



TOPIC
**DEPLOYMENT OF RENEWABLE ENERGY SOURCES AND
CAPACITY BUILDING FOR SUSTAINABLE DEVELOPMENT.**
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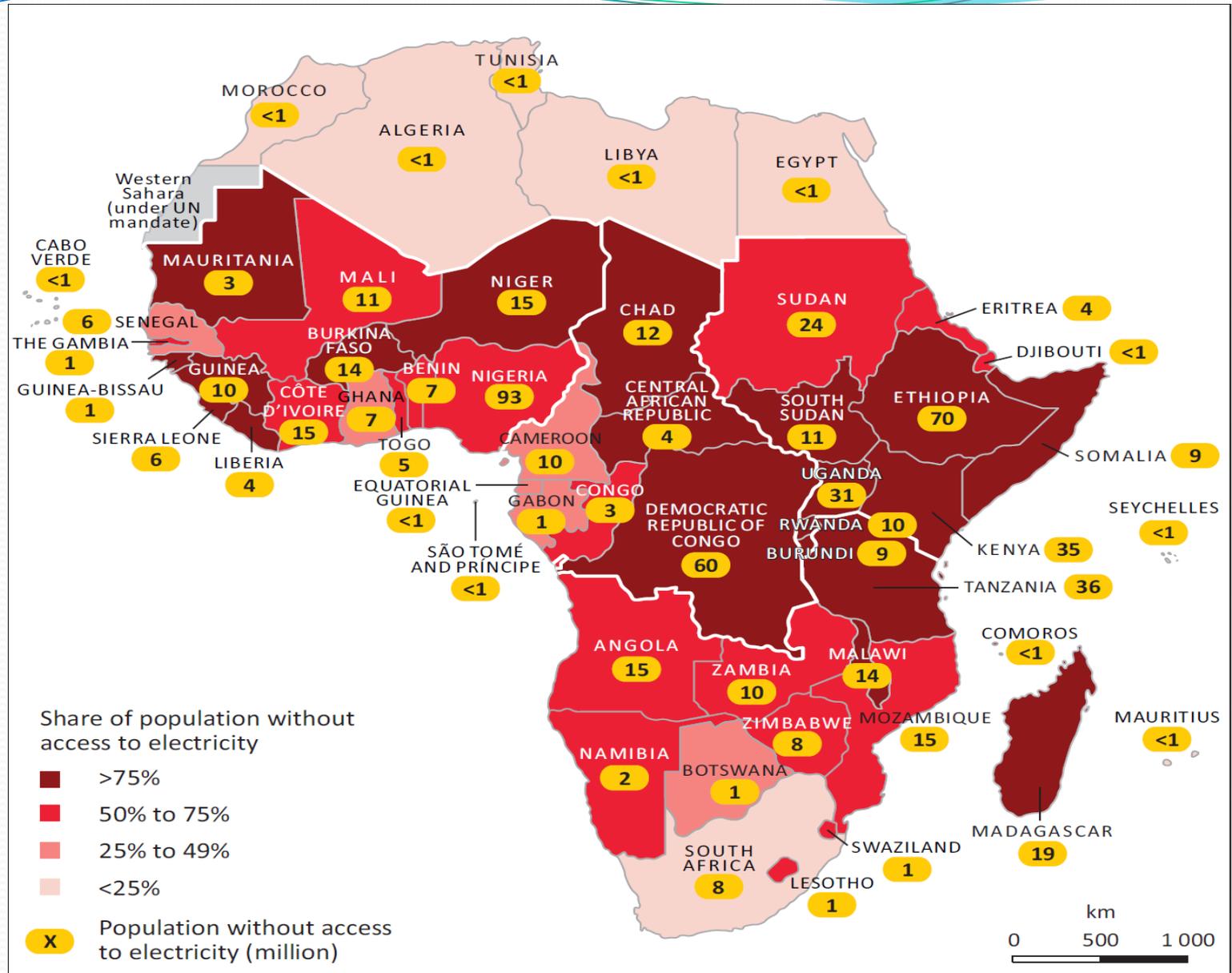
INTRODUCTION

- ❖ According to Steven Harris (2003), **depletion of natural resources** combined with the negative human-driven environmental impacts have led to the accumulation of greenhouse gasses and the depletion of the ozone layer.
- ❖ Although there has been much progress in the use of renewable energy and energy efficiency, and expanding energy access over the past decade, the **world is not on track to meet international climate goals established under the Paris Agreement, or international goals for sustainable development.**
- ❖ We are facing a climate crisis: the IPCC 2018 Special Report on 1.5°C found that **roughly a decade remains to keep global warming below this level and avoid the worst effects of climate change.** Most countries are still subsidizing the consumption of fossil fuels, and fossil fuel consumption subsidies increased 11% in 2017.
- ❖ **Urgent action is needed now to change our energy systems.** Moreover, we will never meet the objectives under UN Sustainable Development **Goal 7 for increasing renewable energy, energy efficiency, and energy access** if we continue down our current energy path.
- ❖ Renewable energy sources will pave a green pathway and **capacity building activities will play a big part in terms of providing the technical know-how through design, operation & maintenance and safety procedures** required in the **technical innovation of the renewables.**

