



Implementing Black Carbon and Tropospheric Ozone Abatement Measures

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Main Messages of the UNEP/WMO Assessment



SLCF Abatement:

- Slow the rate of climate change
- Slow warming and melting in the Arctic, the Himalayas and other glaciated regions helping avoid irreversible, non-linear changes
- Provide major health and food security benefits

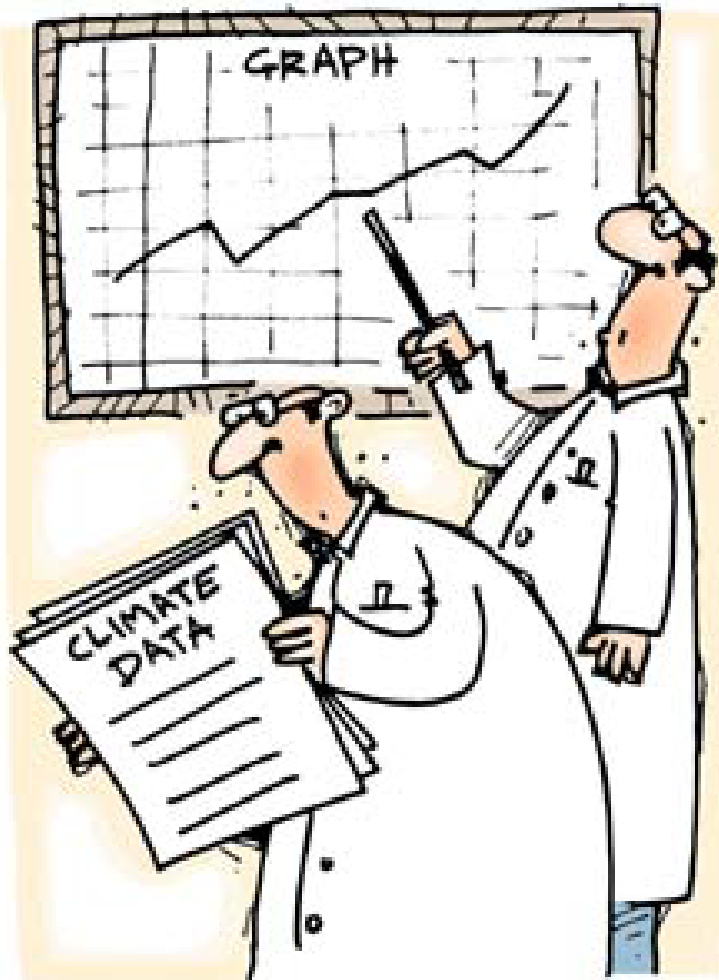


Main Messages

- A small number of emission reduction measures – using existing technologies – could immediately begin to protect climate, public health, water and food security, and ecosystems.
- These emission reduction measures are all:
 - ✓ in use in different regions around the world
 - ✓ to achieve a variety of health, environment and development objectives.



ASSESSING THE IMPACT OF CLIMATE CHANGE ...



THE SCIENTISTS



THE POLITICIANS

MARKINKT

Main Messages of the UNEP/WMO Assessment



- **Much wider and more rapid implementation is required to achieve the full benefits identified in this Assessment.**

Overview



- **Examples of successful black carbon and methane (TO precursor) mitigation programs**
 - ✓ **How can recognition and accounting of multiple co-benefits – near-term climate, health and food security – help increase implementation?**

- **Opportunities for BC and TO mitigation action in the United States**

Black Carbon Abatement Measures

1. Diesel: Particle Filters and Retirement of high emitting vehicles
2. Cookstoves
3. Residential heating with biomass and coal
4. Brick Kilns
5. Agricultural Crop Residue burning



