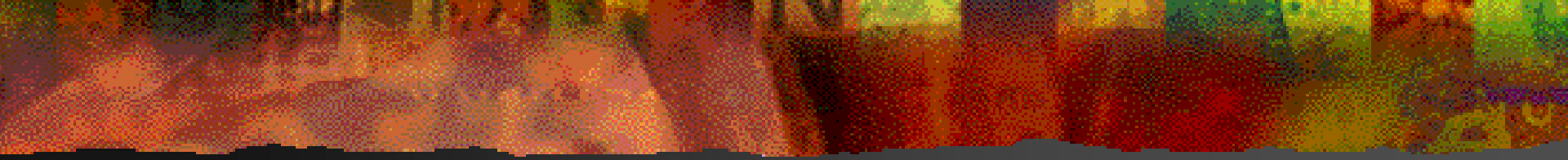

Development and Climate

Twin Challenges for Energy Sectors in Developing Countries

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4éme Forum Européen de l'Energie – Objectif COP21 : Agir efficacement contre le changement climatique
Paris, March 12-13, 2015

Sumary

I – No way to close the gap without net emissions reductions in Developing Countries

II – The mitigation potential do exist in Developping Countries

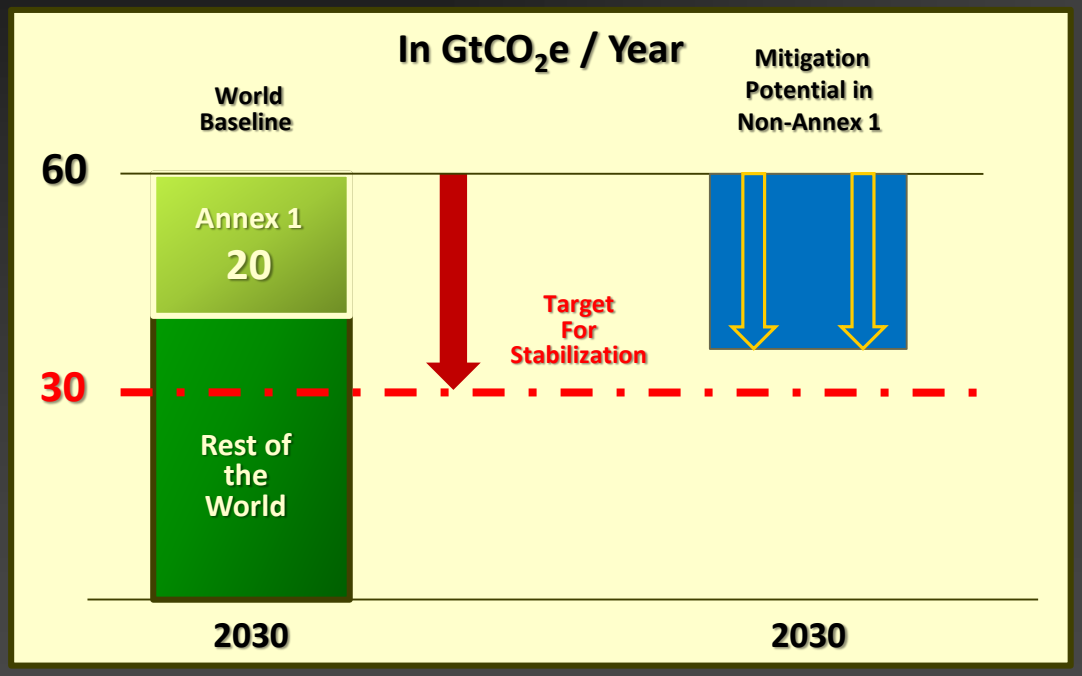
III – Overcoming a series of financing barriers

IV – Creating the proper incentives:

Compatibilize carbon pricing with existing energy policy and development objectives

I – NO WAY TO CLOSE THE GAP WITHOUT NET EMISSIONS REDUCTIONS IN DEVELOPING COUNTRIES

A gap to fill to stabilize concentrations



Potential for mitigation projects in Non-Annex 1 countries is huge

Up to 25Gt CO2e/year

(Sources: UNFCCC, McKinsey, Low-carb Studies, etc.)

