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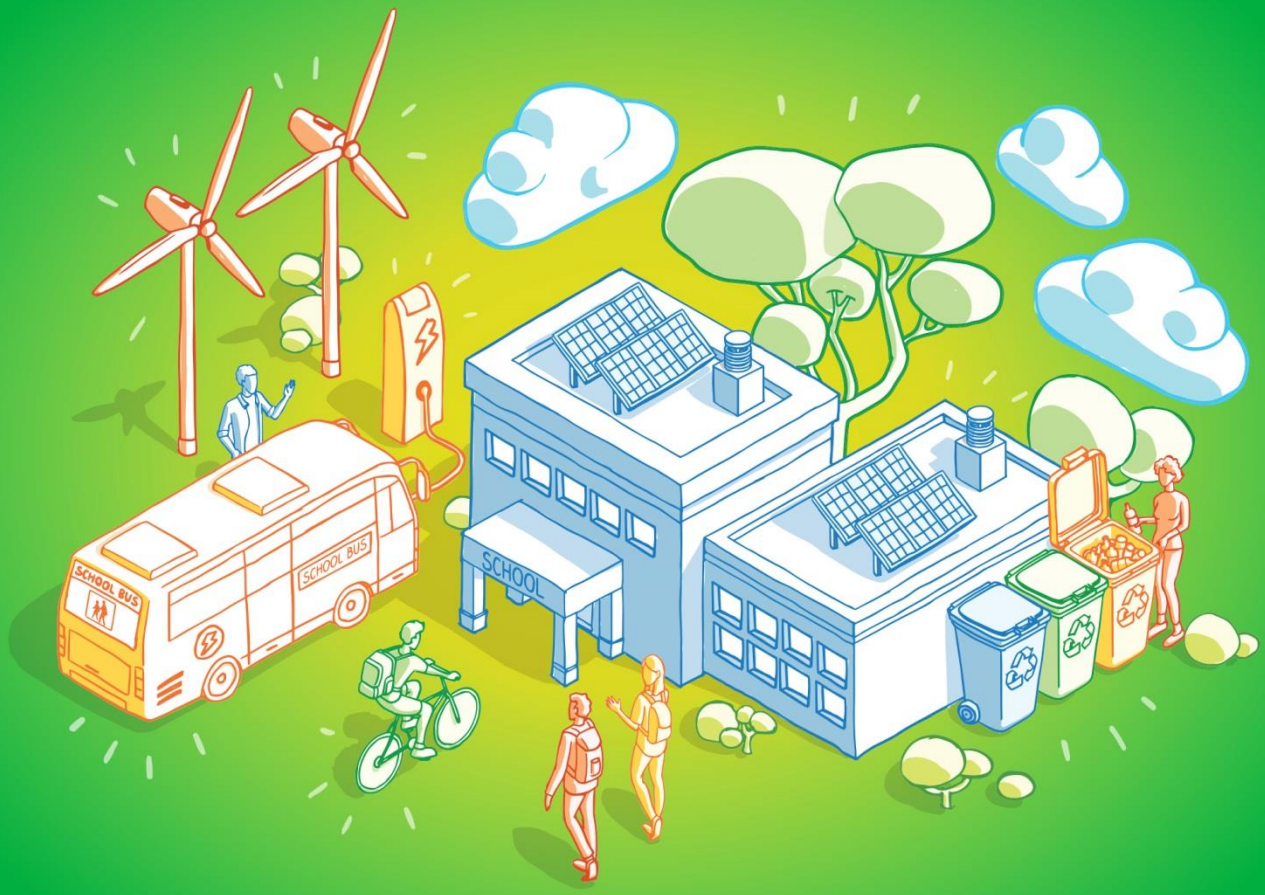

CLIMACT - ACTING FOR THE TRANSITION TO A LOW CARBON ECONOMY IN SCHOOLS – DEVELOPMENT OF SUPPORT TOOLS

Decision Support Tool Manual

June 2019

WWW.CLIMACT.NET

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Executive Summary

The purpose of the Decision Support Tool (DST) user manual is to briefly explain the features of the tool. This document was developed in the context of WP2 — Development of tools to support the transition to a low-carbon economy in schools.

As the goal of this tool is to support the transition to a low-carbon economy in schools, the coordinator of the school will be able to consult the building's instantaneous energy consumption (or zones — if it has the respective sensors) and means of the same, also details of classroom comfort (such as temperature and relative humidity), performance indicators (KPIs), behavioural questionnaire results, life cycle analysis (LCA), and a cost-benefit model for improvement measures that can be implemented at school. The analysis of possible scenarios, improvement measures, will allow the user to discover the solutions that best fit their school.

1 Introduction

The DST condenses the data from the different schools of the project so as to present them in a simple and focused way — to support the decision to reduce the CO_2 footprint of schools. Through these values, the model compares the schools with the objective of classifying them in order to identify the most efficient. These data are also presented on this platform — figure 1.

You should access the platform via the address: ***http://217.78.2.191***

Figure 1 - DST home page.

2 Main Dashboard

The main page displays:

- User name: figure 2— here it is also possible to access user details (name, password, etc.)

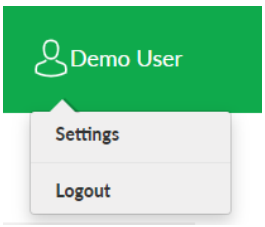
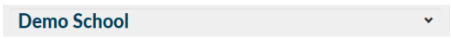
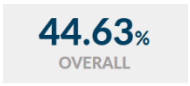


Figure 2 - User details.

- School name: 

- Overall score of the school relative to other: 

- Scores of Indoor Air Quality (IAQ), ventilation and comfort:

- Key Performance Indicators (KPI) of each sector and respective score:

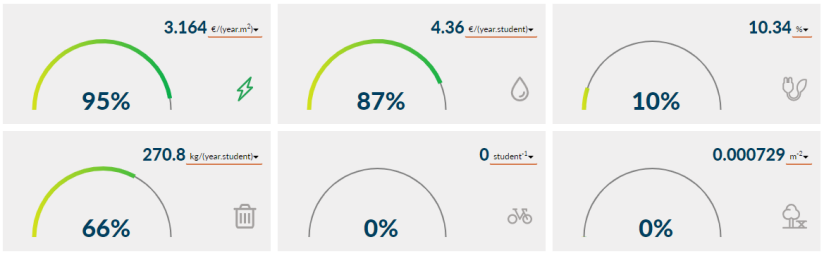


Figure 3 - KPI and individual scores for each sector.

To know what KPI is presented just place the cursor on the value and details on this are presented — figure 4.

Figure 4 - KPI details.

You can check the different KPIs in the main view, for this you need to click on the sector indicator and select the desired one — figure 5.

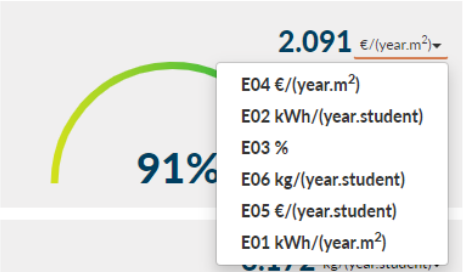


Figure 5 - Selection of KPI/score to show.

Details of the sectors can be consulted by placing the cursor on the respective icon (figure 6), there are also two sectors with more information (energy and indoor air quality) where the icon is in another color (green — figure 1).

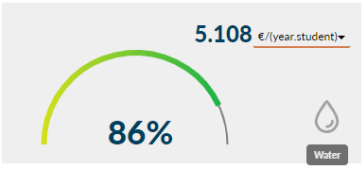


Figure 6 - Sector details.

The following are the details of the IAQ and Energy.

3 IAQ – Indoor Air Quality

When selecting the detailed view of the IAQ, the diagram of figure 7 is shown.

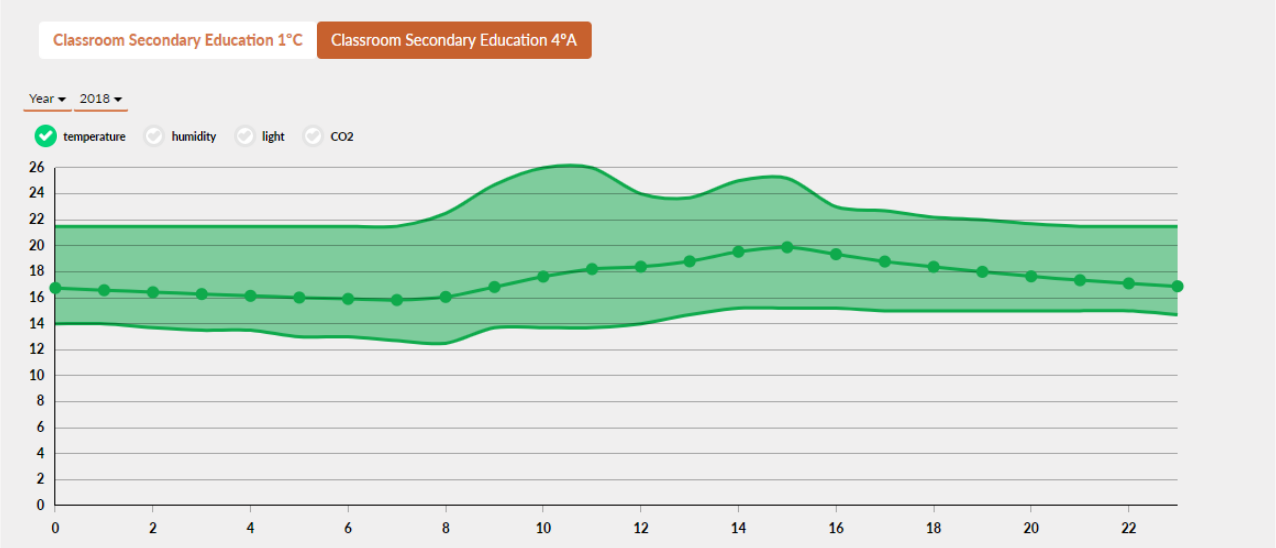


Figure 7 - Data collected in classrooms by air quality and comfort sensors.

In this view are the different sensors associated with air quality (CO_2) and comfort (temperature, relative humidity and luminance) that can be installed in the different classrooms of the school.

