LGML

Examples and Prospects of CDM Projects in the PICs

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SEL

Post 2012 CDM Potential

POTENTIAL DEMAND FOR INTERNATIONAL OFFSETS

Country	Percentage reduction on 2005 levels	Mt CO_2-e 2013-2020
European Union	14	1,696
United States	17 (power sector only)	1,111
Australia	10	332
Japan	25	879
Canada	17	73
New Zealand	28	65
South Korea	4	98
Other	—	26
Total	—	**4,280**

Source: Turner, 2010.

Biofuels and CDM

Approximately 500 litres of biodiesel or 800 litres of ethanol used in developing country/econo my in transition

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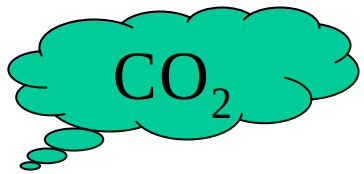

Emissions reductions of 1 tonne CO_2

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1 CER for biofuel producer

Biofuel Methodologies

ACM0017

Production of biodiesel for use as fuel.

Valid from 17th September 2010

Type : Large scale -consolidated

Plant oil- Biofuel CDM (Small Scale) Methodology : AMS- IIIT

- Deals with production of plant oils and their use for transport applications in diesel vehicles.
- In case of blending, plant oil must be mixed with pure diesel not biodiesel.
- Plant oil must fulfill quality standards specified.
- Double counting of CERS not allowed (among producers , retailers and users)
- Only the CO_2 displaced by non-usage of diesel are considered.
- Project participants must demonstrate that area used for biofuel plants is not a forested area or has not been deforested in the last 10 years.
- Any biomass or waste produced during the oil production process should not be stored so as to generate methane through anaerobic digestion.
- This is a small-scale project methodology applied to projects that reduce less than or equal to 60 kT of CO_2 .

Plant oil production and use for transportation-A CDM Project

- Paraguay: Cultivation of 3 types of oil seeds- Castor, Crambe and Oilseed radish. All non-edible
- Cold pressed and filtered plant oil –blended or pure in captive vehicles /farm machinery. No public sale.
- Expected CERs -17,188 annually.
- Registration date ; 17th December 2010.

Biofuel CDM Proposals

Meth. No.	Title / Description	GHG reduction	Host country	Remark
69	30 TPD Biodiesel project using oil seeds from jatropha and pongamia in Andra Pradesh, India	26 ktCO2	India	C
82	Baseline methodology for the production of sugar cane based anhydrous bio-ethanol for transportation using LCA	53 ktCO2	Thailand	C
108	Biodiesel production and switching fossil fuels from petro-diesel to biodiesel in transport sector	26 ktCO2	India	C
109	Sunflower Methyl-Ester Biodiesel Project in	33 ktCO2	Thailand	C
129	Generalized baseline methodology for transportation biofuel production project with LCA	33 ktCO2	Thailand	C
142	Palm Methyl Ester – Biodiesel Fuel (PME-BDF) production and use for transportation	218 ktCO2	Thailand	C
180	BIOLUX Benji Biodiesel Beijing Project production of waste cooking oil based biodiesel for use as fuel	123 ktCO2	China	A
185	Khon Kaen Ethanol Project	40 ktCO2	Thailand	B
223	Biodiesel Project	205 ktCO2	South Africa	C
224	Manufacturing of Biodiesel from Crude Palm Oil and Jatropha Oil	60 ktCO2	India	C
228	AGRENCO Biodiesel project in Alta Araguala	335 ktCO2	Brazil	WIP
233	Palm Methyl Ester – Biodiesel Fuel (PME-BDF) production and use for transportation in	143 ktCO2	Thailand	WIP

Note: A = Approved by the Executive Board (EB); B = Project participants / EB must make some changes; C = Rejected / new Project Design Document (PDD) must be submitted; WIP = work in progress

