

Renewables for African Agriculture:  
Integrating Modelling Excellence and Robust  
Business Models

# Introduction to the models and framework

[www.re4afagri.africa](http://www.re4afagri.africa)



# LEAP-RE

Long-Term Joint EU-AU Research  
and Innovation Partnership on Renewable Energy



**RE4AFAGRI**

Renewable Energy for African Agriculture



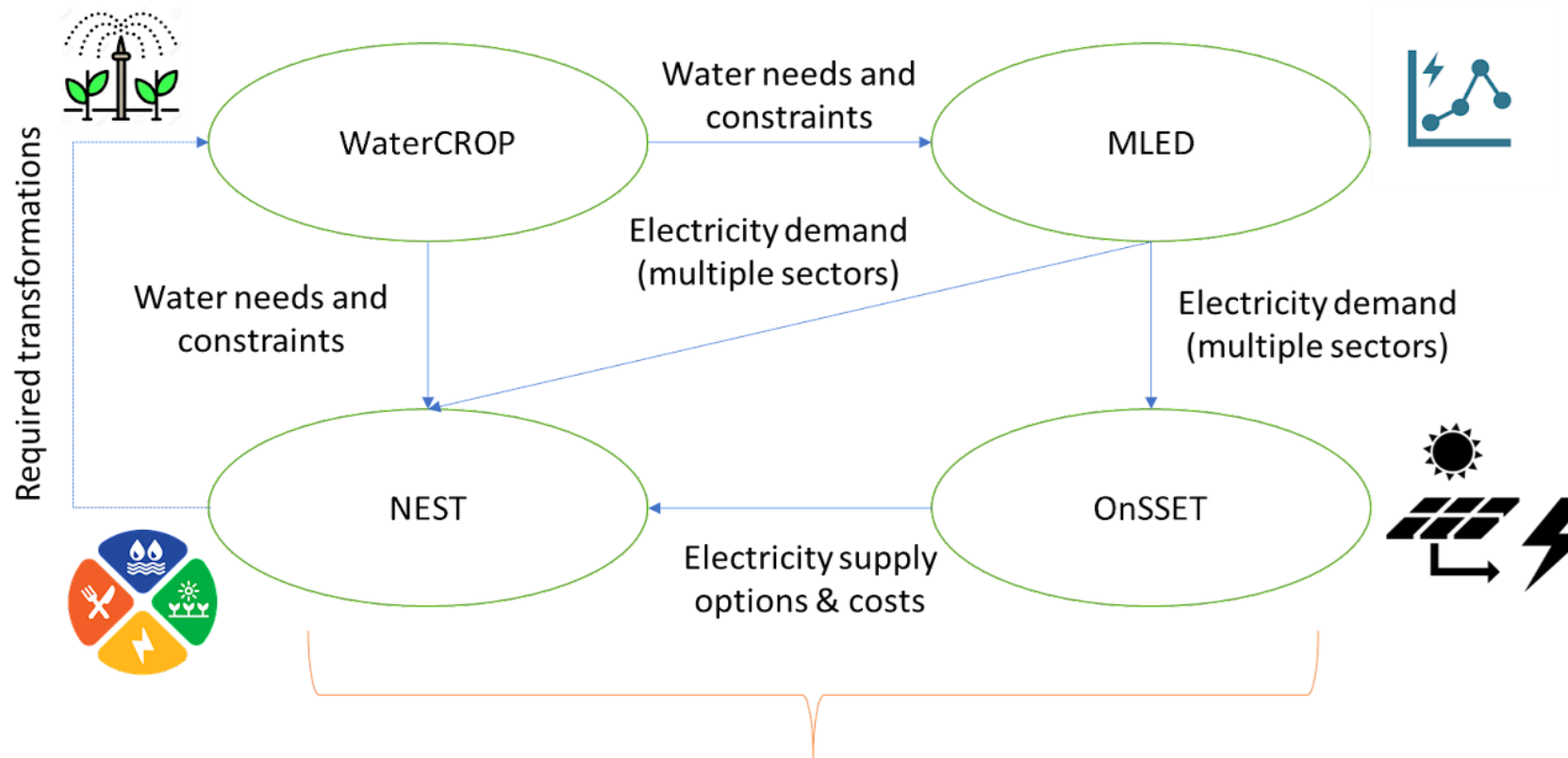
The LEAP-RE project has received funding from the European Union's Horizon 2020 Research and Innovation Program under Grant Agreement 963530.

# THE RE4AFAGRI modelling platform



LEAP-RE

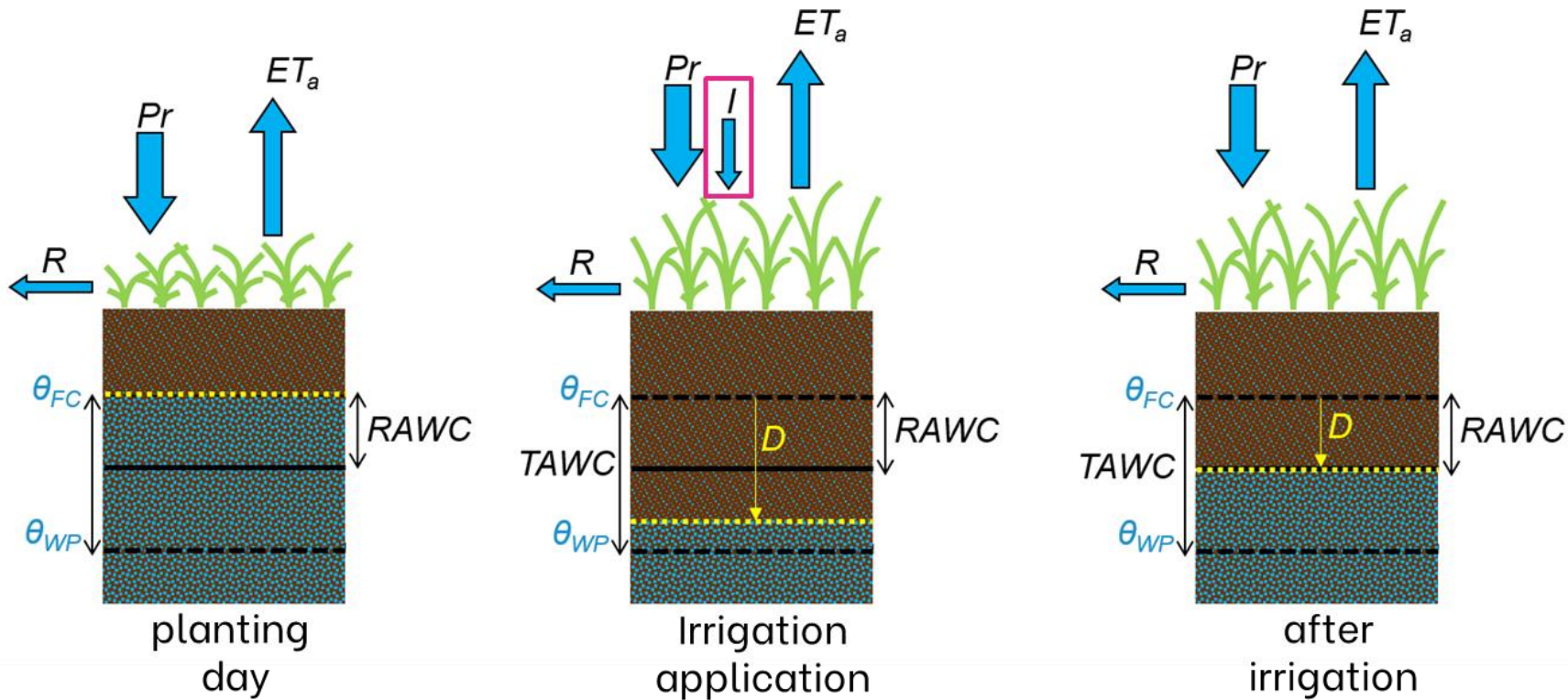
The RE4AFAGRI platform is a multi-model framework understand integrated land-water-agriculture-energy-development nexus interlinkages in developing countries.



