

Promoting the Development Benefits of the CDM: An African Case Study

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Presentation

◆ Introduction

- The Kenyan overview....development indicators
- Potential CDM renewable energy areas

◆ The PIAD/ECM Centre Small CDM Projects Facility....Using CDM to bring sustainable energy to rural communities

- Successful capacity building models
- Increased “development dividends” of marketable projects
- Leveraging CDM financing for local benefits and national development objectives

◆ Results

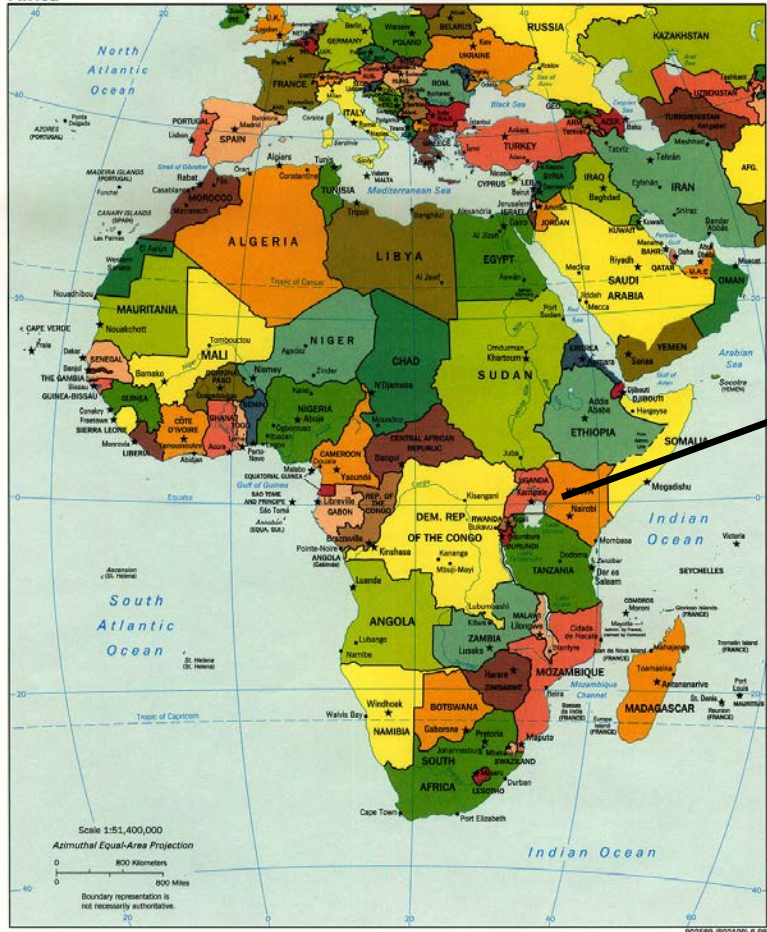
- Sustainable development benefits
- Investor interests
- Current status of project & challenges in moving forward
- Level of GHG emission reductions for each project
- High cost of participation (transaction & administration fees) & impact on IRR
- Next steps for the project in Kenya & the East African Region

◆ The Way Forward-Required Changes to the CDM

- Required changes to the CDM
- Additional capacity building
- Participation cost (transaction and administration)

Location

Africa

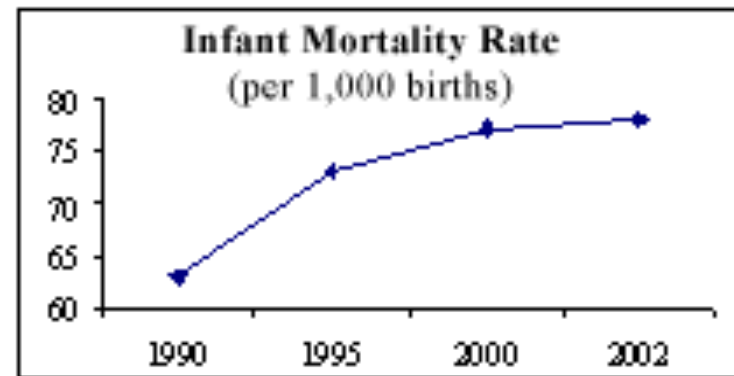
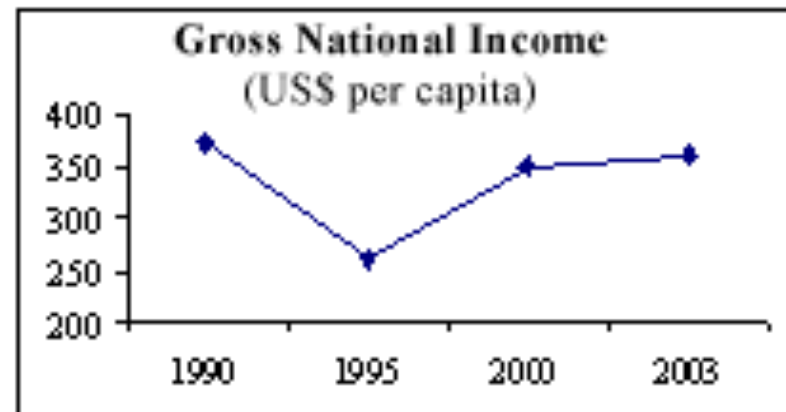


Statistics

- Area: 593,000 km²
- Population: 33.6 million
- GDP growth: 4.3% (2004)
- Per capita income : US\$ 360 (2003)
- Poverty level: 56% (2003)
- Life expectancy: 47years
- Infant mortality rate: 78 per 1,000