Biofuel vs. Solid Biomass:CO_2 reduction

Sweet Sorghum Study

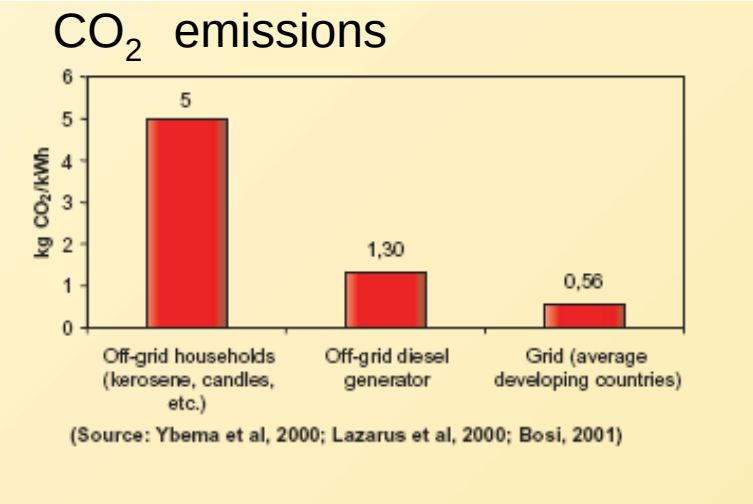
- bioethanol from sweet sorghum to substitute fossil fuels could reduce ~ 65-94 mil t CO2/y
- could reach to ~ 300 mil t CO2/y if solid biomass would be used for power generation

Therefore, utilizing solid biomass (bagasse) for power generation is 3 times more effective in reducing CO2 emissions and generating CERs than converting ethanol to fuel.

LAMNET Brochure

For other crops ?

Solar Home Systems CDM potential



A standardized reduction factor can be developed for SHS CDM projects

One average 250 Kg CO_2 per system per year

Example : 2000 SHS = 500 tonnes CO_2 = 500 CER annually

A Small scale dispersed project
(India)

Rural Education For development Society (REDS)
CDM Photovoltaic Lighting Project

- The project activity: Installation of 300,000 solar PV based CFL or LED lamps in 60,000 rural household in the Karnataka state. 3 W CFL or LED luminaries used.
- The project will reduce 464 840 tonnes CO_{2e} over 10 years by displacing kerosene.
- CDM registration: March 2009

REDS project: baseline calculations

- Project capacity 0.9 MW : Type I Small scale project
- Baseline: kerosene consumption per lamp per hour in 98 households: 0.16 l /lamp per day
- Baseline emissions : CO_2 emission factor: 2.68 kg CO_2 per litre kerosene (IPCC values)
- 59.45 litres/ lamp/year corresponding to 46,484 tcO_2 per year (60,000 households)

LULUCF

Uganda CDM Project

small-scale A/R CDM project activity
Registration: 21 Aug 2009
Crediting period: Nov 08- Nov 28 (renewable)

