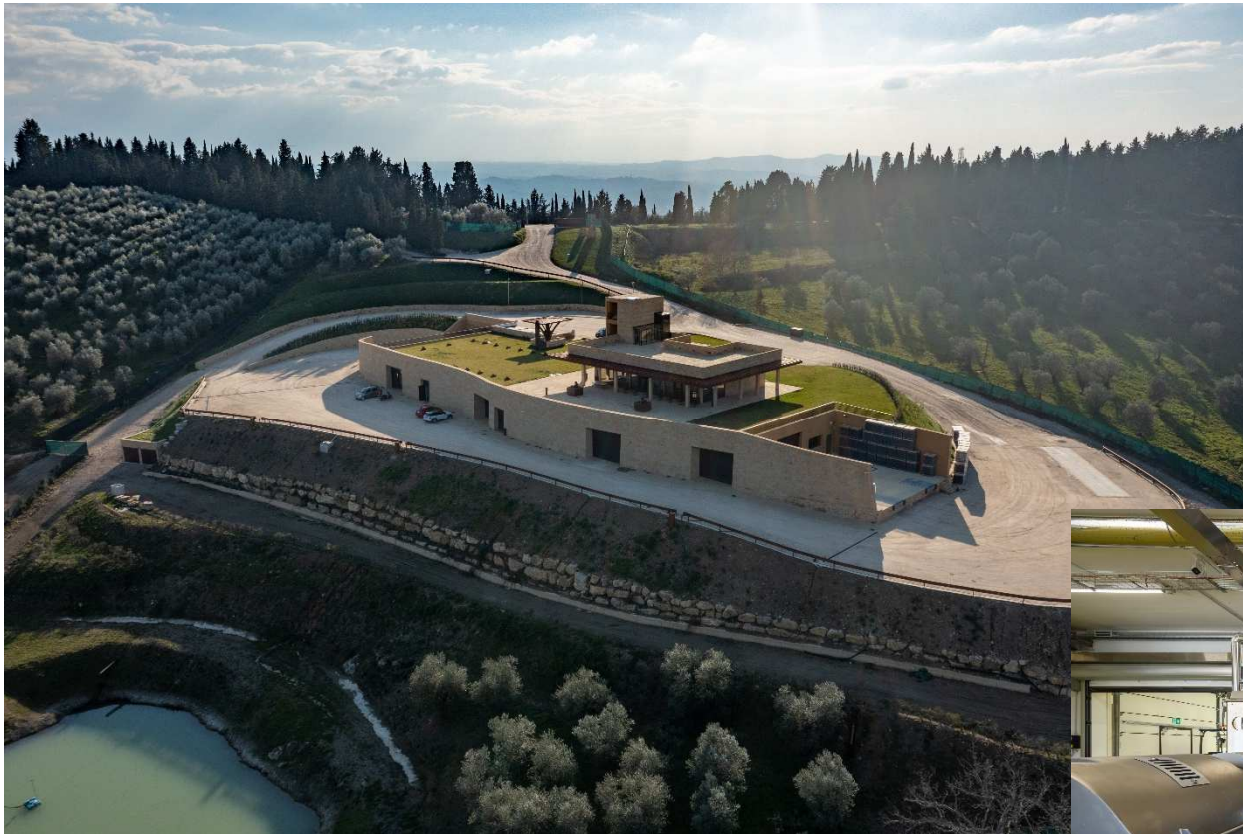
Engineering - Renewable Energies

Fiesole, Firenze Italy; installation of a 550kW biomass plant and an integrated solar thermal system.



Engineering - Renewable Energies

- Buonamici Srl new oil mill heating system 100% renewable



Prototyping: HTL Plant

Patent Pilot Plant for biomass Hydro Thermal Liquefaction (HTL)

PROPERTY: Spike Renewables Srl / RE-CORD n. FI2015A000127 date 29.04.2015

HP HT Filters

Cooling section

Biomass and water

Bio oil tank,
non cond. gases
and waste water

HP electric
pump

Pre-heating



Reactor



Prototyping: MSTP Molten Salts Test Plant



A **Molten Salt Test lab Plant (MSTP)** has been designed and assembled to test different molten salts under real operational conditions and therefore understand critical issues and technological problems before moving to full demonstration scale.



