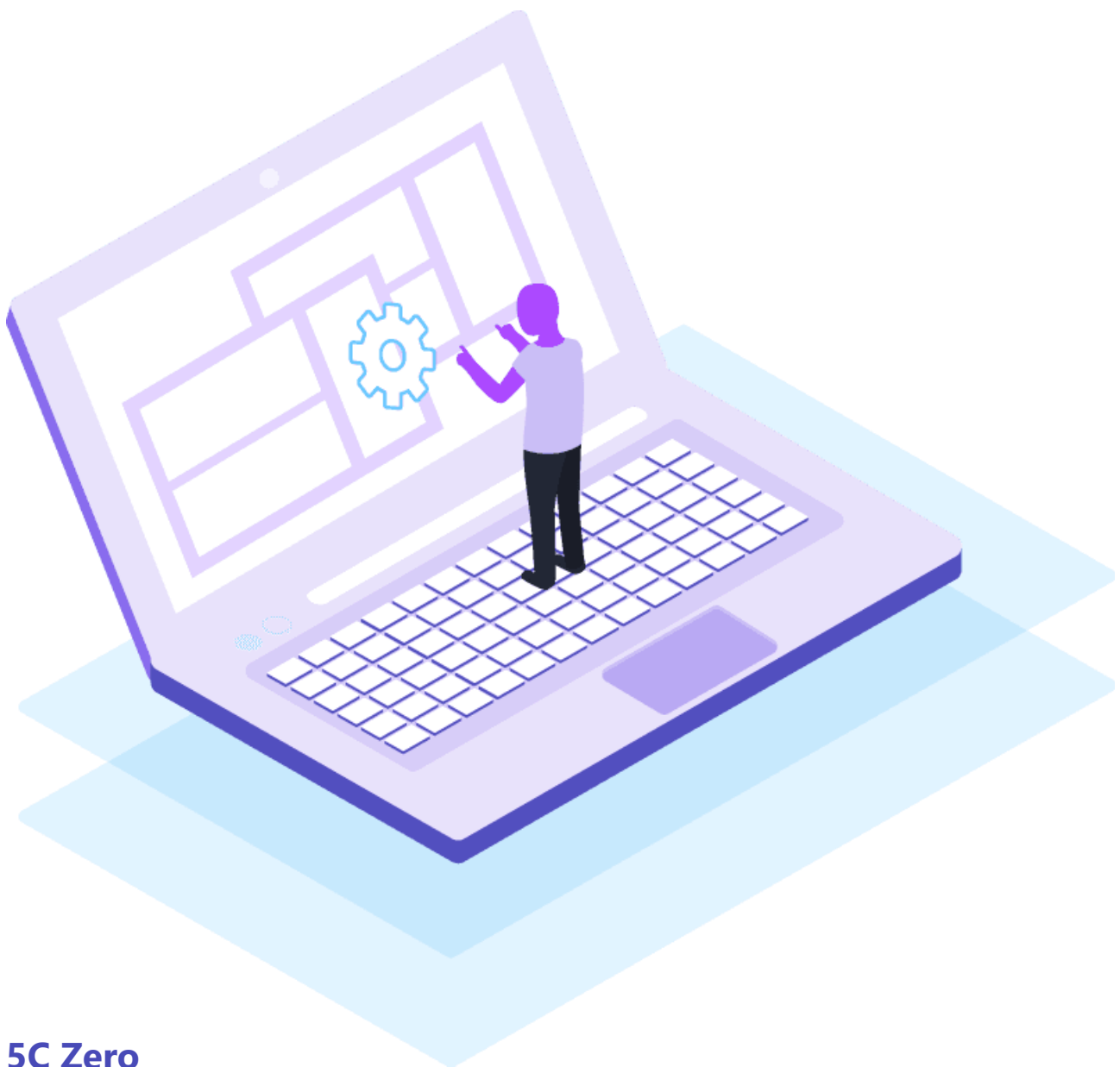




User guide for Indoor Air Quality QA VE Python tool



5C Zero

May 25

Version 2.1

Document control

5CZ product name	Indoor Air Quality QA
5CZ product number	5CZ796
Version	2.1
Status	Issued: Contains finalised information.
Restrictions	Confidential
Release date	05/06/2025

Revision history

Date	Version	Comments
22/05/2024	1.3	Initial version
30/05/2025	2.1	Aligned with VE 2025 updates

Document protection

Arising IP

Description	Owner	Category
Data analysis tool	Deepak Sadhwani	VE Python script package



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1. Introduction

1.1 Purpose of the script

The Indoor Air Quality QA VE Python tool is designed to process hourly CO₂ level data from Apache simulation files to deliver comprehensive insights into indoor air quality across various interior zones.

Central to the tool's output is a dynamic visualisation reflecting CO₂ levels in different spaces. The visualisation illustrates the percentage of time, spaces within the building experience various CO₂ levels measured in parts per million (ppm). The x-axis represents the percentage of time while the y-axis lists the spaces. The color-coded legend indicates the CO₂ levels.