In this view you can select the desired zone, then the time period to be displayed, which can be a month, year or any other period defined by start and end date (average of the day) — figure 8.

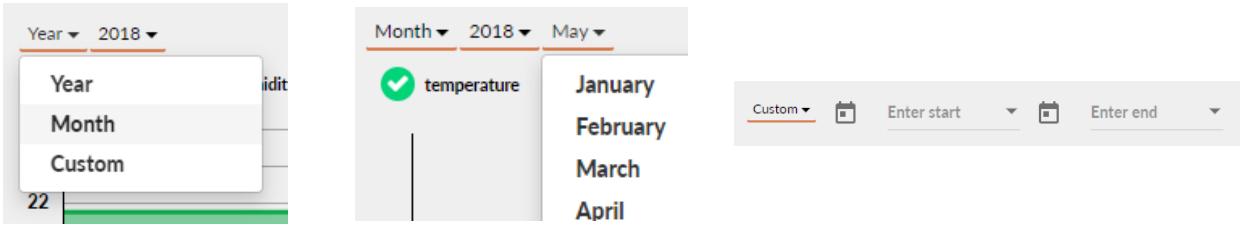
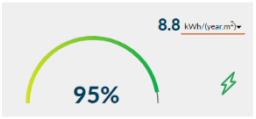


Figure 8 - Display of the different periods to select.

According to the selected sensor, the measured average, maximum and minimum values are displayed for the time period being analysed.

4 Energy



When selecting the detailed view of Energy is presented the diagram of figure 9.

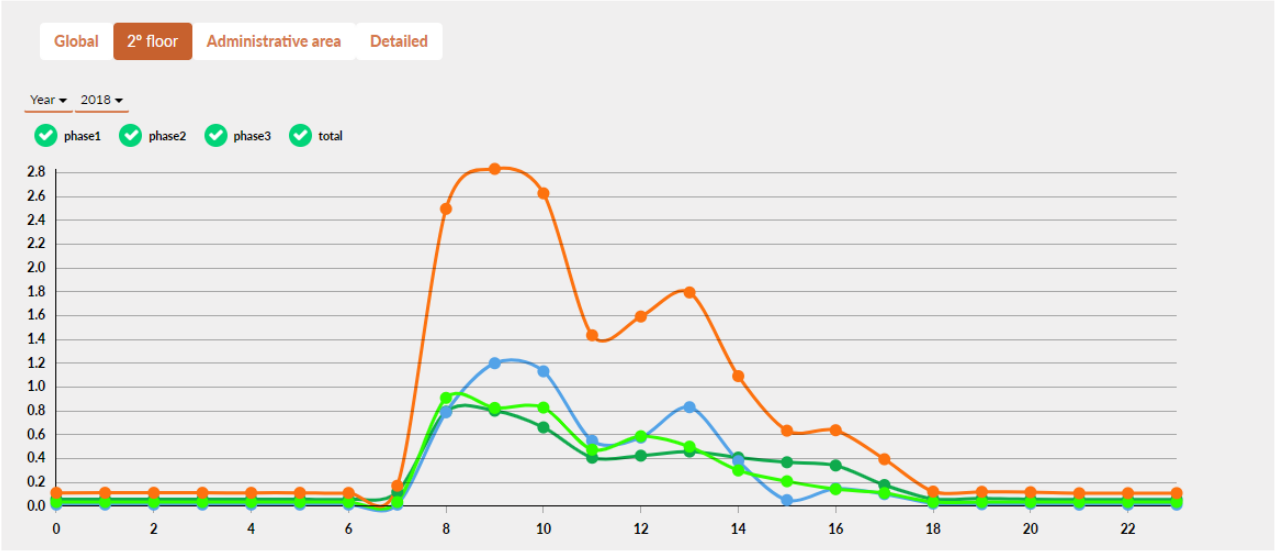


Figure 9 - Measurement of energy consumption.

In this view the different sensors installed by zones appear, and when applicable, the different phases measured.

In this view it is possible to select the desired zone, then the time period to be displayed, following the same steps presented in the previous chapter (figure 8).

If only one phase is selected, the measured average, maximum and minimum values are displayed — figure 10. With the cursor, when placing over an hour you can check the details of it. If several are selected (figure 9) only the mean values of the various phases will be displayed.

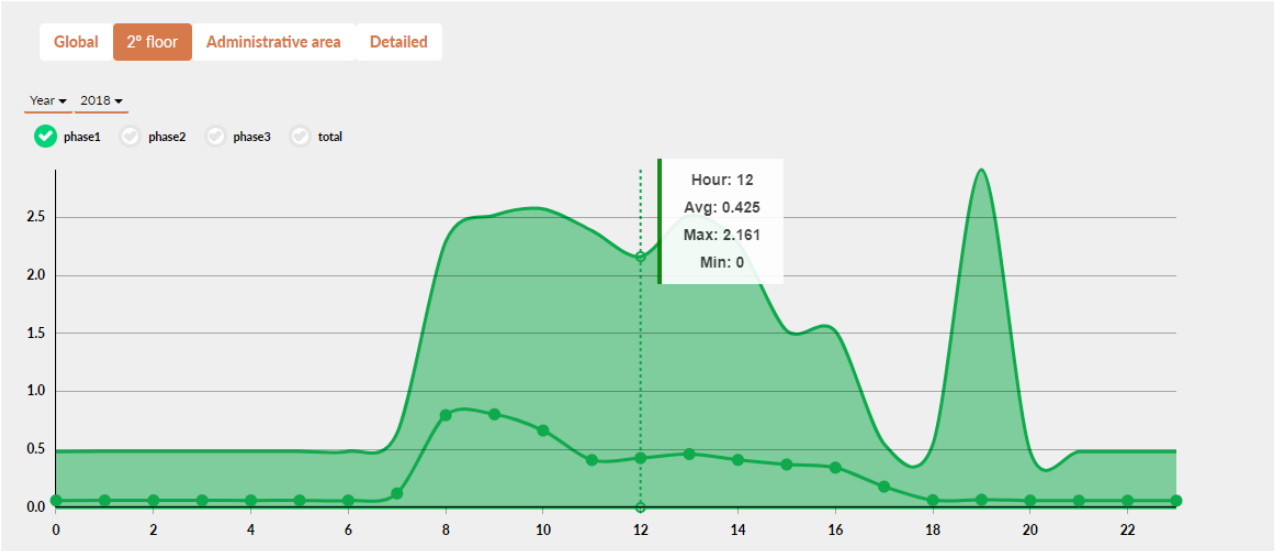
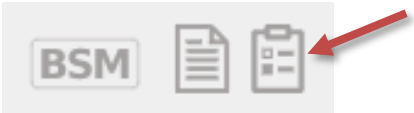


Figure 10 - Detailed data of a phase.

5 Surveys



Surveys can be accessed from the home page by selecting the corresponding icon. It is through this functionality that the user can change / add / remove information regarding the school under analysis.

The list of questionnaires is presented according to a color code, where red represents questionnaires that have never been answered, yellow ones that have been filled for more than a year and green ones that have data updated in the last year —figure 11.

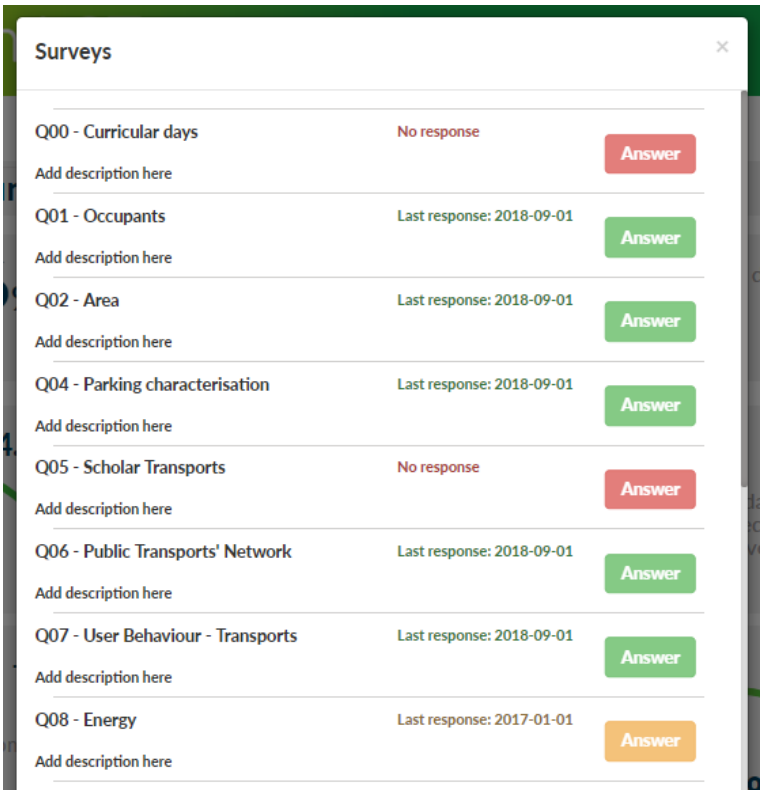


Figure 11 - List of different questionnaires.

The questionnaires are in table format where the user must fill in the missing data.

The list of all the questionnaires and a brief summary of them are shown in table 1.

Table 1 — List of surveys.