- 80% of Kenya's population live in the rural areas
- More than 40% live below the poverty line
- More than 80% are off-grid

**Priority:
Sustainable Development**



Kenyan Energy Scenario

- ◆ High dependence on imported petroleum products: **Represents 30% of Kenya's total import bill.**
- ◆ Shortfall in hydro electricity generation resulting in increased thermal generation- **Large commercial & industrial consumption (60% of electricity generated)**
- ◆ **68% of the national energy used is from biomass**-80% of Kenya's population live in rural areas where there is no electricity; firewood is main source of energy

Source of Energy	% age	Comments
Wood fuel	68	Mainly rural communities
Fossil fuel based	20	Transportation, industrial, electricity generation
Electricity	10	
Others	2	Includes most renewable energy
Total	100	

Kenyan Energy Scenario

- ◆ **Petroleum 2.5 million tonnes, annual consumption**
 - Represents about 30% of Kenya's total import bill.
- ◆ **Industrial & commercial sector consumes 19% of oil imports**
 - The manufacturing sector accounts for 13% of GDP
- ◆ **National electricity demand is 831 MW, effective capacity is 1,123 MW**
 - Large commercial & industrial consume 60%.
- ◆ **Total electric energy consumption in 2002 was 4,700GWh**

Table 1: Commercial Power Generation in Kenya in 2003

Source of Power	MW	% age	Comments
Hydro-based	707	57.3	Includes 30 MW from Uganda
Geothermal	121	9.8	
Fossil fuel	398	32.2	173 MW of this total is from Independent Power Producers (IPPs)
Others	9	0.7	
Total	1,235	100	

Kenyan Energy Scenario

- ◆ Wastage of energy ranges between 10-30% of primary energy input
- ◆ Savings of up to 40% energy bills have been registered by industries
- ◆ Green House Gas emissions cause of Global Warming and Climate Change

Potential Contributions by CDM

- ◆ **Solar energy:** thermal & electric
- ◆ **Wind energy:** mechanical & electric
- ◆ **Geothermal:** Kenya can meet 100% of its energy demand from geothermal power; thermal & electric
- ◆ **Hydro power:** mechanical & electric
- ◆ **Energy efficiency improvement:** Commercial, industrial & domestic
- ◆ **Cogeneration by sugar companies:** potential for thermal & electric power. Electric energy potential up to 150 MW
- ◆ **Biodiesel**
- ◆ **Power alcohol**



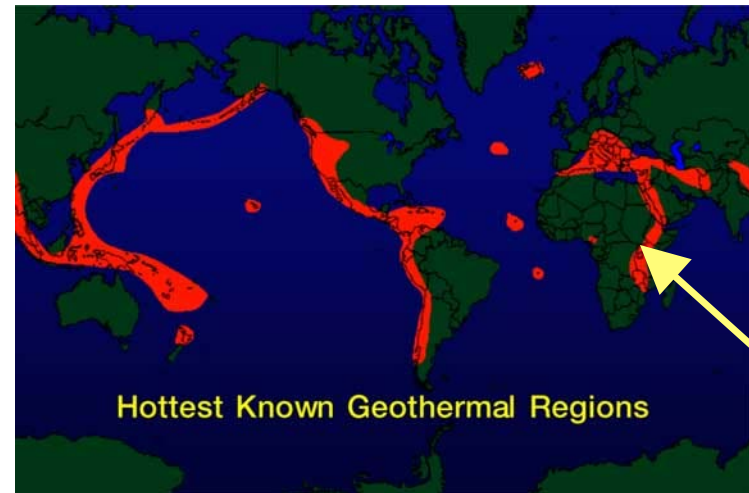
Countries Generating Electricity with Geothermal Resources

Australia	Indonesia	Portugal (Azores)
China	Italy	Russia (Kamchatka)
Costa Rica	Japan	Taiwan
El Salvador	Kenya	Thailand
Ethiopia	Mexico	Tibet
France (Guadeloupe)	New Zealand	Turkey
Guatemala	Nicaragua	United States
Iceland	Philippines	Zambia

