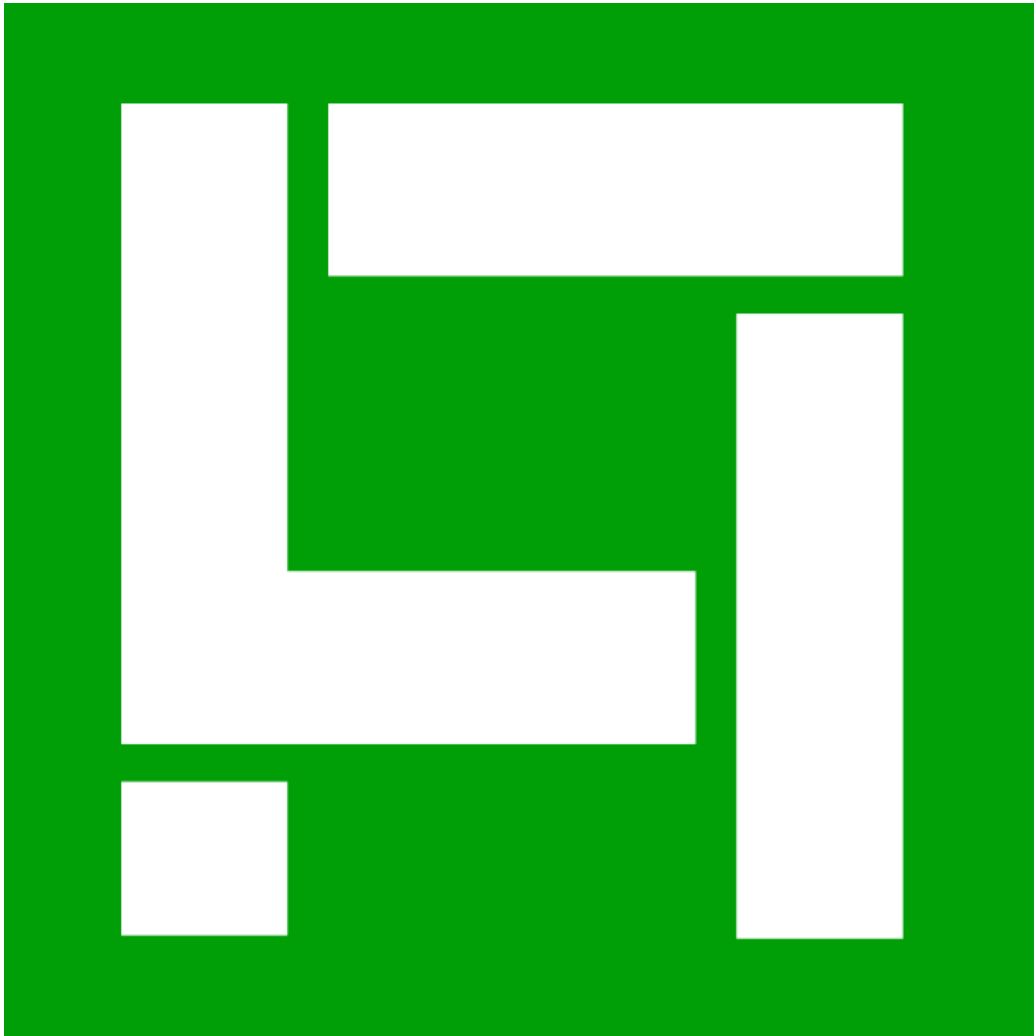


User Manual of SharifLCA Software (v.1.0)





1- Software Activation

When the software is run for the first time, the user is presented with a window similar to Fig. 1. After completing the information in the section indicated by number 1 in this figure, the user should click on the “Submit Your Information” button to submit the information for review and receive the software activation code (therefore, the user's system must be connected to the internet and the entered email address must be correct). After receiving the activation code via email, the user should enter the received code in the designated section indicated by number 2 and then click on the “Activate” button to activate the software. It should be noted that this process is only performed once, and in subsequent runs of the software, there is no need to repeat the activation process. Furthermore, using the toolbar shown in the section indicated by number 3, the user can access brief information about the software, the user guide file, and also communicate with the software developers and send them messages.

