REPORT ON PROGEO PROGRESS

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Activities carried out within the PROGEO project of the ICSA (Innovative Computational Science Applications) Association in collaboration with R.P.C srl, Master-UP srl, RDpower srl and the support of the PLC-System srl, the CNR Institute on Membrane Technology ITM of Rende (CS), the Universities of Roma Tor Vergata, Roma 3 and Perugia is here detailed together with related terminology.

 Horizon 2020-SMEINST-phase 2-2015
This proposal **Power-to-Gas technology for electricity storage and CO_2 valorization for small Thermoelectric Power Generation** refers to a **ProGeo 500 kW** a modular unit enabling the storage of electricity by converting carbon dioxide (CO_2) into synthetic methane (CH_4), with high flexibility thanks to fast start-ups and shut-downs. The first prototype will be offered to owners and managers of small Thermoelectric Generation (s-TEG, < 50 MWth) plants, who will have the possibility of storing electricity (avoiding its low-price selling during little request times) and to reduce the CO_2 emissions.

 ViEnergy project and next PO (Operative Program) Italia-Malta 2014-2020
This Operative program outlines the technical objectives of the PROGEO project in the period 2014 - 2020. Among them, the main one is the use of CO_2 produced by alcohols fermentation to produce green-methane as fuel for agricultural apparatuses rather than diesel. Preliminary analyses and tests are in progress at the University of Roma 3.

 ECOMONDO Rimini (IT) 2015
A new version of *ProGeo* (**Upgraded 250 kW**) was presented in collaboration with IRVO (Istituto Regionale Vini e Oli, the Italian referent of the Italia-Malta agreement) and its activities of capture and storage of CO_2 were described. During the event the innovative storage of methane and/or carbon dioxide in Clathrate hydrates was shown. The technology is appropriate for the environmental conditions in the wine cellars.

 ProGeo 30 kW from PLC System (Acerra - NA) to the University of Perugia
To the end of enhancing research activities for the evolution of PROGEO it has been agreed to transfer the 30 kW prototype apparatus from the PLC System to the University of Perugia within the frame of the **ITN-EJD-642294 TCCM** (Theoretical Chemistry and Computational Modelling) European project. The prototype will be located at the Department of Civil and Environmental Engineering of Perugia.

 ProGeo-U 500kW for Biomethane upgrading
This proposal targets the Biogas production and its use an energetic/industrial sector of wide interest. After a first phase of cleanup, the Biogas ends up being made of about half methane and half carbon dioxide. This mixture can either be used directly (in properly modified engines), or, after separation of CO_2 from CH_4 (with chemical or mechanical technologies). A possibility is also to use it in input to PROGEO for methanization of CO_2, without separation from the main methane stream.

Editor's note

Hereinafter, the experimental industrial methanation apparatus will be named after PROGEO by specifying the model considered. Proposals for funding will be named, instead, by acronims known only to the members of the consortium (the list associating the name of the apparatus to the name of the proposal will remain its exclusive property). In this document the following apparatuses are described:

1) **ProGeo 30 kW** indicates the first prototype (the laboratory previous reactors used for previous experimenting he not been given a name or should be named Progeo.0).

2) **ProGeo 500kW** indicates the prototype of the proposal H2020 (present phase 2 of PLC System).

3) **ProGeo-U 500kW** (U stands for Upgraded) indicates the prototype revision 1 (shortly named CO2STORE: CO2 Valorization and Energy Storage for Large Industries).

4) **ProGeo-U 1MW** is proposed for the next proposal named in the recent past CHARISM (Carbon, Hydrogen And Renewables Interactive for Storage in Methane)