Climate Investment Funds

CTF/TFC.12/5
October 9, 2013

Meeting of the CTF Trust Fund Committee
Washington D.C.
October 28, 2013

Agenda Item 6

CTF INVESTMENT PLAN FOR MEXICO: PHASE II

PROPOSED DECISION

The CTF Trust Fund Committee reviewed document CTF/TFC.12/5, *CTF Investment Plan for Mexico: Phase II*, submitted by the Government Mexico in collaboration with the Inter-American Development Bank and the World Bank Group, and takes note of the request for USD 300 million in CTF funding to finance activities under a second phase. The Committee agrees that, should additional resources be made available to the CTF, any request for a second phase of funding from countries with existing endorsed investment plans should be considered together with a discussion of potential new countries.

Meeting of the CTF Trust Fund Committee
Washington, D.C.
October 28, 2013

CLEAN TECHNOLOGY FUND

INVESTMENT PLAN FOR MEXICO, PHASE II

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LIST OF ABBREVIATIONS AND ACRONYMS

AAGR	annual average growth rate
AMDEE	*Asociación Mexicana de Energía Eólica* (Mexican Wind Energy Association)
BANOBRAS	*Banco Nacional de Obras y Servicios Públicos* (National Bank for Public Works and Services)
BANORTE	*Banco Mercantil del Norte*
bn	billion
BRT	bus rapid transit system
CANACAR	*Cámara Nacional del Autotransporte de Carga* (National Freight Transport Industrial Association)
CB	capacity building
CCLIP	IDB's Conditional Credit Line for Investment Projects
CDM	Clean Development Mechanism
CERTE	*Centro Regional de Tecnología Eólica* (Regional Wind Power Center)
CFE	*Comisión Federal de Electricidad* (Federal Electricity Commission)
CFL	compact fluorescent lamps
CICC	*Comisión Intersecretarial de Cambio Climático* (Inter-ministerial Commission on Climate Change)
CIF	Climate Investment Funds
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CONAGUA	*Comisión Nacional del Agua* (National Water Commission)
CONAE	*Comisión Nacional para el Ahorro de Energía* (National Energy Efficiency Commission), now CONUEE
CONAFOR	Comision Nacional Forestal (National Forestry Commission)
CONAVI	*Comisión Nacional de Vivienda* (National Housing Commission)
CONUEE	*Comisión Nacional para el Uso Eficiente de la Energía* (National Commission for the Efficient Use of Energy)
COP	UNFCCC's Conference of the Parties
CRE	*Comisión Reguladora de Energía* (Energy Regulatory Commission)
CTF	Clean Technology Fund
EE	energy efficiency
ENCC	*Estrategia Nacional de Cambio Climático* (National Climate Change Strategy)
ENE	*Estrategia Nacional de Energía* (National Energy Strategy
ESCO	energy service company
EUR	Euros
FIDE	*Fideicomiso para el Ahorro de Energía Elétrica* (Electricity Savings Trust-Fund)
FIP	CIF's Forest Investment Program
FIRA	*Fideicomisos Instituidos en Relación con la Agriculture* (Agriculture-Related Trust-Funds)
FIRCO	*Fideicomiso de Riesgo Compartido* (Shared Risk Trust-Fund)
GIZ	*Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH* (German Technical Cooperation Agency)
GCI-9	IDB's Ninth General Capital Increase
GDP	gross domestic product
GHG	greenhouse gas
GJ	gigajoule
GoM	Government of Mexico
IBRD	International Bank for Reconstruction and Development (World Bank)
ICF	International Climate Fund (UK)
IDB	Inter-American Development Bank
IEA	International Energy Agency
IFC	International Finance Corporation
IIE	*Instituto de Investigaciones Eléctricas* (Electric Research Institute)
INE	*Instituto Nacional de Ecología* (National Institute of Ecology), now INECC
INECC	*Instituto Nacional de Ecología y Cambio Climático* (National Institute of Ecology and Climate Change)
INIFAP	*Instituto Nacional de Investigaciones Forestales Agr{icolas y Pecuarias* (National Forestry, Agricultural and Livestock Research Institute)
IPP	independent power producer
KfW	*KfW Entwicklungsbank* (German Development Bank)
KM	knowledge management
LAERFTE	*Ley para el Aprovechamiento de las Energías Renovables y el Financiamiento de la Transición Energética* (Law for the Use of Renewable Energy and the Financing of the Energy Transition)
LASE	*Ley para el Aprovechamiento Sustentable de la Energía* (Law for the Sustainable Use of Energy)
LFI	local financial intermediary
LGCC	*Ley General de Cambio Climático* (General Climate Change Law)
M	million
M&E	monitoring and evaluation
MDB	multilateral development bank
MW	megawatts
MXN	Mexican pesos
NAFIN	Nacional Financiera
NAMA	Nationally Appropriate Mitigation Actions
PECC	*Programa Especial de Cambio Climático* (Special Climate Change Program)
PPP	public-private partnership
PRONASE	*Programa Nacional para el Aprovechamiento Sustentable de la Energía* (National Program for the Sustainable Use of Energy)
PROTRAM	*Programa Federal de Apoyo al Transporte Urbano Masivo* (Federal Program for the Support of Mass Transit)
RE	renewable energy
REFF	Renewable Energy Finance Facility (CTF Phase I)
SCT	*Secretaría de Comunicaciones y Transporte* (Ministry of Communications and Transport)
SEDATU	*Secretaría de Desarrollo Agrario, Territorial y Urbano* (Ministry of Land Ownership and Territorial and Urban Development)
SEDESOL	*Secretaría de Desarrollo Social* (Ministry of Social Development)
SEMARNAT	*Secretaría de Medio Ambiente y Recursos Naturales* (Ministry of Environment and Natural Resources)
SENER	*Secretaría de Energía* (Ministry of Energy)
SHCP	*Secretaría de Hacienda y Crédito Público* (Ministry of Finance)
SHF	*Sociedad Hipotecaria Federal* (Federal Mortgage Society)
SME	small and medium-sized enterprise
t	ton
TC	technical cooperation activity
TFC	Trust-Fund Committee
TOD	transit-oriented development
UNFCCC	United Nations Framework Convention on Climate Change
USD	US Dollars
UTTP	Urban Transport Transformation Program

EXECUTIVE SUMMARY

1. The original Clean Technology Fund (CTF) Investment Plan (IP) for Mexico was endorsed by CTF Trust Fund Committee (TFC) on January 27, 2009 (the Mexico CTF IP Phase I). In 2012, the TFC requested CTF recipients to prepare a revision of their investment plans. The Government of Mexico (GoM) prepared and submitted its revised IP, which was endorsed by the TFC in May 2013. In its revised IP, the GoM expressed its interest in requesting additional resources from the CTF in October 2013.

2. The Mexico CTF IP Phase II aims to build on the success of the CTF interventions included in the original IP (as of September 2013, USD 465.6 million from the CTF had been committed under seven projects and programs) to continue removing barriers for the large-scale implementation of climate change mitigation actions.

3. The Mexico CTF IP Phase II is fully aligned with GoM priorities both for development, growth, and climate change mitigation. Such priorities are outlined in the National Development Program, the National Energy Strategy, and the National Strategy for Climate Change.

4. This Investment Plan includes only sovereign guarantee operations. However, this does not mean that the operations are focused only on the public sector. Mexico has very strong national development banks, and the IP seeks to mobilize resources through these institutions to reach the private sector.

5. The suggested interventions included in this Investment Plan fall within the same categories presented in the CTF IP Phase I, i.e., (i) transport, (ii) clean energy and (iii) energy efficiency. Nevertheless, areas that were not included in the previous IP are proposed now, including cogeneration, electricity generation from forest residues, and vehicle substitution. The suggested interventions are the result of several months of discussions between the GoM (through different Ministries and agencies) and the MDBs, and build on years of development experience and policy dialogue between these institutions and the GoM. The choice of programs reflects a combination of the government's priorities and sector implementation readiness, the development banks' capacity and focus, and priorities established by the CTF. The climate change mitigation programs included in this IP are summarized inTable 1.

Table 1. CTF Financing Plan, Phase II (USD million)

Program	MDB	Annex number	CTF	GoM	IBRD loans	IDB loans	Other; private sector	TOTAL
Green Freight Transport	IBRD	1	50	40	50			**140**
Sustainable Urban Transport	IBRD	2	50	400	50		240	**740**
Clean Energy Financing and Risk Mitigation Facility	IDB	3	80	140		80	70	**370**
Electricity Generation from Forest Residues	IDB	4	40	10		30	10	**90**
Energy Efficiency in the Residential Sector	IBRD	5	50	50	100		100	**300**
Energy Efficiency in the Agriculture Sector	IDB	6	30	10		20	10	**70**
TOTAL			**300**	**650**	**200**	**130**	**430**	**1,710**

I. INTRODUCTION

6. The original Clean Technology Fund (CTF) Investment Plan (IP) for Mexico was endorsed by CTF Trust Fund Committee (TFC) on January 27, 2009 (the Mexico CTF IP Phase I). The CTF Mexico IP Phase I proposed CTF co-financing of USD 500 million for projects and programs in urban transport, renewable energy, and energy efficiency. The Government of Mexico (GoM) prepared and submitted a revised version of the CTF IP, which was endorsed by the CTF TFC on May 2, 2013. The revised IP included an update of all projects and programs, and reallocated USD 34.4 million to a new geothermal risk mitigation projects. On September 10, 2013, the TFC approved an amendment to the IP, which reduced the amount of one of the programs by USD 2 million of CTF resources, and created a new small project with the same amount. During these three stages, the total CTF allocation remained at USD 500 million. The IP is currently comprised of 9 projects/programs that are in different stages of preparation or implementation by the International Bank for Reconstruction and Development (IBRD), the Inter-American Development Bank (IDB) and the International Finance Corporation (IFC) (see Table 2). The IP anticipates that the USD 500 million of CTF resources would leverage additional resources from the MDBs, the Government of Mexico (GoM), the private sector, and other sources. As of September 2013, USD 465.6 million from the CTF have been committed under seven projects and programs.

Table 2. Phase I Financing Table (Updated)

MDB	MDB/Program	Total CTF funding	Co-financing						
			Total	Govt.	Private	IBRD	IDB	IFC	Others
IBRD	Urban Transport Transformation Program	200	1,975	1,093	732	150	-	-	-
IBRD	Efficient Lighting and Appliance Project	50	664	230	176	251	-	-	7
IDB	Renewable Energy Part I (Private Sector)	53.38	600	-	484	-	45	71	-
IDB	Renewable Energy Part III (NAFIN RE Finance Facility)	70.61	1914	244	1,016	-	70	-	584
IDB	Energy Efficiency Part I (Commercial Banking Component)	22.4	108	-	44	-	44	20	-
IDB	FIRA Green Line	2.0	30	10			20		
IDB	Energy Efficiency Part II, Ecocasa Program	51.61	249	-	86	-	50	-	113
IDB	Geothermal Exploration Risk Reduction Project	34.4	115	12			34		69
IFC	IFC/ Private Sector Wind Development	15.6	174	-	64	-	22	22	66
Total		**500**	**5,829**	**1,589**	**2,602**	**381**	**285**	**113**	**839**

7. When submitting the revised IP in April, 2013, the GoM expressed its interest to request additional funds from the CTF. Building on the successful implementation of the Mexico CTF IP Phase I, and given that the country has strengthened its commitment towards a low-carbon development path (in particular, the National Climate Change Law, LGCC was published in June 2012), the GoM has prepared the Mexico CTF IP Phase II in collaboration with IBRD and IDB.[1] The Mexico CTF IP Phase II is fully aligned with national priorities and strategies, which are included in Mexico's

[1] The IFC stated that they would not participate in this Phase II.

National Development Plan (PND),[2] the National Energy Strategy (ENE) 2013-2017,[3] and the National Climate Change Strategy (ENCC).[4]

8. The proposed CTF IP Phase II aims (i) to continue removing barriers for proven low-carbon technologies, building on the success of Phase I, and (ii) to address new opportunities which emerged during the implementation of Phase I. The GoM is proposing an allocation of USD 300 million for the Mexico CTF IP Phase II. The areas to be supported remain: (i) sustainable transport (ii) clean energy in the energy sector, and (iii) end-use energy efficiency.

9. The Mexico CTF IP Phase II reinforces the long-standing partnership of the GoM with the World Bank Group (IBRD/IFC) and the IDB, and builds on the banks' experience with climate change mitigation and green and inclusive growth. The IP will remain a flexible and dynamic document that evolves with the needs and developments in the areas of support. The IP will be implemented in close coordination with IBRD and IDB.

