



European Union



Bulgaria – Serbia  
IPA Cross-border Programme

# **GUIDELINES**

## **FOR USING SOFTWARE FOR THE EVALUATION OF THE ENERGY EFFICIENCY IN SCHOOLS**

Links:

- University of Nis ([www.ni.ac.rs](http://www.ni.ac.rs)),
- Faculty of Mechanical Engineering, University of Nis ([www.masfak.ni.ac.rs](http://www.masfak.ni.ac.rs)),
- Technological vocational school „Marie Curie“ Pernik ([www.tpg-pk.eu](http://www.tpg-pk.eu))

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## User registration

EES Language ▾

Home

Logjn

**Register**

Register

Home / Register

Register

Director Admin

Register director

Email

First name

Last name

Figure 1

EES Language ▾

Home

Logjn

**Register**

Register

Last name

Country

School

Password

Repeat password

Registracija

Figure 2

1. In the menu on the left with the left mouse click, select “registration” to come to part for new users
2. Select whether you want to register as a *“director”* or *“administrator”*
3. Enter all data and left mouse click on *“register”*



## Login

After successful registration, you need to wait for approval from the administrator. When the administrator approves your account, you can log in as follows:

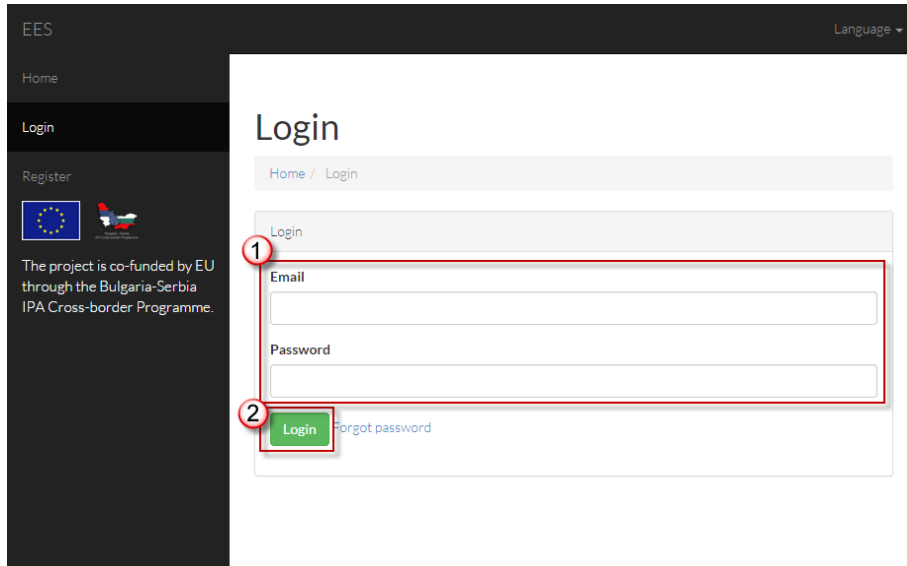


Figure 3

1. Enter all data that you have entered during the registration
2. Click on “*subscribe*” using the left mouse button

## Operating environment after login

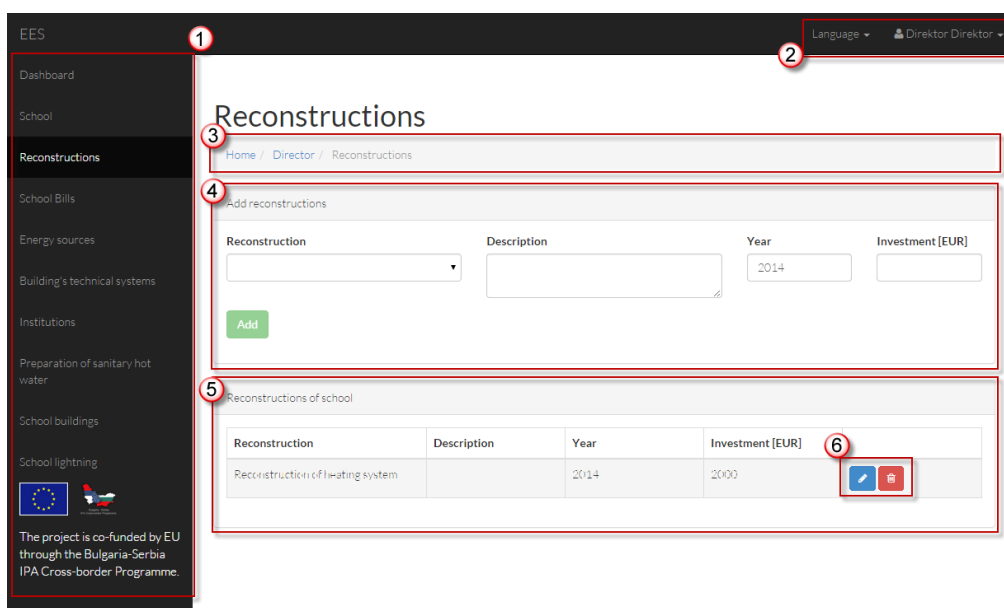


Figure 4



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1. Figure 4 shows the menu on the left side where the user selects a page for data entry
2. In the top right corner user selects the language in which pages are going to be displayed by clicking on “*name and family name*” to open a dialog where the user can log out of the program