M.S.T.P
Molten Salt Test Plant

Electric power input	35 kW, 400 V, 3 Ph, 50 Hz
Max working temperature	600 °C
Design temperature	650 °C
Max working pressure	1 bar
Design pressure	3 bar
Nominal mass flow	8000 kg/h
Nominal volume flow	4 m ³ /h
Max external thermal power	10 kW
Molten salt content	500 kg

H2020 EU research program H2020-EE-2016-PPP
Project: SMARTREC Grant Agreement n. 723838

Engineered by  Built with the contribution of the EC for project 

www.spikerenewables.com smartrec.eu

Prototyping: HX Test Rigs

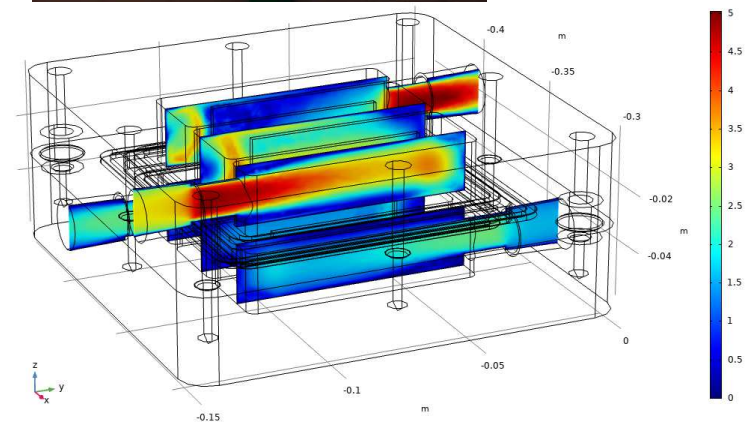
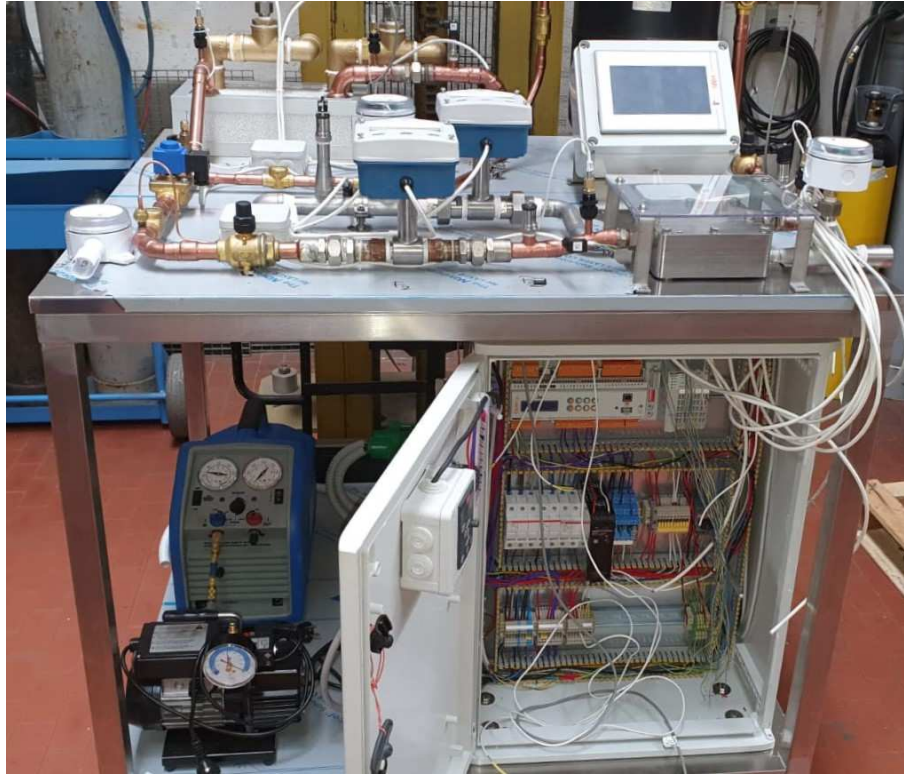


n.3 Test Rigs for single phase / condensing / boiling heat exchange between organic fluids (R134a) and brine has been designed and assembled to test different superficial treatments and coatings on metal plates under real operational conditions. Tests will allow to understand critical issues and technological problems before moving to full demonstration scale.