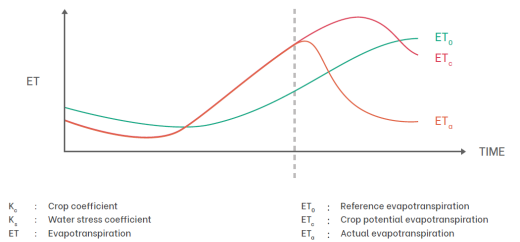
Infrastructure and investment requirements estimated and impact analysis



**WaterCrop is an evapotranspiration model to estimate the crop water demand by source (rainfall plus irrigation)**

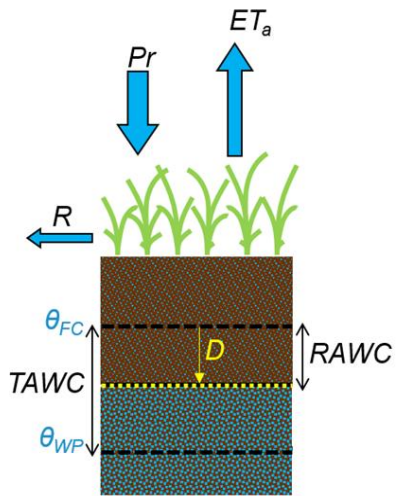


### 3. Evapotranspiration



WaterCrop is an evapotranspiration model to estimate the crop water demand by source (rainfall plus irrigation)

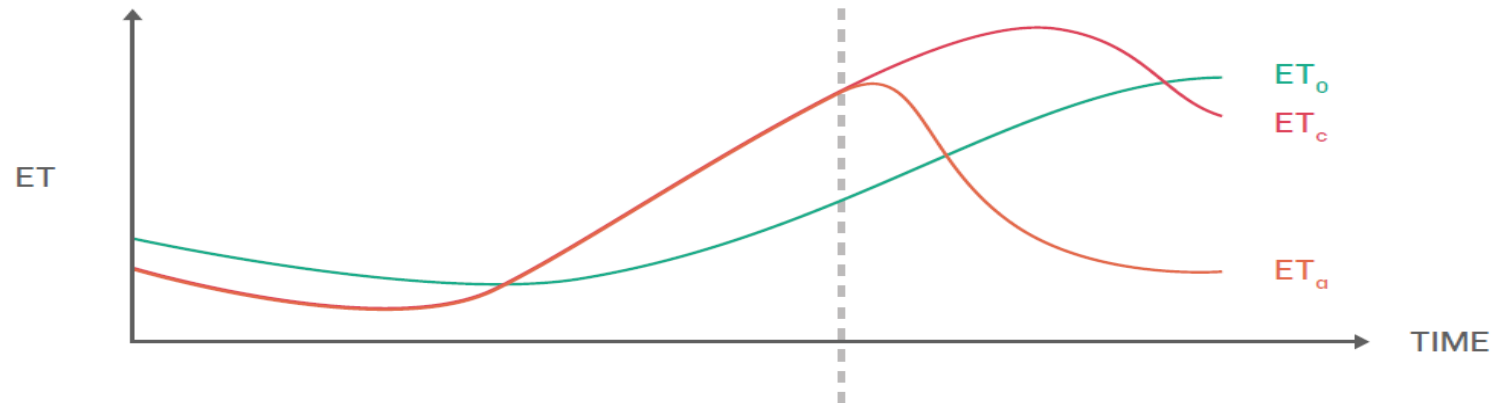
### 3. Evapotranspiration



after irrigation

$K_c$  : Crop coefficient  
 $K_s$  : Water stress coefficient  
 ET : Evapotranspiration

