

D.T.2.2.1 “METHODOLOGY FOR NORMALIZED ENERGY PERFORMANCE OF THE SCHOOLS”

GUIDELINES FOR SEG’S

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1. ABSTRACT

The following document contains technical specifications and practices for collecting and submitting E @ S project data. The collaboration of all the schools involved in the project is indispensable and valuable, in particular the active participation of JEGs, the monitoring of electrical and thermal consumption and, the presence of students or school staff's members within the identified spaces, as a result of the installation of sensors in the various classrooms and work places.

The JEGs will then have to submit weekly, all data generated and organized in a standard table, to the UNIBO research group that is member of the Joint NOC through the activity of the Local NOC. UNIBO will engage in the collection, re-elaboration and analysis of the same, in order to identify a consumption profile and subsequently sustainable behavior for each school identified by a performance score.

Implementing an action plan for improving energy efficiency should be guaranteed using information collected during the tracking and monitoring process described in this document. The ultimate purpose of this document is to re-elaborate such monitoring data for computer software programming, which will also be available via smartphones, allowing the development of E @ S game and the final competition between the schools.

2. ESTABLISH AND MAINTAIN TRACKING SYSTEM

Electricity and gas consumptions provide a variety of information that can assist schools to understand their energy usage and thus their energy efficiency programs.

To implement an action plan of the school is necessary to develop a tracking system and use it to continuously track and monitor energy use data, which is critical for evaluating program progress.

Maintaining an effective centralized tracking system involves the following actions:

- Perform regular up-dates - data can be collected and incorporated into tracking system at regular intervals.
- Conduct periodic reviews - periodic reviews of progress made toward meeting interim goals and milestones can help ensure an energy program will meet its ultimate performance goals based on the energy action plans by Senior and Junior Energy Guardians.
- Identify necessary corrective actions - Periodic reviews can also identify corrective actions the Energy Guardians can take before the formal evaluation of the action plans.

To compare the performance of the portfolio of the different schools, involved in the Energy@School project, at the time of energy audit to determine whether they have met their wide energy goals previewed in the different action plans, it is necessary to ensure third-party verification of savings data so that intended energy performance is actually achieved. The pilots of the Energy@School project will obtain a third-party verification from the Joint NOC by the activities of the E @ S game.



Energy@School game is a tool to compare a performance score of energy efficiency to the baseline performance score. Once the Energy Guardians have determined the results, they can use this information to evaluate the effectiveness of the action plans both of the Senior and Junior. On the bases, if the results indicate the school does not reach its goal, the Energy Guardians can use this information to revise the action plan and then to gain performance score in the Energy@School game.

On the other side, if the results indicate the school reaches its goal, the Energy Guardians can consider setting higher goals revising both the Senior and Junior action plans for achieving positive performance score in the Energy@School game.

3. DATA COLLECTION SPECIFICATIONS

Electricity and gas consumptions provide a variety of information if they are periodically collected that can assist schools to understand their energy usage during the working days.

In order to collect the data of the energy usage, the schools, involved in the Energy@School project, have installed online systems or devices to monitor daily electricity and thermal consumptions.

In order to evaluate the waste energy, it is necessary to introduce two more indicators such as the presence of persons into the school and the indoor temperature; in fact, the energy consumption is directly connected to the presence of student or staff school into the building while the temperature is a simple well-being indicator.

On the basis, the Joint NOC can evaluate the energy performance of each school developing a performance score, if the following types of measurements will be periodically sent at the joint unit:

- > electrical consumption (kWh);
- > thermal consumption (kWh)
- > presence of persons (0 = no, 1 = yes)
- > Temperature (° C)

The installed smart meter in each school takes electricity and gas data at regular intervals or switchboard and displays the data via online portal or display device.

Daily monitoring allows schools to immediately measure the results of energy efficiency programs, putting in evidence any unexpected increases in electricity o gas use.

However, the data from the smart meter are not generally open data and thus it is difficult takes directly the data from each device to be sent via online portal to the control cabin at UNIBO. Furthermore, specific sensors to be interconnected online do not generally recover the indicators of the presence of people into the rooms as well as of the temperature into the working places and then they have to be collected by a manual procedure.



All the smart meters installed will be easy to use both for the SEG 's and for the JEG' s, will allow an immediate reading of the consumption data, by detecting the numeric value on the sensor display. All smart meters, must provide the consumption data in kWh and gas, in kWh or m3. For the detection of the required data, relating to the presence and temperature in a given classroom at a certain time, the JEG 's will have to provide a manual relief, by filling the paper tables, following an inspection and equipped with a classic thermometer.

The surveys must be carried out every day, during three different time slots: 1- beginning of the school day; 2- half day school; 3- on the way out of the school. Since a real time connection of the devices is not possible, every school weekend, the JEG 's, will have to provide for sending the completed templates of all the required consumption data. The precious attention paid to this exercise, both by the Senior and the Junior, will allow the team of the University of Bologna to reprocess all the collected data sets obtaining simplified elaborations able to represent consumption trends with respect to the historical series of consumption.

On the basis, the smart meters and sensors must have this principle characteristics in order to permit the activity for the manual collection of the data from the four different measurements will be collected by the Junior Energy Guardians who have to be encouraged to collect and store data and track changes over time. This manual activity will be described in the document D.T4.3.2 Training exercise to develop JEGs skills of reducing energy consumption in every day life style.

Smart meter for the collection of electrical and gas and/or thermal energy data - the smart meter should make an up-date each one hour and the data should be reported on a digital display to be easily checked-out by the Junior Energy Guardians. The data to be collected and transformed in kWh when reported with different unit of measurement in a specific template.

Presence of people in rooms - this data collection should be organized with a manual reporting using presence or not presence of persons during the working time into the school. The presence of people will be periodically checked by the Junior Energy Guardians and reported in a specific template. Energy Guardians have to choose the classrooms to be checked on the basis of the results obtained by the training exercise from January 2018 to April 2018.

Temperature in the working classroom - this data collection should be organized with a manual reporting using digital thermometer or a fixed one during the working time into the school. Temperature will be periodically checked by the Junior Energy Guardians and reported in a specific template. Energy Guardians have to choose the classrooms to be checked on the basis of the results obtained by the training exercise from January 2018 to April 2018.

The training exercise will permit to normalize a method to collect the data using different smart meter and in the absence of electronic sensors for the presence of people and for the temperature.