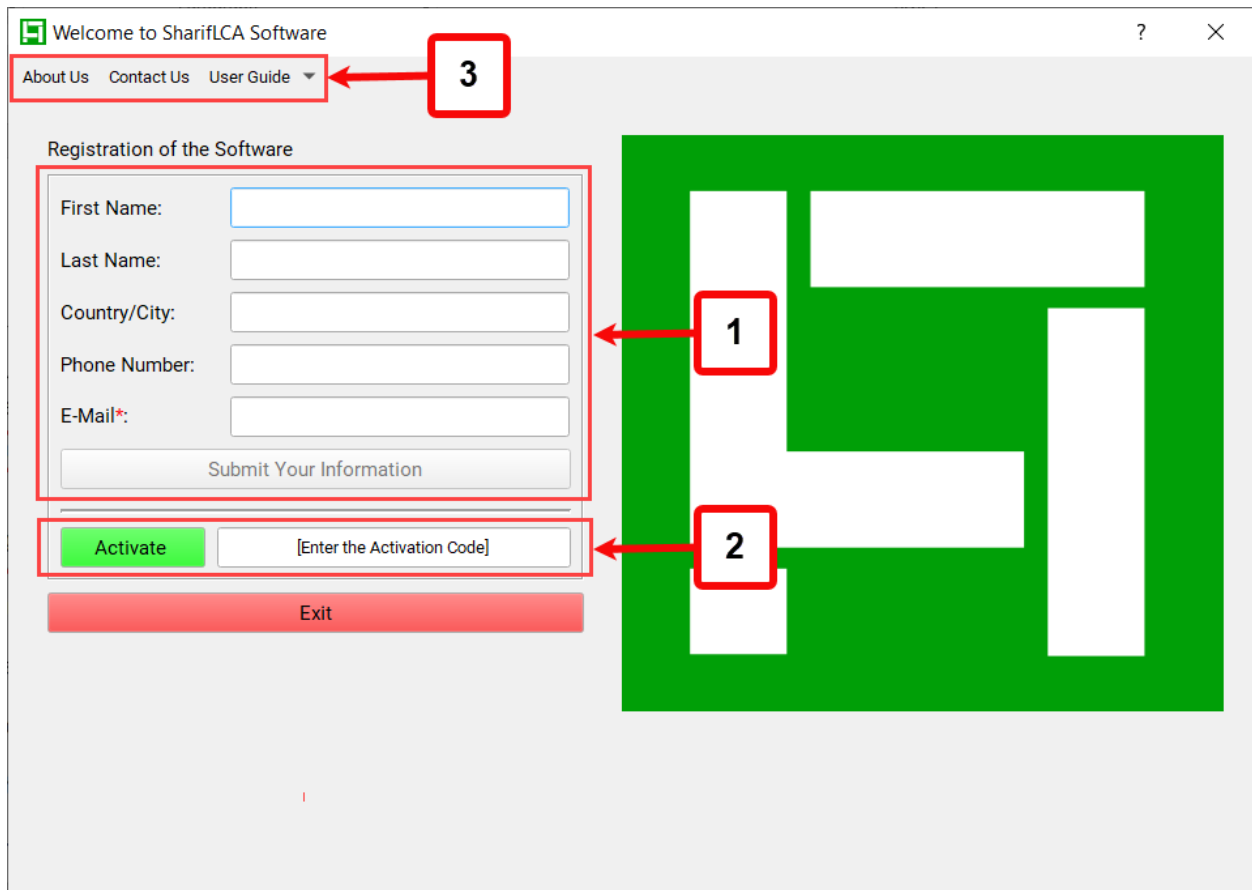


Fig. 1. The activation window of software.

2- The First Window

After activating the software, each time the software is run, the user is presented with a window similar to Fig. 2; where the user can define a new project by using the New button or open a previously saved project by using the Open button. Additionally, pressing the Exit button will result in exiting the software. Also, the user can find information about the software version and the remaining time until its expiration at the bottom of the window.

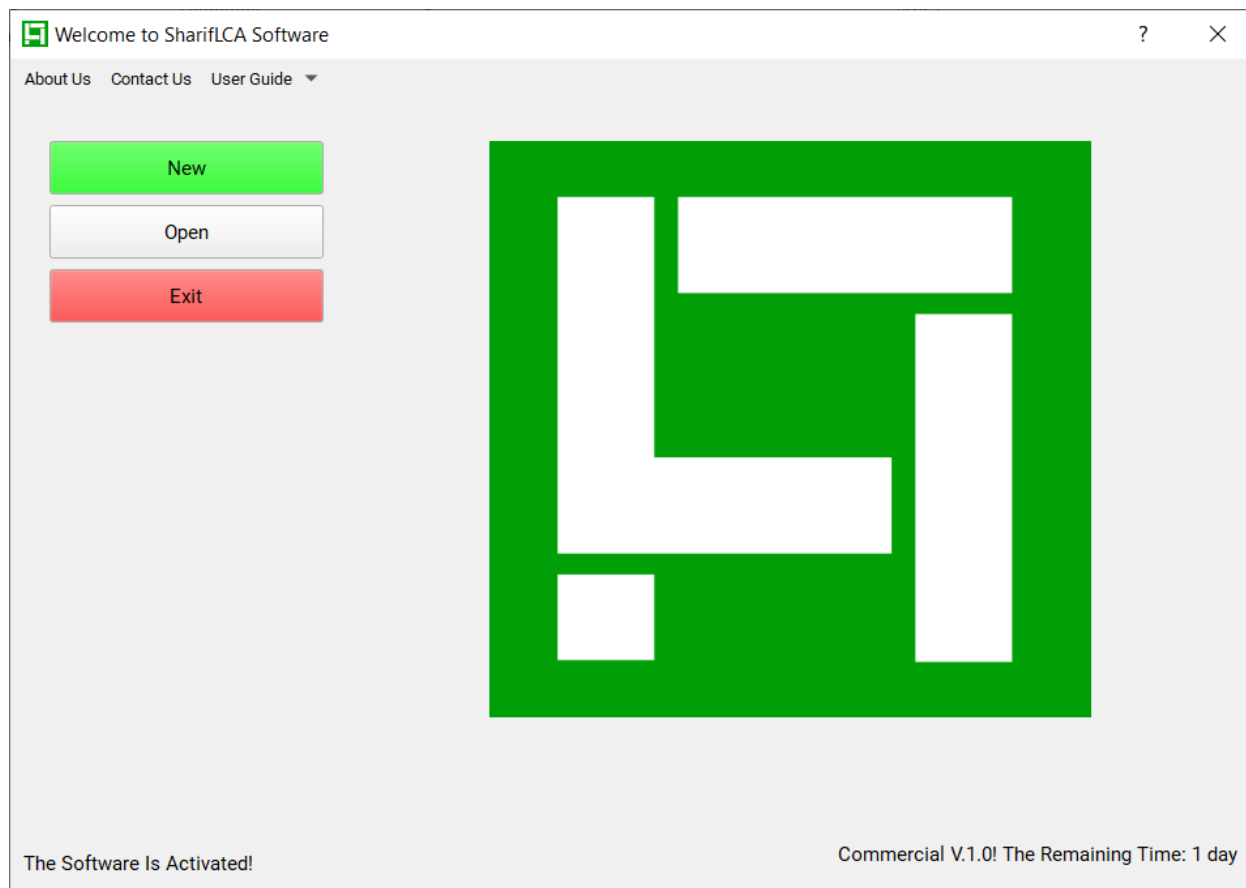


Fig. 2. The initial window of software.