A cluster of 5 projects – Timber Plantation , **29,795 tCO_{2e}** by 2012

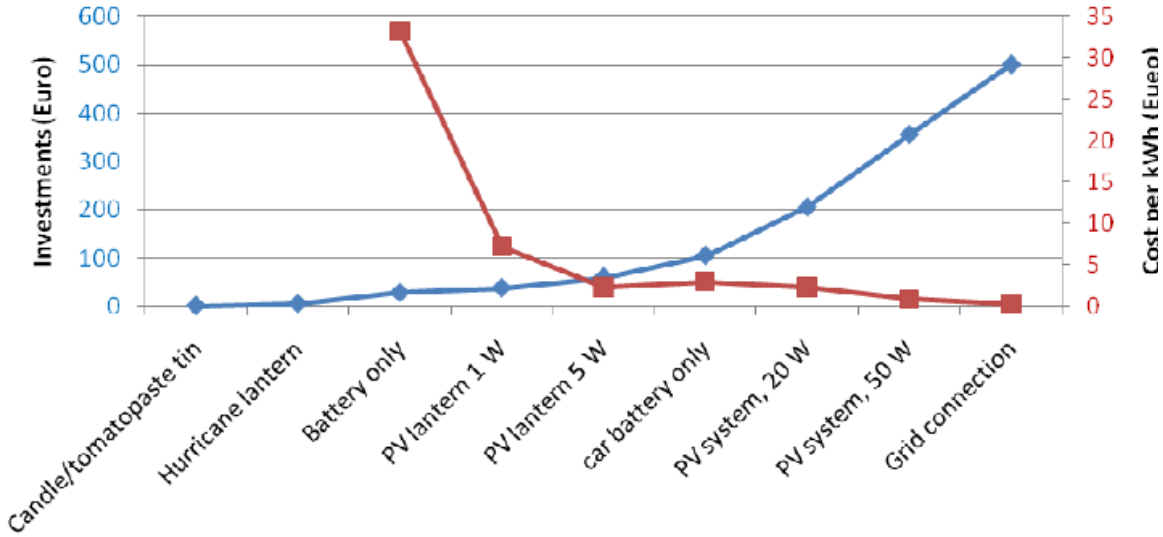
Private and community based tree planting (reforestation)

Project site : Degraded grassland

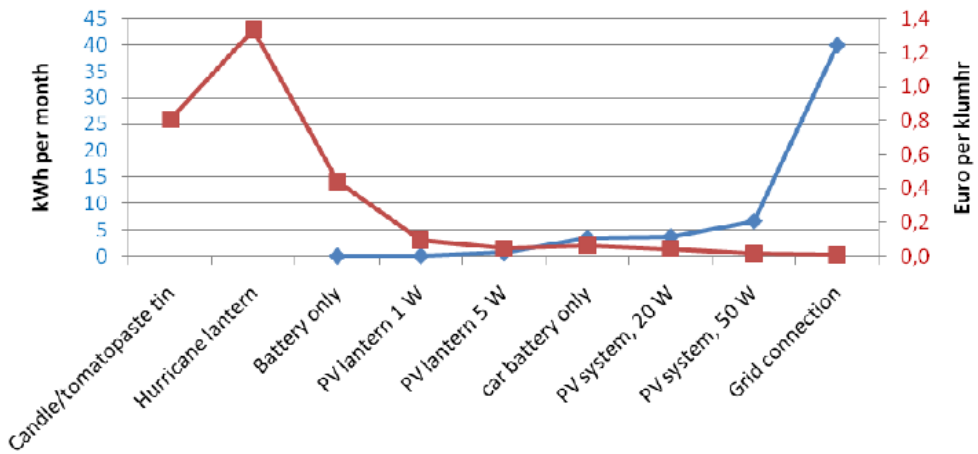
Similar projects in the PICs

Cost Of Lighting-Poor pay more

Investments and kWh costs



Cost of Lighting (Euro/klmh) and kWh Usage



Source ; EnDev

LED Lighting CDM project

New Methodology , AMS III .AR

Substituting fossil fuel based lighting with LED based lighting.

Can be applied if the batteries are charged :

- by a renewable energy system (solar, wind etc.)
- by a standalone (diesel) system or mini grid
- by a grid connected to regional/national grid

LED Lighting

LED standards

•Minimum lamp life 5,000 hours

•Minimum one year warranty

• Illumination level: Task light –20lux , Ambient light-4 lux @ 1 m

•No more than 5 lamps per house or business

•GHG reduction – less than 60 tonnes CO_2 annually

Baseline Lamp

Should directly consume fossil fuel (e.g. kerosene lamps)

LED lighting

Default annual baseline emission factor

Fuel use rate = 0.025 liter/hour

Utilization rate = 3.5 hours/day

Days/year =365

Fuel emission factor =2.4kgCO_2 per liter.

