

## Joint Research Centre (JRC)



### **IE - Institute for Energy**

REU - Renewable Energy Unit

*Ispra - Italy*

<http://ie.jrc.ec.europa.eu/>

[http://re.jrc.ec.europa.eu/esti/index\\_en.htm](http://re.jrc.ec.europa.eu/esti/index_en.htm)

<http://re.jrc.ec.europa.eu/refsys/>

**Project:** Scientific and Technical Support to Sustainable Energy Development in Africa: Rural Electrification, Renewable Energy and Communication

**Funded by:** European Commission, EuropeAid Co-operation Office

**Implementing body:** European Commission - Joint Research Centre, Institute for Energy, Renewable Energy Unit (REU)

**Starting date:** August 2009

**Duration:** 3 years



Overall objective:

to contribute to understand the potential for renewable energy options in Africa for increased access to electrification in rural areas.

Project's purpose:

to develop a common African scientific approach towards evaluating rural electrification methodologies.

Total Population	Population Without Access to the grid
North Africa 153·MM·(in·2005)·[1]	7·MM· (8%·rural,·1%·urban)
<u>Sub-Saharan Africa</u> 777·MM·(in·2008)·[1]	561·MM· (89%·rural,·46%·urban)

REN-21, <http://www.ren21.net/>·World·Energy·Outlook·2009·IEA·

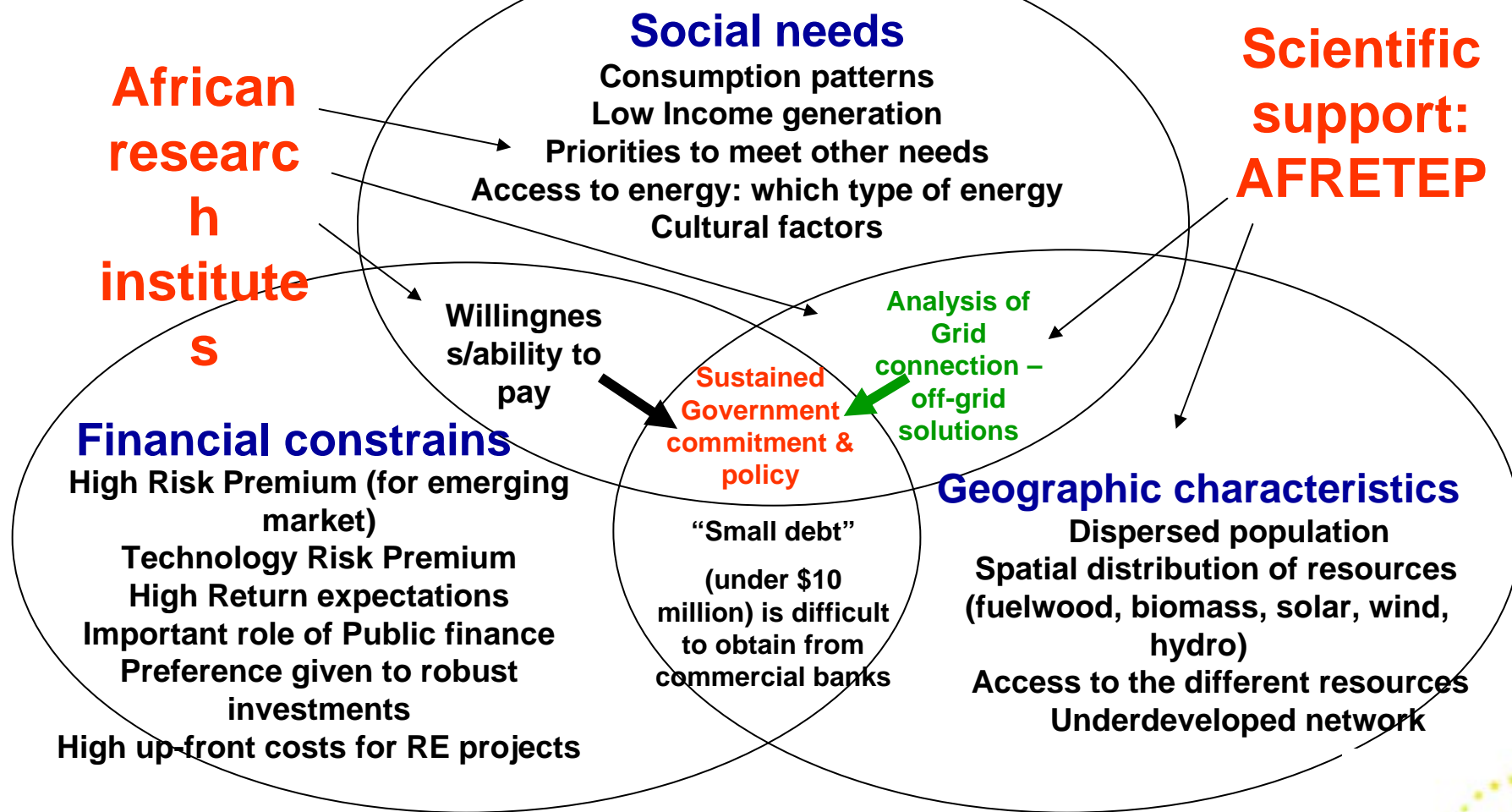
Stephen· Karekezi· and· Waeni· Kithyoma,· Improving· Access· of· Modern· Energy· Use· in· Rural· Africa· African· Renewable· Energy· Policy· Network· (AFREPREN),· 2004·