3. At number 3 in Figure 4 can be seen listed sites to which the user came. This menu makes it easy to navigate through the software and provides insight into the current location of the user in the software
4. At number 4 data entry fields are located
5. At number 5 there is a table with the listed previously entered data
6. Number 6 displays buttons for editing and deleting records.

## Editing entries

In figure 4 number 6, there is a blue button that indicates the possibility of editing the entry. Clicking the left mouse button on this blue button user can directly change values. Clicking on the green button (figure 5 number 2) data are going to be saved, and clicking on the grey button with the symbol “x” values will stay unchanged.

| Reconstructions of school        |                      |                                   |   |
|----------------------------------|----------------------|-----------------------------------|---|
| Reconstruction                   | Description          | Year                              | Investment [EUR]  |
| Reconstruction of heating system | <input type="text"/> | <input type="text" value="2014"/> | <input type="text" value="2000"/>                                 |
|                                  |                      |                                   | <input type="button" value="✓"/> <input type="button" value="x"/> |

Figure 5



## Start of data entry

### The control panel

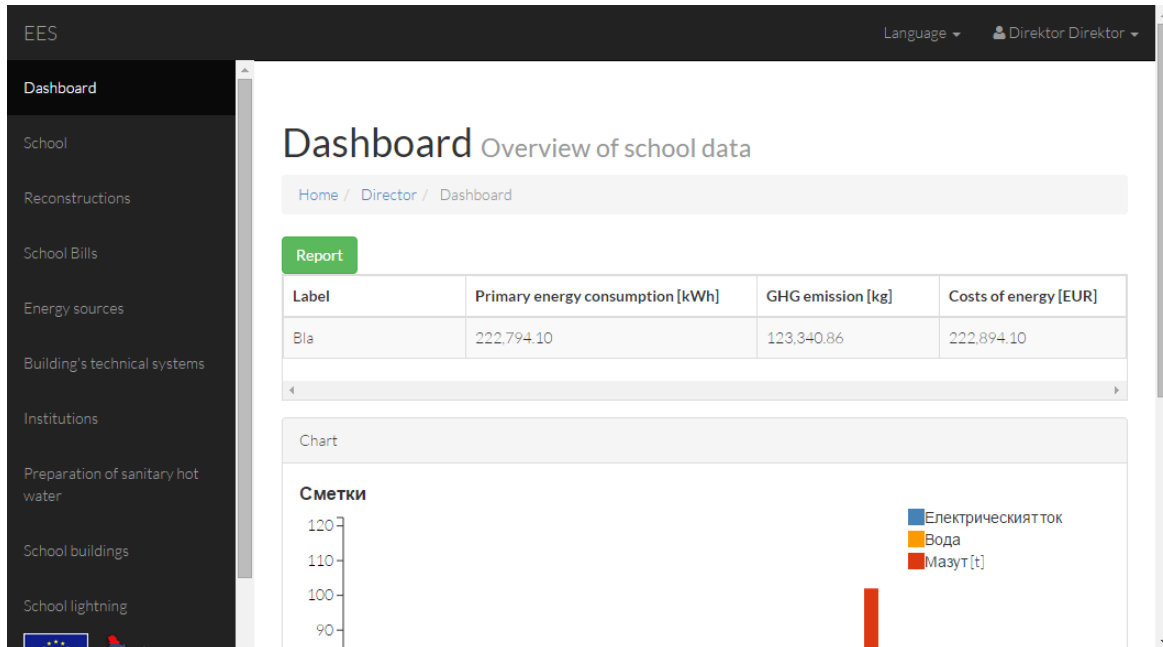


Figure 6

After login, the control panel is shown to user where he has access to the calculated values. If the user has not completed all the required data in the software, the data can show the value 0.00.