Emission Reductions in Annex 1 countries alone will **not be enough** to meet GHG concentration targets *(while their **historical responsibility** remains)*

As a consequence: Emission Reductions brought by Non-Annex 1 countries in the form of **offsets** will **not be enough** either

Scaling up the Emission Reduction effort in Non-Annex 1 **beyond offsets** is **a necessity**

- Reductions in Non-Annex 1 countries require investments, not only soft policies
- Many of these investments enhance development (energy, transport etc.)

Tens of thousands of potential Low-carbon Development projects

II – THE MITIGATION POTENTIAL DO EXIST IN DEVELOPPING COUNTRIES

Check the Potential :
The example of Sub-Saharan Africa

Use the CDM as a lens to track potential low carbon energy projects

How many potential CDM projects in SSA similar to projects developed in other countries with approved methodologies ?

→ *22 types of clean energy projects*

→ *44 countries*

Power Sector

CO_2↗

Power Generation → Transport / Distribution → Consumption/ Use

CDM Projects | CDM Projects | CDM Projects

Generation from Fossil Fuels

- •ACM007, ACM0013
- •AM0052, AM0061 - Addition of 2nd cycle
- •AM0062, AMS-II.B - CHP in industry

Renewable Energy

- •ACM0002, AM0019
- •AM0026, AM0042 - CHP in sugar mills
- •AM0048, AM0015 - Agricultural residue
- •AMS-I.A,D, AM0005 - Forest / wood-process residues
- •AM0032, ACM0004 - Typha australis
- •ACM0012, AM0024 - Jatropha biofuel
- •AMS-III.Q, AM0022 - Hydroelectricity
- Photovoltaics rural areas
- Landfill gas

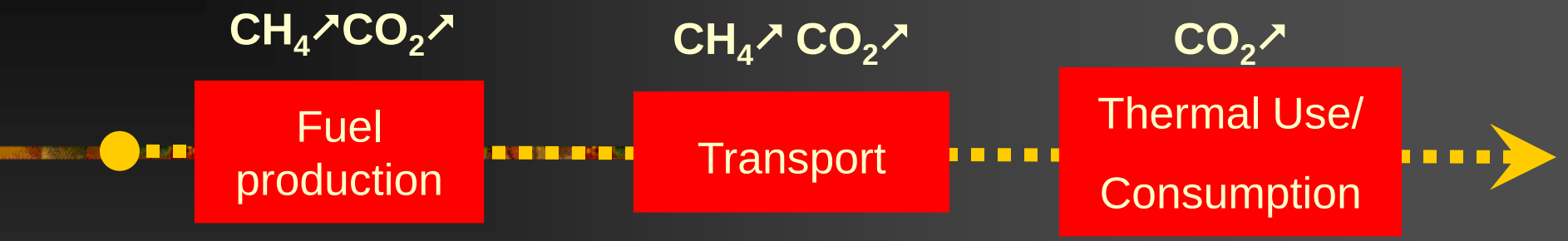
Grid loss reductions

- •AMS-II.A, AM0045

- •AM0020, AM0046 - Switch to compact fluorescent lamps
- •AMS-II.C, AM0044 - Energy-saving household appliances
- •AM0058 - Non-lighting electricity for industry
- •AMS-I.B,C

Nb Proj = 204
CERs = 36 $MtCO_2/y$
Power = 5.9 GW
Inv. Cost = $ 7.1 billion

Fuel for Industry (Coal, Fuel Oil, Gas)