This dynamic display offers an understanding of how often and how significantly spaces are affected by CO₂ concentrations, supporting decisions related to ventilation strategies and indoor air quality improvements.

The extracted data is stored in an MS Excel worksheet in the same folder as the APS file, facilitating further analysis, reporting, and collaboration.

1.2 Scope of this guide

This user guide covers the installation, configuration, and usage of the VE Python tool. It aims to assist sustainability leaders and their teams in efficiently utilising the tool for streamlined sense checks and quality assurance of dynamic simulation models.



2. Getting Started

2.1 Installing the script

Please [follow the instructions](#) to install the tool by clicking on the link.

2.2 Apache simulation settings

This VE Python tool is designed to extract results from **ApacSim** dynamic simulation files with hourly output. Ensure that **Simulation Time Step** is set to 30 minutes and **Reporting interval** is set to 60 minutes. Verify that all necessary model links are checked before running the simulation. Refer to Figure 1 for ideal Apache Simulation settings to run the VE Python tool.

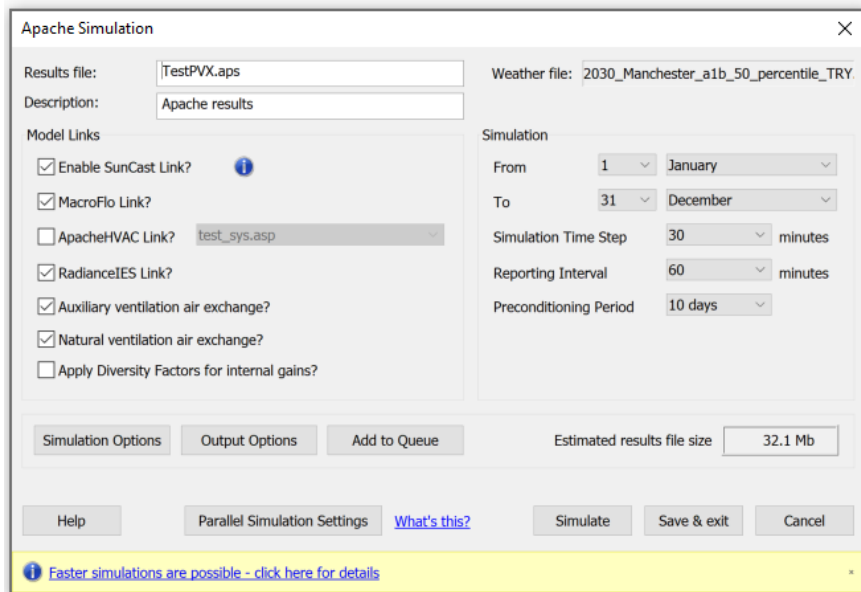


Figure 1. Ideal Apache simulation settings

2.3 Running the VE Python tool

This VE Python tool requires only the APS file from the Windows Explorer pop-up window. In some cases, you may need to navigate to the **vista** folder of your project file.