[2] National Development Plan. http://pnd.gob.mx/

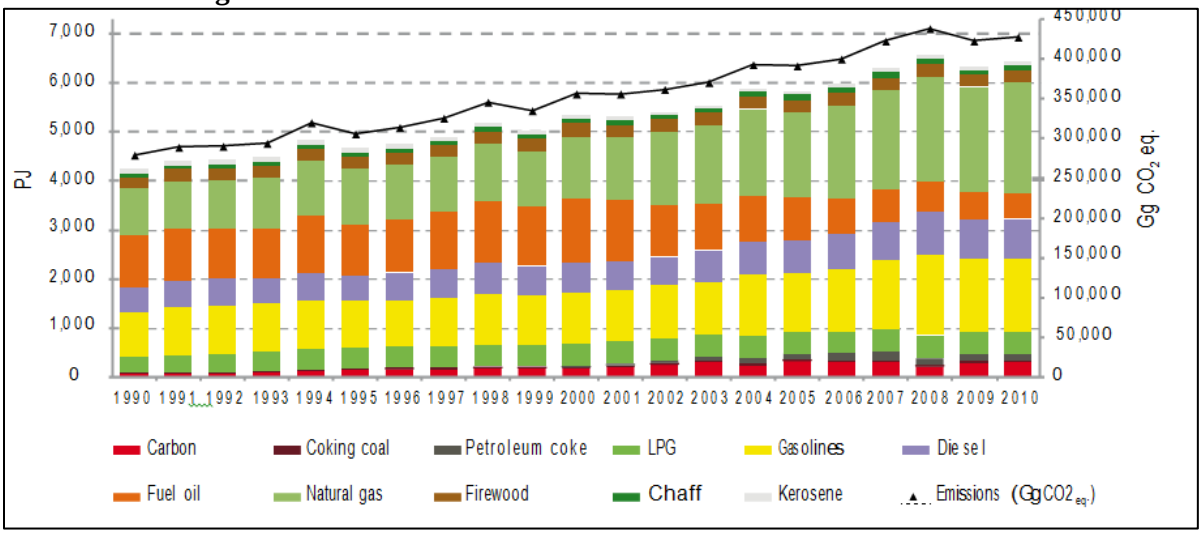
[3] National Energy Strategy. http://bit.ly/ENE2013

[4] National Climate Change Strategy. http://bit.ly/ENCC2013. Given the recent change in administration, the sectoral and special programs, including the Special Climate Change Program (PECC) had not been published at the time of preparing this document. However, the GoM has ensured the alignment of the IP with the drafts of the programs.

II. COUNTRY AND SECTOR CONTEXTS

10. According to Mexico's Fifth National Communication to the UNFCCC,[5] Mexico emitted 748 million tons of carbon dioxide equivalent ($MtCO_2e$) in 2010, which represents an increase of 16% with respect to the total GHG emissions in 2002. Of these emissions, almost 450 $MtCO_2e$ are associated with the combustion of fossil fuels. In 2009, Mexico ranked 12th in the world and 1st in Latin America for GHG emissions from combustion of fossil fuels. Mexico's GHG emissions from combustion of fossil fuels accounted for 1.4% of the global amount. As shown in Figure 1, Mexico's GHG emissions associated with the combustion of fossil fuels have been growing steadily over the past 20 years.

Figure 1. Mexico's GHG emissions from combustion of fossil fuels

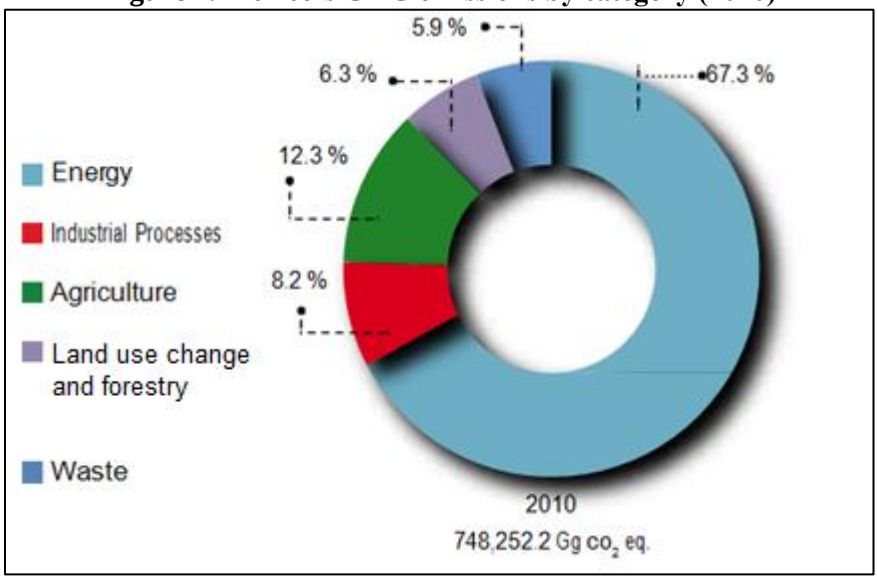


Source: Mexico's Fifth National Communication to the UNFCCC, 2012. http://bit.ly/Mex5Com

11. According to the Fifth National Communication, the sources of Mexico's GHG emissions by 2010 were: energy (67.3%), agriculture (12.3%), industrial processes (8.2%), land-use, land-use changes and forestry (6.3%), and waste (5.9%) (Figure 2).

[5] Fifth National Communication. http://bit.ly/Mex5Com

Figure 2. Mexico's GHG emissions by category (2010)

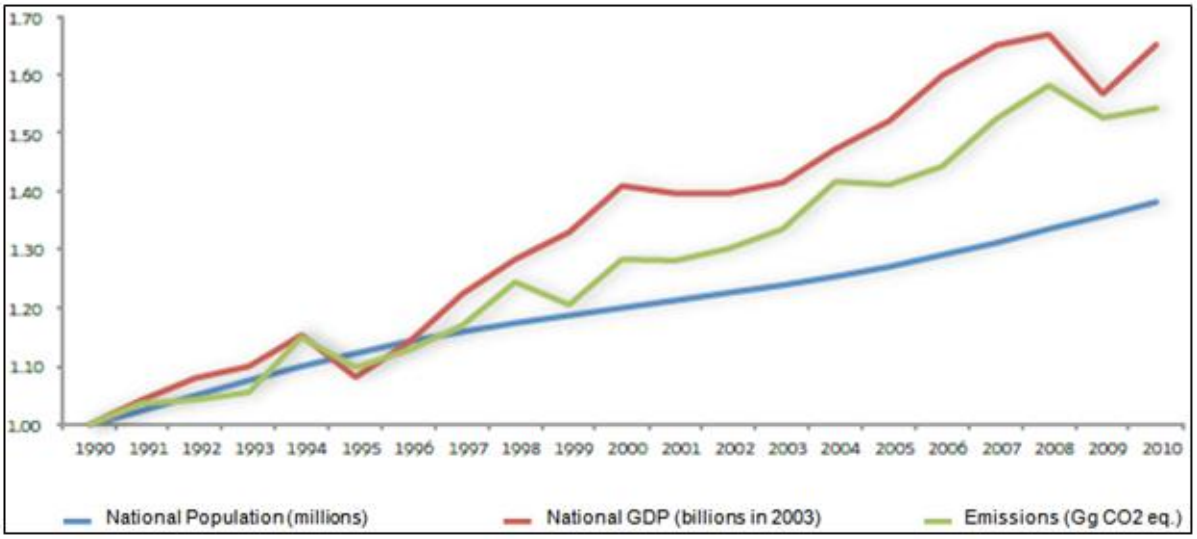


Source: Mexico's Fifth National Communication to the UNFCCC, 2012. http://bit.ly/Mex5Com

12. In 2010, the GHG emissions from the energy sector (67.3% of total GHG inventory, or 504 $MtCO_2e$), were associated to transport (33.0% of energy emissions, or 166 $MtCO_2e$), energy generation (32.3% of energy emissions, or 163 $MtCO_2e$), manufacturing and construction industry (11.3% of energy emissions, or 57 $MtCO_2e$), fugitive emissions (16.5% of energy emissions, or 83 $MtCO_2e$) and other sectors, such as residential, commercial and agricultural (6.9% of energy emissions, or 35 $MtCO_2e$). The energy sector is a major GHG emitter, and within it transport and power generation.

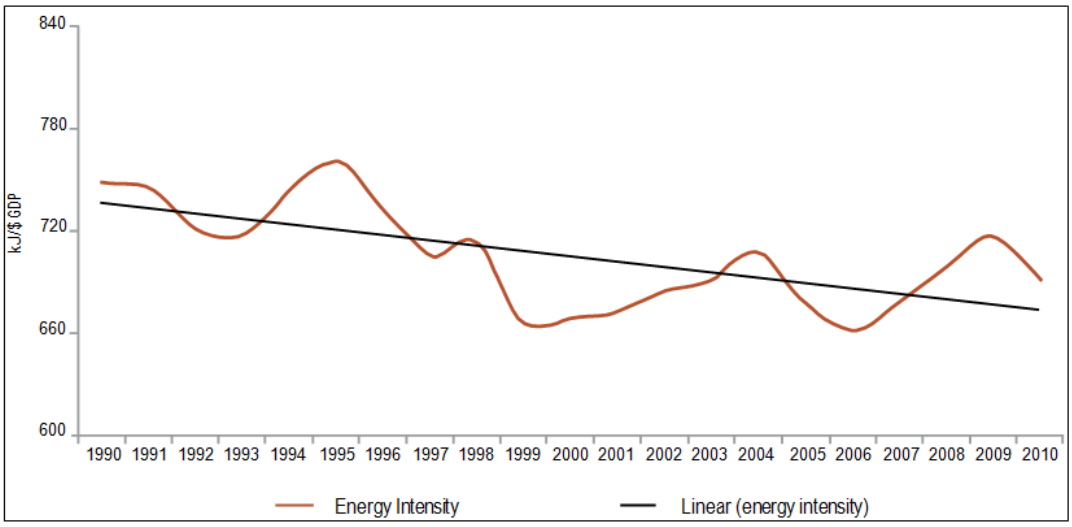
13. According to the Fifth National Communication, the growth in emissions of Mexico in relation to the growth of its economy shows a downward trend (between 1990 and 2010 the economy grew at an annual average growth rate (AAGR) of 2.5 %, while emissions grew at an AAGR of 1.5 % per year) (Figure 3). However, this relationship varies depending on the year, and between 2001 and 2010, the GDP grew less than the emissions. The emission intensity of energy amounts to 0.0048 kg of CO_2e per dollar of GDP (in 2003 prices) (see Figure 4). In 2010, per capita emissions were 6.7 tonCO_2e and per capita energy consumption 75.2 GJ. Per capita GHG emissions from fossil fuel consumption are 4.63 tonCO_2e in 2009, slightly above the world average, which is 4.1 tons. The Fifth National Communication indicates that there are signs of decoupling economic growth and GHG emission growth in Mexico. However, data in recent years have not been so positive, showing the need to improve the country's energy efficiency.

Figure 3. Indexes for GHG emissions, population and GDP



Source: Mexico's Fifth National Communication to the UNFCCC, 2012. http://bit.ly/Mex5Com

Figure 4. Mexico's energy intensity (kJ / USD of GDP)



Source: Mexico's Fifth National Communication to the UNFCCC, 2012

14. Although, as a non-Annex I country, Mexico is not mandated to limit or reduce its GHG emissions under the Kyoto Protocol, the country has firmly adopted the UNFCCC principle of "common but differentiated responsibilities" and pledged to reduce its GHG emissions voluntarily. At the 14th Session of the Conference of the Parties to the UNFCCC in December 2008, Mexico announced that it would reduce its GHG emissions by 50% below 2002 levels by 2050. In June 2012, Mexico published the General Law for Climate Change (*Ley General de Cambio Climático LGCC*[6]), a

[6] National Climate Change Law. http://bit.ly/LGCCMEX

groundbreaking law at the international level, which makes the climate change policy legally binding, including mitigation goals such as a 30% reduction of emissions by year 2020 with respect to a baseline and a 50% reduction by 2050 with respect to emissions in 2000. It also sets a goal of clean energy penetration into electricity generation, which must reach 35% of total installed capacity by 2024. The LGCC also establishes provisions for mitigation at the federal, state, and municipal levels. The LGCC also provides for the creation of the Climate Change Fund, which seeks to capture and channel financial resources (public, private, national and international) to support the implementation of actions to address climate change. Actions related to climate change adaptation, and activities to promote synergies between adaptation and mitigation will be priorities for Fund financing.

15. Mexico has submitted five National Communications to the UNFCCC, with the objective of sharing actions and achievements on climate change mitigation and climate change adaptation, Mexico is the only non-Annex I country to have submitted a Fifth National Communication, strengthening Mexico's intention to maintain its role as a global leader in the fight against climate change.

16. Recognizing the multi-sectorial dimension of the climate change challenge, Mexico established in April 2015 the Inter-ministerial Commission on Climate Change (*Comisión Intersecretarial de Cambio Climático* – CICC) in April 2005, which was reinstalled in 2013. According to the recently published LGCC, the CICC's key mandates include the formulation and coordination of national climate change strategies and their incorporation in sectorial programs.[7] The CICC contains several working groups for different tasks. Among others, the working groups are responsible for developing the Special Program on Climate Change (*Programa Especial de Cambio Climático, PECC*), as well as adaptation and mitigation policies. Associated with the CICC is an Advisory Council on Climate Change, which creates a link between the CICC, the scientific community and civil society.[8]

17. In June 2013, and as a mandate included in the LGCC, the GoM published the second National Climate Change Strategy,[9] which sets the national strategy for climate change adaptation and mitigation for the next 10, 20 and 40 years.

18. The GoM is embarking on a great effort to design and implement Nationally Appropriate Mitigation Actions (NAMAs) in sectors such as sustainable housing, energy efficiency in SMEs, freight transport, and fluorinated gases. The Ecocasa program, which is in execution under the Phase I CTF IP, is closely linked to the sustainable housing NAMA, and similar links can be established in the future between CTF programs and NAMAs.

