PlanningChecker User Guide

Group 8

31/10/2024

Welcome to PlanningChecker

This guide will walk you through each step of using the tool. Follow the instructions below to get the most out of all the features PlanningChecker has to offer.

Contents

1 Introduction

PlanningChecker will check if your given bus planning is complete and correct. Whether you're new to this type of software or an experienced user, this guide will help you navigate through the setup and usage processes for a smooth experience. With the transition to electric busses, bus scheduling has gained more requirements. PlanningChecker makes sure that every bus schedule meets these new requirements. The tool checks if all of the given routes will be driven, if the charging time of a bus is more than 15 minutes and if the bus has an SOC-value (State of Charge-value) below the minimal value. If the given bus planning and timetable don't meet the conditions, PlanningChecker will let you know where the conditions aren't met. This makes it easier for planners to quickly identify and correct potential issues and minimizing errors in the scheduling process.
Before using the tool, please read the Disclaimer (chapter 7).

2 Requirements

To use PlanningChecker, you will need:

- Access to the tool.

- A stable internet connection and access to a modern browser (Chrome, Edge, etc.).

- A bus planning that meets the following specifications:

  - All columns except the first (containing the row numbers) should match the following names exactly ['**startlocatie**', '**eindlocatie**', '**starttijd**', '**eindtijd**', '**activiteit**', '**buslijn**', '**energieverbruik**', '**starttijd datum**', '**eindtijd datum**', '**omloop nummer**'].

  - In the column 'activiteit':

    * Charging activities must be denoted by '**opladen**'.

    * Deadhead trips must be denoted by '**materiaal rit**'.

    * Idle activities must be denoted by '**idle**'.

More requirements on the next page.

- A timetable that meets the following specifications:
  - The time table file must contain 2 sheets, one containing the time table and the other containing the distance matrix.
  - The sheet containing the distance matrix must be named '**Afstandsmatrix**'.
  - The sheet containing the time table must contain the following columns: ['**startlocatie**', '**vertrektijd**', '**eindlocatie**', '**buslijn**'].
  - The sheet containing the distance matrix must contain the following columns: ['**startlocatie**', '**eindlocatie**', '**afstand in meters**', '**buslijn**'].
- All names written in **bold** are case sensitive and must match exactly.

3 How to use the tool

3.1 Step 1: Upload files

1. Navigate to the website
   - To do this, open the following URL in your browser: https://planningchecker.streamlit.app
   - This should open the tool, if that is not the case, please check if you have met all the requirements, if so, please try to contact us about the problem, see '6 Support Information'.

2. On the 'PlanningChecker' page, click on the 'Browse files' button and upload the correct file (see figure 1).
   - Make sure the files are Excel files and fit the requirements specified in '2 Requirements'.
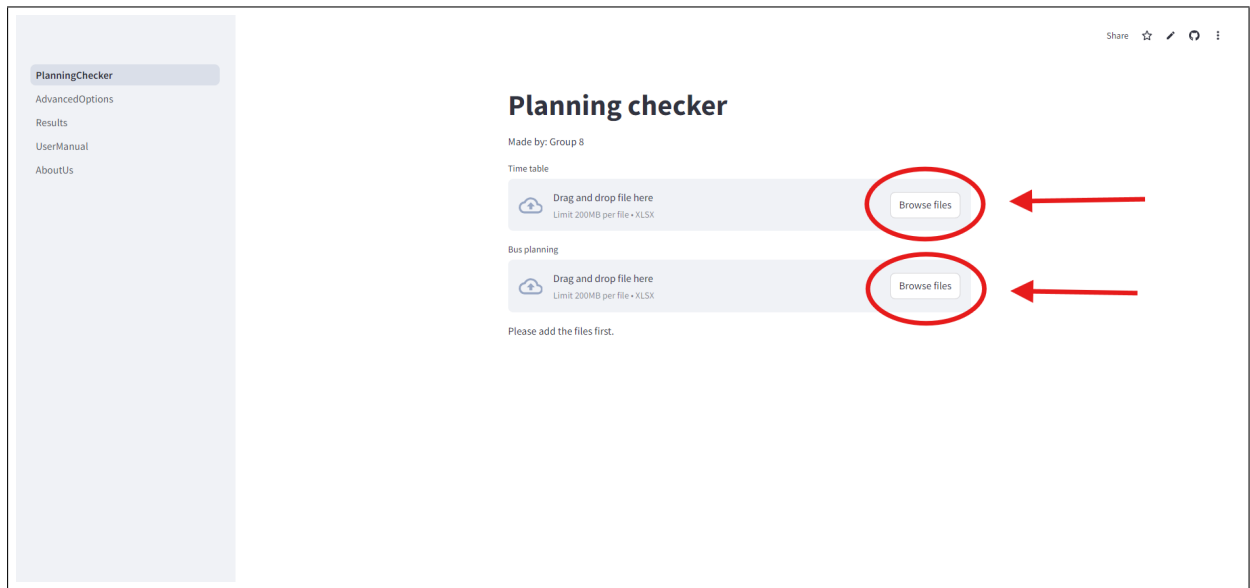
Figure 1: *The home screen with the upload buttons highlighted.*