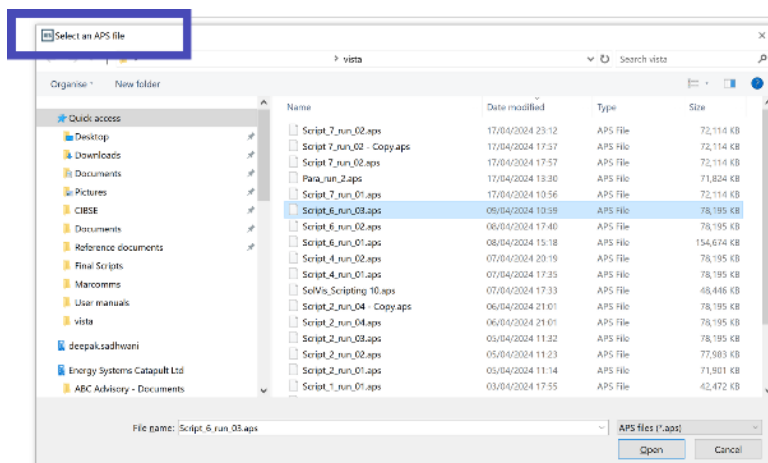


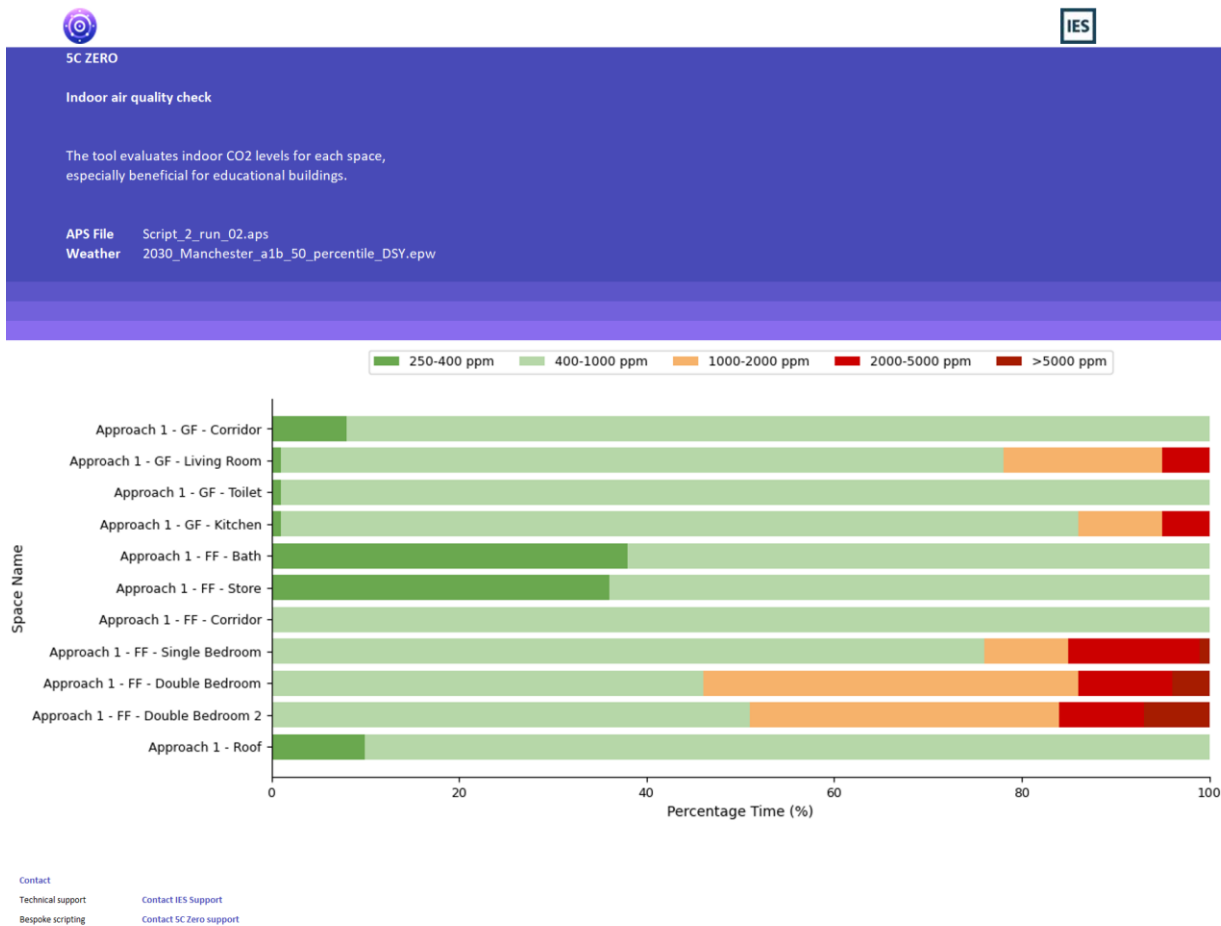
Figure 2. Select an APS file

3. Output

The tool identifies and quantifies CO₂ levels in predefined ppm categories (<400 ppm, 400-800 ppm, 800-1200 ppm, and >1200 ppm). These ranges are selected to represent a spectrum of air quality conditions, enabling a nuanced analysis aligned with recognised indoor air quality standards.

CO₂ Categories and their Inference:

- **250-400 ppm:** Indicates excellent air quality; typical of outdoor air levels.
- **400-1000 ppm:** Suitable for general indoor environments; reflects acceptable air quality for everyday use.
- **1000-2000 ppm:** Indicates moderate air quality; may require improved ventilation.
- **2000-5000 ppm:** Poor air quality; likely to cause discomfort and may require immediate ventilation measures.
- **>5000 ppm:** Hazardous air quality; requires urgent measures to reduce CO₂ levels.



DISCLAIMER
This tool has been developed by SC Zero Ltd. This tool is designed for use with the IES Virtual Environment and is intended to assist in extracting data from VE model simulation files for sense check and quality assurance purposes. This is tailored for professionals who are conversant with IESVE and should be utilised to analyse their specific model data. The tool is currently under review and pending validation by Integrated Environmental Solutions Limited. The effectiveness and accuracy of the tool are directly influenced by the user's input data and operations within IESVE. Although SC Zero Ltd endeavours to ensure the precision of this tool, there is no warranty, express or implied, as to the reliability or correctness of the tool or the resulting data. Users are strongly encouraged to cross-check all data extracted with this tool against standard IESVE inputs and outputs and to exercise due diligence in their decision-making processes. The developers shall not be held accountable for any inconsistencies, errors, or financial loss that may arise from the deployment of this tool.

Figure 3. Example of output worksheet

In the example above, the analysis indicates that certain rooms have CO₂ levels exceeding 2000 ppm, suggesting inadequate ventilation and a need for air quality improvement measures.



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