COMPETITION RULES FOR THE ACQUISITION OF A SMART IRRIGATION SYSTEM FOR CUÑA VERDE PARK IN LA LATINA

I. GENERAL PROVISIONS

1. BACKGROUND AND PURPOSE

European citizens demand excellent digital public services. The Govtech4All European project, in which the Madrid City Council is a participant, brings together public administrations to adopt cutting-edge technological solutions from startups and other European administrations.

The Digital Office of the Madrid City Council has joined the Govtech4All project consortium and is participating in one of its three pilot programs. The objective of this initiative is to carry out pilot projects that test innovative public procurement processes by launching innovation challenges at a cross-border European level. To achieve this, a project competition model will be used to evaluate and select the most suitable solutions for piloting.

Specifically, this competition addresses an innovation challenge proposed by the General Directorate of Water and Green Areas Management, under the Department of Environment and Mobility. The goal is to pilot a smart irrigation system that enables remote control and dynamic adaptation of irrigation schedules based on environmental conditions, to be implemented in Cuña Verde Park in La Latina (Madrid).

Since the Universidad Politécnica de Madrid (UPM) and the Madrid City Council collaborate under an agreement that aims to research, experiment, and establish standards for the use of IoT and communications in smart cities, the procurement and supervision of this project competition will take place within the framework of this agreement. The initiative will be developed as part of the IoTMADLab, coordinated by the Centro de Domótica Integral (CeDInt) of UPM.

This project competition is part of the "Madrid, Digital Capital" Strategy of the Madrid City Council and its smart city objectives, which focus on designing Smart Urban Spaces with efficient services that dynamically adapt to the needs of citizens, such as irrigation and lighting in green areas. These Smart Urban Spaces contribute to the development of the City 5.0 concept—a citizen-centered city where services automatically adjust based on real-time sensor data, responding to people's needs.

2. OBJECTIVE OF THE PROJECT COMPETITION WITH JURY INTERVENTION

These rules establish the conditions governing the project competition, which will be decided through the intervention of a jury. The jury will select the winning proposal to address the challenge of supplying and installing a smart irrigation system for a specific area of Cuña Verde Park in La Latina (Madrid).

2.1. Summary of the Challenge

The Madrid City Council is responsible for maintaining the green areas of Cuña Verde Park in La Latina. Seven years ago, an irrigation system was implemented in the park, consisting of a set of electrovalves and wireless, battery-powered controllers that allowed remote control of each electrovalve. However, this system has not performed well, presenting various operational, interoperability, and connectivity issues. The challenge consists of replacing the current system with a smart irrigation system featuring a remote-control software capable of adapting irrigation schedules to water needs and monitoring its operation. The solution must comply with the technical specifications detailed in Annex 2 - REQUIREMENTS OF THE SMART IRRIGATION SYSTEM FOR CUÑA VERDE PARK IN LA LATINA, summarized below:

- The following physical components must be supplied:
    - Autonomous battery-powered controllers capable of wireless remote control both via proximity communication (Wi-Fi, Bluetooth, or similar) and through remote connectivity. The system must be able to manage the 68 existing electrovalves. Currently, there are 48 controllers that need to be replaced and installed in the designated enclosures, with the assistance of the park's maintenance technical team: 36 controllers managing a single station, 9 controllers managing two stations, 3 controllers managing four stations. An additional 5% of units must be supplied as spare parts.

    - At least three environmental IoT devices/soil moisture/temperature sensors, with one installed in a drip irrigation area, one in a sprinkler irrigation area, and one kept as a spare.
    - At least two flow meters to monitor water consumption and detect potential leak.
- The system must be managed from a mobile application or another Internet-connected device and allow for remote default scheduling of each electrovalve through a web interface. It must enable dynamic rule definitions, allowing the electrovalves to override default schedules based on environmental conditions (e.g. delaying or cancelling irrigation due to rain, excessive soil moisture, or forecasted heavy rainfall). Additionally, the system must monitor water flow, detect system malfunctions or failures, and generate alerts.

The challenge also includes solving the following sub-challenges:

- Energy Efficiency.

  The system must minimize energy consumption, particularly for electrovalve controllers and sensors, utilizing isolated renewable energy sources available in the park.