19. With the objective of defining the actions to accomplish the strategies defined by the ENCC, the GoM published the first version of the PECC[10] in August 2009, with a scope of four years (2009-2012). As with all government programs, the PECC was considered part of the 2007-2012 National Development Plan. The PECC for 2013-2018 is expected to be published in early 2014. At the end

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7 The CICC is chaired by President, who might delegate such responsibility to the Minister of the Interior or the Minister of Environment and Natural Resources, with the following thirteen Ministries serving as members: Environment and Natural Resources; Agriculture; Health; Communication and Transportation; Economy; Tourism; Social Development; Interior; Navy; Energy; Public Education; Finance; and Foreign Affairs.

8 http://bit.ly/LGCCMEX

9 http://bit.ly/ENCC2013

10 http://bit.ly/PECC_Mexico

of 2012, 55.0 $MtCO_2e$/year were reduced, which represents a 110% compliance with the goals set in the first PECC for 2012.

20. According to INE (2012),[11] the potential for GHG emissions abatement through clean energy generation by 2020 is 86 $MtCO_2e$ equivalent to 23% of theoretical potential identified. This study shows that the marginal cost of abatement technologies such as geothermal and small hydro is very low. Renewable energy technologies including large hydro currently provide 20.55% of the total estimated capacity and 14.90% of the total electricity generated in year 2012. [12]

21. According to the Fifth National Communication, and based on data from the 2009-2012 National Program for the Sustainable Use of Energy (PRONASE)[13] and other studies from INECC and CONUEE, a potential emission reduction of 64 $MtCO_2e$ through energy efficiency improvements until 2020 has been identified, equivalent to 24.5% of the theoretical potential estimated.

[11] Instituto Nacional de Ecología y Cambio Climático (INECC), 2012. Bases para una estrategia de desarrollo bajo en emisiones de México. http://bit.ly/BEDBEMex

[12] Secretaría de Energía. Informe sobre la participación de las energías renovables en la generación de electricidad en México al 31 de diciembre de 2012. dd. http://bit.ly/IPERM2012

[13] Programa Nacional para el Aprovechamiento Sustentable de la Energía 2009-2012. http://bit.ly/PRONASE

III. PRIORITY SECTORS FOR GHG ABATEMENT

22. The National Climate Change Strategy (ENCC) 2013[14] sets a long-term climate change agenda for Mexico, along with medium to long-term goals for adaptation and mitigation (see below on Table 4 the relationship between the ENCC's action lines and the interventions included in the Mexico CTF IP Phase II).

Table 3. Policy Pillars and Strategic Axis/Action lines (ENCC)

P1.	Have cross-sectoral climate actions and policies that are articulated, coordinated and influencing
P2.	Develop fiscal policies and economic and financial instruments with a climate approach
P3.	Implement a research, innovation, climate technologies and institutional strengthening capacity platform
P4.	Promote the development of a climate culture
P5.	Instrument Monitoring, Reporting and Verification (MRV) and Monitoring and evaluation (M&E) mechanisms
P6.	Strengthen strategic cooperation and international leadership
A1.	Reduce the vulnerability and increase the resilience of the social sector towards climate change
A2.	Reduce the vulnerability and increase the resilience of strategic infrastructure and productive systems towards the effects of climate change
A3.	Conserve and use the ecosystems sustainably and keep the environmental services that they provide
M1.	Accelerate the transition to clean energy sources
M2.	Reduce energy intensity through efficiency and responsible consumption schemes
M3.	Move towards sustainable urban models with low-carbon mobility systems, integral waste management and housing
M4.	Promote best practices in agriculture and forestry to increase and preserve natural carbon sinks
M5.	Reduce short-lived climate pollutants and promote wellness and health benefits[15]

23. The ENCC 2013 also includes the projections for GHG emissions in Mexico, starting from 2010 (748 $MtCO_2e$) with a span of 45 years (2055). The projections are shown in Figure 5 and consider the following scenarios:

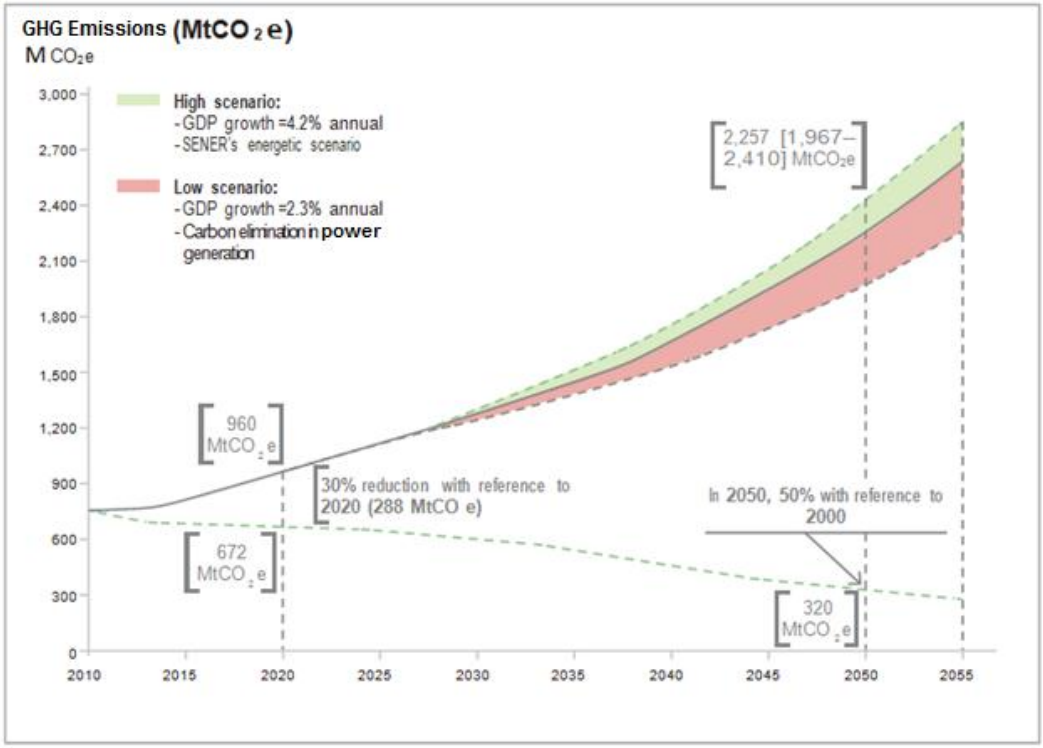
    a) Total absence of mitigation actions and an annual GDP growth of 3.6% (baseline), which would result in 2,257 $MtCO_2e$ in 2050.
    b) A higher-than-estimated scenario (annual GDP growth of 4.2% plus the current assumptions of the Ministry of Energy), which would result in 2,410 $MtCO_2e$ in 2050.
    c) A lower-than-estimated scenario (annual GDP growth of 2.3% plus phase-out of coal in power generation), which would result in 1,967 $MtCO_2e$ in 2050.

24. Figure 5 also includes projections with targets of 30% reduction of GHG emissions by 2020 with respect to the baseline, and of 50% by 2050 with respect to emissions in 2000 (672 $MtCO_2e$ and 320 $MtCO_2e$, respectively).

[14] http://bit.ly/ENCC2013

[15] Black carbon may impact climate change due to its ability to absorb large amounts of energy: one gram of its particles can absorb more than a million times more radiant energy than a gram of CO_2. However, emissions from the latter are more than 3,000 times higher and its lifetime in the atmosphere is more than 2,500 times (Fifth National Communication, 2012).

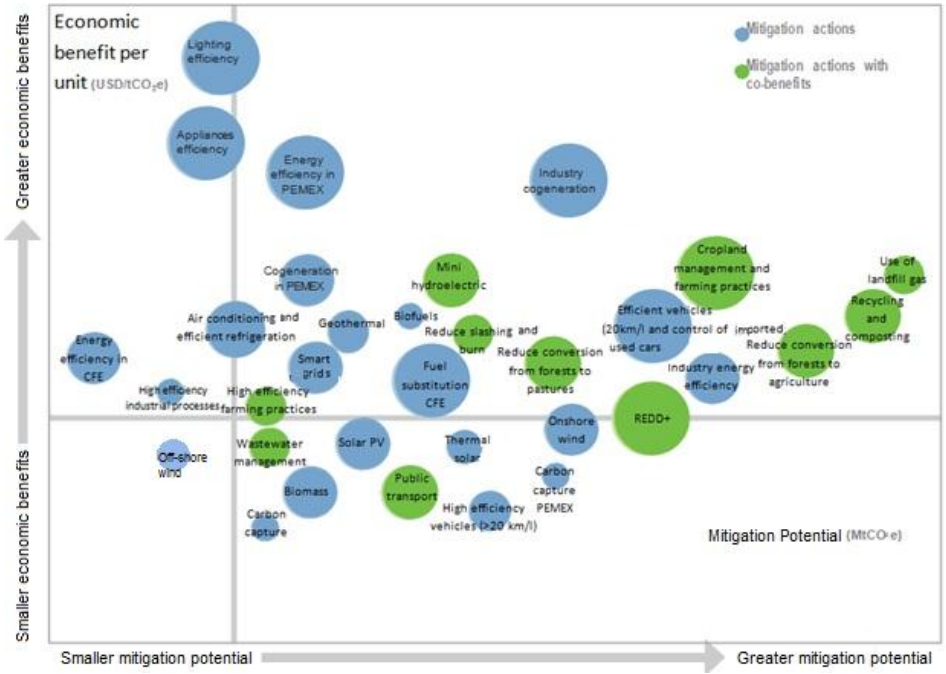
Figure 5. Projection of Mexico's GHG emissions by 2050



Source: National Climate Change Strategy 2013. http://bit.ly/ENCC2013

25. The ENCC 2013 identifies potential mitigation measures, as shown in Figure 6. In this Figure, the size of the circles represents the feasibility of the intervention given the current circumstances. In other words, the bigger the circle, the more feasible the intervention is.

Figure 6. Potential mitigation measures in the medium-to-long term (2020-2050)



Source: National Climate Change Strategy 2013. http://bit.ly/ENCC2013

26. According to the ENCC 2013, the following areas present significant emission reduction potential and economic benefits: land use and forestry, energy efficiency in the industry, renewable energy, and transport. Measures with high mitigation potential are industrial energy efficiency, REDD+ initiatives, industrial cogeneration, and land management. Among renewable energy interventions, geothermal generation, mini hydro and solar PV represent solid mitigation alternatives. Public transport interventions have good mitigation potential and good feasibility, with the advantage of additional co-benefits. The measures that stand out for their greater economic benefits are: energy efficiency in appliances and lighting, energy efficiency in PEMEX, and efficient cooling.

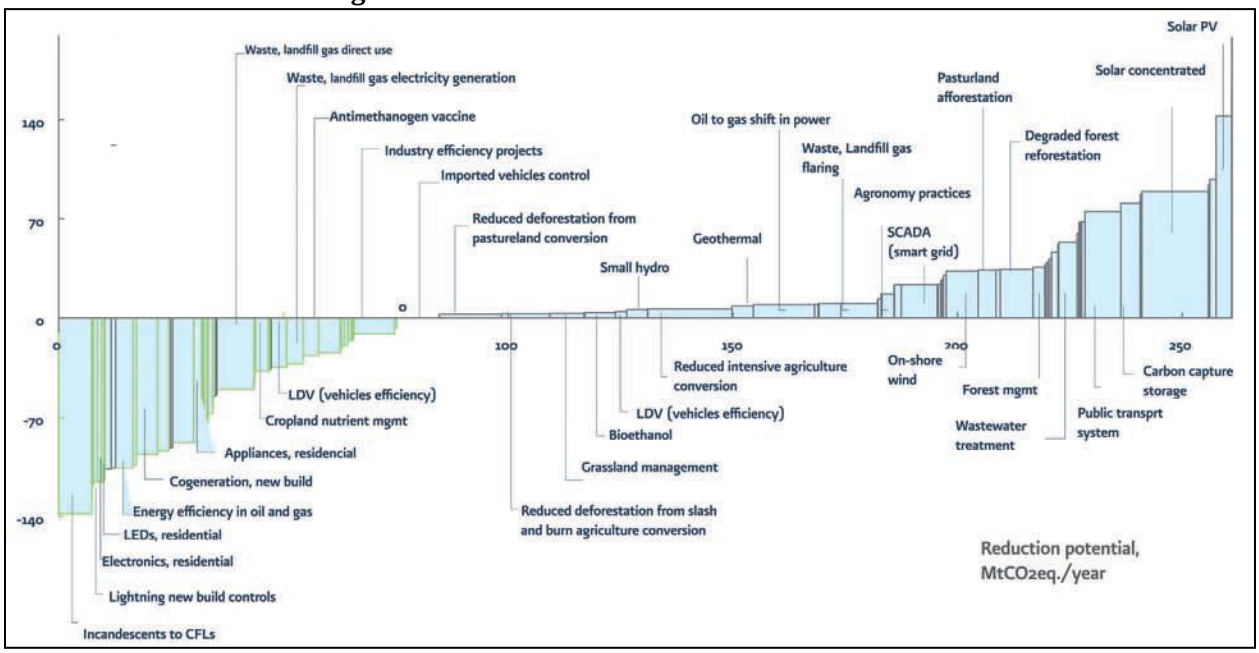
27. According to the Fifth National Communication, Mexico's GHG emissions are estimated to grow to 872 $MtCO_2e$ by 2020 and to 996 $MtCO_2e$ by 2030, mainly from power generation and transport sectors. Such estimates constitute the baseline for Mexico's GHG emissions if no mitigation actions are adopted. The Fifth National Communication also identifies mitigation potential of 261 $MtCO_2e$ by 2020 (30% reduction with respect to the baseline of 872 $MtCO_2e$), and of 523 $MtCO_2e$ by 2030 (53% reduction with respect to the baseline of 996 $MtCO_2e$). Figure 7 shows the abatement curves for Mexico towards 2020.[16] In Figure 7, the horizontal axis represents the cumulative potential of reduction of GHG emissions (in $MtCO_2e$ per year), whereas the vertical axis represents the estimated marginal cost per avoided $tonCO_2e$.[17] A negative marginal means that the intervention implies savings as compared to the baseline scenario. Each rectangle in the cost curve represents an option

[16] See also the marginal abatement cost curve included in Johnson et al., 2010 (Low Carbon Development for Mexico, http://bit.ly/lcdmex), which includes some of the interventions included in this document. In particular, electricity generation from biomass is shown as having a potential of 35,1 $MtCO_2eq$ yearly at a negative cost of 2.4 USD per ton of CO_2e abated.