Diesel Particle Filters

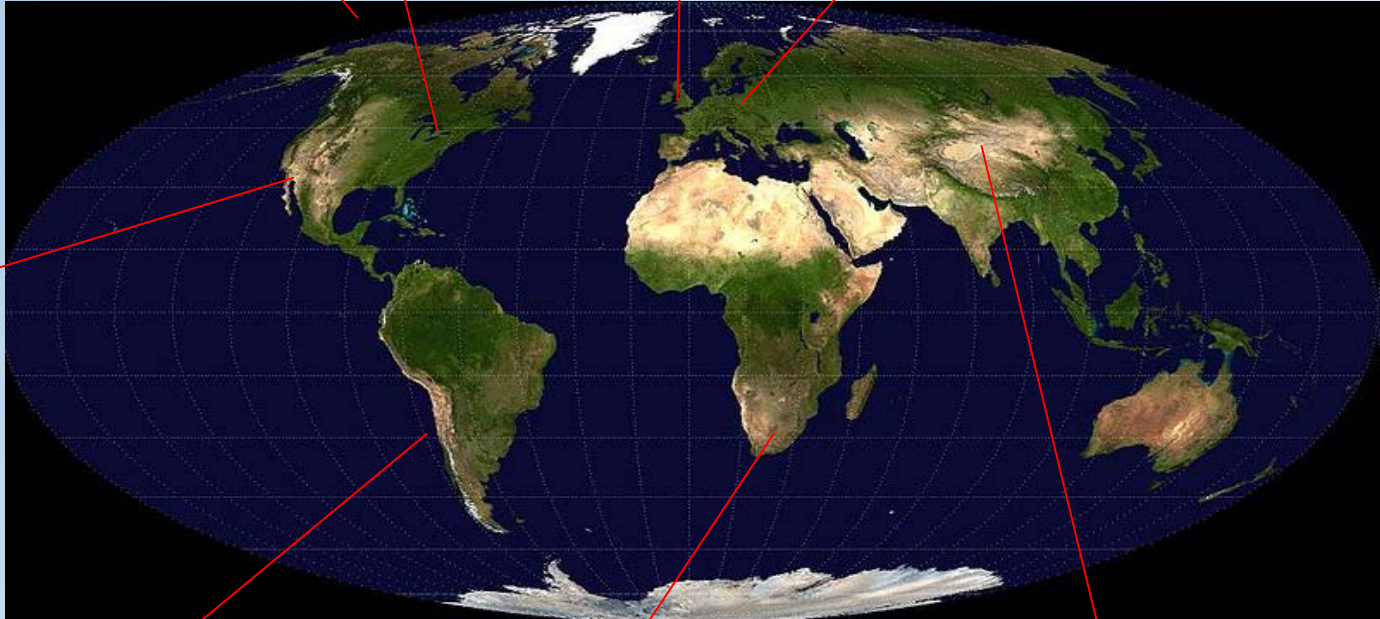
US Diesel Rules – Clean Air Act

New York City Municipal Law 77

London – DPFs fitted on city bus fleet

Europe – Low Emissions Zones in Berlin, London, Gothenburg, Milan and other cities

California – Heavy Duty Truck Rule (1987); AB32/GW Solutions Act



Santiago de Chile – DPF for municipal bus fleet

Johannesburg -- Bus Rapid Transit with Euro IV Diesel Engines

China – Vehicle labeling and scrappage program



United States Clean Air Act



Off-Road Diesel Rule & Clean Air Highway Diesel Rule

- Requires DPFs on new vehicles – 90% BC reduction
- But fleet turn over slowed with recession

New York City Municipal Law 77 (2003)



**City owned and contracted equipment must have
DPRs.**

**“The Council finds that air quality is a concern in
all parts of New York City, and well as in Lower
Manhattan, particularly since the City suffers
from some of the highest asthma rates in the
country.”**





Municipal Buses retrofitted with DPF – Santiago de Chile



SOOT FREE FOR THE
CLIMATE

Berlin Low Emission Zone (LEZ) – Creating Incentive to retrofit: Vehicle Labeling



sticker:			
minimum criteria for Diesel vehicles	Euro 2, or Euro 1 plus particle filter	Euro 3, or Euro 2 plus particle filter	Euro 4, Euro 3 plus particle filter
ban for Diesel veh. older than ...	1992	1996	2000
minimum criteria for petrol cars			Euro 1 plus catalytic converter

London Low Emission Zone



China: Vehicle Labeling and Scrappage – Cash incentives to scrap old high emitting diesel vehicles



China's green and yellow vehicle labels

Johannesburg, South Africa: Bus Rapid Transit (BRT) system



Euro IV
Standards -
with Diesel
Particulate
Filters



Credits: <http://busnews.blogspot.com/2009/05/bus-rapid-transit-south-africa-for.html>; <http://www.reavaya.org.za/welcome>

Other Diesel BC abatement approaches



Electric Vehicles

Switzerland – diesel tax policy

Jakarta - Bus Rapid Transit system – fuel switching to CNG



Guangzhou Bus Rapid Transit

Mexico City – Metrobus Bus Rapid Transit System

Bogota – TransMilenio Bus Rapid Transit System

Delhi – Fuel Switching

Fuel Switching to CNG in Delhi – Buses, Taxis and Rickshaws



A citizen petition on poor air quality spurred the Supreme Court of India to mandate fuel switching for all public transport vehicles

Brick Kiln Modernization Ciudad Juarez, Mexico



- Conventional brick kilns (left) burn waste wood, oil and tires in open-topped kilns
- New kilns (right) use same fuels but filters exhaust into underground channels, reducing emissions by 80%

