Terms of reference (ToRs) for the procurement of services below the EU threshold

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Exploration and design of solar air heaters with a focus on their technical and financial applicability for rural Armenia	**Project number/ cost centre:** **18.2062.0-015.00**

0. List of abbreviations

AG	Commissioning party
AN	Contractor
AVB	General Terms and Conditions of Contract for supplying services and work
FK	Expert
FKT	Expert days
KZFK	Short-term expert
ToRs	Terms of reference

1. Context

The "Management of natural resources and safeguarding of ecosystem services for sustainable rural development in the South Caucasus" (ECOserve) Environment Programme implemented by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH commissioned by the German Federal Ministry for Economic Development and Cooperation (BMZ) is part of the wider German support in the priority area "Environmental policy, conservation and sustainable use of natural resources in the South Caucasus". The objective of ECOserve Programme Armenia is to improve the preconditions for sustainable and biodiversity-friendly management of natural resources (particularly pastures and grasslands) in Armenia, with particular focus on the energy security of the rural population. ECOserve is implemented by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH jointly with the partner Ministry of Territorial Administration and Infrastructure, Ministry of Environment, and Ministry of Economy of the Republic of Armenia.

This assignment/task is a part of the EU co-financed **"EU4Energy Efficiency and Renewable Energy in Armenian Communities" Project** within the framework of "ECOserve" programme, commissioned by the German Federal Ministry for Economic Development and Cooperation (BMZ) and implemented by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. The Project objective is to provide the communities and households with better access to energy efficiency and sustainable energy solutions, thereby contributing to the improved energy security of the rural population and the conservation of natural resources. More information about the project can be obtained in a project leaflet.

The energy component of ECOserve Programme Armenia, with a focus on rural areas, aims at the promotion of marketable approaches for more efficient use or substitution of fuelwood or dung as a source of heating energy that addresses the specific benefits of women (e.g., indoor air quality, room temperature, fuelwood procurement legality). Improved energy efficiency (EE) in rural households can significantly reduce the use of fuel (fuelwood, dung, etc.) for heating with consequent reduction of forest degradation and energy poverty of the rural population. Alternative solid biofuel from renewable biomass also has the potential to replace fuelwood/dung as heating fuel. In the framework of ECOserve Programme Armenia, a number of studies on rural energy demand, supply and efficiency have been implemented related to the use of fuelwood and dung. Armenia has significant solar energy potential: average annual solar energy flow per square meter of horizontal surface is 1 720 kWh (the European average is 1 000 kWh), and one-quarter of the country's territory is endowed with solar energy resources of 1 850 kWh/m^2 per year. The Government of Armenia has approved the Energy Sector Development Strategic Programme until 2040. According to the Strategic Programme, the share of renewable resources, mainly solar, for energy production should be increased by up to 15% in total energy production. After realizing small hydro potential, mostly after 2000, the focus is shifted to solar energy and wind. Armenia is developing solar energy capacity from current 59.57 MW to 1000 MW before 2030, to increase both, green energy share and energy security (at least 15 per cent in 2030 in power generation mix). Wide-scale operation of solar PV systems is currently in progress. As of 1 July 2022, around 102.8 MW of solar PV installations (of up to 5 MW each) were in operation. Another batch of grid-connected PV power plants totaling 176.7 MW are under construction, the largest being the Masrik solar PV station with 55 MW of installed capacity. Moreover, more than 6 940 autonomous electricity producers with 136.1 MW of total installed capacity are connected to the distribution grid. Although, PV panels are considered most promising source of energy, for average households (HH) in rural areas of Armenia it is still not an easily affordable approach for heating considering relatively big upfront investment for installation. Meanwhile, solar thermal energy has been developing rapidly in Armenia both in public buildings and individual HHs. Thanks to their energy savings and cost-effectiveness, solar water heating (SWH) systems have been widely

installed in nurseries, residential homes, and medical facilities through charitable programmes with international funding, as well as in private houses via cash payment or loans with low interest rate by HHs. In particular, SWHs become beneficial for the settlements and HHs with no gas supply and year by year most of the houses in rural settlements are covered with SWHs.