3- Software Interface and Main Buttons

The main interface of the software is shown in Fig. 3. In the left toolbar of the software, there are various buttons that can be enabled or disabled depending on the conditions. These buttons include Goal and Scope Definition, Life Cycle Stages, Inventory Analysis, Databases, Calculate, and Results, each of which will be described below.

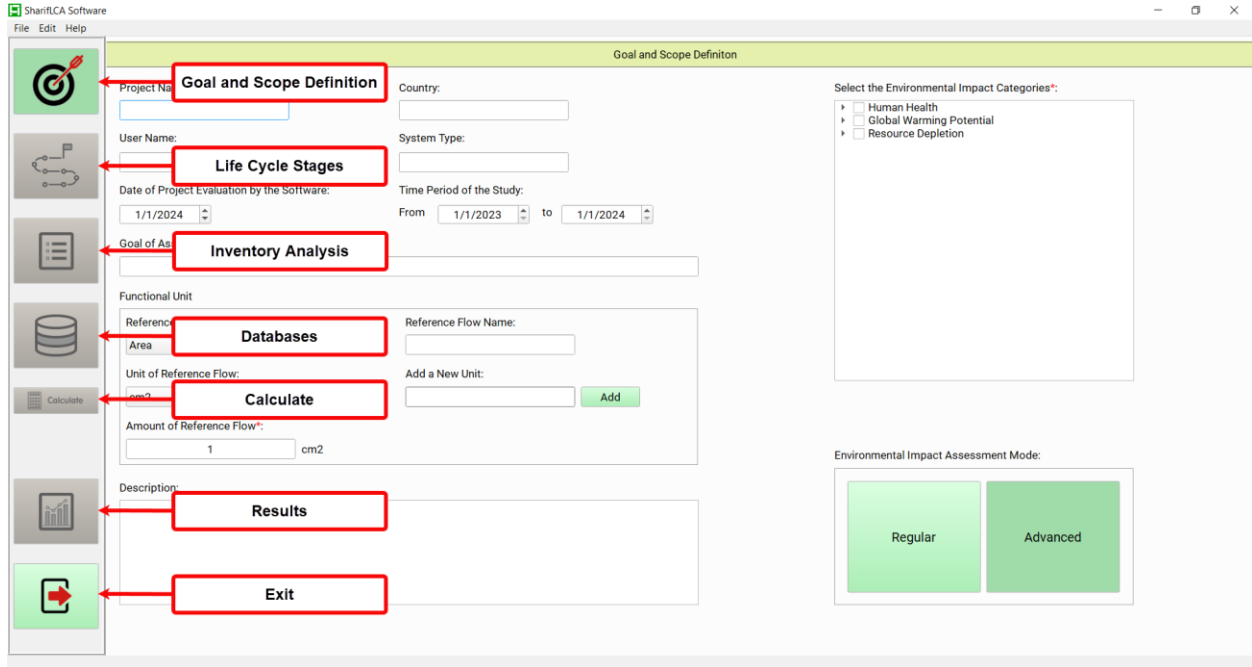


Fig. 3. Main software window and introduction to key functions.

4- Goal and Scope Definition Section of the Software

In the first stage, namely Goal and Scope Definition, the user can enter general information about the desired project according to their preferences. This section is indicated by number 1 in Fig. 4. In section number 2, the user must select the environmental impacts they wish to assess. In section number 3, relevant information about the functional unit of the system under study should be entered. In section number 4, similar to number 1, the user can provide a description of the project as desired. Section 5 is available only in the commercial version of the software. In this section, users can choose between Regular and Advanced modes. In Regular mode, users can utilize default data for assessing local impacts. However, in Advanced mode, users can input region and emission source details for a more precise assessment.

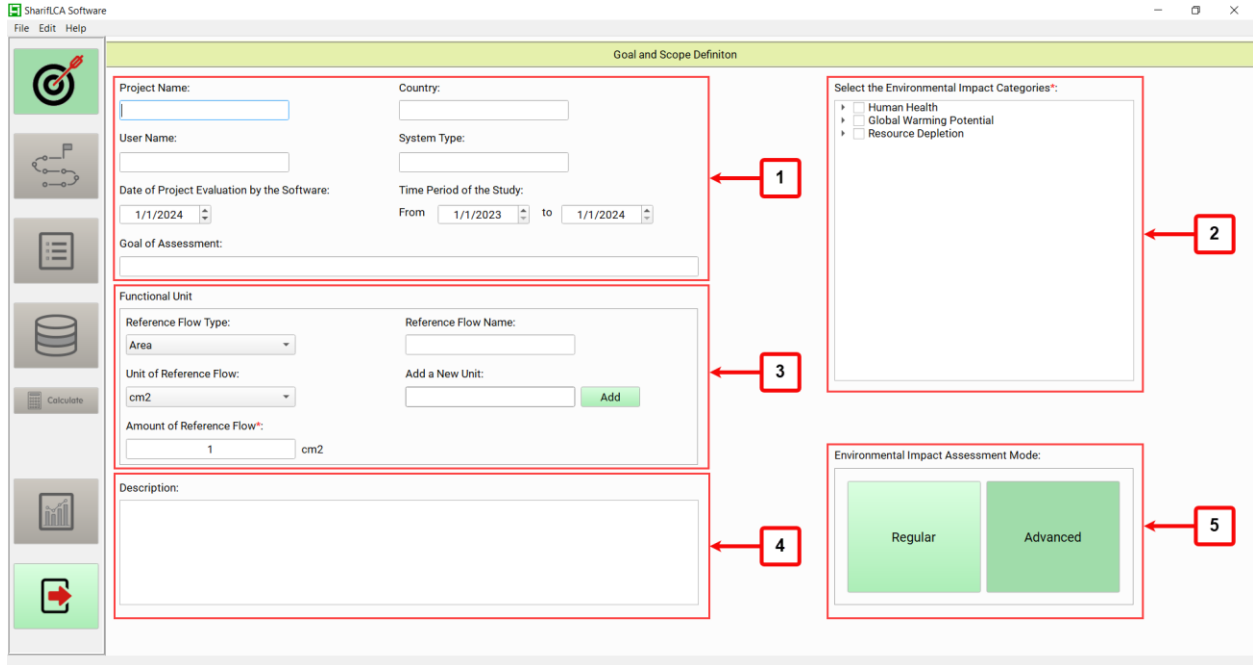


Fig. 4. Introduction to different parts of the software in the Goal and Scope Definition section.