  One of the main issues in the current system is rapid battery depletion, requiring frequent replacements.

  The new system must provide battery status monitoring, issue early warnings for replacements, and prevent valves from remaining open due to low battery level

- Secure Communications.

  The communication system must include robust security mechanisms to prevent unauthorized access.

- Water Efficiency.

  The irrigation system must optimize water consumption by dynamically adjusting schedules based on sensor data and weather forecasts, compared to the default scheduling.

- Leak Detection.

  The system must detect water leaks, such as pipe breaks or excessive flow, by identifying flow rates that exceed normal operational ranges, provided that the difference is significant enough to be measured.

  Upon detecting a potential leak, the system must trigger an alarm and halt irrigation to minimize water loss.

- Rain Alert System:

  The management system must generate alerts when irrigation is postponed or interrupted due to forecasted rain or an approaching storm.

- Integration with Smart City Systems:

  The system must be compatible with the Home Assistant platform (provided by UPM and the Madrid City Council), enabling interaction with other smart city systems. This includes postponing irrigation upon detecting human presence through IoT presence sensors or activating lighting signals when irrigation starts using IoT-controlled lighting nodes.

2.2. Project Competition Procedure

The competition will be conducted with the participation of a jury composed of independent experts, who will evaluate proposals impartially, based solely on the documentation submitted anonymously and the criteria established in these rules.

Following the publication of these rules and the competition announcement, interested entities may submit their participation request, which must include: a responsible declaration confirming compliance with the eligibility requirements and a PROJECT PROPOSAL detailing the proposed

solution to the challenge.

The jury will evaluate and score each submission based on predefined criteria. If the jury unanimously determines that no satisfactory proposals have been submitted, the competition may be declared void.

The winning project will receive a financial award of up to €50,000 (excluding VAT) to develop and implement the selected solution.

The competition winner will enter a minor service contract with the Universidad Politécnica de Madrid (UPM). The competition and jury decision will serve as the selection mechanism for the most favorable offer under this contract.

If legal or financial impediments prevent the execution of the contract with the winning entity, the entity will not be entitled to any financial compensation for lost profit. In such a case, the contract will be offered to the next highest-ranked participant, following the competition's evaluation results, until the minor service contract is awarded.

3. CONTRACTING AUTHORITY

The contracting authority will be UPM-OTT. The minor contract will be processed by CeDInt-UPM, in accordance with UPM's current regulations for awarding minor service contracts funded by OTT projects.

Postal address: CEDINT-UPM Building, Montegancedo Campus, 28223 Pozuelo de Alarcón, Madrid, Spain

4. BUDGET, ESTIMATED VALUE, AND INVOICING

The maximum total contract amount awarded to the competition winner is €50,000 (excluding VAT), following this invoicing schedule:

- First payment: 25% of the awarded amount, upon completion of the first project milestone (deliverable with the formal project definition document and detailed planning).
- Intermediate payment: 50% of the awarded amount, upon installation of the irrigation system equipment in the park, ensuring effective daily remote programming of the irrigation elements described in the competition rules (excluding firmware and software adapted to the Madrid City Council's IoT architecture).
- Final payment: The remaining 25% of the awarded amount, upon validation of the proper functionality of the firmware and software adaptations to the Madrid City Council's IoT architecture for all components of the smart irrigation system.

Before applying for participation, interested entities may request clarifications regarding the interpretation of the competition conditions and related documentation. All inquiries must be submitted exclusively via email to: concursoparques@cedint.upm.es.

The deadline for submitting inquiries is 7 calendar days before the submission deadline for competition proposals.

CeDInt-UPM will respond to inquiries submitted within the appropriate timeframe via the same email channel, at least 5 calendar days before the submission deadline. Inquiries not submitted through this official channel will not be answered.

5. INCOMPATIBILITIES AND OBLIGATION TO REFRAIN FROM PARTICIPATION

The following individuals or entities are not eligible to participate in the competition:

- Jury members and their close relations, including immediate family members (first-degree relatives), spouses or partners in a similar affectionate cohabitation relationship, individuals with an ongoing professional relationship with a jury member.
- Companies or entities in which any of the above-mentioned individuals hold a stake or have a direct involvement.

