Introducing CCG's Energy Modelling Offer

MODELS WITHOUT FRONTIERS

Climate Compatible Growth

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Global Research and Technology Development
Funded by UK Government

To attract investment for your clean energy projects, you need credible business cases. For that, you need data-driven analysis of your country's situation and models that show the most viable way forward. These also help to shape your policies. Our energy modelling tools can support you with every aspect of this process.

We curate a suite of open-source modelling tools and frameworks that support the energy planning process for the climate transition in low- and middle-income countries (LMICs). Many of these tools are contributed to by a range of international partners, including **IAEA**, **IRENA**, **KTH**, **UNDESA** and **The World Bank**.

Certain common design features of CCG's modelling ecosystem make it particularly effective and adaptable to various contexts:

- **Free of charge.** All models are open-source, promoting transparency and reproducibility, and widening access by removing software costs.
- **Easy to use.** All models work with simple interfaces and minimal coding, meaning most people can start to use them.
- **Faster results.** Starter Data Kits containing the basic data needed to run zero-order modelling scenarios in over 60 LMICs are available, allowing rapid generation of preliminary results for urgent policy decisions in a rapidly changing energy landscape.
- **Interlinkages.** While each model can be run independently, they are also strongly interconnected and can be used in conjunction to shed light on more complex issues and interactions, with outputs from one model acting as inputs to the next. Each linkage is further detailed with an online hands-on exercise for transparency and accessibility, allowing you to replicate and reproduce the workflow with ease.
- **On-demand training.** Each model in CCG's ecosystem comes with associated training material designed to support online, self-administered learning (through the Open University's OpenLearn Collection) and more advanced and intensive in-person learning at one of our Energy Modelling Platform training events.

These tools aim to support you in moving along the investment pipeline from 'Data-to-Deal'. The term Data-to-Deal refers to actions taken throughout an entire process that runs from data collection, system modelling, and development planning to national financing strategies, project finance arrangements, and the agreement of a deal (i.e., receiving financing for a transaction). These are also all driven by a strong stakeholder engagement process.

To support Data-to-Deal, different modelling tools and frameworks can be incorporated and developed for the **IMPACCT Framework** which spans upstream planning activities (left) to downstream financing activities (right) (see **Table 1** for brief descriptions of each modelling tool and framework and Figure 1 to see how they interlink).

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Table 1: *Overview of CCG modelling tools and frameworks*

Category	Modelling Tool or Framework	Description	Developer(s)
GIS	EAE - Energy Access Explorer	Identifies high priority areas for energy access interventions based on energy supply and demand	World Resources Institute
	OnSSET - Open Source Spatial Electrification Tool	Optimises the expansion of electricity access whilst considering locations and infrastructure constraints	Multi-agency collaboration, coordinated by KTH Royal Institute of Technology
	OnStove - Open Source Spatial Clean Cooking Tool	Compares the relative potential of different cookstoves based on their costs and benefits	KTH Royal Institute of Technology
	NISMOD - National Infrastructure Systems Model	Analyses infrastructure systems across different sectors. Assesses their resilience, risks, and screen adaptation investment needs	University of Oxford
Techno-economic	MAED - Model for Analysis of Energy Demand	Evaluates future energy demand based on assumptions on demographic, socioeconomic, and technological developments	International Atomic Energy Agency
	OSeMOSYS - Open Source Energy Modelling System	Optimises the least-cost capacity expansion plan based on a pre-defined demand	Multi-agency collaboration, coordinated by KTH Royal Institute of Technology
	CLEWs - Climate, Land, Energy and Water Systems (CLEWs)	Analyses the interdependencies between climate, land use, energy, and water systems	Multi-agency collaboration, coordinated by KTH Royal Institute of Technology
	SIBs - Social Impacts and Benefits (SIBs)	Quantify the social and environmental implications from a capacity expansion plan	KTH Royal Institute of Technology
	FlexTool	Optimises least-cost power system flexibility assessments based on national capacity investment plans	International Renewable Energy Agency
	PathCalc - Pathways Calculator	Uses ambition levels and policy levers to show the impact of various choices on demand, investments, and emissions	Department for Energy Security & Net Zero, Imperial College London
Financial	FFRM - Fossil Fuel Retirement Model	Quantifies the foregone revenue resulting from early shut down of fossil fuel plants, ensuring asset owners are reimbursed for lost revenues	Imperial College London, University of Oxford, World Bank Group
	MinFin - Model for Informed National Financing	Bridges the gap from planning to finance by estimating the financing costs associated with specific investment plans and evaluating the adequacy of sector cashflows to support their repayment.	University of Oxford, Imperial College London
	FINPLAN - Model for Financial Analysis of Electric Sector Expansion Plans	Simulates financial performance of power plant projects over their lifetime by comparing the cost components with available financing sources	International Atomic Energy Agency
	FinCoRE - Financing Costs for Renewables Estimator	Estimates international commercial cost of capital for different power technologies, by year and country	Imperial College London
	FinTrack - Climate Finance Tracker	Maps available development and climate finance envelopes by country, detailing concessionality, access conditions, and utilisation rates	Imperial College London