Solar Air Heaters (SAH) have been in use for already more than 15 years in different parts of world, particularly in Canada, US, Australia, Antarctica etc. SAHs are mainly used to contribute to the heating of residential buildings, offices, schools, kindergartens, houses and their basements, camp houses and greenhouses. Such devises are produced by companies working in sphere of heating and cooling systems. Depending on their design and size, SAHs can efficiently contribute to the reduction of heating costs on sunny days during the heating season. The main principle of how such devices work is by collecting solar rays for heating the air. There are three main types of solar air heaters:

1. Circulating indoor air by heating (highest efficiency, no air quality balance)
2. Circulating indoor air and mixing outdoor air (mid efficiency, balancing air quality)
3. Blowing outdoor heated air into indoor space (low efficiency, air quality balance)

Considering its relatively simple design, low level of maintenance costs, and low level of upfront investment, such devices have potential to be applied in the Armenian context. It is worth exploring the possibilities of using SAH to support the heating both in public buildings and in private houses. As a potentially new product in Armenia, it will require testing and piloting.

2. Tasks to be performed by the contractor

The objective of this study is to explore the different models of Solar Air Heaters and offer the most suitable and applicable models of SAHs for Armenia. The study should include **research, prototyping, practical testing, calculations, and drawing of the SAH models,** which should be cost-effective, highly efficient, and easy to manufacture. Based on the results and suggestions of the study, the best options for SAHs can be considered for piloting in the rural areas of Armenia.

The consultant should complete the following tasks for the assignment.

Task 1.
Conduct research (desk study based on local and international experiences) to pre-select the most suitable models of SAHs for further exploration, considering the local market and the use of recyclable and reusable items or products as raw materials for manufacturing. Based on the results of the research, select, and suggest **two models** out of which one can be selected for (a) self-manufacturing (do it yourself/DIY) and (b) the second model as a market product. Prepare a short technical report on the main findings of the research and justify the selection of the two models for testing (report up to 8 pages).

Task 2.
Develop a methodology for testing the solar air heaters and organize a series of testing for **the two selected models** along with technical improvements with the aim to reach the highest efficiency of SAH, considering the possible lowest price of manufacturing and the use of recyclable/reusable materials (e.g., pop cans, metal net, furniture, and glass remnants etc.) **for the first model** and marketability **for the second model**. Possible additional features such as **indoor air temperature** and **CO_2 concentration controllers** among others should also be considered. After the improvements re-testing is necessary. The main parameters, which

should be addressed are efficiency, difference between inlet and outlet air temperatures, dehumidifying coefficient, indoor air quality considering PMs (Particulate Matters), TVOCs (Total Volatile Organic Compounds), dust, noise level, air flow velocity and others, which may affect indoor microclimate, as well as human health. In total, the testing processes may include up to two improvements of models as well as retesting, based on necessity. A working discussion should be organized with ECOserve Armenia staff, as well as other specialists and stakeholders in the field to present the main findings from the initial research and the selection criteria of SAHs for further testing as well as the testing methodology, before starting actual testing. Prepare a short technical report on the testing methodology, as well as the testing process, and the test results (report up to 20 pages).

Task 3.
Based on the results of the testing, develop the drawings of **the final models of SAHs** and the list of costs for the required materials (those available in the local market for making a solar air heater), as well as the technical details for the materials to be used for manufacturing, including the ones related to air quality and health issues (type of paints, glues, etc.). Develop a thorough manual for DIY model with assembling and installation steps, as well as a video script. Conduct Cost-Benefit Analysis (CBA) of the applicability of solar air heaters, calculations of energy savings, and GHG emission reductions comparing with the use of different energy sources.

Task 4.
Prepare a comprehensive report of implemented activities based on the reports delivered for Task **1** to Task **3** and present to GIZ ECOserve responsible adviser (up to 30 pages) excluding calculations and details of tests, which can be presented as Annexes. The report should also include a list of technical and policy recommendations including recommendations on how to promote scaling up effects for learning and innovation. Based on the feedback received from GIZ ECOserve responsible adviser revise the report as necessary.

