The impact of productive uses on financing decentralized solutions

EGM on promoting market-driven access to sustainable modern energy services in the Arab region

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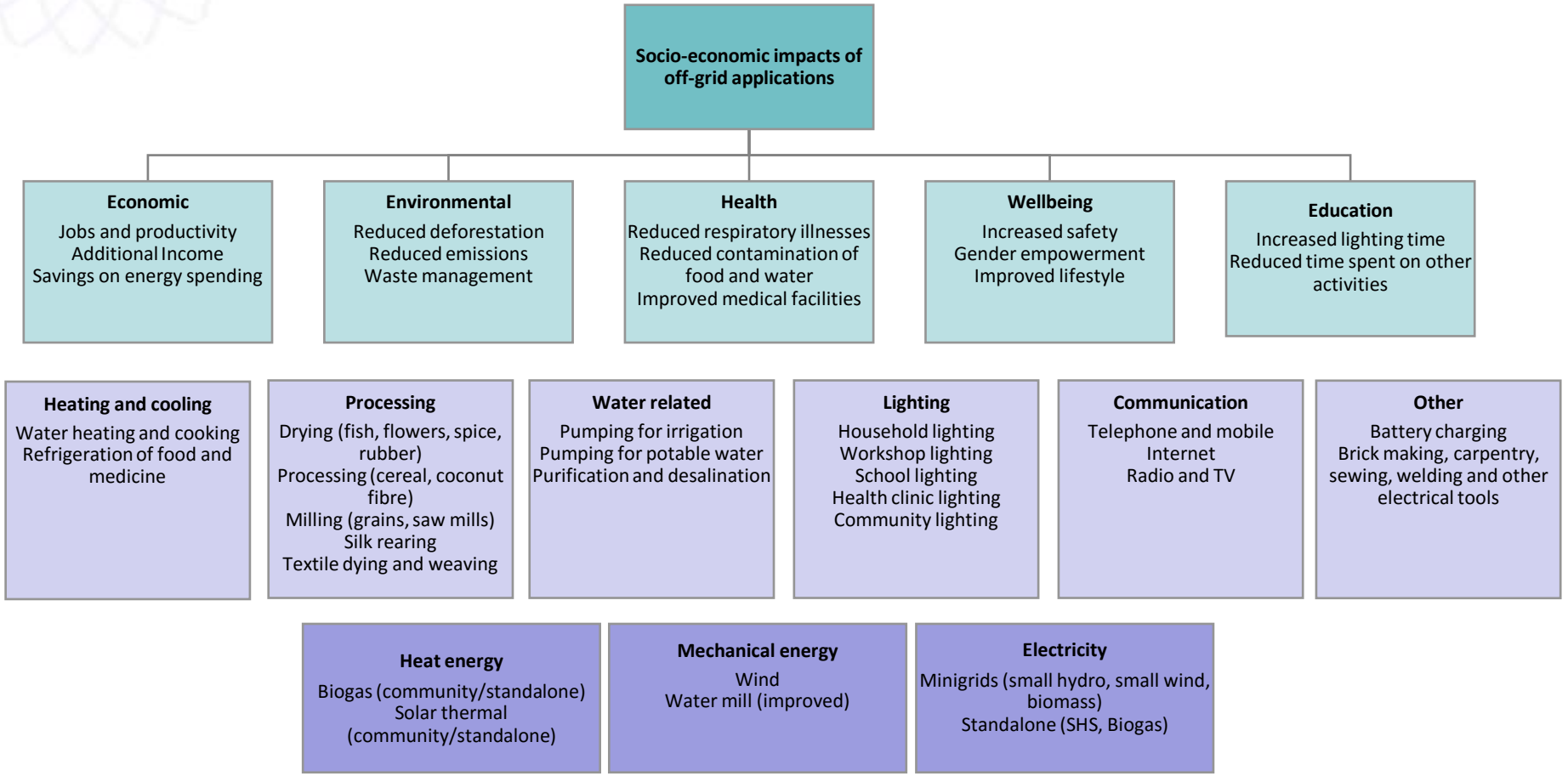
IRENA
International Renewable Energy Agency

IRENA's work on the topic

- Publications
  - Renewable Energy Jobs & Access
  - Renewable Energy and Jobs
  - Socio-economic Benefits of Solar and Wind
  - Renewable Energy in the Water, Energy and Food Nexus

- IOREC
  - Two-day conference on scaling up of rural electrification through off-grid RE
  - Identify key barriers and drivers for stand-alone and mini-grid RE system deployment
  - Platform to share experiences, lessons lear and best practices

Assessing socio-economic impacts



The linkages between energy, applications and socio-economic impacts (adapted from Kapadia, 2004)

Agro-processing micro-enterprise and rural electrification through improved watermills (IWNs) in Nepal

- Installation of a water mill for rice de-husking, a 2.27 KW capacity power plant in addition to a 3.5 Km extension line for transmission
- Alternative Energy Promotion Center (AEPC) executing agency
- Government of Nepal channels subsidies for RETs through support mechanisms
- Project implemented by the Center for Rural Technology Nepal (CRT/N) in participation of local communities with technical and financial support from GIZ-EnDev and SNV Netherlands

Improved Water Mill with Metal turbine and shaft

- Project handed over to committee after construction who owns, maintains and manages the project
- Provides agro-processing and electricity to 39 households with a population of 279
- CRT/N provides capacity building in management for the committee

