

**ATTACHMENT 17**

**ENERGY MANAGEMENT SYSTEM**

## **I. CONCESSION GRANTOR'S REQUIREMENTS REGARDING THE ENERGY MANAGEMENT SYSTEM**

Energy management is a set of services that include:

- analysis of energy consumption and the associated energy supply costs
- assessment of potential energy savings and the associated energy supply costs
- identifying the measures to achieve these savings and assessment of their feasibility
- implementing the right set of measures to achieve these savings
- monitoring of energy consumption and the associated energy costs, analysis, comparing the achieved results with the expected ones
- taking actions in case of negative deviations.

The concession grantor has obtained some information about the facilities. The information gathered includes a basic analysis of energy consumption, the associated energy supply costs, and an assessment of potential energy saving measures.

### **DOCUMENTATION**

Upon implementation of the system, the concessionaire shall provide the concession grantor with a complete documentation for all components. The concessionaire shall regularly maintain this documentation. In case of changes or supplements, the concessionaire shall submit the latest version of the complete system documentation to the concession grantor.

Components of the energy management system:

- processes
- metering devices
- supporting information system
- information of public interest – OData
- interoperability
- the protocol of connecting other concessionaires
- control system of other concessionaires

### **PROCESSES**

With the energy management system, the concessionaire has to establish a process of continuous monitoring of energy consumption and the associated energy supply costs, analysis of data and propose a course of action in case of negative deviations.

Process activities and execution functions must be transparently documented in order to ensure that the concession grantor has a guaranteed and sufficient amount of information for planning the acquisition before the end of the contract.

### **METERING DEVICES**

Due to the fact that some facilities don't have metering devices for measuring the energy consumption for heating, the concessionaire has to establish, in agreement with the concession grantor, a system for measuring consumption.

This also includes the installation of necessary metering devices in the facility. The analysis of metering instruments must take into account all known and potential information-security risks for the specific metering device and the impact of possible abuse on the integrity of the building.

The concessionaire shall maintain a list of metering devices in conjunction with the buildings and the location of installation. The list of metering devices must be approved by the concession grantor. For each metering device, the concessionaire must provide the documentation about the installation and the scheduled maintenance plan.

## **SUPPORTING INFORMATION SYSTEM**

The aim is to establish a supporting central information system that will allow various third party management systems access to the same database, specifically by using common interoperable services and common policies for ensuring full confidentiality, integrity, and availability.

At the end of the contract period, the City of Ljubljana shall assume ownership and management responsibilities of the supporting information system.

With the intent of lowering the costs of the acquisition, the concessionaire must obtain the consent of the concession grantor at the planning stage, when the concessionaire is choosing the technology for back-end systems, user interfaces, and other system components.

The concessionaire shall comply with the provisions of the “Ordinance on Security Policy of the City of Ljubljana” for the development and management of the system, and obtain the consent of the concession grantor on the security suitability of the proposed solution.

In the period of the concession contract of the supporting information system, the concessionaire must adapt its technological solution to the technical standards adopted by the concession grantor. The concession grantor must inform the concessionaire about changes as soon as possible. The changes must be implemented within a one-year period after their announcement. The concessionaire must ensure full harmonisation 6 months before the expiration date of the contract. The concessionaire shall, before the expiration of the contractual period, carry out a transfer of elements of the information system to the IT environment specified by the concession grantor.

The concessionaire must implement the supporting information system in a system environment that ensures a 24/7 operation. The support system also has to provide a 24/7 operation.

The concessionaire must provide all the necessary information-security technical documentation for the supporting information system. The necessary documentation shall contain at least the following elements:

- technological parameters of back-end system and user interfaces
- process model
- data model
- logical scheme
- physical scheme
- specifications of operational procedures for security backups and ensuring business continuity
- description of the maintenance activities

- user manual
- instructions for connecting other concessionaires

### **EXPECTED FUNCTIONALITY**

The supporting information system used to monitor the energy consumption and the associated costs must be able to do so on a certain time basis, which shall be defined later on. The concessionaire is responsible for entering the necessary data. It must enable continuous on-line access to information to The City of Ljubljana (MOL).

The concession grantor will determine the users and their rights in regards to reviewing the data. The concessionaire is obligated to carry out an education/training that will provide the necessary know-how for the concession grantor to review and analyse the data, as well as the ability to generate reports. The education/training must be carried out at the beginning of the service. The concession grantor may also determine which analyses and reports the concessionaire will have to deliver to specified persons on a monthly basis.