Task 5.
Prepare and conduct a short working presentation on the process and results of the study covering Task 1 to Task 4 for GIZ ECOserve team Armenia in cooperation with the responsible adviser of ECOserve program.

Task 6.
Prepare a short report/Policy Brief up to 4-6 pages in the Armenian and English languages presenting the main findings of the study, the applicability of such devises in the Armenian context, and a list of policy recommendations as mentioned in Task 4.

Task 7.
In close coordination with GIZ ECOserve staff, organize a closing workshop for partners and stakeholders, aimed at presenting and discussing the results of the study including the results of the tests, the designed final products, the results of the CBA, the applicability for the Armenian context, and the policy recommendations.

Results and work schedule

Task	Outputs	Number of days	Deadline
Task 1. Research/desk study based on local and international experiences of using	A brief report on the results of the research and the selected models for further	6	2 weeks after signing contract

SAHs with a purpose to pre-select the two most suitable model-prototypes for Armenia.	testing (report up to 8 pages).		
Task 2. Develop a methodology for testing the SAHs. Carry out technical improvements and a series of testing of the preselected models for reaching the highest efficiency. Organize working discussion with ECOserve Armenia staff, as well as other specialists and stakeholders in the field.	**1.**Technical report (up to 20 pages) on the methodology of testing, as well as the results of the testing **2.** A working discussion with ECOserve Armenia team is organized and the main findings of research, test methodology and selection criteria are shared using a PPT presentation	14	5 weeks after signing the contract
Task 3. Development of drawings and list of costs for the selected final models. Conduct CBA and energy-saving calculations.	Drawings of 2 final models and the list of prices of the materials, DIY manual, a video script. Results of CBA and energy-saving calculations.	10	7 weeks after signing contract
Task 4. Preparation of a comprehensive report covering main activities and results	A final comprehensive report with annexes including international experience of SAHs, methodology of testing, tests' results, CBA of applicability of SAHs and final drawings of suggested models.	4	9 weeks after signing contract
Task 5. Prepare and conduct short summary presentation to the GIZ team	Short summary presentation PPT on the process and results covering Task 1 to Task 4	2	9 weeks after signing contract
Task 6. Prepare policy brief reflecting the key findings and the applicability in the Armenian context in Armenian and English.	Policy brief up to 4-6 pages.	2	10 weeks after signing contract

Task 7. Organize closing workshop for partners, stakeholders.	Presentation of key findings, recommendations, and a final product for possible piloting.	2	10 weeks after signing contract
Overall		**40 days**	

Period of assignment: from December, 2023 until May, 2024.

Reporting

- The contractor manages costs and expenditures, accounting processes and invoicing in line with the requirements of GIZ.

- The Contractor shall report to GIZ. All the activities and technical issues should be closely coordinated and agreed beforehand. GIZ will provide the company with all the available information and materials in relevant areas as well as with necessary background and technical information upon request. The Contractor will be responsible for planning assignment-related meetings and the timely delivery of the agreed deliverables. All the documents shall be delivered electronically in the Armenian language, if possible, in the English language to GIZ, using the official the reporting format, which will be provided by GIZ.

3. Concept

In the tender, the tenderer is required to show *how* the objectives defined in Chapter 2 (Tasks to be performed) are to be achieved, if applicable under consideration of further method-related requirements (technical-methodological concept). In addition, the tenderer must describe the project management system for service provision.

Note: The numbers in parentheses correspond to the lines of the technical assessment grid.

Technical-methodological concept

Strategy (1.1): The tenderer is required to consider the tasks to be performed with reference to the objectives of the services put out to tender (see Chapter 1 Context) (1.1.1). Following this, the tenderer presents and justifies the explicit strategy with which it intends to provide the services for which it is responsible (see Chapter 2 Tasks to be performed) (1.1.2).

The tenderer is required to present the actors relevant for the services for which it is responsible and describe the **cooperation (1.2)** with them.

The tenderer is required to describe the key **processes** for the services for which it is responsible and create an **operational plan** or schedule (1.4.1) that describes how the services according to Chapter 2 (Tasks to be performed by the contractor) are to be provided. In particular, the tenderer is required to describe the necessary work steps.

