

Restructuring & Diversification Management Unit to coordinate the implementation of the NATIONAL ADAPTATION STRATEGY to the EU Sugar Reform, SWAZILAND

Workshop Kyoto Projects in Swaziland

26 September 2008



Introduction: Energy and Carbon Assignment

Global Objective

The global objective of the Energy/Carbon assignment on behalf of RDMU is to enhance the efficiency and hence the profitability of the sugar sector along the value chain starting from the smallholder sugar cane growers via the transporters to the millers

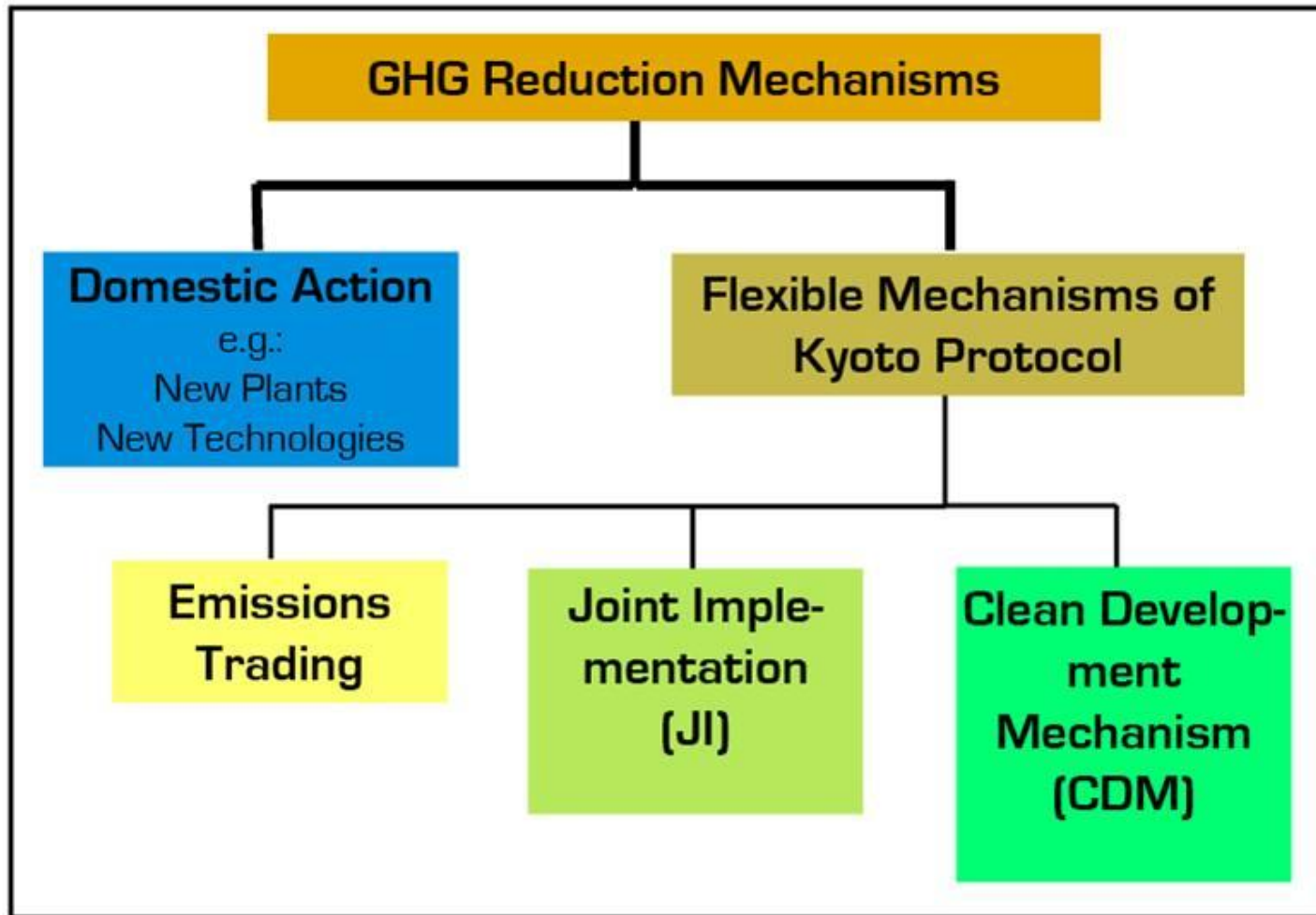
Specific Objectives

Data collection and assessment of opportunities for cost savings in the energy sector (energy efficiency, use of renewable energy)

Identification and development of bankable and implementable projects

Assessment of co-funding through the CDM of the Kyoto Protocol: Project Idea Notes (PIN), Project Design Documents (PDD)

Introduction Kyoto Protocol and CDM



Introduction Kyoto Protocol and CDM

KYOTO Protocol: The Market Participants

Carbon Credit BUYERS :

Governments of countries having a huge compliance gap (e.g. Italy, Spain, Austria, Denmark, etc.)