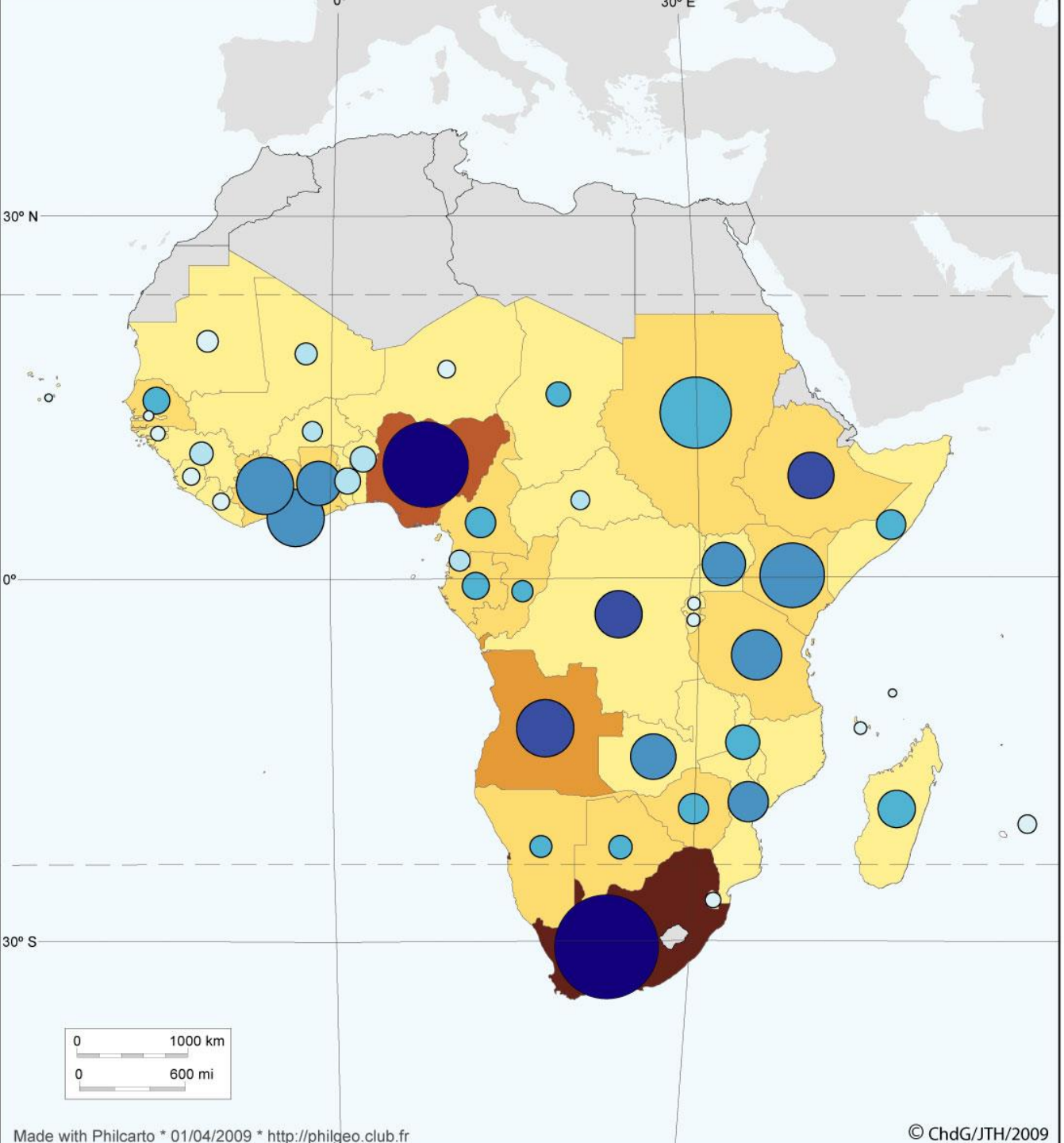
CDM activities | CDM activities | CDM activities

Production
- Flared gas recovery
- Coal mine methane
- Waste gases in crude oil refinery

Thermal Use and Consumption
- Improved steam system
- Reduced clinker use in cement manufacturing

Nb Proj = 46
CERs = 2.8 $MtCO_2$/y
Power = GW
Inv. Cost = $ 0.1 billion

Nb Proj = 26
CERs = 4.3 $MtCO_2$/y
Power = 0.7 GW
Inv. Cost = $ 0.9 billion



SUB-SAHARAN AFRICA

CO2 Emissions and Number of Low Carbon Energy Projects

Potential of Emission Reductions in % of Region Emissions (2005)