3.2 Step 2: Settings

1. Before clicking on 'Submit files', check the box 'Use advanced options' to alter the default settings* (see figure 2).
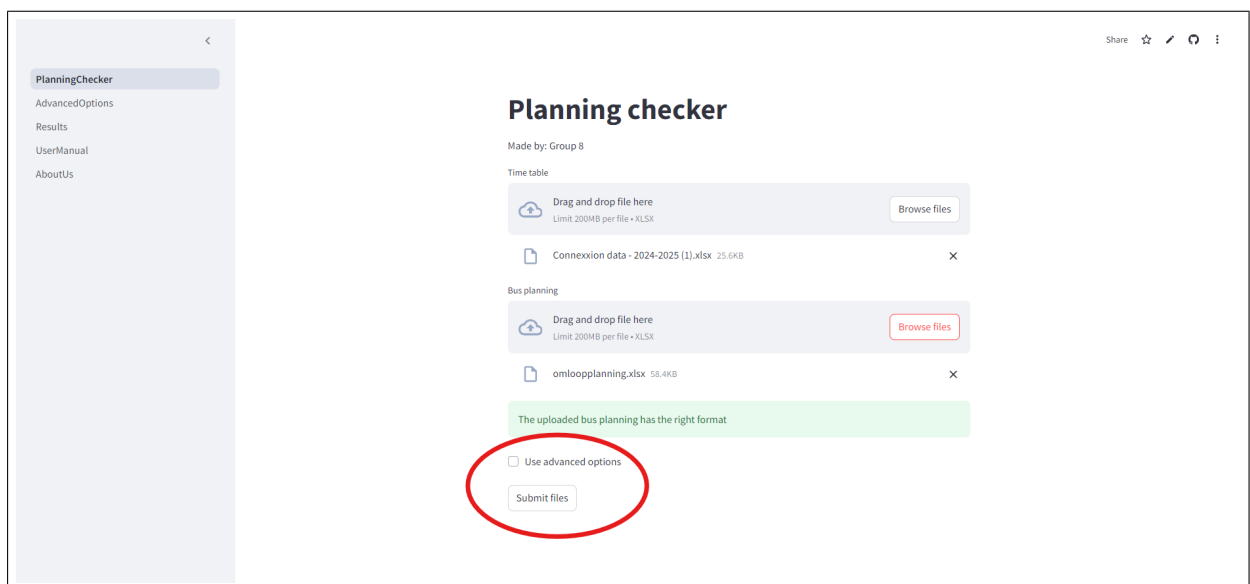

Figure 2: *The home screen with the advanced options button highlighted.*

2. When the box is ticked, the 'AdvancedOptions' tab is opened. Here you can change the following parameters (in order):

   (1) The State Of Health (SOH) for each bus.