ID	Designation	Summary
Q00	Curricular Days	Indication of the average number of lessons per year
Q01	Occupants	Listing of the number of occupants by type, ie students, administrative, auxiliary, other
Q02	Area	Listing of the area of the different school spaces
Q03	Building characterization	Building information
Q04	Parking characterization	Number of parking spaces by type of vehicle
Q05	Scholar Transports	List of routes carried out by the vehicles of the school for transportation of the students (when they exist)
Q06	Public Transports' Network	List of types of public transport in the vicinity of the school
Q07	User Behavior – Transports	Summary of the behavioural questionnaire concerning the transport used for the school to the students

ID	Designation	Summary
Q08	Energy	Summary of the average annual consumption and costs of energy associated with the school (be it electricity, gas, diesel, others)
Q09	Water	Annual water consumption and cost
Q10	Heating systems	List of the ambient heating equipment used in the school, as well as the efficiency of the same and the average annual energy consumption
Q11	Hot water	List of sanitary water heating equipment used in school, as well as the efficiency of the same
Q12	Cooling systems	List of ambient cooling equipment used at school, as well as its efficiency and average annual energy consumption
Q13	Ventilation	Indication of the type of ventilation of the building, as well as the period of operation
Q14	Lighting systems	Listing of light fixtures types in the building
Q15	Green spaces	Listing of all products, such as water, energy, compost and pesticides, used in gardening as well as the list of existing plant types
Q16	Cleaning and maintenance	List of products and equipment used for school cleaning and maintenance
Q17	Food service	Amount of food purchased for school, as well as quantities of different distributors and equipment used for its preparation
Q18	Waste	Amount of waste produced, reused and recycled
Q19	ACTST	Listing of materials and equipment used by students per year, namely books, pencils and other
Q20	Laboratory	Materials, products and equipments used in the laboratories
Q21	Gym	Equipment and materials used in the gym
Q22	Library	Number of CDs, DVDs, books, and supplies purchased annually by the library
Q23	ACTADM	Consumables purchased annually for school
Q24	Excursions	List of transports for the different excursions / field trips carried out by the schools
Q25	Equipment efficiency	List of equipment by efficiency

6 Reports

The *Reports* feature allows you to consult the results of the analysis of the performance indicators, as well as the life cycle analysis report.

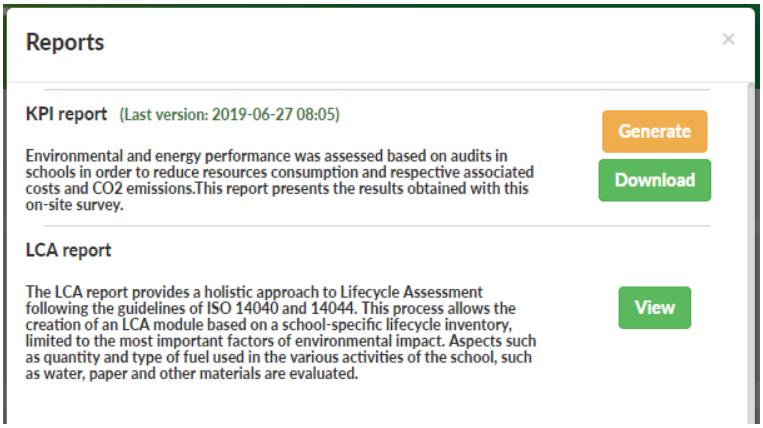


Figure 12 - Reports made available by the DST.

6.1 KPI Report

The KPI report presents the results obtained in the different audits carried out to the schools, with the purpose of reducing the consumption of resources, costs and carbon footprint. This report also uses the data entered in the different questionnaires of the tool (table 1).

Associated with this report there are two actions: *Generate* and *Download*. If your school data has changed, you are advised to *Generate* a new report in order to download the most current report. If you want to download the latest version just select *Download*. When you download, a pdf file with the summary of the school's KPI and scores is made available — figure 13.

Figure 13 - Cover of the KPI generated report.

6.2 LCA Report

The LCA report provides a holistic approach to Life Cycle Assessment following the guidelines of ISO 14040 and 14044. This process allows for the creation of an LCA module based on a school-specific life cycle inventory, limited to the most important environmental impact factors. Aspects such as the quantity and type of fuel used in the various activities of the school, water, paper and other materials are evaluated.

The report is generated in a bar graph format by dividing the impact of the school's operating activities, educational activities and transportation/mobility into different forms of environmental impact — figure 14.

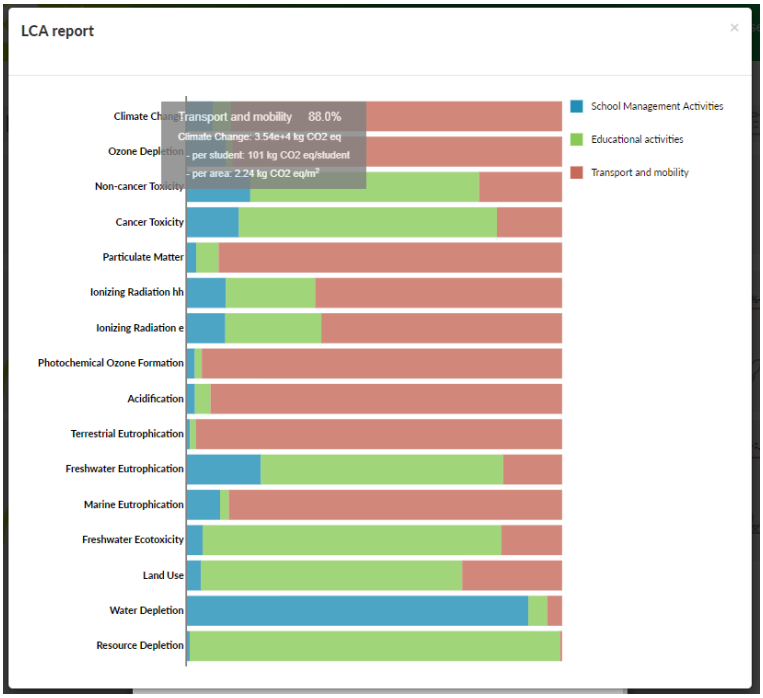


Figure 14 - Baseline report of the LCA analysis.

You can check the details of each subsystem by selecting the same — figure 15.

Figure 15 - Detailed LCA analysis report – by subsystem.

7 BSM and CBA

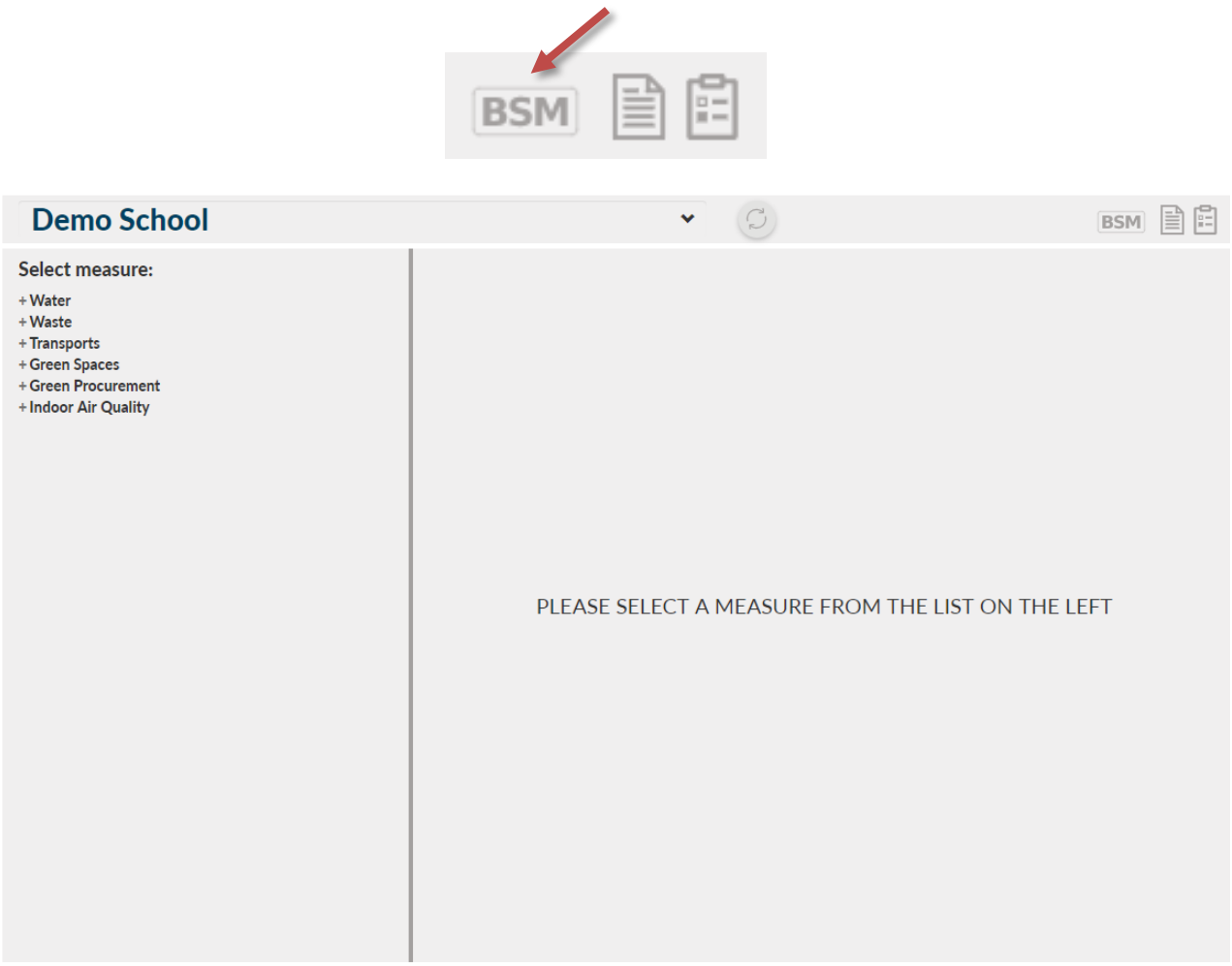


Figure 16 – BSM main page.

7.1 CBA

In the cost-benefit module, the net benefit of each action plan incorporated in the tool is evaluated. The cost-benefit evaluation supports decision-making by enabling a more efficient allocation of resources, allowing the current situation to be compared with alternatives in order to identify the optimal point to maximize social well-being. All costs and benefits to society will be accounted for in monetary terms, including the relevant external ones.

The CBA calculations analyses three main elements:

1) Calculation of cost data (investments and operating and maintenance costs) of each action plan;
2) Associated social benefits (energy savings and environmental benefits);
3) The results of the LCA module will be explored.

To start, the user must select a measure inside of the different sectors: water, waste, transport, green space, green procurement and indoor air quality - figure 17.