SITUATION

- According to [Energy Access Outlook \(2017\)](#), an estimated 1.1 billion people – 14% of the global population – did not have access to electricity.
- Many more suffer from supply that is of poor quality.
- Around 84% of those without electricity access reside in rural areas and more than 95% of those living without electricity are in countries in sub-Saharan Africa and developing Asia.
- The efforts to tackle energy poverty may look as if they are at a standstill because estimates of the number of people without electricity have barely changed for years.
- In fact, electricity has been extended to 1.7 billion more people between 1990 and 2010, and 1.6 billion people gained access to cleaner cooking fuels.
- But world population grew 1.6 billion over that same period, with high growth in regions with poor energy access; a problem concentrated in about 20 countries in Asia and Africa

Example : Africa's population without electricity

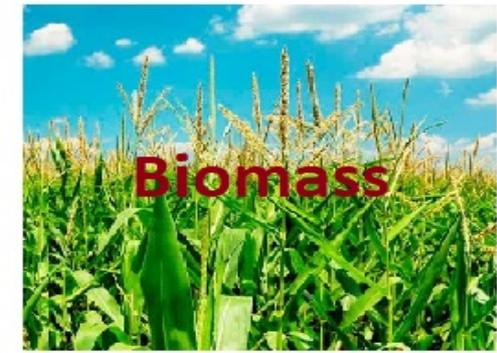
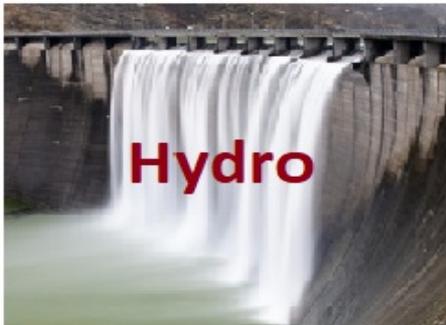


This map is without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

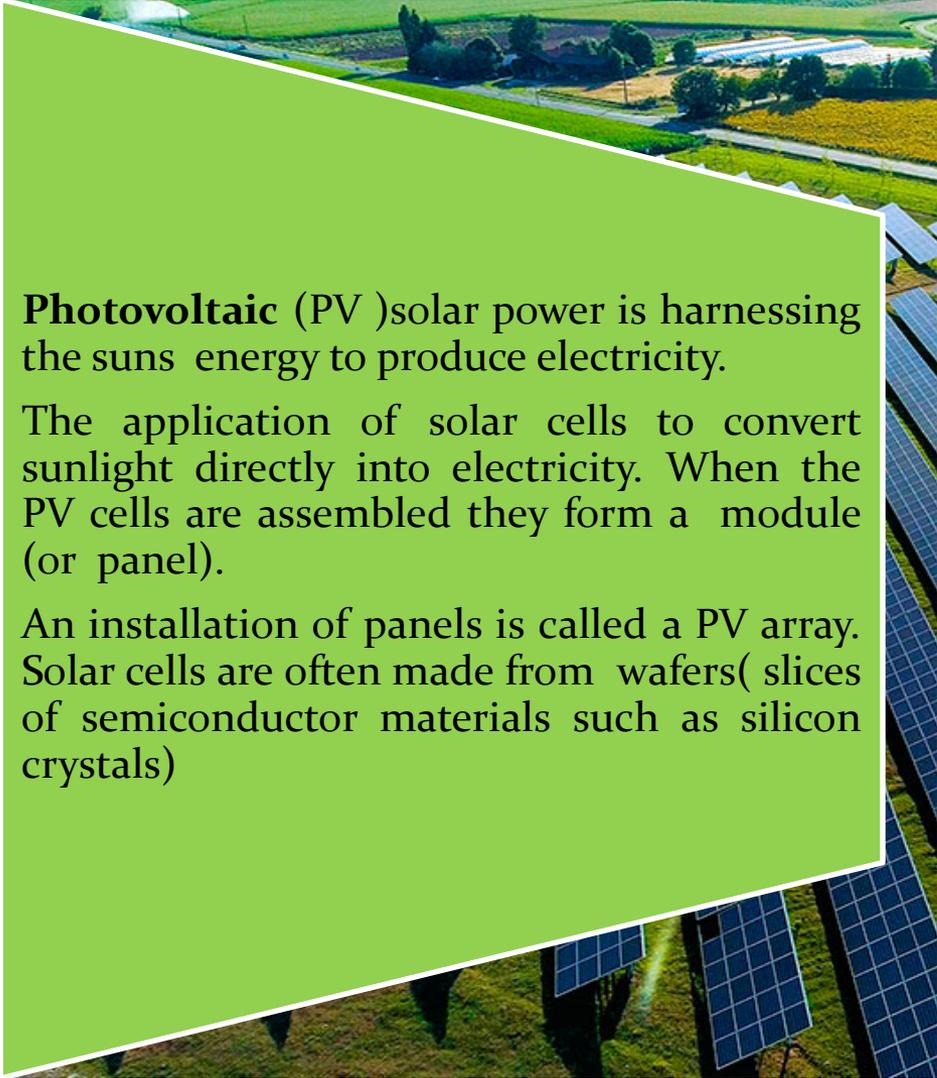
What are renewables?

