

4th OnSSET Steering Committee – Wednesday July 17th 2020

Participants

Andrii Gritsevskiy – International Atomic Energy Agency,
Mario Tot – International Atomic Energy Agency
Magda Moner-Girona – Joint Research Center
Benjamin Stewart – World Bank
Nicolina Lindblad – World Bank
William Brent – Power for all
Dimitris Mentis – World Resources Institute
Santiago Sinclair – World Resources Institute
Mark Howells – Loughborough University
James Morrissey – Oxfam
Sulaiman Fayeze – Kabul Polytechnic University
Gregory Ireland – University of Cape Town
Alison Hughes – University of Cape Town
Giacomo Falchetta – FEEM
Charles Van-Hein Sackey - Carnegie Mellon University
Christian Kabongo – Resource Matters
Andreas Sahlberg – KTH Royal Institute of Technology
Alexandros Korkovelos – KTH Royal Institute of Technology
Oluchi Monwe – KTH Royal Institute of Technology
Babak Khavari – KTH Royal Institute of Technology
Francesco Fuso-Nerini – KTH Royal Institute of Technology
Nandi Moksnes – KTH Royal Institute of Technology
William Usher – KTH Royal Institute of Technology

Introduction

The participating organizations introduced themselves and their engagement with OnSSET. The engagement ranged broadly from organizations using OnSSET for education and research, to analysis within electrification projects, and to others interested to connect OnSSET work and outputs to their respective work and platforms.

Main points discussed

Session 1 - Overview of developments over the past year

- The World Bank and ESMAP launched the Global Electrification Platform (GEP) at the end of 2019. GEP is an open source, interactive, online platform for 59 countries, giving the user the ability to seamlessly change between 216 investment scenarios for any of the chosen countries. The platform has the largest set of scenarios available to date, which were generated using a version of the OnSSET tool-
- OnSSET analysis featured in IEA's World Energy Outlook 2019. Two scenarios were developed and presented regionally for all of Sub-Saharan Africa, and also individually for 12 Sub-Saharan African countries.
- At least five new publications using the OnSSET tool have been published since June 2019:
 - Korkovelos A., Mentis D., Bazilian M., Howells M., Saraj A., Fayeze Hotaki S., Missfeldt-Ringius F., "**Supporting Electrification Policy in Fragile States: A Conflict-Adjusted Geospatial Least Cost Approach for Afghanistan**", Sustainability (Feb 2020)

- Menghwani V., Zerriffi H., Korkovelos A., Khavari B., Sahlberg A., Howells M., Mentis D., **"Planning with justice: Using spatial modelling to incorporate justice in electricity pricing – The case of Tanzania"**, Applied Energy (April 2020)
 - Falchetta G., Hafner M., Tagliapietra S., **"Pathways to 100% Electrification in East Africa by 2030"**, The Energy Journal (May 2020)
 - Peña Balderrama G., Balderrama Subieta S., Lombardi F., Stevanato N., Sahlberg A., Howells M., Colombo E., Quoilin S., **"Incorporating high-resolution demand and techno-economic optimization to evaluate micro-grids into the Open Source Spatial Electrification Tool (OnSSET)"**, Energy for Sustainable Development (June 2020)
 - Bissiri M., Moura P., Carvalho Figueiredo N., Pereira da Silva P., **"A geospatial approach towards defining cost-optimal electrification pathways in West Africa"**, Energy (June 2020)
- The publications by Falchetta et al. and Bissiri et al. do not include any author from KTH, which indicates growth of the OnSSET community.
 - Some of these new publications cover certain interesting developments such as:
 - Electrification planning in fragile states (Korkovelos et al.)
 - Soft linking of OnSSET with other models (RAMP and MicroGridsPY) in order to obtain a spatial dimension together with a more robust micro-grid analysis (Balderrama et al.)
 - Incorporating socio-economic analysis in electrification research using the OnSSET tool (Menghwani et al.)
 - There is a growing interest from researchers at different universities, such as ETH Zurich, University of Cape Town, Carnegie Mellon, Loughborough University, Addis Ababa Institute of Technology etc., to use OnSSET.
 - Updates of OnSSET in 2019/2020 include:
 - A time-step functionality, i.e. results are no longer presented for the end year but the analysis can now be run in sequences. This opens up for more dynamic analysis.
 - The ability to impose grid-expansion restrictions taking into account constraints that might exist in different countries (lack of funding for the national grid, generation capacity deficit etc.).
 - OnSSET has moved from raster cell (most recently 1 x 1 km) population layers to population clusters that better represent settlements.
 - There has been large interest to look into electricity demand in other sectors than residential only. To this end, the code has been adapted to be able to incorporate other demand sectors.
 - Updated training material hosted on the OnSSET GitHub (github.com/onsset). This training material now include video recordings of the first lectures and exercises. More training material will be uploaded to the site in the coming weeks.

- Currently, there are two major capacity building activities that involve OnSSET. The Energy Modelling Platform for Africa (EMP-A) scheduled for December 2020, and the Summer School on Modelling Tools for Sustainable Development which has been postponed to June 2021. These capacity building efforts are recurring annually. Further capacity building events are currently scheduled on a project basis.

Open discussion:

- How do we engage other communities that are interested in using OnSSET? – Further discussed in session 2 and 3.
- How can we best use online training, especially in light of travel restrictions during covid-19? – Further discussed in session 2.