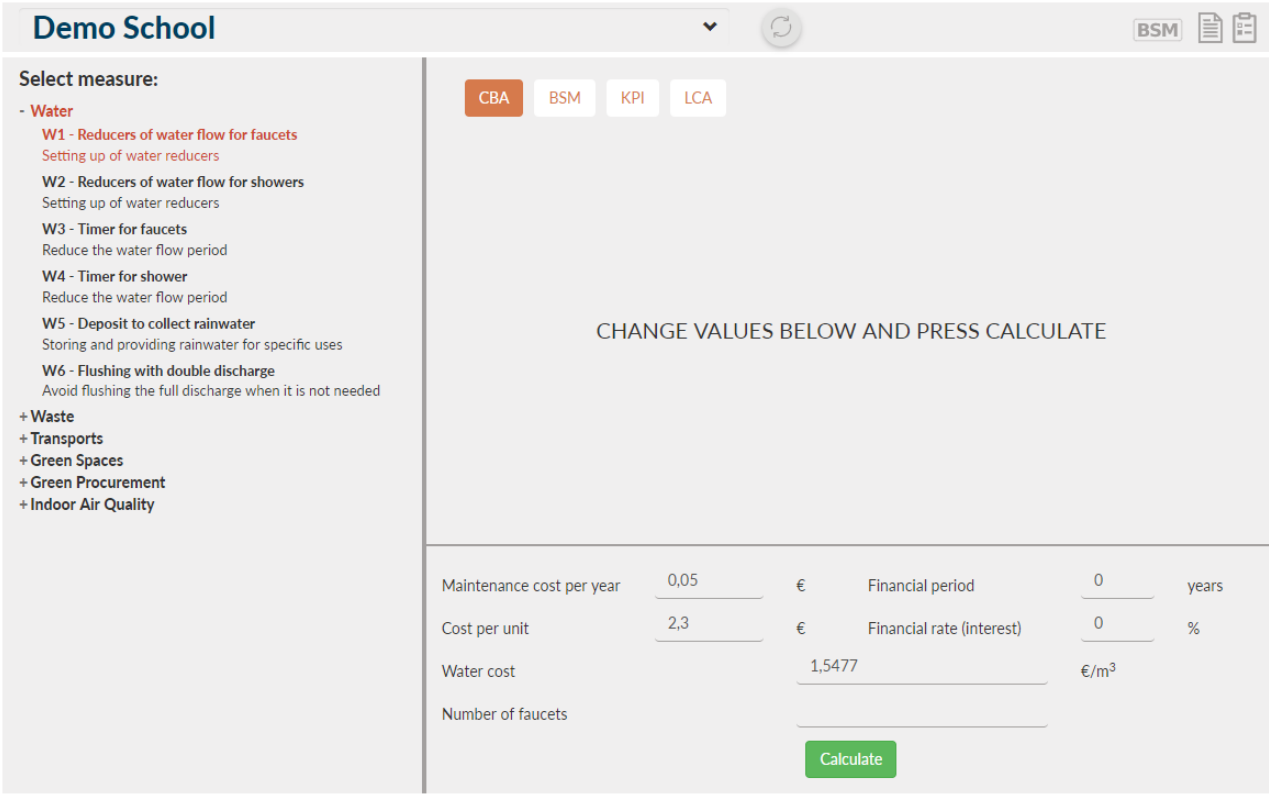


Figure 17 - Cost benefit analysis form of the selected measure.

Filling the form and selecting the 'Calculate' button the results are presented as showed in the figure 18.

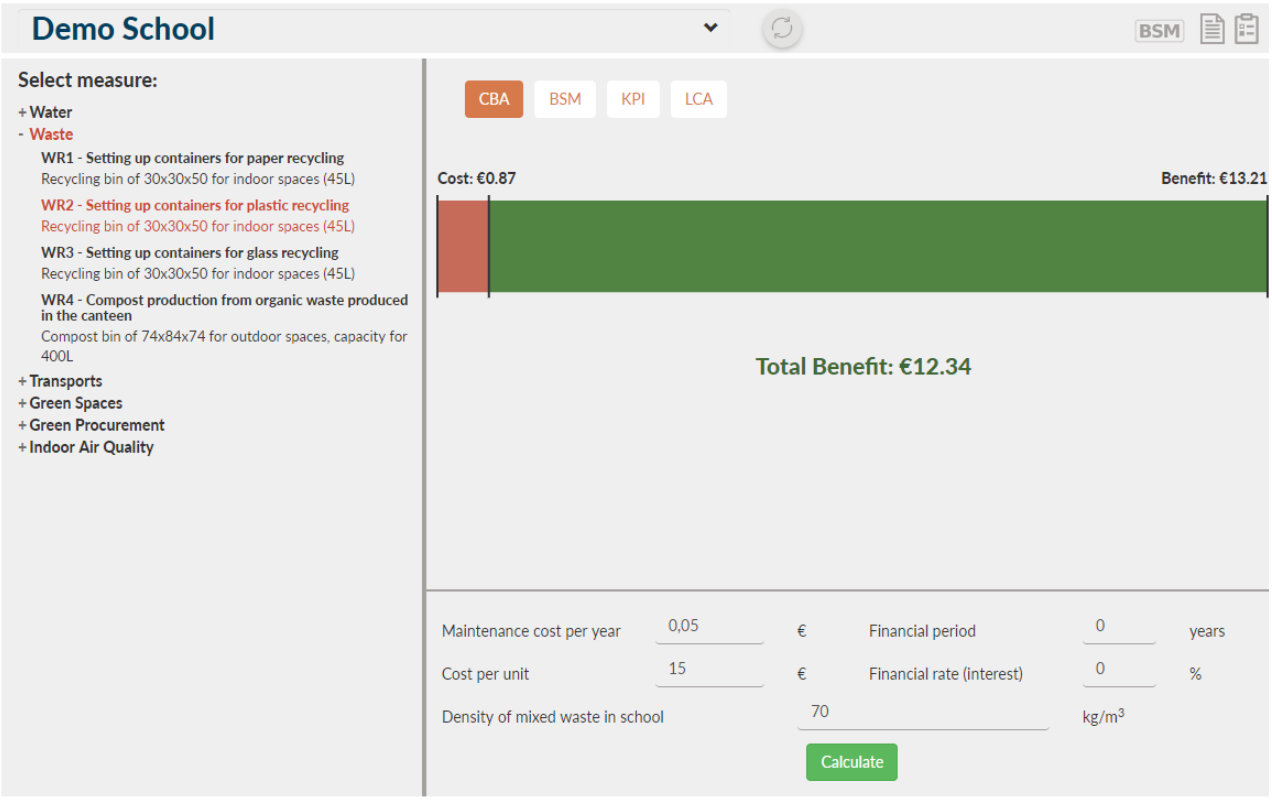


Figure 18 – Cost-Benefit of the Measure WR2.

7.2 BSM

The BSM shows to the user the expected energy consumption after the measure *vs* the actual energy consumption. Selection a month with the cursor the user can consult detailed information - figure 19.

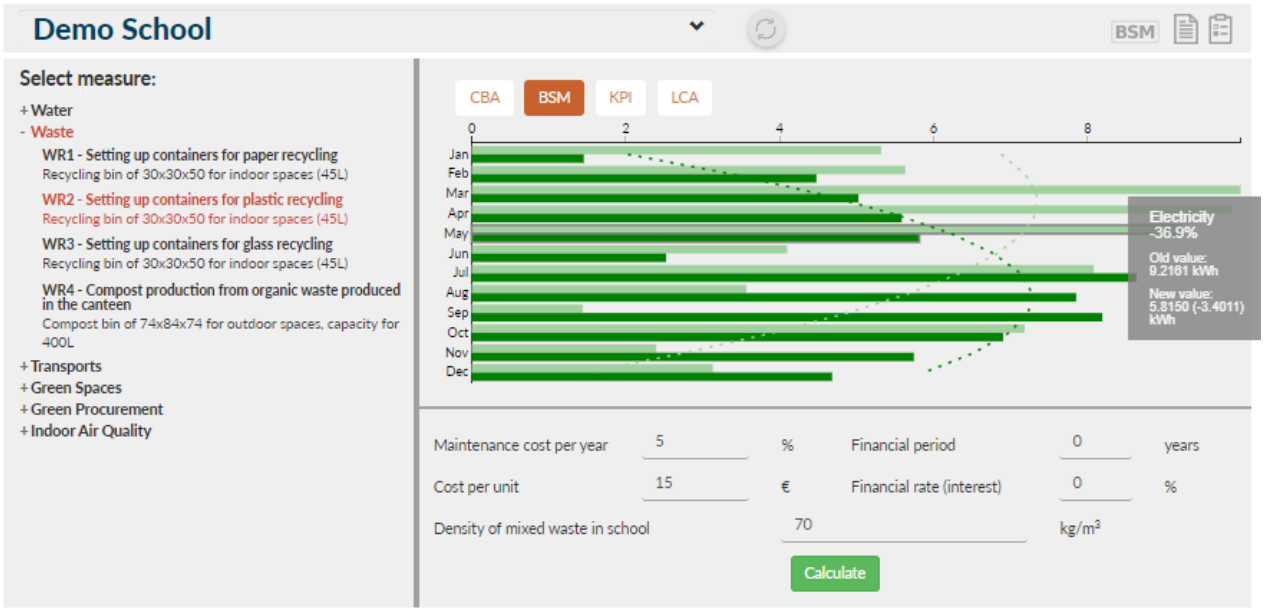


Figure 19 – Expected energy consumption after WR2 vs actual energy consumption.

7.3 KPI

Selecting the KPI button the user can consult the impact of the measure to all the KPI related - figure 20.