They are resources found in nature that are self regenerating. They are used to produce clean(green) energy. This production does not lead to climate change since it doesn't involve emission of pollutants.

A related term is sustainable energy: The concept refers to generating energy with an awareness of the future i.e. in away that would enable future generations to meet their energy needs too. The concept is related not only to renewables but also energy efficiency. (energy and sustainability cuts across environmental, social and economic aspects)



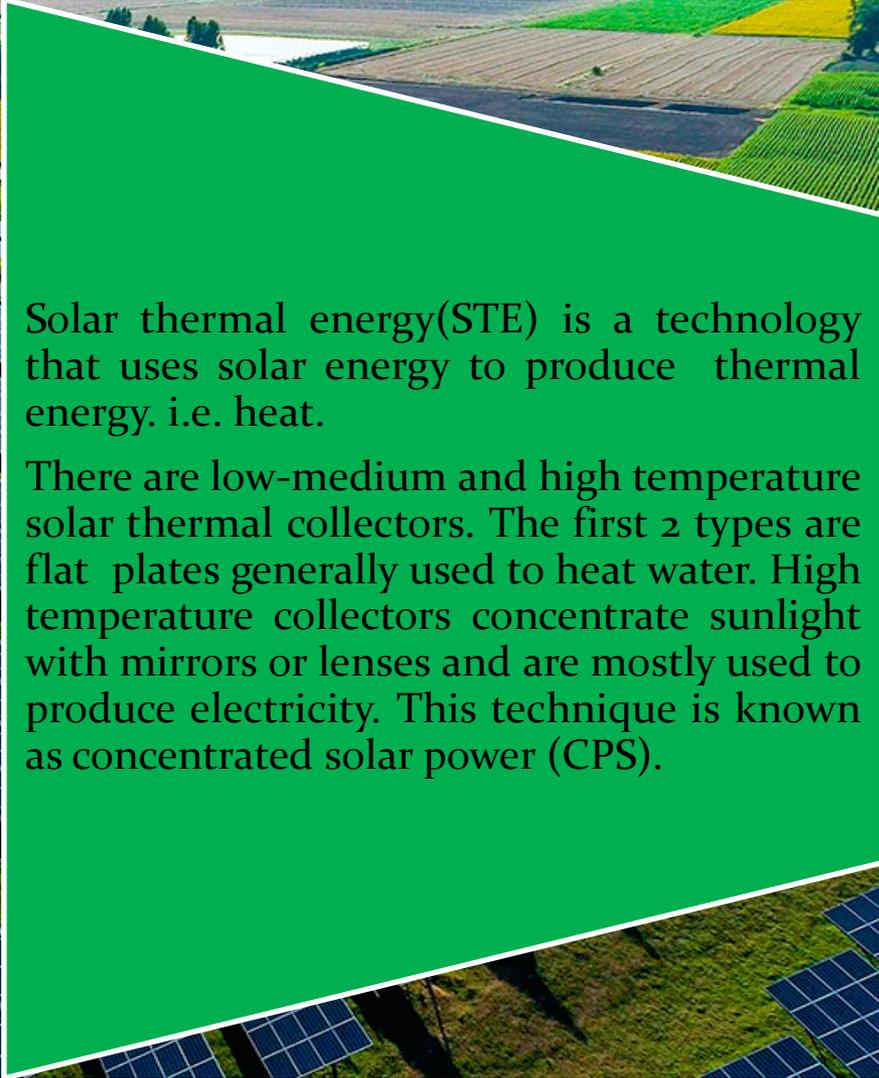
SOLAR ENERGY



Photovoltaic (PV) solar power is harnessing the sun's energy to produce electricity.