30
10
5
2
1
0.5
0

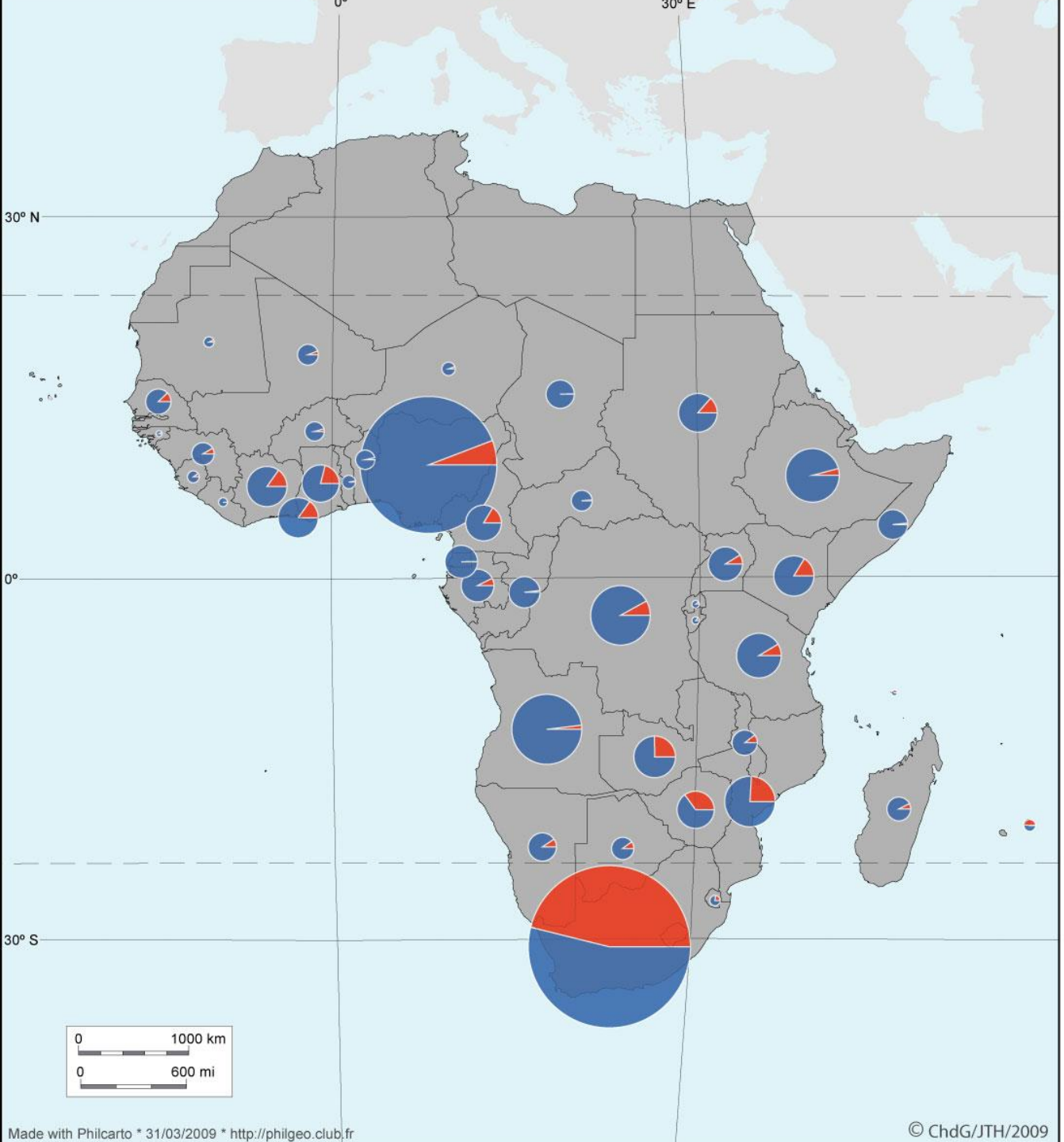
Country CO2 Emission in % of Region Emission

65
30
15
3
0.5
0

Projects number

834	South Africa
563	Nigeria
251	Côte d'Ivoire
90	Malawi
33	Equatorial Guinea
4	Cape Verde

Data: Low-carbon Energy Projects For Development In Sub-Saharan Africa. The World Bank, 2008.



