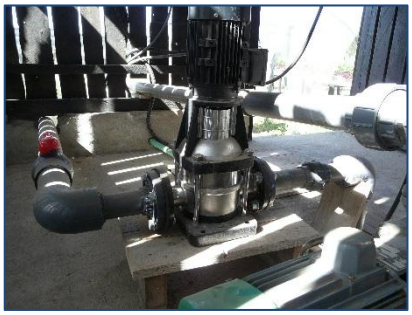
COUNTRY:
KENYA



SOLAR POWERED IRRIGATION SYSTEMS – COUNTRY CASE STUDY ONGATA-RONGAI

Geographical Location:

- Nairobi
- Latitude: 1°24’5” S
- Longitude: 36°48’58” E
- Altitude: 1,731 m

Specific Site Conditions:

- Climatic condition: semi-arid
- Groundwater of low quality, high sodium contents
- Remote location, connected to public grid but frequent black-outs
- Farmers’ success depends on reliable electricity / water supply
- Unique hydroponic irrigation system
- Conventional water pumping from deep well
- Solar circulation of nutrient solution

Salient Features of Solar-powered Irrigation System:

- Hydroponic irrigation system with two separate pipe-networks
- Two subsurface circulation tanks of 10 m^3 capacity
- 2.5 kW_p PV generator on Lorentz tracking system
- Two separate PV surface pumps for continuous circulation of nutrient solution (4 - 6 hours at night no irrigation)
- Daily mean water agitation: 200 m^3/day
- Pumping head: 12 m
- Two gravity tanks serve to buffer supply during periods of varying cloud cover
- Freshwater blending of nutrient solution from gravity tanks
- Continuous flow irrigation in hydroponic channels (Australian make)
- Reverse osmosis filter with 4,000 litres/day treatment capacity

System Costs / Financing:

- PV pumping system: 8,250 EUR
- Irrigation system: - not disclosed –
- Reverse osmosis and fertigation unit: 45,000 EUR
- Private financing from equity

Farming System / Cropping Patterns:

- Horticultural farming in net houses (monoculture)
- Lettuce (e.g. Frisé), additional maize and fodder production
- Farm size: 5 ha but only 1.5 ha under hydroponic irrigation, 2 ha maize and fodder production
- Crop rotations per year: 5 - 6

Experiences / Lessons Learnt:

- PV system is far more reliable than existing grid-connection
- Electricity bill could be reduced by 50%
- Tracking system is essential for continuous water flow
- PV panels were stolen – theft protection (electric fence) required
- Under local conditions lettuce is the only suitable crop for hydroponic irrigation due to tolerance to short periods of non-irrigation
- System concept interesting for intensive farming on farms with limited landholding and poor soil quality
- High capital and operational costs, high production loss risk in areas with unreliable grid power supply (back-up source required)

Promoting and Planning Bodies:

- System integrator: Centre for Alternative Technologies (CAT), Kenya
- Private project development over multiple phases
- Potential public promotors (e.g. Ministry of Agriculture) have not shown much interest