DMRC

CLEAN DEVELOPMENT MECHANISM

AND

DELHI METRO RAIL CORPORATION

- S A VERMA
DY. CHIEF ENGINEER

WORK SHOP ON CDM- "SUBSIDY TO FOSSILS OR LEAPFROG TO TECHNOLOGY"
CENTRE FOR SCIENCE AND ENVIRONMENT
NEW DELHI

NOVEMBER 17,2011

CDM in Numbers

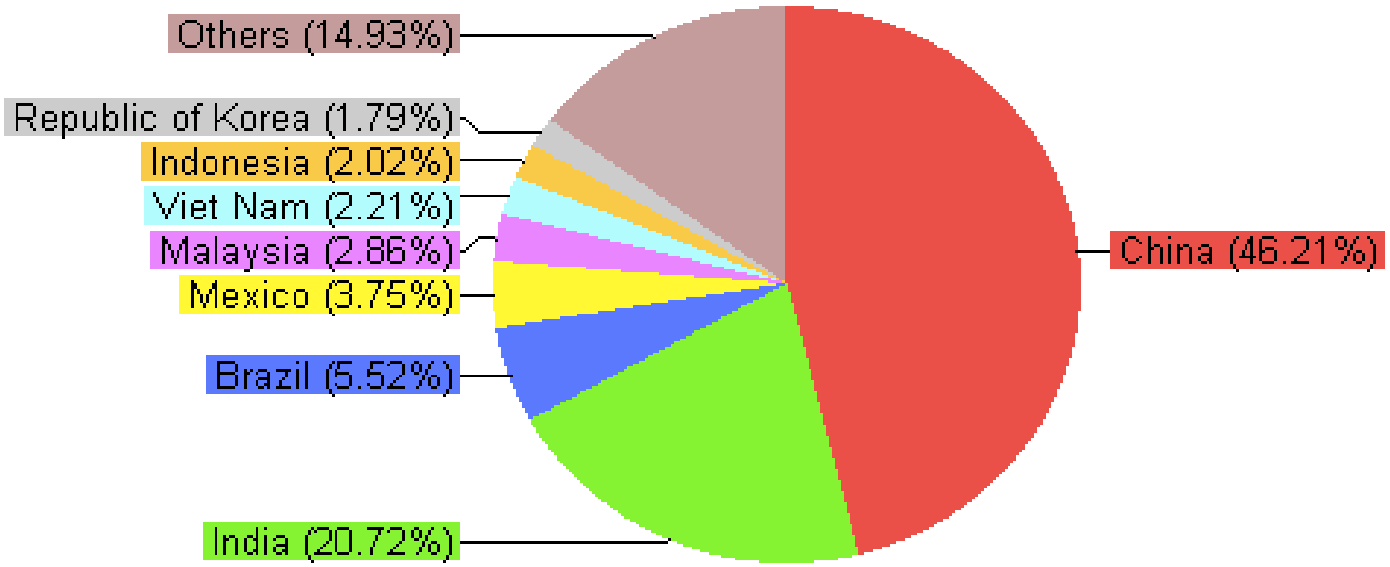
- CDM Projects in pipe line : 5600
- Registered Projects : 3571