Multilateral Funds (e.g. WB or EBRD carbon funds)

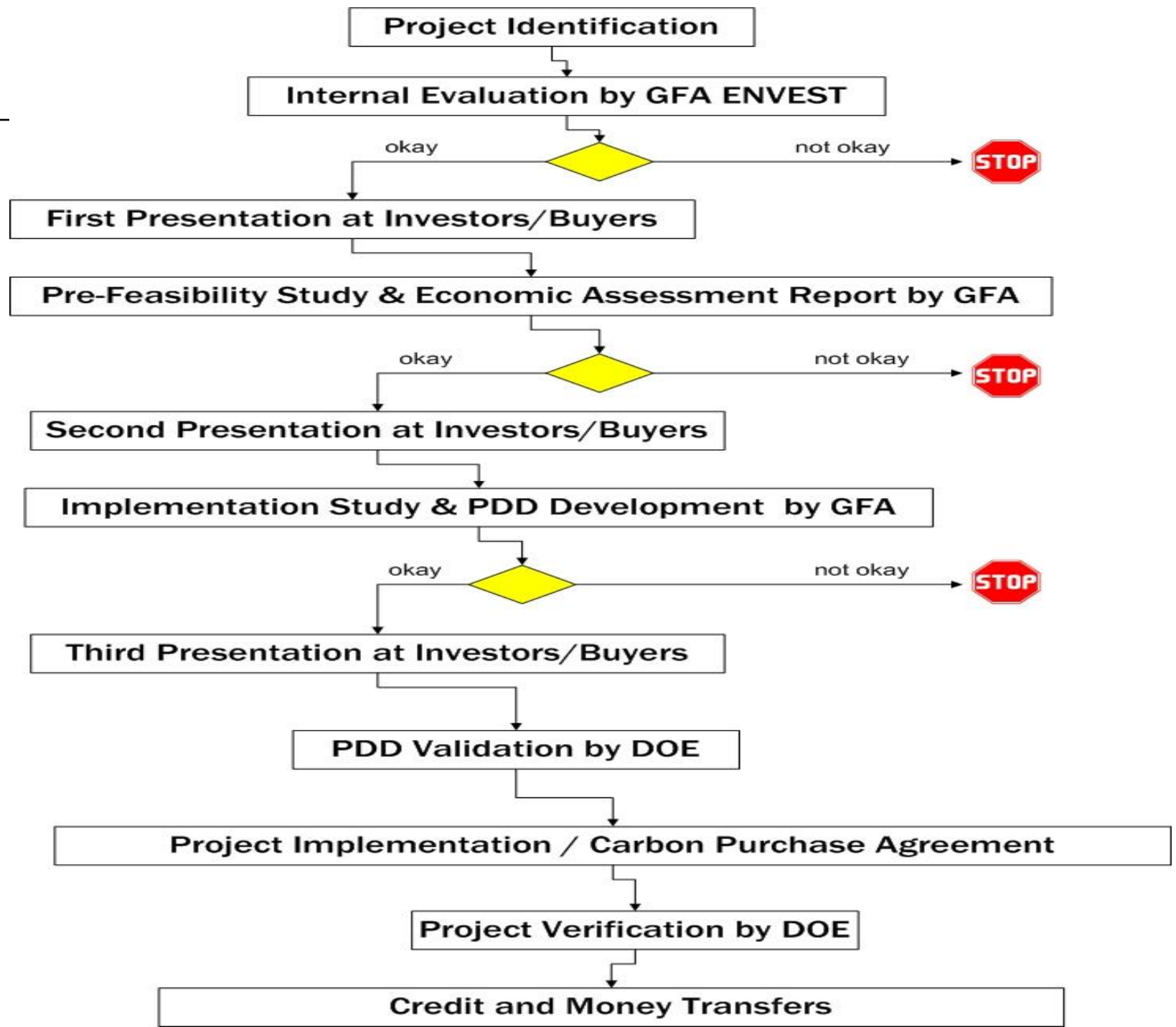
Companies from Annex-1 countries with an emission problem (e.g. Western-European power utilities)