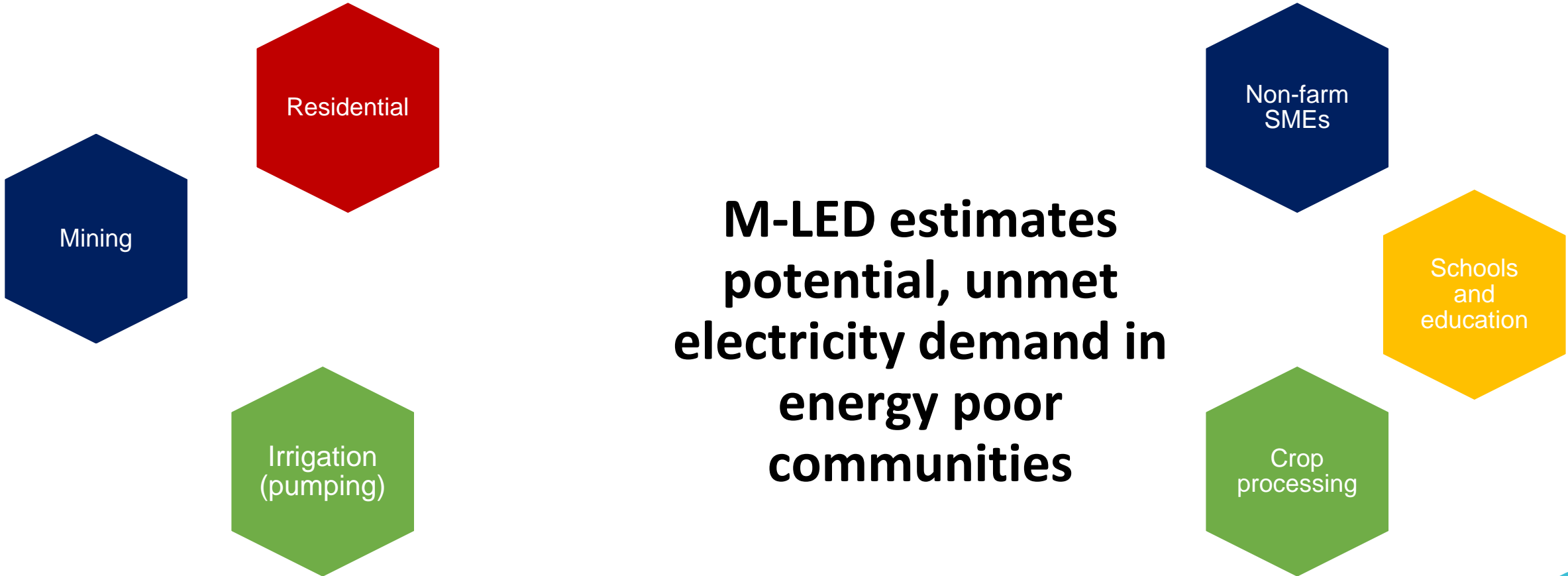
$ET_o$  : Reference evapotranspiration  
 $ET_c$  : Crop potential evapotranspiration  
 $ET_a$  : Actual evapotranspiration



# M-LED - Multi-sectoral Latent Electricity Demand



LEAP-RE

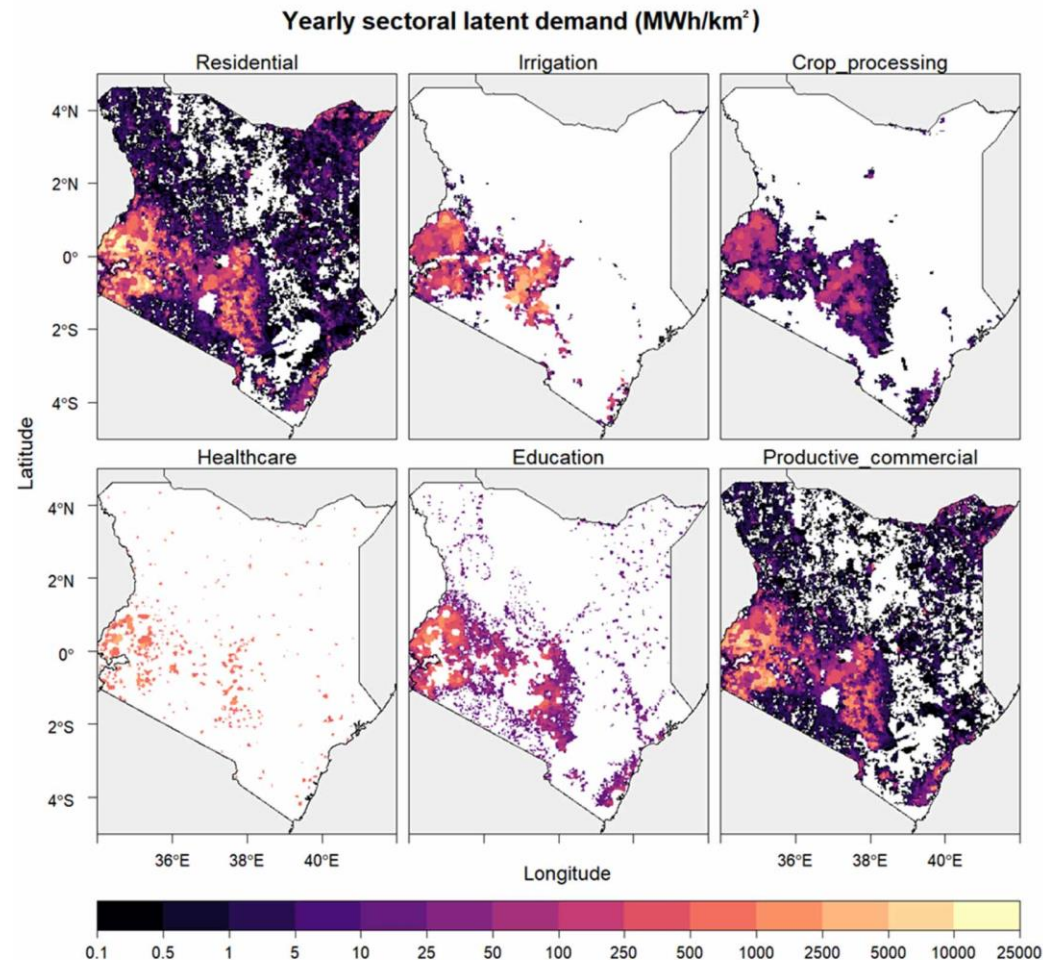


# M-LED - Multi-sectoral Latent Electricity Demand



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M-LED estimates potential, unmet electricity demand in energy poor communities



Residential

Non-farm SMEs

Mining

Schools and education

Irrigation (pumping)

