Project Green Manual

Submission for CMSC 150

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About

Project Green is a project making use of optimization to solve a specific problem: To minimize the cost of a selection of project meeting its constraint. Specifically, the City of Greenvale has been mandated by the national government to drastically reduce its pollution footprint, identifying ten (10) specific pollutants to reduce. To achieve these reductions, Greenvale has access to a menu of 30 mitigation options. However, the valid solution only comes with specific combinations of projects. To visualize the problem, including its inputs and outputs, this program is created.

Libraries and Dependencies

Python, Flask, FlaskSession, NumPy

How to Run

1. Extract the project folder
2. Open the project folder in a terminal

   ```
   cd path\to\CMSC150_PROJECT
   ```

3. The folder already includes a virtual environment and the required libraries. Activate that virtual environment using

   ```
   Windows (Command Prompt): venv\Scripts\activate
   Windows (Powershell):  venv\Scripts\Activate.ps1
   Linux:  source venv/bin/activate
   ```

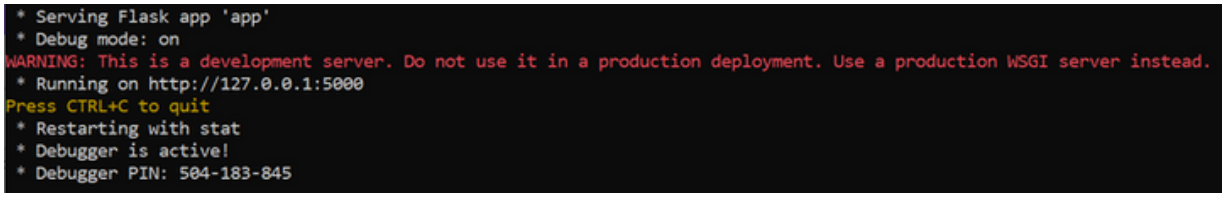
   You should now see a (venv) at the beginning of the line of your command prompt
4. Just to be sure (hehe), install the dependencies using (venv must be activated):

   ```
   pip install -r requirements.txt
   ```

5. Now, run the application using:

   ```
   python app.py
   ```

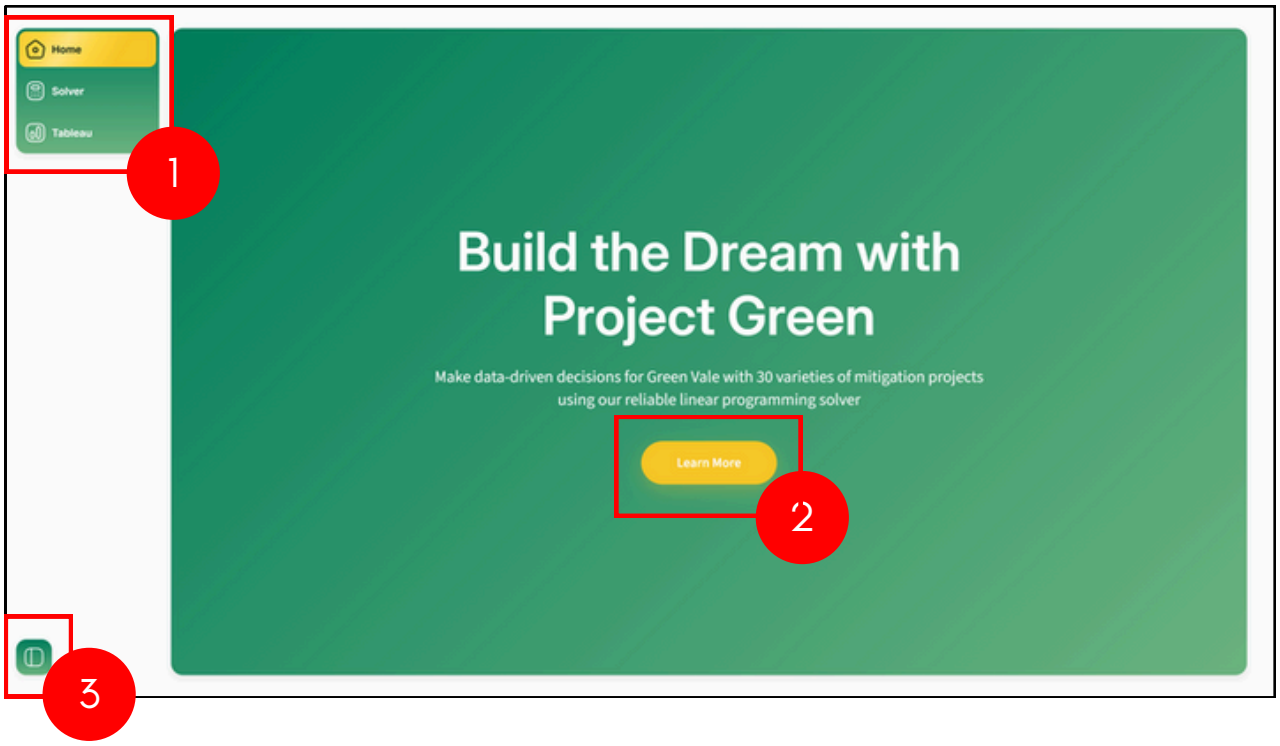
   You should see the following in your command prompt