¶

	Electrification·rate· (%)·			Population· without· electricity· (millions)
	Total·	Urban·	Rural·	
Africa	40.0	66.8	22.7	588.9
Sub-Saharan· Africa	28.5	57.5	11.9	587.2
North·Africa	98.9	99.6	98.2	

Source:·Electricity·access·in·2008—Africa·WEO,·2009·

# Conditions, barriers and points of intervention for Rural Electrification in Africa



1) There is a need for an extended process for **generating and collecting reliable renewable energy data in Africa** - especially as it is assumed that this lack of data presents a major barrier to RE development in Africa.

2) **Electricity to widely scattered rural populations in Africa is achievable**

**Conditions** for higher penetration are:

- Sustained commitment of the government, national policy – crucial condition
- Clear demarcation of responsibilities: regional power companies develop medium voltage network; local communities build the low voltage network; and provinces provide decentralized oversight
- Creation of robust demand for electricity services through awareness creation leading to high willingness to pay
- Partnership between state and local utilities
- Active participation of local governments and communes
- Enforcement of strict technical standards

Identified **most important benefits** are as:

- Improved educational benefit (High enrollment rates +10% increase)
- Enhanced rural productivity
- Improved irrigation and aquaculture
- Equipment to run small-scale manufacturing

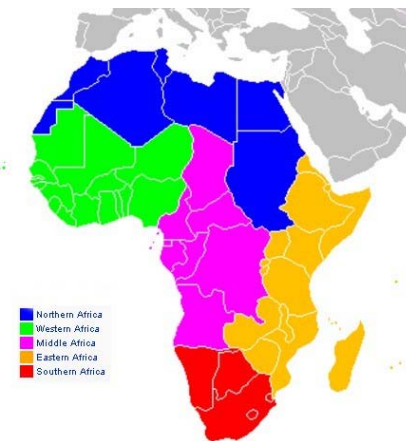
- The main activities are the following:

1. Capacity building of African researchers/students at the REU.



European Solar Test Installation Laboratory

2. Launch of the web-based African Renewable Energy Technology Platform (AFRETEP). This platform will consist of a network of African renewable energy research centres.



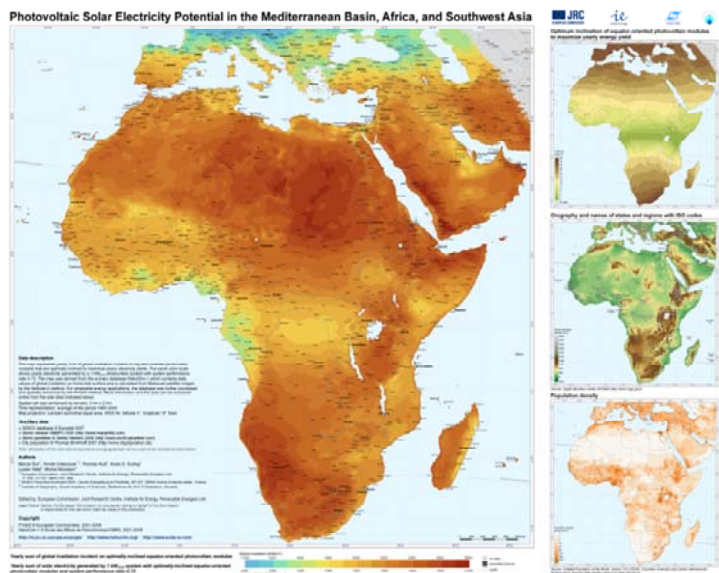
Selected renewable energy research centres representing each region



• The main activities are the following:

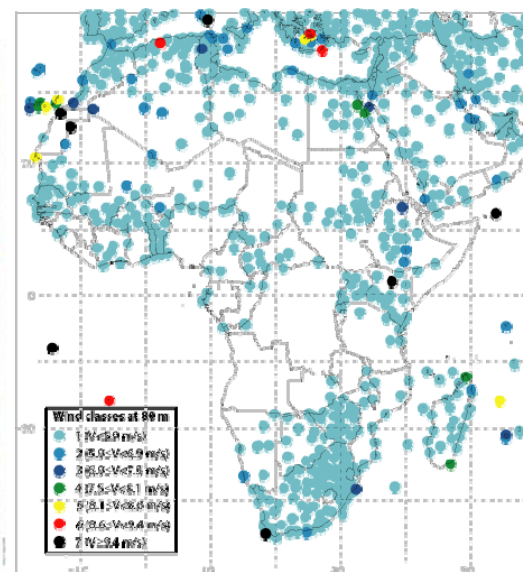
3. High quality renewable energy resource information (solar, wind, hydro) in Africa and accessible via the AFRETEP website.

## Solar resource



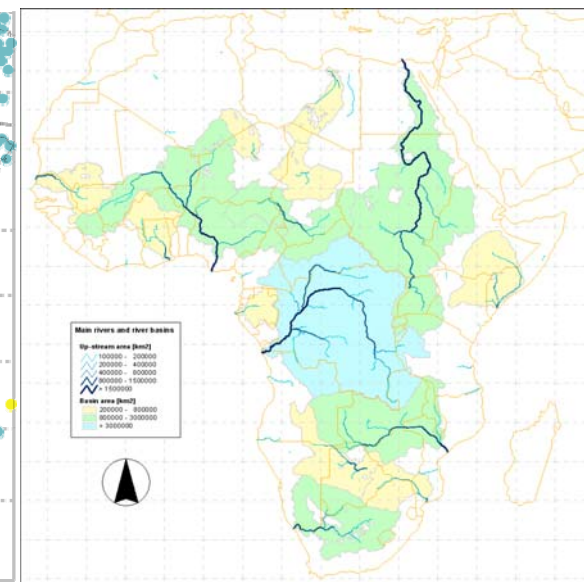
Source: PVGIS, JRC IE REU  
<http://re.jrc.ec.europa.eu/pvgis>

## Wind resource



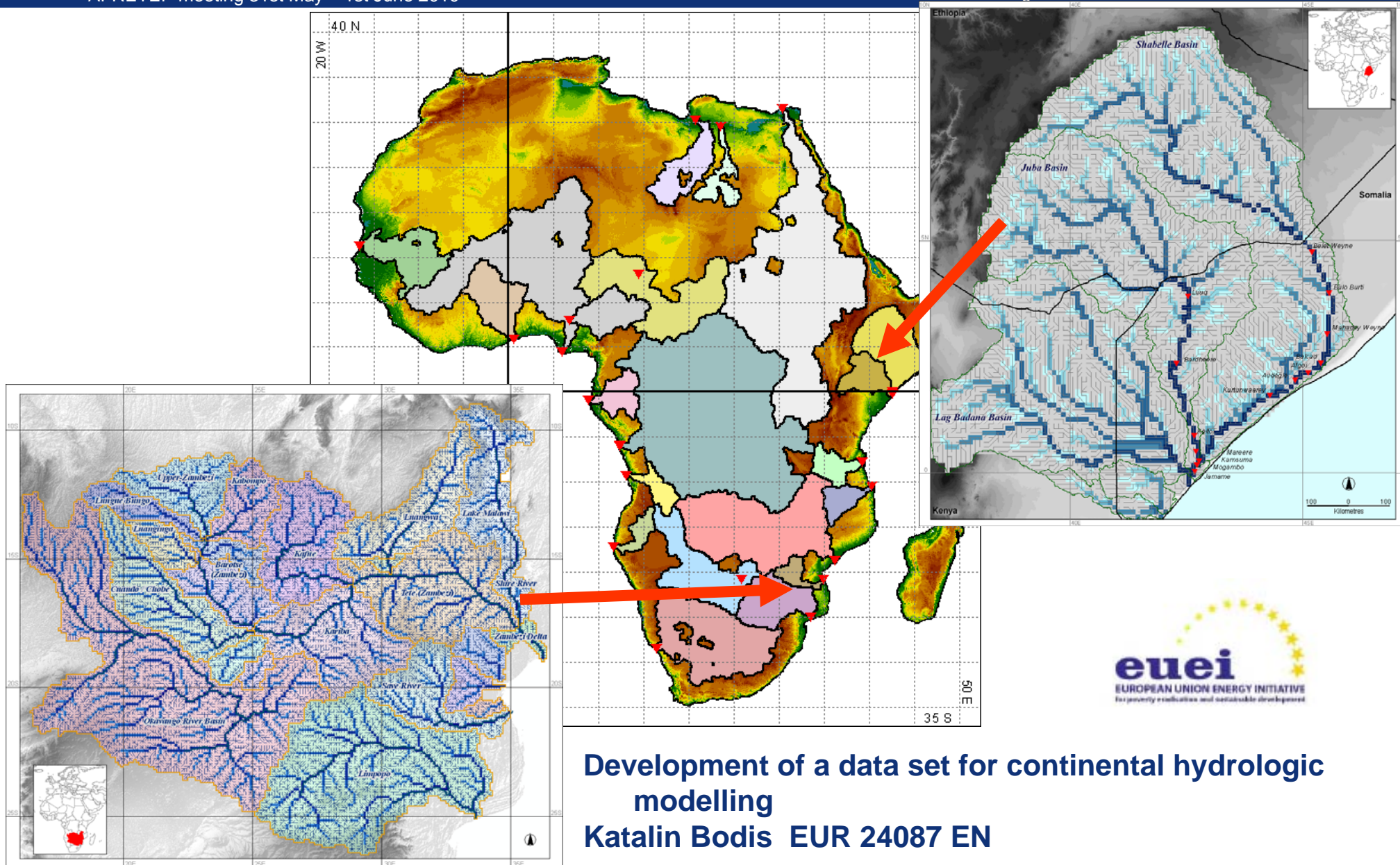
Source: Archer C. L.- Jacobson M. Z.  
[http://www.stanford.edu/group/efmh/winds/global\\_winds.html](http://www.stanford.edu/group/efmh/winds/global_winds.html)