Leakage

Bagasse based Co-generation

Fiji – 1.5 Million tonnes of bagasse annually

Methodology : ACM 0006 version .04

Grid connected and biomass residue fired electricity generation

The calculation of the emission reductions from the HCM project activity is as follows:

$$ER_y = ER_{heat,y} + ER_{electricity,y} + BE_{biomass,y} - PE_y - L_y$$

where:

ER_y	are the emissions reductions of the project activity during the year y in tons of CO_2,
$ER_{heat,y}$	are the emission reductions due to displacement of heat during the year y in tons of CO_2,
$ER_{electricity,y}$	are the emission reductions due to displacement of electricity during the year y in tons of CO_2,
$BE_{biomass,y}$	are the baseline emissions due to natural decay or burning of anthropogenic sources of biomass during the year y in tons of CO_2 equivalents,
PE_y	are the project emissions during the year y in tons of CO_2, and
L_y	are the leakage emissions during the year y in tons of CO_2.

8 MW Bagasse Power Project (India)

- Small scale CDM project
- Methodology-AM I.D. Grid connected renewable energy project (Type I)
- Bagasse requirement 81 tonnes/hr
- CERs (7 years) = 152,068

	Without CDM	With CDM
Project IRR	10.54%	16.59%
NPV (USD)	46,872	998,659

Municipal Solid Waste (MSW) Based Power project

Methodology: AMS III. E. and AMS I.D.

Production of electricity using RDF (Refuse Derived Fuel) from the land fill.

RDF in pallet/fluff form

Use in power boilers to generate electricity

Municipal Solid Waste (MSW) Based Power project

Methodology : AMS-III.G., AMS I.D.(<15 MW)

Methane from the Landfill

250 m^3 gas per tonne of waste

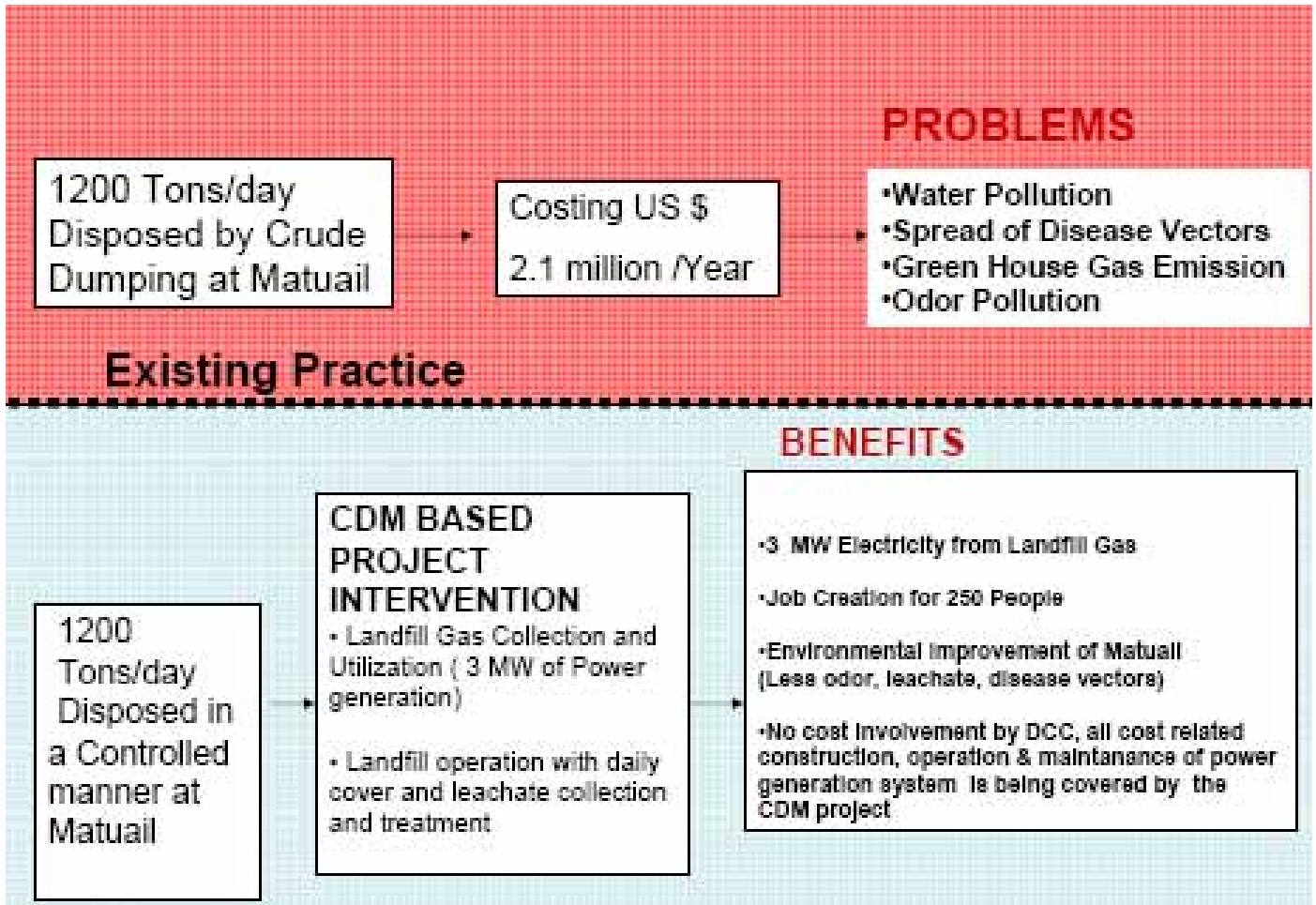
One tonne of waste = Gas production 100 times its volume