II. DEVELOPMENT OF THE COMPETITION

6. SUBMISSION OF PARTICIPATION APPLICATIONS

The project competition will be announced on the IoTMADLab website (https://iotmadlab.es) where participants can access the competition rules and additional information. Once the announcement is published, the organizing entity will disseminate it broadly using all available channels.

All participation documents must be submitted electronically by email to concursoparques@cedint.upm.es. The submission deadline for participation requests is February 23, 2025.

All documents must be written in Spanish or English.

By submitting a proposal, participants agree not to disclose any part of it before the jury's decision to ensure anonymity and maintain the competition's objectivity. Failure to comply with this commitment will result in immediate disqualification.

Participants must not communicate with jury members regarding the competition. Proposals that violate these conditions will be excluded.

Submitting a participation request implies unconditional acceptance of all competition rules without exception or reservation.

Entities interested in participating must submit the following documents:

A- Participation Application:

Completed participation application form, including contact details of the company/organization/consortium submitting the proposal. The form must follow the model provided in Annex 1 of these rules.

B- Executive Summary of the Project:

The executive summary must include the following sections:

1. Detailed Description of the Solution:

- Technical and operational details of the proposed solution.
- System architecture, highlighting IoT technology integration and communication protocols used.
- Description of the proposed physical equipment, including estimated operational time for battery-powered autonomous devices before requiring replacement.
- Software description, including details on installation and autonomous maintenance on servers managed by the Madrid City Council.

2. Benefits:

- Explanation of how the solution addresses the specific challenges of the competition.
- Description of how knowledge transfer will be conducted so that Madrid City Council personnel can autonomously manage the system after the pilot phase.
- Operational efficiency in data collection and analysis.
- Potential energy and environmental savings.

3. Implementation Plan:

- Implementation details of the solution.
- Specific timelines for each project phase.
- Identification of required resources, both human and technological.
- Definition of key milestones for implementation evaluation.
- Adjustments and improvements expected during implementation

4. Long-Term Sustainability:

- Explanation of how the solution will integrate into existing infrastructure over time.
- Strategies for scalability and replicability in other urban areas.
- Maintenance and technology upgrade plans.
- Environmental impact analysis of the proposed solution.

5. Innovation of the Idea:

- Proprietary Technology Used: Detailed description of the innovative technologies or approaches in the solution. Explanation of how these elements differentiate the proposal from existing market alternatives.
- Competitive Advantages: Explanation of how the proprietary technology enhances security, efficiency, scalability, and adaptability to evolving public sector needs.
- Technology Readiness Level (TRL): Evaluation of the maturity level of the proposed solution.

6. Budget, Financial Resources, and Feasibility Plan:

- Detailed budget breakdown, including training costs for Madrid City Council personnel who will autonomously manage the system after the pilot phase, Estimated maintenance costs for future system improvements.
- Cost-benefit justification of the implementation.

7. Team Composition:

- Detailed description of the project team, including team member profiles and relevant experience (without including names or any identifying details to maintain anonymity).
- Experience in implementing similar solutions in public or private organizations.
- Demonstration of the team's capability to successfully implement the solution.

8. Risk Identification and Mitigation Strategies:

- Identification of potential risks during implementation.
- Mitigation strategies for each identified risk.

9. Public Sector Application and Scalability:

- Success Metrics:
    - Identification of Key Performance Indicators (KPIs) to evaluate the impact and effectiveness of the solution.
    - Establishment of quantitative and qualitative evaluation criteria for urban management improvements, operational efficiency, and citizen benefits.
    - Definition of success criteria for data collection, analysis, and service

customization.

10. Growth Potential:

- Scalability assessment to replicate the solution in other green areas of Madrid, demonstrating adaptability to different urban environments.
- Exploration of potential public-private partnerships to expand and sustain the solution over time.
- Evaluation of specific challenges and requirements for future expansion, with proposed solutions to address them.

7. EVALUATION CRITERIA

The following evaluation criteria will be used to assess the proposals:

Solution Architecture Evaluation (25%):

The technical and operational details of the proposed solution architecture will be assessed, considering integration and interoperability between different components. Priority will be given to telecommunications optimization, favoring solutions that reduce operating costs, simplify installation, optimize network usage, and require minimal maintenance, while ensuring system security.