       - This is given as a percentage of the total battery capacity of a bus (300 kWh).

   (2) The lowest percentage a battery is allowed to have.

       - This is given as a percentage of the SOH.

   (3) The battery percentage of the busses at the start of the day.

       - This is given as a percentage of the SOH.

   (4) The average driving usage.

       - This should be in kWh/km

   (5) The amount of energy a bus uses when it's idle.

       - This should be in kWh

   (6) The charging speed

       - This should be in kW/h

3. Once the settings are set correctly, click 'Submit' to apply the settings and start the checking process (see figure 3).
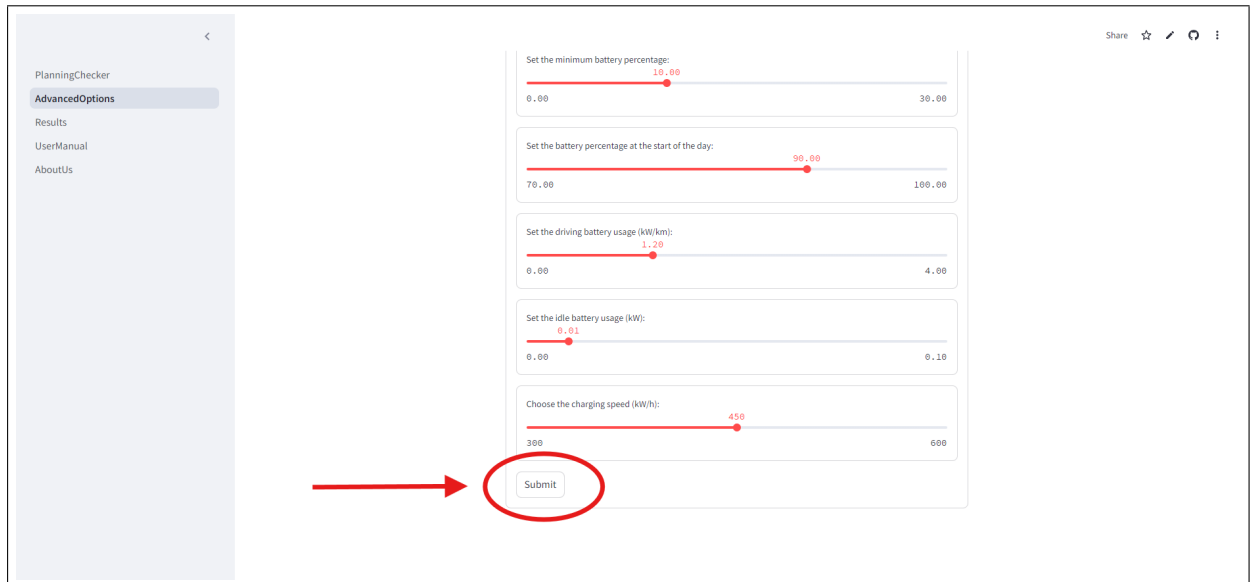

Figure 3: *The AdvancedOptions screen with the submit button highlighted.*

5

Default settings*:

- *All SOH values are set on 90%*

- *A minimum battery percentage of 10%*

- *The battery percentage at the start of the day is set at 90%*

- *The driving battery usage is set at 1.20 kWh/km*

- *The idle battery usage is set at 0.01 kWh*

- *The charging speed is set at 450 kW/h*

3.3   Step 3: View the results

Message 1:   Notification that the energy-usage column has been recalculated.

Message 2:   Notification about if all rides have been driven by the given schedule.

Message 3:   Notification about if the charging time is at least the minimum charging time (15 minutes).

Message 4:   Notification about the SOC values.

Graph 1:   Gantt chart of the bus planning given.

Export button: For exporting the calculated data, originating from the program.