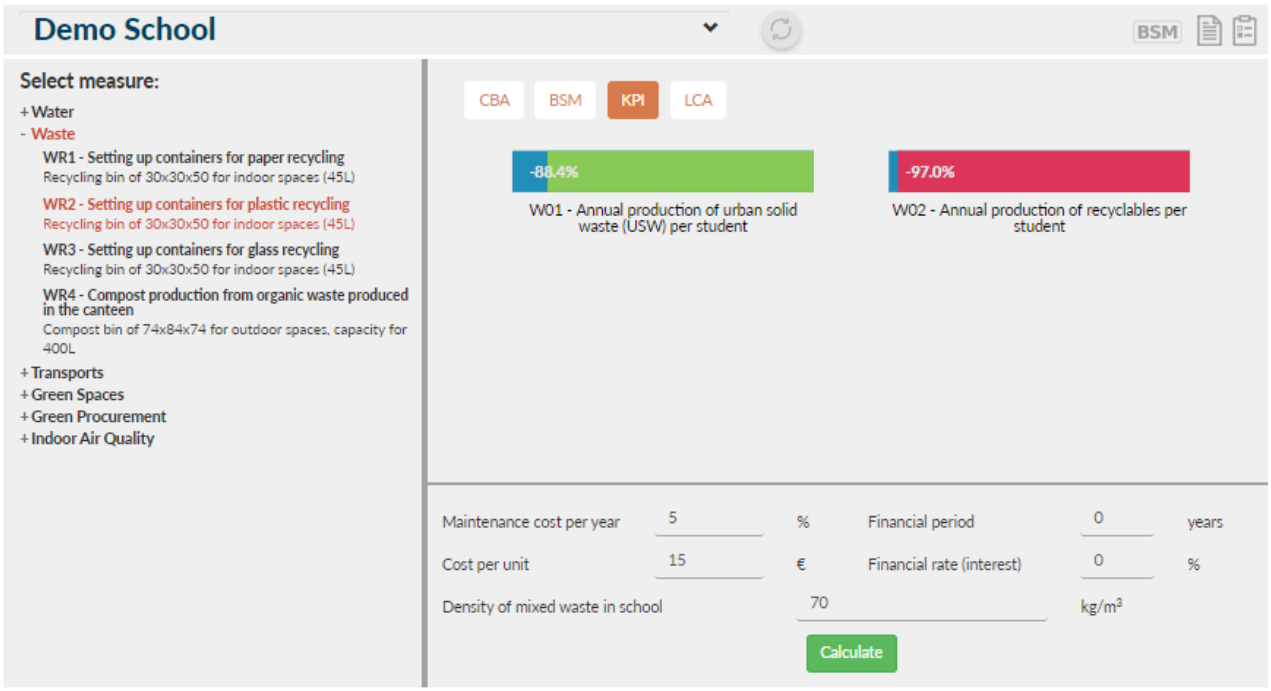


Figure 20 – KPI impact of the measure WR2.

7.4 LCA

Selecting the LCA, once again, is presented to the user the impact of the measure, but now to the Life Cycle Assessment of the school - figure 21.

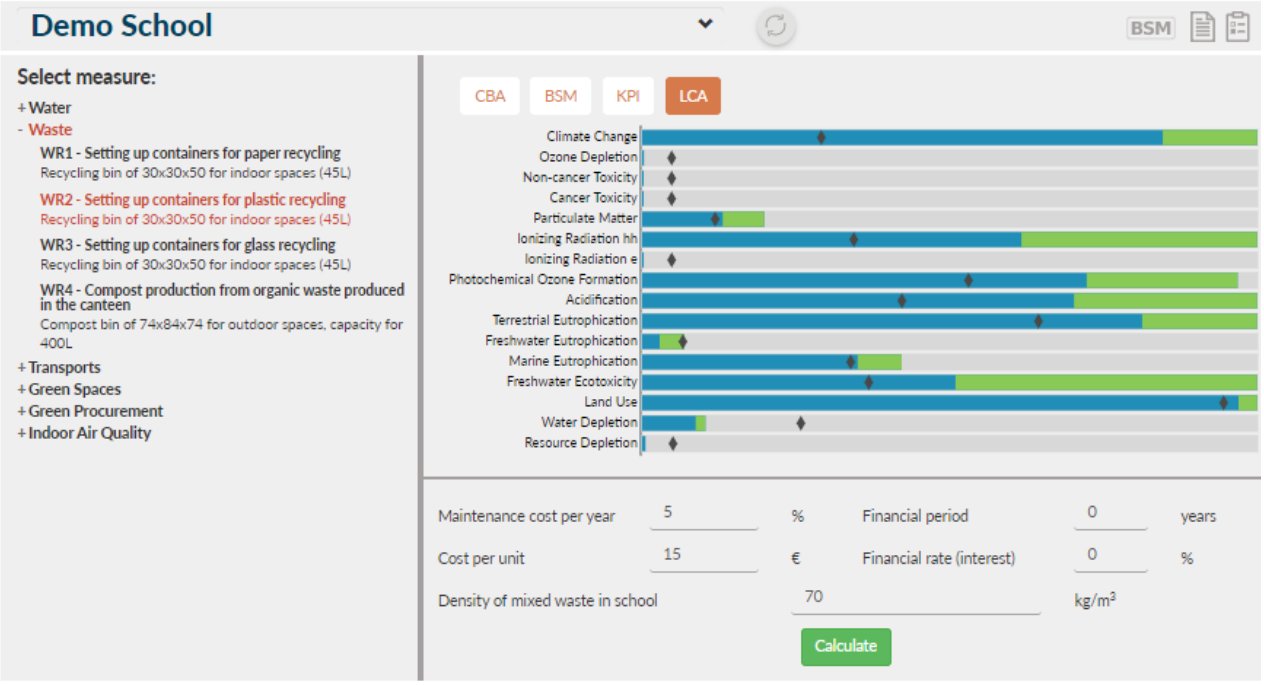


Figure 21 - LCA impact of the measure WR2.

8 Personal Data

It should be noted that there are three types of users, these being:

- Administrator
- Manager
- Coordinator

Each of these has different permissions that will be displayed in this section.

Coordinator

For users with coordinator privileges, selecting options in the user name displays the menu in figure 18. In this area the user can change his/her username, name, email and phone number.

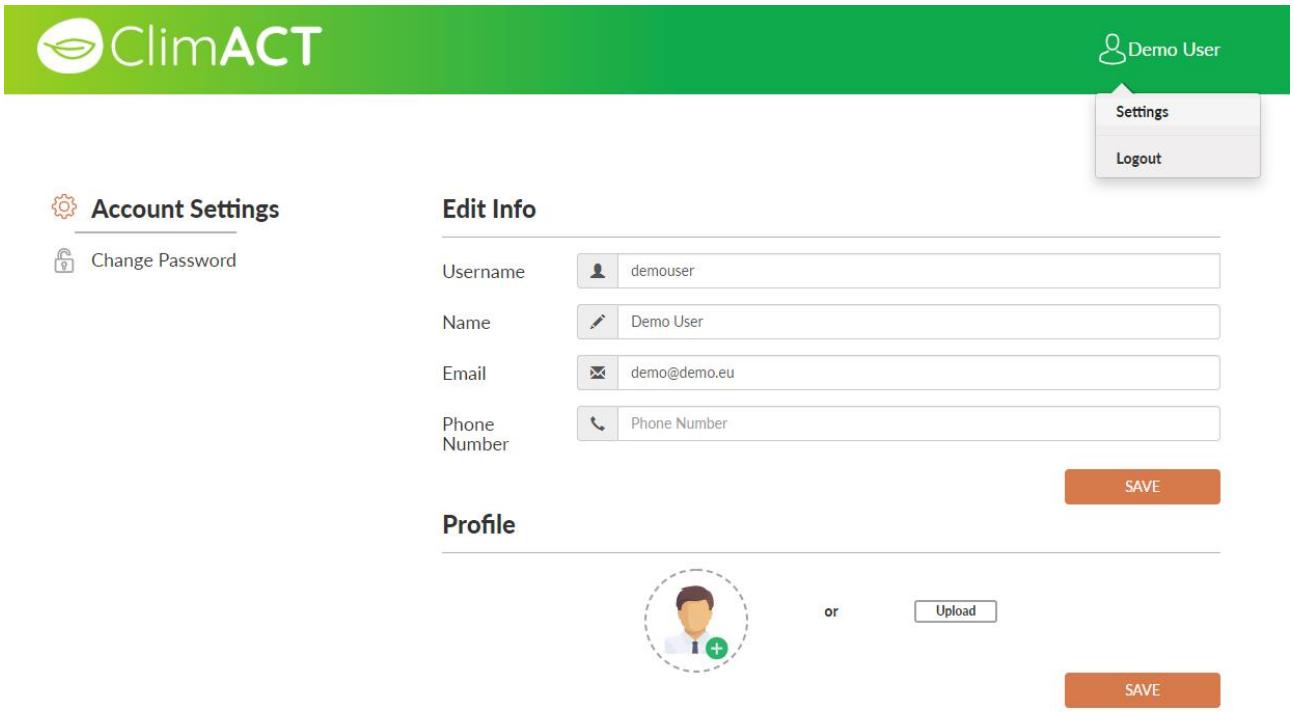


Figure 22 - Edit menu of the user's personal data.

When you select *Change Password* on the left side, the area shown in the figure 19 is displayed.

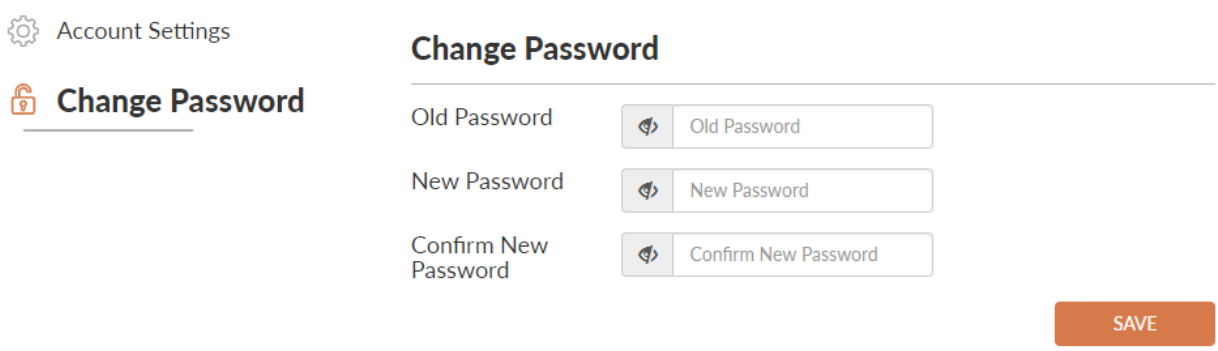


Figure 23 - Password update menu.