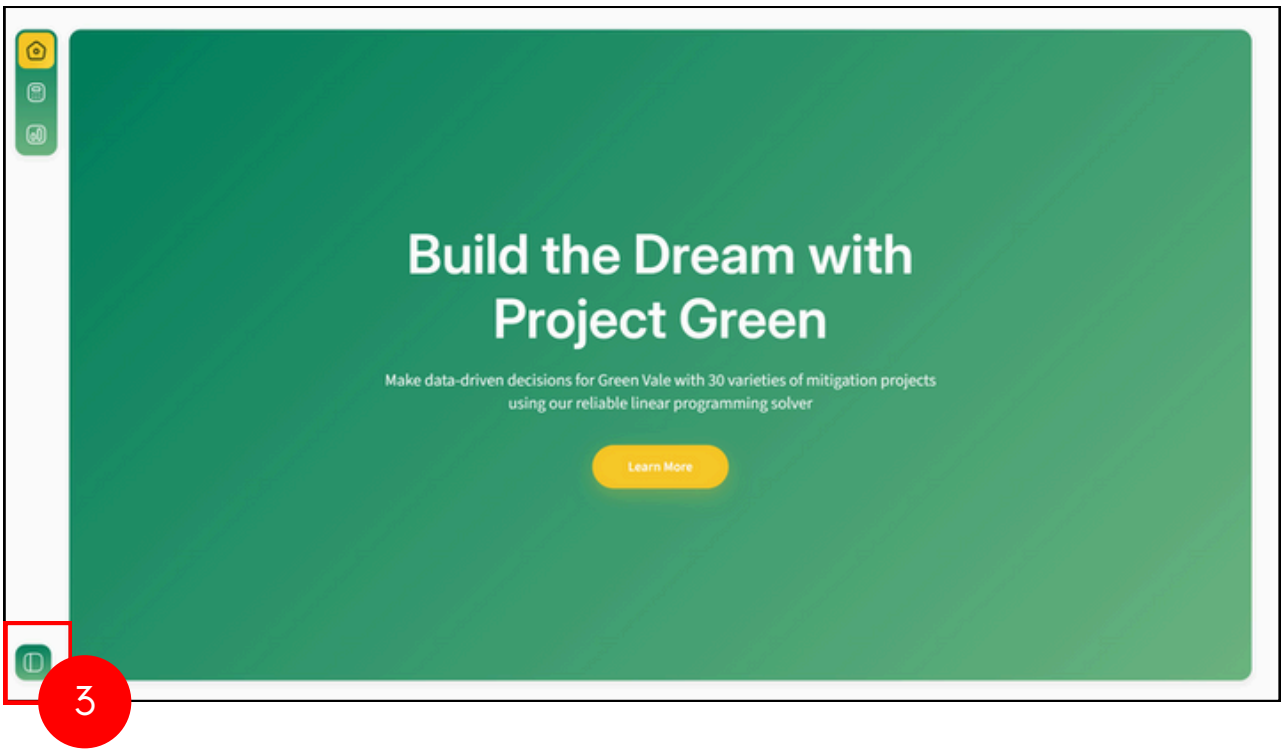
6. Visit http://127.0.0.1:5000

Navigation

1. Home Page

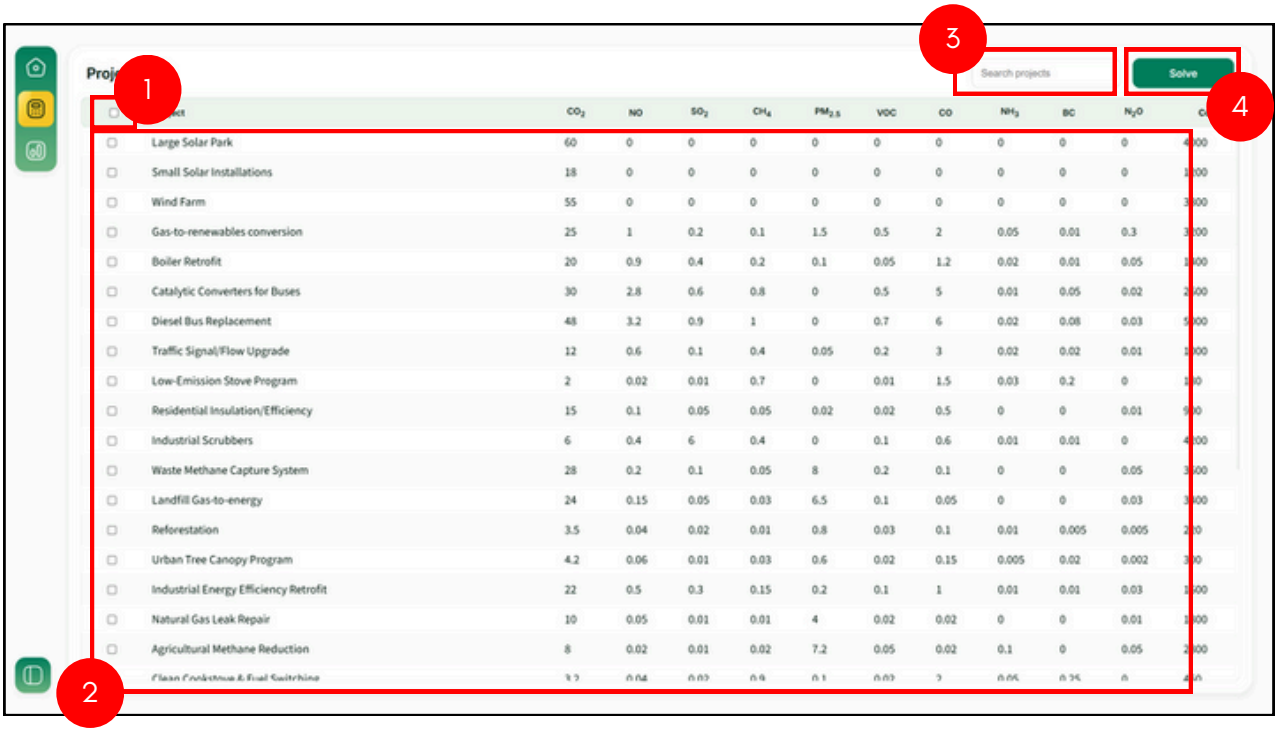


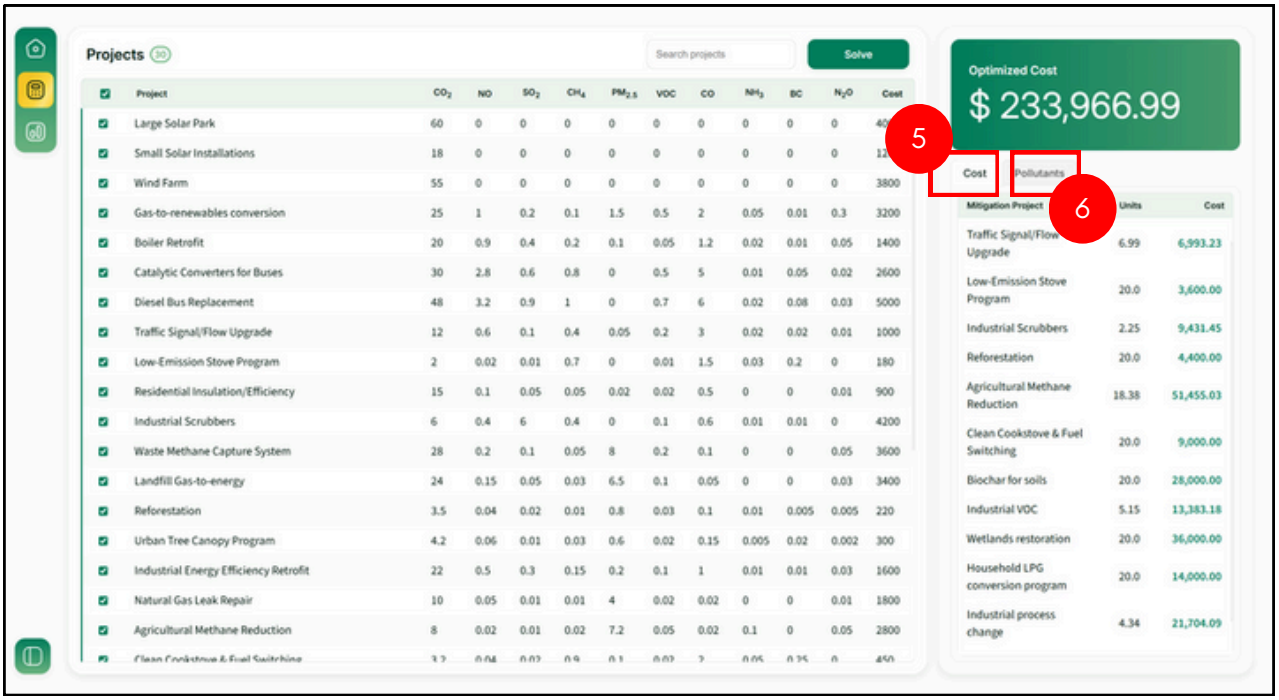
1.1 Sidebar - Click each tab to navigate to it's respective page
1.2 Learn More - Click learn more to download the manual
1.3 Toggle Sidebar - Click toggle button to collapse or expand the sidebarl