Troubleshooting: For any issues, visit our help section or contact support via the methods below, see '6 Support Information'.
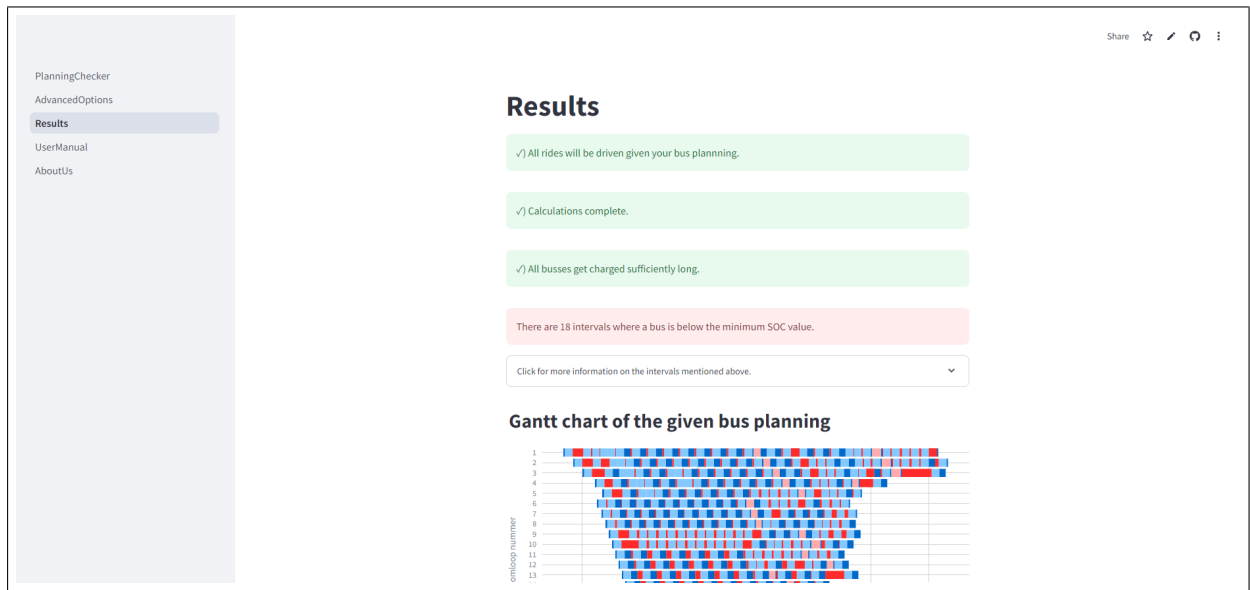
Figure 4: *An example image of what the results could look like.*

3.4 Step 4: Use the info

- **Messages:** If there are no errors found, all messages are green and your planning is acceptable. If there are errors found, the messages will tell you what went wrong.

- **Messages drop-down:** If the planning is incomplete or has errors; you can click the drop-down to show specifics about where it is incomplete (see figure 5 and 6).

See next page.

- **Gantt-chart:** Can be used to get a better insight of the planning, for example:

  - Show all the deadhead trips.

  - Show all the regular trips.

  - Show all the idle times.

  - The start time of an individual trip.