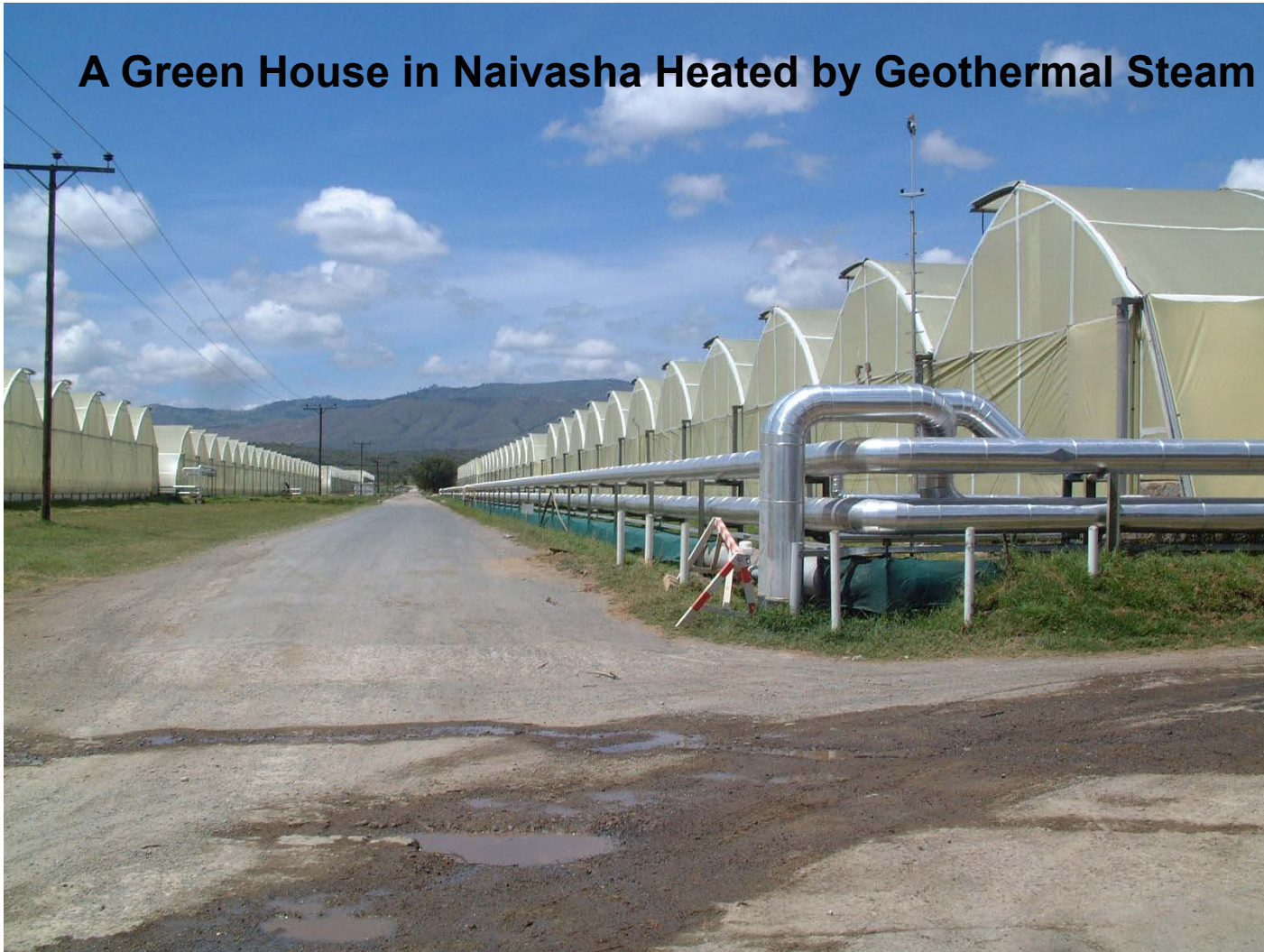
...and geothermal power plants are planned in several other countries

Potential Contributions by CDM

- ◆ Kenya is among the countries with vast geothermal resources
- ◆ Most of the hot springs are located within the rift valley in the rural areas without electricity