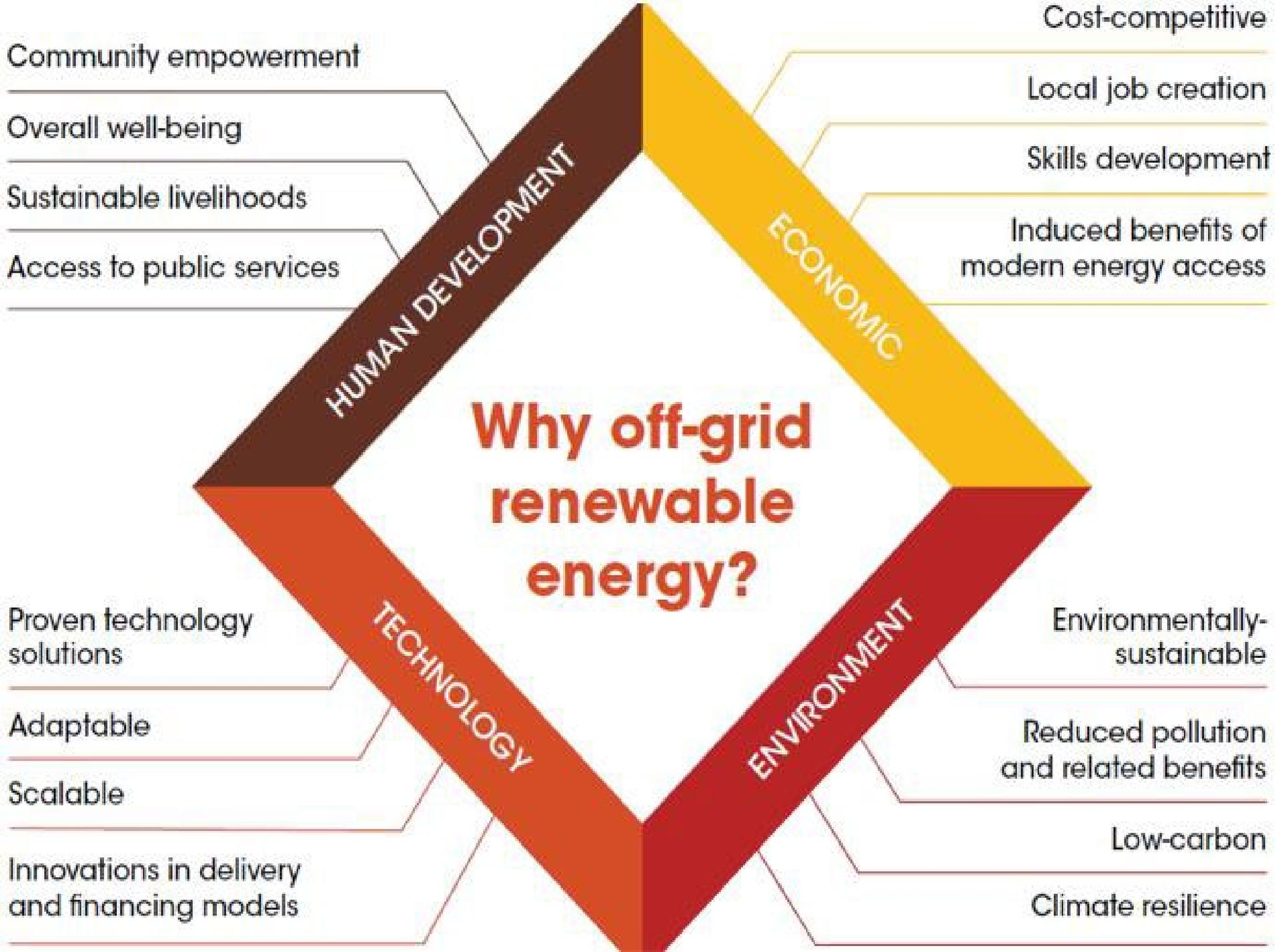
The application of solar cells to convert sunlight directly into electricity. When the PV cells are assembled they form a module (or panel).

An installation of panels is called a PV array. Solar cells are often made from wafers (slices of semiconductor materials such as silicon crystals)