Navigation

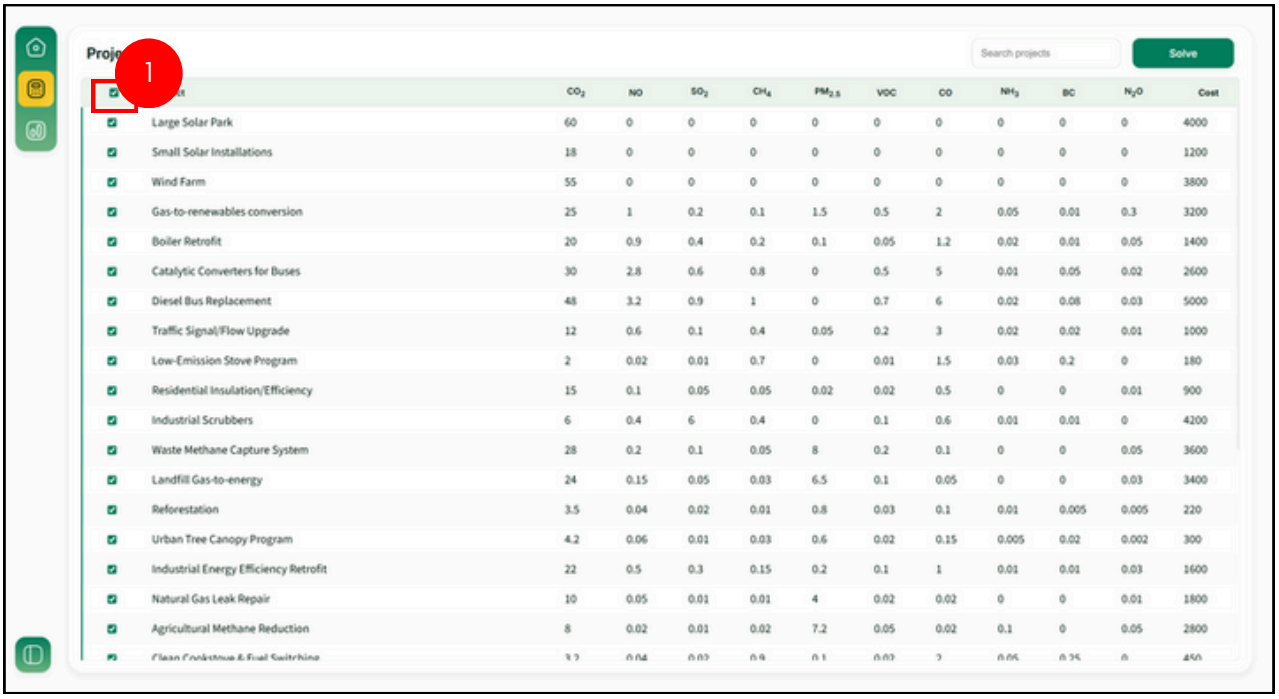
2. Solver Page





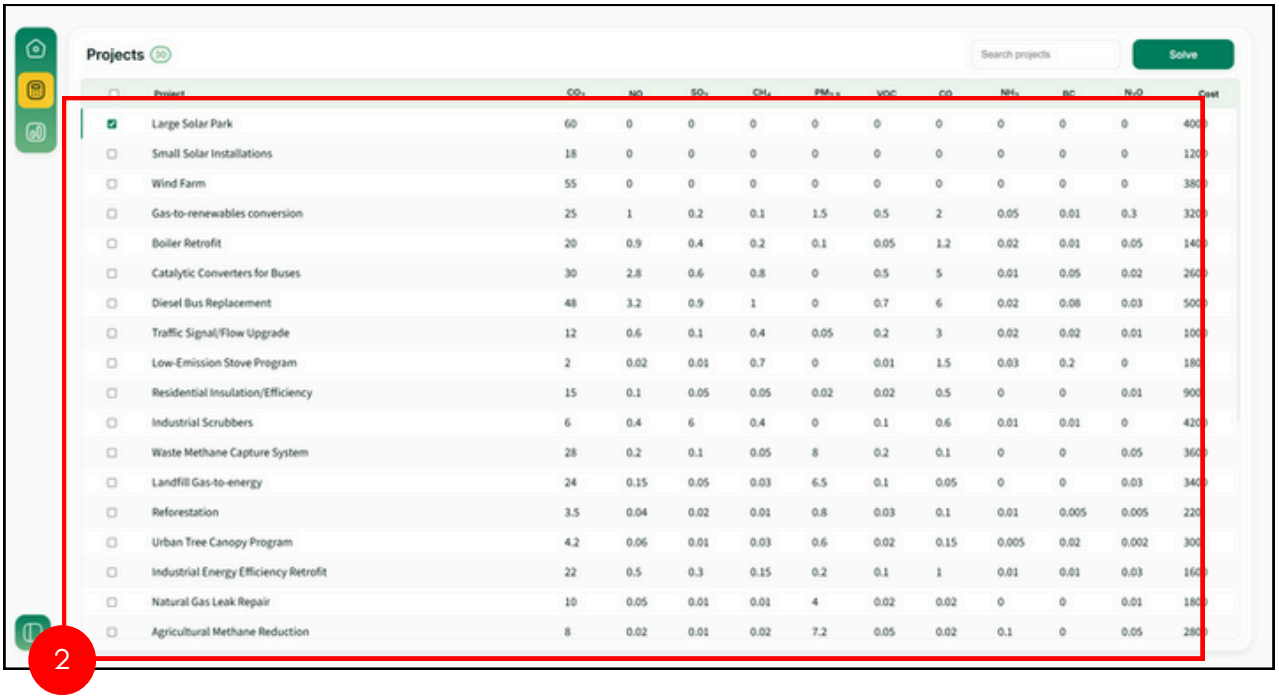
Navigation

2.1 Master Checkbox - Click the master checkbox to select/deselect all checkboxes. Clicking a selected master checkbox will deselect all checkboxes, while clicking a deselected master checkbox will select all checkboxes