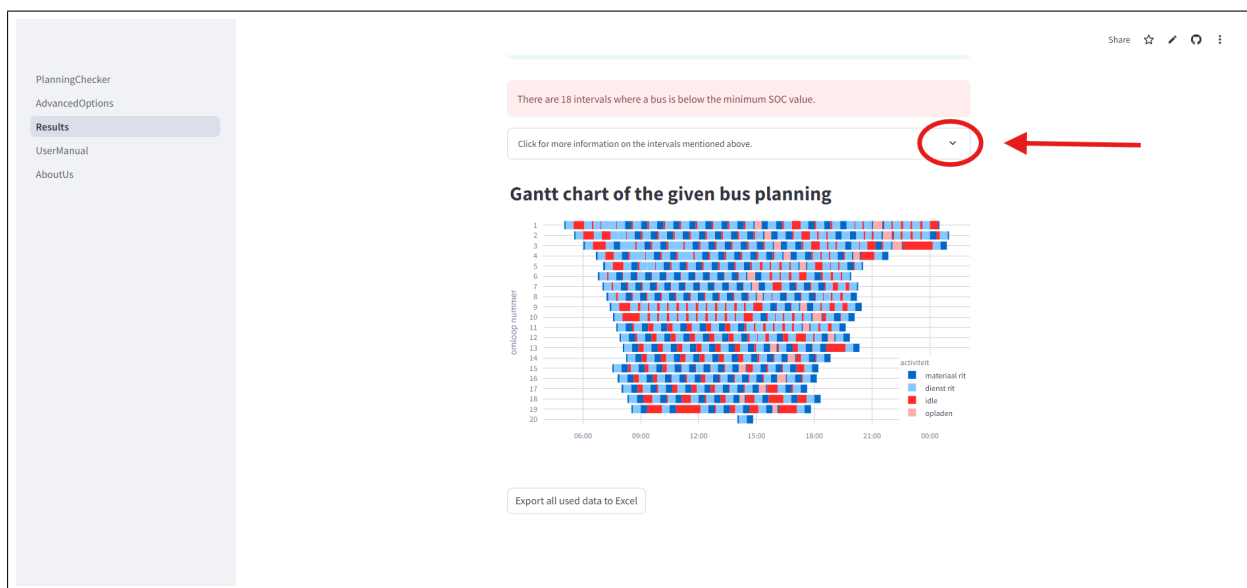 - The end time of an individual trip.

  - Show the bus line.

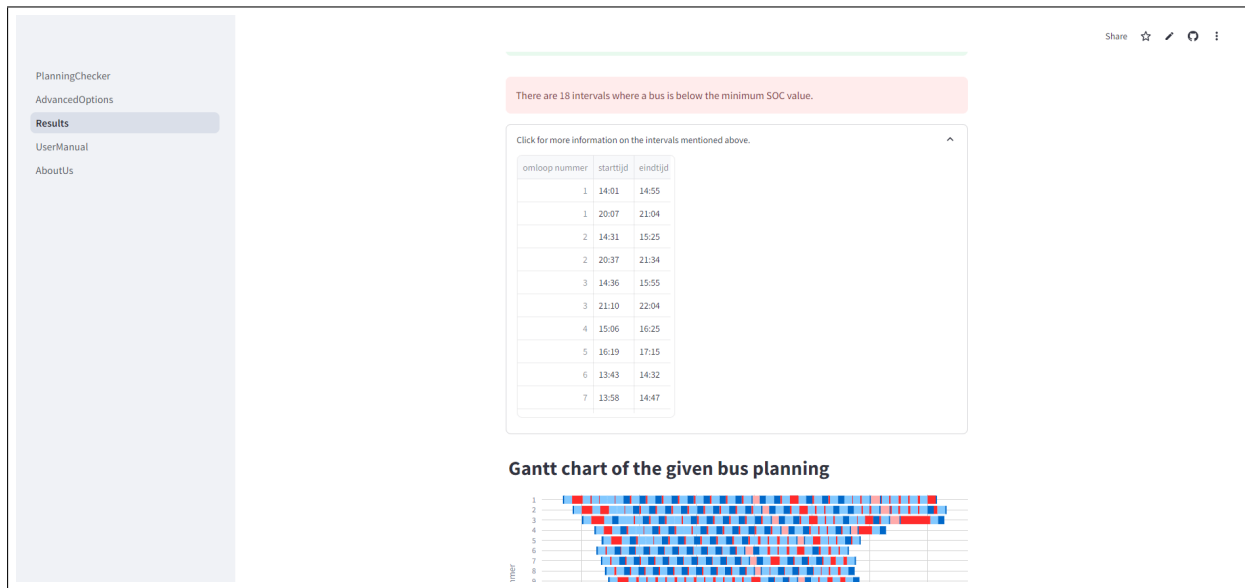Figure 5: *The results screen with the expand button highlighted.*

Figure 6: *An example of a results screen after an expand button is pressed.*

3.5 Step 5: Export the info

- **Gantt chart:** When hovering over the gantt chart with your mouse, more icons appear on the top of the chart. Press the camera icon and the gantt chart will automatically download as a .png file (see figure 7).