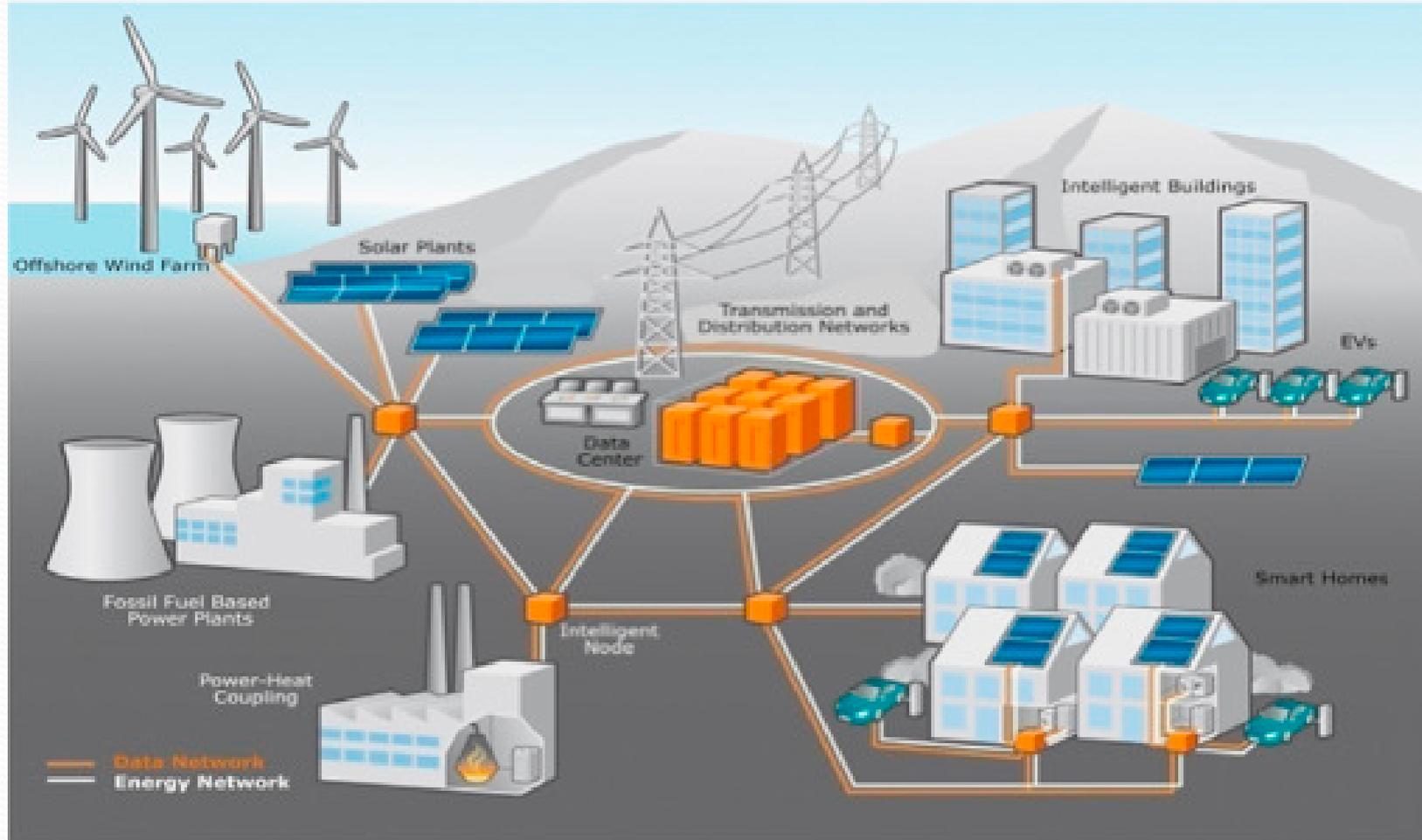


Solar thermal energy (STE) is a technology that uses solar energy to produce thermal energy. i.e. heat.

There are low-medium and high temperature solar thermal collectors. The first 2 types are flat plates generally used to heat water. High temperature collectors concentrate sunlight with mirrors or lenses and are mostly used to produce electricity. This technique is known as concentrated solar power (CPS).



SMART GRID SOLAR TECHNOLOGIES



HOW PVs CAN BE CONNECTED

- The PV systems can operate by themselves as **off-grid PV systems**, connected to the **utility grid**, or **grid-tied PV systems**.

a) Hybrid standalone

Hybrid energy systems combine two or more forms of energy generation, storage, or end-use technologies, and they can deliver a lot of benefits compared with single source systems.

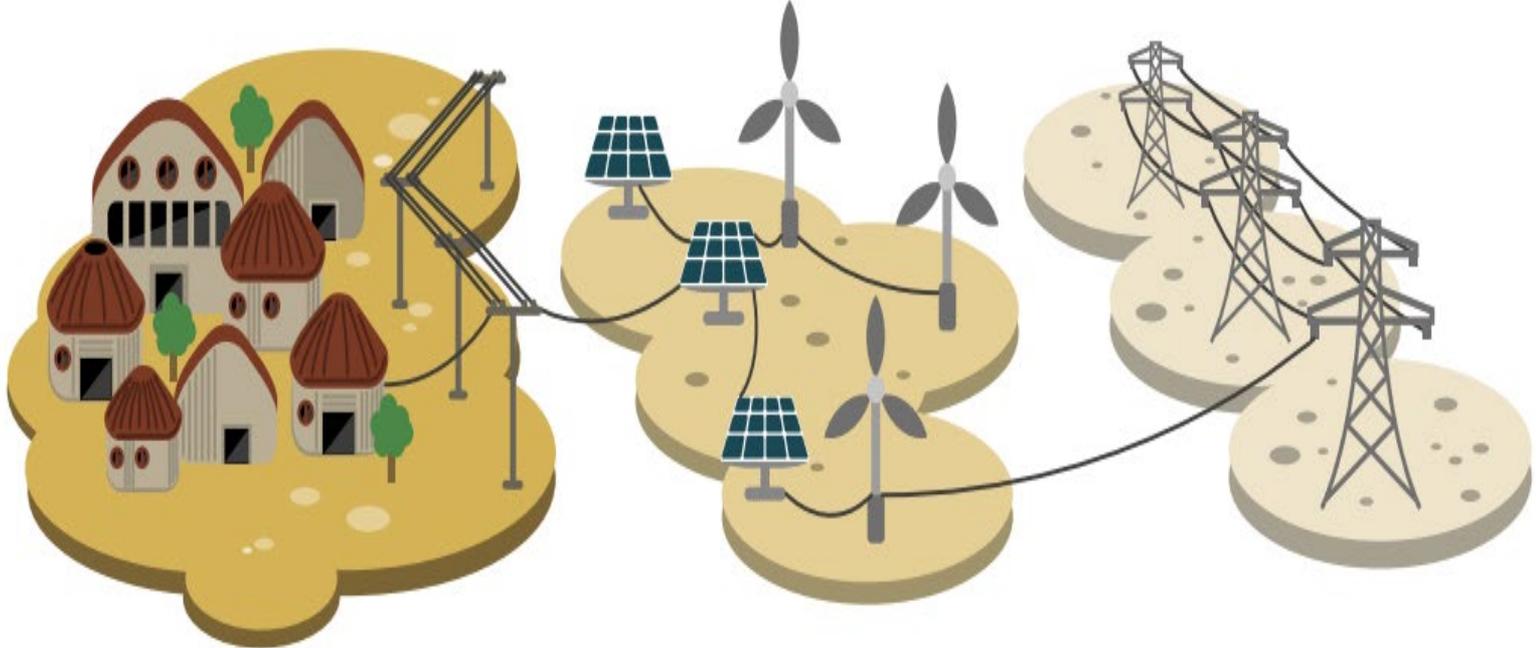
For Example: If the target community is far from the grid or plants, energy providers can invest in an independent mini-grid operated as an integrated mini-utility. Mini-grids serving local clients can be powered from renewable –based power plants, coupled with storage solutions or diesel generators to ensure continuous and reliable energy supply and reduce exposure to weather variability.