Test Rig WP2 for boiling R134a phase: shipped to University of Iceland

Test Rig WP4 for condensing R134a phase: shipped to TWI Ltd (UK)

Prototyping: HX Test Rigs



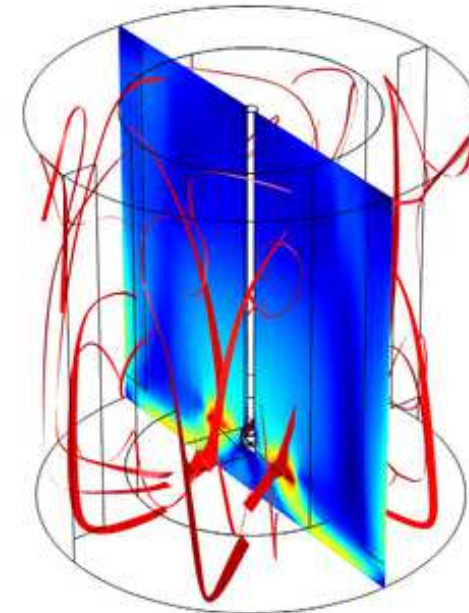
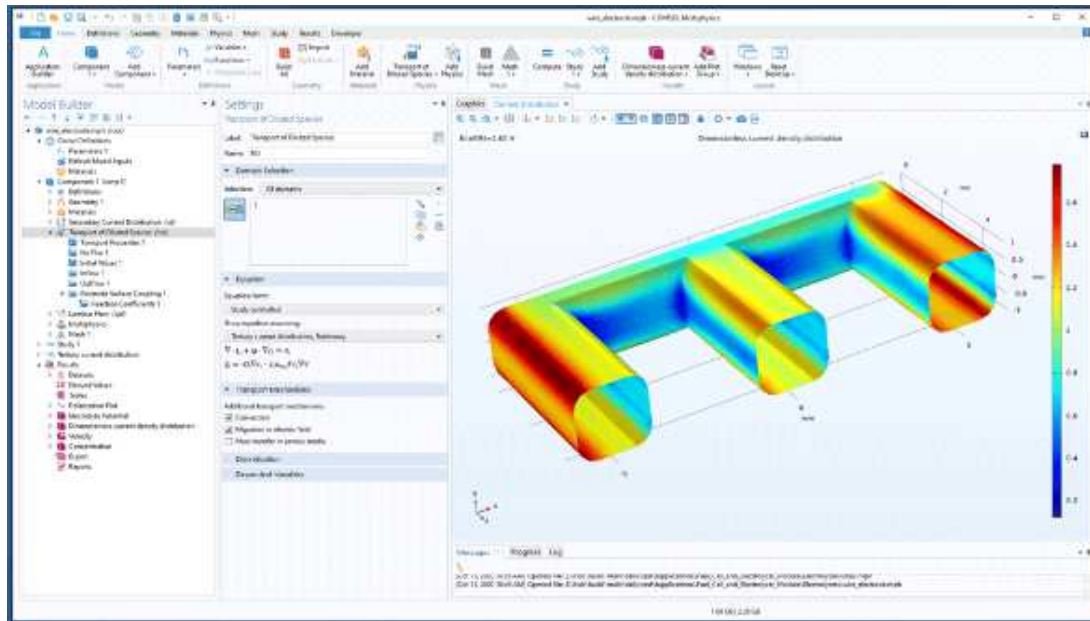
Test Rig WP2 for liquid R134a phase: shipped to ON Power (Iceland)

Prototyping: Silica scaling reactor & Retention Tank



Shipped to KIZILDERE II; ZORLU Energy Geothermal Power Plant (Turkey)