- Total project cost of **USD 13,886** covered by:
  - Subsidies: project subsidy of **USD 5,612** and government subsidy of **USD 1,523**
  - Community contributions: **USD 679** cash and labour worth USD 6,072 (equivalent to 2,160 man-days)

Agro-processing micro-enterprise and rural electrification through improved watermills (IWNs) in Nepal

Benefits of using improved water mills

- Reduced workload and improved living standards of farmers, particularly women and children
- Improved health and financial security of farmers
- Simple technology requiring little maintenance

- **8,493 IWMs** and **25** Improved Watermills with Electrification (IWME) installed between 2003 and 2013
- Increased the power and efficiency of the traditional system by 80–90%
- Increase in the grinding capacity from about **10-15 kg of grain per hour** to about **25–30 kg per hour**
- Initiated other activities such as floriculture, fisheries, small-scale industries beekeeping (2–10 boxes can give a return of about **USD 580 per year**)
- Investment of **USD 810** gave a return of **USD 135 a month**
- Women empowerment 4.68 percent are owned by women
- Considerable job creation. The installation of **8,493 water mills** has created additional employment for around **7,572 people**.

Source: www.bioone.org

Source: Nepal Headlines

Promoting domestic biogas digesters in Vietnam

- Biogas programme initiated by SNV Netherlands Development Organisation in partnership with the Vietnamese Ministry of Agricultural and Rural Development (MARD) and implemented through the Department of Livestock Production under the MARD
- Institutional set up ensures maximum domestic ownership of the biogas programme
- From 2003 to 2014, programme funded by the Dutch Government. Since 2013 Energising Development taken over large share of the funding in combination with funds from the sales of Emission Reductions (Carbon Credits)
- Programme provided subsidy of USD 54 per digester, slightly below 10% of the total investment

Improved Water Mill with Metal turbine and shaft

Promoting domestic biogas digesters in Vietnam

Around **3 billion people** rely on wood, straw, dung, or coal for their cooking needs (WHO and UNDP, 2009)

Benefits of cooking and purifying water using renewables:

- Improved sanitation from cooking food and purifying water
- Reduced time collecting firewood
- Reduced respiratory diseases from burning firewood
- Reduced deforestation and environmental impacts

Income savings and generation

- Savings made on fuels:
  - **166 USD/hh** in 2013 if the hh buys all fuel
  - **54 USD** annually on average
- Reduced electricity consumption:
  - Annual savings 69.62 kWh/yr/hh = **4.5 USD/hh/year**
- Use of bioslurry:
  - Savings on fertilizer of **22.6 USD/year**
- **Avg hh saves 175 USD/year if market prices are considered and 63.6 USD/year**

Job creation

- > 1000 active micro enterprises with on average 4 people per team for 15-10 days per digester
- Around **774 direct FTE annually** for the project
- Trained masons earned approximately **90% more** and untrained assistants aroun**d 45% more than the average GDP/capita of USD 1,028** in the same year

Time savings

- **1.48 hours** saved per day on fuel collection
- Annual time saving equivalent to 30% full time job per family

Food and material processing using solar dryers

Benefits of using solar dryers to dry fruits, grains, rice, corn or rubber

- Capability to dry harvest with high moisture content
- Capability to dry larger quantities of agricultural products in a shorter period of time
- Saving harvest otherwise lost to mould, insects or left unharvested because of the time needed
- Additional income from larger quantity and better quality of products that can be sold at a higher price
- Additional income from saving on fossil fuel spending

Source: www.lowcarboneconomy.com

- Banana chips produced in Thailand sold for **USD 0.36/kg** compared to **USD 0.21/kg** for chips dried over fire or in the sun
- The increased income from drying **9.6 thousand tons** of bananas is **USD 1.5 million per year**
- The increased income from drying **2.9 million tons** of rubber is between **USD 71 and USD 107 million** more in earnings

Refrigeration using Solar Thermal

Benefits of using solar thermal refrigeration for the preservation of Milk in Kenya

- The installation of three solar icemakers produces up **to 50 kg** of ice **per sunny day**, capable of chilling up **to 100 litres** of milk
- Health benefits due to preservation of milk
- Economic benefits include:
  - Excess milk produced can be preserved to be sold and products can be transported to the market when refrigerated with ice
  - Induced businesses for milk collection, packaging and sale for cooperatives,
  - Enabled the production of yogurt and mala, sold at a higher price, generating additional profits
  - In the first five months of operation, around **USD 25,720** of revenue generated out of which **USD 15,906** was distributed to **184 dairy farmers**
  - Job creation in the installation of the coolers (preparing the foundation, positioning and assembling the components, installing the collector, and charging with refrigerant)

Source: Erickson, 2009

Key messages

- Electricity is not the only application of **decentralized renewable energy for productive uses**
- Impacts are mostly observed where there is **potential for economic activity with access to markets**
- **Private sector participation** is critical. It needs to be allowed and facilitated
- **An enabling environment** based on effective policies and regulations, tailored financing models and technology solutions is necessary
- **Frameworks for delivering affordable capital** need to be developed to make financing more accessible to entrepreneurs and end-users
- **Tariffs** need to be flexible and tailored to the specific contexts to ensure the viability of projects
- **Capacity Building** efforts improve the sustainability of projects by reducing dependence on foreign know-how.

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Thank you!