Improved Cookstoves



Turbococina – used in schools in El Salvador



**Oorja
smokeless
biomass stove -
India**

**HELPS stove
- Guatemala**





GLOBAL ALLIANCE FOR CLEAN COOKSTOVES

LPG Cookstoves – Senegal

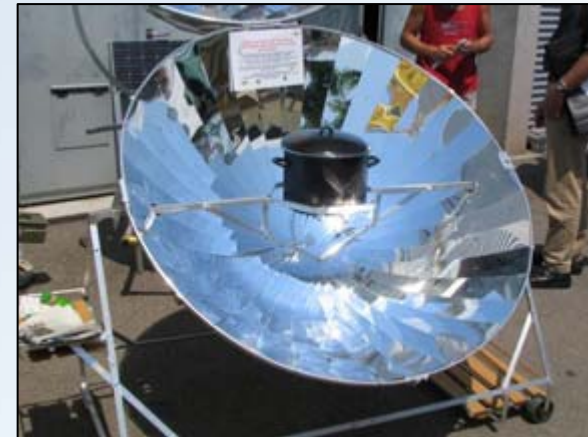


Fuel Switching incentivized with subsidies

Project Surya: India



- Promote culturally acceptable cooking technologies to replace firewood and dung burning with solar for daytime cooking, or biogas for nighttime cooking
- High adoption rates in pilot phase
- Pilot project stoves reduce black carbon by 50-80% compared to mud stoves
- Ongoing outdoor and indoor black carbon monitoring



Reducing Agricultural Crop Residue Burning

Vietnam –

Reducing open burning of rice straw –

promoting economically viable alternatives

Farmers :

- Sell bales for construction material and livestock feed
- Make mulch for vegetables



Methane /TO Abatement



- 1. Coal Mine methane recovery**
- 2. Recovery/venting fugitive emissions from oil & gas production**
- 3. Reduce leakage from long-distance transmission pipelines**
- 4. Landfill gas collection & utilization**
- 5. Wastewater treatment – upgrade to secondary/tertiary with gas recovery**
- 6. Intermittent aeration of flooded rice paddies**
- 7. Livestock manure management**

Coal Mine Methane recovery and power generation

Sihe Mine, Shanxi Province, China



2.5 million metric
tons CO₂eq of
methane
emissions
avoided annually



Methane Recovery and Utilization of Flare Gas from oil production Kumchai oil field, Oil India Ltd



Reducing gas leakage from Long-Distance Transmission Pipelines



Methane to Markets



Natural Gas
EPA POLLUTION PREVENTER

Natural Gas STAR International

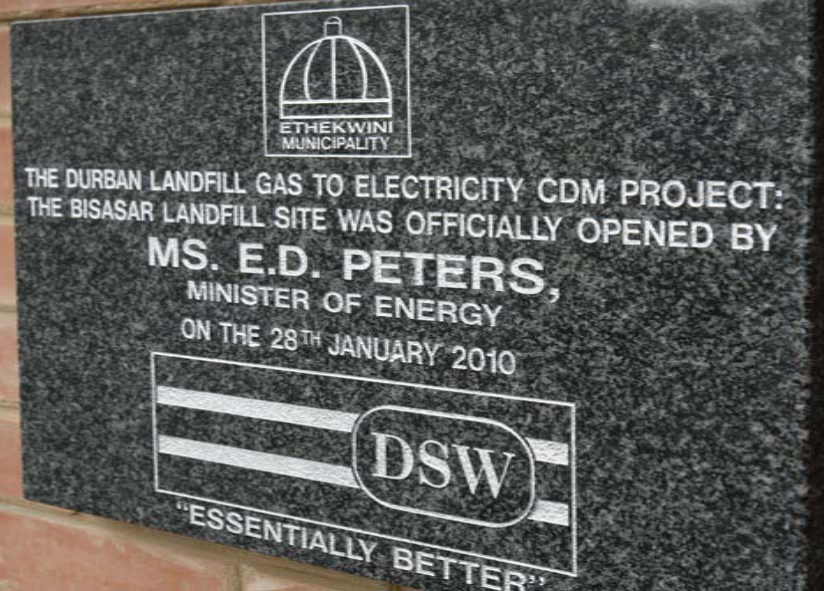
**Reducing Emissions
Increasing Efficiency
Maximizing Profits**

Last Updated: October, 2010

Monterrey, Mexico Taps Methane Landfill Biogas Energy to Power its Metro System and city lights