Manager

If the user is a Manager, he/she will have the privilege of creating/editing/deleting Schools (within his/her group) and Coordinators. The Settings menu is similar to the one shown (figure 18), however the *Administration* option is added — figure 20.

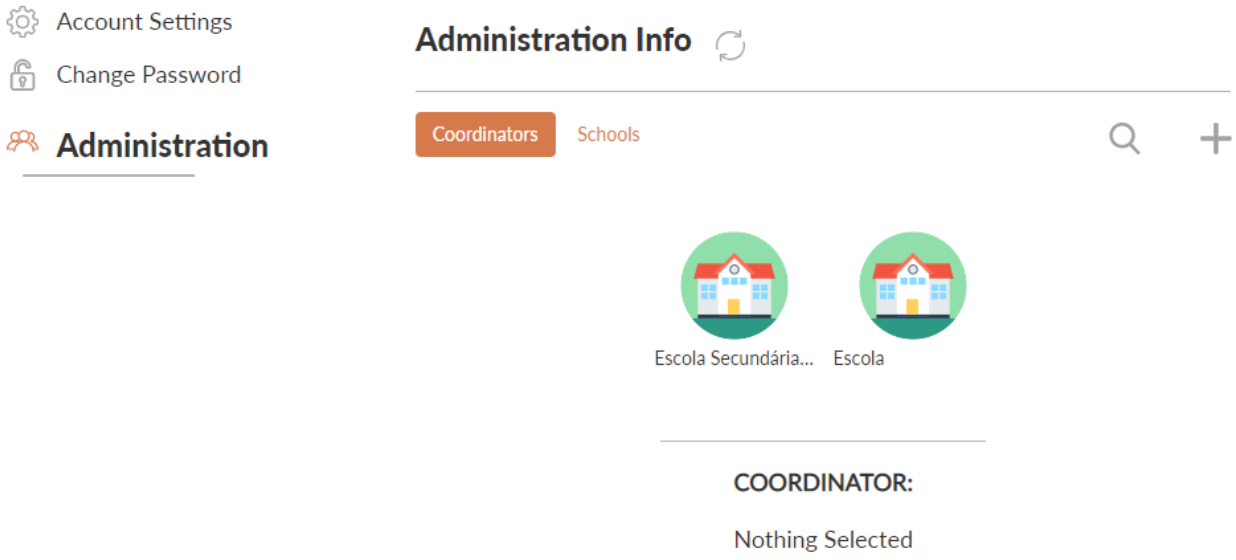


Figure 24 - Administration option for a Manager.

To create a coordinator, simply select the + icon from the menu shown in figure 20 and the window in figure 21 is displayed. To edit an existing coordinator, simply select the school to which it is associated and then the coordinator to edit/delete — figure 22.

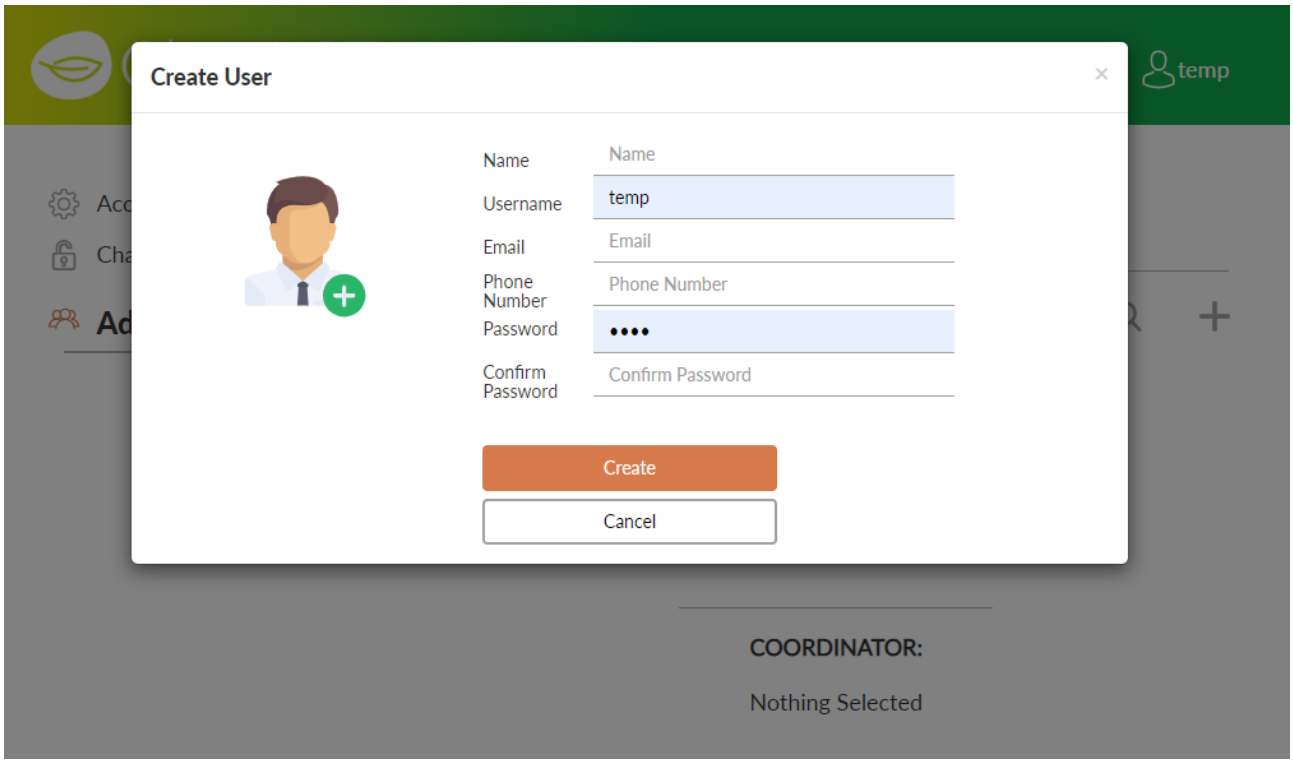


Figure 25 - Creation of a coordinator type user.

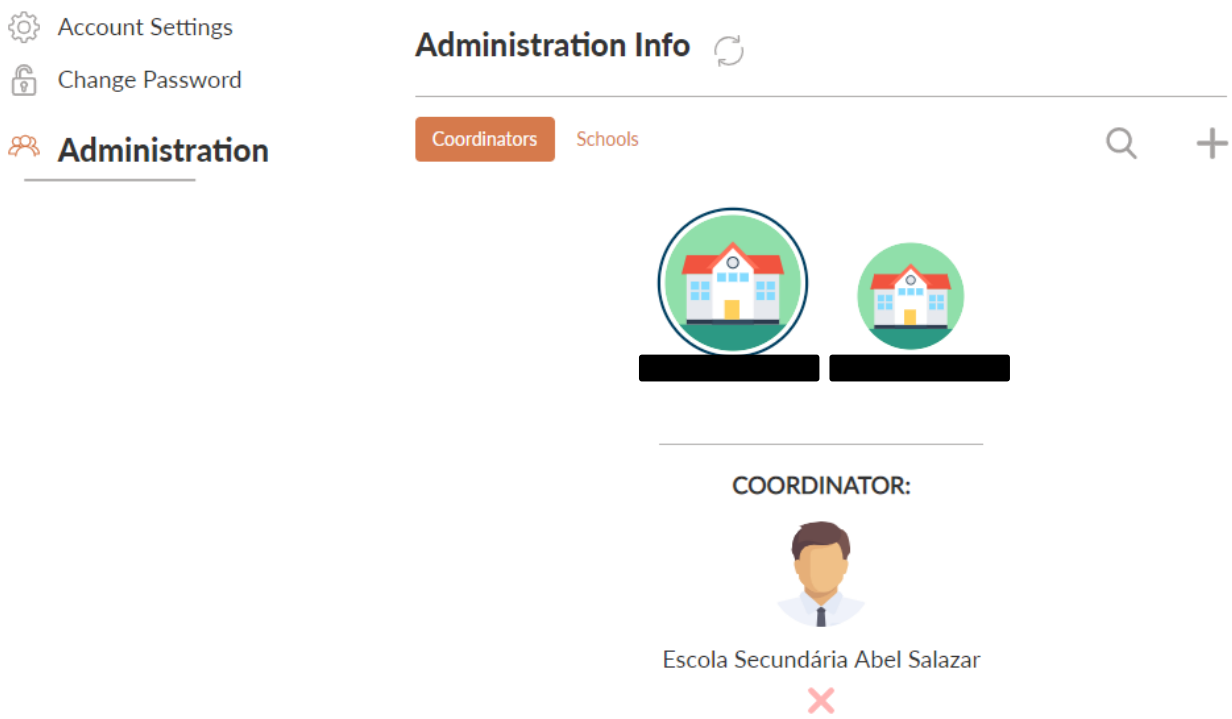


Figure 26 - Selecting a coordinator to change or remove.

You can unlink a user from a school by clicking on the **X** icon in Figure 22. By selecting the desired coordinator his/her details will be presented, so the user can change or delete the coordinator — figure 23.

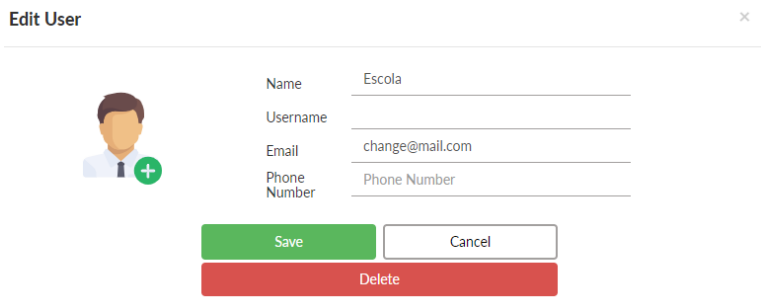


Figure 27 - Editing a Coordinator's Data.

By selecting the *Schools* option, the user can create/edit/delete schools from his/her group — figure 24. Like the coordinator, simply select the + icon to create a school (figure 25) or select the school to edit (figure 26).