Private investors

Carbon Credit SELLERS :

Annex-1 companies with emission allowance surplus





CDM and JI project owners



CDM Project opportunities in Swaziland

Energy/Carbon projects in the Sugar Industry

Background:

-  The Swazi sugar industry currently covers its energy demand by firing bagasse and coal, and by purchasing electricity from the national grid
-  Sugar companies are confronted with rising energy prices, both for coal as well as for power from the grid
-  Investments are required to reduce the consumption of energy in sugar plants. Saving energy costs projects will make a sugar company - as well as related smallholder cooperatives of sugarcane growers - more competitive in the internationally sugar markets.
-  Sugar companies can support the development of national power production capacities by being in the position to feed surplus electricity produced from renewables to the public grid.

The objective of proposed **CDM projects** in the sugar industry is to reduce GHG emissions by

- 1) Avoiding the utilization of coal through implementing energy efficiency measures within the production line of the sugar plant and/or substitution of coal through biomass (fuel switch);
- 2) Substituting fossil fuel based energy taken from the electricity grid with power generated from own (new) renewable energy sources;
- 3) Feeding surplus renewable energy into the public electricity grid.

CDM Project opportunities in Swaziland

Energy/Carbon projects in the Sugar Industry

- **Energy efficiency measures in sugar production**
e.g.:
 - Installation of more efficient boilers and/or increase the pressure of existing boilers
 - Replacement of steam drives by electric drives
 - Avoidance of steam leakages
 - Installation of frequency converters

- **Production of energy from additional biomass (trash)**

Utilization of plant residues from harvesting sugarcane plants ("trash") as biomass fuel for CHP either in combination with bagasse or as single fuel in special boilers

Project opportunities in Swaziland

Energy/Carbon projects in the Sugar Industry

CDM Potential:

(Assumptions: grid factor = 800 CO₂eq/GWh, CER = 10 Euro)

