

LETSACT Model General Information

The LETSACT Model is a linear programming-based least-cost energy and transportation sectoral analysis model for evaluating greenhouse gas reduction technology and emissions trajectories. The model, written in MATLAB, was developed at the University of Michigan by Dr. Sarang Supekar as part of his doctoral thesis.¹

While all of the model's functionalities are fully operational with regards to the research presented in the paper titled, "Analysis of costs and timeframe for reducing CO2 emissions by 71% in the U.S. auto and energy sectors by 2050", the computer code has not yet been fully optimized for public use or computational efficiency. The primary purpose of the model at this point is to **assist with a transparent peer-review of the research** conducted and written using this model and we request that users **do not distribute** the files at this time. As such, we caution that any significant changes made to the code structure or its input data files may result in code errors. In due course of time, we will be releasing a Beta version of the LETSACT model with adequate documentation to make it more user-friendly.

Users or reviewers interested in viewing only the input data files and results discussed in the above mentioned paper can do so by accessing the zip files titled "Model Input Files.zip", "Auto Sector Results.zip", and "Electric Sector Results.zip" without necessarily having to run the LETSACT model. To run the model, please follow the guidelines presented next.

LETSACT Model Use Notes

1. The LETSACT model can be run on a personal computer (Windows or Macintosh). You would additionally need Microsoft Excel and MATLAB to run the LETSACT model. The model input and output files collectively require about **1 GB of disk space**. We recommend a computer with at least **16 GB of RAM** to avoid running into memory issues associated with storing large matrices that the model creates during its run.
2. Download and unzip the file titled "LETSACT Code.zip". Once unzipped, **do not rename, move, or delete any of the files or folders** as that may lead to code errors.
3. To run the auto sector or electric sector models, simply open the "AutoLP.m" or "ElecLP.m" file respectively and hit "Run".
4. An important note if you are using a Macintosh computer and running the code in MATLAB for OS X. The model extensively uses the "xlswrite" function to print model results to Excel files. However, "xlswrite" does not work as intended on OS X due to Java compatibility issues. To run the code on OS X:
 - i. uncomment all the "javaaddpath" lines at the beginning of the code,
 - ii. replace all instances of "xlswrite" in the code with "xlwrite" leaving the rest of the function call inputs unchanged.
5. Codes for both the auto and electric sectors are by default setup to run 27 different uncertainty analysis scenarios considering climate action years from 2015 all the way through the year when climate action becomes infeasible (2024 – 2027 depending on the sector and uncertainty scenario). As such, each sector's analysis with the **entire uncertainty analysis requires several hours to run**. There would be long periods of time during the model run where the code does not output any messages, and is simply conducting computations. This does not necessarily mean that the code has stalled so please allow the code to run all the way to the end.
6. At the end of the run, the output result files and result spreadsheets will automatically be created in the "Results" folder within the "LETSACT Code" folder.

¹Supekar, S. D. (2015). *Environmental and Economic Assessment of Carbon Dioxide Recovery and Mitigation in the Industrial and Energy Sectors*. Doctoral Thesis. University of Michigan, Ann Arbor. Retrieved from <http://search.proquest.com/docview/1681292072?accountid=14667>