[17] Marginal cost is defined as the difference between the cost of the intervention and the alternative of the baseline, i.e., no intervention. Such cost does not include transaction, communication, information costs, nor subsidies and taxes.

for reducing emissions. The width measures the option's potential emissions reduction from business as usual, in millions of metric tons (Mt), in the year 2030; the height measures its cost, in U.S. dollars. Options whose benefits outweigh the costs appear on the left side of the curve, below the "0" line on the vertical axis. Options with net costs appear on the right side of the curve, above the "0". "Negative" costs don't imply that the measures would happen without support, as they face a number of barriers.

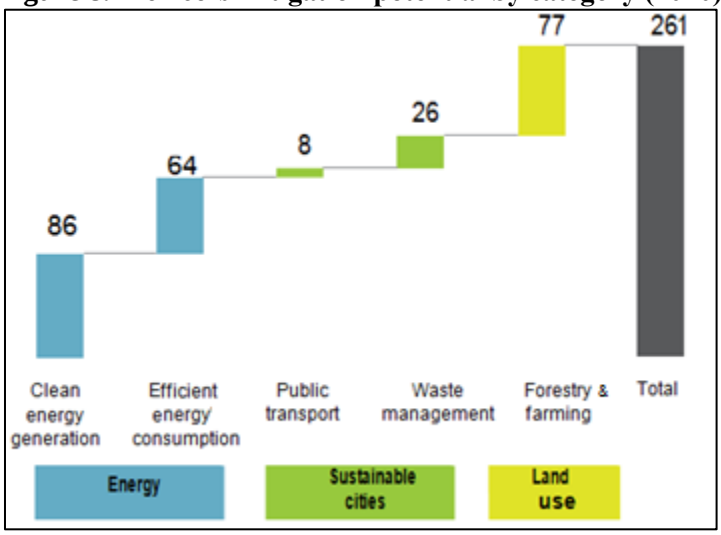
Figure 7. Mexico's abatement cost curve to 2020



Source: Mexico's Fifth National Communication to the UNFCCC, 2012. http://bit.ly/Mex5Com

28. By category, the mitigation potential for Mexico by 2020 is shown in Figure 8. According to the Fifth National Communication, clean power generation and energy efficiency account for approximately 57% of the mitigation potential for Mexico towards 2020. Notice that transport interventions such as efficiency for light vehicles, vehicle substitution, and clean transport are included in the energy efficiency category. Other interventions such as public transport are included in the Sustainable Cities category. Renewable energy generation represents the highest contributor to the mitigation potential (33%).

Figure 8. Mexico's mitigation potential by category (2020)



Source: Mexico's Fifth National Communication to the UNFCCC, 2012. http://bit.ly/Mex5Com

29. The information presented in this section shows that energy (energy efficiency and clean energy), as well as transport interventions, continue to be significant mitigation alternatives for Mexico.

IV. RATIONALE FOR SELECTED SECTORS

30. This section of the Investment Plan describes the considerations for selecting the emission reduction opportunities presented to the CTF. Although the sectors proposed to the CTF have been identified as mitigation alternatives, only selected interventions within each sector will be presented for consideration under the CTF IP Phase II. All the suggested interventions fall within the same categories presented in the CTF IP Phase I, i.e., (i) transport, (ii) clean energy and (iii) energy efficiency. Nevertheless, areas that were not included in the previous IP are proposed now, including cogeneration, electricity generation from forest residues, and vehicle substitution. The suggested interventions are the result of several months of discussions between the GoM (through different Ministries and agencies) and the MDBs, and build on years of development experience and policy dialogue between these institutions and the GoM. The choice of programs reflects a combination of the government's priorities and sector implementation readiness, the development banks' capacity and focus, and priorities established by the CTF.

31. The interventions proposed for CTF support involve technologies that are readily available to Mexico today, but face institutional, regulatory, or cost barriers (especially upfront investment cost barriers) which must be overcome for large-scale deployment. As it was the case for Phase I, support from the CTF would help overcome these barriers.

32. Table 4 presents a summary of the mitigation interventions included in this IP, in the context of GoM policy documents, and the paragraphs below present the rationale for the programs put forward.

Table 4. Mitigation interventions included in the Mexico CTF IP Phase II, in the context of the ENCC

ENCC Lines of Action	Proposed Program in CTF IP 2	MDB
M2. Reduce energy intensity through efficiency and responsible consumption schemes	Green Freight Transport	IBRD
M3. Move towards sustainable urban models with low-carbon mobility systems, integral waste management and housing M2. Reduce energy intensity through efficiency and responsible consumption schemes	Sustainable Urban Transport	IBRD
M1. Accelerate the transition to clean energy sources M2. Reduce energy intensity through efficiency and responsible consumption schemes	Clean Energy Financing and Risk Mitigation Facility	IDB
M1. Accelerate the transition to clean energy sources M4. Promote best practices in agriculture and forestry to increase and preserve natural carbon sinks[18]	Electricity Generation from Forest Residues	IDB
M2. Reduce energy intensity through efficiency and responsible consumption schemes	Energy Efficiency in the Residential Sector	IBRD
M2. Reduce energy intensity through efficiency and responsible consumption schemes	Energy Efficiency in the Agriculture Sector	IDB

[18] This project also contributes to some of the objectives under the M5 line of action (Reduce short-lived climate pollutants and promote wellness and health benefits)

4.1. Transport

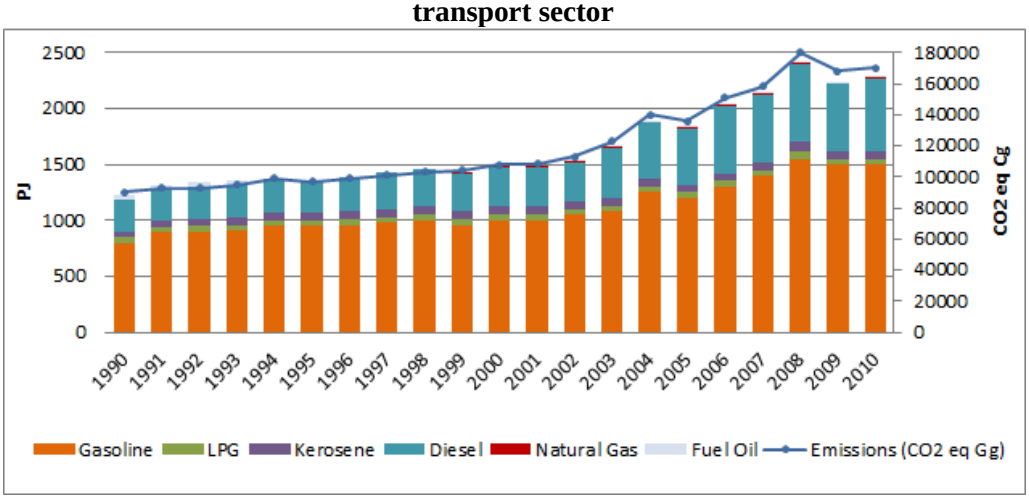
33. **The transport sector is a significant energy consumer and a major source of greenhouse gas emissions in Mexico.** According to Mexico ENCC 2013, GHG emissions from transport totaled 166 $MtCO_2e$ in 2010, which corresponds to 22.2% of total emissions in Mexico. Moreover, transport related emissions are showing an average growth of 3.2% per year. This positions transport as the fastest growing source of GHG emissions. Within the transport category, the GHG emissions by source were:

    a) On-road, 94.5% of transport emissions, or 157 $MtCO_2e$,
    b) Aerial, 2.9% of transport emissions, or 4.89 $MtCO_2e$,
    c) Maritime, 1.4% of transport emissions, or 2.34 $MtCO_2e$, and
    d) Rail, 1.2% of transport emissions, or 1.94 $MtCO_2e$.

34. By fuel category (Figure 9), the GHG emissions were:

    a) Gasoline, 69.2% of transport emissions, or 115.158 $MtCO_2e$
    b) Diesel, 26.1% of transport emissions, or 43.467 $MtCO_2e$
    c) Kerosene, 2.9% of transport emissions, or 4.822 $MtCO_2e$
    d) Liquefied Petroleum Gas, 1.6% of transport emissions, or 2.58 $MtCO_2e$
    e) Natural Gas and fuel oil, 0.2% of transport emissions, or 0.3845 $MtCO_2e$.

Figure 9. Energy Consumption (PJ) and tendency of GHG emissions (thousand tons of CO_2e) in the transport sector



Source: Mexico's Fifth National Communication to the UNFCCC, 2012. http://bit.ly/Mex5Com

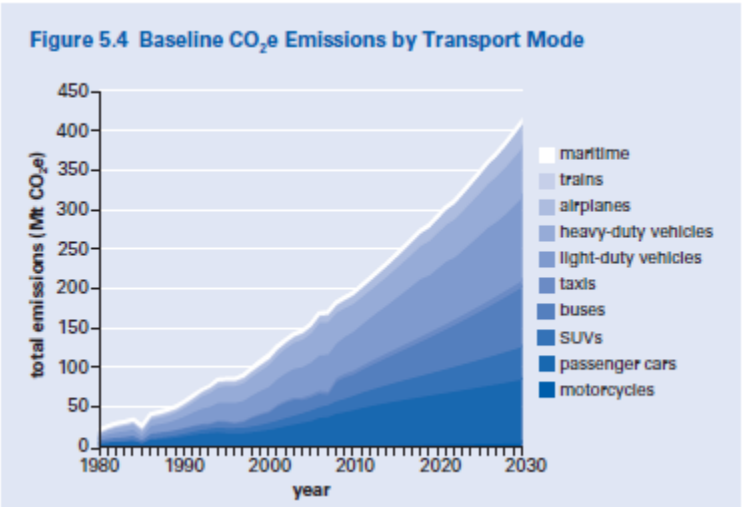
4.1.1. Freight Transport

35. **Freight sector carbon emissions are large and rising rapidly.** In 2011 in Mexico, the transport sector was responsible for roughly 47 percent of all energy consumed and 22 percent of CO_2 emissions, with road-based modes contributing more than 94 percent of this amount.[19] Freight

[19] Based on Mexico ENCC 2013 (http://bit.ly/ENCC2013), and Johnson et al., 2010. Low-Carbon Development for Mexico (http://bit.ly/lcdmex)

transport from all modes represents roughly 26 percent of transport's total fuel use, primarily diesel. Freight transport is also one of the fastest growing sectors in terms of energy consumption and emissions in Mexico. The Mexico Low-Carbon Development program estimates that GHG emissions for all transport modes under a business as usual scenario will continue to increase at 2.8 percent per year, with a significant contribution from the trucking sector. With a proper accounting of black carbon impacts, it is likely that role of trucks on climate change will appear to be only more severe.[20]

Figure 10. Projection of GHG Emissions by Category of Vehicle



Source: Johnson et al. (2010). Low Carbon Development for Mexico. http://bit.ly/lcdmex

36. **The freight sector is a critical and large part of the Mexican economy.** Freight is not only an essential and integral element of a modern industrialized economy. Freight is also an important source of employment, entrepreneurship and innovation. Data suggest that freight accounted for about 6.2 percent[21] of Mexico's GDP in 2011, generating more than 1 million employments. The 2011 Annual Transport Survey from INEGI (Mexican National Institute for Statistics and Geography) estimated that the transport industry generated USD 72 billion in net operating revenue in that year.