5- Life Cycle Stages Section of the Software

In the Life Cycle Stages section, stages and sub-stages need to be defined and their characteristics should be specified (Fig. 5). In section number 1, the user needs to specify the name of a stage (e.g., power plant in the life cycle assessment of electricity generation), and in section number 2, enter the name of a sub-stage (e.g., construction of the power plant). By using the designated button indicated by number 4, the user is transferred to the Environment Definition section, which is activated when the user wants to assess local impacts such as the effects of carcinogenic, non-carcinogenic, and ionizing radiation. To add a new sub-stage, the user can use the designated button indicated by number 3; it should be noted that this button is enabled when the definition of the current sub-stage is completed. Additionally, to create a new stage, the user can use button number 5; it is necessary to have at least one fully defined sub-stage from the current stage in order to make a new stage. Due to the software's structure, the names of stages and sub-stages cannot be the same.

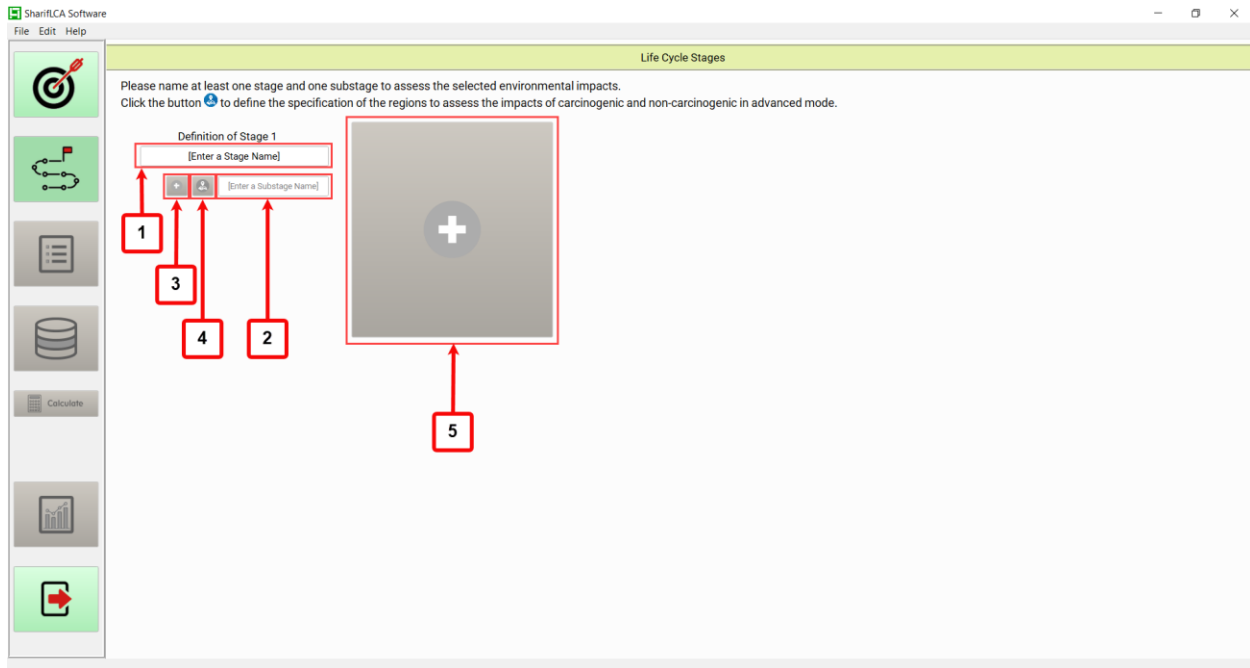


Fig. 5. Introduction to different parts of the software in the Life Cycle Stages section.

As mentioned, if one of the local impacts is selected, the user needs to enter some regional information. After the user clicks on the designated button, they will be presented with a window similar to Fig. 6. The user can access different environments for defining regional characteristics using the specified tab indicated by number 1. In the section shown by number 2, the user needs to enter the production time according to the reference flow (e.g., assuming the reference flow is electricity generated from a power plant and the assessment is based on the net electricity production in megawatt-hours, and it requires m cubic meters of natural gas for its production). Now, if the user wants to enter the region's information related to the sub-stage of the power plant, they should enter the required time for producing n megawatt-hours of net electricity in this section. If they want to enter the region's information related to the sub-stage of the refinery, they should enter the required time for producing m cubic meters of natural gas in this section.

In the section indicated by number 3, the user needs to enter the length and width of the geographical boundary associated with the relevant sub-stage. Furthermore, in section number 4, the user should enter the population structure of the region. Depending on the level of access to information, the user can enter the population in the form of a population pyramid, disaggregated



by gender and age groups, or enter the total population; this allows the software to distribute the population based on the country's population pyramid.