### School

If the user from the left menu choose section "school", the page as shown in Figure 7 will be open. When user enter all required data, he can click "save" by left mouse button, to make data stored.

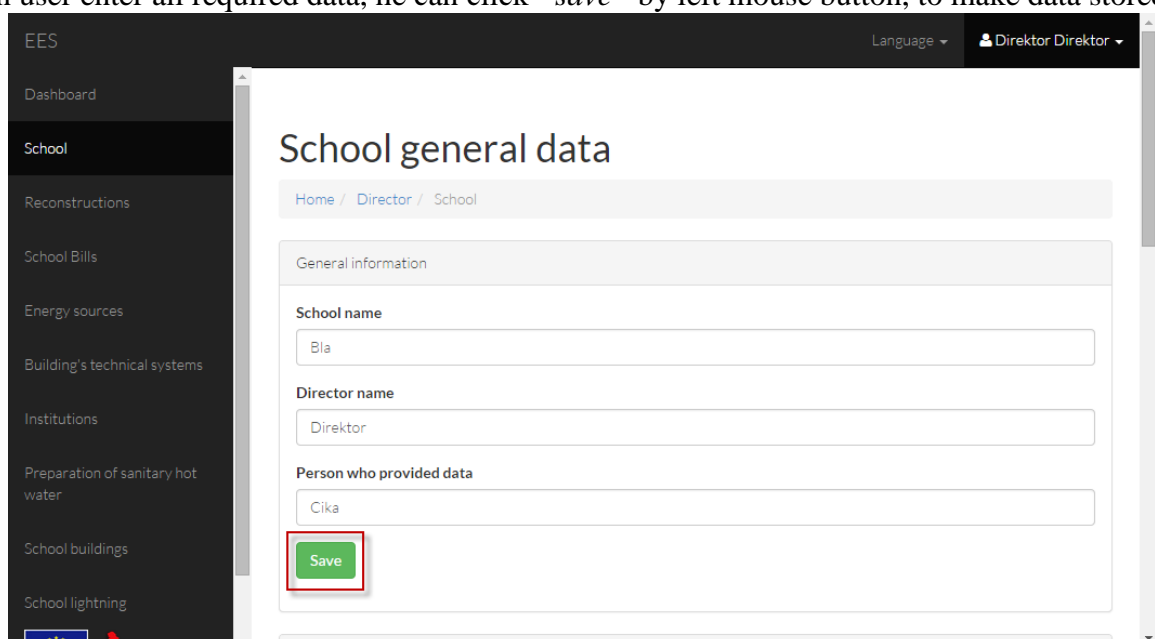


Figure 7



## Reconstructions

As it is shown in Figure 8, here user can enter data on the reconstructions, that were performed at the school. From the drop-down menu, user can select type of construction, description, year and investments which was necessary for this construction in EUR, and click button “add” pressing the left mouse button.

Figure 8

## Bills

This is a field where user can enter bills for consumed energies used in schools (figure 9 number 1). It is necessary to choose an energy source and then fill fields for month, year, etc. When data is completed press the left mouse button and click “add”. Depending on the type of energy, input fields will be changed.

Figure 9



## Energy sources

In the part for input energy sources, it is necessary to enter all energy sources that are used in school. Figure 10 shows drop-down menu “energy source” where is necessary to choose appropriate energy source and then fill in other fields. After that user should click “add”, pressing left mouse button. Lower calorific values, specific emission of CO<sub>2</sub> and factor conversion for calculating primary energy, which can be changed are automatically displayed.

### Note

Energy sources that are going to be entered will be displayed wherever is necessary to select energy source, for example, in technical systems in buildings and in the drop down menu for bills entering.

| Energy source           | Lower heating power of energy source [kWh/jm] | Specific emission of CO <sub>2</sub> per unit of primary energy [kg/kWh] | Conversion factor for calculating primary energy (0-1) | Payment dynamic | Payment model | Price [EUR/jm] | The annual rate increase in price |
|-------------------------|---|--|--|-----------------|---------------|----------------|-----------------------------------|
| Water [m <sup>3</sup> ] | 0   | 0  | 0  | Monthly         | Free          | 0              | 0                                 |

Figure 10

## Technical systems in buildings

In this menu user can enter:

- Heating system
- Electrical appliances and equipment
- Photovoltaic cells

### Heating system:

After choosing the heating system, proportion of use is entered (0 ÷ 1). If it is one heating system, the proportion is 1, and if we use other system proportion is smaller than 1.