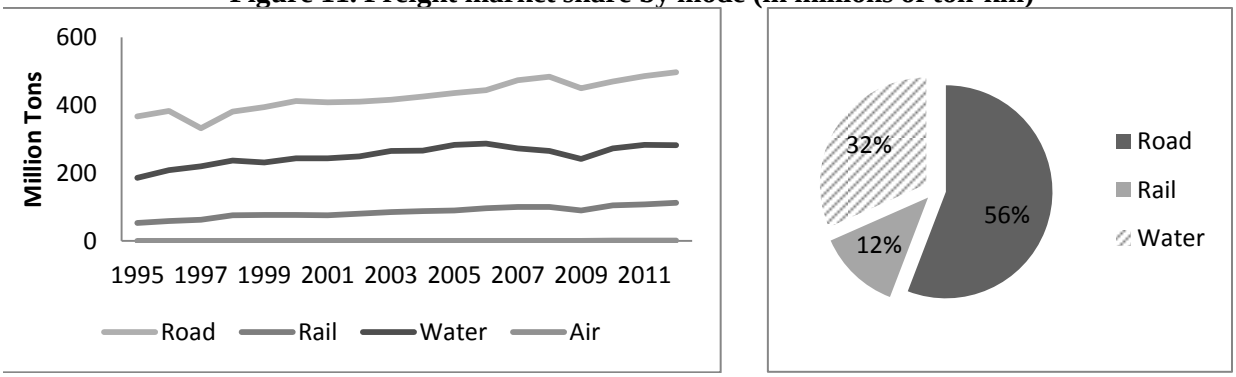
37. **Moreover, freight demand is expected to continue growing in the medium and long term.** Freight demand is closely linked to economic growth and the sector has seen significant expansion related to the economic growth in recent years. In 2011, freight transport in Mexico handled more than 500 million tons (with more than 88% by road), which, suggests a matrix heavily tilted towards the trucking sector. The 2013-2018 National Transport Plan for Mexico (PNTM, SCT, 2013) estimates that total freight in net ton-kilometers to grow from 226 million in 2011 to 425 million in 2030— an annual growth rate of over 3.2 percent.

[20] Black carbon is the name given to soot – extremely fine particulate matter (< PM2.5)— which have been found to have significant global warming potential. It is formed through an incomplete combustion of fossil fuels, biofuels, and biomass, and is critical for both human health and climate change. The emissions come from a wide range of sources, including energy consumption, diesel-powered vehicles, industrial processes and construction activities. There is little information available about black carbon in Mexico and its global impact. This is an area that requires further research and analysis.

[21] SCT, 2011.

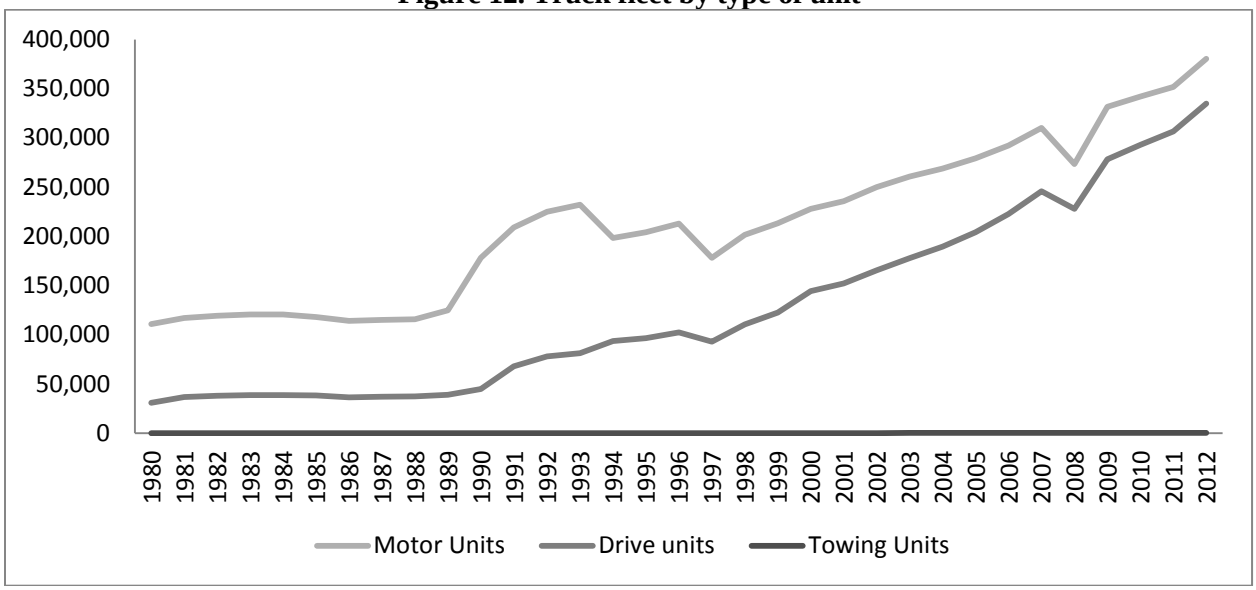
38. **Trucking is the largest segment of the freight sector and is likely to remain so.** About 55 percent of all freight ton-kilometers in Mexico are carried by trucks, as shown in Figure 11. Indeed, the share of freight value on trucks is much higher than other modes as most high-value and time-sensitive cargo is carried on roads. Expectations are that this will continue to remain the case. Even in the best of circumstances and in countries with very developed rail and inland waterway systems (such as the US and China), trucks will continue to carry a large share of freight particularly for high-value goods and most short and medium-distance trips. The PNTM, which calls for significant investments to promote inter-modality in freight transport, still projects that road freight tons and ton-kms will increase in absolute terms in the coming decade. Market expectations are similar. According to data from AMDA (The Mexican Association for Vehicle Distributors), 37,259 new trucks were licensed in 2012, a 19 percent increase over 2011. Mexico is already the eleventh largest country globally in terms of sales of heavy-duty vehicles and it continues at a rapid pace of growth in the truck segment. Indeed, between 1996 and 2011 the number of trucks in Mexico doubled from 315 thousand to 658 thousand vehicles (see Figure 12).

Figure 11. Freight market share by mode (in millions of ton-km)



Source: SCT, Estadística Básica del Autotransporte Federal. México, 2011.

Figure 12. Truck fleet by type of unit

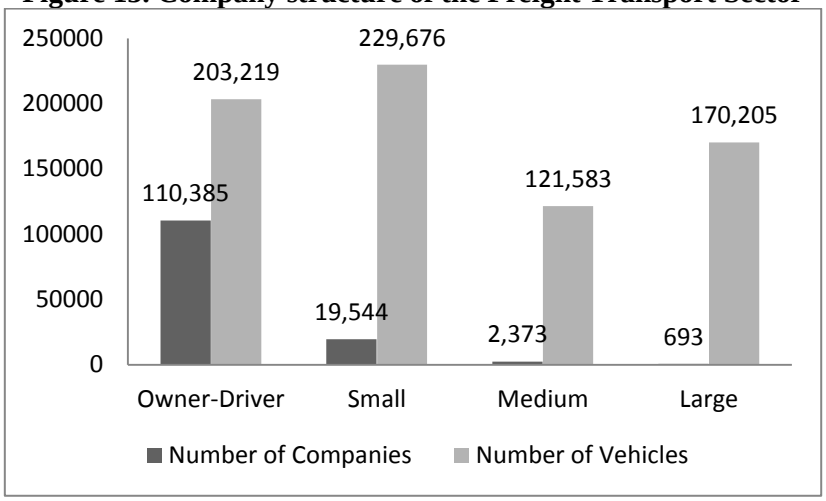


Source: SCT, Estadística Básica del Autotransporte Federal. México, 2011.

39. Although there are large transport companies with solid balance sheets and with capability to participate in government programs to invest in fleet renewal and state-of-the art technologies,

significantly avoiding GHG emissions will require the incorporation of the medium and small companies into these initiatives. Road freight transport is mostly a private industry, with about a third of the fleet characterized by "hombre-camión"; owner-operators who are usually under-capitalized and lack the resources to purchase and maintain energy efficient vehicles. Data from the Federal Ministry of Communications and Transport (SCT) estimates that trucking comprises more than 132,000 businesses, among them nearly 110,000 independent owner-operators who own about 28 percent of the vehicles, 19,000 small companies who own about 30 percent of the vehicles and 3,000 medium and large-size companies who own the remaining 40 percent of the fleet (Figure 13).

Figure 13. Company structure of the Freight Transport Sector



Source: SCT, Estadística Básica del Autotransporte Federal. México, 2011.

40. Supporting global climate objectives requires a focus on reducing the carbon intensity of the sector by (i) facilitating/promoting a shift of freight to more fuel efficient modes and reducing unnecessary vehicle kilometers traveled without constraining economic growth; and (ii) increasing the fuel efficiency of the existing modes. On the one hand, there is a need to support the development of an integrated multi-modal transport sector that facilitates logistics brokerage, coordination among carriers, and that provides funding for relatively small investments that solve bottlenecks. On the other hand, when it comes to reducing the fuel-intensity of freight modes and the efficiency of the logistics system, trucks are critical. They not only carry the majority of the freight, but owing to the distributed and fragmented nature of trucking, account for the vast majority of all freight vehicles and vehicle-kilometers (with the exception of air transport). In this context, the challenge is to identify and deploy strategies that reduce fuel-use in the trucking sector and facilitate multimodality.

41. **The trucking industry has a strong incentive to improve fuel-economy for both environmental and economic reasons.** Enhancing fuel-efficiency in the trucking sector is critical to reduce its carbon footprint, and is critical for profitability and economic performance. Fuel is typically the largest component of truck operating costs. A survey of transport companies and experts in Mexico concluded that fuel represents nearly 42 percent of operating costs in Mexican trucking excluding depreciation and capital costs.[22] While this figure can vary widely depending on road conditions and type of cargo, this is not out of line with international experience. For comparison, fuel can be as much as 60 percent of operating costs in China (World Bank and CAI-Asia, 2010) and as low as 20-

[22] INEGI (2011), Encuesta Anual de Transporte.

30 percent in the developed countries depending in part on the fuel tax structure, labor costs and other taxes and fees (OECD, 2011).[23] In the US, it is estimated to be 36 percent on average, still the largest single cost item (TRB, 2010).[24] In other words, there is also a strong, compelling business case for focusing on fuel-use in this sector which is particularly sensitive to energy costs and has thin profit margins.

4.1.2. Urban Transport

42. Urban transport in Mexico is a major source of GHG emissions and grows faster than any other sector because of the pressures of urbanization, sprawl and an increasing demand for automobility. Cities concentrate economic activity (80 percent of GDP[25]). Mexico's urbanization rate – 78 percent in 2011 according to the World Bank – is one of the highest in the region. The development pattern that Mexican cities are following, is characterized by low density or sprawled pattern which increases transport demand and results in more and longer motorized trips. While in the last thirty years the population has doubled, cities extension has multiplied by seven[26]. This growth in cities' extension has in general been characterized by a prioritization of private transport infrastructure over public transit provision. Finally, public transport continuously loses quality, efficiency, and proper maintenance. Since the 70's, policies following deregulation trends lead to the atomization of the public transport sector. The owner-operator scheme generates an oversupply in transport which leads to fleet oversupply and low-cost competition. This discourages technology improvements and proper maintenance.

43. Mexico, like many other countries has identified urban transport as a great opportunity to reduce its carbon footprint while achieving social and economic development. In the case of Mexico, the strategy of the government has been to create a federal program to support mass transit via the Federal Program for the Support of Mass Transit (PROTRAM). The PROTRAM is in general terms both a financial facility for subnational entities to access grants to finance urban transport and at the same time is an instrument to leverage sustainable transport policies. The program focuses on investments that catalyze mass transit corridors, private sector participation, and reduction of pollutants and energy efficiency. To that end the program provides non reimbursable and reimbursable resources for eligible projects. The program eligibility criteria ensure that the supported projects are aligned with the objectives.

44. **The Clean Technology Fund and the World Bank are successfully partnering with the Federal Government to allow greener investment decisions and complement the PROTRAM with strategic interventions**. The CTF and the World Bank are applying an innovative approach to adapt to the complex needs of a country such as Mexico. CTF funds support not only public investments but also interventions under PPP schemes and private sector acquisitions linked to public projects. In this context, CTF financed *Ecovía*, a 30 km BRT corridor in Monterrey, public works and has supported the private concessionaire in the bidding process to procure 80 low carbon buses to operate the corridor. This process, together with an effort to better support PPP schemes, positions the CTF and the World Bank at the final stage of the learning curve. CTF resources can also support complementary investments such as bike paths, pedestrianisation or capacity building interventions.

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[23] OECD (2011), "Moving Freight with Better Trucks: Improving Safety, Productivity and Sustainability."

[24] Transportation Research Board (TRB, 2010), "Technologies and Approaches to Reducing the Fuel Consumption of Medium- and Heavy-Duty Vehicles."

[25] IMCO (2012)

[26] Secretaría de Desarrollo Social (SEDESOL), 2011

45. **Despite the successful ongoing intervention in the sector, additional CTF financing has the potential of having a significant impact nationally within PROTRAM's growing portfolio for qualitative and quantitative reasons**. During the first stage of the intervention (under implementation as part of CTF Phase I financing), some gaps have arisen regarding technical capacity or possible ancillary investments. In addition, CTF concessional resources set key incentive that fosters greener components like the acquisition of low carbon rolling stock or the selection of renewable sources to provide energy in new projects. The PROTRAM portfolio accounts for more than 30 projects promoted by different states and municipalities. This portfolio totals almost USD 6bn to which FONADIN/PROTRAM will contribute with more than USD 2bn.