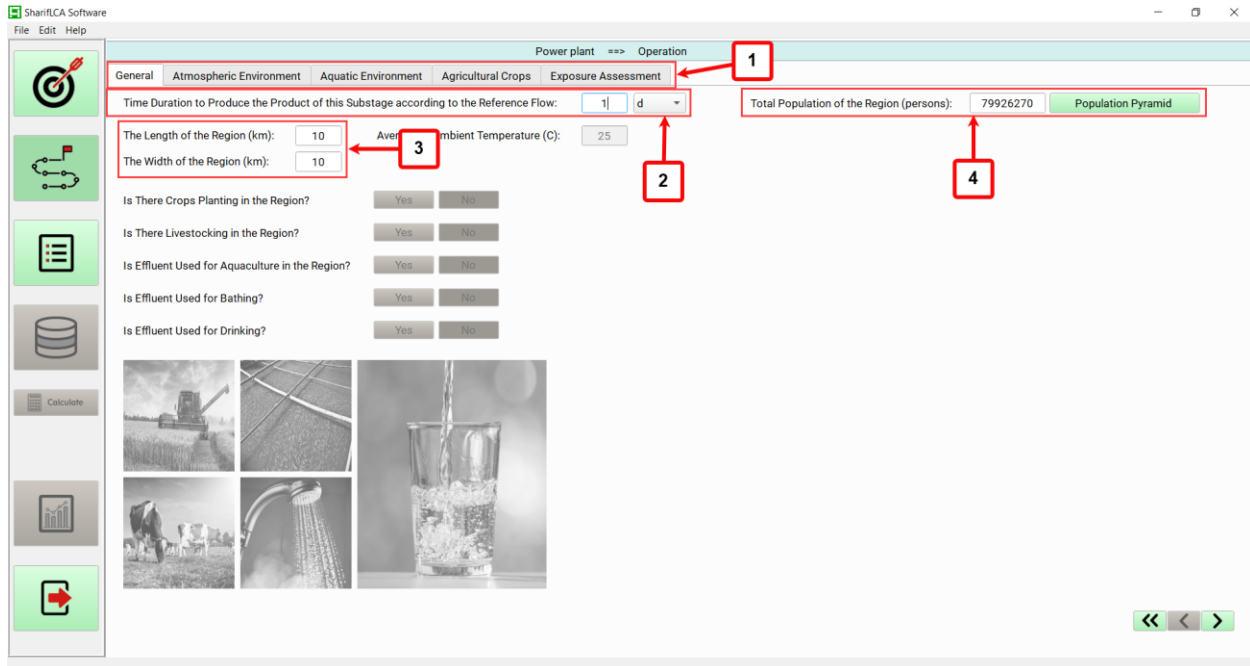


Fig. 6. Introduction to the Environment Definition section.

In order to model the dispersion of pollutants in the air, you need to access the Atmospheric Environment tab (Fig. 7). According to the section indicated by number 1 in Fig. 7, the user needs to activate the air pollutant dispersion modeling module first. Then, in section number 2, the user should enter the number of nodes for evaluating pollutant concentrations at that location. Since the number of nodes directly affects the accuracy of the results and the speed of environmental impact assessment, it should be determined accurately. In section number 3, the user should enter the relevant data for the stack (emission source). Additionally, to model the dispersion of air pollutants in the environment, the user needs to enter the weather conditions of the region and the prevailing wind in the area in the section indicated by number 4.

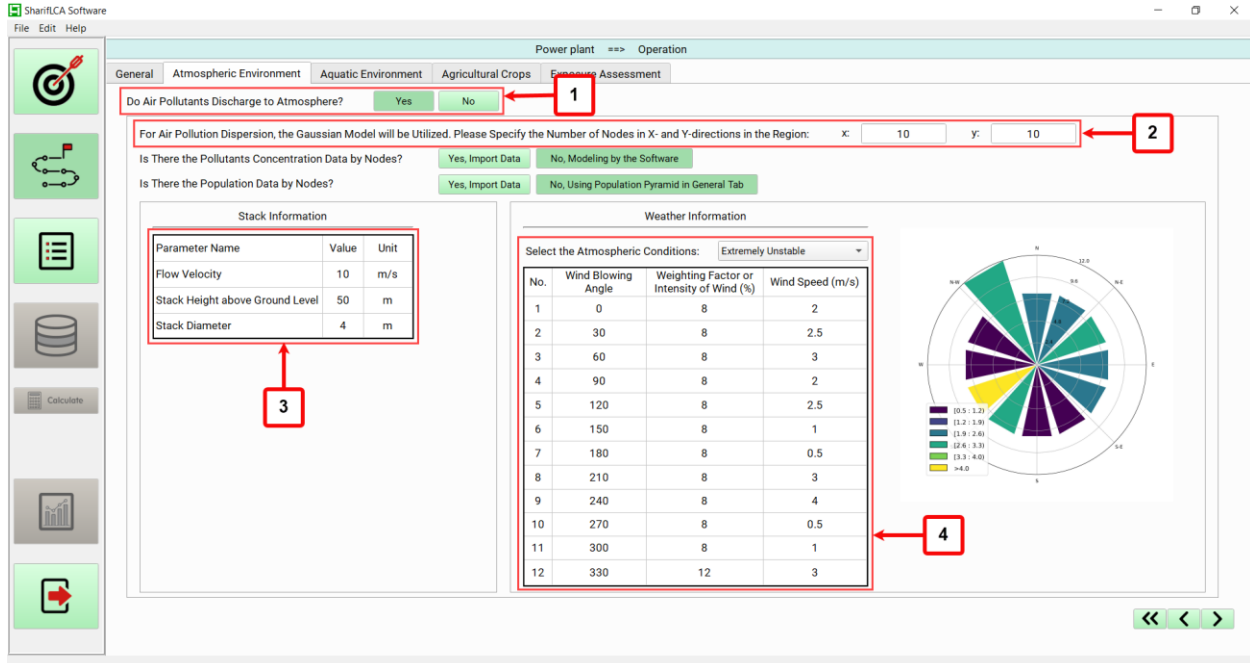


Fig. 7. Module of modeling air pollutant dispersion in the environment.

