

2020

# Engineering and Prototyping Activities SME - Spike Renewables Srl

*Spike Renewables Srl*  
*RE-CORD Consortium*  
*Florence, Italy*

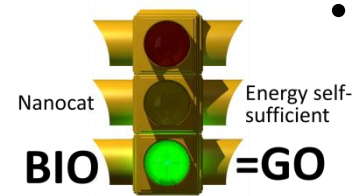
# Spike Renewables SrL



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 CE program on Geothermal Energy Production and in Industrial Process Efficiency.
- Technologies on which Spike, through its R&D activities, has a specific expertise are Hydrogen production and utilization.

# Ongoing Research Projects



- **BIOGO-for-production (FP7)** - [www.biogo.eu](http://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](http://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 Research Projects



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



- GeoHex (H2020) - [www.geohehexproject.eu](http://www.geohehexproject.eu) :  
Develpping high performance heat exchangers for Geothermals

# 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 – Efficiency in Buildings

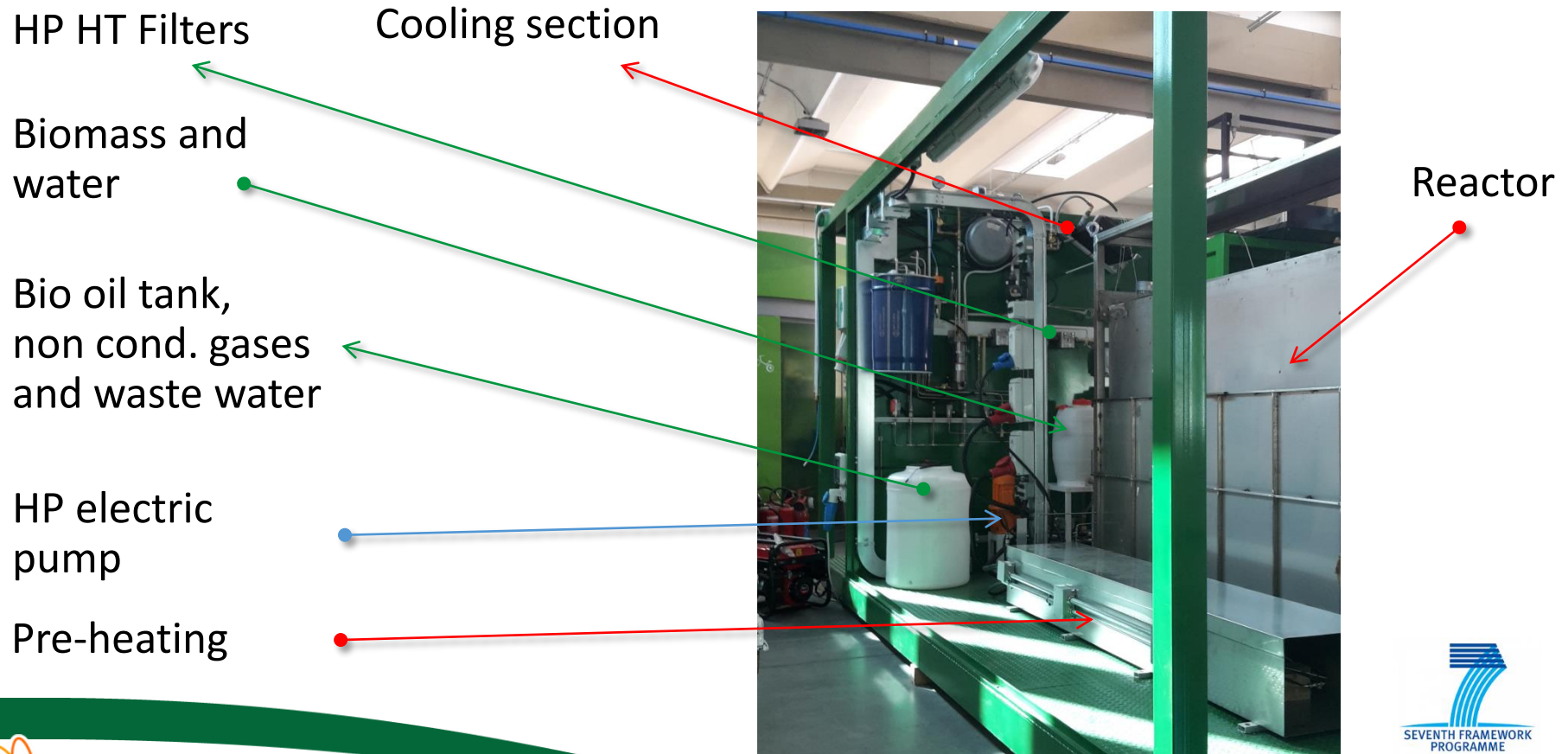
- Florence, Italy; 1400kWh of energy (ice) in a PCM storage tank.



