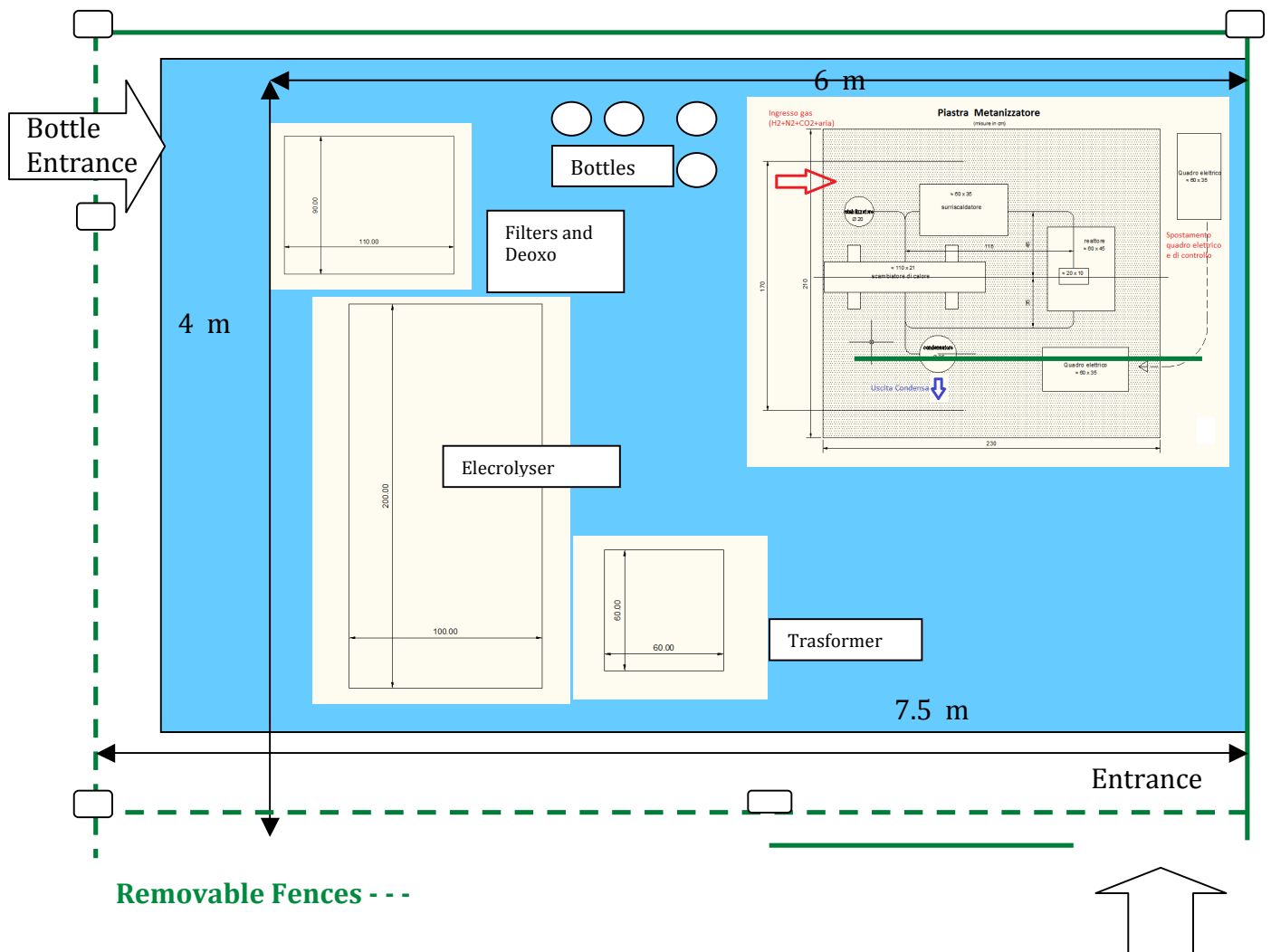


PROGEO: FUTURE DEVELOPMENTS IN PERUGIA

Antonio Laganà, MASTER-UP, Perugia

What future for PROGEO? The slides (in Italian) attached to this paper and related to the talk given at the 2015 workshop of the Department of Chemistry, Biology and Biotechnology of the University of Perugia on October 2 to present the activities of MASTER-UP (a former spinoff of the University of Perugia) are addressed in particular to the unveiling of the future perspectives of PROGEO following its move from Acerra to Perugia. In Acerra, where the generosity of the PLC System srl has made it possible to implement the ICSA (Innovative Computational Science Applications) Association project of assembling a first experimental industrial prototype of PROGEO.

The mentioned first experimental industrial prototype of PROGEO is PROGEO 30 kW (30 kW peak value; 20 kW nominal value) that has a nominal carbon neutral methane production varying from 1 Nm³/h to 1.5 Nm³/h as described in the PCT: WO 2012/1900581 A1 with the title: “Unit for the accumulation of electrical energy via production of methane”. The prototype (whose scheme is given in the Figure) can recover the heat of the outlet gas from the reactor by heating the inlet gas, using intrinsically passive safety elements and making flexible use of the heat generated during methanation reaction through an innovative interface with variable thermal conductivity. The assemblage of PROGEO 30 kW is the outcome of the cooperative work of Andrea Capriccioli (ENEA) and of people of R.P.C srl, Master-UP srl, RDpower srl, CNR Institute on Membrane Technology ITM of Rende (CS) and the Universities of Roma Tor Vergata, Roma 3 and Perugia.



The next version of PROGEO (that will be located as sketched in the scheme illustrated in the Figure at the Department of Civil and Environmental Engineering under the supervision of Stefano Falcinelli (see the enclosed Memoranda of understanding signed by the Department of Chemistry, Biology and Biotechnology with both the mentioned Engineering Department and the PLC System)) will consist of a more advanced and compact apparatus with a faster stop and go mechanism and a more complete management of the energy chemical storage process. As illustrated in the enclosed slides, in fact, the present scheme of PROGEO consists of two sections. The left hand side section devoted to the production H_2 by means of an electrolyser (and related electrical devices) and the right hand side section devoted to methanation (production of CH_4) by means of the reduction of CO_2 . The new version of PROGEO will include also the storage of the produced methane as clathrate hydrate and will be used to experiment alternative ways of producing H_2 . The transfer to Perugia has, indeed, the goal of fostering tighter interaction between research and its technological implementation. In particular, the computational investigation of the involved chemical processes will benefit of the activity of the ESR4 of the ITN-EJD-642294 TCCM (Theoretical Chemistry and Computational Modelling) for innovation in the production of H_2 and more effective catalytic reduction of CO_2 through a more intense interaction among ENEA, the CNR Institute on Membrane Technology ITM of Rende (CS), the Universities of Roma Tor Vergata, Roma 3 and Perugia, the cluster of SMEs coordinated by ICSA (MASTER-UP srl (Molecular modelling), R.P.C. srl (numeric control) and RDpower (clathrate hydrates production)).

ANNEXES

- 1) Slides of the talk given at the 2015 workshop of the Department of Chemistry, Biology and Biotechnology of the University of Perugia
- 2) Mou between the Department of Chemistry, Biology and Biotechnology and the Department of Environment and Civil Engineering
- 3) Mou between the Department of Chemistry, Biology and Biotechnology and the PLC Systems