## Hydro resource



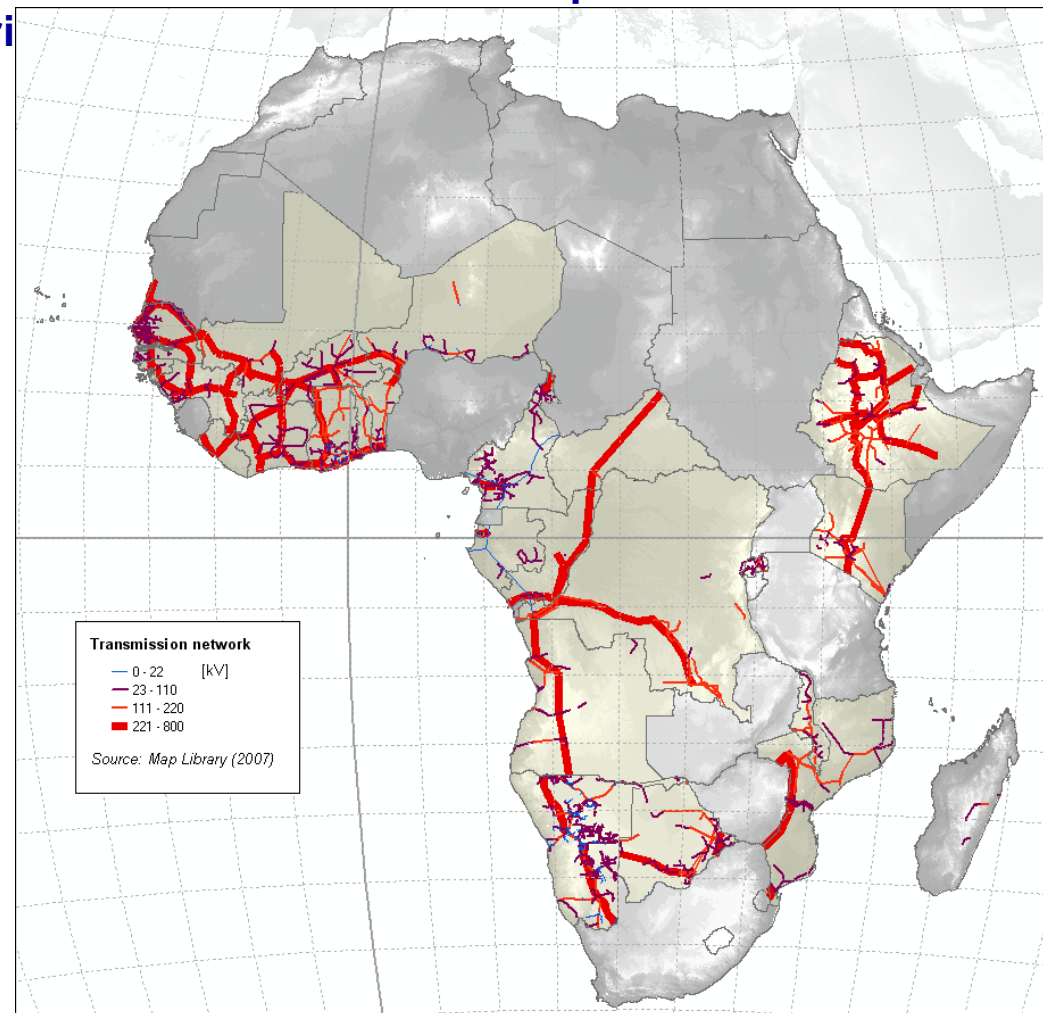
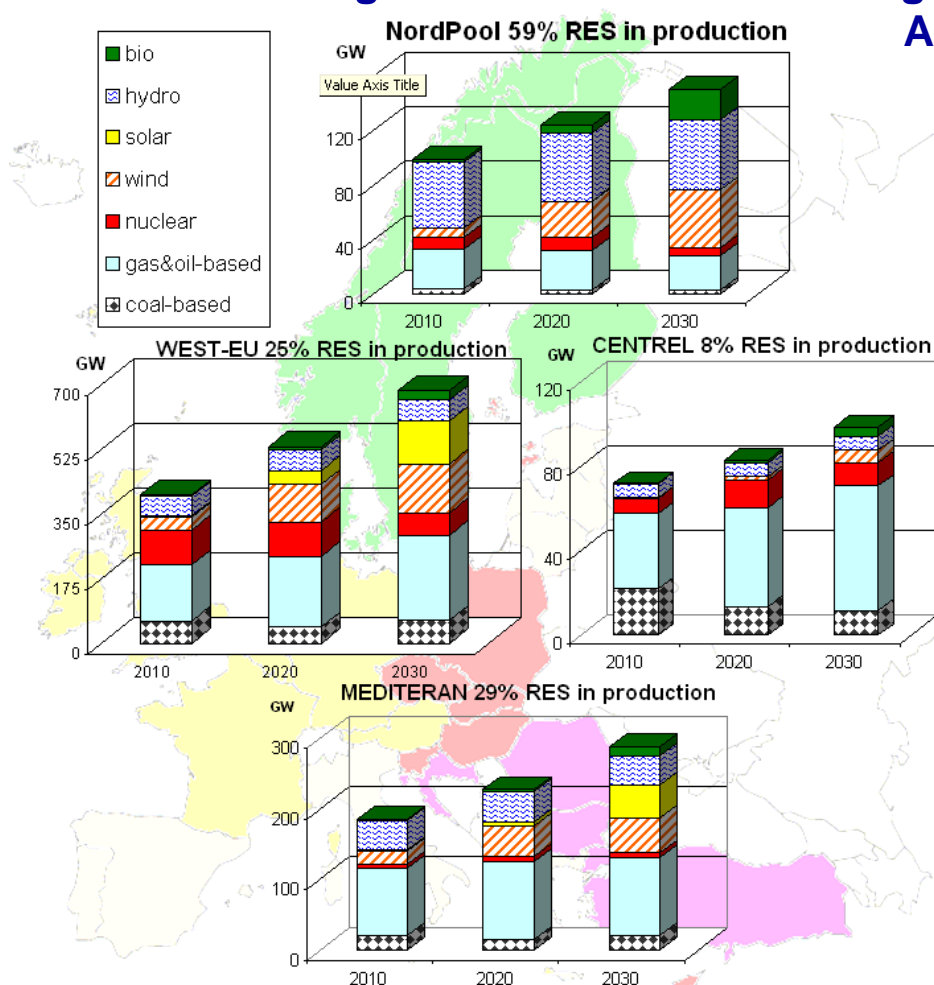
Source: Derived data based on SRTM V4  
<http://srtm.csi.cgiar.org/>





**The existing grid infrastructure makes a huge difference between the Planning of Renewable Energy Sources (RES) in Europe and in Africa. In Europe all RES can be feed into the grid without excessive integration costs. The situation is quite different in**