2.2.1 Projects - Scroll down to view more projects

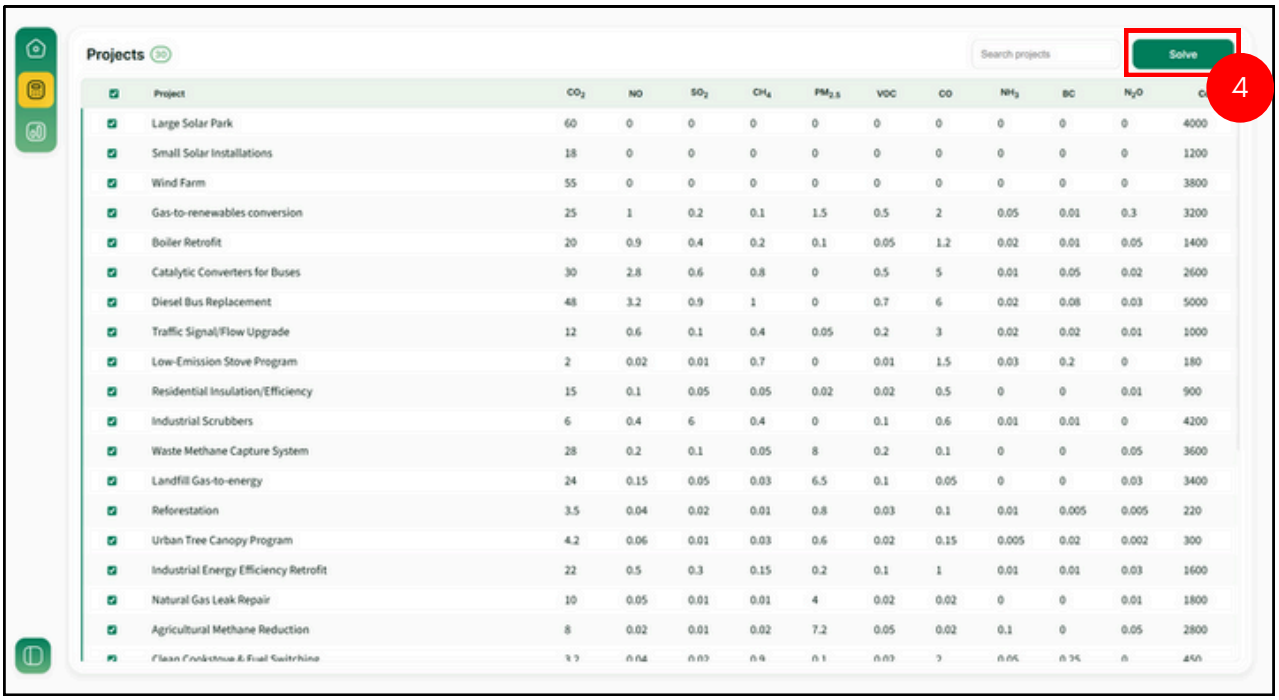
2.2.2 Checkbox - Click the checkbox to select the projects and add to the project selections



Navigation

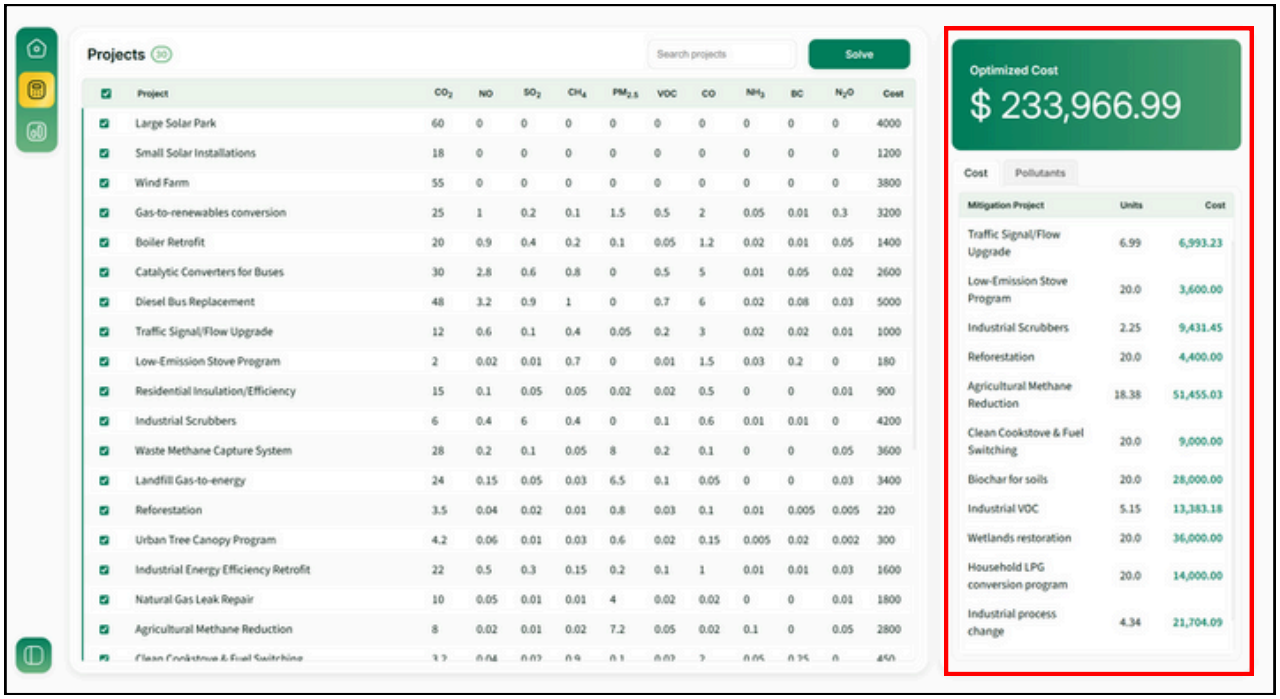
2.3 Search - Click the search bar and type an input to search for specific projects