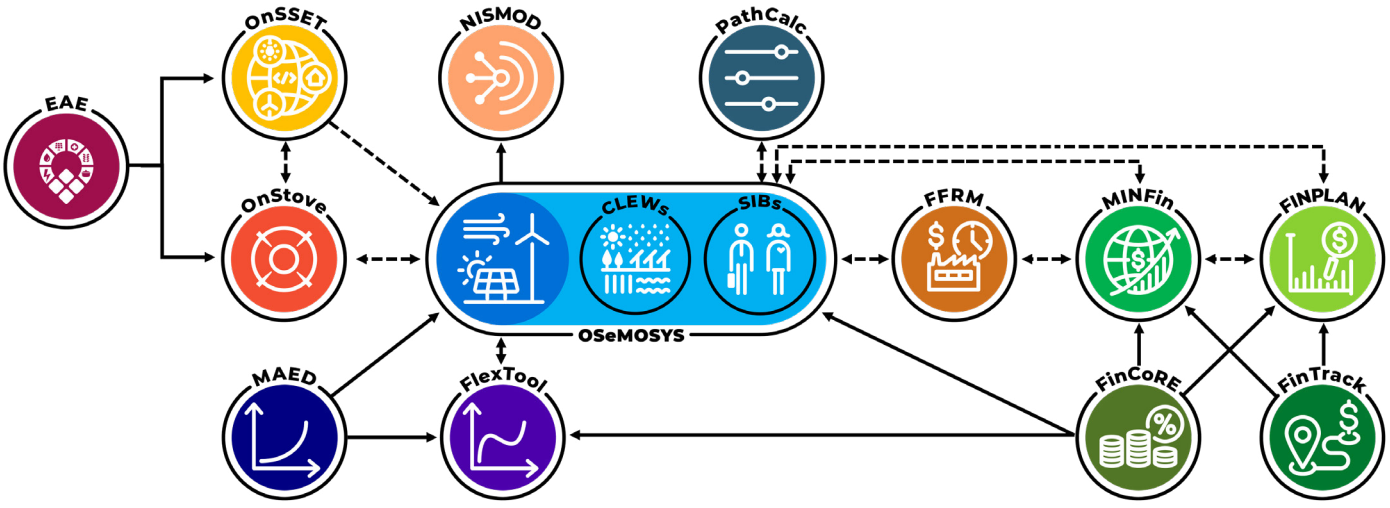
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Figure 1 shows how these tools and frameworks interlink. The IMPACCT Framework begins with energy demand assessments with MAED. Simultaneously, high priority areas for energy access can be identified with EAE, thereafter, electrification and clean cooking plans can be developed with OnSSET and OnStove, respectively. Outputs from MAED, OnSSET, and OnStove can then be fed into OSeMOSYS to develop a capacity expansion plan, and broader linkages with land and water can be studies with CLEWs, and social implications with SIBs. From OSeMOSYS results, power system flexibility can be evaluated with FlexTool, national infrastructure planning can be assessed with NISMOD, and impacts of certain choices on carbon emissions can be visualised interactively with PathCalc. OSeMOSYS outputs can also be used to understand the foregone revenue from early shutdowns of fossil fuel plants with FFRM. With projected capital costs from FinCoRE and financing terms from FinTrack, OSeMOSYS outputs can also be used to develop a national climate finance strategy using MINFin and evaluation of the financial viability of utility-scale projects using FINPLAN.

Find out more about CCG's energy modelling and capacity building activities by scanning this QR code

Figure 1: *A visual overview of CCG's IMPACCT Framework (interlinkages between the modelling tools and frameworks)*



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