46. **Though, as more subnational entities show interest in the facility and the portfolio grows, it naturally focuses the limited resources in the mass transit investment only, which leaves aside those ancillary investments that are critical to achieving the ideal modal shift and emissions reductions.** The World Bank estimates the potential public transport infrastructure investment requirements to be between USD 70bn and USD 90bn for the next 12 years. Unless a transformation of the sector is undertaken that highly emphasizes maximizing a modal shift toward mass transport systems, and fuel efficient vehicles, the business-as-usual scenario will continue to see an increase in motorization rates in the foreseeable future, with mass and public transport services continuing to lose share, thereby exacerbating the increase in Mexico's carbon footprint. CTF is a key support to incentivize strategic decisions to maximize the positive impact in reducing GHG emissions and to foster highly impacting and replicable ancillary activities to maximize the program impact.

47. *Priority activities.* The proposed activities will leverage the additionally of the CTF funds. As was the case with CTF Phase I resources, the funds will keep supporting investment in activities to promote a modal shift in urban areas, including those associated with an improvement in the efficient allocation of public space for transport, such as bus rapid transit systems and associated measures (urban densification, the use and linkage with non-motorized transport and demand management actions), rank amongst the most cost effective in the sector.

48. In addition to the activities already financed with CTF Phase I, these additional funds will focus on activities that unlock the GHG reduction potential of the program under two primary objectives. First, to promote the creation of high quality transport network that represent a sound alternative transport mode for current private vehicle users. Second, to support complementary investment to foster public transport use and reduce/eliminate implicit subsidies for automobile travel.

49. The proposed objectives will be met focusing CTF support in activities such as:

    a) Highly replicable pilot activities with a great impact on carbon footprint reduction. Those activities will aim the creation of high quality public networks in a small number of metropolitan regions.
    b) Complementary investments to maximize project impacts (inter alia Land Use and transport integration (TOD-like), Transport System Integration, Pedestrianisation, pricing, street design modifications)

50. *Cumulative emissions savings.* Mexico has estimated a theoretical total potential reduction of 8MtCO_2e a year from urban transport interventions[27]. Regarding actual urban transport infrastructure projects identified, the country calculates a potential reduction of 2 MtCO_2e per year,

[27] Mexico. Fifth National Communication to the UNFCCC. 2012

which is the same quantity estimated in the CTF investment plan in the first stage of the project. Depending on local conditions, a standard mass transit corridor in Mexico can potentially reduce between 15,000t and 80,000 tCO_2e annually, a range that depends on largely on the complementary investments implemented.

51. Program results indicators are as follows. Cost effectiveness of reductions is estimated at USD 30/ton for the entire financing, or about USD 6 of CTF resources/ton.

4.2. Energy Sector

52. *Cumulative emissions savings.* According to the Fifth National Communication, by 2020 *clean*[28] energy measures could result in as much as 86 $MtCO_2e$ per year of abatement. This includes **clean energy sources**, and **energy efficiency at the supply side**.

53. Despite having world class renewable energy resources and the prospect of wind power and other sources achieving economic competitiveness in the short-medium term, the renewable energy sector of Mexico remains relatively untapped. Mexico is extremely dependent on fossil fuels, with 80 % of electricity generation in Mexico coming from them. According to data from SENER,[29] by the end of 2012 the effective capacity of renewables in the national electricity system constituted 20.55% of the total, and it is estimated that the generation associated with these sources accounted for 14.92% of the total electricity generated in that same year.

54. Although substantial progress has been made in specific sectors, the barriers identified in the original Phase I IP for the unlocking of the potential of renewable energy and energy efficiency in Mexico remain strong: (i) lack of financing; (ii) lack of incentives and knowledge of the benefits of a shift to more efficient equipment; (iii) high perception of risk in energy efficiency investments and (iv) high upfront renewable energy capital costs.

55. Electricity generation is responsible for 20% of emissions in Mexico and has the largest abatement potential. In the last decade, Mexico has made great efforts to increase the penetration of renewable energy in the network through tenders for projects of independent power production (IPP) and favorable regulations for self-supply projects. However, IPP projects face barriers in the budget allocation process, while self-supply projects face increasing transaction costs rate and existing subsidies. Projects in the form of small production remain viable except in exceptional circumstances, due to the lack of a guaranteed rate. A number of studies have been carried out to identify strategies and instruments to promote investment in geothermal energy, solar power and biomass.[30]

56. The GoM has also made progress in the promotion of technology development. Despite delays, the hybrid solar and natural gas fired power plant in Agua Prieta, Sonora, is moving forward, and the government will support the creation of centers of excellence on geothermal, wind, and solar power,

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[28] According to the document, clean energy includes renewable energy and fuel switching to natural gas.

[29] Informe sobre la participación de las energías renovables en la generación de electricidad en México al 31 de diciembre de 2012. dd. http://bit.ly/IPERM2012

[30] http://www.energia.gob.mx/webSener/res/0/D121122%20Iniciativa%20Renovable%20SENER_Cogeneraci%C3%B3n.pdf
http://www.energia.gob.mx/webSener/res/0/D121122%20Iniciativa%20Renovable%20SENER_Solar%20FV.pdf
http://www.energia.gob.mx/webSener/res/0/D121122%20Iniciativa%20Renovable%20SENER_Geotermia.pdf
http://www.energia.gob.mx/webSener/res/0/D121122%20Iniciativa%20Renovable%20SENER_Biomasa.pdf
http://amdee.org/LiteratureRetrieve.aspx?ID=114205

through a competitive process. In the off-grid domain, the use of renewable energy technologies has also made progress, and the GEF/IBRD/SENER Integrated Energy Services for Small Rural Communities is in the process of being implemented.

57. Cogeneration is another clean energy technology with a substantial mitigation potential. Untapped electric potential of cogeneration is estimated on about 12 GW. This potential lies primarily in the industrial sector, where thermal and electrical energy are essential inputs. PEMEX ranks second in its potential for cogeneration. Industry's simultaneous and continuous demand for heat and electricity is significant (see Table 5).

Table 5. Potential for cogeneration Mexico

Sector	Potential (GW)
PEMEX	3,3
Industrial	7,0
Commercial	1,5
Total	**11,8**

Source: CRE; CONUEE/GTZ; PEMEX; PwC [31]

58. The potential GHG emissions abatement via clean energy generation is 86 $MtCO_2e$ (equivalent to 23% of theoretical potential identified according to the 5th National Communication, see Figure 8). According to some of the marginal abatement cost studies (see Figure 7), renewable energy technologies such as geothermal and small hydro have some of the lowest marginal abatement costs, among those with positive costs.

59. *Priority Activities.* It is proposed that CTF resources be utilized to accelerate and scale-up recent commitments towards implementation of a comprehensive national renewable energy program, with CTF and MDBs financing being used to prioritize the following activities:

    a) Provide funding and technical assistance for a **Clean Energy Finance Facility**, which builds on the existing Renewable Energy Finance Facility financing facility in NAFIN, by expanding the risk mitigation component, and by including cogeneration.[32] The very positive experience from Phase I of the Facility and the emphasis on new technologies further support this proposal.
    b) Design and Implement an **Electricity Generation from Forest Residues Program**, as part of a joint initiative with the participation of the National Forestry Commission (CONAFOR), the Ministry of Energy (SENER), and the Energy Regulatory Commission (CRE).

60. *Replication and scalability potential.* The program would build upon and leverage existing clean energy projects in a more programmatic approach towards scaling-up investments in geothermal, biogas, solar, and cogeneration. There would also be clear opportunities for scaling up throughout other areas in Latin America and the Caribbean. Scaling-up as well as global technology learning benefits through such scale-effects, so driving down the costs of such investments in the region. A further added benefit of the investment would be assessment of smart grids and potential for scaling these up. With resources from the Phase I IP, the dissemination of current knowledge on renewable energy will be supported through an international renewable energy (RE) conference.

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[31] http://www.cogeneramexico.org.mx/anexos/File/10-POTENCIAL-COMPETITIVO-COGEN.pdf

[32] Cogeneration in an energy efficiency technology, but it is included in this program, since it can benefit from similar financial instruments.

61. *Environmental co-benefits.* The implementation of renewable energy and cogeneration projects has a range of local and regional air quality benefits. The generation of electricity from forest residues may contribute to reducing deforestation through sustainable forest management, and the removal of residues reduces the danger of forest fires. The GoM and the MDBs are carrying out studies to assess the environmental impacts of scaling-up wind power.

62. *Social co-benefits.* Developing the Mexican renewable energy industry would help create new sources of employment and increase Mexico's competitiveness in a growing global industry. In particular, the labor-intensive forest residues program will deliver significant development and poverty reduction benefits. In order to enhance the positive impacts of renewable energy projects on the development of local communities, in particular in the windy Isthmus of Tehuantepec, a set of studies are in preparation or execution by the GoM and the MDBs (including with CTF resources).

63. *Economical co-benefits*. As already seen and quantified in international experiences where a large grid integration of electricity coming from renewable energy sources and cogeneration has taken place, the positive effects of the integration have been reflected on net reductions on electricity consumer prices and avoided costs due to a reduced dependency on price instabilities and supply risks for fossil fuels. The IDB will contribute with its own resources to an effort by SENER to assess the costs and benefits of the integration of renewable energy and cogeneration technologies in the electricity grid.

64. Program results indicators are as follows. Cost effectiveness of reductions is estimated at around 0.26 tons CO_2e reduced per CTF dollar invested at a net abatement cost of USD 3.77/t CO_2e.[33]

Table 6. IDB Clean Energy Program Results

Indicators	Baseline	Investment Program Results
Installed clean energy capacity increased	1,304.5 MW (2012)	330 MW of new capacity (Biomass, mini-hydro, solar, geothermal, and cogeneration)
Estimated annual GHG emissions from the electricity sector reduced	0	26.460 $MtCO_2e$
Scope for avoided annual GHG emissions from the electricity sector is to be replicated according to the existing potential (5,000MW wind + 3,250MW small-hydro)	0	18 Mt CO2e per year (6% of total projected emissions from the power sector in 2030)

4.3. Energy Efficiency

65. Energy Efficiency is a key element to achieving the main objectives of the National Energy Strategy 2013-2025: (i) to meet the energy demand required for sustained economic growth, and (ii) to improve energy access for improving population's quality of life.

66. Mexico has made great strides in the field of energy efficiency standards and certification labels, awareness raising activities, and the implementation of programs targeting specific technologies or sectors (e.g. substitution programs in commerce and housing fixtures, installation of energy efficient appliances, engine replacement program, etc.). Phase I of the CTF also contributed, in particular with (i) the Mexico Efficient Lighting and Appliances Project, which constituted a major success for the

[33] Cost-effectiveness factor defined according to the CTF Investment Criteria. Clean Technology Fund Investment Criteria for Public Sector Operations, paragraph 12 from January 5, 2009.

GoM (a Guinness Record for exchanging the largest amount of incandescent bulbs by efficient lamps at no cost to the final consumer — 22.9 million incandescent bulbs were exchanged), and (ii) the Ecocasa Low Carbon Housing Program, an innovative program which became the first pilot project of the Sustainable Housing NAMA, and which focuses on the medium and medium low income sectors.

67. However, energy efficiency is still facing barriers to lack of information and access to adequate financing. In some sectors, energy subsidies represent an additional barrier. According to the Fifth National Communication, the abatement potential for Energy Efficiency is 64 $MtCO_2e$ per year (which represents 24.5% of total abatement potential for Mexico by 2020 (261 $MtCO_2e$). The estimated potentials are disaggregated in the categories shown in Figure 14 and Table 7.

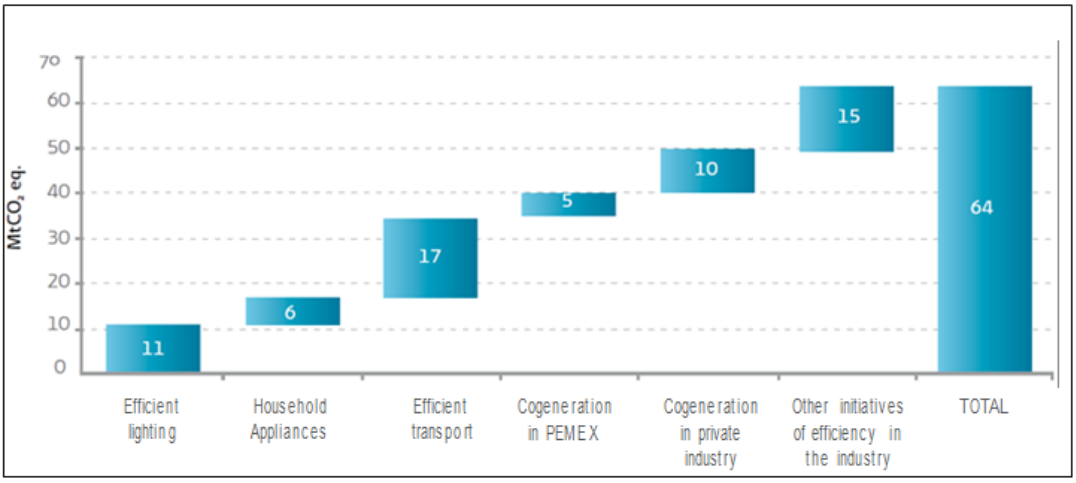
68. *Priority interventions*. The interventions proposed in the CTF IP2 address a number of these areas:

    a) A program targeting energy efficiency in agriculture sector (IDB), which seeks to implement energy efficiency measures along the whole value chain of agriculture SMEs. The measures can include efficient refrigeration, savings in energy consumption through reduced water consumption, and efficient transport.
    b) A lighting and appliances program (IBRD).

