Installation Guide for OnSSET

OnSSET (Open Source Energy System Simulator for Electrification) is a tool designed to model and plan electrification pathways for countries, regions, or localities. It helps in assessing the costs, benefits, and feasibility of electrifying an area using different technologies, considering available resources such as solar, wind, hydropower, and grid expansion. OnSSET is widely used by governments, utilities, and international organizations to make data-driven decisions for electrification planning.

To install **OnSSET**, you will need to follow a series of steps to set up the necessary environment, install the required software, and configure the model parameters for running electrification scenarios. This guide provides detailed instructions for installing **OnSSET**, preparing the required input data, and explaining the parameters used in the code.

For the official **OnSSET code** and to access all relevant resources, visit the GitHub repository: https://github.com/OnSSET/onsset.

To understand the **data requirements**, installation process, and configuration, refer to the official **OnSSET documentation**: https://onsset.readthedocs.io/.

Step 1: Install Python

Before you begin installing **OnSSET**, make sure that **Python** is set up on your computer. **OnSSET** is built using Python, so you need to have Python installed to run it. We recommend using **Python version 3.6 or higher** for the best experience.

(Video 1)

To install Python:

Go to the official Python website: https://www.python.org/downloads/.

Download the latest version of Python for your operating system (Windows, macOS, or Linux). **macOS/Linux**: You can use: `brew install python` or `sudo apt-get install python3`

Follow the installation instructions that appear on the screen. Make sure to check the box that says **"Add Python to PATH"** during installation.

Step 2: Set up a Virtual Environment

It's like a separate "folder" for Python that keeps OnSSET and its dependencies organized and prevents conflicts with other software.

In Windows create a folder, for example c:\onsset_project

Open the terminal or Command Prompt and navigate to the folder:

```
cd\
```

```
cd onsset_project
```

Create the virtual environment:

```
python -m venv onsset_env
```

Activate the virtual environment:

Windows:

```
onsset_env\Scripts\activate
```

macOS/Linux:

```
source onsset_env/bin/activate
```

(Video 2)

Step 3: Install OnSSET from GitHub

To install OnSSET directly from the source code, you need to install Python first, as described in Step 1.
If you followed the above procedure, you should have Git already installed. If Git is not available, you can download Git from https://git-scm.com/downloads and follow the installation instructions.

You can clone it using the following Git command in your command prompt or terminal:

```
pip install setuptools wheel setuptools-scm
git clone https://github.com/onsset/onsset.git
```

Alternatively, you can download the OnSSET repository from GitHub, visit https://github.com/OnSSET/onsset. You can click the green "Code" button and select "Download ZIP" to get the repository as a ZIP file, that you can expand for example directly on the C:\OnSSET folder.

Once the repository is downloaded or cloned, navigate to the OnSSET folder in your terminal. For example:

```
cd /
```

```
cd onsset
```

Finally, to install OnSSET, run the following command from within the OnSSET folder:

```
pip install -e .
```

(please note that the full stop character “.” is part of the instruction)

Verify if the software is installed:

```
pip show onsset
```

The above procedure will install **OnSSET** itself from the official Python software repository.

The libraries required by the software should be installed already in you onset_env/Lib directory. To verify that the required libraries are installed or reinstall the missing libraries you can type the following commands one by one and press **Enter**:

```
pip install numpy pandas geopandas matplotlib scikit-learn
```

The command will install **numpy**, **pandas**, **geopandas**, **matplotlib**, and **scikit-learn** – tools that **OnSSET** needs to run.

Step 4: Installing QGIS and the OnSSET Plugins

OnSSET is dependent on GIS software like QGIS or ArcGIS to organize and manage spatial data.

You can download and install the supported version of QGIS from https://www.qgis.org/download/

After installing QGIS, you will also need to download two **OnSSET plugins**, which help integrate QGIS with the OnSSET Python code for spatial analysis.

Population cluster

https://github.com/OnSSET/PopCluster/blob/master/Plugin/Option%201/hrsl_clustering.zip

GEP Plug in

https://github.com/OnSSET/ClusterbasedExtraction/blob/master/Plugin/Option%201/gep_onsset.zip

To install the OnSSET plugin in QGIS, download the plug-ins as zip files. Then open the QGIS application and navigate to the **Plugins** menu. From the menu, choose **Manage and Install Plugins**. In the Plugin Manager, select **Install from Zip**, browse **hrsl_clustering.zip**

and then **Install Plugin**. Repeat the procedure for the **gep_onsset.zip** file. The plugins will allow you to prepare the input files directly within QGIS.

The OnSSET plugin for QGIS facilitates the creation of input files in the form of CSVs, which are required for running the model. This plugin integrates GIS data such as population density, grid infrastructure, and renewable energy resources, and generates the appropriate input files for OnSSET.