# Prototyping HTL Plant

**Patent** Pilot Plant for biomass Hydro Thermal Liquefaction (HTL)

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





# Prototyping: MSTP Molten Salts Test Plant

A **Molten Salt Test lab Plant (MSTP)** has been designed and will be 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 <sup>3</sup> /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

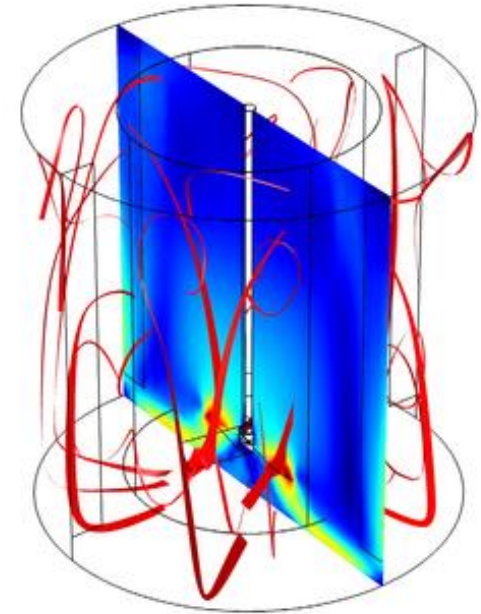
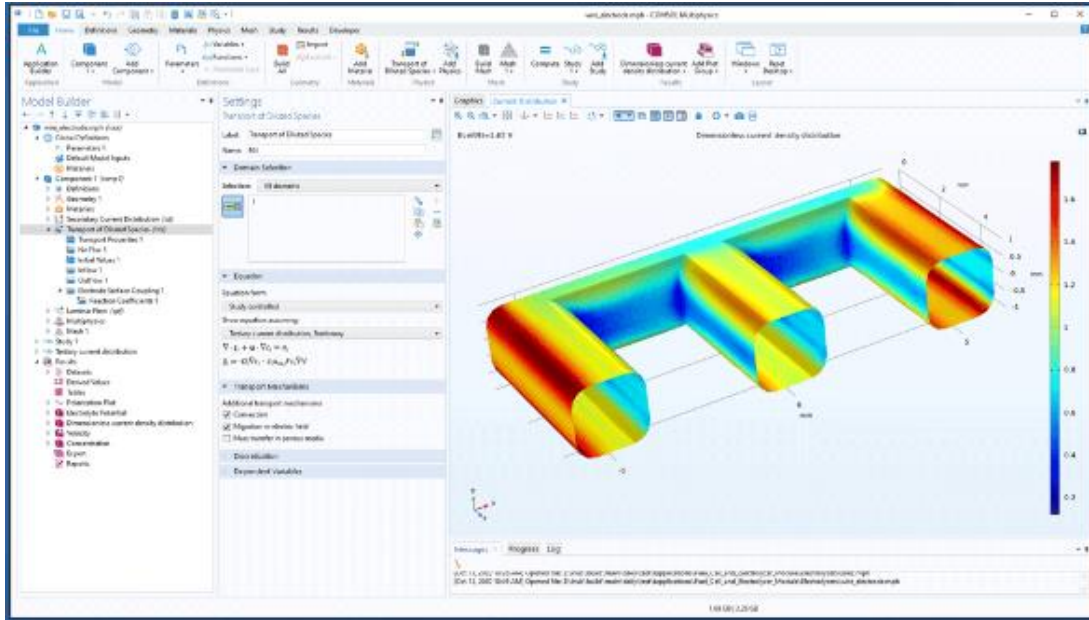


# Prototyping: HX Test Rigs



**A Test Rig 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.

# Numerical simulation by COMSOL software



**Prototyping is optimized by numerical simulation activities:**

The main topics focus on Batteries, H<sub>2</sub> Fuel Cells & Electrolyzers and CFD simulations.

# Conclusions

- Spike Renewables Srl is an Engineering Company (SME) founder member of RE-CORD Consortium (University of Florence), with specific activities on energetic systems engineering and prototyping of innovative pilot plants.
- New Processes and/or Mechanical Components can be optimized at lab scale and simulated by numerical computational programs before scaling up to industrial applications.



# Thanks

**Paolo Taddei Pardelli**

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