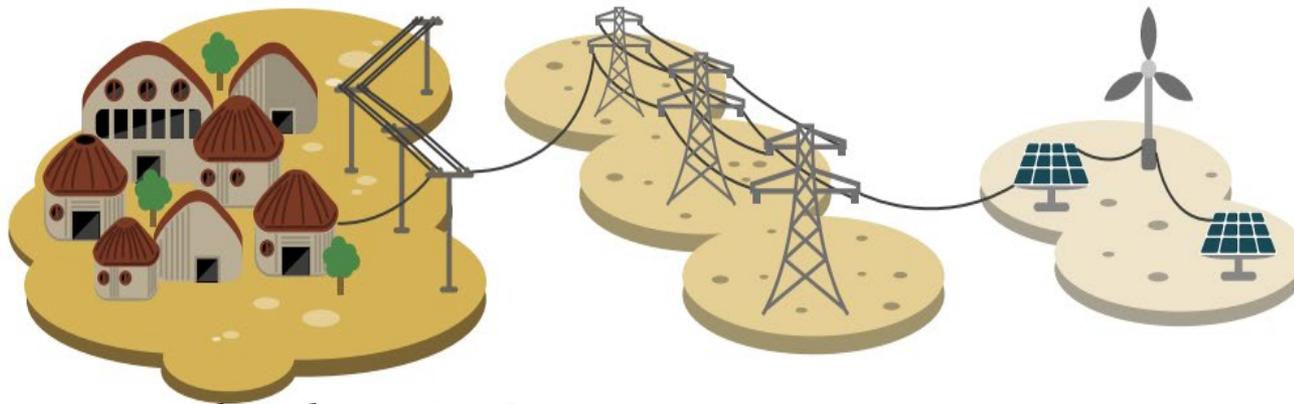
b) Smart extension

- The smart extension conceptualizes an existing RE plant where an amount of generated energy is spilled out through “a cable pulled” in low voltage to supply the main productive uses of the surrounding communities. RES4Africa (2019).

For example; If the target community is in proximity of an existing large-scale grid connected RE plant, an energy company may implement an extension of the plant to serve surrounding communities. This reduces new connection costs for local communities and can help to better manage power plant energy production as well as dispatch for the plant owner and grid operator.



c) Grid extension



Why move in this direction?

1. **Combating climate change.** The burning of fossil fuels for energy results in a significant amount of greenhouse gas emissions that contribute to global warming (ECO-FRIENDLY)
2. **Reducing air pollution and improving public health** by decreasing pollution and emissions
3. **Added advantages - lower costs and stable energy prices.** There also are opportunities for the development of **local industry**, and increased **job opportunities**. Renewables can bring increased **reliability and resilience** of the energy system and energy supply
4. **Providing access to energy**
5. **Supporting community involvement** and expanding **energy democracy**.
6. **Land restoration/reclamation of degraded land**

- It is estimated that by 2030, renewable energy sources will power over 60% of new electricity access, and stand-alone and mini grids Systems will provide the means for almost half of new access(IEA,2017)-a target within the **Sustainable Development Goals (SDG7- Affordable and clean energy)**.