- **New data:** A lot of data is calculated using the set settings. Press the 'Export all used data to Excel' button and a new Excel file will be automatically downloaded containing the new data (see figure 8).
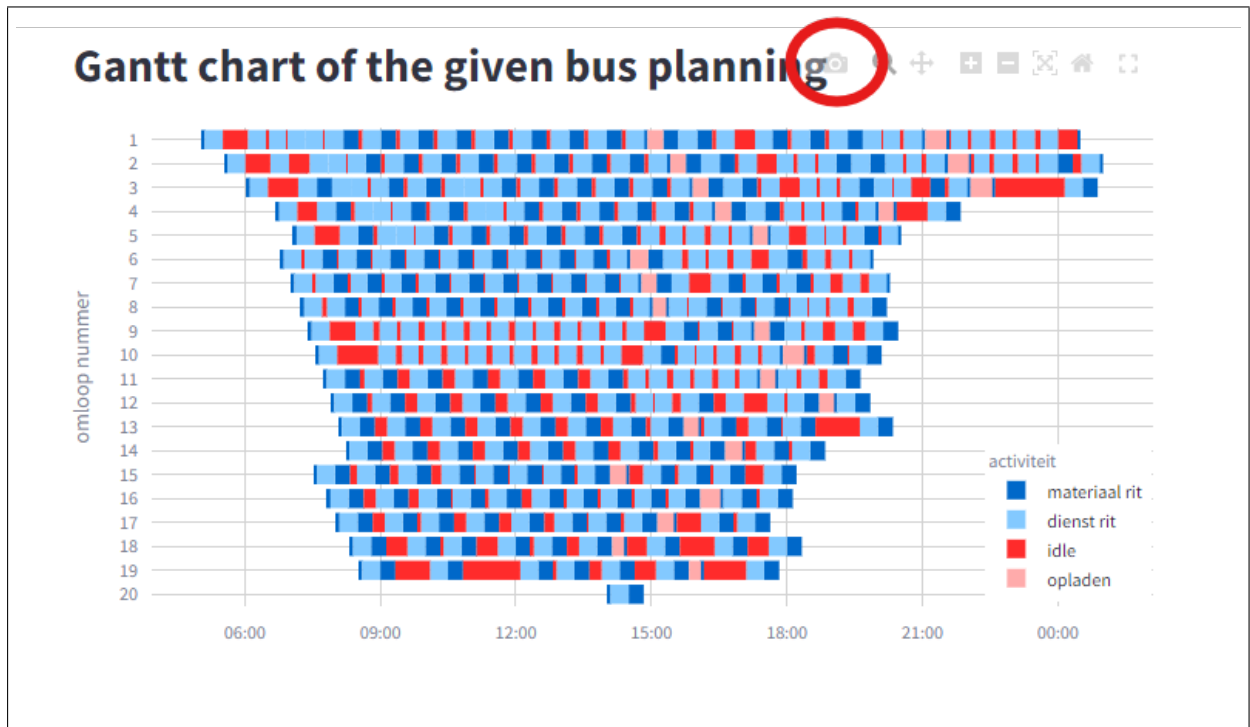
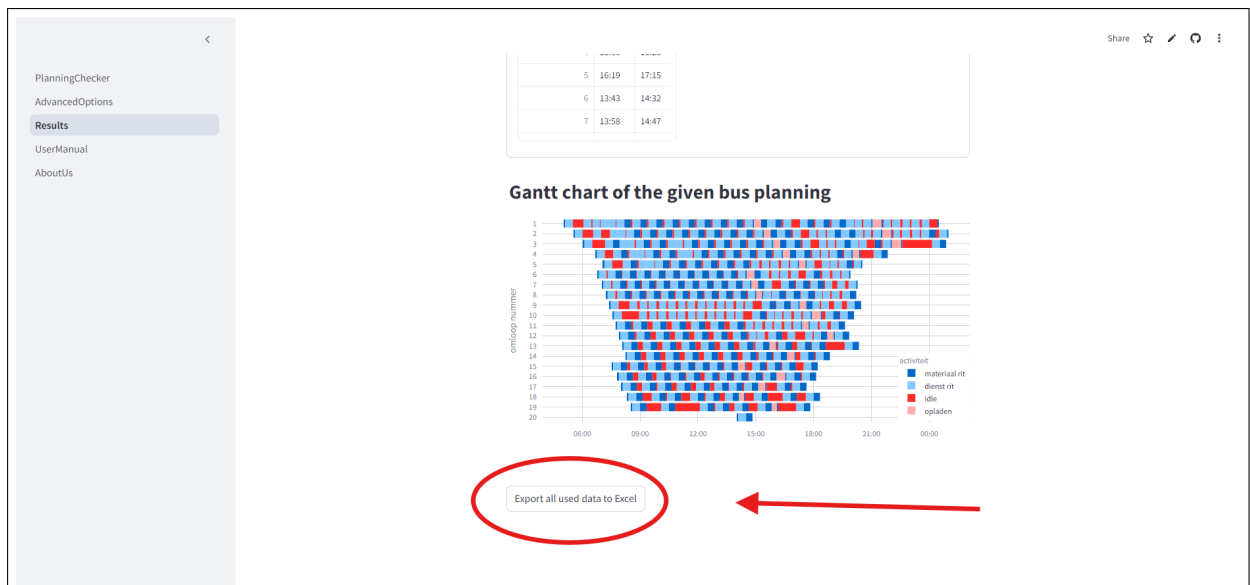Figure 7: *An example of an gantt chart with the download button highlighted.*