  Annual Average CERs : 536,796,574

- Requesting Registration : 69

  Annual Average CERs : 6747,942

Registered Projects-3571



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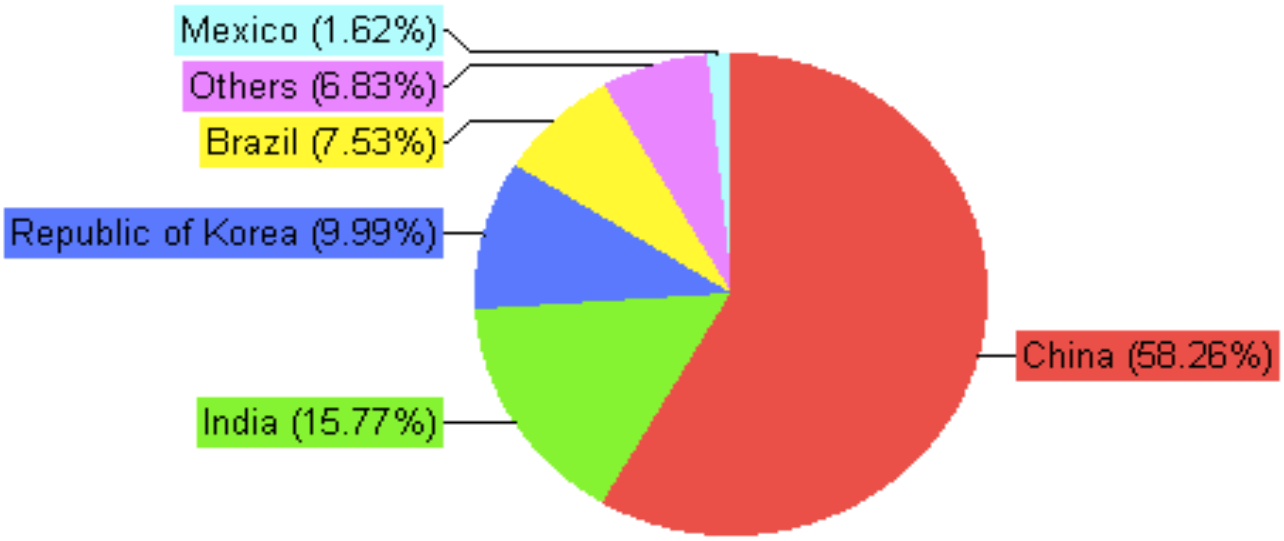
Major Players-CERs

CERs issued by host party. Total 774,737,324



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DMRC & CDM

Two projects registered with UNFCCC so far:

(i) Project Code-1351: “Emission Reduction by Low GHG emitting vehicles” (also called regenerative braking project) registered on 29.12.2007

.....contd.

(ii) Project Code - 4463 : “Metro Delhi, India” (also called Modal Shift project) registered on 30.06.2011

GHG and Transportation

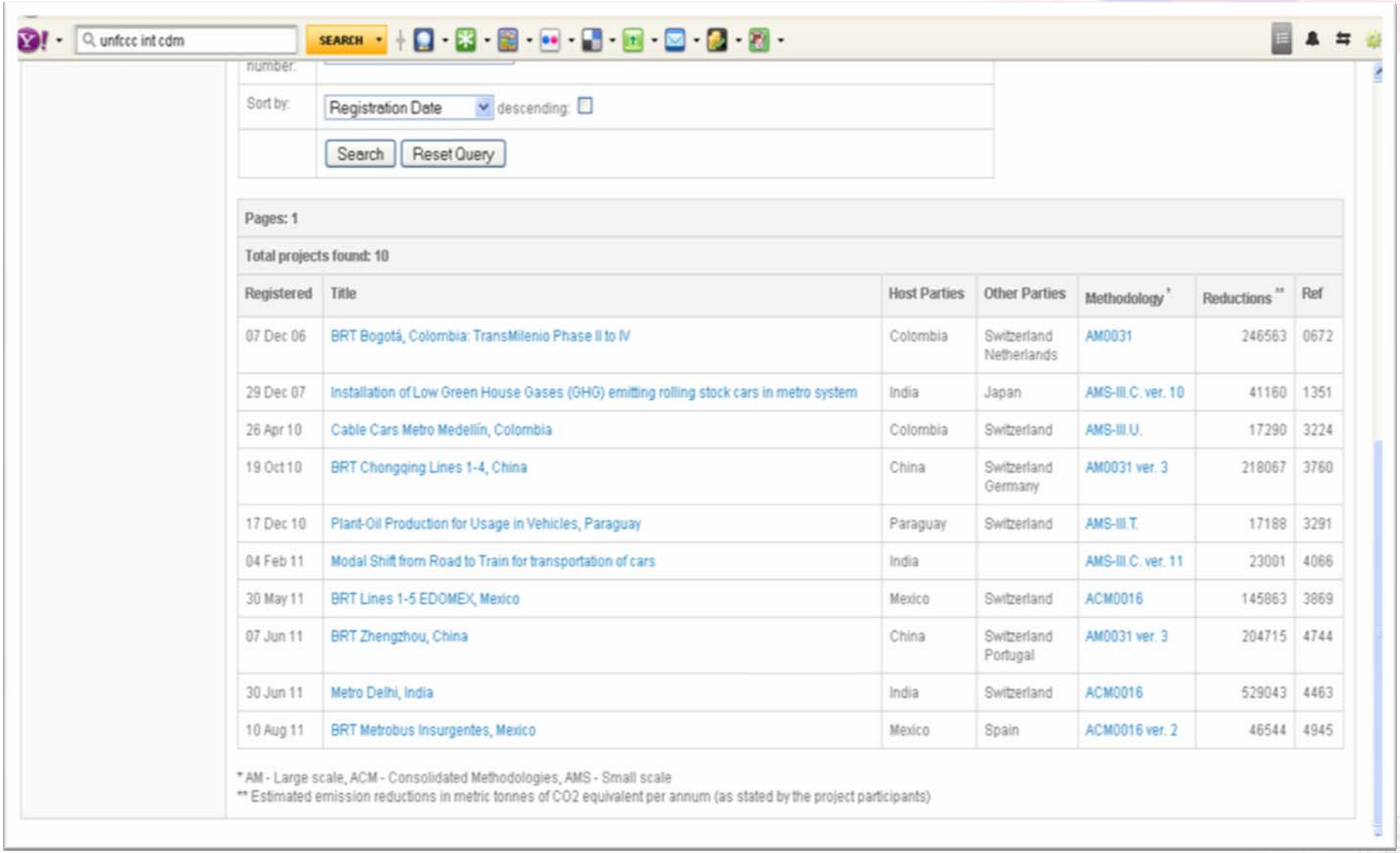
- Transportation sector is responsible for nearly 24% of CO_2 emissions
- Fastest growing source of GHG Emissions
- Contributes equally to polln, congestion, accidents, adverse health etc.