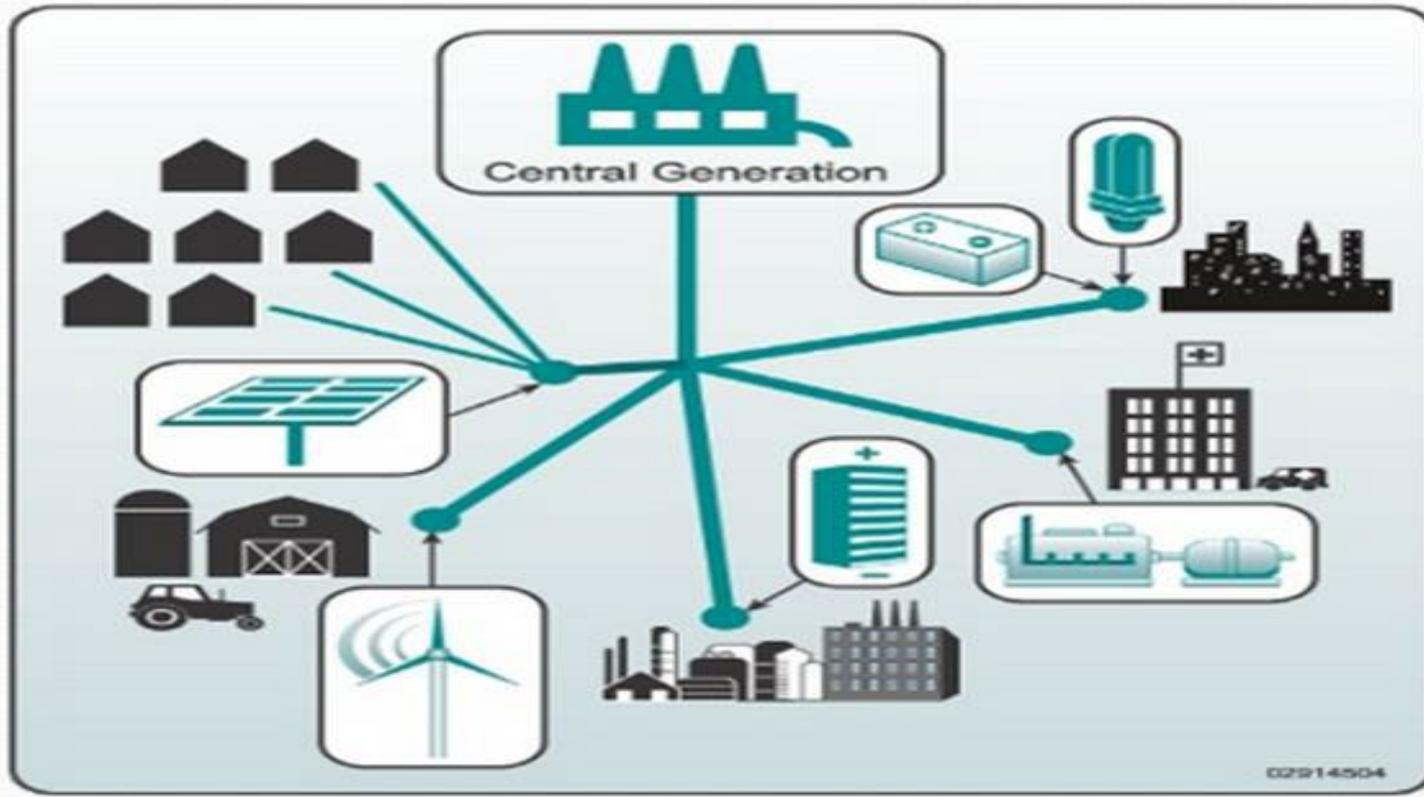
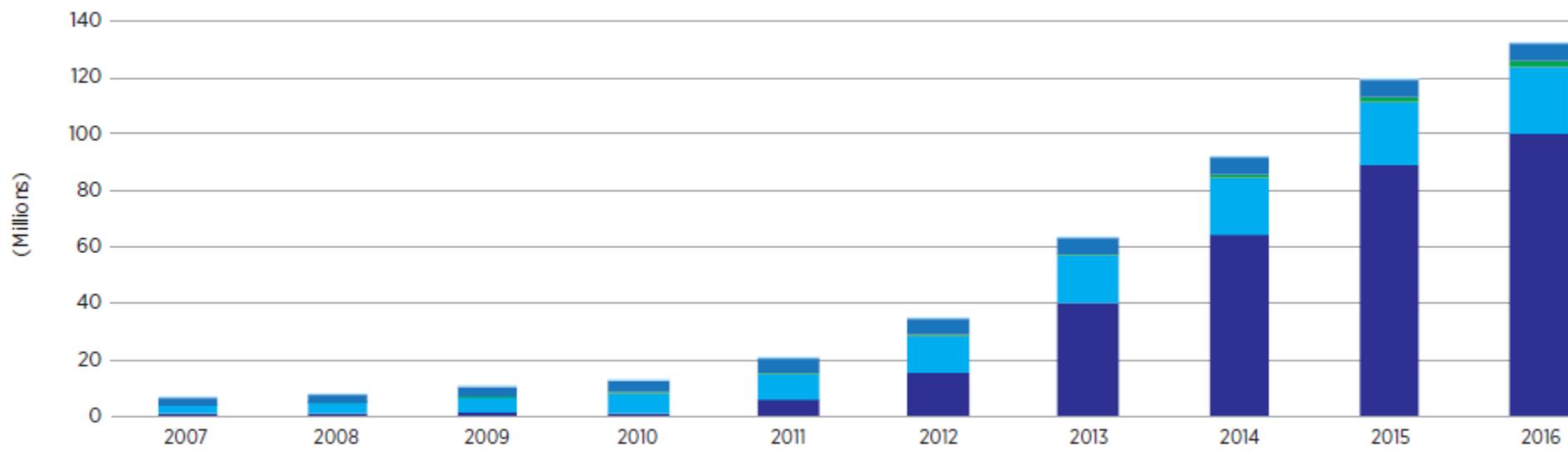
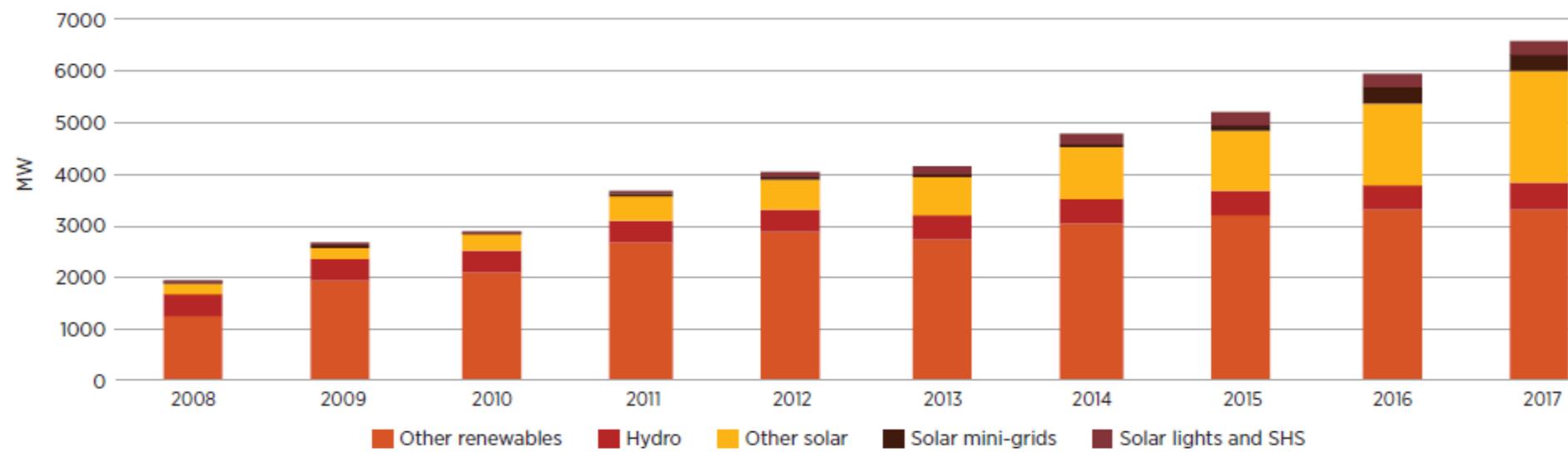