Crop processing

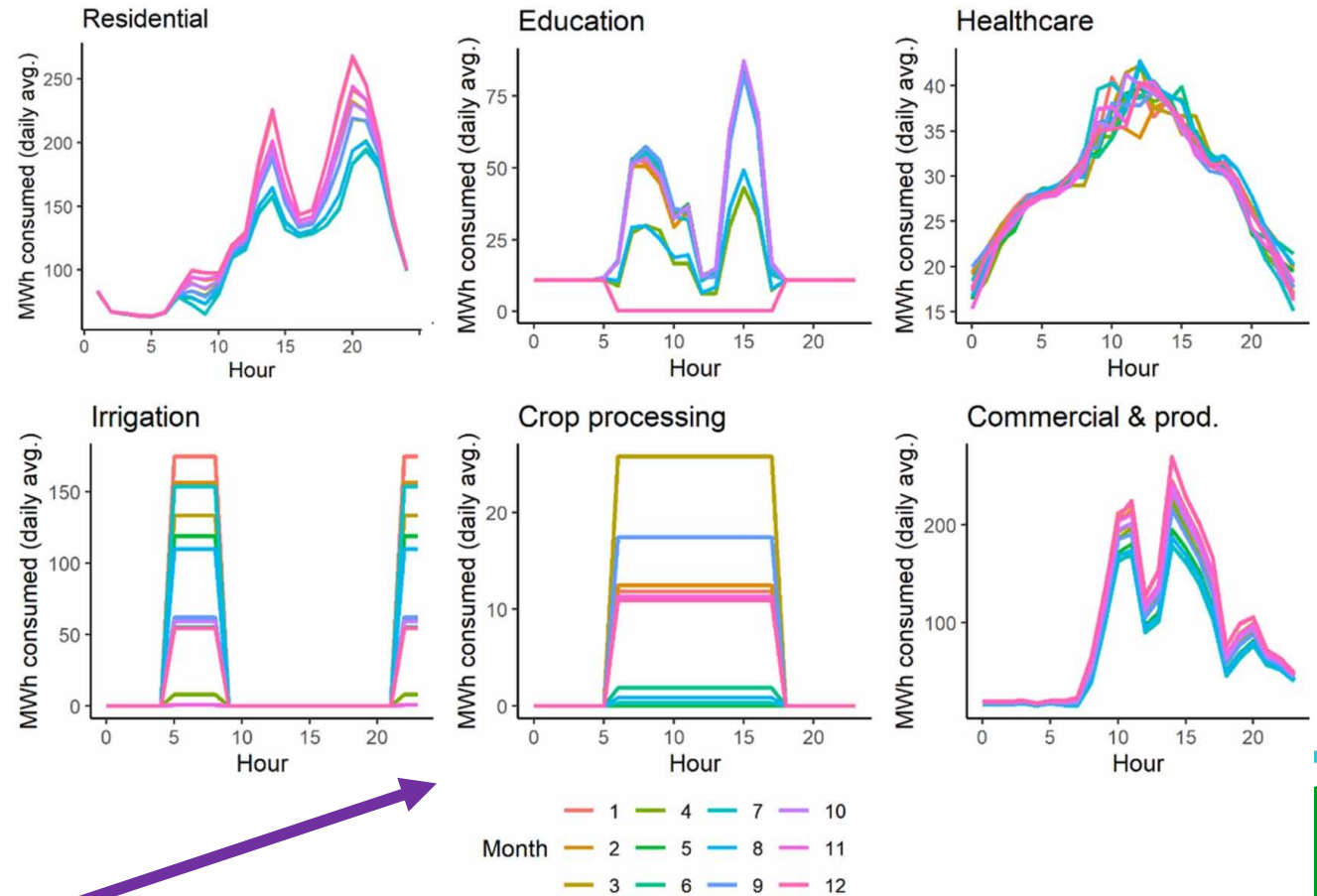
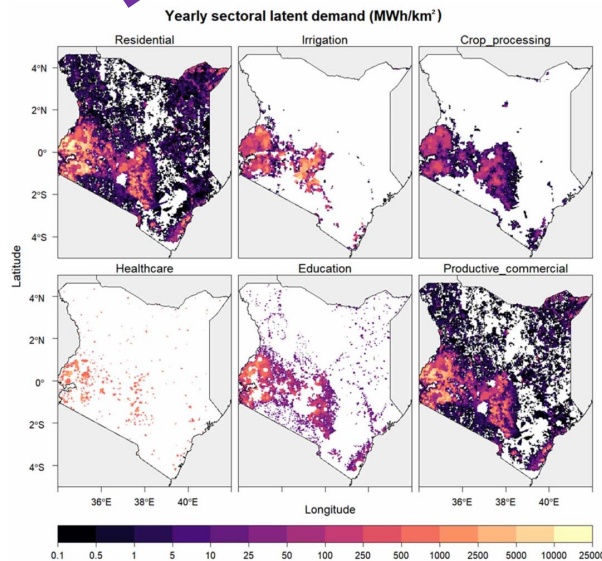
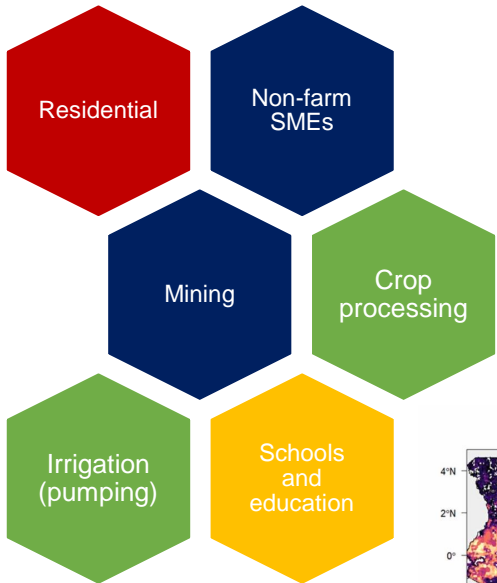


# M-LED - Multi-sectoral Latent Electricity Demand



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M-LED estimates potential, unmet electricity demand in energy poor communities