The concessionaire is, on an annual basis, obligated to present the results of the analyses made on the basis of the energy accounting and the impact of measures under this contract. The concessionaire will carry out the presentation no later than three months after the end of each accounting period for each facility separately.

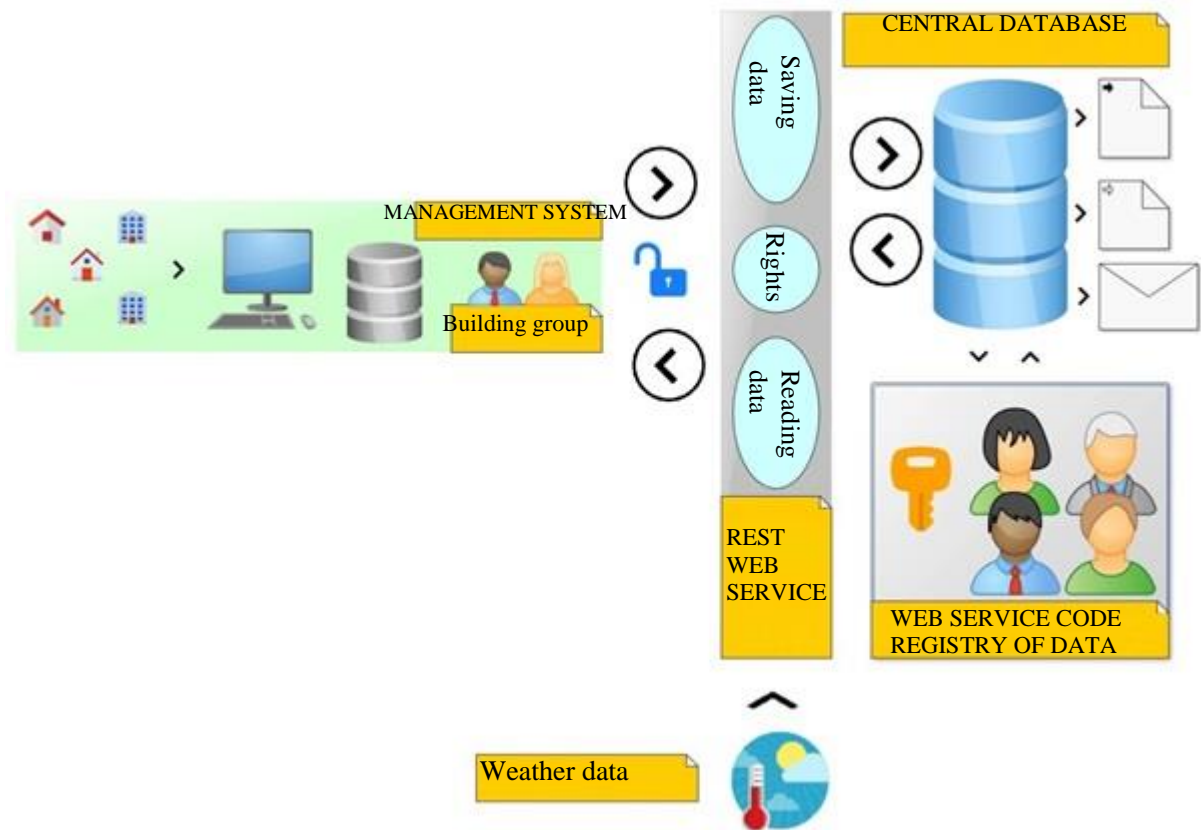
The concessionaire is obligated to submit the full data export from the relational database to meet the needs for additional backups in the IT environment of the City of Ljubljana. The concessionaire must do so at least once a year, or as many times as agreed upon. The concessionaire must ensure all necessary measures and procedures in the production environment in order to achieve the appropriate level of security of the information system according to current standards, with special emphasis on **confidentiality, integrity, and availability** of data/information.

A central database for monitoring the results of the implemented measures is to be established by the concessionaire. Data from the metering devices of the facilities owned by the concession grantor will be submitted to the central database. RDBMS (Related DataBase Management System) technology is chosen according to prior coordination with the concession grantor. The data is stored in one place in a uniform, normalised format, independently from the selected technology of the concessionaire, which offers the service of monitoring/metering. The tables in the database must be properly normalised, and the data must be classified with a corresponding code register.

