Low Emissions Development Strategies (LEDS) Small scale irrigation

Mozambique Modelling Team
Background

Reference year: 2010

Country surface: 80.1 million ha

Potential agricultural area: 47 million ha

Crop area: 5.65 million ha (12% of potential agricultural area)

Irrigated area: 0.027 million ha (0.5% of the cropped area)

Forest area: 41 million ha
Low Emissions Development Strategies (LEDS) Modelling Support - Mozambique

• Establish Mozambique’s project level baseline as reference for extrapolating future policy & implementation options in the identified priority sectors

• Long term LEDS policy planning analytical framework established targeting emissions abatement & climate resilience trends, socio-economic development tradeoffs and cost-benefit analysis of prioritized options
Action 1: Replace fuel powered irrigation pumps (FPI) with Solar Powered Irrigation (SPI)
Replacing Fuel Powered Irrigation by Solar powered Irrigation

• Based on 2010 national statistics
  • 27,160 ha irrigated land
  • Sugar cane (60%), Cereals, Legumes, Roots and Tubers
  • Energy source: mostly from fuel-based pumps; gravity; national grid (hydropower)

• Projections based on national strategies
  • Based on national irrigation strategy
  • Increase irrigated land up to 90,000 ha by 2020
  • Assumed the same rate up to 2030
  • Assumed linear trends

• Emissions estimations
  • Emission factors from the Literature (tCO2eq/liter fuel)
  • Crop water requirements (liter water per hectare per year)
  • Sugar cane (60% of the irrigated area) not included
  • Irrigation efficiency (rate liter fuel:liter water)
Irrigated crops
(initial and projected area)

- **27,160 ha in 2010**
- **90,000 ha in 2020**
The irrigation scheme

Emission Factor (tCO2/liter)

Diesel or Gasoline

Fuel Powered Generator

EMISSIONS (tCO2/year)

Water Pump

Crop water requirements (liter/ha.year)

Quantity of water (liters)

Irrigated area (ha)

EMISSIONS (tCO2/year)

FPI

Solar Panel

SPI
Emissions Business as Usual
Replacing fuel operated pumps by PSI (selected crops)
Total emissions reduction

Total emissions (TonCO2eq. x 1000)

- Total Fuel Operated Pumps
- Total Emissions with PSI

Year:
- 2010
- 2011
- 2012
- 2013
- 2014
- 2015
- 2016
- 2017
- 2018
- 2019
- 2020
- 2021
- 2022
- 2023
- 2024
- 2025
- 2026
- 2027
- 2028
- 2029
- 2030

Emissions (TonCO2eq. x 1000)
Total emissions including land use change: BAU
Agroforestry (sequestration) + SPI (emission reduction)
Net Present Cost

![Bar chart showing net present cost for diesel-powered and solar-powered irrigation systems. Diesel-powered irrigation has a much higher net present cost compared to solar-powered irrigation.]
Socio-economic analysis

- SPI: Reduce emissions, but not all systems can be replaced yet
- SPI: Increase chances for more people to invest in irrigation
Conclusions and Lessons Learned

• There is a great deal of opportunities to reduce CO$_2$ emissions, and increase CO$_2$ sequestrations in the Agricultural sector, including the SPI

• Solar powered irrigation: although it has reduced impact in emissions reduction, it provides significant increased economic returns, and increase opportunities for more people to engage in irrigated agriculture

• This analysis does not consider emissions associated with manufacturing and disposal of the PV system

• SPI is being considered as part of the country NDC
Thank you!