69. Two other programs also target energy efficiency: The IDB's clean energy program (see above) includes the financing of cogeneration projects, whereas IBRD's freight transport project (see above) contributes to increasing the efficiency of the fleet.

70. A parallel effort is expected to support a very relevant area of large abatement potential: energy efficiency in SMEs. The Government of the UK, through its International Climate Fund (ICF) has approved in principle a potential grant of **USD 80 million for a Transformational Energy Efficiency program for Mexico's SMEs.** The program will target SMEs with 10 – 250 employees, which account for 250,000 businesses, 4.2 million employees (10% of employment) and a total turnover of USD 300 billion (17% of GDP). It is expected to continue for a period of five years, and will transition afterwards to a commercial model with support from the Mexican financial sector.

Figure 14. Mexico's abatement potential in the energy efficiency subsector



Source: Mexico's Fifth National Communication to the UNFCCC, 2012. http://bit.ly/Mex5Com

Table 7: Mitigation Potential in energy efficiency measures (to 2020 and 2030) in $MtCO_2$/year

Technology	2020	2030
Efficiency in Lighting	11.0	14.1
Efficiency in vehicles and control in the import of second hand vehicles	17.5	47.5
Cogeneration in the private industrial sector and PEMEX	14.8	27.5
PEMEX	4.8	3.9
Efficiency in industry	10.0	23.6
Other industrial processes	14.6	35.8
Energy efficiency in the commercial and residential sector	5.9	13.5
Home appliances	2.9	5.9
Water heating and space cooling	3.0	7.6
Total	**63.8**	**138.3**

Source: INECC, 2012. Bases para una estrategia de desarrollo bajo en emisiones de México. http://bit.ly/BEDBEMex

71. *Social co-benefits and environmental co-benefits. Energy efficiency has a range of global and local* and air quality benefits. Air pollution from the energy sector includes not only GHG emissions, but also SO_2, NOx, Hg, and PM emissions. According to the national inventory reported in the Fifth National Communication, the following emissions were registered in Mexico in 2010: 1.31 ton Hg, 250 kton NOx, 1.557 kton SO_2 and 104.07 kton PM.13

72. *Other co-benefits*: These include increased energy security and lower dependence on fuel imports and fuel price volatility, lower GHG emissions, savings in reduced infrastructure investments for energy supply deferred investments in generation capacity, significant savings in electricity subsidies, and lower energy expenditures.

4.3.1. Energy Efficiency in the Agriculture Sector

73. Rural consumption of resources is high and inefficient. At the same time, natural resource depletion and degradation reduces rural productivity. As a result, the adoption of measures for energy efficiency (EE), renewable energy (RE) and the rational use of water is essential to ensure the sustainability of the country's natural resources, agricultural sector growth and the welfare of the population in the medium and long term.

74. In Mexico, agriculture accounts for 7% of total greenhouse gas (GHG) emissions and forests and land-use change account for 14%, for a total of 21% of the country's emissions. The ENCC includes agriculture as a mitigation priority, both through projects that reduce water and energy consumption in the sector, as well as through the support to actions focused on instrumenting energy efficiency and renewable energy in the sector, such as the use of biodigestors. Unleashing the EE potential is a major challenge that Mexico has to face in the short term in order to protect and strengthen their energy balance. However, the implementation of EE projects requires investments for which funding is scarce. The funding shortage is accentuated in rural areas where productivity is low, limiting the ability to accumulate resources and increasing the perceived risks.

75. *Cumulative emission savings*. The energy savings potential within the productive sector are estimated to be between 15% and 40% of the sector consumption. Achieving such savings will require a substantial scale-up of investment underpinned by policy, regulatory and financing approaches that can transform the market for energy efficiency goods and services. For the transformation of the productive sector alone such costs are estimated in USD 5.6 billion. Cumulative savings up to 2030 from industry are estimated at 27 Mt CO_2e/year.

76. *Replication and scalability potential:* Program results indicators are to be developed as part of the design of the program, based on emission reduction potentials (reduced GHG emissions from agreed sector and country baselines, as well as co-benefits in terms of energy security, and reduced costs of basic goods and services.

Table 8. Energy Efficiency in the Agriculture Sector Program Results

Indicators	Baseline	Investment Program Results
Electricity consumption reduced	0	4,172 GWh over 10 years
Estimated annual GHG emissions reduced	0	0.243 $MtCO_2e$ per year, or 2.43 Mton CO_2e over 10 years

4.3.2. Energy Efficiency in the Residential Sector

77. According to the Ministry of Energy, in 2011, the residential sector accounted for about 18% of total end-use energy in Mexico[34] (769 PJ out of a total of 4,736 PJ). The commercial and public sector in Mexico are also important electricity consumers, accounting for over 11% of total electricity use. Lighting, air-conditioning, and home appliances are expected to be the main drivers for growth areas of residential electricity demand at the residential level in Mexico. Several small-scale efforts to increase the penetration of more efficient technologies in these sectors have been implemented in the country. The main lesson learnt through these pilots is that for dramatically scaling-up the market share of efficient technologies some level of public intervention and support is needed to correct market failures, organize the market and catalyze investment.

78. According to the Fifth National Communication, a sustainable use of energy has a mitigation potential of 64 $MtCO_2e$, equivalent to 24.5% of the national's mitigation target towards 2020 (261 $MtCO_2e$). The opportunities in the SENER is seeking CTF resources to develop a large-scale energy efficiency transformational program leading for efficient lighting (residential sector represent a mitigation potential of 11 $MtCO_2e$ (efficient, commercial, street and public lighting) and 6 $MtCO_2e$ (efficient domestic appliances). Also, such interventions have negative cost per t CO_2e (see Figure 7), thus resulting in savings with respect to the business-as-usual scenario (no interventions).

79. Recognizing the mitigation potential in the residential sector, the GoM, in partnership with the IBRD, itself and acting as implementation agency of GEF, designed and implemented the Energy Efficiency Lighting and Appliances project to replace (i) 22.9 million Incandescent Bulbs (IBs) with Compact Fluorescent Lamps (CFLs), and (ii) 1.7 million of old and inefficient appliances (approximately 90% low income households (refrigerators and 10% air conditioners). Such program was included in the Mexico CTF IP Phase I, with an allocation of USD 50 million of CTF funds through NAFIN.

80. By June 2012, the Energy Efficiency Lighting and appliances project had exchanged 22.9 million of IBs, and by September 2012, 1,781,538 appliances had been replaced. The CTF funds, which were used to provide loans to customers to replace their appliances, were fully disbursed by November 2012.

81. The GoM has expressed interest in requesting additional funds for the Efficient Lighting and Appliances project for the following reasons: (i) the success of the original project in terms of energy

[34] See SENER's Energy Information System, http://sie.energia.gob.mx/

savings and reduction of GHG emissions, which has also helped strengthen the global leadership of Mexico in the climate change agenda, (ii) the potential of the project to create jobs, (iii) the knowledge and logistics capabilities developed during the project implementation, and (iv) a large remaining potential of inefficient appliances to be replaced (approximately 8 million refrigerators).

82. The second phase of the Efficient Lighting and Appliances Project will consist of three components:

    a) State-of-the-art energy efficient refrigerators (USD 50 million CTF): Replacement of inefficient refrigerators with improved energy efficiency and more environmentally friendly appliances (foams and refrigerant gases). The CTF funds would be exclusively used for this component, since the new appliances, although already available, remain expensive and unlikely to enter the Mexican market in the short term without appropriate incentives.
    b) Replacement of IBs in cities with less than 100,000 inhabitants (without funding from CTF). Expansion of IBs exchange to reach customers who were not benefited during the first phase.
    c) National standard in Energy Efficiency for appliances (without funding from CTF): Support in the elaboration of a new Mexican Energy Efficiency standard, aligned with the best international practices.

83. As in the first phase, appropriate public and private sector financial institutions would also be engaged to leverage an adequate financial package. The program would result in lower electricity consumption, significant emissions reductions both from energy savings and refrigerant gas capture (as detailed below), and increased energy security.

84. *Avoided emissions.* The CTF funds would be used to support the second component of the project, i.e., replacement of inefficient refrigerators. Although the amount of appliances is still to be defined by the GoM, the following estimations can be obtained from GoM's data[35]:

    a) Energy savings: 600 GWh per year, per million appliances (6,000 GWh in a life-span of 10 years)
    b) Total avoided emissions associated to energy savings: 3.2 $MtCO_2e$ per million appliances[36] (assuming a life-span of then years and a grid factor of 0.533 tCO_2e/MWh)

85. *Replication and scalability potential.* After successful implementation of the Mexico Efficient Lighting and Appliances Project, it was estimated that around 8 million inefficient refrigerators (older than 10 years) remained in use in the residential sector in Mexico. Under the proposed intervention (component a), the GoM aims to exchange around 950,000 refrigerators (around 12% of the estimated market), with improved energy efficiency and more environmentally friendly appliances (foams and refrigerant gases), using CTF resources to facilitate the introduction of such technologies in the Mexican market. The GoM expects that, as a result of the CTF intervention, state-of-the-art appliances will become affordable for Mexican consumers, which could facilitate the replacement of the remaining 7 million refrigerators.

[35] Partial results for energy savings and avoided emissions reported in the Fifth National Communication for the Mexico Efficient Lighting and Appliances project for 2010.

[36] Additional avoided emissions can be considered due to refrigerant gas capture. However, since refrigerant gas capture is a once-in-a-lifetime event, preliminary results for the Mexico Efficient Lighting and Appliances project were not included in the estimations.

86. Program results indicators are as follows. Cost effectiveness of reductions is estimated at approximately USD 98/ton CO_2e for the entire financing (assuming USD 300 million to exchange around 950,000 appliances, with a cost of around USD 315 per appliance). Considering only CTF funds, the cost effectiveness is estimated at 16 USD/tCO_2e.

Table 9. Residential Energy Efficiency Results

Indicators	Baseline	Investment Program Results
Electricity savings	No savings in 2013	6,000 GWh in a life span of 10 years once appliance replacement begins.
Estimated annual GHG emissions reduced from the program intervention	No avoided emissions in 2013	3.0 MtCO_2e in a life span of 10 years once appliance replacement begins.

V. ENABLING POLICY AND REGULATORY ENVIRONMENT

5.1. Transport

5.1.1. Freight Transport

87. Mexico has advanced in Federal programs aimed at increasing efficiency of its road-based freight fleet, including the *Transporte limpio* and the Federal truck scrapping programs. Despite these efforts to improve efficiency and reduce emissions in the freight transport sector, further actions are required to reach substantial scale and to better target medium and smaller size operators. The current policy, institutional and regulatory environment is characterized by:

    a) The Mexico National Development Plan (2013-2018) contemplates 5 national development pillars, one of which aims to increase prosperity in the country. Of this pillar, one of the 11 main objectives is to "have a transportation infrastructure that is reflected in lower costs for economic activity."
    b) The Mexico Transport and Communication Sectoral Investment Program (2013 – 2018) contemplates three fundamental objectives and five main actions. The fundamental objectives aim at (i) developing a logistic connectivity which lowers overall transport costs, increases road safety and kick starts activities which increase the value of Mexican exports; (ii) promoting a well-balanced regional development which allows growth opportunities throughout the entire country; and (iii) increase welfare in the Mexican population by introducing transport, logistics and communications infrastructure which is fast, safe and affordable. The five main actions tap into road, rail, ports, airports and telecommunications infrastructure. Specifically, road infrastructure activities aim at having a trunk network which is safe, complete and in a good state of repair, by which all regions are connected as well as far apart communities.
    c) *The existence of a voluntary scheme pilot Transporte limpio*, provides the policy basis on how to operate a public-private partnership of its kind. *Transporte limpio* regulatory framework is built upon a memorandum of collaboration specific for the program between the Ministry of Transport (STC) and the Ministry of the Environment and Natural Resources (SEMARNAT) signed in October 2010.
    d) *The Scrapping Program for Federal Transport (Esquema de Chatarrizacion)*. Since October 2003 the GoM created by decree the Federal Scrapping Program which provides fiscal stimuli to freight operators to purchase a vehicle less than 6 years old to substitute vehicles older than 10 years.
    e) *Program for financing freight fleet upgrade (Programa para la Modernización del Autotrasporte Federal)*, which is operated by a national development bank and as the objective of providing fiscal incentives to scrapping, financing for new vehicle down payment and capacity building programs.

88. Moreover, the GoM has recognized the importance of greening the sector. For instance it is preparing regulation for including eco-driving in the commercial vehicle licenses process. Moreover, the president recognizes that Mexico is lagging behind its peers in infrastructure competitiveness and logistic performance, has recently announced an ambitious plan to transform the freight sector in

Mexico by investing more than USD 300M[37] in infrastructure, tightening fuel economy standards, and facilitating the transition to the formal market of smaller operators.