SUB-SAHARAN AFRICA

Potential for Clean Electricity Generation

Total count (GWh)

493.452 South Africa

349.387 Nigeria

93.115 Angola

28.770 Sudan

12.272 Malawi

111 Cape Verde

Potencial for Clean Electricity Generation

Annual electricity generation of the country in GWh (base 2003)

Data: Low-carbon Energy Projects For Development In Sub-Saharan Africa. The World Bank, 2008.

Technical Potential of Low Carbon Energy Projects in SSA

(available for each of the 44 countries considered – see attached CD)

Number of Potential Projects	2,866	**3,227**
Number PoAs	361	
Potential GHG reductions	740 MtCO2 /year	
Percent of the countries emissions	***109 %***	
Value of the GHG reductions over crediting period *(10 or 21 years, base 10 US$/tCO2)*	$ 97.8 billion	
Potential of additional electricity generation	1,244 TWh/year	
Percent of actual generation	***380 %***	
Potential of additional power generation capacity	155 GW	
Percent of installed capacity	***225 %***	
Investment cost *(only for projects for which cost data is available)*	$ 157,6 billion	

Huge potential for future energy development at zero additional emissions

Example Brazil: Fossil Fuels for Industry

Fuel production → Transport → Thermal Use/ Consumption

Fuel production		BR.	World
	Flaring, recovery of flared	0	20
AM0009*	Recovery of flared gas fro	0	17
AM0037*	Flare reduction and gas uti	0	3
AMS-III.K*	CH4 from charcoal avoide	0	0
	EE refineries (FO)	0	0
AM0055*	Recovery and utilization of	0	0
AMS-III.P*	Waste gas recovery and ut	0	0
	CMM destruction (coal)	0	26
ACM0008*	CBM CMM to flaring or he	0	26

Transport/Distribution		BR.	World
	EE in fuel transport	0	0
AM0053*	Biogenic CH4 injection to g	0	0
	Reduction of pipeline leak	0	0
AM0023*	Leak reduction from natura	0	0
AM0043*	Leak reduction by pipe rep	0	0

Consumption/Use		BR.	World
	Fuel switch	17	168
AM0049*	Gas-based elec. Generatio	0	0
AMS-III.B*	Swithcing fossil fuels	7	37
AM0007*	Cogen offseason switch fr	0	0
AMS-II.D*	EE and fuel switch measur	1	99
ACM0009*	Fuel witch coal/oil to gas	2	11
AM0036*	fuel switch fossil to biomas	1	4
AM0008*	Ind. Fuel switch - CONSOLI	6	17
	EE (steam traps, etc.)	2	216
ACM0012*	Waste heat/gas/pressure C	1	15
AMS-III.M*	Reduced elec. Consumptio	0	2
AM0032*	Waste gas/heat to power C	0	2
ACM0004*	Waste gas/heat to power g	1	181
AM0017*	Steam traps	0	0
AM0018*	Steam optimization system	0	15
AM0038*	Electric arc furnace EE	0	1
AM0054*	Boiler improv. Oil/water en	0	0
AM0056*	Fossil fue-fired steam boile	0	0
AM0060*	Replac. By EE chillers	0	0

88% of available CDM methodologies

UNUSED in Brazil (as of the date of beginning of the project)

Fossil Fuels for Industry Use(cont.)

