ATLANTIC CANADA ENERGY SYSTEM (ACES) MODEL

INSTALLATION INSTRUCTIONS for Windows

Overview

Net Zero Atlantic has been working on an open-source energy system model to help users find the least-cost sets of investment decisions that ensure that Atlantic Canada's emission reduction targets will be met. This package outlines the steps involved in installing the necessary programs and applications that you will need to successfully run the ACES model.

Time to Complete

The full installation of the ACES model will take approximately 2-3 hours to complete. This includes approximately 1 hour of active work time, with the installation running in the background for the remaining time.

Overview of What You Will Need

Links and instructions for each step are described in the section below.

1. **Windows Subsystem for Linux**
   o Windows Subsystem for Linux is a compatibility layer for running the Linux operating system on Windows. This will enable you to use faster solvers, speeding up the model run time!
2. **Ubuntu Terminal**
   o Ubuntu is a desktop operating system based on Linux.
   o You will be able to use this terminal to run the commands to run the model.
3. **Anaconda for Linux**
   o Anaconda is a program that distributes Python to simplify packages and overall use.
   o ACES uses Python coding; using Anaconda streamlines this process.
4. **ACES Model Files**
   o The ACES folder has all the files needed to run the ACES model.
5. **Atom**
   o Atom is a text and source code editor that will be helpful for editing code in text files.
6. **DB Browser for SQLite**
   o DB Browser is a tool to create, design and edit database files compatible with SQLite.
   o SQLite is a relational database management system, where the files to run and edit the model are formatted. You can think of DB Browser as similar to Microsoft Excel.

Steps for ACES Model Installation

1. ## INSTALLING WINDOWS SUBSYSTEM FOR LINUX (WSL) AND TERMINAL
   - Search your Windows machine for the **Command Prompt** application. When you see the icon, select the **Run as administrator** option.
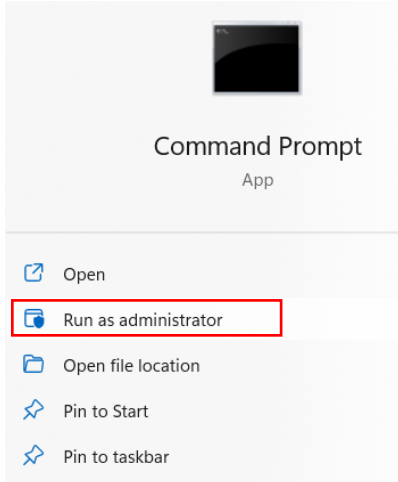
   - You may be asked if you want to allow this application to make changes to your device – select "yes". This will open a terminal. Type the following command and press **enter**:
     ```
     wsl --install
     ```
   - This will begin to install Windows Subsystem for Linux. To complete the installation, you will see a message that says you will need to restart your device. Restart your computer.
     - Note: if you already have WSL installed, install Ubuntu by typing: `wsl --install -d Ubuntu`
   - When your computer restarts, it will automatically begin installing Ubuntu. When it is complete, it will ask you to create a UNIX username. Use only lowercase letters and no spaces. Press **enter**. Create a password. The password line will appear blank when you type, but the text is just hidden for privacy. Type in your chosen password, press **enter**, re-type it in the following prompt, and press **enter** again. When done, you should see **Installation successful!**, a few additional lines, and finally a new command line.
   - In a new Command Prompt window, type the following to change the version of WSL installed:
     ```
     wsl --set-version Ubuntu 1
     ```
   - To check if it worked, type:
     ```
     wsl -l -v
     ```
     Like the image below, your window should indicate you are now running Version 1:

2. **DOWNLOADING ANACONDA FOR LINUX**
   - You can install Anaconda for Linux from your Ubuntu terminal. There are many versions of Anaconda; you can see a list of releases at https://repo.continuum.io/archive. The one you will be using is **Anaconda3-5.3.1-Linux-x86_64.sh**, if you have a 64-bit operating system (this is most likely). If you have a 32-bit operating system, you will likely use the **x86.sh** version. **You do not need to download it from here**, as you will be doing this from your terminal in the next step.
   - In your Ubuntu terminal, you should have a command line ready. Please remember that any commands you type are **space- and case-sensitive**, and to press **enter** after each new command you type.
   - Copy the following and paste into the terminal by right-clicking next to the command prompt, OR manually type (as one line):

     `wget https://repo.anaconda.com/archive/Anaconda3-5.3.1-Linux-x86_64.sh` (or the version of Anaconda that works for you).

     When that has loaded, a new command line will appear. Install Anaconda by typing:

     `bash Anaconda3-5.3.1-Linux-x86_64.sh`

     You will be asked to review the license agreement – press **enter**. Continue to press **enter** until the entire license agreement appears. The last line will say **Do you accept the license terms? [yes|no]**. Type **yes** into the prompt. It will then tell you the location that it will install Anaconda3, press **enter** to continue, then wait for it to install (this will take some time).