**Since 2003
1.7 million tons
CO₂ eq
of methane release
avoided**



Durban, South Africa – Landfill Gas to Electricity Project

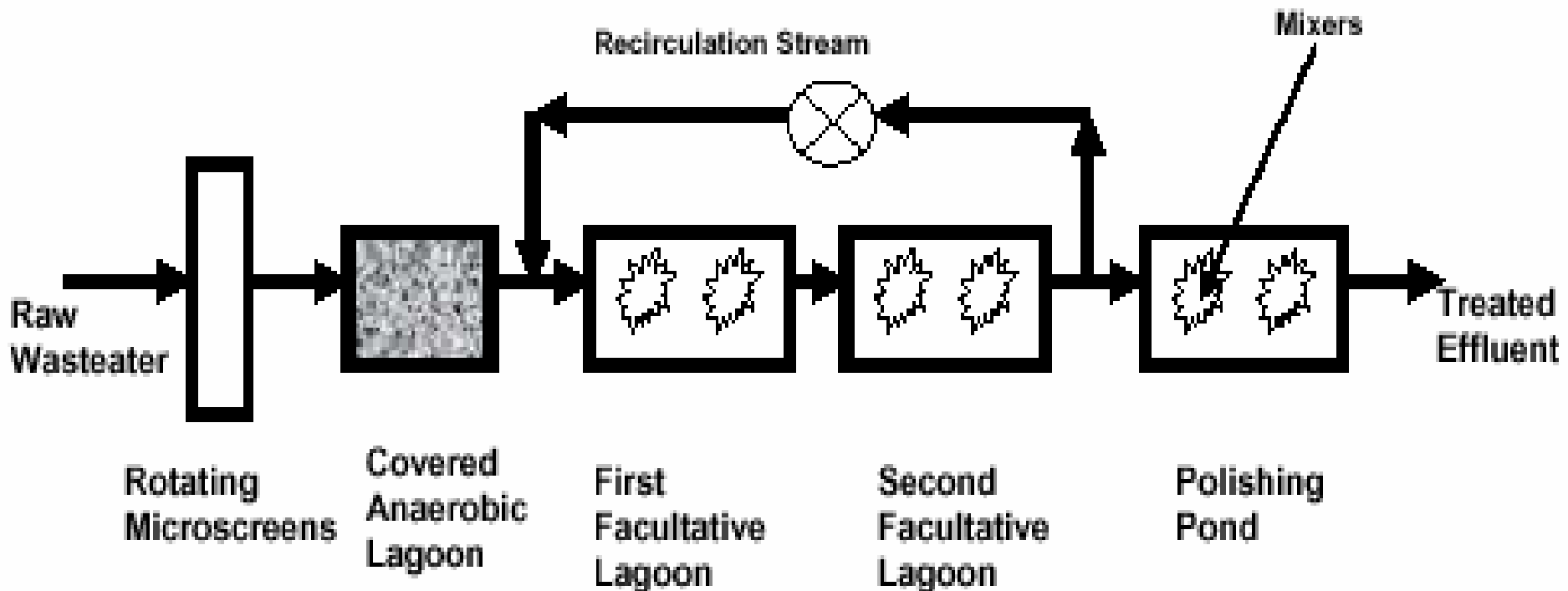
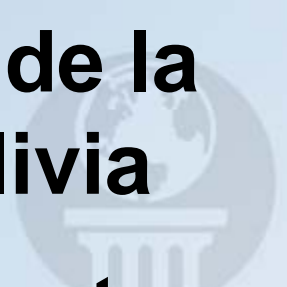
**CDM project
Avoided methane
emissions = to
68,833 metric tons
CO₂eq/year**





Santa Cruz de la Sierra, Bolivia

Wastewater Treatment Methane Capture Project





Aeration – mid season drainage – of continuously flooded rice paddies





Granja Becker, Minas Gerais Brazil Clean Development Mechanism Project



Pre-project Activity Condition:
Open Air Lagoon



Project Activity Condition:
Anaerobic Digester with Flare



Minimum Configuration - Open Lagoon to Ambient Temperature Anaerobic Digester with Flare



Opportunities for Black Carbon, Ozone and Methane abatement in the United States

- **Clean Air Act**
 - **NAAQS for PM 2.5**
 - **NAAQS for Ozone**
 - **New Source Performance Standards**



CLIMATE SUMMIT

WHAT IF IT'S A BIG HOAX AND WE CREATE A BETTER WORLD FOR NOTHING?

- ENERGY INDEPENDENCE
- PRESERVE RAINFORESTS
- SUSTAINABILITY
- GREEN JOBS
- LIVABLE CITIES
- RENEWABLES
- CLEAN WATER, AIR
- HEALTHY CHILDREN
- ETC. ETC.



11/19 USA TODAY
JEN RITT



Air Quality concerns

Senator James Inhofe (R-OK)



- **Global Warming – “the greatest hoax ever perpetrated”**
- **Diesel Emissions Reduction Act (DERA) co-sponsor**





Clean Air Act – Upcoming Rule-Making

Opportunities for SLCF abatement

- **National Ambient Air Quality Standard (NAAQS)
for Ozone and PM2.5**
- **New Source Performance Standards
(NSPS) oil and gas production,
transmission and distribution – ozone
precursors (VOC & NOx) & methane**



Arctic Haze

Credit: National Oceanic and Atmospheric Administration



**Born Under The
Clean Air Act**



American Lung Association