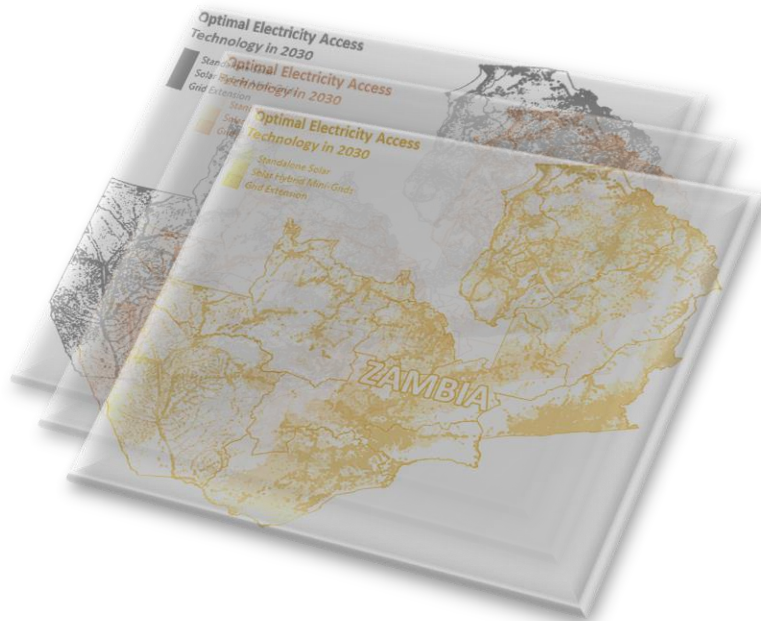
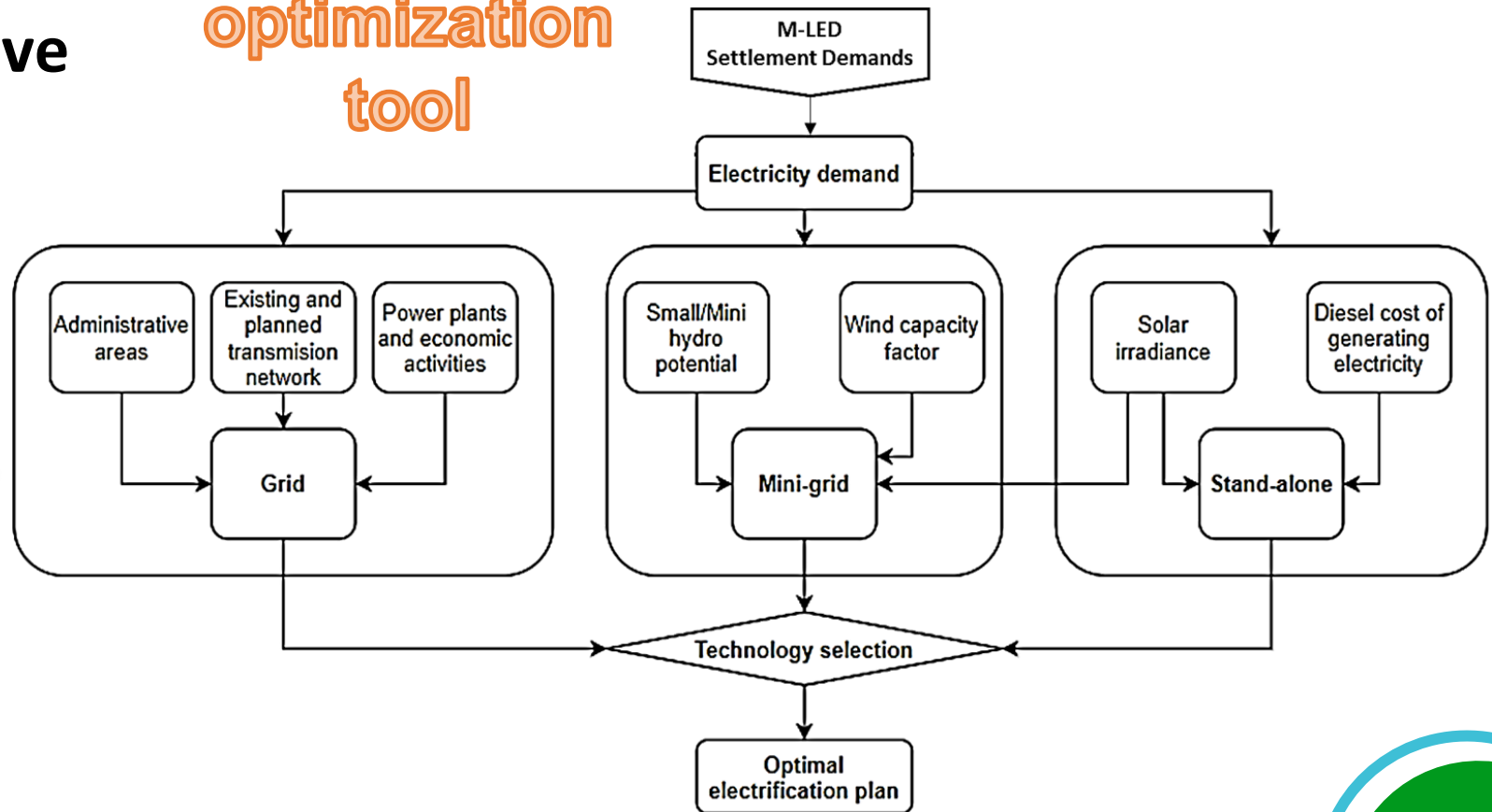
# OnSSET - Open Source Spatial Electrification Tool



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**OnSSET supports electrification planning and decision making to achieve energy access goals.**

**GIS-based optimization tool**



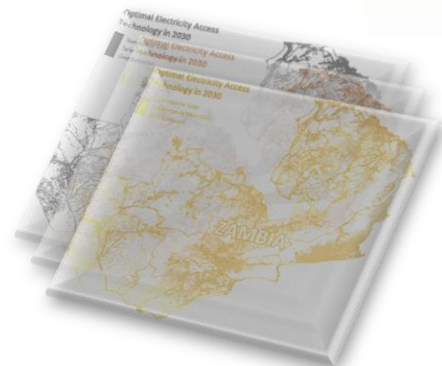
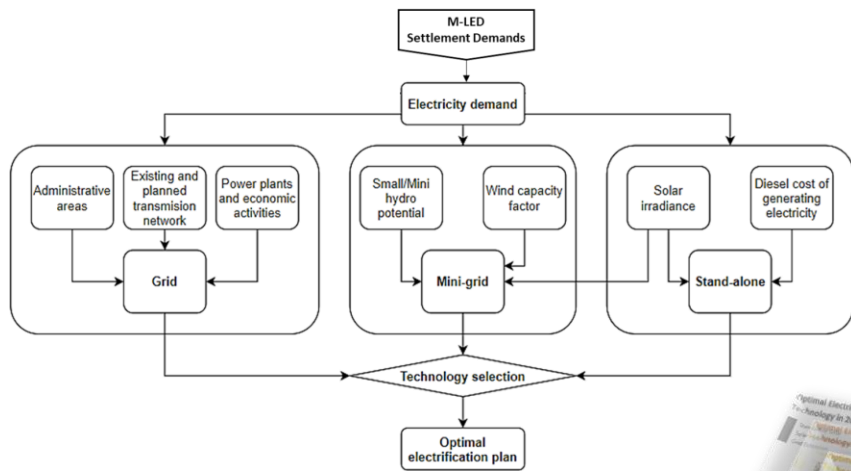






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**OnSSET supports electrification planning and decision making to achieve energy access goals.**



