Swiss Review of the Work Program of SCCF/C.7 – November 2009

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Commentaries on Projects

N°01: SCCF-4040: Brazil: RCCS – Renewable CO_2 Capture and Storage from Sugar Fermentation Industry in Sao Paulo State (UNDP); GEF: USD 2,650,000; Total USD 10,365,000.

Overall Commentaries

CO_2 Capture and Storage (CCS) has a large potential as a secondary measure to limit the increase of the CO_2 content in the atmosphere. However, CSS in conventional power stations based on fossil fuels or biomass is related to high costs and leads to a significant increase of the primary energy consumption. This is primarily due to the CO_2 separation from flue gas, which is necessary and expensive since the flue gas contains less than 20% CO_2, and secondly due to the expenses for the CO_2 storage. Hence there is a conflict of aims due to the energy consumption for CO_2 capture, which may accelerate the exploitation of fossil fuels. Consequently, CCS might be much more efficient in terms of cost and CO_2 savings when applied to processes where pure CO_2 is produced as a side-product nowadays emitted to the atmosphere. In the case of sugar fermentation for ethanol production, ethanol and CO_2 are produced in almost equal quantities and directly separated in the process. Hence almost pure CO_2 can be easily collected and compressed for transport and storage without an expensive CO_2 separation. This application of Renewable CO_2 Capture and Storage (RCCS) can potentially result in a net CO_2 reduction from the atmosphere. The technology will be introduced and demonstrated in the present project, where CO_2 will be collected from the sugar fermentation industry and transported in pipes for storage to underground saline formation available within less than 100 km distance. The project covers four project components from the feasibility study, realisation of the RCCS demonstration plant, capacity building on RCCS application, and project monitoring. Thanks to the avoidance of CO_2 separation, the technology achieves far lower CO_2 reduction costs than CCS from fossil fuel applications. Since the technology is relatively simple, capacity building and technical assistance will be the main focus of the project while only 18% of GEF resources are devoted to the technology demonstration.

Questions, Concerns and Challenges for further Project Preparation

The concept of CO_2 storage from ethanol production is potentially highly efficient and cost effective. By the principle of picking low hanging fruits first to achieve the maximum contribution to CO_2 savings, all ethanol production sites should be applied with CCS before implementing CCS to fossil-fired power plants. Consequently, the project concept is very promising. However, the following aspects need to be critically considered:

- Reliable assessment, implementation, and long-term monitoring of the underground storage of CO_2 is needed to safely ensure CO_2 storage and avoid leakages.
- A business plan needs to be developed which ensures the continuous and ongoing application of RCCS after implementation which is related to operation costs without economic benefit except potentially for CO_2 credits if available.
- The production of energy crops for ethanol production such as sugar cane in Brazil is often related to severe negative effects on environment (deforestation, conversion of fixed carbon and minerals from the soil, water utilisation and pollution, air pollution from field burning etc.), and also on social aspects (competition with food production). RCCS can potentially improve the life cycle analysis of existing ethanol production if properly applied. However, all other aspects

in the value chain of crop production and ethanol utilisation need to be improved in future and should be considered for further capacity building for ethanol. Among others and specifically with respect to climate change, open field-burning resulting in excessive black carbon emissions needs to be strictly avoided in future, since due to new findings (agreed by the IPCC), black carbon is regarded as one of the three most important components for the anthropogenic contribution to global warming, i.e., number 2 after CO_2 or number 3 after CO_2 and methane.

Conclusions and Recommendations

The implementation RCCS in sugar fermentation in Brazil has a high potential for CO_2 reduction. It can be much more cost effective and resource effective than CCS for fossil fuel application and hence should be widely introduced prior to fossil CCS. Hence the project is proposed for funding if strict project management and monitoring is assured and measures to avoid additional negative impacts of the bio-ethanol chain are ensured as described.