CDM and Transportation

- Of 3571 projects registered, very few in transportation sector – just 10

- Only few projects involving Public Transport

Registered CDM Projects-Transportation



unfccc int cdm SEARCH

number:

Sort by: Registration Date descending:

Search Reset Query

Pages: 1

Total projects found: 10

Registered	Title	Host Parties	Other Parties	Methodology *	Reductions **	Ref
07 Dec 06	BRT Bogotá, Colombia: TransMilenio Phase II to IV	Colombia	Switzerland Netherlands	AM0031	246563	0672
29 Dec 07	Installation of Low Green House Gases (GHG) emitting rolling stock cars in metro system	India	Japan	AMS-III.C. ver. 10	41160	1351
26 Apr 10	Cable Cars Metro Medellín, Colombia	Colombia	Switzerland	AMS-III.U.	17290	3224
19 Oct 10	BRT Chongqing Lines 1-4, China	China	Switzerland Germany	AM0031 ver. 3	218067	3760
17 Dec 10	Plant-Oil Production for Usage in Vehicles, Paraguay	Paraguay	Switzerland	AMS-III.T.	17188	3291
04 Feb 11	Modal Shift from Road to Train for transportation of cars	India		AMS-III.C. ver. 11	23001	4066
30 May 11	BRT Lines 1-5 EDOMEX, Mexico	Mexico	Switzerland	ACM0016	145863	3869
07 Jun 11	BRT Zhengzhou, China	China	Switzerland Portugal	AM0031 ver. 3	204715	4744
30 Jun 11	Metro Delhi, India	India	Switzerland	ACM0016	529043	4463
10 Aug 11	BRT Metrobus Insurgentes, Mexico	Mexico	Spain	ACM0016 ver. 2	46544	4945

* AM - Large scale, ACM - Consolidated Methodologies, AMS - Small scale

** Estimated emission reductions in metric tonnes of CO_2 equivalent per annum (as stated by the project participants)

CDM and Transportation

- BRT : 5
- Cable Car : 1
- Metro/Railway : 2
- Fuel Switch :1
- Commercial Transport : 1

WHY ???

Hurdles / Difficulties

- Methodologies in transport are complex
- Monitoring in transport can be costly and difficult
- Establishing baseline is costly as additional studies are required
- Additionality
- Foolproof documentary evidence of GHG reduction
- Little familiarity / acceptance of CDM as a concept

Transportation Sector
DMRC Projects

- ✓ No previous Methodology available for modal shift
- ✓ Two methodologies proposed earlier were rejected
- ✓ Survey subjectivity, huge sample size
- ✓ Only a few Consultants available

DMRC CDM Projects

Two in number.

Should be viewed against the above challenges.

(i)“Installation of low GHG emitting rolling stock in metro system”

(ii) “Metro Delhi, India”

DMRC's First CDM Project

"INSTALLATION OF LOW GHG EMITTING

ROLLING STOCK IN METRO SYSTEM"

Methodology Applicable

Title : “Emission Reduction by Low GHG emitting vehicles”.

