

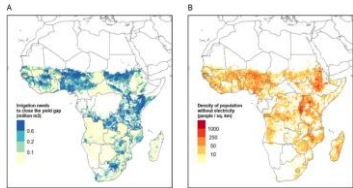
Achieving renewable energy-centered sustainable development futures for rural Africa



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Context & objectives

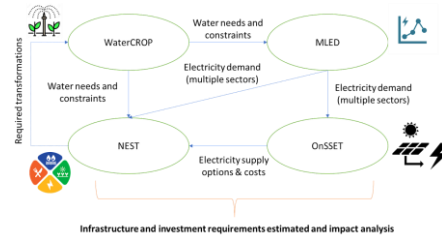


Multi-dimensional and overlapping Nexus challenges in rural sub-Saharan Africa (>90% rainfed irrigation; <35% electricity access; 60% moderate/severe food insecurity; 35% below poverty line; +300 million additional people by 2050) and growing **climate change impacts**.

Need for **multi-level interventions** (from national policies, to regional/river basin-scale planning, to local planning and investment) and **innovative technology-business model solutions** to sustainably achieve wellbeing and increase adaptive capacity.

Study objectives: soft-linking bottom-up water and energy demand and infrastructure assessment models into a multi-node, national Nexus-extended Integrated Assessment Model (MESSAGEix-Nexus) to show how water and energy needs for agriculture can jointly shape energy access pathways.

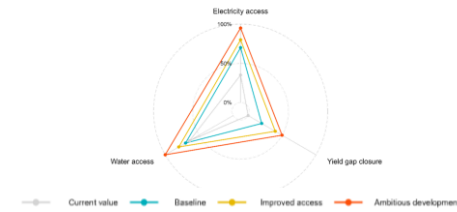
Materials & methods



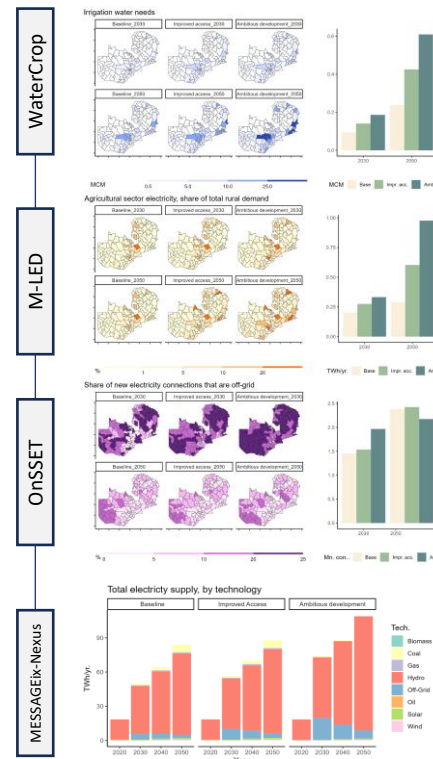
Four models integrated in the “**RE4AFAGRI modelling platform**” are run in sequence and soft-linked, connecting **bottom-up demand onto multi-node IAM for supply and investment assessment**.



Harmonized **SSP-RCP and policy target scenarios** to 2050 across models (baseline; improved access; ambitious development scenarios) and consistent, **stakeholder-validated modelling assumptions**.



Zambia implementation



95-187 MCM of water required to achieve irrigation expansion goals, growing to **239-610 MCM** by 2050. In turn, total electricity demand climbing from the current 18 TWh/yr to 55-93 TWh/yr in 2030 and **87-116 TWh/yr** in 2050-

Water needs for agriculture affect energy demand through water pumping and increased crop yields (and thus crop processing and storage energy use) → implications for energy planning and SDGs (energy access; nutrition security).

Stimulating agricultural uses of energy (e.g. through subsidies, regulation, innovative business models) drives much faster uptake of mini-grid and standalone electricity access systems → **accelerated rural development and SDGs achievement**.

National-scale integrated modelling with explicit focus on Nexus interlinkages allow **assessing locally-relevant demand sources and investment needs**, and their implications for sustainable development.

Note: I have another simultaneous poster ☺

If I am not here, please find me at **Hall A | A.1** or drop me an email to falchetta@iiasa.ac.at