Low carbon technologies pilot projects in urban and rural areas: Botswana, Solomon, Vanuatu

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Introduction

- ENEA provide to IMELS (Italian Ministry of Environment , Land and See) technical support in cooperation international activities of climate changes mitigation and adaptation
- Following project proposal has been implemented in collaboration with local government authorities:

- **Botswana** – Ministry of Environment, Natural Resources Conservation and Tourism (MENT)
  - "Mitigation and adaptation Actions in the civil sector: a demonstrative experience in the MENT buildings "
- **Vanuatu -** Ministry of Agriculture, Livestock, Forestry, Fisheries and Biosecurity:
  - "Irrigation for a resilient and sustainable agriculture "
- **Solomon Island -** Ministry of Mines, Energy and Rural Electrification of Solomon Islands (MMERE) :
  - "Pilot project for the dissemination in rural areas of sustainable energy and environmental services"

Botswana - Greening of MENT buildings

MENT Headquarters

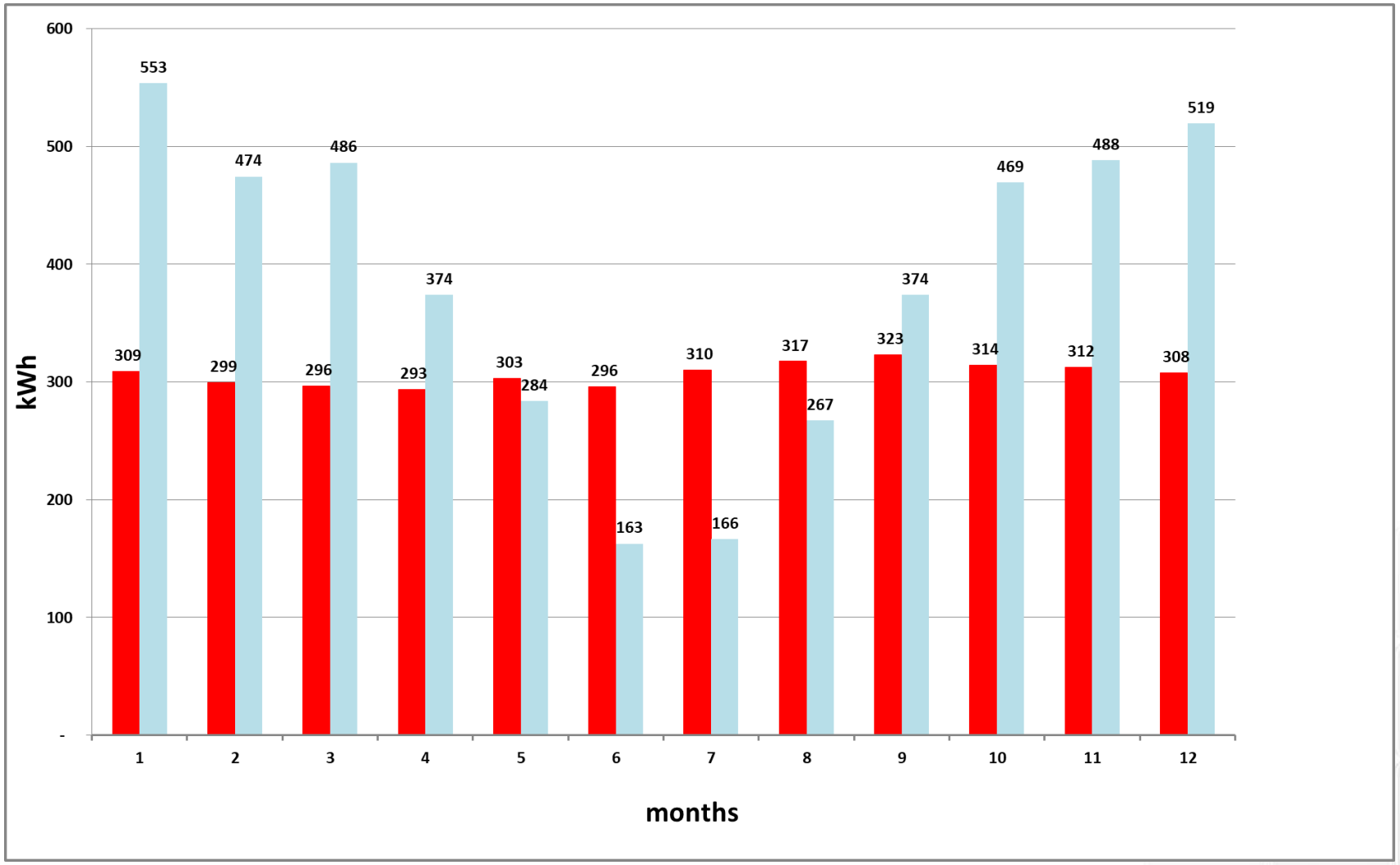
Department of Meteorological Services

Actions considered

- Adjustable shading systems
- High efficiency HFC-free air conditioning centralized systems
- Recovery and disposal of R22 (ozone depleting gas) used in the old air-conditioning systems
- High efficient LED lighting system
- 65 kWp photovoltaic system on the roof – 1st building
- 270 kWp photovoltaic system in the parking -2nd building
- Electric accumulation systems with Li-ion battery
- Management systems of electrical loads
- Rationalization of the use of water in the building
- Collection system of rainwater from the roof
- Collection of gray water
- Sanitization of recovered water