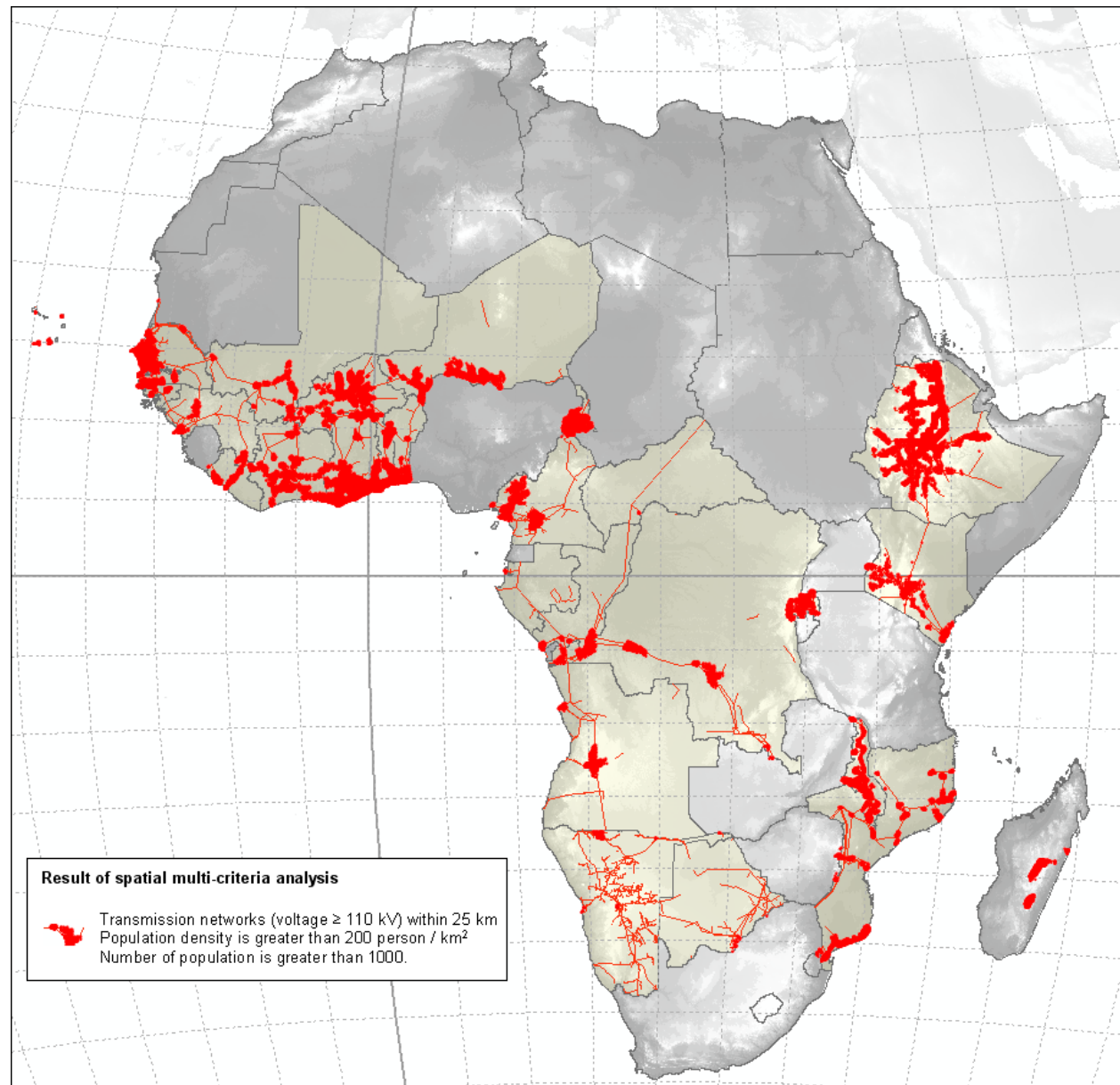
**Afri**





By applying a techno-economic analysis we can identify areas where the grid cannot be economically extended. The benefits to include RE options in these places can be