Evaluation of Proposed Physical Devices (25%):

The proposed physical devices will be assessed, prioritizing autonomous devices with longer estimated operation times before battery replacement. Ease of configuration, both locally and remotely, will be evaluated. Security mechanisms to prevent fraudulent use or denial-of-service attacks will be considered. Preference will be given to open-architecture devices that allow interaction with non-proprietary software.

Evaluation of Proposed Software (25%):

The software must provide the required functionalities. Preference will be given to open-source solutions with no licensing costs, offering source code access to allow future modifications and maintenance. The ability to install the software on scalable cloud servers managed by the Madrid City Council will also be evaluated.

Solution Scalability Potential (25%):

The scalability of the solution will be analyzed to determine its ability to cover large green areas. Preference will be given to open, interoperable solutions that provide a better cost-benefit ratio and enable the integration of devices from different manufacturers.

8. JURY

8.1. Composition

The evaluation of submitted proposals will be carried out by an independent jury.

The jury will be composed of individuals who are independent of the participants in the project competition.

Jury selection will adhere to principles of professionalism, expertise, impartiality, and independence. Each jury member must sign a Declaration of Absence of Conflict of Interest.

The jury will make decisions independently, following the evaluation criteria outlined in these rules.

The jury will consist of experts in public sector technology and innovation, specifically in municipal service management technologies.

Jury Composition:

- President:

- An expert in public technology and innovation from CeDInt-UPM.

- Members:
  - A representative from the Subdirectorate General for Green Area and Tree Conservation of the Madrid City Council.
  - A representative from the General Directorate of the Digital Office of the Madrid City Council.
- Secretary:
  - A CeDInt-UPM staff member, who will participate in meetings without voting rights.

The jury members' names will be published on the IoTMADLab website in advance to allow potential challenges to their selection.

Before the jury is officially constituted, its members will declare the absence of incompatibilities. If any conflicts of interest arise, the affected member must resign, and a replacement will be appointed following the same declaration procedure.

8.2. Jury Proceedings

(i) Proposal Review and Evaluation.

The jury will conduct a private session to review and evaluate the submitted project proposals. The proposal opening will not be public.

The evaluation will follow the criteria established in these competition rules.

An official report will be prepared, documenting the evaluation process and listing the attendees.

(ii) Award Recommendation

The jury will issue a ruling, proposing the selection of a winner. Proposals will be ranked based on their scores. If no proposal is deemed satisfactory, the jury may declare the competition void.

(iii) Final Ranking Announcement

The jury will publish the final decision, including the winning proposal and the ranked list of all participants.

9. AWARDING, CONTRACT RESOLUTION, AND NOTIFICATIONN

Based on the jury's decision, CeDInt-UPM will proceed with the contracting process for the winning company.

CeDInt-UPM reserves the right to cancel the contracting process for justified reasons, without entitlement to any compensation for participants.

ANNEX 1 – PARTICIPATION APPLICATION

PARTICIPANT INFORMATION:

Contracting entity (name): ……

National tax identification number or VAT number (if applicable): ……

Postal address: ……

Contact person(s): .....

Contact phone number: .....

Email address: .....

Website (if applicable): ……

RESPONSIBLE DECLARATION:

I, Mr./Ms. ……, holder of National Identity Document No. ……, acting on behalf of the company ....., with National Tax Identification Number or VAT Number (if applicable): ……, in my capacity as …… of said company, having read the announcement published in …….. on ……, and being fully aware of the conditions, requirements, and obligations necessary to participate in the "PROJECT COMPETITION FOR THE ACQUISITION OF A SMART IRRIGATION SYSTEM FOR CUÑA VERDE PARK IN LA LATINA",

I DECLARE UNDER MY RESPONSIBILITY THAT:

- The signatory represents the company submitting the offer, holds the necessary authorizations to carry out its activities, and is not subject to any disqualification or incompatibility for contracting.
- The submitted proposal complies with all the provisions outlined in the competition rules, which are accepted fully and unconditionally, assuming all rights and obligations derived from them.
- The company has not participated in the drafting of the competition rules and has not provided advisory services to the Madrid City Council or CeDInt-UPM during their preparation.