Elo 1 - Produção	Elo 2 - Distribuição/ transporte	Elo 3 - Consumo/Uso Térmico
Número de Sites Identificados	Número de Sites Identificados	Número de Sites Identificados
52	2	449
Potencial de Redução de Emissões em 10 anos ($MtCO_2e$)	Potencial de Redução de Emissões em 10 anos ($MtCO_2e$)	Potencial de Redução de Emissões em 10 anos ($MtCO_2e$)
20	0,2	141

Example: Fuel-switch from Fossil to Biomass: Pulp and Paper Industry

Description	Value	Unit
Annual Emissions Reductions	635.539	tCO_2e / year
Number of Projects	122	projects
Potential Carbon Revenue (CER at US$ 5)	3.177.695	US$/year
Investment Cost	48.030.976	US$

Brazil: Synthesis of Results per Sectors

Number of Projects pre-identified : 18,480 : 2/3 green field and 1/3 incremental projects on existing installations

- Fossil Fuels for Industry: 2.204 projects/sites
- Other Industry Inputs: 706 projects/sites
- Transportation (Vehicular Fuels): 344 projects/sites
- Waste Management : 3.124 projects/sites (10 GW)
- Electricity: 12.102 projects/sites (452 GW)

Synthesis:

- Over 18.000 potential mitigation projects and sites
- Great potential for PoA
- Potential GHG Emissions Reductions : 450 MtCO2e/year
- Corresponding investment need: US$ 1,284 + billion (annual investment in Brazil is $225 billion)
- Potential revenue from CER sales in 10 years : US$ 45.604 billion

III – OVERCOMING A SERIES OF FINANCING BARRIERS

- A Low Carbon Development Facility (LCDF) to leverage international financial markets

- Addressing the too limited capacity of industry to take additional debt

Low Carbon Development Facility - LCDF

A Need for a New Financing Mechanism to support Emission Reduction investments

PROBLEM:
Bottleneck
Limited access to financing

PROPOSAL:
Create a Low-Carbon Development Facility (LCDF) to provide financing

Many clean infrastructure projects cannot achieve financial closure
(lack of liquidity, too short maturity, risk adversity, etc.)

Even if eligible to sale carbon credits
(as evidenced by CDM pipeline)

To scale-up financing by tapping on large international capital markets pools
(pension funds, insurance funds, sovereign funds, etc.)

To unlock economically viable low-carbon development projects
(energy projects, transport project, industrial projects, etc. that generate commercial revenues)

To harvest the large mitigation potential

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LCDF PRINCIPLES

- Initial LCDF Capital sized to sustain AAA rating while …
- …raising large volumes of resources from financial markets through AAA rated bonds…
- …to provide cheap AAA-conditions financing to low-carbon investments, which ratings are far lower *(ranging from C to AA)*

THE WORLD BANK

Low Carbon Development Facility: facts and perspective

LCDF finances an abatement capacity of circa 10 GtCO2eq per year in 2030
(increases progressively)

$100Bn international annual financing brought through LCDF
compares to FDI flows of $600Bn/year and ODA of $75Bn/year

Initial capital of $68Bn by Annex 1 to sustain the AAA rating
by weathering default on loans in 99.9996% of cases

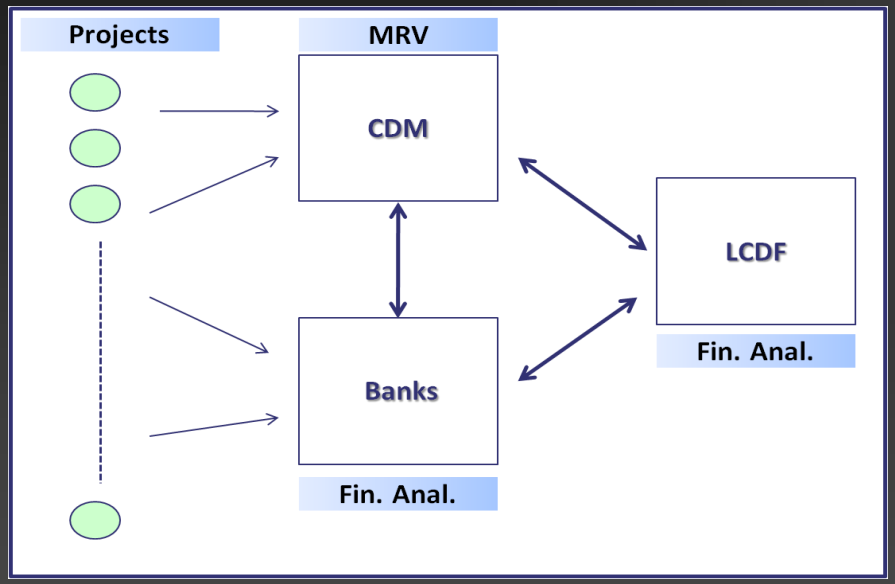
Concessional rate of Libor + 10bp on 2/3rd of financing;
a BBB emerging government borrows at Libor + 300bp