Potential Contributions by CDM



Potential Contributions by CDM



**Pipeline from OrrPower to Oserian Flower Farm:
Brings Both CO2 and Steam**

Potential Contributions by CDM

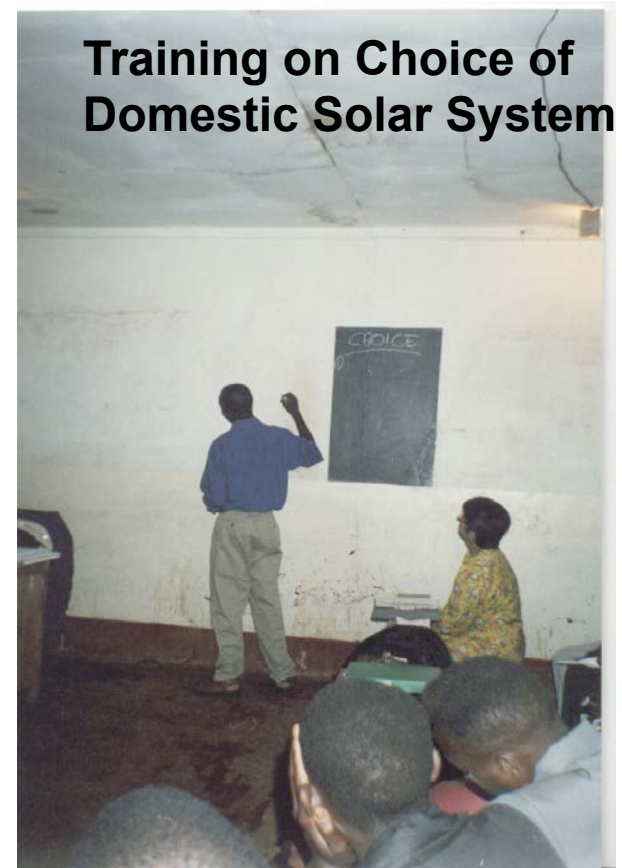


Potential Contributions by CDM

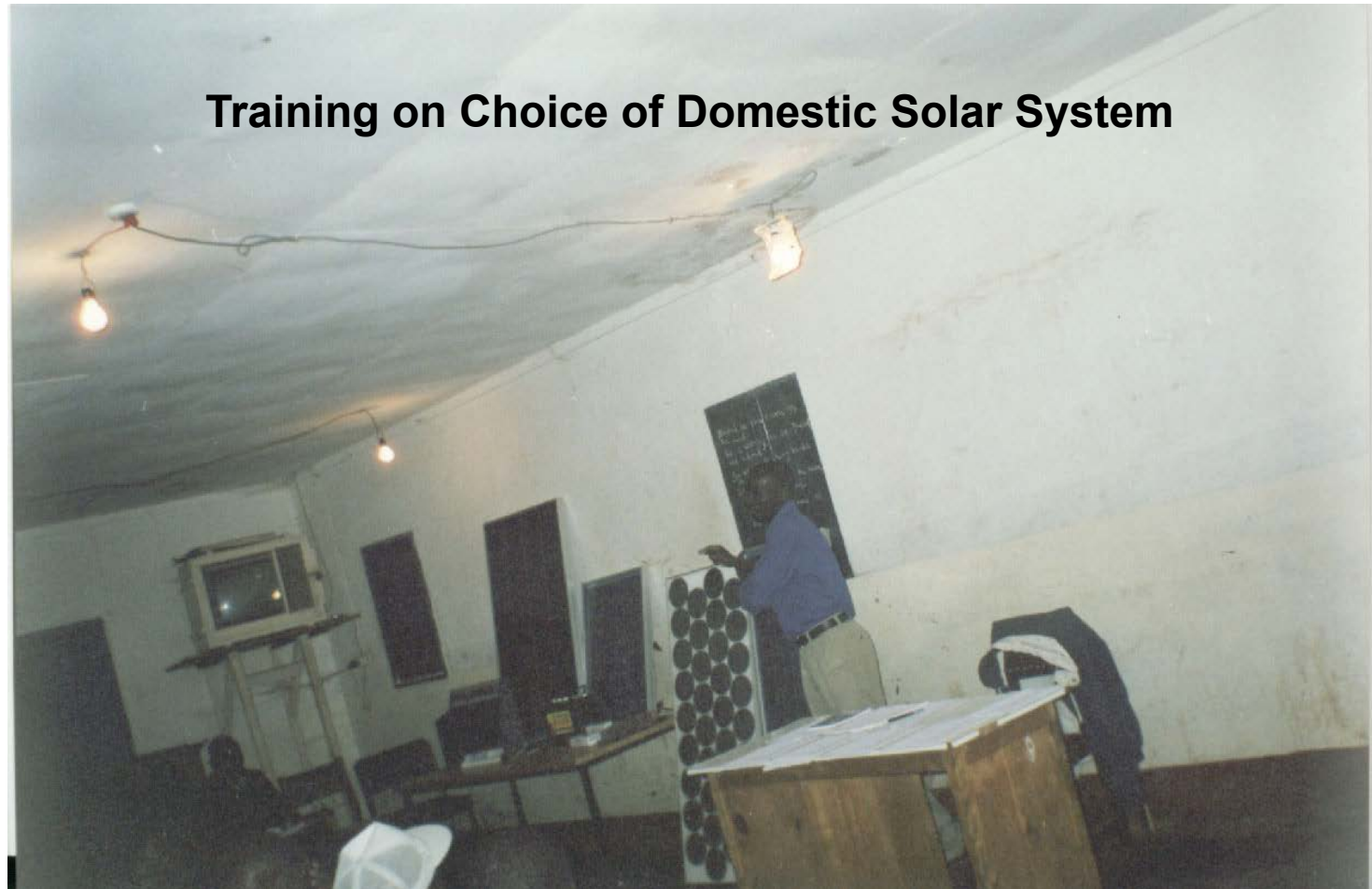