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The same is about choosing of energy sources within this menu. Once you entered energy sources that are used in school, it is necessary to enter technical systems that are used in schools. In the left part it is necessary to choose system or device (figure 11, number 1) and then from the drop-down menu a specific system used by school. Depending on the type of systems, input fields are changed. After entering all necessary data, user should click on the button “add”, pressing the left mouse button.

The screenshot shows the 'Building's technical systems' page in a web application. The sidebar on the left lists various categories, with 'Systems and appliances' highlighted and circled with a red '1'. An arrow points from this menu item to a dropdown menu in the main form area, which is also circled with a red '2'. The dropdown menu currently shows 'Technical building system'. Below this, the form contains several input fields: 'Annual time of use [h]', 'Installed capacity [kW]', 'Estimated annual maintenance and operation costs [EUR]', and 'System's efficiency (0-1)' with sub-fields for 'Piping network efficiency', 'Automatic regulation efficiency (0-1)', and 'Boiler efficiency (0-1)'. At the bottom, there are 'Energy sources' fields for 'Energy source 1' and 'Energy source 2', each with a 'Participation [0 - 1]' field.

Figure 11

## Institutions

This is a page where it is necessary to enter institutions by whom is school funded and what is actually funded, for example: energy sources, ongoing maintenance etc.



## Preparation of domestic hot water

Figure 12 shows that it is necessary to choose the method of preparation of sanitary hot water and there are two possibilities (within the heating system and electrical water heater), then to enter necessary data and finally, to click “add” button, pressing the left mouse button.

EES Language ▾ Direktor Direktor ▾

Dashboard  
School  
Reconstructions  
School Bills  
Energy sources  
Building's technical systems  
Institutions  
**Preparation of sanitary hot water**  
School buildings  
School lightning

Home / Direktor / Preparation of sanitary hot water

Preparation of sanitary hot water

1 Method of preparation of sanitary hot water

Within the heating system  
 Electric boiler

Volume of used water - yearly [m<sup>3</sup>]: 1000  
Temperature of prepared sanitary hot water [°C]: 40  
Temperature of water from the system [°C]: 12

Electrical boiler efficiency: 0.8  
Boiler heat loss: 0.2

Comment:

2

The project is co-funded by EU through the Bulgaria-Serbia IPA Cross-border Programme.

Figure 12



## School building

In part “*school building*” user should click “*add*” button first, and then enter data and click “*save*” button (figure 13 number 1). Above the “*add*” all school buildings are listed. Clicking on one element from the list, data is going to be load in the middle part of the page (panel “*building*”). When the user enters required number of buildings and the necessary data, he should enter a zone for one building. So, he should choose from the list of buildings, specific building for which he needs to add the zone and click on the button “*zone*” pressing the left mouse button (figure 13, number 3). It is possible to enter a larger number of zones.

Figure 13



### School zone

School’s zones are entered in a similar way as the school building. When the required number of zones and necessary data are added, user should choose one of the zones from the list and then in “menu”, shown in Figure 14, he should click on an item from the list. Within the zone user should enter all data, where the usable area is total school area and it is essential for calculation of heat gains from people.