UNFCCC Reference: AMS IIIC

Project No. : 1351

Registration : 29.12.2007

Salient Feature

- The Regenerative Braking Technology employed in DMRC is different from the prevalent system adopted by the other metro system in the country which uses conventional electro-dynamic Rheostatic Braking system.
- The project activity replaces conventional electro dynamic rheostatic braking technology in other metros with regenerative braking technology fitted Rolling Stock.

Basic Principle

- In conventional system, braking converts the kinetic energy of decelerating Rolling Stock into the thermal energy which is dissipated as heat.

- In Regenerative technology the kinetic energy while braking is converted to electrical energy by the same traction motor which acts as a generator while braking.

.....contd

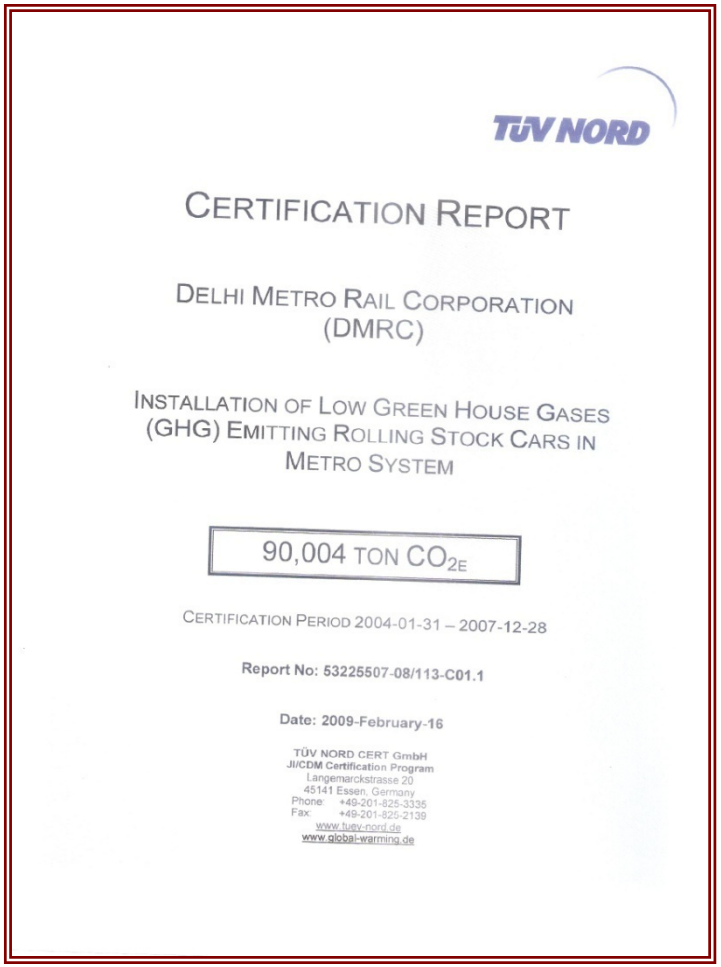
- The regenerative electrical energy is used by other Rolling Stocks in the line operating in power mode.

- This reduces consumption of net grid electrical energy required by the powering trains thereby conserving electrical energy and GHG emission reduction.

Emission Reduction

Years	Emission reduction (tCO_{2e})
2007-2008	41,160
2008-2009	41,160
2009-2010	41,160
2010-2011	41,160
2011-2012	41,160
2012-2013	41,160
2013-2014	41,160
2014-2015	41,160
2015-2016	41,160
2016-2017	41,160
Total estimated Reductions (tonnes of CO_{2e})	411,600

VER Certificate



TÜV NORD

CERTIFICATION REPORT

DELHI METRO RAIL CORPORATION (DMRC)

INSTALLATION OF LOW GREEN HOUSE GASES (GHG) EMITTING ROLLING STOCK CARS IN METRO SYSTEM

90,004 TON CO_{2E}

CERTIFICATION PERIOD 2004-01-31 – 2007-12-28

Report No: 53225507-08/113-C01.1

Date: 2009-February-16

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CERTIFICATION REPORT: INSTALLATION OF LOW GREEN HOUSE GASES (GHG) EMITTING ROLLING STOCK CARS IN METRO SYSTEM
TÜV NORD JI/CDM Certification Program
P-No.: 53225507-08/113

