



## **MoManI: a tool to facilitate research, analysis, and teaching of computer models**

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Allocating limited resource efficiently is a task to which efficient planning and policy design aspires. This may be a non-trivial task. For example, the seventh sustainable development goal (SDG) of Agenda 2030 is to provide access to affordable sustainable energy to all. On the one hand, energy is required to realise almost all other SDGs. (A clinic requires electricity for fridges to store vaccines for maternal health, irrigate agriculture requires energy to pump water to crops in dry periods etc.) On the other hand, the energy system is non-trivial. It requires the mapping of resource, its conversion into useable energy and then into machines that we use to meet our needs. That requires new tools that draw from standard techniques, best-in-class models and allow the analyst to develop new models.

Thus we present the Model Management Infrastructure (MoManI). MoManI is used to develop, manage, run, store input and results data for linear programming models. MoManI, is a browser-based open source interface for systems modelling. It is available to various user audiences, from policy makers and planners through to academics.

For example, we implement the Open Source energy Modelling System (OSeMOSYS) in MoManI. OSeMOSYS is a specialized energy model generator. A typical OSeMOSYS model would represent the current energy system of a country, region or city; in it, equations and constraints are specified; and calibrated to a base year. From that future technologies and policy options are represented. From those scenarios are designed and run. Efficient allocation of energy resource and expenditure on technology is calculated. Finally, results are visualized. At present this is done in relatively rigid interfaces or via (for some) cumbersome text files.

Implementing and operating OSeMOSYS in MoManI shortens the learning curve and reduces phobia associated with the complexity of computer modelling, thereby supporting effective capacity building activities. The novel structure of MoManI allows different teams to collaborate simultaneously from around the globe. Each user can easily edit and update any part of the modelling process: from the underlying mathematical equations of OSeMOSYS through to the visualization of results.

Going forward, this tools' flexible structure will make it a potential interface for a larger selection of modelling tools, thus extending its use from OSeMOSYS for energy to other systems modelling, moving beyond SDG7 to others.