2.4 Solve - Click the solve button to start optimizing based on the selection

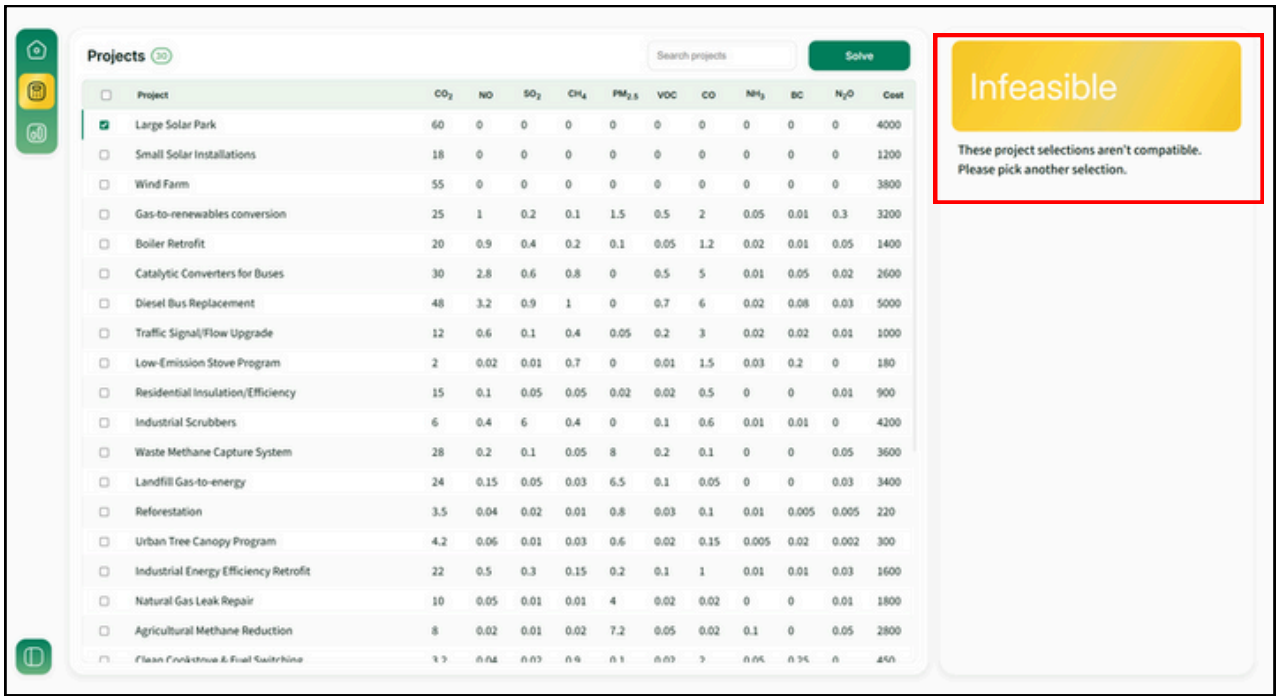


Navigation

2.4 A card and table will appear upon a successful optimization. The card will indicate the optimized cost and the table will display the cost per all units and pollutants breakdown.