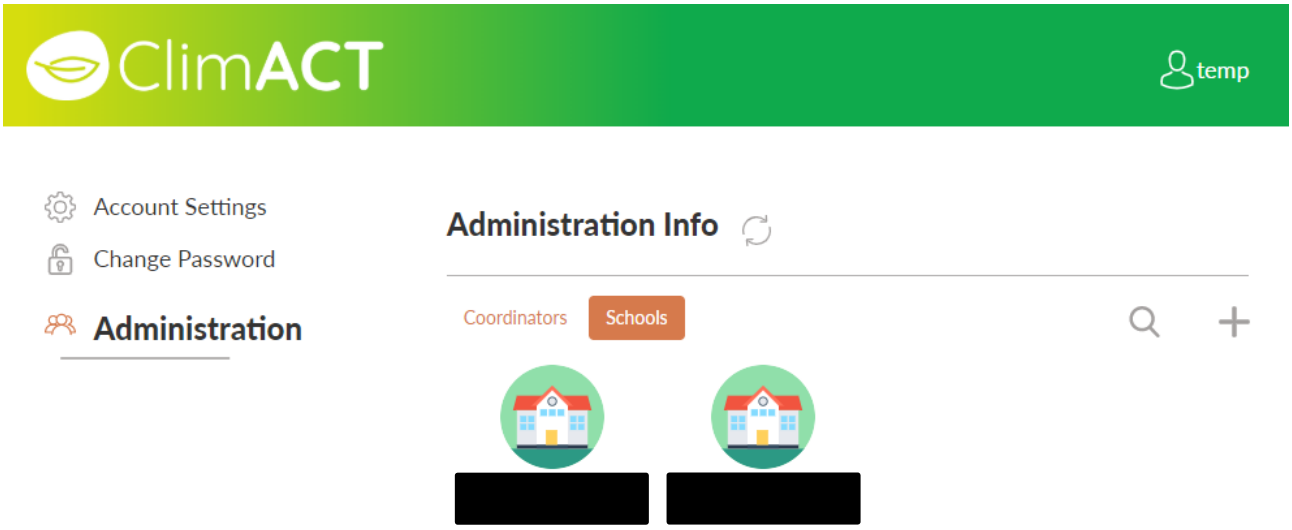


Figure 28 - Selecting a school to edit or delete.

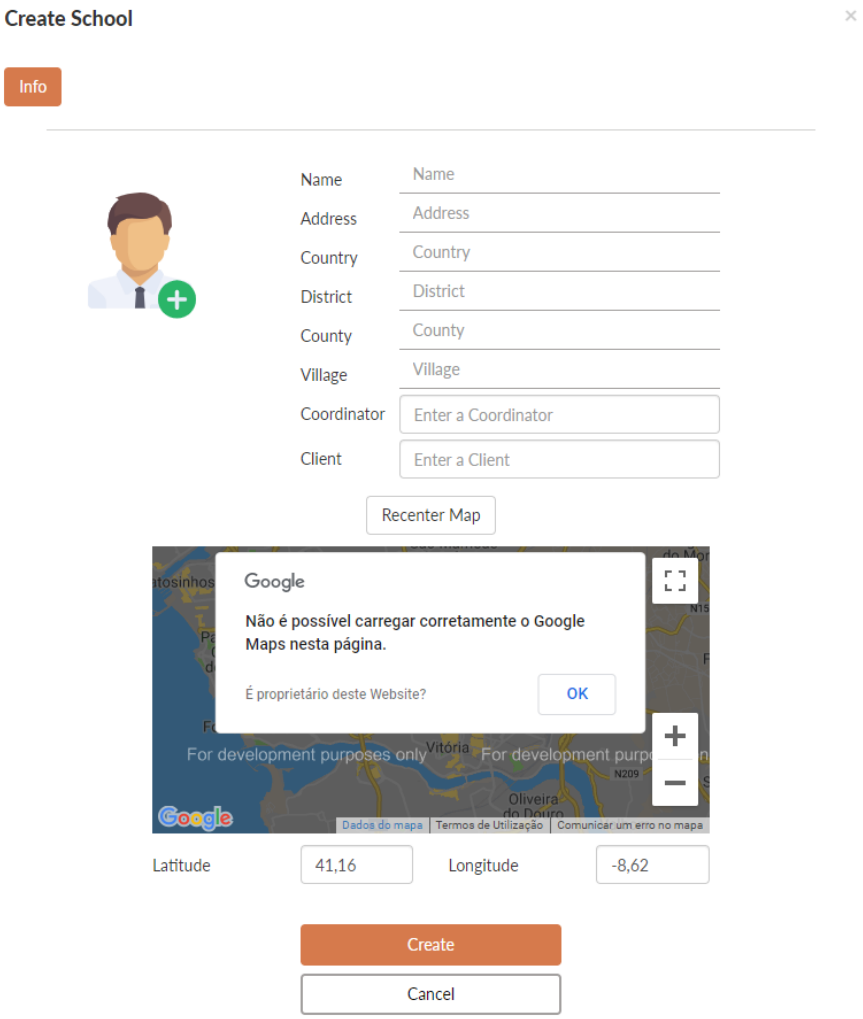


Figure 29 - Creation of a school.

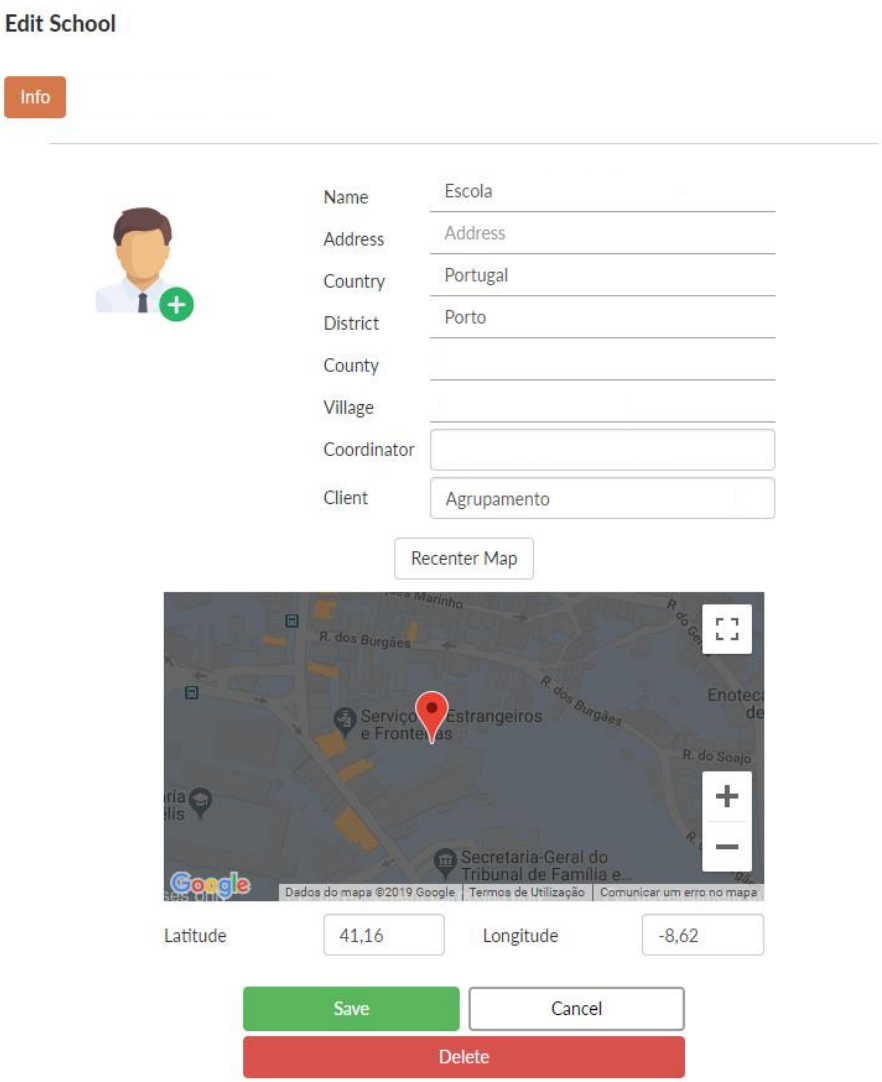


Figure 30 - Editing School data

Administrator

In the case of an Administrator, in addition to the privileges of a coordinator and manager, you can also create / edit / delete groups and managers for them. Groups are any geographic or administrative division that makes sense within the scope of this tool (countries, school groupings, ...). It is presented with one more option: Managers — figure 27. In this window the user can add groups of schools by selecting *Create Group* (figure 28). When selecting a group, it shows the associated managers as well as the subgroups that belong to them — figure 29.