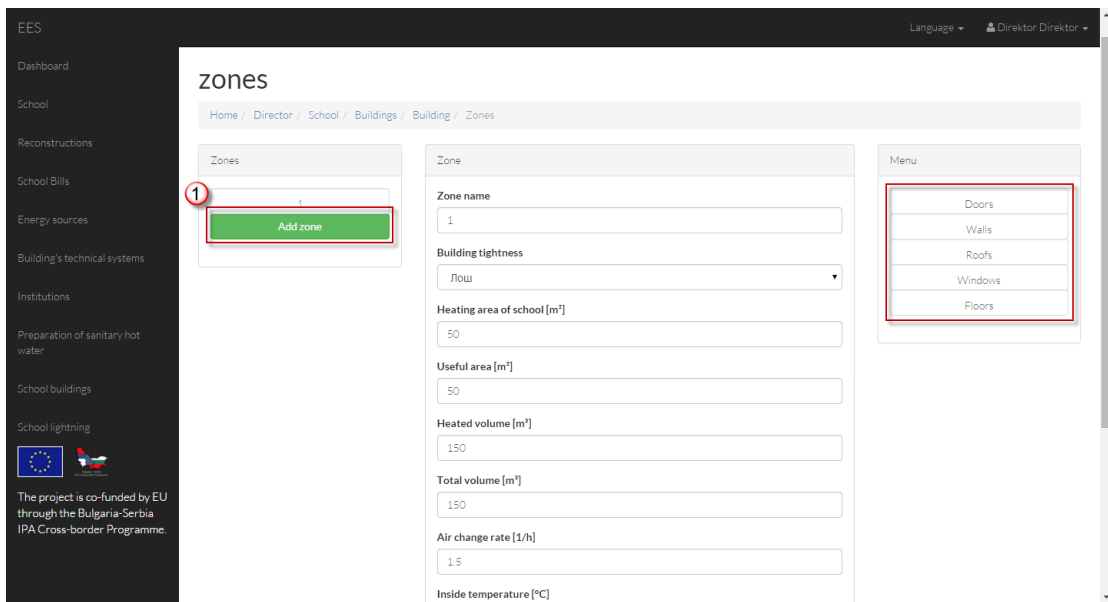


Figure 14

### Doors and windows

Figures 15 and 16 show parts of page to enter external and internal doors and windows of the school. In this part data are entered in the same way as it has already been explained in the preceding examples. The angle refers to the inclination of the plane.

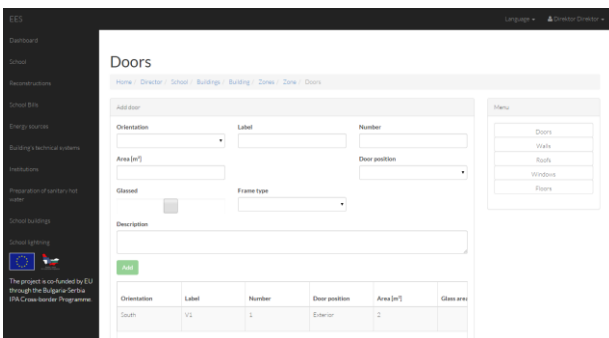


Figure 15

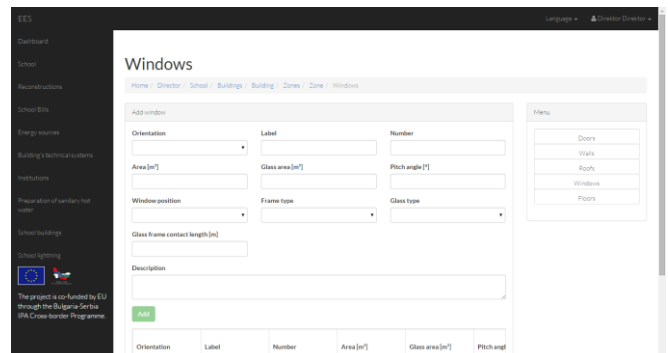


Figure 16



## Walls, roofs, floors

When user should enter walls, roofs and floors, it is necessary to enter their layers, too. For each added wall, button “layers” is going to be shown in the table (Figure 17), which is located in the right part, near buttons for deleting and editing.

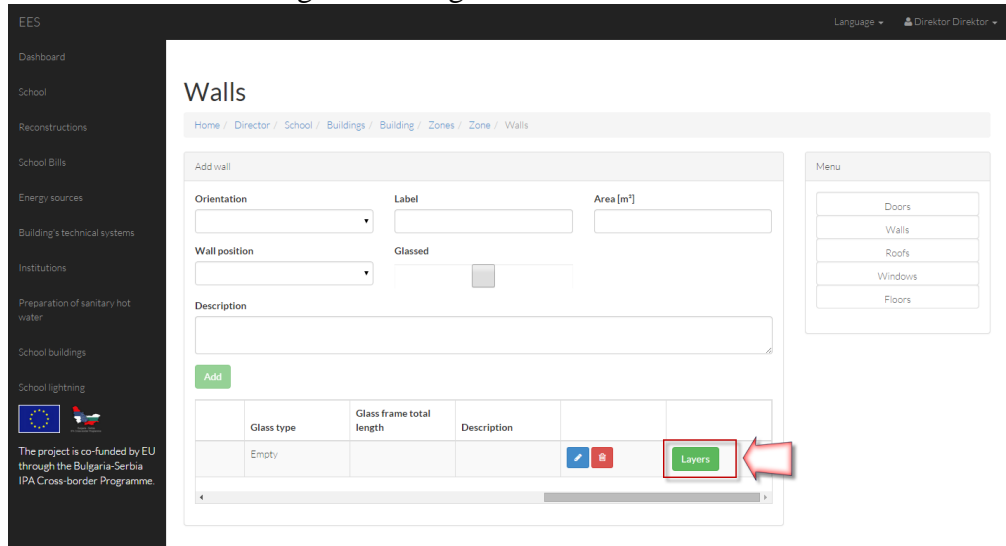


Figure 17

## Layers

For each wall, roof or floor, it is necessary to enter layers. Through the form shown in Figure 18, it is necessary to enter each layer.