Project management of the contractor (1.6)

The tenderer is required to draw up a **personnel assignment plan (1.6.2)** with explanatory notes that lists all the experts proposed in the tender; the plan includes information on assignment dates (duration and expert months) and locations of the individual members of the team complete with the allocation of work steps as set out in the schedule.

4. Personnel concept

The tenderer is required to provide personnel who are suited to filling the positions described, on the basis of their CVs (see Chapter 6), the range of tasks involved and the required qualifications.

The below specified qualifications represent the requirements to reach the maximum number of points in the technical assessment.

Team leader

Tasks of the team leader

- Overall responsibility for the consultancy package of the contractor (strategy and processes, schedule and timeline, quality)
- Coordinating and ensuring communication with GIZ, cooperation actors, and others involved in the measure
- Planning and steering the Tasks mentioned in Chapter 2 and working closely with the local expert in conducting Tasks 1 - 7
- Regular reporting to GIZ in accordance with deadlines
- Preparation of the final comprehensive report and Policy Brief
- Organizing workshops, presentations on the progress of tasks and findings of the assignment.

Qualifications of the team leader

- Education/training (2.1.1): university degree (MSc/PhD) in energy/renewable energy, energy engineering or other related field
- Language (2.1.2): B2-level language proficiency in the English Language, C2 proficiency level in the Armenian language
- Specific professional experience (2.1.4): 5 years in the field of management for relevant renewable energy-related projects/measures in Armenia and/or the region
- Leadership/management experience (2.1.5): 2 years of management/leadership experience as a project team leader or a manager in a company
- Regional experience (2.1.6): regional experience (South Caucasus) in relevant projects is of high asset

Key expert 1 (Thermal Energy Specialist with an experience in energy engineering related to air heating systems and ventilation)

Tasks of key expert 1

The expert should coordinate closely with the Team Leader in carrying out the Tasks 1-7.

- Conduct research (including local and international experience) on solar air heaters (SAH) and their usability

- Select more suitable models of SAHs for further testing and improvement
- Develop a methodology of testing and organize series of tests, including improvements of the selected models
- Develop final drawings of tested and improved models of SAHs
- Conduct CBA (cost-benefit analysis) of SAHs with a focus on their applicability in the Armenian context

Qualifications of key expert 1

- Education/training (2.2.1): university degree (MSc/PhD) in energy/renewable energy, energy engineering or other related field
- Specific professional experience (2.2.4): 3 years of professional experience in the relevant sector in Armenia and/or the region 3 years of professional experience in the relevant sector in Armenia

Soft skills of team members

In addition to their specialized qualifications, the following qualifications are required of team members:

- Team skills
- Pro-activeness and initiative
- Communication and presentation skills
- Socio-cultural skills
- Efficient, partner- and client-focused working methods
- Interdisciplinary thinking

5. Costing requirements

Deliverables	**Price per unit (AMD)**	**Total price (AMD)**
Expert days (combined, up to 40 working days)		
Expert meetings (up to 2)		
Closing workshop (1)		

The Contractor shall assess the travel needs and list the expenses separately by daily allowance, accommodation, and other travel expenses.

6. Requirements on the format of the tender

The structure of the tender must correspond to the structure of the ToR. In particular, the detailed structure of the concept (Chapter 3) should be organised in accordance with the positively weighted criteria in the assessment grid (not with zero). The tender must be legible (font size 11 or larger) and clearly formulated. It must be drawn up in English (language).

The complete tender must not exceed 10 pages (excluding CVs).

The CVs of the personnel proposed in accordance with Chapter 4 of the ToRs must be submitted using the format specified in the terms and conditions for application. The CVs shall not exceed 4 pages each. They must clearly show the position and job the proposed person held in the reference project and for how long. The CVs can also be submitted in English (language).

Please calculate your financial tender based exactly on the parameters specified in Chapter 5 Quantitative requirements. The contractor is not contractually entitled to use up the days, trips, workshops or budgets in full. The number of days, trips and workshops and the budgets will be contractually agreed as maximum limits. The specifications for pricing are defined in the price schedule.