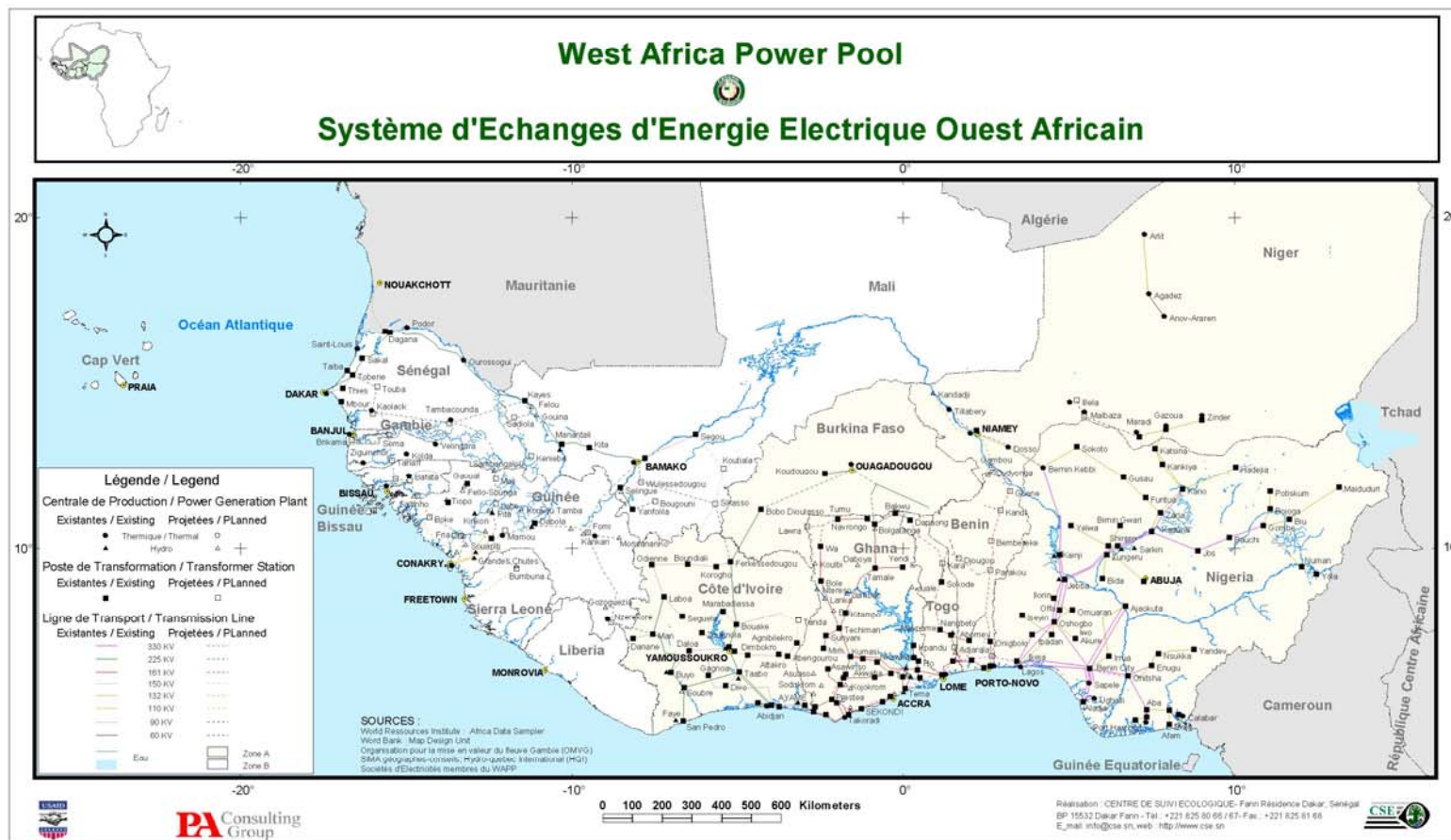
1.