6- Inventory Analysis Section of the Software

In the next section, which is the Inventory Analysis section, the input and output flows of each sub-stage need to be entered (Fig. 8). In this section, new tabs with the specified names are created for the number of stages and sub-stages defined in the Life Cycle Stages section.

In the tab corresponding to each sub-stage, based on the selected impact categories and the type of environmental assessment defined for the region associated with the sub-stage, tabs for Emission to Air, Emission to Water, Cumulative Energy Demand, and Embodied Water are added at the bottom of the page for discharged air and water flows, as well as energy and water input flows (tabs number 3). Within each of these tabs, sub-tabs are displayed based on the type of impact category (tabs number 4), allowing the user to enter their inventory (e.g., the table shown with number 5 in Fig. 8 represents the human health impact category resulting from ozone depletion).

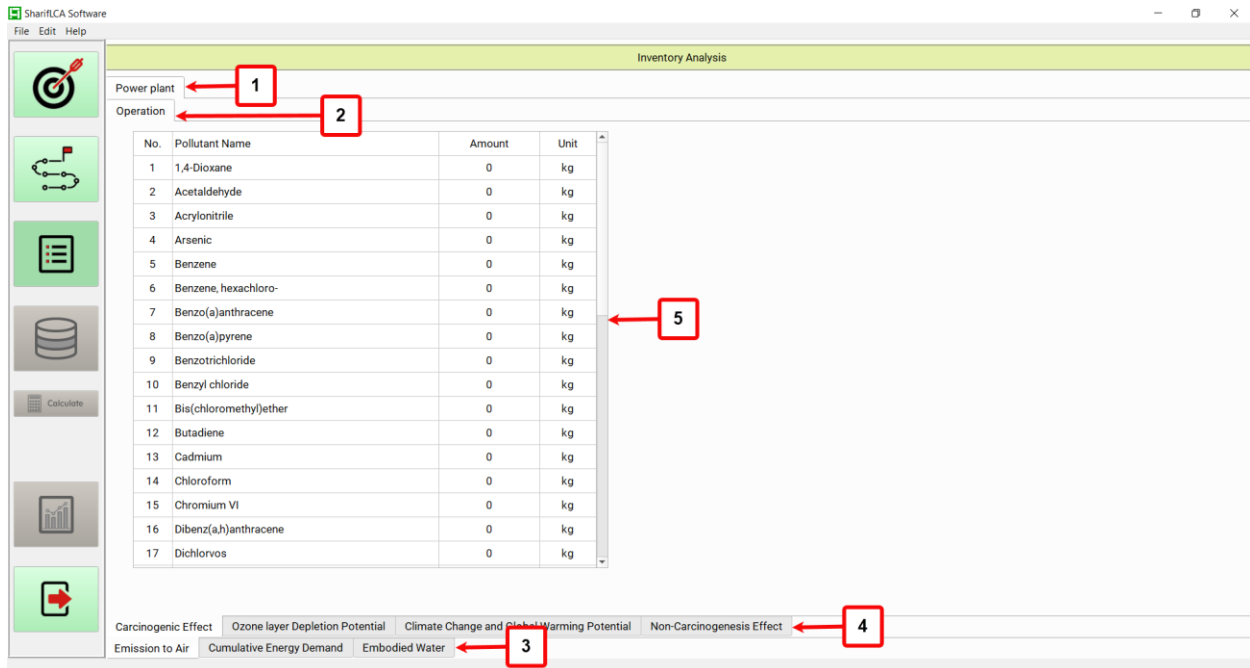


Fig. 8. Introduction to different parts of the software in the Inventory Analysis section.

In the Cumulative Energy Demand tab, the user is presented with Fig. 9. In this impact category, flows are divided into two categories: energy flows and feed flows. The user first selects the desired energy or feed flow from the list in bars number 2 or 7. If the desired flow is not found, the user has the option to define their desired flow in section number 11 to add it to the list. In sections number 3 or 8, the user must enter the value of the desired energy or feed flow. Additionally, sections number 4 and 9 are provided to enter the heating values of the flows. Furthermore, in order to convert the flows into primary energy, the user needs to enter a coefficient between 0 and 1 in sections number 5 and 10 for each flow. After defining a flow, the user can define a new flow using the designated keys numbered 1 and 6. It should be noted that in this impact category, only flows that enter the sub-stage from outside the system boundaries should be defined.

