



## WinProGen – A Datadriven Window Status Profile Generator

A Python-written software for the stochastic generation of windows state profiles  
based on Markov Chains and field test data

<b>Easy to use</b>	Intuitive graphical user interface
<b>Solid</b>	Markov Chain simulation models
<b>Robust</b>	Monte Carlo Markov Chain mathematical validation
<b>Datadriven</b>	> 155 Million windows' states as input
<b>Open</b>	Include your own field test into WinProGen

*System's requirements: WinPynton 2.7, pandas library 0.20, PyQt4*

WinProGen is a software for the generation of stochastic window states profiles, entirely written in Python, make use of the Markov Chain technique and adopt field test data as robust for the generation of the profiles. Please refer to our publication (*D. Cali, Occupants' Behavior and its Impact upon the Energy Performance of Buildings. Dissertation, Aachen, Germany, 2016.*) to know the way WinProGen works. If you have any question, just contact [dcali@rwth-aachen.de](mailto:dcali@rwth-aachen.de).

Check for updates @ <https://git.rwth-aachen.de/lukas.schmitt/WinProGen.git>

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Tab “**Generate WSP**”: generate stochastic window states profiles

### Model selection

- M1 – DAAT: Profiles with a dependency on the time and on the daily average outdoor temperature
- M2 – DAAT WWED: Profiles with a dependency on the time, the daily average outdoor temperature and on weekday or weekend day
- M3 – DAAT AP+D: Profiles with a dependency on the time and the daily average outdoor temperature of the actual and previous day

### Profile properties

- Weather conditions: Default conditions were recorded in South-Germany (2012). Additional weather conditions can be added as “.csv” and “.dat”-files. CSV-weather-files have to be in style of .../WinProGen/data/AT2014.csv.
- Complete dataset/ Profile Choice/ Random choice: Levels contained in the field test can be chosen completely, directly by preference or randomly

- Substitute profiles with no changes in the state of the window: The function is only available for field tests provided by the author. By activating, data of a room exhibiting a potentially defect sensor will be replaced by data recorded in a room (of the same type, e.g. bathroom data will be replaced by bathroom data) contained in another level.

Time step:

- Selection of a time interval: intervals may also be chosen beyond annual limits e. g. 27.10 – 02.02

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Tab **“Add field test”**: add own field test data to the database

Model selection (see tab **“Generate WSP”**)

Profile properties:

- File selection: Additional field test data can be added here. ATTENTION: The file to add has to be in style of .../WinProGen/data/Original/example\_style.pdf
- Temperature range: Determine temperature intervals for the calculation of separate window state probabilities, input in style “5, 11” sets up intervals “ $\leq 5$ ”, “ $> 5$  and  $\leq 11$ ” and “ $> 11$ ”

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Tab **“MCMC Validation”**: generate validation files for stochastic window states profiles

Model selection (see tab **“Generate WSP”**)

Profile properties (see tab **“Generate WSP”**)

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Tab **“Visualize Data”**: visualize field test data and generated profiles

Diagram typology:

- Windows status depending on daily average outdoor temperature (diagram 1): windows states of buildings, levels and rooms can be compared on daily average outdoor temperature, standard deviation can be included
- Daily profile: Windows status depending on daytime (diagram 2): window status of every window contained in the selected field test can be visualized depending on time for different temperature intervals
- Daily profile: Status change depending on daytime (diagram 3): profiles’ window states, generated with tab **“Generate WSP”**, can be visualized depending on time

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Tab **“Properties”**: properties for facilitating usage

Generate WSP:

- Show warning if generated file already exists: if the output file of the profile to be generated is about to override an existing file, the raising warning message can be suppressed