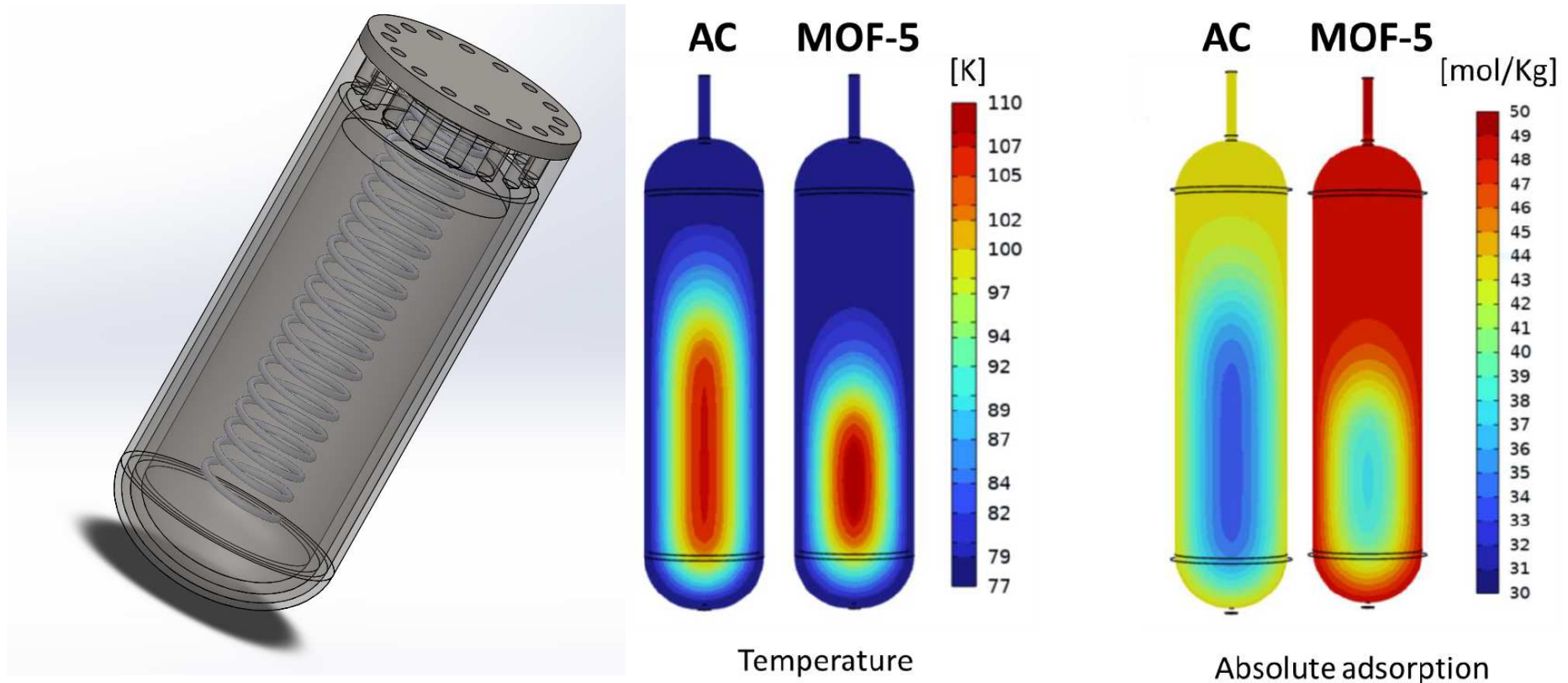
Numerical simulation by COMSOL Multiphysics



Prototyping is optimized by numerical simulation activities:

The main topics focus on H₂ Fuel Cells & Electrolyzers and CFD simulations.

Digital Twin for Hydrogen Storage by MOF & ACs



Digital Twin of the tank refilling simulates the effect of different tank configurations on hydrogen temperature pressure swing and on the hydrogen adsorption

Customers



PIN - Polo Universitario
Città di Prato



AGRICONSULTING



UNIVERSITÀ DI PISA



EU Network: Universities and R&D Centers



**Northumbria
University**
NEWCASTLE



Consiglio
Nazionale
delle Ricerche



Fraunhofer
IMM



**Newcastle
University**



TÆKNISETUR



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DEGLI STUDI
FIRENZE



**Brunel
University
London**



EU Network: Industrial



Conclusions

- Spike Renewables Srl is a private Engineering Company (SME) founder member of RE-CORD Consortium, with specific activities on renewable systems engineering and R&D.
- New Processes and Customized Mechanical Components can be optimized at lab scale by prototyping and/or numerical computational simulation before scaling up to industrial applications.

Thanks



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