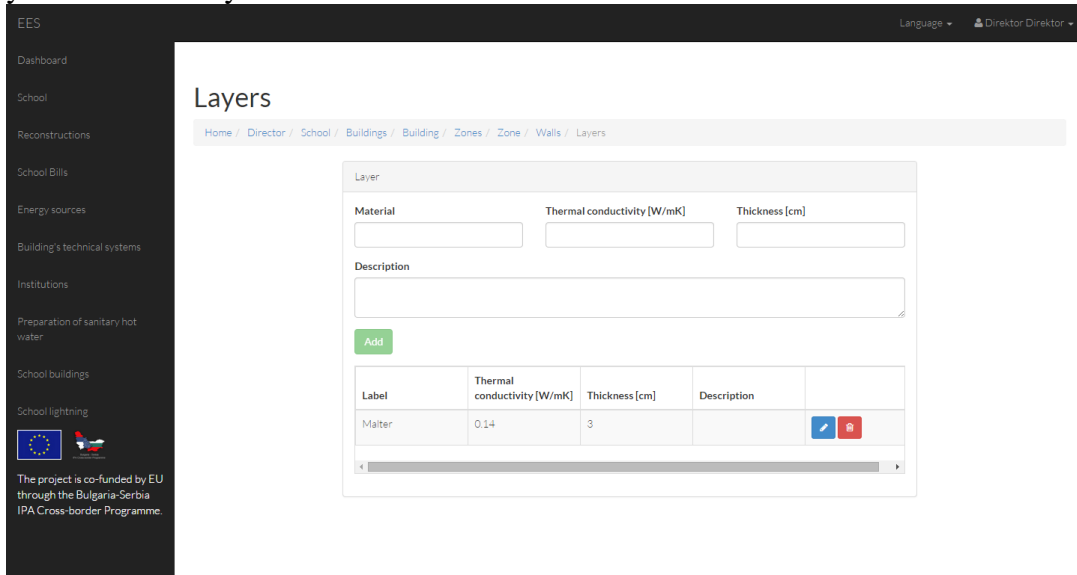


Figure 18

## Lightning of the school

In the part “lightning of the school” it is necessary to enter types of bulbs, number of bulbs, their power and time of using during the year.



## Administrator

### Schools

Administrator in his menu has two additional fields “schools” and “projects”. In field “schools”, shown in Figure 19, administrator sees all schools from the selected state and can view reports for each school by clicking on the button “report”.

The screenshot shows the EES Administrator interface. The top navigation bar includes 'Language' and 'Admin A'. The sidebar on the left contains 'EES', 'Dashboard', 'Schools', and 'Projects'. The 'Schools' section is active, displaying a table with the following data:

| School name | Place |        |
|-------------|-------|--------|
| [Redacted]  | Niš   | Report |
| [Redacted]  | Niš   | Report |
| [Redacted]  | Niš   | Report |
| [Redacted]  | Niš   | Report |

Figure 19



## Projects

In the part “*projects*” administrator from the drop-down menu selects school for which he creates a project and then enters required information. After entering all required data, it is necessary to click “*add*” button pressing the left mouse button. Figure 20 shows marked part of the table which contains buttons for project opening, editing and deleting and summary report for that project.

Clicking on the button for project opening in the left part of the screen in the menu, an additional menu for project’s data editing appears, as it has already been explained in the first part of this guidelines.

The screenshot shows the 'Projects' administration page. On the left is a sidebar with navigation options: Dashboard, Schools, and Projects. The main content area has a breadcrumb trail 'Home / Admin / Projects' and a form titled 'Add project'. The form includes fields for School (a dropdown menu), Label, Project start year, Project duration, Discount rate, and a checkbox for 'Is do minimum scenario?'. There is also a large text area for 'Description' and a green 'Add' button. Below the form is a table with the following data:

|   | Project start year | Project duration | Investment | Discount rate | Description |   |
|---|--------------------|------------------|------------|---------------|-------------|---|
| 1 | 2014               | 5                | 40000      | 0.7           | asdf        | <div style="border: 1px solid red; padding: 2px;"><span>Open project</span> <span>[edit]</span> <span>Report</span></div> |

Figure 20