Figure 8: *An example of a results screen with the 'Export all used data to Excel' button highlighted.*

4 Frequently Asked Questions (FAQ)

Q1: Can I change the settings values after I have submitted them?

Yes, you can definitely do that. By pressing the AdvancedOptions tab, you can change the values. After changing the values, you will be able to see the new results after clicking on the submit button.

Q2: What is the maximum amount of rows my planning can contain?

Theoretically infinite. In practice it can be as long as you want, as long as the file is not too big to upload. Keep in mind, more data means more processing time.

Q3: Does the tool automatically correct any issues in my schedule?

No, the tool only analyzes and highlights issues for you. All changes to the schedule must be made manually by the user, based on the feedback provided.

Q4: How do I upload my schedule to the tool?

To upload your schedule, simply click on the 'Upload Schedule' button on the main dashboard and select your file. Please ensure the file format is supported (.xlsx). Once uploaded, the tool will automatically analyze your schedule and provide feedback.

Q5: What kind of feedback does the tool provide?

PlanningChecker checks if all of the given routes will be driven, if the charging time of a bus is at least 15 minutes, and if the busses don't get under their minimal battery percentage. If there is a mistake in the given planning, PlanningChecker shows a table with the faulty rows or intervals.

Q6: Why does PlanningChecker return long intervals for the check about the SOC-value

In case PlanningChecker returns suspiciously long intervals (multiple hours) for the SOC-check, this is not a mistake. The bus in question has such a low SOC-value that even the planned charging events will not get the SOC-value above the minimum.

5　Known bugs

At the moment there are no known bugs in the tool.

If you encounter any bugs that aren't mentioned, please contact us via the methods mentioned in '6 Support Information'.

6　Support Information

If you encounter issues or have any questions, feel free to reach out to our support team via:

- **Email**
- **Teams**

7　Disclaimer

The Bus Planning Checker has been developed as part of a school project to assist users in evaluating bus schedules for potential issues. While we have taken care to provide accurate and useful feedback, this tool may not cover all edge cases or unique operational requirements. Users are advised to verify the results independently before implementing any changes to their schedules.

This tool is provided "as-is" without warranties of any kind. The developers do not assume liability for decisions or actions taken based on its feedback. By using this tool, you acknowledge and accept these terms and agree to use it at your own risk.