     You will also be asked if you wish to initialize Anaconda3. Again, type **yes** into the prompt. When the installation is complete, it may ask if you would like to install VSCode. Type **no** .
   - Close the terminal and reopen Ubuntu. You should see a command line. To test that it worked, type `which python`. It should print a pathway that has anaconda in it, such as /home/username/anaconda3/bin/python.

3. **UPDATING CONDA**
   - To update the **conda** distribution paste or type the following command in Ubuntu:

     `conda upgrade -n base -c defaults --override-channels conda`
   - Press **enter**. You will receive a prompt asking **Proceed ([y]/n)?**, type **y** and let the update complete. A command line will appear when done.

4. **OBTAINING THE ACES FILES**
   - Go to the ACES Model website (acesmodel.ca > Run The Model) and select "Download ACES Desktop Folder" on the side bar.
   - Find the ACES zip you downloaded. Open the zip file and find the ACES folder inside. If your device does not automatically have an extracting tool, you can use a free extracting tool from the internet, such as 7-zip. Once the internal file is extracted, **place the ACES folder in your C-drive**.

5. **CREATING THE PROJECT ENVIRONMENT**
   - Creating a virtual environment will separate your current project to make it distinct from other Python projects. The **environment.yml** file is in the ACES folder. It is a text file that lists all the required packages and functions, telling your system what it needs to set up the environment.

- Open your ACES folder. To set the directory in the Linux Terminal, **Shift+right click** in the ACES folder space. This should give you an extended list of options, including **Open Linux Shell Here**. Alternatively, you can manually set the pathway in your Ubuntu terminal by typing:

  `cd /mnt/c/ACES`

  This tells the terminal to navigate your current directory (cd) to your C-drive, in the ACES folder. This pathway will only work if the folder is in the **C-drive**, otherwise put your correct pathway (e.g., `cd /mnt/downloads/ACES` if your ACES folder was in **downloads**). Press **enter**.
- To create the environment, type:

  `conda env create`
- Let the environment solve and download packages. This will take a while! It can take over an hour but will vary a lot depending on your computer. Leave it alone while it does this, feel free to work on other things in the meantime.
- When it is finished, a new command line will appear. Activate the modelling environment with:

  `conda activate ACES`

  You should see a new command prompt starting with (ACES) which has replaced (base), signifying that the environment has been activated.
- To test that the environment is working, invoke the following command (as one line):

  `python data_processing/MakeGraphviz.py -i ./data_files/ACES-Testing.sqlite`

  Note: there is a space before and after the "-i"
- A network diagram of the energy system should appear under the **ACES-Testing_input_graphviz** directory in your ACES folder in your C-drive. When you open the file, you should get something like this:
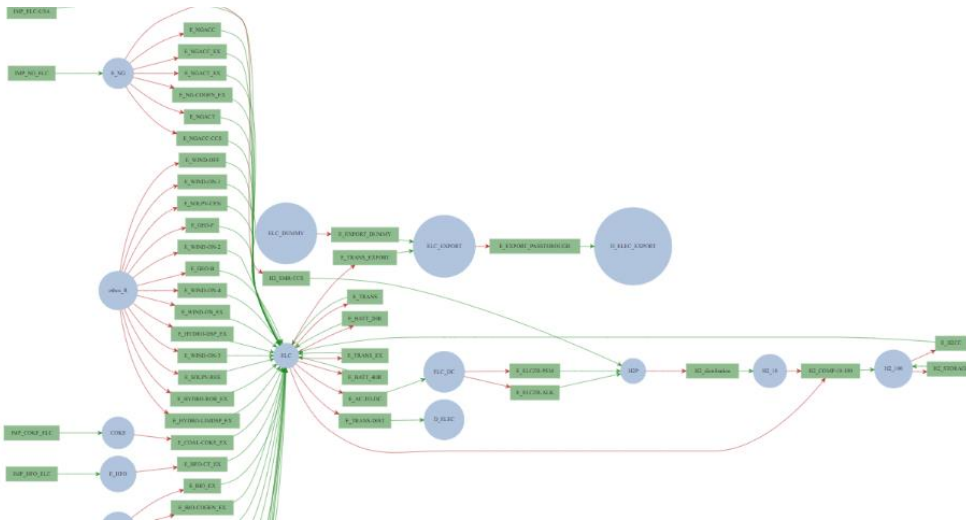
6. DOWNLOADING ATOM
- Atom will be helpful for editing text files, such as making changes to any code (as outlined in the User Guide).
- Download here: https://atom.io/
- Open the downloaded file to install the app. You can close it when it launches.

7. **DOWNLOADING DB BROWSER FOR SQLITE**
    o   DB Browser will be helpful for changing the parameters to run different model scenarios.
    o   Download here, selecting the Standard installer for 64-bit Windows: https://sqlitebrowser.org/dl/
    o   Open the downloaded file, agree to the terms, and continue until it is installed. If you get a pop-up asking if the program can make changes to your computer, select **yes**.

You should now be all set up to run the updated version of ACES. If you have any questions or issues, do not hesitate to contact vwatson@netzeroatlantic.ca. You can also use our online booking system to schedule technical support with us at any time.

Book a technical support meeting: https://acesmodeltrainingbooking.as.me/technicalsupport