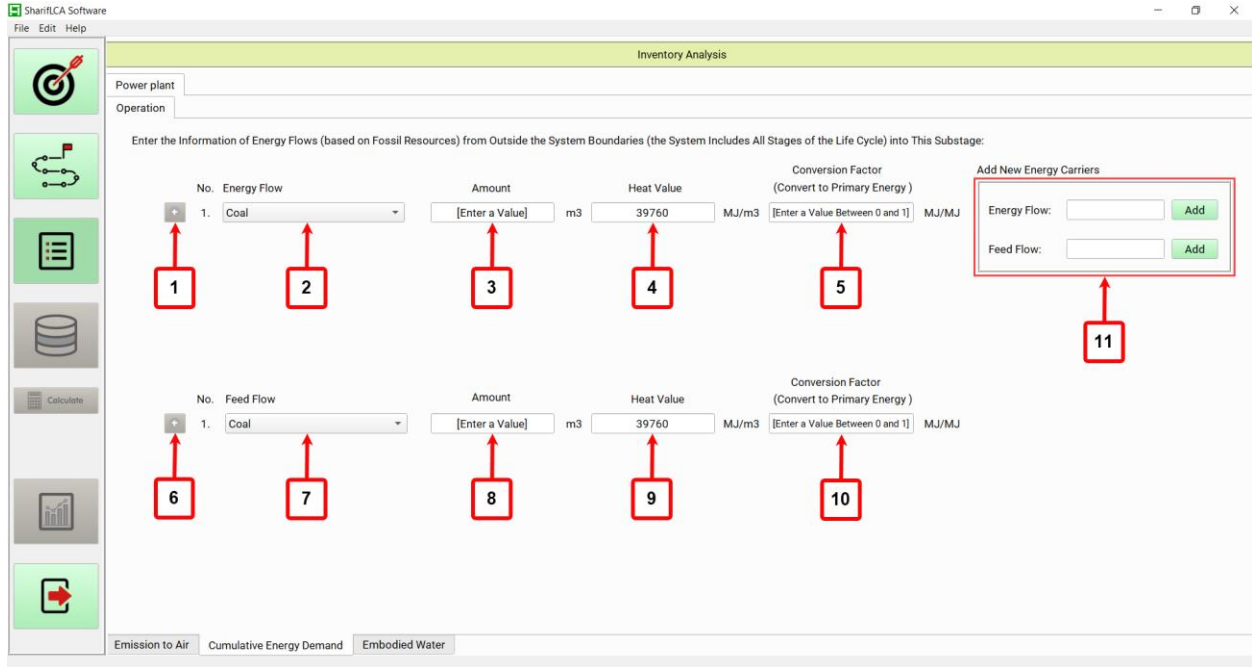


Fig. 9. Introduction to different parts of the software in the Cumulative Energy Demand of the Inventory Analysis section.

By accessing the Embodied Water tab, a window similar to Fig. 10 is displayed. In the list shown in bar number 2, the user selects the desired type of water flow. If necessary, the user can define a new type of flow using the section indicated by number 4 and add it to the list in the bar. Then, in section number 3, the user enters the value of the desired water flow. After defining a flow, the user can add and define a new flow using the key indicated by number 1.

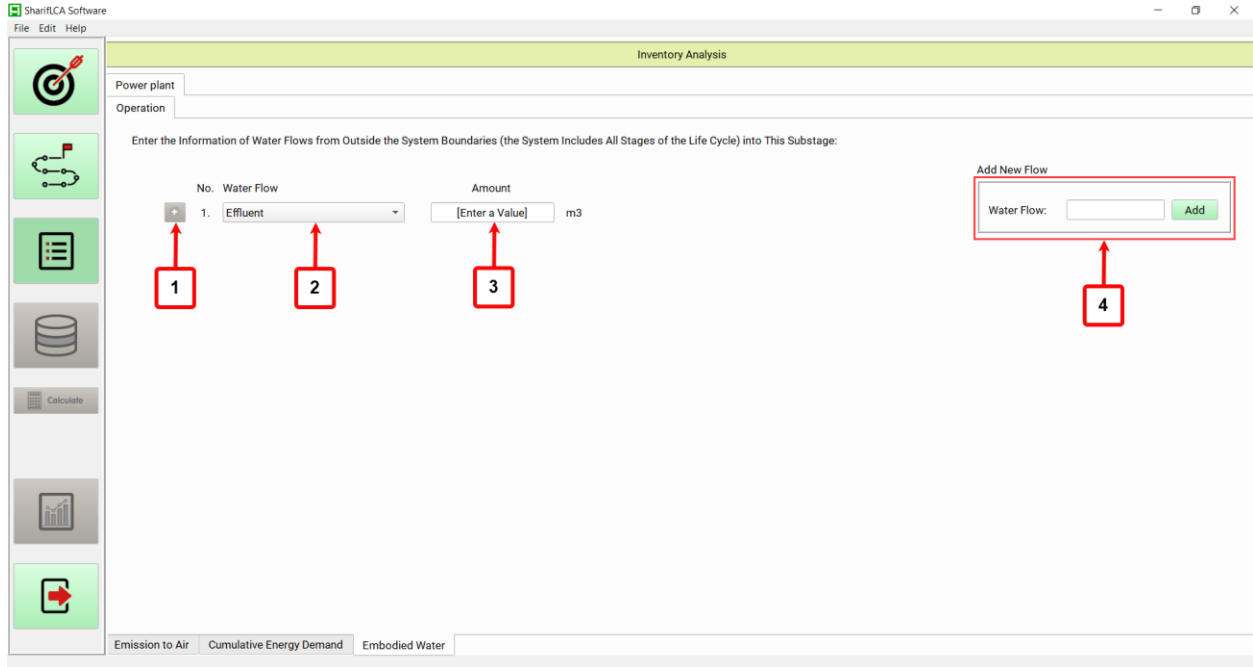


Fig. 10. Introduction to different parts of the software in the Embodied Water of the Inventory Analysis section.

7- Databases Section of the Software

In the next section of the software, under the Databases tab (as shown in Fig. 11), the user can enter their desired database for impact assessment according to the frameworks provided on the software's website. They can either enter their own database (key indicated by number 2) or use the default databases provided by the software (key indicated by number 1). It should be noted that the activation or deactivation of these keys is determined based on the selected impact categories for assessment.

