

February 10, 2023

CALL FOR EXPRESSION OF INTEREST

Short-term consultancy services (Research Institute)

Project: Green Hydrogen Production for use in off-grid applications (Feasibility study for green hydrogen technology in off-grid areas in the Philippines)

Objective: *Conduction of a simulated techno-economic evaluation of the potential to replace diesel generators in off-grid areas with hydrogen and fuel cell technology.*

1. Background

As an archipelago in the Pacific, the Philippines is vulnerable to climate catastrophes such as storms and rising sea levels. At the same time the country is depending on climate-harming fossil fuels to meet its increasing energy demand. To address the effects of climate change, the government has committed to reduce greenhouse gas emissions by 75% by 2030. The country's abundant natural resources such as geothermal, wind, and solar energy, are already sustainable energy alternatives. At present, renewables contribute about 21% of the energy mix with the government's National Renewable Energy Plan aiming to reach 35 % by 2030. This goal is to be achieved in particular through the use of rooftop solar energy as an affordable solution for businesses and households as well as energy storage systems for a weather-independent power supply.

Due to the Philippines' dispersed geography of more than 7,000 islands, 1.63 million Filipino households are not connected to the electricity grid. A widening gap between supply and demand has forced many Filipinos to rely on diesel generators for power generation and for emergency backup power, especially in remote areas. Local production of hydrogen, its storage and the use of fuel cells could replace those climate-harming and cost-intensive diesel generators.

The German-Philippine Chamber of Commerce and Industry, Inc. (GPCCI) in the Philippines is undertaking a study under the framework of the ***"Exportinitiative Umweltschutz"*** (*Export Initiative Environmental Protection*) of the ***„Bundesministerium für Umwelt, Naturschutz, nukleare Sicherheit und Verbraucherschutz"*** (BMUV - *"Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection"*). The study is conducted in close cooperation with the ***"Nationale Organisation Wasserstoff- und Brennstoffzellentechnologie"*** (NOW - *"National Organisation Hydrogen and Fuel Cell Technology"*).

The aim of the study is to illustrate the techno-economic configurations and sensitivities of renewable, hydrogen and fuel cell technology options (PV, electrolysis, hydrogen storage, fuel cell, etc.) in several scenarios (full [100%] or partial [e.g., 95%] renewable energy supply, combinations with battery storage, etc.) in comparison to an energy supply with a diesel generator. To execute this study, GPCCI is looking to recruit the services of a research institute with competences in modelling a wide range of energy systems.

2. Context

After an initial study conducted by GPCCI, it has been concluded that a more detailed techno-economic analysis is useful and necessary to assess the potential business case for green hydrogen production and usage for off-grid applications.

This would require an adaptable multi-vector simulation model that would allow for a more detailed techno-economic analysis to provide a basis for evaluating potential use cases and projects.

As the project focuses on definable energy systems (i.e. off-grid diesel generators), such an analysis would also be easily realisable. A multi-vector simulation model would be suitable for the analysis of a possibly local (green) hydrogen production and usage in such off-grid areas. As a result, the levelized cost of electricity, CAPEX and OPEX, optimal system capacities, dimensioning of the supplementary components for electrolysis and reconditioning via fuel cell, analysing peak performance and surplus generation by installed renewable capacities can be determined using such a model. Such an analysis would also make it possible to assess the local demand and generation profiles of such a hydrogen installation replacing the off-grid diesel generators and possibly derive potential areas of application for the generated hydrogen and possibly for co-generated products (i.e. heat, oxygen).

3. Scope of Work

GPCCI is looking to recruit the services of a competent research institute to perform the techno-economic simulation of hydrogen production and usage at **TWO** selected existing energy systems (hybrid or 100% relying on diesel generators) operated by the National Power Corporation (NPC) and **ONE** privately run mini-grid (hybrid or 100% relying on diesel generators). The preferred contractor should have experience in using open-source and/or commercially available multi-vector simulation models for energy systems. The contractor will also be required to liaise periodically with the project team at GPCCI. The key activities that the contractor will be expected to perform under this project include, but are not limited to, the following:

- Liaising with the GPCCI team and the NOW team to determine the optimal energy systems model to be used for the study, based on the objectives of the study
- Upgrading or adapting the model (where necessary)
- Advising on site selection for the study

- Providing guidance to support the achievement of the objective of the project through consultation with GPCCI and the local stakeholders (e.g. NPC and the private operator of the off-grid diesel generators)
- Identification of the input parameters and definition of the data points that GPCCI is to collect during site visits to the off-grid diesel generator locations
- Workshop with GPCCI project team and partners to discuss the input parameters to be used for the study
- Creation of data collection forms to be administered by GPCCI during site visit to the selected off-grid diesel generator locations
- Modelling the feasibility of a hydrogen / fuel cell-based energy system at the off-grid diesel generator locations (i.e., the techno-economic evaluation of hydrogen production and consumption at the off-grid diesel generator locations)
- Notes regarding technology selection and system dimensioning, assumptions made
- Presentation of the results in an internal workshop with the National Power Corporation (NPC)
- Expert presentation at an external expert event
- Possible inclusion in interviews with local media and in podcast formats.

4. Deliverables and Reporting

- a. Inception Report: Approach, work plan and timelines including participation and PowerPoint presentation of approach in an inception meeting (virtual) with the GPCCI project team.
- b. Periodic exchanges with GPCCI project team.
- c. Preparation and Input of 20 min upon central findings of techno-economic analysis within a digital event organized by GPCCI (specific date to be defined)
- d. Documented communication project activities / publications within the project scope in coordination with GPCCI in order to maximise dissemination with relevant stakeholders and project impact in English
- e. Draft and final reports on assignment and PowerPoint presentation of results in English including an executive summary (German and English) in a debriefing meeting (virtual) with the GPCCI team.

The reports should touch upon all the tasks spelt out in section 3.



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5. Non-disclosure and intellectual property

All results of the study and the techno-economic analysis shall be for the exclusive use of GPCCI only. The selected competent research institute as the contractor shall not be permitted to use and exploit the data provided and/or collected and results obtained outside the immediate study production, unless GPCCI has given its prior written consent. In addition, applicants should be aware that the conclusion of the contract may require the agreement of an additional contract to clarify copyright and intellectual property rights.

6. Proposed Time Schedule

Provision of the final version of the techno-economic analysis by 31 October 2023

Completion of any additional services (PR/communication, etc.) before 30 November

7. Additional content

The specified deliverables are mandatory. However, applicants are free to propose additional deliverables and services within their techno-economic analysis that could support the defined activities and objectives.

8. Requirements

GPCCI hereby invites technical and financial offers from competent research institutes to perform the services outlined in this call for expression of interest, by Friday, March 3, 2023.