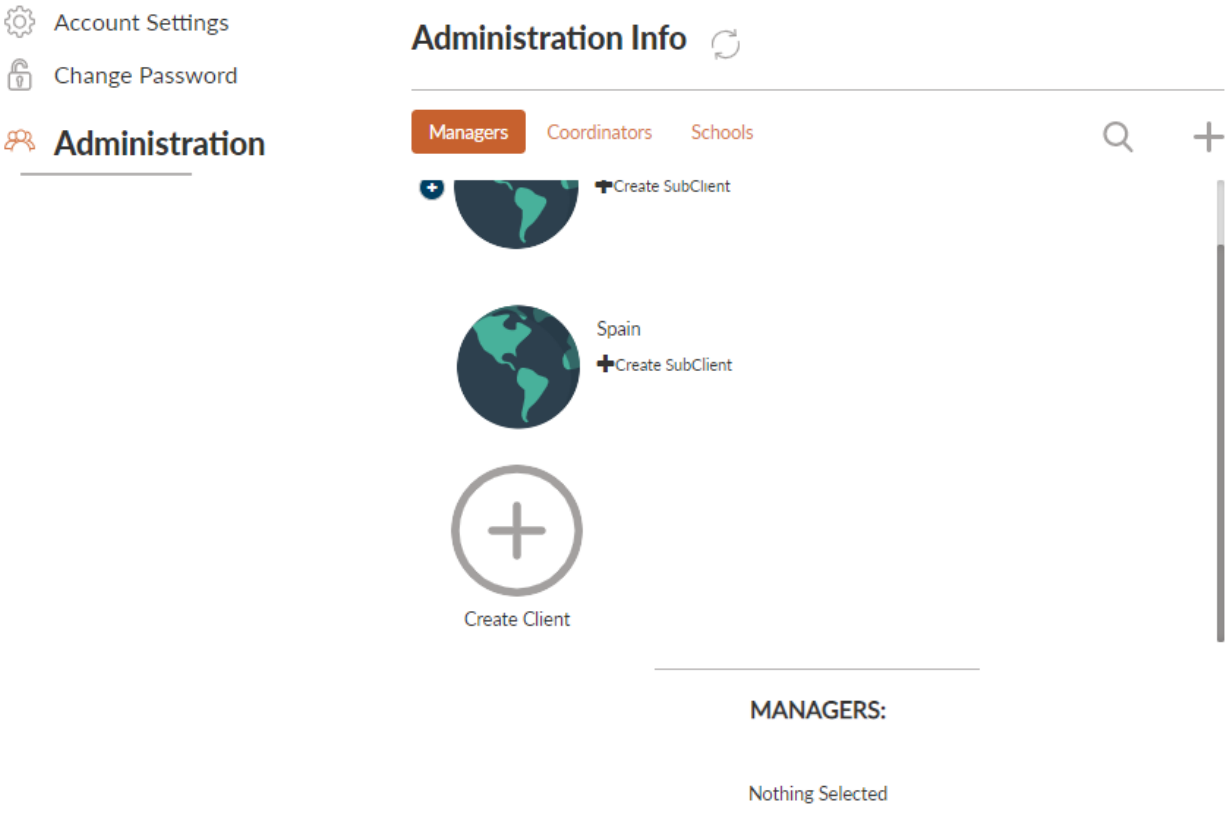


Figure 31 - Managers option in the Administration section of the admin type users.

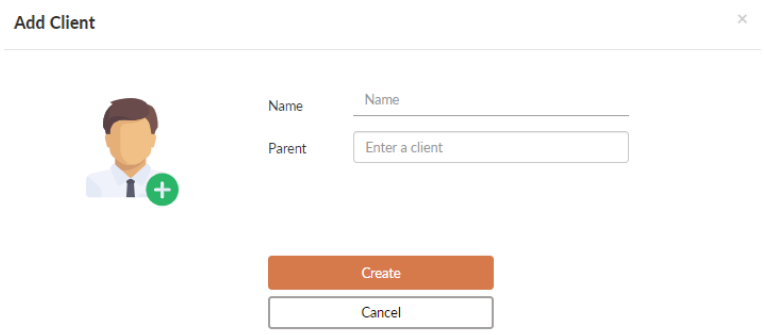


Figure 32 - Addition of groups of schools.

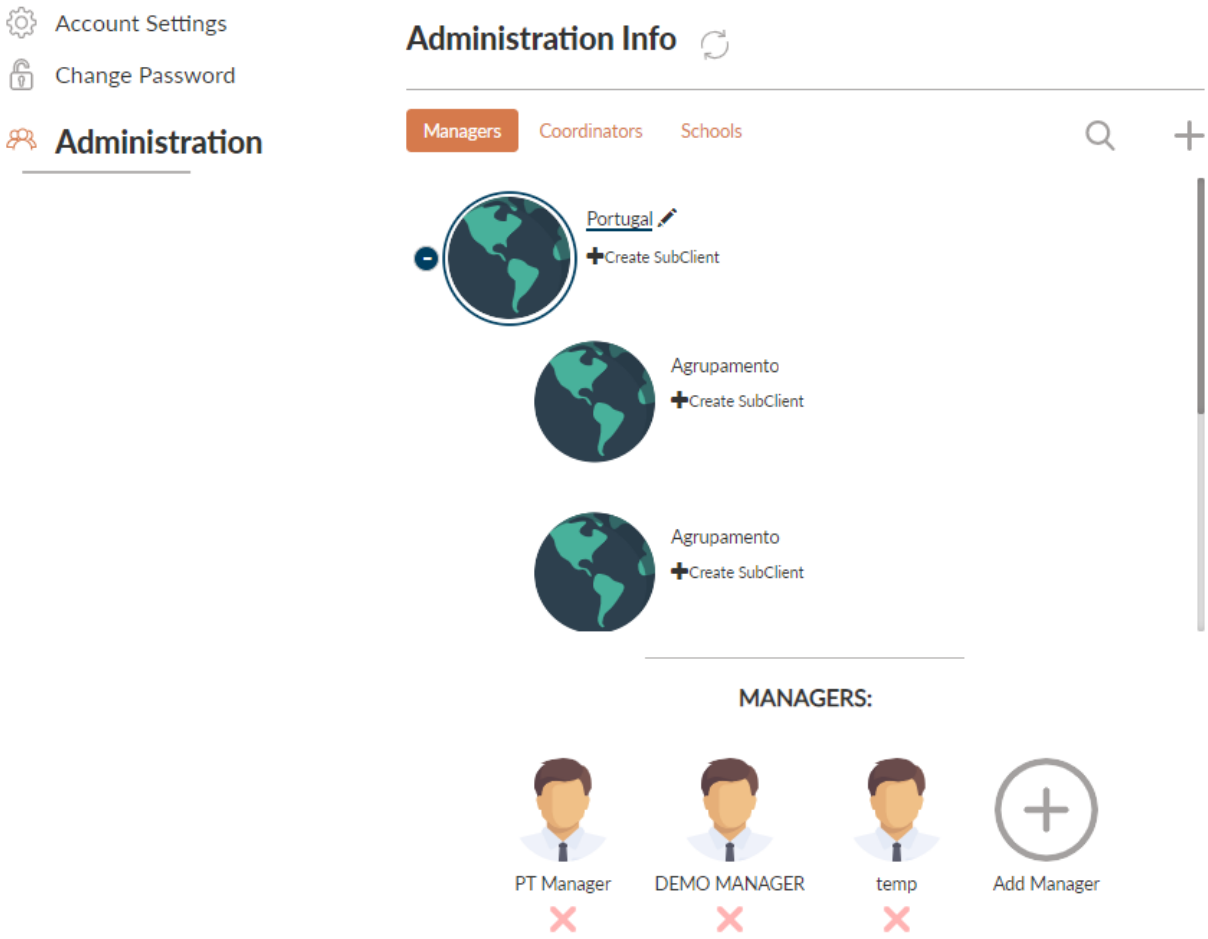


Figure 33 - Consult data from the groups of schools, subgroups and associated managers.

It is possible in the figure view of 29 to associate or disassociate managers from the group of schools and, in the view of figure 30, edit the personal data or delete the selected manager.

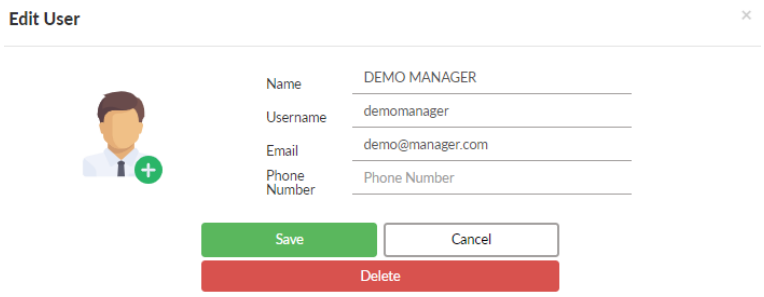


Figure 34 – Edit/delete managers.

To add Managers to a given group simply select it, choose the *Add Manager* option and in the new window choose the desired manager — figure 31.

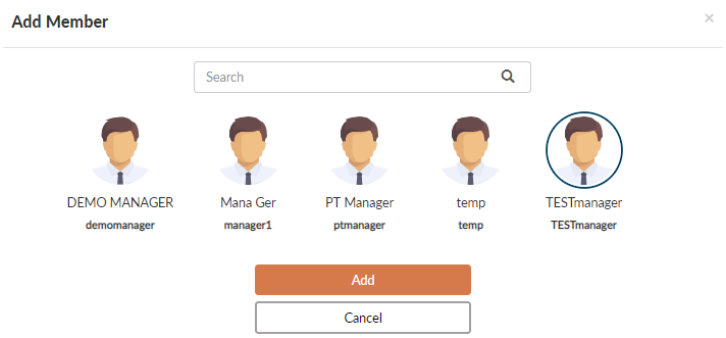


Figure 35 - Associate a manager to a group.

To create a subgroup for an existing group simply click the *Create Subgroup* option. Thus the "Subgroup of" field is already filled with the group information to which a subgroup will be added — figure 32.

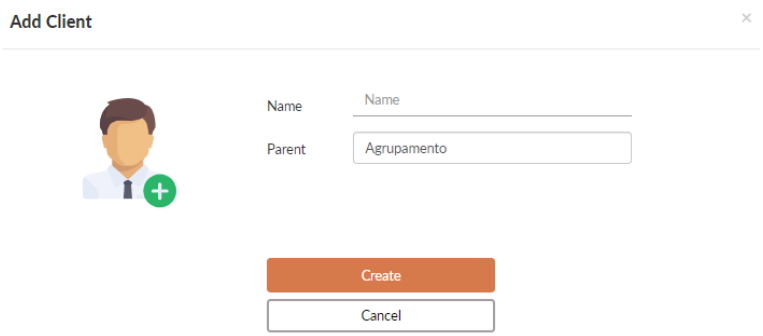


Figure 36 - Create a subgroup.

To edit information about the group, click on the group name and the pencil icon — figure 33.

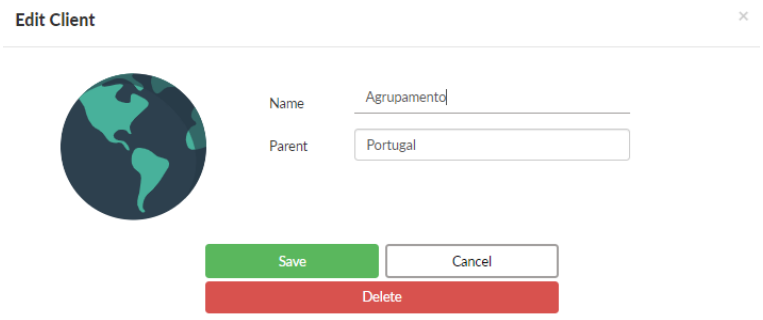


Figure 37 - Edit group data.