Potential Contributions by CDM

Technicians Installing a Domestic Solar System in Rural Kenya



Potential Contributions by CDM



Potential Contributions by CDM

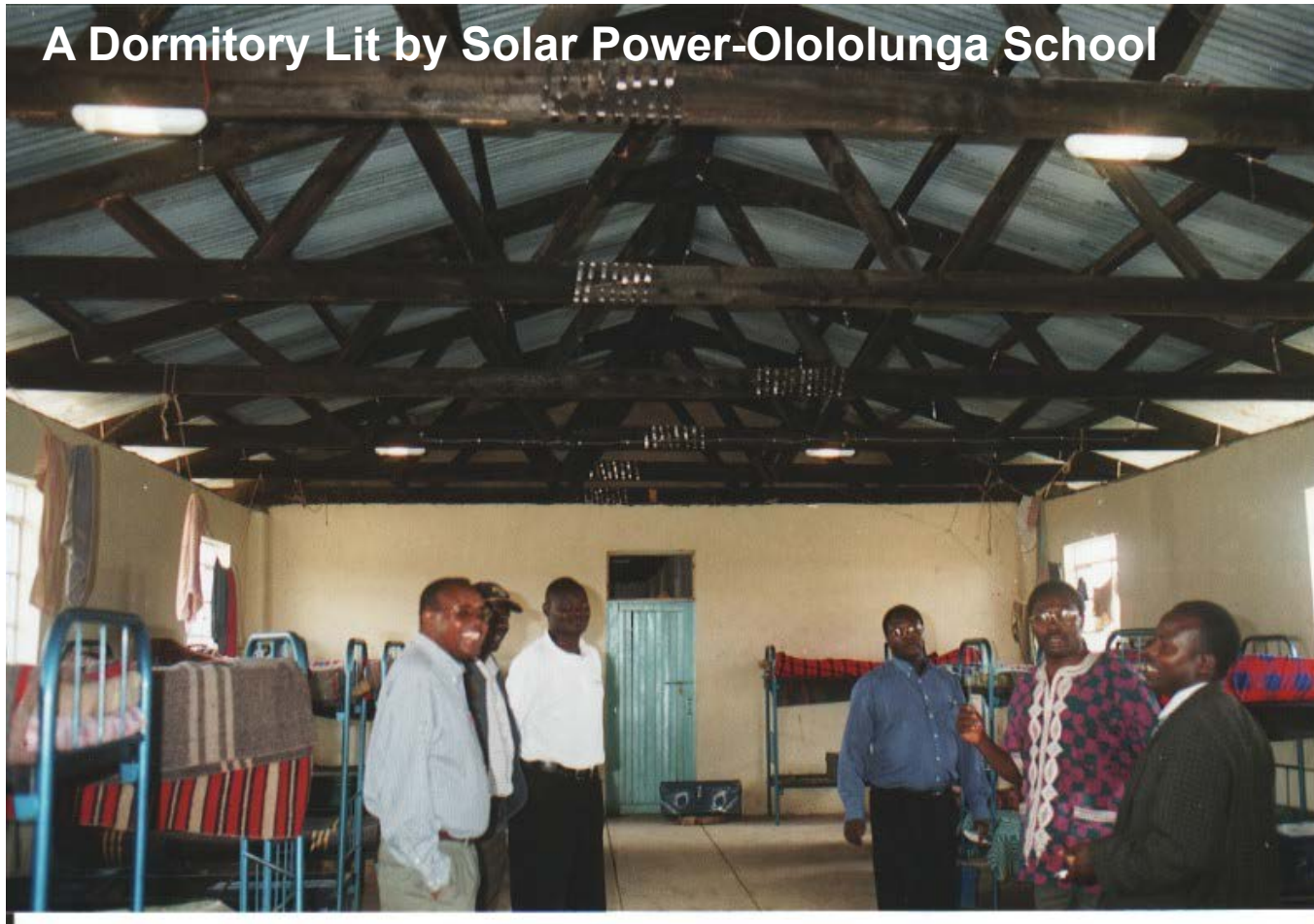
Introducing Domestic Solar Systems in Rural Kenya