Average financial cost of the abatement effort "seen" by Annex 1 countries of $1.1/$tCO_2e

Private and public banks bring their loan screening, origination and financial analysis in a public-private partnership with LCDF

Low Carbon Development Facility: facts and perspective

Origination and Monitoring/Reporting/Verification of the Environmental Performance



Environmental Performance & MRV

The LCDF can use the MRV system of the CDM, seen as a public "Methodology Asset" (*In the context of an enhanced CDM).* Also Voluntary Standards methodologies can be used for activities not covered by CDM

Loan interest rate to *increase* for projects failing to perform or to comply with MRV.

Worldwide Projects Screening and Loan Origination

Available studies show that the potential number of projects is huge *(Low Carbon studies, Africa Study)*

Private banks would work as partners with the LCDF: *Bring their screening and loan origination capacity to increase LCDF regional penetration and world scope*

Other entities (ESCOs, etc.) can originate projects.

Voluntary Standards can also work as channels to identify projects

Limited access to finance is not only a question of financing availability

It is also q question of ability to take the financing available

Example: Untapped energy efficiency potential in the Industry in Brazil

Financing is available (BNDES- PROESCO)

- *But no debt space left on industry balance sheet*
- *World Bank is working with National Confederation of Industry (CNI) on a Special Purpose Vehicle (Sociedad de Serviços Energeticos – SEE)*
- *SEE will take the debt, install energy efficient equipment, retain ownership, charge take or pay for installed capacity (ex: air compressor)*

→ Convert CAPEX (constrained) into OPEX

IV – CREATING THE PROPER INCENTIVES:

Compatibilize carbon pricing with existing energy policy and development objectives

Create the proper incentives

Besides unlocking financing for low-carbon investment, create incentive :

- *Either command and control (standards, etc.)*
- *Or price signal: Carbon Pricing*

Interfacing Carbon Pricing and Energy Policies

From theory perspective: a no-brainer

Price eleasticities: an easy concept for modeling impact of carbon pricing on demand to reduce emissions

However, what response can we expect from investor when oil prices are so volatile ?

- from $ 35 to $ 145 / barrel over last 7 years
- corresponding carbon shadow price: from $80 to $335 / tCO2

→ *Far larger than possible carbon price in developing countries*

In addition: investors are adverse to uncertainty

Ideally: energy prices should be stabilized and then add a carbon price

→ Is this compatible with current cruzade against fossil fuels subsidies ?
(without denying how harmful such subsidies can be...)

Carbon pricing does not come into an empty space

In Brazil: 14 different levies and charges in electricity prices

Energy pricing and regulations are not all illegitimate

The reflect – poorly or efficiently – energy policy objectives

Ignoring them can lead to undesirable unexpected effects:

Example: windfall profits by power companies during first EU ETS phase

Still Many development objectives in energy policies and pricing in developing countries

- *Supply security, reliability, energy independence*
- *Affordability, consumers protection, reditributive objectives*
- *Competiveness, industrial policies, macro-economic objectives*
- *Rural and regional equity, etc.*

→ Developping Countries face different challenges than OECD

Growth, vulnerability to schocks, social development, etc...

Distinguish instruments from policy objectives

Too much dogmatic focus on "good" or "bad" instruments
Risk of throwing the baby while removing "bad instrument" or unexpected effects of blind application of "good instrument"

However, instruments can be changed, adapted creatively to to combine "new" GHG mitigation objective with "old" but still relevant energy policy objectives

Example California :

Utilities receive free allowances

But are required to auction them and rebuy it

→ Reveal the cost of the allowances to be passed through

All auction proceeds have to be paid back by utilities to customers through flat "climate credits" ($35/semester in 2014)

More than offset price increase to low-income households