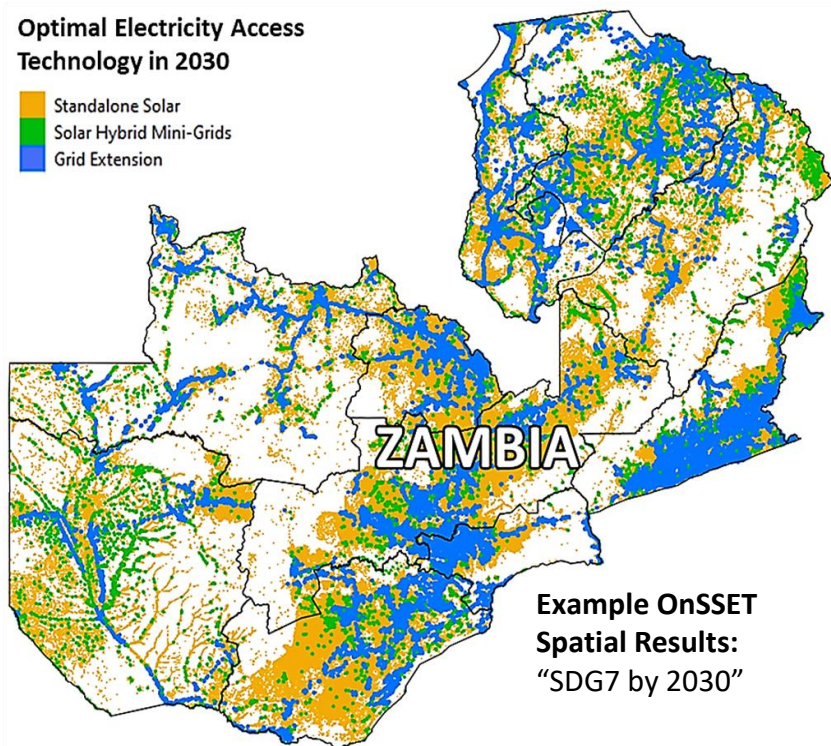
Pico 0-10W	Solar home systems (SHS) 10-100W	Mini-grids <10 MW	Grids ≥10 MW
Small individual devices	Stand-alone system for residence	Distribution system for localised group of customers isolated from grid supply	Interconnected network: electricity to multiple customers, large distance
<p><b>“Standalone systems”</b></p>  <p>Poor / low income</p>  <p>Micro-commercial, poor / middle class households</p>		 <p>Unserved / underserved areas</p>	 <p>Industry / commercial, urban, reachable rural areas</p>



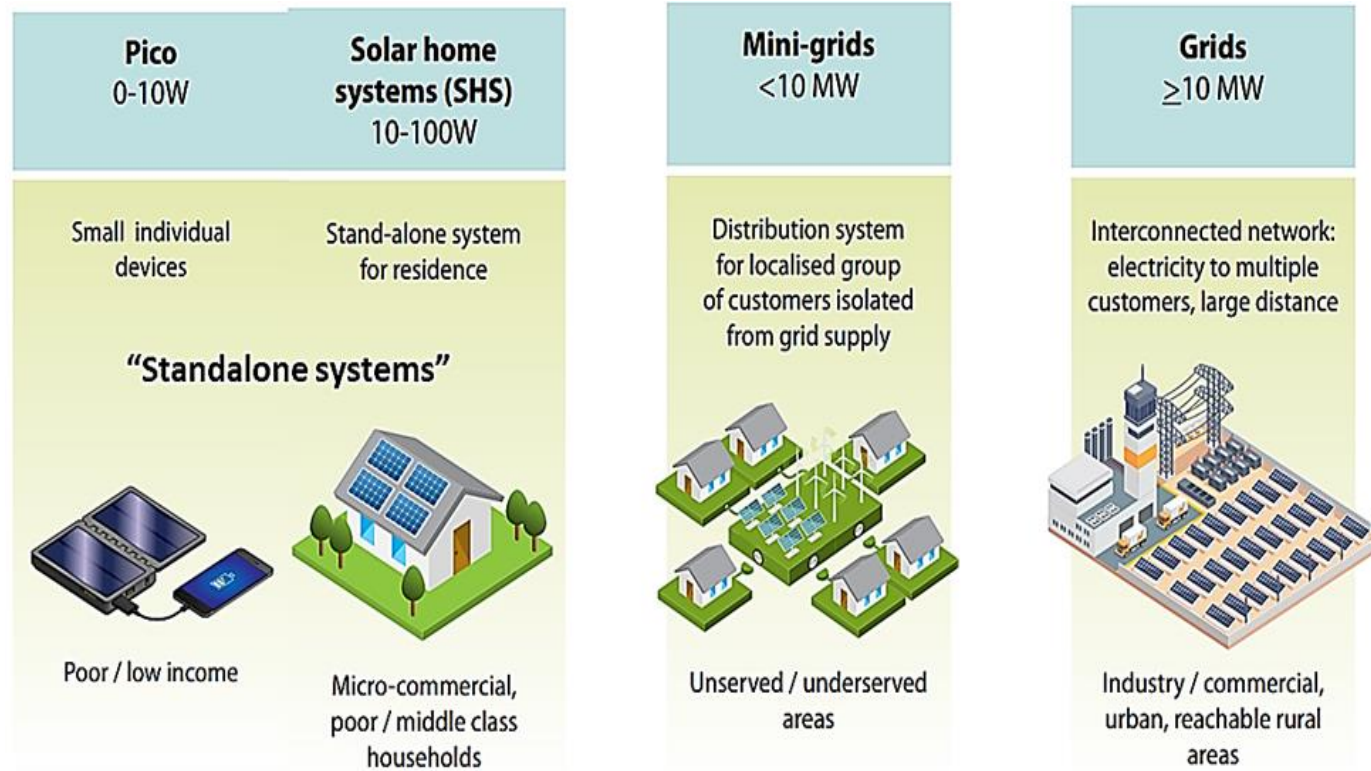
**OnSSET supports electrification planning and decision making to achieve energy access goals.**

Optimal Electricity Access Technology in 2030

- Standalone Solar
- Solar Hybrid Mini-Grids
- Grid Extension



Example OnSSET Spatial Results: "SDG7 by 2030"