Potential Contributions by CDM



Potential Contributions by CDM

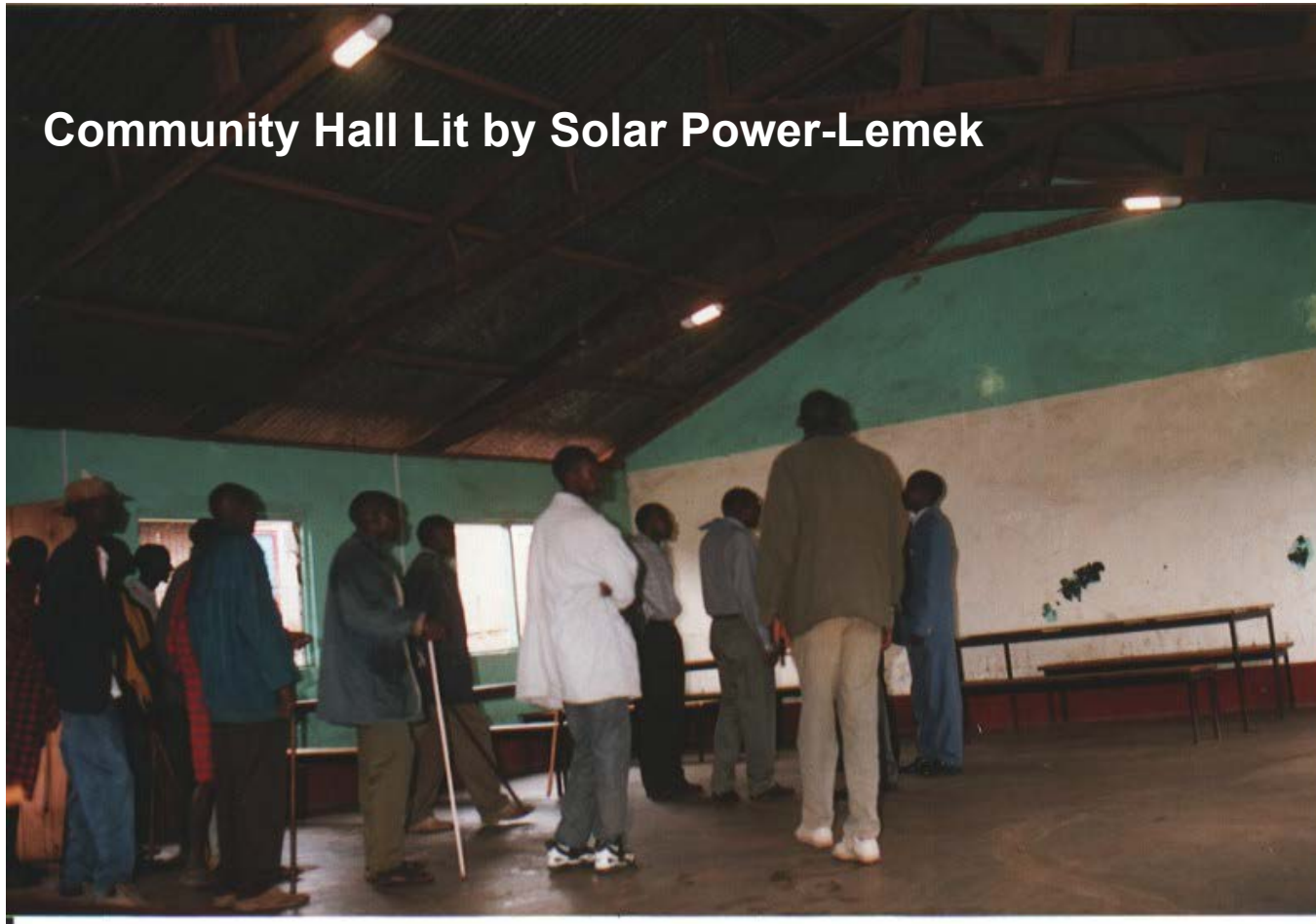


Potential Contributions by CDM

Classrooms Lit by Solar Power-Ngoto School

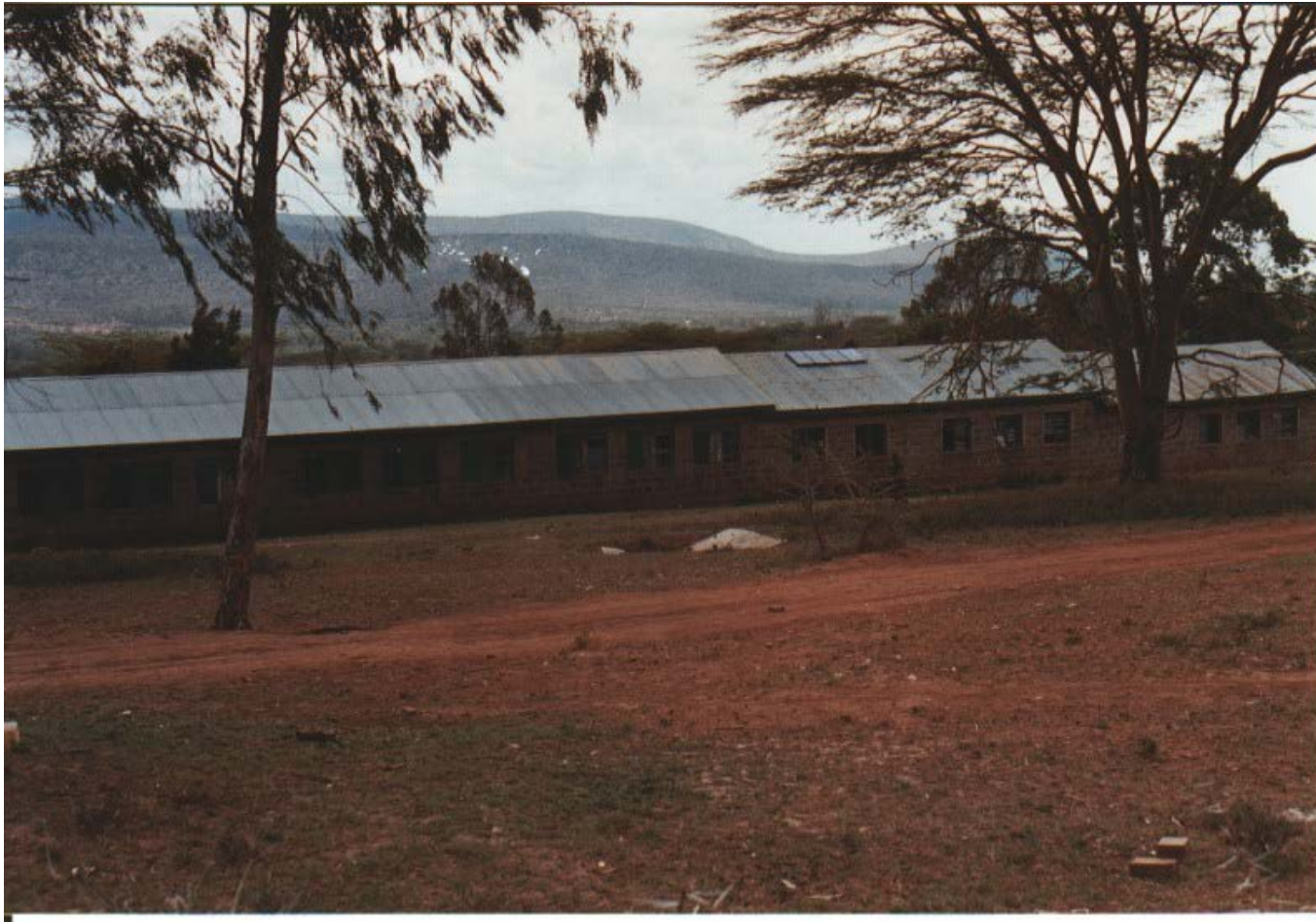


Potential Contributions by CDM



Potential Contributions by CDM

A School Lit by Solar Power-Lemek



Potential Contributions by CDM



The PIAD/ECM Centre Small CDM Facility Project

- The PIAD introduced the concept of CDM Small Projects Facility in Kenya in June 2004
- A similar project had been successfully piloted in India by PIAD and SRA

The Purpose of the PIAD Project

To provide assistance to communities, NGOs and SMEs in developing small CDM projects

- Develop up to six small scale CDM projects in Kenya
- Building the capacity of the ECM Centre Limited
- Training 6 local graduate interns on CDM projects development
- Facility focused on assisting project developers with:
 - The development of baseline and monitoring plans
 - Financial analysis of the projects with CDM financing
 - Preparation of the Business Plans, CDM Project Design Document (PDD) & Project Identification Note (PIN' s)

Project Description

- ❑ Capacity building for the ECM Centre & the internship program to assist project developers with:
 - The development of baseline and monitoring plans.
 - Financial analysis of the project with CDM financing
 - Preparation of the CDM Project Design Document (PDD).
- ❑ Recent business graduates (interns) were backstopped by CDM experts
- ❑ One-on-one assistance provided to the project developers by interns
- ❑ Hosting a National CDM information session in Nairobi with funding from Pembina Institute, the CDM/JI Office (on March 22, 2005)
 - Inform local stakeholders of the programming by the CDM Small Projects Facility-Kenya;
 - Present details of the project opportunities identified by the Facility and the completed CDM Project Design Documents (PDD);
 - Showcase the CDM PDDs
 - Initiate discussions between local stakeholders, CDM experts, and project developers on future CDM activities in Kenya.
- ❑ The university information sessions presented by each of the interns to students and faculty of three Kenyan universities