Suva: 24,500 tonnes MSW annually

Nadi : 8176 tonnes MSW annually

Lautoka : 17,556 tonnes MSW annually

MSW Power project-Bangladesh



Source:Waste concern

Methane Recovery in Waste Water treatment

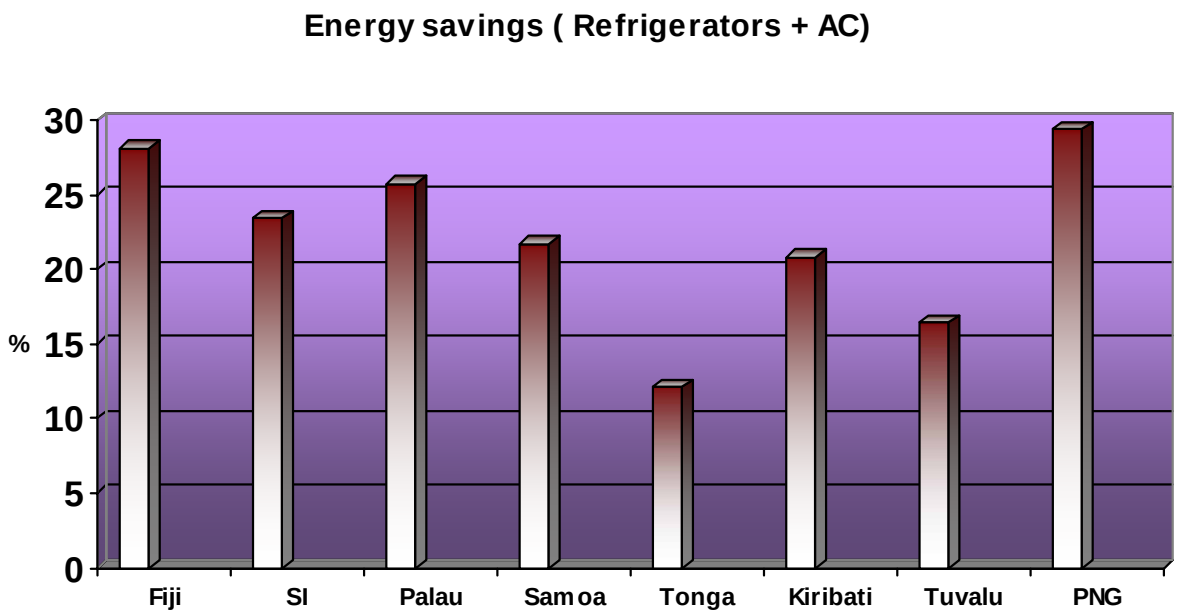
Kinoya STP CDM project

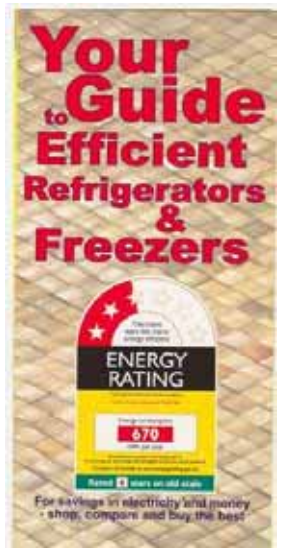
Methane Flaring

Supported ADB APCF

CDM and Energy Efficiency in PICs

Energy Savings With Energy labelling and MEPS





Source: SRCI,1995

Energy savings translate into CERS

Efficient Lighting (CFL)-CDM Project

(Based on a hypothetical one million CFL program)

PROGRAM INFORMATION		
Number of CFLs Installed	Number	1,000,000
Capacity of CFLs	Watts	15
Rated Lifetime of CFLs	Hours	8,000
Capacity of Incand. Replaced	Watts	60
Cost of CFLs	$/CFL	1.00
Cost Charged to Customer	$/CFL	0.00
Distribution Cost	$/CFL	0.20
Program Management Cost	$	100,000
Marketing & Promotion Cost	$	200,000
CDM costs	$	100,000
Daily Usage	Hours/Day	3.5
Power Factor	%	50%
Coincidence factor	%	85%
Net-to-Gross Ratio	%	90%
CUSTOMER BENEFITS AND COSTS		
Annual Energy Savings	GWH/Year	57.5
Total Energy Cost Savings	Million $	44.8
Avoided Costs of Incendescents	Million $	2.1
Total Benefits	Million $	46.8
NPV of Benefits (Economic Analysis)	Million $	32.6
Customer costs	Million $	0.0
NPV of Net benefits	Million $	32.6
Net Benefits - Costs	**Million $**	**32.6**
Benefit/Cost Ratio	**Ratio**	**N/A**