o Fuel Switch

➤ 30,000 t coal subst. by 80,000 t trash

Benefit: **3.15 Mio Euro per year**

- Coal savings: 2.4 million Euro/year
- 75,000 CER : 750,000 Euro/year

o Energy Efficiency

➤ up to 60 GWh savings

Benefit: **up to 2 Mio Euro per year**

- Energy cost savings: 1.5 million Euro/year
- 48,000 CER : 480,000 Euro/year

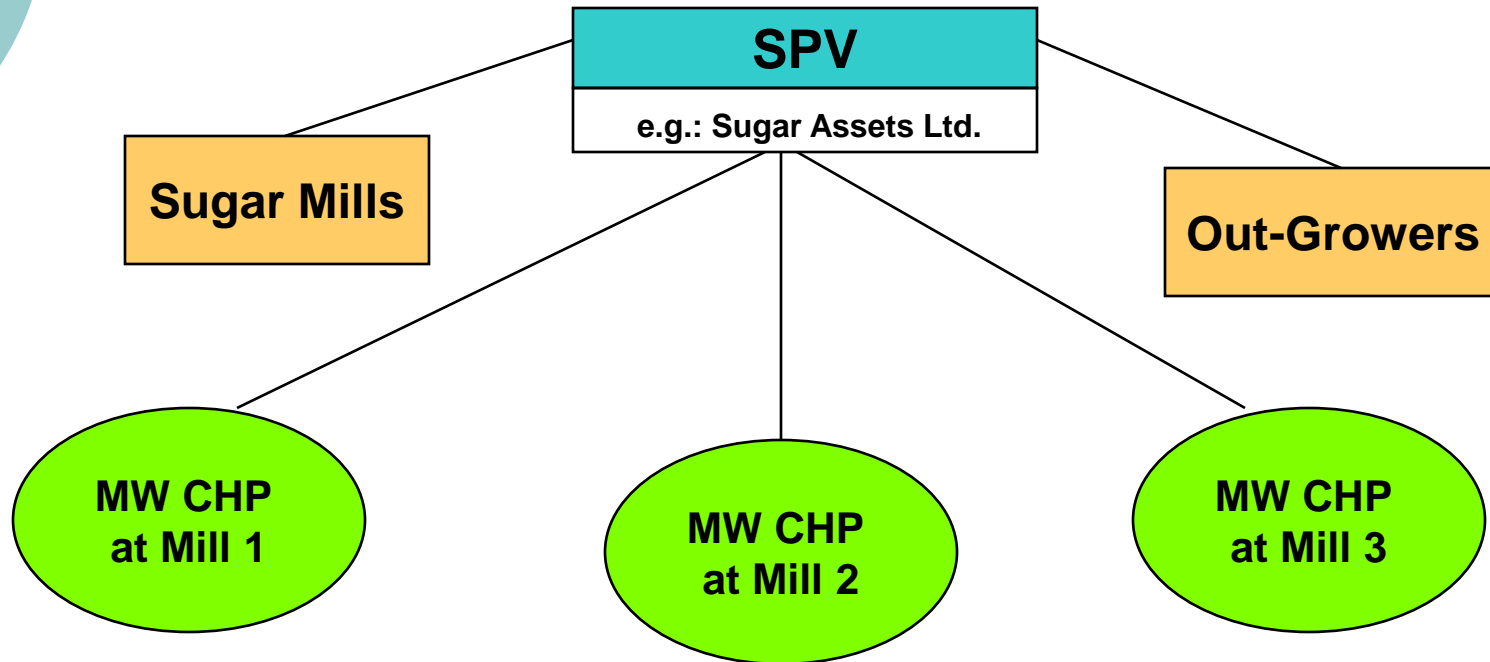
Project opportunities in Swaziland



Project opportunities in Swaziland

Energy/Carbon projects in the Sugar Industry

CDM Potential: "Biomass - Grid in Sugar Industry"



Project description

Where the terrain is compatible, install centre pivot systems of irrigation which use energy efficient pumps and motors leading to

Energy saving,

Water usage reduction,

Increase in cane production due to more efficient application of water,

Labor savings,

Permitting mechanical harvesting.

Project example:

Assuming an irrigated area of 8,000 ha using 50 GWh/year

Switching from sprinkler system to centre pivot will result in 40% energy saving (i.e. 20 GWh/year)

= 16,000 CO₂ equivalent

= 160,000 Euros/year

Within 10 years financial returns from carbon credit will amount to 1.6 Mio Euros corresponding to 13% of incremental cost

Project description:

Biomass opportunities exist in the timber industry in form of:

- chips, sawdust, off-cuts
- forest residues from harvesting (including black wattle)
- municipal solid waste

Project opportunities in Swaziland

Bioenergy Outside of Sugar Industry

Proposed project:

- Installation of two 30 t (steam) boilers running on biomass (560 tons per day) which are connected to a 5 MWel turbine (CHP)
- Will be able to generate 25 GWh (operating time of 5,000 hrs/year) for selling electricity to the national grid plus providing thermal energy for own heat demand
- Revenue of approx. 6.25 Mio Euros per year for feeding electricity to the grid and 0.25 million Euros from carbon credits per year

Project opportunities in Swaziland

Solar Heating in Housing - PoA

Background:

Water heating accounts for about 30% of an average household's total energy use

Households use unsustainable firewood, coal or electricity from the national grid for thermal purposes such as hot water and space heating

Project idea:

Solar panels will provide alternative renewable thermal energy

Project opportunities in Swaziland

Solar Heating in Housing - PoA

Average household: Approx. 1 t coal/year and 1.5 MWh electricity/year

Investment per household: Approx. 1,000 Euro

Savings per household:

Energy cost savings	=	80 Euro
Carbon credits ca. 2 CER/y/HH	=	20 Euro

CDM potential:

5000 households = 10,000 CER/year

Financial benefits:

100,000 Euro/year from carbon credits

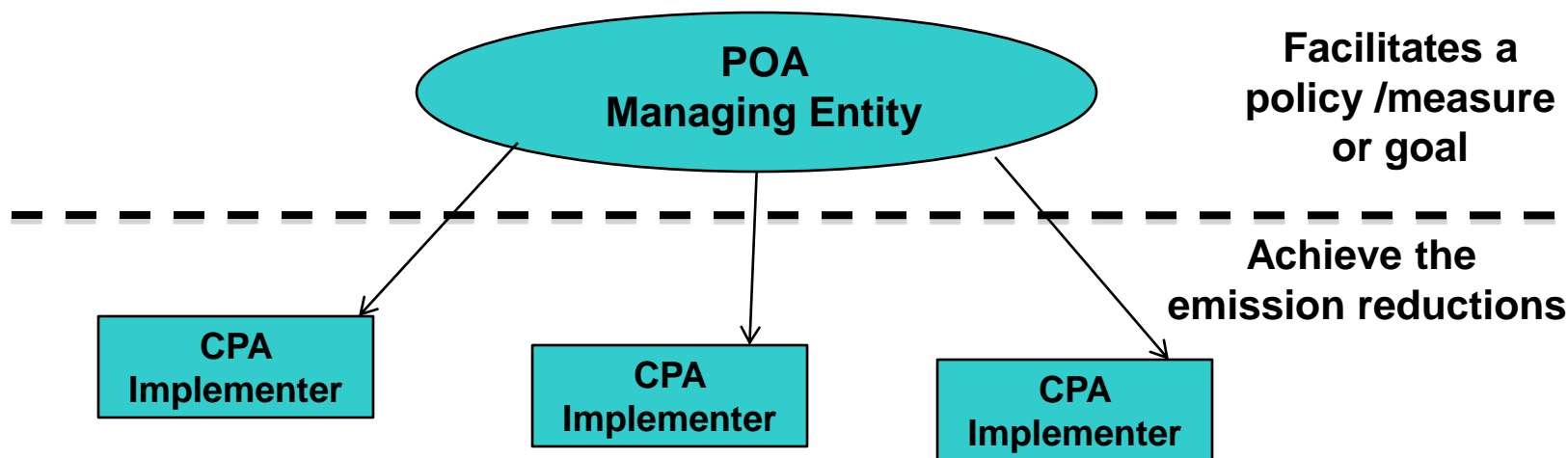
400,000 Euro/year from energy cost savings

Project opportunities in Swaziland

Solar Heating in Housing - PoA

PoA – Programmatic Approach:

- Same technology project concept
- Numerous dispersed activities
- Implemented over time (up to 27 years)
- Implemented by various stakeholders
- Aggregation of SSC can go beyond SSC limits



Background

Worldwide 20% of GHG emissions are originated from the transport sector with an increasing tendency. Diesel and petrol are the most common transport fuels. LPG, biodiesel, pure plant oil (PPO) and ethanol are also in use and heavily discussed.

Project idea

Plant oil production on marginal land, in order to substitute diesel fuel with PPO in trucks (e.g. transport in sugar industry)

Project opportunities in Swaziland

Fuel Switch in Transportation

Applicability:

Marginal land,

No competition with food (non-edible oil),

No export to Annex 1 countries,

Approved methodology so far for PPO only.

Critical factors:

Land availability,

Yield (seed, fertilizer, water), and

Labour availability.

Engine modification could be requested, due to higher viscosity of PPO

Project opportunities in Swaziland

Fuel Switch in Transportation

Carbon potential:

GHG mitigation potential (project emissions included)

1000 liter PPO = approx. 1 t CO₂e

1000 liter Biodiesel = approx. 0.5 t CO₂e

1000 liter EtOH = approx. 0.7 t CO₂e

10,000 t PPO (11 Mio Liter)

= 20,000 ha Castor (marginal land: 1t seed/ha)

= 20,000 ha Jatropha (marginal land: 2t seed/ha)

Project case:

Substituting 10,000 t PPO diesel fuel in trucks will lead to:

Financial benefit:

10,000 CER/y = 100,000 Euro/year

10,000,000 l diesel = 9,000,000 Euro/year

Background

International Emission Trading provides opportunities for co-financing efficient light bulb distribution. These activities result in a reduction of energy consumption which is based to some extent on fossil fuels.

Project Idea

Replacement of light bulbs in public buildings (ministries, schools, universities...) by more efficient light bulbs.

CDM Potential

Replacement:

100W bulb => CFL => energy savings of 80W/h

Assuming 4 working hours => energy savings 115.2 kWh/year

Assuming 1,000,000 CFLs => energy savings of 230 GWh/year

Assuming a grid factor of 800 t CO₂/ GWh => 184,000 tCO₂e/year

Assuming CER price of 10 € => 1,840,000 Euro/year

CDM options:

Afforestation/Reforestation

VER options:

Conservation

Forest management



Open questions and next steps regarding CDM projects

Grid factor

Working group (DNA, Ministry of Energy, SEC)

CER vs. VER

PINs and PDDs

Siyabonga! – Thank you!

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