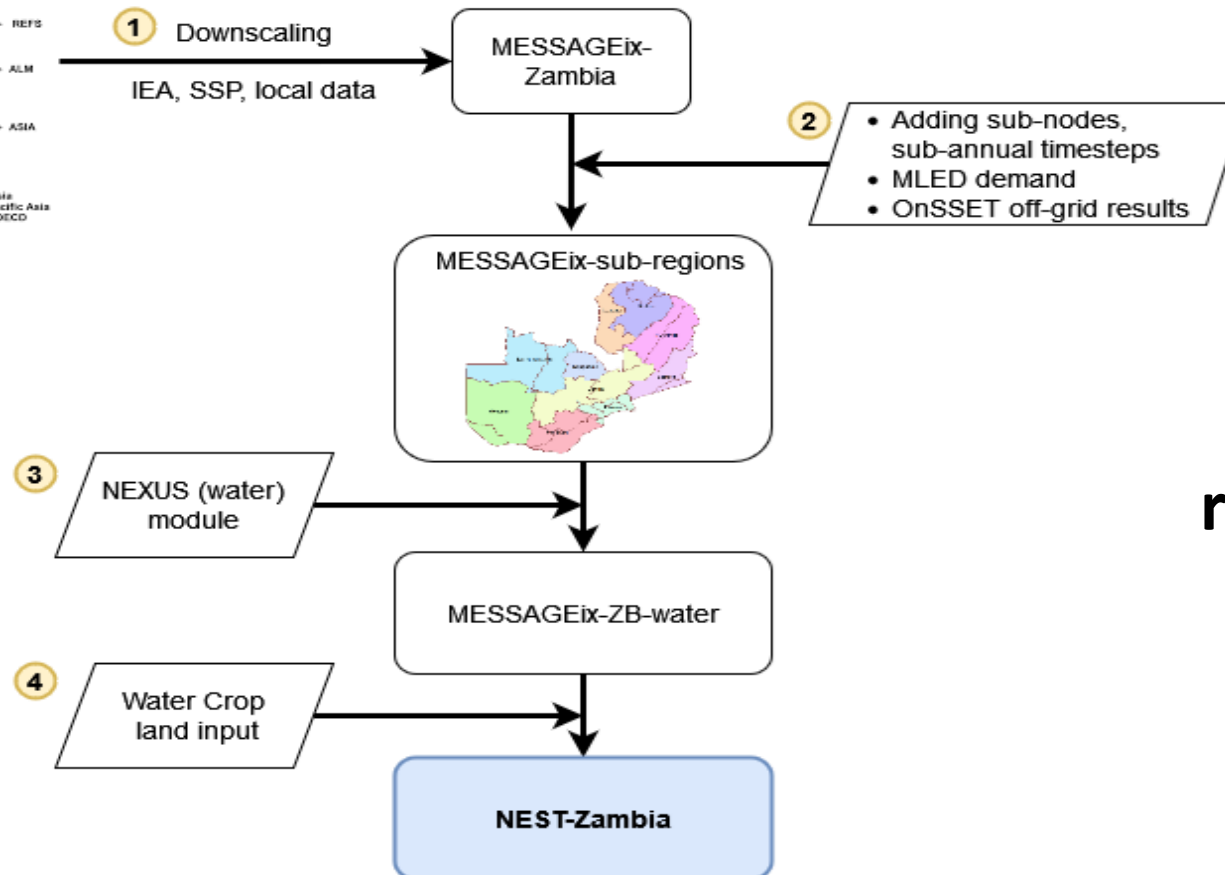


# NEST - (The NExus Solutions Tool)



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MESSAGEix-global



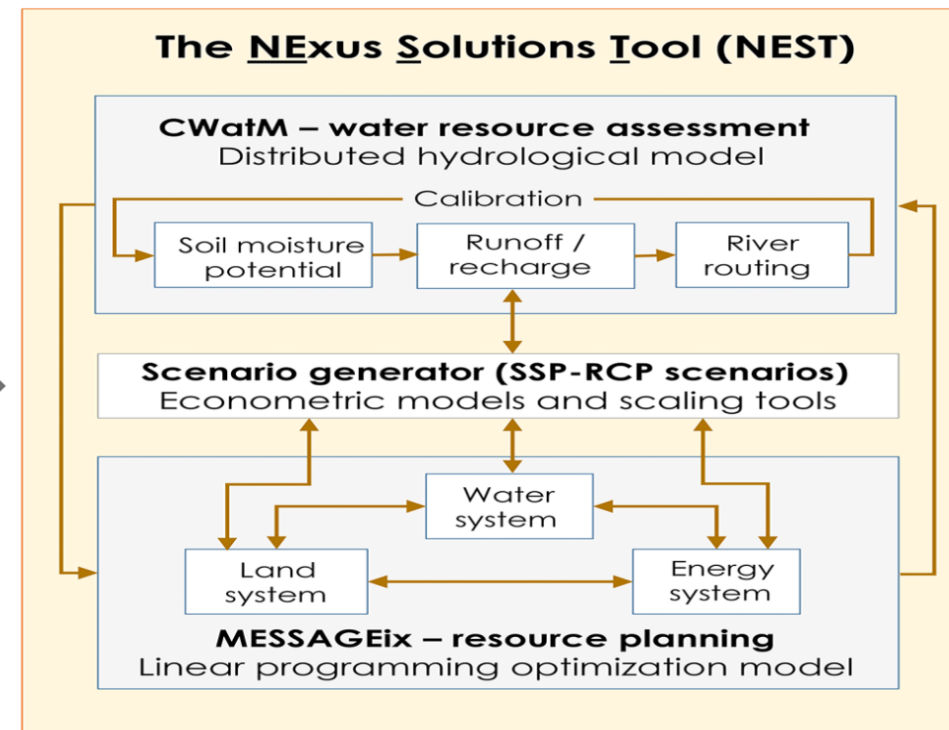
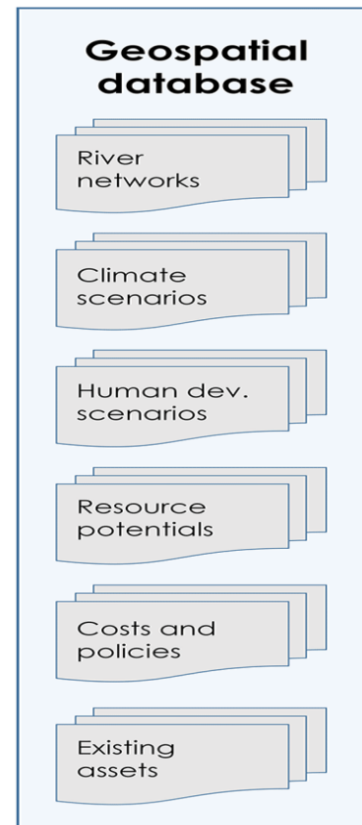
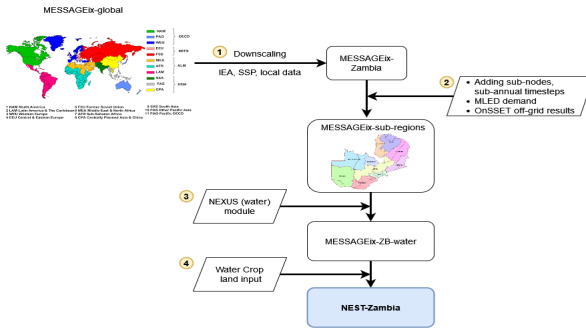
**NEST integrates  
multi-scale  
energy–water–land  
resource optimization  
for sustainable  
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# NEST - (The NExus Solutions Tool)



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## NEST integrates multi-scale energy–water–land resource optimization for sustainable transformation