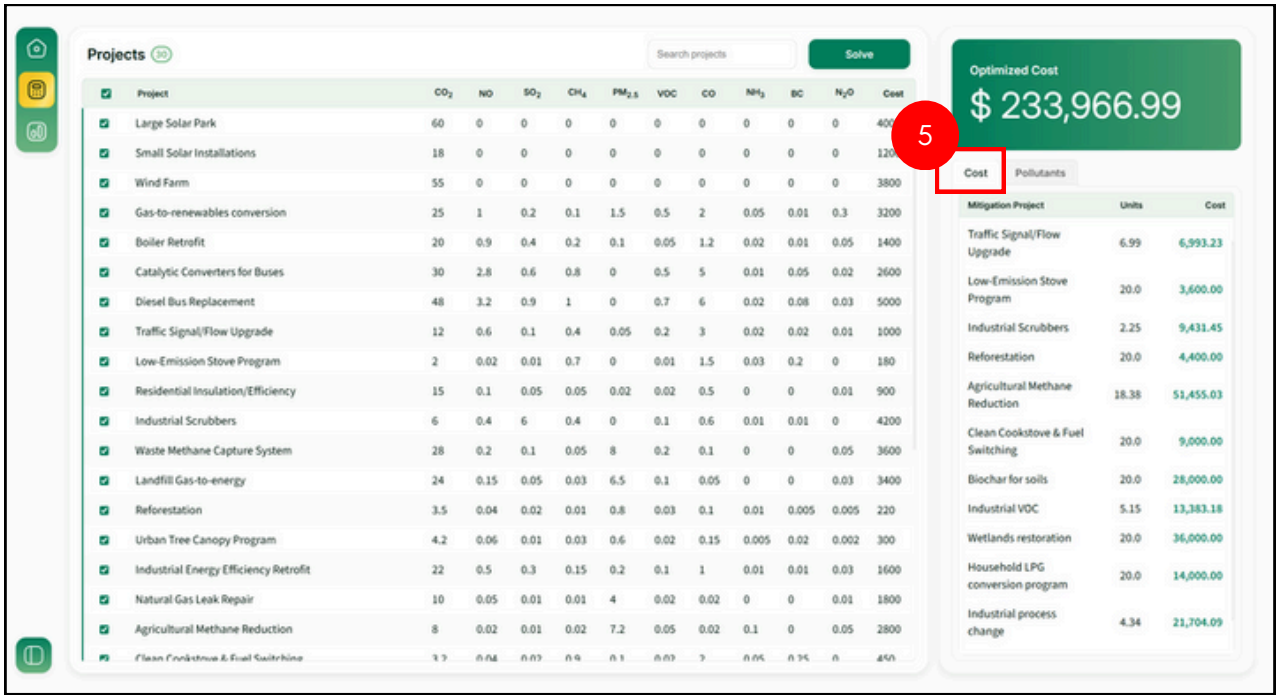


2.4 Upon an infeasible selection, a card indicating *Infeasible* will be displayed along with a message.

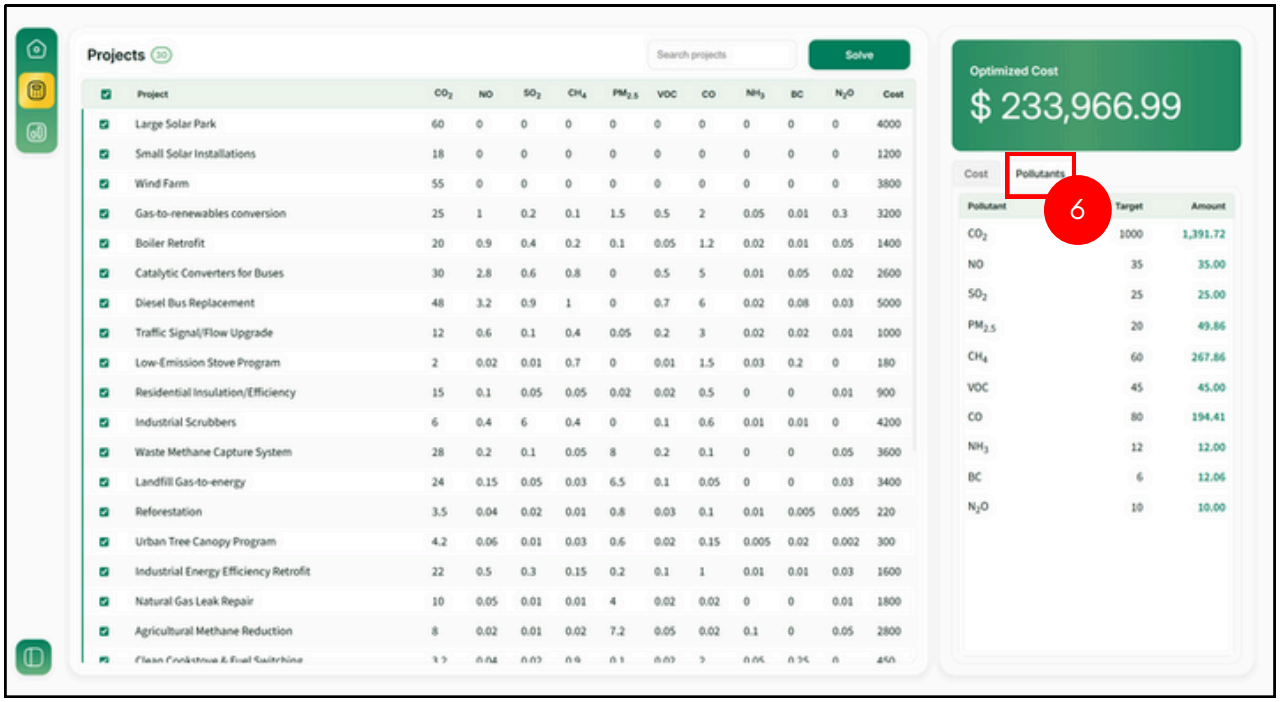


Navigation

2.5 Cost Breakdown - Clicking the cost tab will display a table indicating the total units to be implemented and the total cost of the specific project

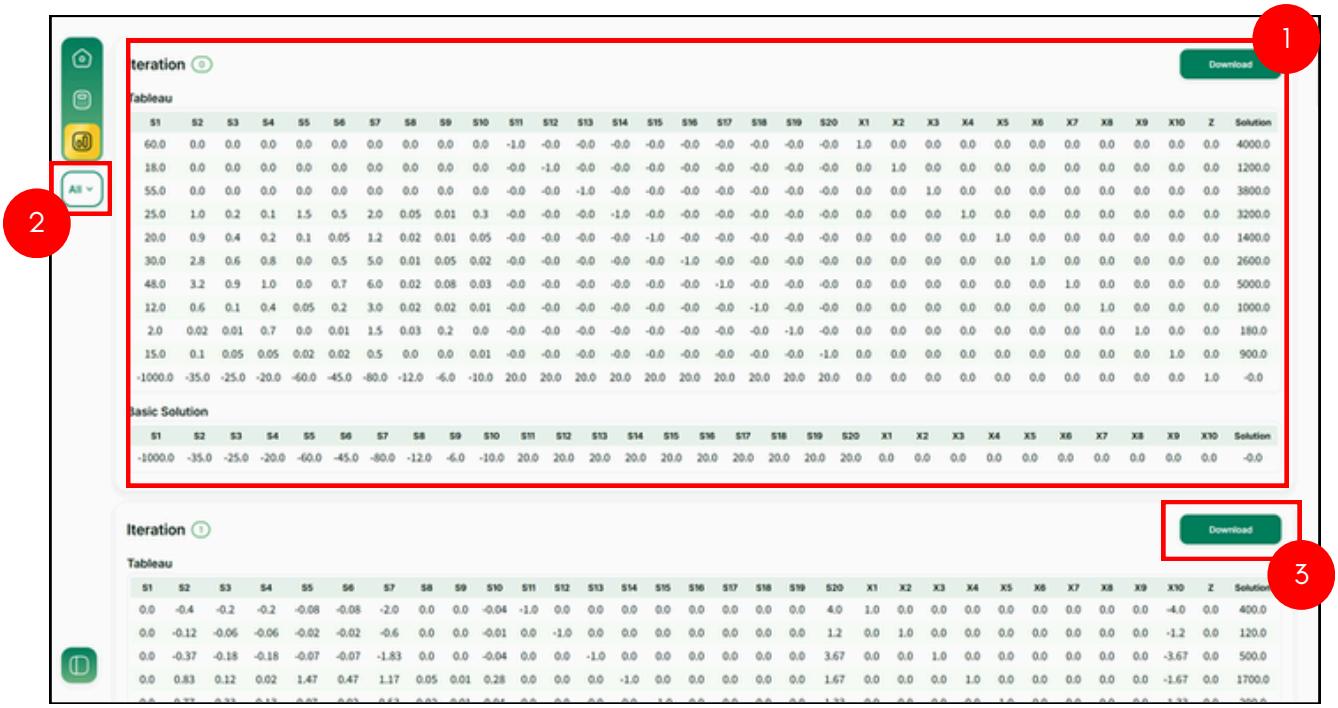


2.6 Pollutants Breakdown - Clicking the pollutants tab will display a table indicating the target pollutants and the amount of pollutants produced by the optimized solution