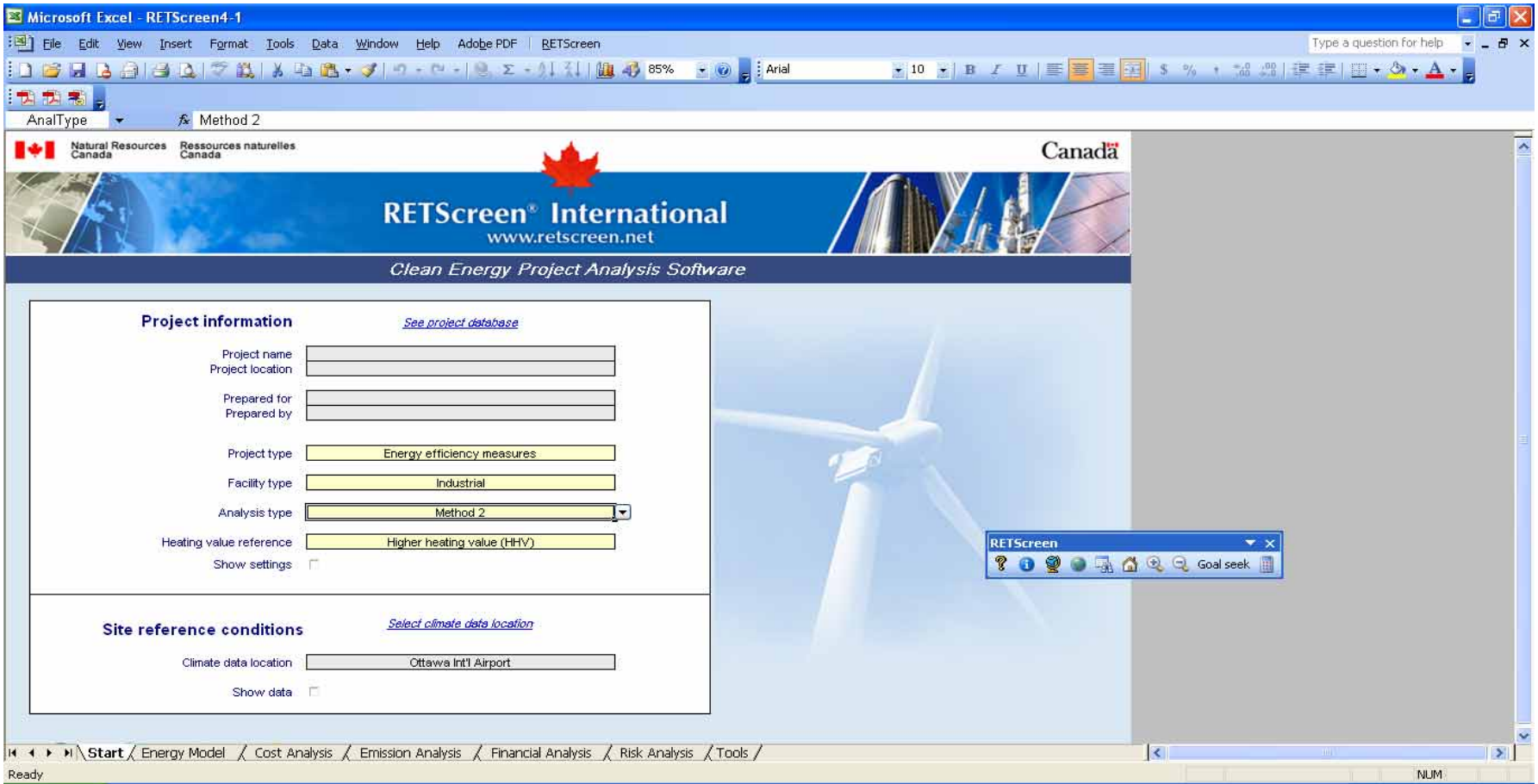
World Bank spreadsheet model

Efficient Lighting (CFL)-CDM Project

UTILITY BENEFITS AND COSTS		
Capacity Savings - Generation Level	MW	38.9
Annual Energy Savings - Utility	GWH/Year	60.5
Avoided capacity Costs	Million $	37.9
Avoided Energy Costs	Million $	31.6
Total Utility Benefits	Million $	69.5
NPV of Benefits (Economic Analysis)	Million $	48.4
Program Costs	Million $	2.0
Revenue Loss	Million $	44.8
Total Costs	Million $	46.8
NPV of Total Costs	Million $	32.9
Net Benefits - Costs	**Million $**	**15.5**
Benefit/Cost Ratio	**Ratio**	**1.5**
NATIONAL BENEFITS AND COSTS		
Avoided capacity Costs	Million $	37.9
Avoided Energy Costs	Million $	31.6
CDM Revenues	Million $	3.2
Total National Benefits	Million $	72.7
NPV of Benefits (Economic Analysis)	Million $	50.6
Total National Costs	Million $	2.0
NPV of Total Costs	Million $	1.7
Net Benefits - Costs	**Million $**	**48.8**
Benefit/Cost Ratio	**Ratio**	**29.5**
GHG Impacts		
Total GHG reductions	Thousand Tons	316.9
Total CDM Revenues	Million $	3.2

World Bank spreadsheet model

RETScreen- A Prefeasibility Tool



Thank You