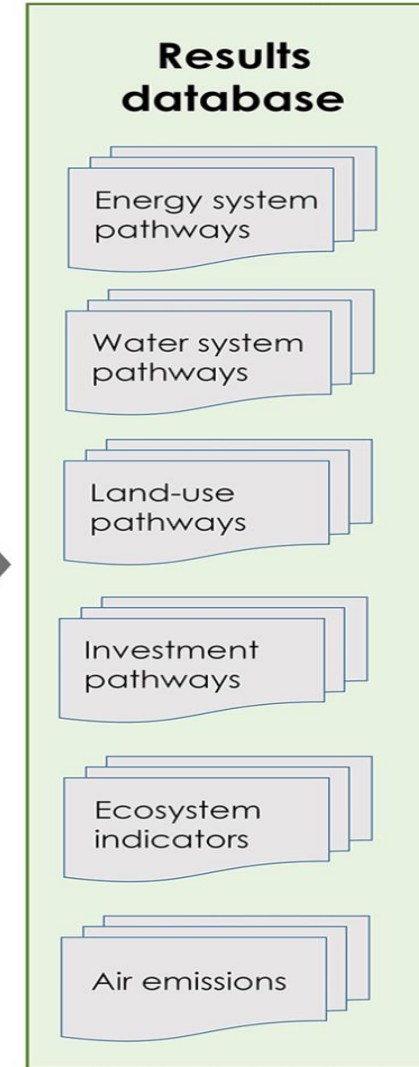
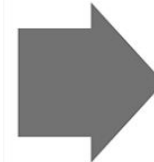
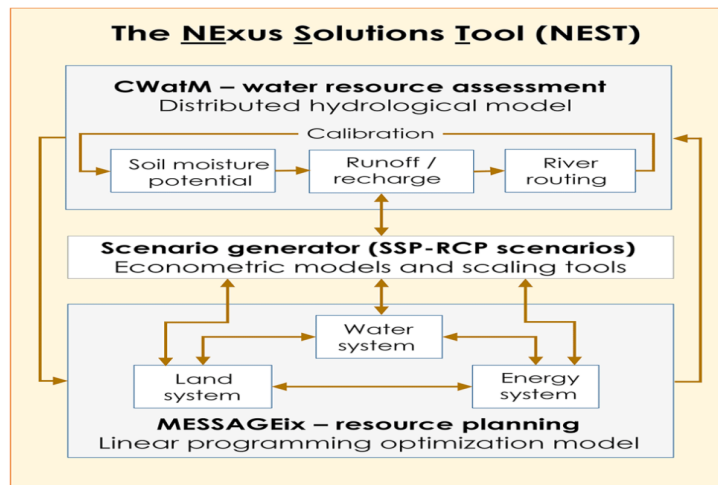
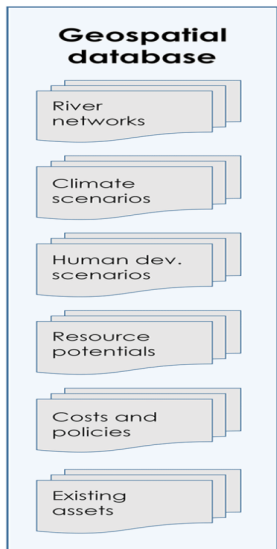
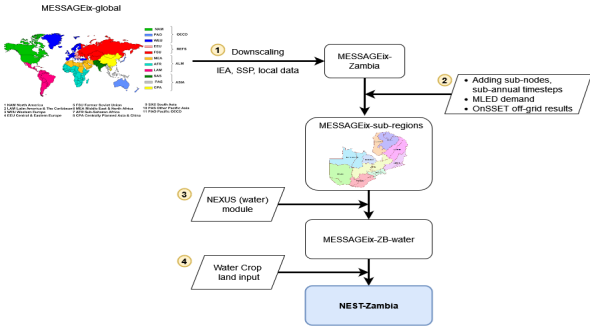


# NEST - (The NExus Solutions Tool)



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**NEST integrates multi-scale energy–water–land resource optimization for sustainable transformation**



- 7 AFFORDABLE AND CLEAN ENERGY**
- 6 CLEAN WATER AND SANITATION**
- 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE**
- 15 LIFE ON LAND**
- 13 CLIMATE ACTION**



## Data:

The [RE4AFAGRI Zenodo channel](#) hosts both the **data inputs** and **outputs** of the models

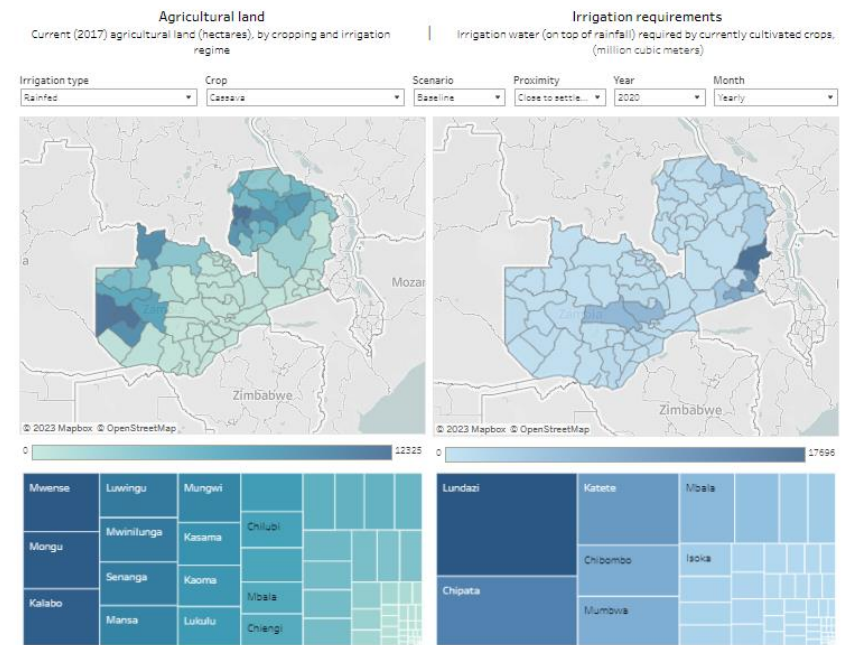
## Code:

The [RE4AFAGRI Github repository](#) hosts the **source code** of the [modelling platform](#), with the **data bundles**

## Documentation:

The [RE4AFAGRI Wiki](#) page hosts the **official documentation** of the modelling platform

## Interactive results visualisation dashboards for stakeholders



<https://re4afargi.africa>



**Thank you**



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