Via a single central database, the concessionaire shall provide data, in an uniform way, for use in other software and systems within the organisation, as well as data in the field of public interest (using OData standard) that is determined in coordination with the concession grantor.

The concession grantor will appoint a person who will manage the contents of the database or at least the code register in order to adequately define the code register. The rules for defining the code register shall be defined in advance. The code register shall support the expansion of the base without changing its structure, in case new or additional metering devices have to be added. The concession

grantor will determine the maximum metering interval (min. 15 min) in which measurements have to be recorded. The measurements shall include status information (OK, Error, etc.).



Each bidder provides its own method of monitoring and management of buildings in accordance with the tender conditions.

The manager of the selected reference system (Reference group of buildings) provides for the development of a REST web service, which will allow read and write access to the central database. The web service must be accessible and protected appropriately.

The manager of the Reference group of buildings prepares a complete concept, implementation, licensing, and long-term management of the support system, in accordance with the code of conduct of the profession. The manager of the Reference group of buildings handles the rules for the inclusion of other concessionaires (groups of buildings – additional buildings) into the common support system and authorisations for independent use for other concessionaires (groups of buildings – additional buildings).

The manager prepares the code register (defines the rules of the code register), which allows unique identification of all data within the database. The code register must allow grouping of data by projects, buildings, devices, type of data (all outside temperatures, all meter states, etc.), locations, areas, etc. The code register must be defined in such a way that it allows additions of new data for existing or new buildings. The manager of a group of buildings shall provide the concession grantor a graphical interface, which is accessible for viewing and editing the code register. The manager shall

set the code register's usage rules for other managers of groups of buildings (groups of buildings – additional buildings).

The manager shall ensure that the concession grantor can assign the usage rights for the REST web service (read and write access) through the same graphical interface. The rights have to be implemented in such a way that a user can easily assign access to the data for various buildings regardless of the source or the group that the specific building belongs to. The procedure for assigning rights has to be flexible to the extent that the concession grantor can assign or revoke read access to the level of a single data. The manager of the Reference group of buildings also defines the rules for the use of the access control list for other managers of groups of buildings.

The manager of the Reference group of buildings shall, in writing, define the rules for data collection, establish protocols, and give detailed instructions for the exchange of information for other managers of groups of buildings. The manager of the Reference group of buildings shall provide the other managers of groups of buildings with an example (source code) for accessing the REST web service. In addition to the source code, the manager of the Reference group of buildings shall also provide a testing software tool with demo access, for testing the REST web service and all its functions.

The manager of the Reference group of buildings shall, together with the concession grantor, provide all stakeholders with different user names, which are used to grant or revoke web service usage and data access rights.

The manager of the Reference group of buildings shall grant other managers access to the last version of the code register via a web service, because every manager sees only the records to which they have access rights.

The manager of the Reference group of buildings shall provide free-of-charge use of the REST web service to other managers.

The manager of the Reference group of buildings shall ensure transfer of weather data, for the location of Ljubljana, to the central database. The weather data shall be offered free-of-charge to other managers via the REST service.

Managers of all groups of buildings are required to regularly upload the recorded data to the central database in accordance with the instructions and requirements of the concession grantor. They shall also transfer the relevant code register (for their own data) in accordance with the rules of the central code register, which shall be submitted after the implementation and completion of the central database.

### **INFORMATION OF PUBLIC INTEREST – ODATA**

Via the uniform central database, the concessionaire will offer information, in the OData standard format, for public use in data sets, which are approved by the concession grantor in advance. The implementation in the form of web services is recommended. The concessionaire and the concession grantor shall clearly define the usage restrictions of public information in specific data sets.

## **INTEROPERABILITY**

All data exchanges listed in the system architecture must be properly regulated and documented.

XML format and the corresponding XML schema shall be used. The implementation in the form of web services is recommended. Specifications shall ensure an uninterrupted exchange of data for all participants.

## **THE PROTOCOL OF CONNECTING OTHER CONCESSIONAIRES**

The system shall be designed in such a way that it allows free use of the system to third party concessionaires authorised by the concession grantor, with all the functionalities and within the defined rules.

For the purposes of ensuring the integrity of the system, the concessionaire defines the conditions of access and recommended use.

## **CONTROL SYSTEM OF OTHER CONCESSIONAIRES**

The concession grantor must be familiar with the functionality of the control systems used by energy management concessionaires for individual groups of buildings.

This specifically applies to the active management field, which is at risk of intrusion or abuse due to technological deficiencies – SCADA systems and other systems of active and automatic control.