Project Development

- ◆ Estimate real emission reductions
- ◆ Develop emissions monitoring & verification protocol
- ◆ Prepare investment plan & undertake financial analysis
- ◆ Draft BPs, PINs & PDDs

Outputs

- Five PDD' s, PIN' s and Business plans
 - Only 4 technologies profiled but with different learning points (methodologies and procedures)
- Financial analysis with different CER prices (US \$ 5-7 per ton CER)
- Demonstrated interest of Japan Carbon Fund and Pact International
- We have since developed 3 additional PINs for other project developers, including one LULUCF for a Tanzanian Developer (from 1st principles)

Sustainable Development Benefits

- Alleviation of poverty through increase in disposable income
- Increase in forest cover
- Reduction of GHG emissions
- Breakthrough in new renewable source of energy
- Forex saving on fossil fuel importation
- Improved health; Malaria control & reduced bronchial problems
- Secure domestic source of energy
- Technology transfer
- Use of marginal land

Levels of GHG Reductions

Project	GHG Emission Reductions (Tons)	CER Value US \$	IRR Without CERs (%)	IRR With CERs (%)
Jatropha/Vanilla	931,913	4,609,566 (10 years)	27.2	30.9
Chemelil Sugar	525,200	3,676,400 (20 years)	14.1	15.2
ApproTec.... Treadle Pumps	80,268	401,340 (20 years)	10	14
Biodiesel	359,100	1,745,500 (21 years)	5	7
Solarnet... STEP Project	8,094	40,469 (10 years)	12.3	16.6

Current Status of Projects

- The Solarnet and Treadle pump projects have progressed and under full implemented....no one so far interested in the CERs which are small
- Jatropha Vanilla project is progressing slowly due to lack of funds to develop seed nursery & buy seedlings...revolving fund missing. JCF interested if implementation speeded up.
- Chemelil Sugar Company cogen project...looking for capital but JCF interested.
- Other projects we are working on for JCF include geothermal, Mumias Sugar cogen, biogas from slaughter house and charcoal briquetting projects

Acknowledgements

Project Developers

- ◆ ApproTEC
- ◆ Chemelil Sugar Company
- ◆ High Value Crops (K) Ltd
& Victoria Vanilla (K) Ltd
- ◆ Solar Energy Network
(SolarNet)
- ◆ BioFuel Company of
Kenya

Graduate Interns

- ◆ Joseph Kilongosi Mutei
- ◆ Nobert Ochieng Owino
- ◆ Wilson Kyalo Mbola
- ◆ Joash Masira Obare
- ◆ Kenneth Mwangi Kamau

- ◆ John Mutua Muinde

Acknowledgements

- ◆ Canadian Government / CIDA
- ◆ Pembina Institute for Appropriate Development
(Carol Brunt & Roger Peters)
- ◆ Symbiotec Research Associates (S. K.
Rajshekar & Abhijit Chatterjee)
- ◆ ECM Centre Ltd (Anjali Saini, paul Kirai & Julie
Mundia)
- ◆ BEA International (Patrick Karani & Staff)

Next Steps

- ECM Centre to develop a permanent CDM secretariat
 - To concretise the learning
 - Move Kenya into a lead position in East Africa on CDM
- ECM Centre has vigorously marketed CDM
 - One half day open presentation on CDM in Nairobi
 - Several private visits as follow up to identify more potential projects
 - One workshop proposed in February/March 06 with GTZ agro-based industries project...sectoral approach
- ECM Centre has vigorously marketed CDM
 - A contract with Japan Carbon Bank to provide 5 PINs by end 2006 (above 30,000 tonnes CERs per year)
 - Pact International expressed Interest on some PINs & in working with ECM Centre....negotiations on
- ECM Centre recognised nationally & internationally
 - Invited to join the National Action Committee on Climate Change
 - Invited to the membership of Development Dividends Task Force (IISD)

Lessons Learnt

- There are several potential CDM projects in Kenya, and the whole East African region
- Barriers to their development include
 - Capital investment, most buyers have so far expressed interest on not less than 30,000 tons CERs per year (commercial decision, transaction costs), no upfront funds
 - Awareness among stakeholders
 - Most community based CDM projects require seed capital which can usually be traced to ODA...acrobatics required
 - Most community sustainable development projects have low CERs but high social value
 - Most buyers consider community projects high risk
 - Transaction costs cannot be met by most small CDM projects with high social & development value....simplify process, more DOEs
 - Potential investors on CDM projects are apprehensive...an abstract concept, "selling air & who has earned from CERs so far in Kenya"



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Five Pilot CDM Projects

- Jatropha Vanilla
- Cogeneration at Chemelil Sugar Company
- Biodiesel Production in Kwale
- Treadle Pump Promotion
- Solar Technology for Electricity Provision (STEP)

Simplified small scale CDM methodologies used for the projects

Presenter: Tom Owino Oduol
Environmental Cost Management (ECM)
Centre



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Small Scale CDM Project:

Jatropha Vanilla project



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**Location: Malindi and Migori
Districts in Coast and Nyanza
Provinces Respectively**

Project Proponent:

High Value Crops (K) Limited, Victoria Vanilla (K)
Limited & The Poverty Eradication Commission (PEC)

Contact Person:

Mr. Pierre van Engelen and Alnoor Amlani



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Project Location

Migori District

- High Value Crops (K) Limited
- 100 acres nucleus plantation

Malindi District

- Victoria Vanilla (K) Limited
- 100 acres nucleus plantation

Total Farmers

- 4,000 in 2005
- 100,000 in 2014





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Project Purpose

Replacement of:

- Kerosene with Jatropha oil for lighting and some cooking
- Diesel with bio-diesel for transport & power generation in stationery engines

Nationally,

•93% of the poor use Kerosene for lighting & some cooking..... the mean monthly expenditure on Kerosene is US\$. 0.9 per poor family



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Project Description

- Growing Jatropha trees as:
 - Shade and tutors for Vanilla vines
 - Fencing for Vanilla farms
- Jatropha seeds from farmers & nucleus plantation pressed for oil extracted
- Oil sold to farmers at subsidized prices, cake used as fertilizer in the nucleus plantation
- Surplus oil converted to biodiesel (transesterification) & sold to local diesel users



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Why CDM ?

- Investment barrier
- Social barriers
- Prevailing practices
- Technological barrier

Additionalities

“Business not as usual”

Baseline Methodology

- Type III. B: Fuel Switching



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Project Benefits

- Alleviation of poverty through increase of disposable income
- Increase in forest cover
- Reduction of greenhouse gas emissions
- Source of renewable energy
- Forex saving on fossil fuel importation
- Improved health...malaria & bronchial problems
- Organic manure with pesticide properties for high quality vanilla
- Raw materials (glycerol) for soap production



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Financial Viability

Total Carbon Emissions Reductions (CERs)-10 years: 931,913 tons

Total value of CERs (@ 5 US \$ per CER, net transaction costs:

US \$ 4,609,566

Without CDM	With CDM
IRR = 27.22%	IRR = 30.85%



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Small Scale CDM Project: Solar Technology for Electricity Provision



ECM Centre Limited

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**Location: Eastern, Western,
Nyanza & Rift Valley Provinces**

Project Proponent:

**Solar Energy Network
[Solarnet]**

Contact person:

Mr. Daniel M. Mututa



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Project Purpose

The STEP programme encompasses two projects:

- The Energy for Schools Project, and
- Rural Community Solar Home Systems Finance Project

The programme will mobilize financial assistance for the acquisition of Solar lighting Photovoltaic Systems for targeted beneficiaries.



Why CDM ?

- **Investment Barrier**
Solar PV systems require a high upfront investment
- **Technological Barrier**
Solar PV systems are more technologically advanced
- **Barrier due to prevailing practices**
- **Other barriers**

Additionalities

“Business not as usual”

Baseline Methodology

- Type I. A: Electricity Generation for the User



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Project Benefits

- Contribution to Sustainable Development
- Economic sustainability
- Ecological sustainability
- Social justice and equity
- Improved health...less respiratory problems
- Facilitated learning & education



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Solar Module



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A Rural Solar System Installation

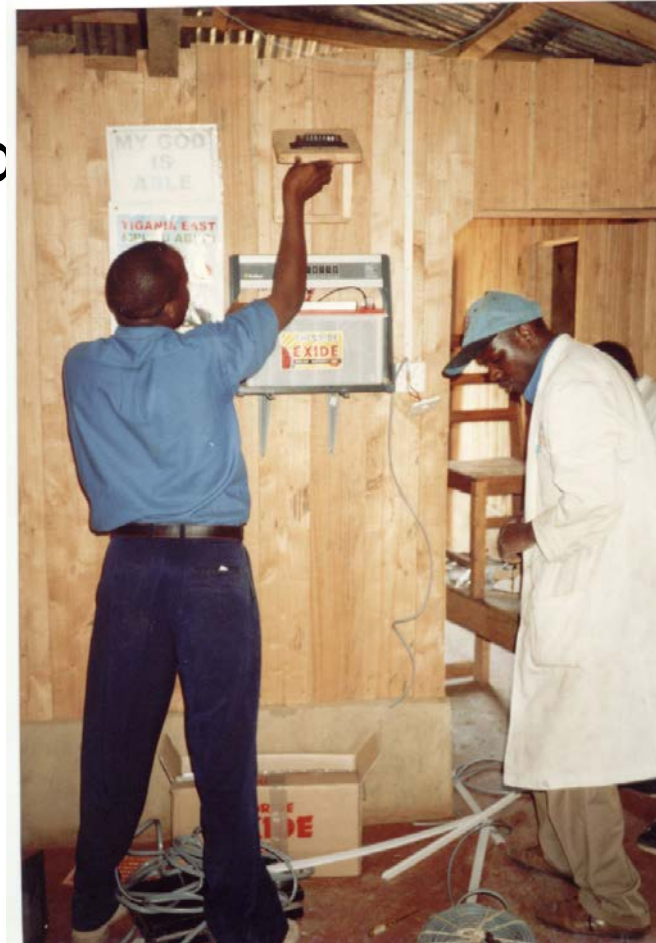




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Local Technician Have Been Trained





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Financial Viability

Ratio Analysis	With CDM	Without CDM	Variance
IRR =	16.56%	12.32%	4.23%
Carbon Emissions Reductions Generated			
=	CO _{2equ}	@ US 5 =	40,469



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Conclusion



**Let us fix the
sustainable
development
component of the
CDM**

**We owe it to the
future generations**



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End of presentation.

Thank you