Part 2 - Open source issues, community management and capacity building

GitHub

- As an open source tool, there has been improvement to the openness of the tool. These include:
 - OnSSET has been moved to a separate GitHub repository, no longer under the KTH-dESA organization.
 - OnSSET has been made available as a package at PyPI, facilitating installation and versioning of the tool.
 - GitHub issues related to the code can be used to request improvements, and to community members to start engaging in the code development.
 - Unit tests have been set up within the OnSSET repository to enable broader engagement for model development.

Action plan:

- Set up a contribution workflow that guides people on the steps in collaborating to develop the model using GitHub
- Minor changes such as code efficiency, code clean-up and debugging shall be merged to the master if they pass the test. These tests will run automatically. There are sample input and output files that need to match with the outputs resulting from the minor changes. In case the test results change (e.g. due to a bug fix) the tests should be updated as well. The process will be documented in the “How to contribute” guidelines.
- Major methodological changes will be merged to the master only if supported by academic publications or equivalent
- Anyone who contributes to the code will be displayed as a contributor on GitHub
- Community roles will be shared through GitHub to allow for active participation by the community in the management of the tool and organization. A suggestion of roles will be distributed shortly for feedback.
- Create a document that adequately explains the unit tests and how they work within the OnSSET code base.

- OnSSETs GitHub will continue to be managed by the KTH team for now.

Capacity building and online self-learning material

There is a lot of interest on capacity building involving the OnSSET tool. As mentioned previously, there are two major capacity building events that run annually. In addition to this, capacity building events are scheduled connected to OnSSET-based projects. Developments of online material aim to provide an avenue for self-learning. The latter was highlighted and discussed in light of the covid-19 situation.

Issues raised and discussed:

- To what extent can knowledge be transferred virtually? Certain requirements have to be set for efficient virtual trainings. Generally, there is a positive opinion towards online training, however, it requires a certain level of commitment and face-to-face training might not be completely replaceable.
- At the moment most online training conducted by the participants of the meeting (in other tools and areas) is meant to facilitate a later face-to-face training.
- There are a few hurdles for new OnSSET users that can potentially discourage them from continuing to use the tool, and a few suggestions were raised that could help users getting used to the tool more quickly.
 - There are several steps and requirements to run an OnSSET analysis – from QGIS data extraction to Jupyter Notebooks to visualization. A suggestion was to develop a GUI version for OnSSET. This would give users a choice for those not interested in the coding aspects of OnSSET. The GUI version should try to latch on to an existing infrastructure (QGIS, ArcGIS, etc.)
 - The online material has to be adapted for different types of users, including those that are neither GIS nor code savvy. A suggestion was to develop a very simple initial exercise that takes one through a step-by-step process of e.g. replicating one of the country studies on GEP. This would help get new user involved and interested in the tool, and they can then go deeper into the GIS processing, Jupyter Notebook etc.
 - Not all of the results are clear. A detailed explanation for understanding the results (e.g. an infographic) can help with newer recruits utilising the tool.
- Capacity building events are limited by the number of trainers available. High quality training material is required for capacity building that can aid “train the trainer” initiatives.

Outreach and engagement

Issues raised and discussed:

- The forum is not very active. There is a need however to be able to engage with the community to get help or to find answers to common questions, especially related to the self-learning material. Several alternative options were discussed:
 - Move the forum to the issues section on OnSSET GitHub platform and tag with appropriate labels for easy identification.
 - Use the GitHub wiki system for OnSSET
 - FAQ (could be on GitHub, OnSSET website or OnSSET documentation)

- Other collaborating platforms apart from GitHub for users who are not very acquainted with using GitHub. A platform for easy interaction between experts and new users to exchange ideas and questions.

Session 3 - Ongoing and future developments

There are many geospatial electrification tools available and each has its strengths and weaknesses. The capabilities of these tools range from pre-feasibility studies to detailed electricity analysis. For these various tools, there is a constant trade-off between complexity and speed. OnSSET has its core strength in its transparency and open-source nature; which aids easier utilisation for new users. Some of the ongoing and future developments for OnSSET which have been identified include:

- For electricity demand:
 - Improve demand representation in the model
 - Integrate productive loads such as agriculture
 - Integrate social loads such as health clinics, schools, public lighting
- For electricity supply:
 - Integrate hybrid micro-grids and off-grid system optimisation
 - Integrate grid routing into the OnSSET modelling framework
- For the social dimension of electrification:
 - Site prioritisation. The current prioritisation algorithm currently assists in this aspect.
 - Planning with justice. As mentioned previously, Menghwani et.al has taken an initial step towards incorporating this with the current model.

With OnSSET, there is a possibility to link other modelling tools to combine their individual strengths.

Issues raised and discussed:

- Integrating electricity reliability within the OnSSET model
- For electricity demand: variation in the load curves across the various demand sectors, integration of hourly load profile for households, integration of social loads
- Improving the population clusters to take into account productive and social loads
- Integration of small and medium enterprises (electricity demand modelling)
- Potential collaboration between e.g. JRC and OnSSET as many similar developments happen in parallel.

Part 4 - Academic Excellence | Good academic practice

- Annual OnSSET publication summarizing all efforts made towards developing OnSSET during the year. Anyone who has worked with developing OnSSET will be acknowledged through this publication.

- The benefits of scientific publications is two-fold; on one hand generating academic publications is a key metric for many researchers, and on the other they get OnSSET developments peer-reviewed by the scientific community.

Action plan:

- Provide a template for how to best share data and research linking people who use OnSSET to the right resources

Part 5 – Any other business

- No other business