N°02: SCCF-4036; Jordan: DHRS Irrigation Technology Pilot Project to face climate Change impact in Jordan, (UNDP/IFAD); SCCF cost: 2 million USD; total: 8 million USD

Overall Commentaries

The project's primary objective is to transfer an innovative irrigation technology to reduce the vulnerability to climate change of the agricultural system in Jordan and particularly from its impacts on water resources. The project will achieve this objective through: a) transfer of pilot dRHS technology for efficient water use; and b) provision of targeted training on the installation/use of the system. The project aims to test on a pilot base a new technology named Dutyion Root Hydration System (dRHS) that enables agriculture to use water more efficiently. It was designed to help farmers to grow crops using low or no value water, which is basically attractive but also associated with risk in the case of system failure. The project is well in line with national and regional priorities and strategies such as the importance of effective water management as a response to climate change impacts on water resources as well as with the GEF climate change strategic objectives. However, key issues with regard to crucial success factors of technology transfer projects are not adequately addressed and need further specification.

Questions, Concerns and Challenges for further Project Preparation

According to the web site http://www.dti-r.co.uk the Dutyion Root Hydration System (dRHS), developed by UK-based DTI-r, is a subsurface irrigation technology that allows the use of brackish water to grow crops and trees in the desert. The process uses a novel plastic pipe buried at root level, through which brackish water is pumped. As "phase change permeation" occurs – a process similar to pervaporation – water vapour passes through the pipe to hydrate roots. The firm was awarded the Global Water Technology 2009 award, which underscores the high potential of this technology. The web site of the firm states that so far semi-commercial trials have been conducted in Chile, Libya, Tanzania, Mauritius and Spain, with plans for expansion of one of the trial systems currently installed in the Middle East to include irrigating with water which is more saline than the sea. Water with higher salinity than the sea is available on the coastline of the Dead Sea in Jordan.

- As the technology is still under pre- or semi-commercial testing, the proposed project is rather a technology demonstration then a technology transfer project. According to the system description provided in the paragraph above, it is obvious that the low or no value water passing through the under-surface pipes in farmers' fields is associated with a significant system failure risk. In case of pipe damage or leaks, this system is associated with risks to which particularly small farmers with smallholdings will be very sensitive. It is hence somewhat irritating that the PIF does not contain a paragraph on technology risks and that no STAP review had been conducted. Conducting this risk assessment is considered a must! This in particular if the technology is promoted by GEF under the objective of alleviation of rural poverty.
- Similarly no reference is made to cost/benefit or investment cost analysis in the PIF. The incremental investment can be expected in the order of 20'000-30'000 USD/ha. These are not small amounts to be funded for small farmers, if dissemination is to be successful. The PIF is silent on the entire issue of project finance following the technology demonstration phase.
- The PIF in paragraph G outlines that the accurate maintenance of the dRHS pipes is critical for the efficiency of the irrigation system. The risks will be minimized through the organisation of targeted training. On the other hand PIF paragraph H outlines that maintenance costs are low, as once the pipes are laid, the system requires little maintenance. Considering the risk of soil contamination with saline water, maintenance and maintenance cost are key issues which need further clarification from experience in other semi-commercial demonstrations and a commercial affordability perspective.
- The possibility to use low or no value water in the system and avoiding the salination problems in many irrigated areas in Jordan obviously could lead to high environmental benefits and in-

creased income. While further planning this project the commercial viability of the technology demonstration has to be properly analysed and documented.

- Component 2 comprises measures for dissemination such as workshops and flyers/information material. This proposed level of efforts seems not sufficient to achieve the stated outcome. Experience with drip irrigation in many developing countries underscore the key importance of "social marketing" and finance under active private sector involvement in order to achieve the poverty alleviation targets envisaged.

Conclusions and Recommendations

On the basis of the above considerations, we recommend improving the proposed technology transfer strategy in close consultation with STAP and subsequently revising the project design, taking into account the various points raised in this project review. The issues raised should be adequately addressed in the final document which will be submitted for CEO endorsement.