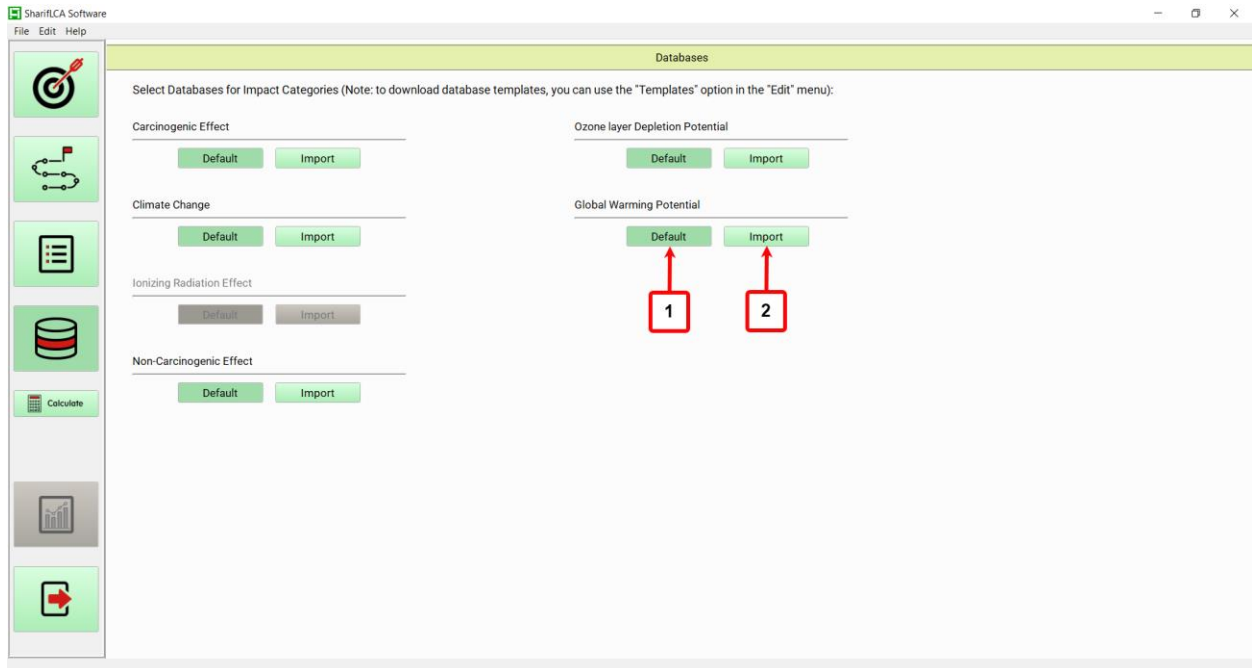


Fig. 11. Introduction to different parts of the software in the Databases section.

8- Results Section of the Software

After selecting the databases, the user needs to click on the Calculate button to perform the environmental impact assessment. Upon doing so, a loading bar similar to the one shown in Fig. 12 (Section 1) will be displayed, indicating the software's process of assessing the impact categories. When this loading bar reaches 100% and the assessment process is completed, the message "Is Done!" will be displayed, and the Results section of the software will become active (button indicated by number 2).

Under the tab indicated by number 3, additional tabs such as Human Health, Global Warming Potential, Cumulative Energy Demand, and Embodied Water may be added depending on the selected impact categories for assessment. The table shown in Fig. 12 presents the results of the impact category assessment, categorized by sub-stages and stages. Furthermore, the user can select their desired unit for displaying the impact category values using the dropdown menu shown in Section 5. It should be noted that the display of these values is based on the functional unit selected in the Goal and Scope Definition section.



In Section 6, the necessary tools for displaying the results in the form of charts are provided to the user. Additionally, to obtain Excel outputs for the available inventory and results of the software, the buttons indicated by numbers 7 and 8 can be used.

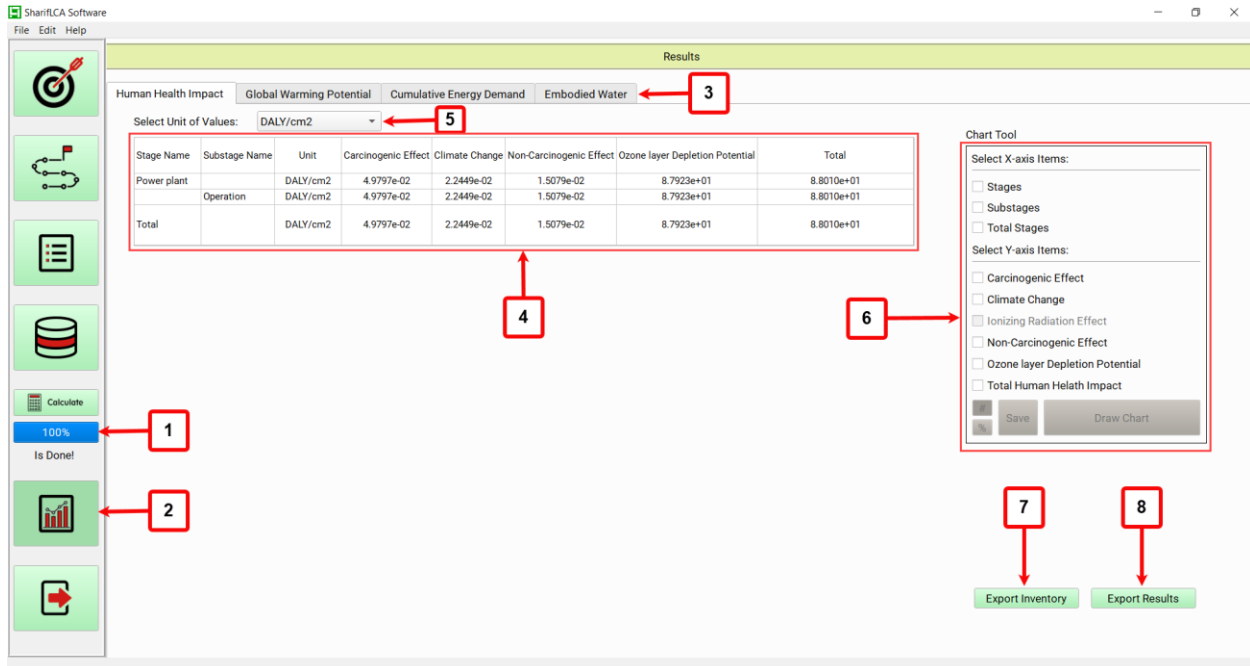


Fig. 12. Introduction to different parts of the software in the Results section.