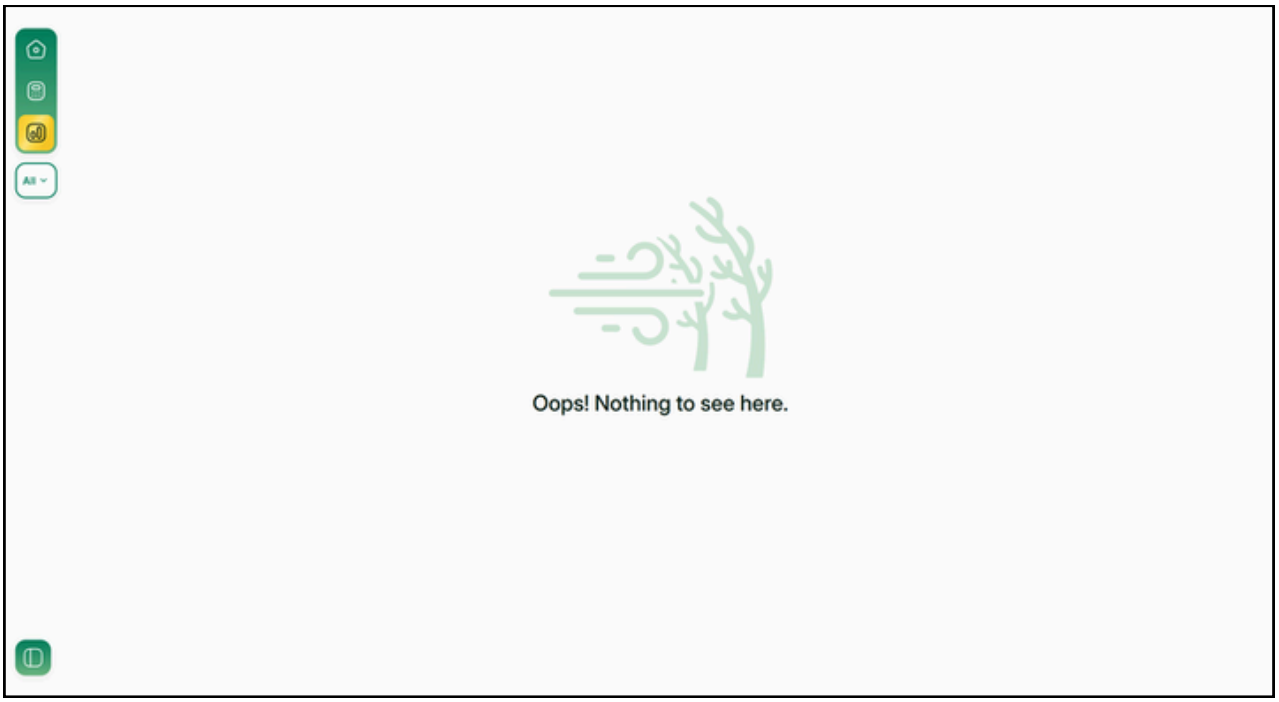


Navigation

3. Tableau Page

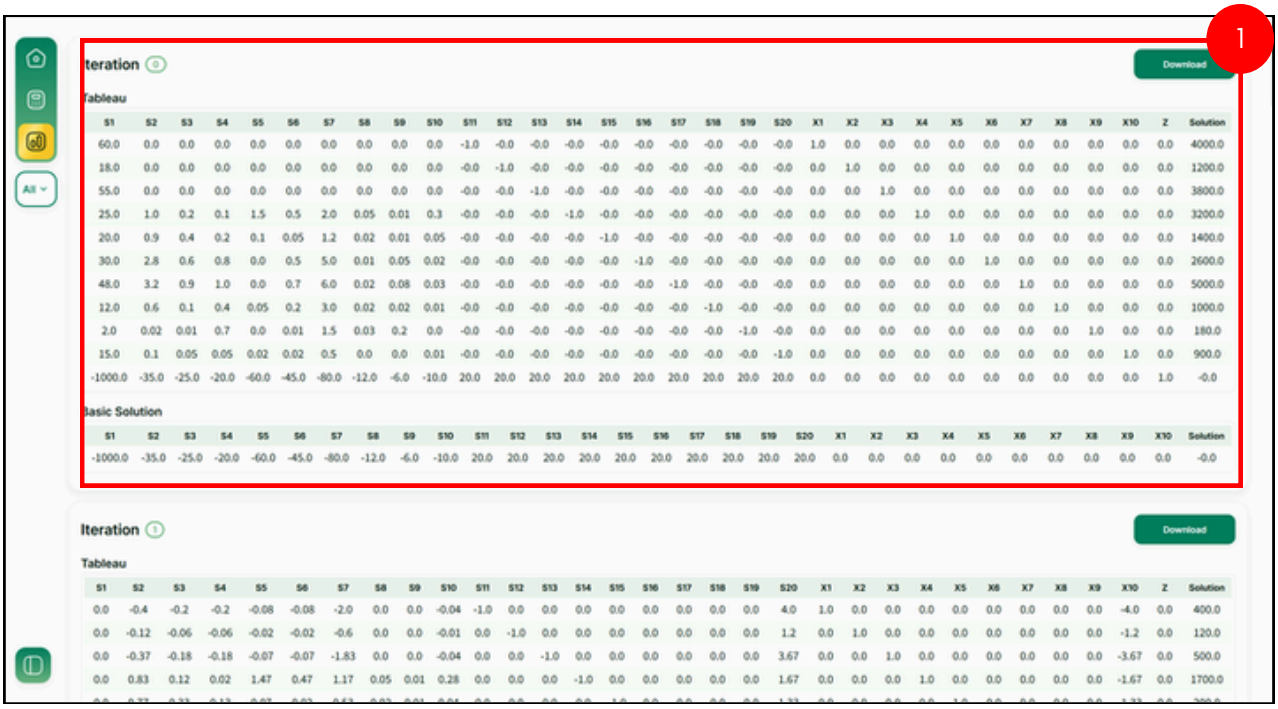


3.0 Blank Page - Upon visiting with an empty tableau iterations, a blank page is displayed

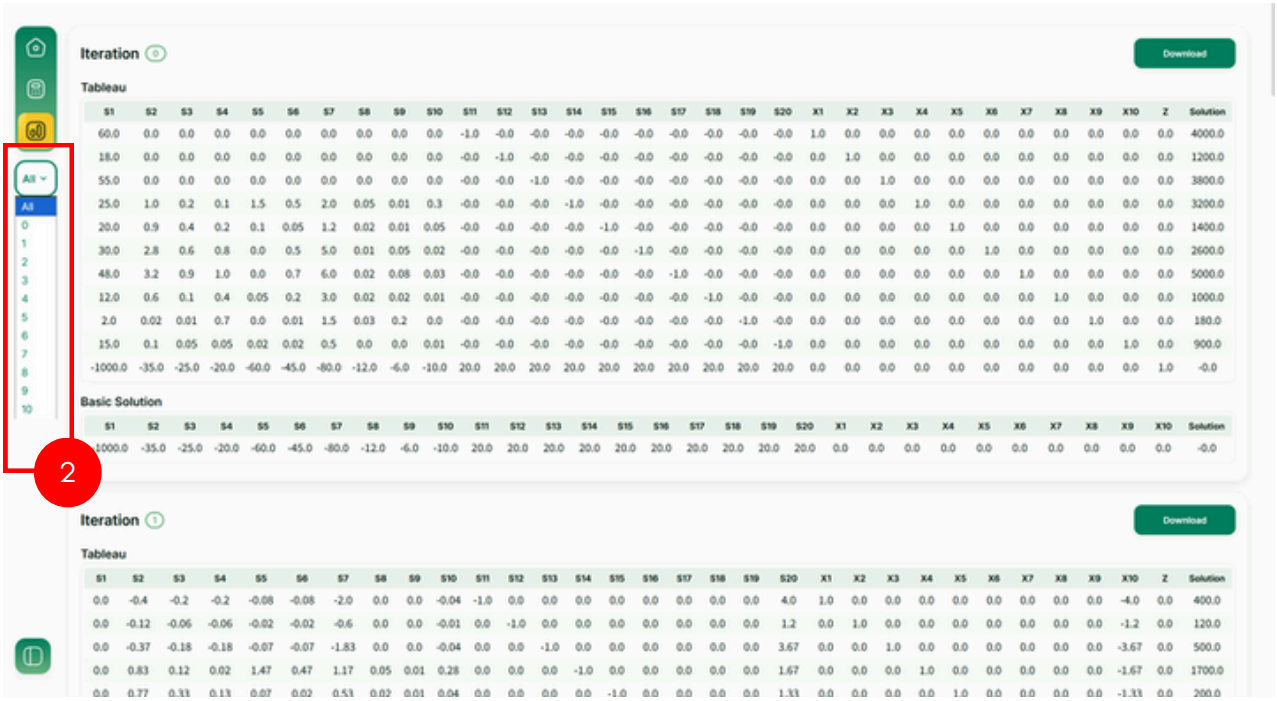


Navigation

3.1. Iteration Display - Users will be able to view a specific iteration of the solution, displaying the iteration number, the tableau, and its basic solution. Labels at the top of each tables include the slack variables, the unknown project variables, the (Z) solution variable, and the solution value.

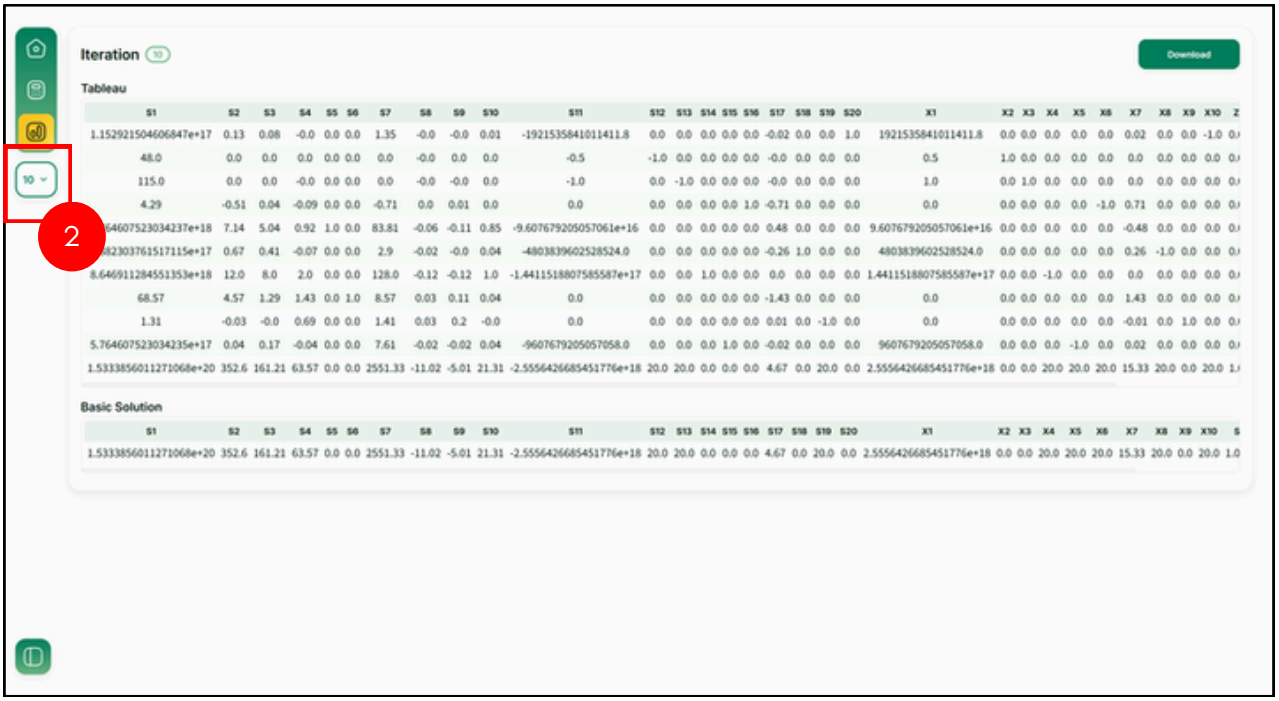


3.2. Iteration Selection Dropdown - Whether infeasible or not, users will be able to see each iteration of the solution (stops at the final tableau for infeasible solution). Users can choose to view all iterations, or a specific iteration depending on their preference.



Navigation

3.2. Iteration 0 displays the initial tableau of the system of linear equations of the problem. The final iteration displays either the solution of the problem or the final tableau before concluding the problem's infeasibility.



3.3. Download - Click the Download button to download the table content as a .csv file