Renel

ENERGY
& POWER
ENGINEERING

Thessaloniki 18.05.2023

Request for Proposal:

«Machine learning for drone aerial power network inspection»

Estimated Value: 100.000,00 € (not including VAT)

[May 2023]

Contents

1   Company Short Description

Renel (Renel Energy and Power Engineering) is an SME located in the center of Thessaloniki, in Greece. Renel provides innovative, holistic solutions for energy and electromechanical projects and services. Emphasizing on the industrial, energy, building and research sector, Renel designs and implements cost effective proposals, improving business efficiency, increasing resilience and promoting business vision.

Renel provides design, construction and maintenance services for low and medium voltage electrical installations, RES and electromobility projects. Renel offers energy services with the aim to improve the energy efficiency of facilities and equipment. The company is committed to using environment friendly practices to combine efficient production with effective environmental protection. All the activities are conducted in a way that ensures the correct and efficient use of renewable and non-renewable natural resources. Compliance with applying legislation, continuous efforts to protect the environment and strive to improve environmental performance are an integral part of the personnel's daily activities.

2   ALTITUDE Short Description

ALTITUDE project aims to create an innovative product, for performing aerial network inspections automatically, using Unmanned Aerial Vehicles (UAVs - drones) and machine learning algorithms. More specifically, a suitable data collection protocol will be created for the use of UAVs in the inspection of the medium/high voltage (MV, HV) aerial network. Then, an online tool will be created, which will use high-resolution aerial photographs from UAVs and properly trained machine learning algorithms, to inspect and evaluate the network through automated processes. The tool that will be developed will depict (with the use of appropriate geo-visualizations) all the potentially dangerous spots of the network, assisting the user (such as HEDNO) in the optimal planning of maintenance works (actions regarding repair, prevention and prediction). The project involves the research and development of the smart, automated system that is described above. Pillars of the developed product will be the proper data acquisition protocol using UAVs, the aerial network inspection methodology protocol, the AI algorithm based on machine learning (which will be trained to identify specific problematic parts of the network, resulting in alarms/reports and proposing specific preventive or repairing actions), the communication protocol and the web platform (which will present the results).

ALTITUDE aims to support the creation of a next-generation electric network automatic inspection and monitoring system by combining UAS technology (Unmanned Aircraft System), 5G data transmission, and state-of-the-art machine learning algorithms. This proposal intends to give an impulse in using state-of-the-art technologies and algorithms with UAS high-resolution data to quantify and monitor the spatiotemporal distribution of potential deficiencies and dangers of the electric grid and various electric infrastructures. The UAS will be used to acquire very high-resolution optical and thermal data, by automatically executing specially designed flight patterns and following a concrete pipeline, that systematizes the drone data acquisition process for electric network monitoring and inspection. ALTITUDE will conceptualize all the best practices for applying state-of-the art deep learning and convolutional neural networks to automate the inspection, monitoring, and mapping of large-scale electric network assets and infrastructures by UAVs. The proposed approach has great potential to be applied for routine monitoring by regulatory bodies and all relevant stakeholders, not only to inaccessible locations or sensitive areas but to large-scale electric networks of a region or a country.

ALTITUDE system can become an affordable and versatile tool for inspecting, monitoring, and mapping large-scale electric network assets and infrastructures.

3   Description of Requested Services

3.1   Service Description

The contractor will assist Renel to implement the "Machine learning for drone aerial power network inspection" task. More specifically, an AI algorithm based on deep learning CNNs will be created to detect all power network problems. CNN's will be trained to identify specific problematic parts of the network resulting in predictions (future or existed network problems) that can be translated into repair actions.

To demonstrate the performance of the AI pipeline, the datasets of the flight campaign will be used to evaluate the deep learning models' generalization ability to a large new and unknown power line. The use of large unseen image set will showcase the geographical transferability of our approach to new and unknown power network.

3.2   Time plan

The deadline for the completion of this service is the end of Q4 2023. All relevant works and deliverables must be completed by April 2024 the latest.

4   Project Budget

The submitted quote cannot exceed 100,000 euro (VAT not included). Moreover, the repayment of the amount can be made in installments upon agreement with the subcontractor.

5   Selection Criteria

The selection criteria are the following:
- Company experience in similar Projects.
- Company know-how in machine learning.
- Cost

The received quotes/proposals will be evaluated within 2 weeks of the closing date.

Non-selected proposals can submit an appeal within 3 days from the time of notification of the evaluation result.

All quotes should be submitted electronically to: v.kotoula@renel.gr until 29/05/2023.

All questions or other inquiries concerning this quote should be addressed to the point of contact for this procurement who is Vicky Kotoula (v.kotoula@renel.gr, 2310528239).