Example of system energy balance

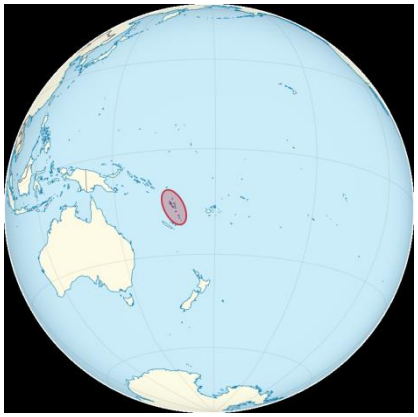
MENT Headquarters building – Gaborone
Daily photovoltaic electric production (red) - electric demand (blu)



Expected results

- Self production of 80% energy demand
- Reduction of 50% of water supply
- Air conditioning system HCFC-HFC free
- Avoided emission: 986 tCO2eq/year.
- Exemplary role for citizens
- Resilience of buildings to:
  - climatic anomalies
  - electric black-out
  - water shortage

Vanuatu project



Title: Irrigation for a resilient and sustainable agriculture
Location: Efate, Santo, Tanna Islands
Cost: 229.596 Euros
Beneficiaries: 6 farms
Technology: photovoltaic pump, drip irrigation
Duration: 2 years
Impacts: 280 tCO2 / year avoided
Project responsible: Vanuatu Ministry of Agriculture, Livestock, Forestry, Fisheries and Biosecurity, Department of Agriculture and Rural Development

Project objectives

- Make resilient the horticultural production to the impact of low rainfall periods imposed by climate change
- Increase local vegetable production
- Avoid CO_2 emissions resulting from the use of diesel pumps and air transport related to the import of these products from long distance.
- Improve the economic conditions of the farmers, their diet, and indirectly, through the lowering of local prices, in the rest of the population diet
- Demonstrate the benefits of introducing sustainable technologies to modernize agricultural practices in the country

Input data of the utilizers

	Village - utilizer	Island-province	Ground water level (m)	Irrigated area (ha)	Daily water demand during dry season (m3/d)	Daily water demand during wet season (m3/d)
1	Vanuatu Agriculture College	Santo - Samna	50	1	10	2
2	Department of Agriculture Farm, Tagabe	Efate - Port Vila	20	1	10	2
3	Alfred Lolies Farm, Eton	Efate - Shefa	36	2	20	4
4	Napil Rural Training Center, Middlebush	Tanna-Tafea	45	2	20	4
5	Tan Alkut Agriculture Farm	Tanna-Tafea	50	2	20	4
6	Malafau	Efate - Shefa	37	2	20	4
	total			10		

Results of systems design

Pumping system data sheets

	Village - utilizer	Pump flow rate (m3/h)	Pump Pressure (m)	Pump electric power (kW)	Photov. power (kW)
1	Vanuatu Agriculture College	2,5	90	1,8	3,0
2	Department of Agriculture Farm, Tagabe	2,5	60	1,2	2,0
3	Alfred Lolies Farm, Eton	5,0	76	3,0	5,0
4	Napil Rural Training Center, Middlebush	5,0	85	3,3	5,6
5	Tan Alkut Agriculture Farm	5,0	90	3,5	6,0
6	Malafau	5,0	77	3,0	5,1

Evaluation of avoided GHG emission

GHG avoided emission related to photovoltaic utilization

	Village - utilizer	Fuel consumption (lt/year)	Avoided emission (tCO2/years)
1	Vanuatu Agriculture College	1313	3,4
2	Department of Agriculture Farm, Tagabe	875	2,3
3	Alfred Lolies Farm, Eton	2217	5,8
4	Napil Rural Training Center, Middlebush Tanna	2479	6,4
5	Tan Alkut Agriculture Farm	2625	6,8
6	Malafau	2246	5,8
	total	11754	30,6

GHG emission related to air transportation of vegetables produced

Annual crop production (t/year)	20
Specific aircraft transport emissions (kgCO2/t freight - km)	0,5
Transportation distance (km)	2500
Air transportation avoided emission (t CO2/year)	250

Solomon Island projects

Title: Pilot project for the dissemination in rural areas of sustainable energy and environmental services
Location: West and Malaita provinces
Cost: 706.760 Euros
Beneficiaries: 16 remote villages
Technology: off-grid photovoltaic system, high efficiency pump, LED lamps, sterilizer and refrigerator for surgery, satellite phone communication
Duration: 2 years
Impacts: 64 tCO_2/years
Project responsible: Ministry of Mines, Energy and Rural Electrification of Solomon Islands

Project objectives

- Demonstrate the technical and economic feasibility of photovoltaic systems diesel integration for the supply of electrical services essential to isolated villages.
- Avoid CO_2 emissions resulting from the use of diesel generation and kerosene lamps
- Improve the capacity building of technicians, local companies and governmental structures in the design, component selection, management, maintenance of such systems, through theoretical and practical training.
- Overcome barriers to the development on the territory of a distributed generation supplied by renewable sources

Thanks for your attention

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