## The project focuses on collecting the data on network infrastructure highlighted by the gap analysis



## Data sources from Africa can improve the quality of these datasets

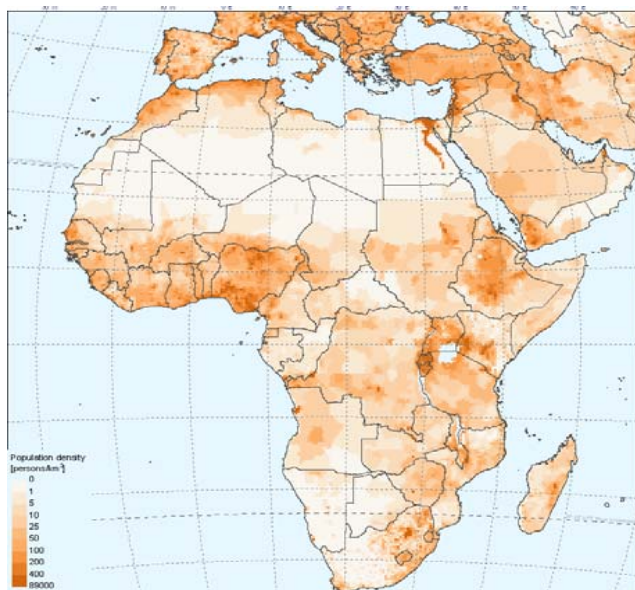




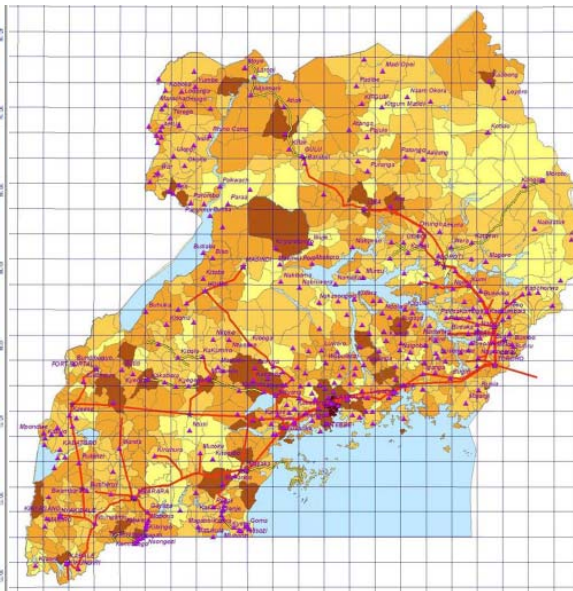
• The main activities are the following:

4. Develop a consolidated technical and socio-economic base for assessing rural electrification projects.

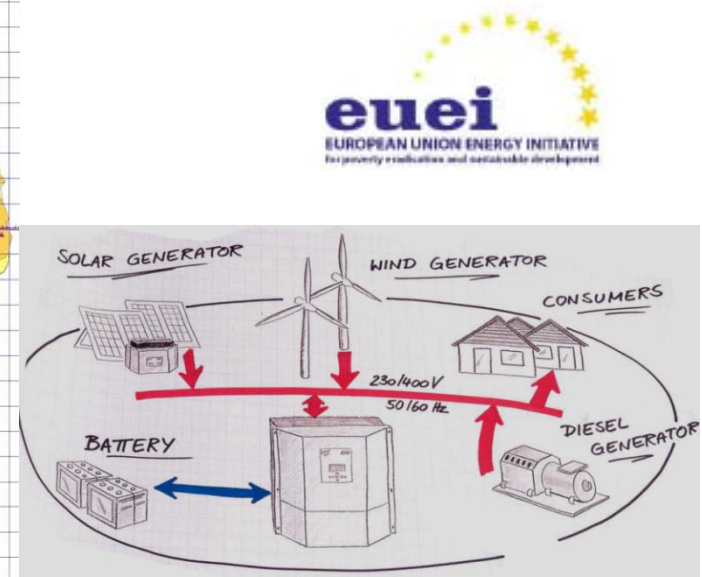
- Define proper criteria for selection of grid extension vs. off-grid solutions.
- Harmonization of existing tools and/or development of missing methodologies



Population density (persons/km<sup>2</sup>)



Population density along the electricity grid



Example of hybrid system in isolated areas



- The main activities are the following:
  5. Provide a communication channel for decision and policy-makers and stakeholders. The AFRETEP web page will be accessible from the European Union Energy Initiative (EUEI) web site, [www.euei.net](http://www.euei.net).



The screenshot shows the EUEI website homepage. The header includes the EUEI logo, a search bar, and the URL [www.euei.net](http://www.euei.net). The main content area features a large banner for the "European Union Energy Initiative" with the text "contributes to provide the access to energy necessary for the achievement of the Millennium Development Goals." Below this, there are sections for "In the focus" and "Useful links". The "In the focus" section highlights "News on the 2nd Call of ACP-EU Energy Facility" and "Latest developments in the Africa-EU Energy Partnership". The "Useful links" section lists various partnerships and initiatives, including the Johannesburg Renewable Energy Coalition (JREC), the Global Village Energy Partnership, and the Global Network on Energy for Sustainable Development (GNESD).



The screenshot shows the AFRETEP website page. The header includes the EUEI logo, a search bar, and the URL <http://www.euei.net/wg/african-renewable-energy-technology-platform-afretep>. The main content area features a large banner for the "African Renewable Energy Technology Platform, AFRETEP" with the text "The African Renewable Energy Technology Platform (AFRETEP) aims at building a network of African research institutions dealing with renewable energy." Below this, there are sections for "User login", "Actions", and "WG items". The "User login" section includes a form for username and password. The "Actions" section includes links for "VIEW" and "CONTACT". The "WG items" section includes a link for "register" and "login".