Fig: Decentralized Generation diagram

a. Population served



b. Capacity



Source: IRENA 2018

ROLE OF DIFFERENT TIMES IN PROPELLING GREEN ENERGY

- **Climate change scenario**
- **International community influence/ Historical Agreements**

Kyoto protocol

Paris Agreement

Millennium Development Goals

Sustainable development Goals

- **Evolution of off-grid solar sector**
- **Climate change movements e.g. Green belt Movement & Fridays for future**
- **Capacity building initiatives**

The Global fuel supplies are deteriorating and the atmosphere is becoming more polluted (World Energy Outlook, 2017), with greenhouse gasses filling up the atmosphere; Global Warming has become a harsh reality that all mankind has to deal with.

Prof. Wangari Maathai (2004 Nobel peace prize Laureate) said, “We are called to assist the Earth to heal her wounds and in the process heal our own”. This healing can only be done through innovative technologies and studies that focus on reducing the level of carbon emissions to the already polluted environment

STUMBLING BLOCKS IN DEPLOYMENT OF RE

Technological/social/Economic

- Infrastructure inadequacy
- Transmission barriers
- Cyber security
- Fewer experts in the RE field- lack of technical/maintenance skills
- Donation mentality- mindset
- Lack of capital investments
- Unfavorable regulations and policies
- Oversupply
- Barriers to entry

RELATIONSHIP TO SDGS

Through promotion of deployment of large-scale and decentralized renewable energy and energy efficiency can help communities to meet their local energy needs.



SDG 1: End poverty in all its forms everywhere - Case study 1:

Matembwe- Ikondo mini-grid in Tanzania

SDG 2: End hunger, achieve food security and improve nutrition, promote sustainable agriculture - WEF Nexus approach (RES4Africa)

SDG 3: Good health and well-being for all - Case study 3: St. Luke hospital – Wolliso, Oromia region –Ethiopia

SDG 4: Ensure Inclusive and equitable quality education and promote lifelong opportunities for all - Case study 4: Dodowa Da school- Ghana

SDG 5: Achieve gender equality and empower all women and girls - Case study 5: Organizations Promoting Women activities in RES field to reduce inequalities(Energia & AWEEF)

SDG 6: more low-income earning people accessing water- Case studies 6: Solar as a solution – Rural India



SDG 7: Ensure access to affordable, reliable, sustainable and modern energy for all - Case study 7: Kitonyoni mini-grid project in Kenya

SDG 9: Build resilient infrastructure, promote sustainable industrialization and foster innovation- Sustained investment in infrastructure and innovation are crucial drivers of economic growth and development

SDG 13: Take urgent action to combat climate change and its impacts

SDG 17: Revitalize the global partnership for sustainable development - Case studies 8: MGA Capacity building in RES4Africa

CAPACITY BUILDING FOR RENEWABLE ENERGY SOLUTIONS

Capacity building as a Vocational training tool aims at creating a **Skilled and concious workforce** to deploy decentralized renewable energy solutions. This will enhance **access to energy** in rural and local communities while fostering **local enterprises** and **job creation** in the developing countries and foster the go green evolution in the developed countries.



Pic: Microgrid Academy Training by RES4Africa – Wolliso Hospital, Ethiopia

CONCLUSION

- Renewable energy can therefore be used **to fill in the gap of energy access** by connecting regions without access to energy or the main grid to electricity
- Access to sustainable energy does more than just bring power – it enables the pursuit of human rights and **creates opportunities** for sustainable development. Energy **empowers individuals, communities and economies** by providing lighting, heating, transport, communications and mechanical power, all key to satisfy basic energy needs, drive productive uses and create industrial development
- Capacity building in international development is a \$15billion industry which is about social and political change (Guy 2016)
- Investment in capacity building activities with a comprehensive set of skills necessary to successfully **design, develop, manage and operate** decentralized renewable energy projects, through interactive training modules led by **experts in the renewable energy value chain.**

QUESTIONS????