TÜV NORD

CERTIFICATION STATEMENT

Project Title:	Installation of low Green House Gases (GHG) Emitting Rolling Stock Cars in Metro System
Project Participant(s):	Delhi Metro Rail Corporation
Applied Standard:	Voluntary Carbon Standard (version 1)
Monitoring period:	2004-01-01 to 2007-12-28
Type of Verification:	☐ Combined (no separate validation) ☒ Based on validated PDD
CDM PDD:	Registered by CDM EB of UNFCCC (Ref no 1351, PDD version 03 dt. 2007-12-29)
Monitoring report:	Draft version 01 dt. 2008-03-04; final version 02 dt. 2008-12-22
Methodological approach:	☑ Approved CDM Meth; ☐ Combined appr. Meths; ☐ Project specific Meth
Applied methodology(s):	AMS III.C "Emission reduction by low greenhouse gas emitting vehicles" (version 10, 23 December 2008)
Verification Opinion:	The scope of this verification covers the determination of voluntary greenhouse gas emission reductions generated by the above mentioned project. The verification is based on the above mentioned PDD and Monitoring reports, emission reduction calculation spreadsheet and supporting documents made available to the TÜV NORD JI/CDM CP by the project participant.

As a result of the verification, the verifier confirms that:

- The project activity is in line with all applicable criteria of the VCS version 01.
- all operations of the project are implemented and installed as planned and described in the project design document. The monitoring system is in place and functional. The installed equipment essential for generating emission reductions runs reliable and is calibrated appropriately.
- the GHG emission reductions are calculated without material misstatements in a conservative and appropriate manner.

TÜV NORD JI/CDM CP herewith confirms that the project has achieved emission reductions in the above mentioned reporting period as below:

Emission reductions:	CO_2 [t CO_2]	CH_4 [t CH_4]	N_2O [t N_2O]	HFCs [t HFC]	PFCs [t PFC]	SF_6 [t SF_6]	Σ_{um} [t CO2e]
2004	6.115	-	-	-	-	-	6.115
2005	12.866	-	-	-	-	-	12.866
2006	34.794	-	-	-	-	-	34.794
2007	36.229	-	-	-	-	-	36.229
TOTAL:	90.004						90.004

Essen, 2009-02-16

Katja Beyer
TÜV NORD JI/CDM Certification Program

TÜV NORD
TÜV NORD CERT GmbH
Verified Emission Reduction

DMRC's Second CDM Project

Modal Shift Project:

Metro being efficient, faster, safer and more reliable means of transport, people shift from other more polluting motorised modes to the less polluting metro.

Methodology Applicable

Title : “Metro Delhi, India”.

UNFCCC Reference: ACM 016

Project No. : 4463

Registration : 30.06.2011

Baseline Scenario

- The baseline situation is a continuation of traditional modes of transport including buses, taxis, private cars, rickshaws, motorcycles and bikes.

- Baseline emissions include the emissions that would have happened due to the transportation of the passengers who use the project activity, had the project activity not been implemented.

Project Scenario

- The metro complements other modes of transport and replaces partially, trips made by conventional or traditional means of transit by metro.
- Emission reductions are achieved through reducing GHG emissions per passenger-kilometre, comparing conventional modes of transport with metro.

contd…

- The resource efficiency of transporting passengers by the Metro is improved i.e. emissions per passenger kilometer are reduced compared to the situation without project.

- Similar project scenario for other Metro Projects, for whom it is now made possible to earn carbon revenue.

Emission Reduction

This is realized through following changes:

- **Improved efficiency:** metro has lower GHG emissions per passenger-kilometre compared to other modes of transport used in absence of the project.

- **Mode switching:** The MRTS is more attractive to clients due to reduced transport times, increased safety and reliability. It can thus attract private car, taxi or motorized rickshaw users with higher emission rates to switch to public transport.

Emission Reduction

Year	Reduction
2011	305,077
2012	477,389
2013	497,989
2014	519,448
2015	541,799
2016	565,077
2017	591,082
2018	205,443
Total estimated reductions 1st crediting period (tCO_{2eq})	**3,703,304**
Annual average over the crediting period of estimated reductions (tCO_{2eq})	**5,29,043**

Next Steps

- CDM : Modal Shift Phase- III

- Gold Standard VERs

THANK YOU