5.1.2. Urban Transport

89. The current policy, institutional and regulatory environment is characterized by:

a) Country wide reform process characterized by the *"Pacto por Mexico"*, a national political agreement between the main political parties that is supposed to result in institutional changes. In this context, the government created recently the Ministry of Land Ownership and Territorial and Urban Development (SEDATU), as a new government agent responsible for Urban Planning and with a role in transportation.
b) *The National Development Plan (2013-2018)* includes urban transport as a key component of two main goals. The first objective is "to have a transportation infrastructure that is reflected in lower costs for economic activity", for which the plan establishes two lines of action: (i) to improve urban mobility through mass transit systems according to sustainable urban development and integrating technologies to optimize people travels; (ii) to promote massive public transport use with complementary measures including bicycle and pedestrian transportation, and reduction of private car use. The second objective is "to move towards a sustainable urban development model […]", for which the plan establishes a line of action including urban transport: (i) to promote sustainable urban mobility by supporting massive public transport projects, and to foster non-motorized transport use.
c) *The Mexico Transport and Communication Sectoral Investment Program (2013 – 2018)* aims to improve the welfare of Mexican population by introducing fast, safe, and affordable transport infrastructure. It also intends to reach a well-balanced regional development. The Program identifies several strategic projects to be prioritized. Among the priorities there are six urban mass transit projects and three passenger trains.
d) *The consolidation of the PROTRAM* as a federal financial facility for urban transport projects. The current amount of investments, including projects in identification and preparation, total almost USD 6bn, which is more than twice the USD 2.4bn projected in the ten year financing plan developed in 2009.
e) *The increase in private sector participation to provide appropriate financing mechanisms.* PPP schemes based on operation services, maintenance, use of stations, or use of the infrastructure (through the local figure PPS, similar to Private Finance Initiatives - PFIs in the United Kingdom). The growth of public debt in some subnational entities may increase the use of these financing schemes, which is already extensive, to reduce the fiscal burden of the public sector.
f) The reorganization of public transport and improvements in mass transit by enhancing the institutional framework, through the use of appropriate tools for integrated planning metropolitan integration, building capacity at the municipal and state levels, and gradually increasing the involvement of the GoM in urban transport through PROTRAM within the Federal Fund for Infrastructure (FONADIN).
g) *Improvements in the mobility of the poorest.* Urban transport improvements can contribute to poverty reduction both indirectly, through its impact on the city economy, and directly, through its impact on the daily needs and access to basic services for poor people.

[37] Announcement by Mexican President Peña Nieto on August 29, 2013 at the Board Meeting of the National Freight Transport Industrial Association (CANACAR).

h) The launching of a financial instrument (FONADIN) to promote investments in infrastructure – including Urban Transport – through the provision of federal subsidies for projects that incorporate private sector participation or have important environmental benefits.

5.2. Energy Sector

90. The Mexican energy sector is constituted by two state-owned enterprises, which exercise near-monopoly control over the energy industry as a whole: *Petróleos Mexicanos* (PEMEX), the state's oil enterprise, and *Comisión Federal de Electricidad* (CFE), a vertically integrated power utility responsible for generation, transmission and distribution. Independent Power Producers (IPPs) generate and sell to CFE almost 24% of the total electricity output.

91. The Ministry of Energy (SENER) is responsible for planning and formulating energy policy, and for approving exploration activities related to natural resources. The Energy Regulatory Commission (CRE) is responsible for the regulation and oversight of private power generation and gas distribution. The Ministry of Finance approves the electricity tariffs proposed by CFE for retail distribution. In July 2013, the Mexican Government presented an Energy Reform, which will be discussed in the Congress. The reform seeks an amendment to two constitutional articles to increase private participation in electricity generation and to allow private participation in the hydrocarbons sector. Additionally, the Ministry of Energy and the Energy Regulatory Commission will increase their planning and regulatory capabilities, respectively. The first stage of the reform involves the amendment of two constitutional articles, and it is expected that secondary legislation will be amended after Congress' decision.

92. Mexico's electricity sector is still highly subsidized for residential consumers and agricultural uses. Electricity subsidies represent a high financial liability for the government as they represent about 1 percent of GDP. The government essentially reimburses CFE for providing subsidies to its customers by discounting the taxes and dividends (*aprovechamiento*) that CFE would otherwise have to pay the government. Since 2002, the volume of subsidies has exceeded the notional amount of *aprovechamiento* and has begun to erode CFE's capital base.

93. Electricity subsidies for residential consumers in Mexico result in overconsumption and excessive GHG emissions. Average residential electricity prices only cover about 40% of the cost of supply, while agricultural tariffs cover only around 30%. Residential and agricultural rates incorporate both marginal and accounting costs of production but are highly subsidized. The main drawback in the design of these rates is that the subsidies seldom benefit lower-income groups, but rather higher-income consumers, who in general, consume larger amounts of electricity. This price distortion reduces the incentive for customers to take energy saving measures.

94. During the last decade average electricity tariffs in Mexico have been held below cost with the aim of maintaining macroeconomic and social stability. For all tariffs, an interagency group comprised of CFE, SHCP, SENER, CRE, and the National Water Commission (CONAGUA) meet regularly and once a year they prepare a tariff proposal for the subsequent year. Tariffs are approved by SHCP and not by the energy sector regulator.

95. On November 28, 2008 a number of energy reform bills were signed into law, including the Law for the Use of Renewable Energy and the Financing of the Energy Transition (LAERFTE), calling for development of a national strategy for promoting renewable energy and energy efficiency, as well as a new Energy Transition Fund ($300m /year for 2009 - 2011 from the federal spending budget).

96. The LGCC (published in 2012) sets the target of achieving 35% of power generation from non-fossil-fuel-based sources of energy by 2024. According to the National Energy Strategy 2013-2027,

such ambitious target will require a comprehensive development of wind potential in Mexico, as well as careful consideration of nuclear re-engagement.

5.3. Energy Efficiency

97. On November 28 2008, the Law for the Sustainable Use of Energy (LASE) came into effect, establishing the following programs and entities in the area of energy efficiency: (a) National Program to promote energy efficiency actions, in which there is a specific mandate to formulate a strategy on efficient lighting; (b) National Commission for the Efficient Use of Energy to promote the adoption of EE measures at various levels of government and among private entities; (c) Advisory Council to back up EE programs; and (d) National Information System to promote energy efficiency. All of these efforts are to be led by the SENER, as the head and highest level authority in the energy sector in Mexico. As a consequence of this law, the former National Commission for Energy Savings (CONAE) became CONUEE, whose main objective is to promote energy efficiency and to provide technical guidance on sustainable use of energy.

98. In 2011, a Lighting Efficiency Standard came into effect, complementing a number of standards in different technologies. Such standard establishes minimum requirements for lighting efficiency in residential, commercial, services, industrial and public lighting sectors[38] (NOM-028-ENER-2010). According to the Fifth National Communication, resulting savings associated with lighting efficiency are estimated as USD 1,430 million by 2020. Abatement potential from the enforcement of this standard is 11 $MtCO_2e$ by 2020.

[38] See http://dof.gob.mx/nota_detalle.php?codigo=5169747&fecha=06/12/2010

VI. IMPLEMENTATION POTENTIAL

99. This section addresses the capacity in place to implement the proposed investments, some of the constraints and key risks that could impede implementation. As in Mexico's CTF IP Phase I, a generic risk for all investments designed to reduce the carbon footprint of Mexico, and indeed of most other countries, is the volatility of oil prices. Generally speaking, an increase in oil prices tends to make a transition to a low-carbon economy more financially attractive. Conversely, a downward trend in oil prices might make the necessary investments less financially attractive.

100. However, in a country such as Mexico, where fiscal revenues heavily depend on oil production, a reduction in oil prices may also have a harmful effect on investments in clean energy, energy efficiency and more sustainable urban transport, which could potentially be significant. Regardless of oil volatility in recent years, Mexico has shown a strong commitment towards climate change mitigation, as indicated by the ambitious targets of GHG emissions reduction and percentage of non-fossil-fuel-based sources of energy for power generation established in the LGCC.

101. In terms of oil prices, Mexico's policy has been to maintain prices stable in real terms. With the sharp increase in world oil prices since 2007, the price of gasoline and diesel in Mexico fell considerably below import prices, thereby causing an explicit subsidy to gasoline consumption. Oil prices have kept a stable path in the last 4 years in the range from 70 to 100 dollars per barrel, As a consequence, international prices for gasoline and diesel are above the domestic price. Government has taken important steps to reduce the gap, but the subsidy still prevails.

6.1. Transport

6.1.1. Green Freight Transport

102. Mexico has been ranked as 68 out of 144 countries in infrastructure competitiveness and 50 when it comes to volume of roads ranking of the World Economic Forum. Indeed, Mexico lands in the 57th position worldwide when it comes to logistics performance. Road infrastructure coverage in Mexico is relatively high in comparison with other countries in Central and South America, but relatively low when compared to emerging economies. Nevertheless, road infrastructure in Mexico is still under the OECD average, which suggests that investments to further increase coverage and tighten technical specifications are still required. Such investment becomes a National priority in a scenario in which increased competitiveness and efficiency in the sector is a central development strategy as it is the case in Mexico.

103. Cost-benefit analysis for investments in fleet upgrading and eco-driving show positive rates of return due to reductions in fuel consumption and in GHG emissions. International experience shows that the main challenges in up-scaling fleet scrapping and upgrading programs remain with finding mechanisms that allow adding to the program small truck fleets and independent drivers.

104. Overall risk for the transport investment is moderate based on the expectation that institutional, regulatory and policy requirements are in place or in process of being adopted in the target cities while the technologies and systems to be deployed have been successfully tested in other countries and/or cities. However, the implementation capacity poses moderate risk as the program is quite ambitious, and requires coordination with other modes of transportation and operators, but the institutional capacity is limited. The table below summarized the main risks and risk mitigation measures:

Table 10. Risk Table for Green Freight Transport Project

Risk	Mitigation	Residual Risk
Limited Policy and regulatory framework	Scaling up existing voluntary programs will mitigate risks. Yet, more ambitious agenda will require legislative efforts to reduce oversupply and tighten standards.	L
Technology: New technology presents operational and maintenance problems	Technologies are not new in the market, experience in US, Canada and China among others will lower the risk of technology entry. Many of the retrofitting technologies have also been field tested in Mexico with similar operational conditions. In addition experiences and lessons learned in other programs will be analyzed and integrated.	L
Finance: Lack of resources to support large scale retrofitting, renovation and scrapping	Loan resources will be complemented with GoM resources.	L
Environmental management: While addressing greenhouse gas emissions, local airborne pollutants and air quality concerns may be ignored	The options to be supported will render both global and local benefits and promote improvements in air quality, while reducing emission of greenhouse gases and air toxics.	L
Development potential: Medium and smaller operators face risk of being left out of the program	Renovation programs will be financed via loans and guarantees. Guarantees are key for reaching medium and smaller size operators.	H
Procurement	A set of clear procurement guidelines for scrapping and purchase of used fleet is still to be defined	M
Overall		Moderate

6.1.2. Sustainable Urban Transport

105. The experience with CTF I showed that risk in the implementation of BRT corridors is manageable when proper safeguards are applied. There are no major problems in the infrastructure for corridors being constructed.

106. *Replication and scalability potential.* This plan is an extension of the CTF intervention in urban transport approved in 2009. Scaling the intervention is advisable due to the large needs to transform urban transport in Mexico and the strategic positive effects of CTF support. CTF resources leverage public and private capital towards greener, strategic, concentrated, investment decisions. The lessons learned in the first phase will speed up the process during the second intervention increasing scalability potential. Regarding replication, this kind of program can be applied to other countries facing similar problems in urban transport. Lessons learned during the first phase are highly applicable to other middle income countries with complex financial needs. In addition, the program has proven to be an effective and efficient instrument to provide additional strategic incentives that make possible greener investment decisions, which in turn amplified the potential carbon footprint reduction of projects.

107. *Environmental co-benefits*. Mexico's geographic characteristic makes some areas very vulnerable to local pollution. According to the Fifth National Communication to the UNFCCC, the implementation of identified BRT corridors has the potential to reduce negative effects on health by USD 60M to USD 80 million. Other economic benefits derived from the project are time savings (43 – 53 million hours) and reduction of accidentability.

108. *Social co-benefits.* The PROTRAM objectives include a special focus in vulnerable groups. BRTs target low and middle income riders. The gains in efficiency (reduced congestion, better use of public space, associated urban renewal) would therefore bring benefits to both passengers and urban

dwellers in the area of influence of the systems. Moreover, the infrastructure construction is critical for generating jobs and the concessions schemes for the operation will cause migration from informal to formal jobs for future BRT operators.

Table 11. Risk Table for Sustainable Urban Transport Project

Risk	Mitigation	Residual Risk
Policy and regulatory framework	Municipalities will be selected into the program based on their existing policy and regulatory framework and the availability of instruments to promote the adoption of cleaner, safe and efficient transport.	L
Implementation capacity: Over-ambitious program and limited resources for institutional capacity	This proposition is based on the expectation of reaching a critical mass as the results are exponential Discipline in project identification and selectivity will be critical to achieve results. Experience with the first phase of UTTP shows that lack of resources in the program for institutional capacity is a challenge. During preparation this will be addressed by ensuring that technical assistance resources are set aside to mobilize the program.	H
Finance: Lack of resources to implement the corridor program	Loan resources will be complemented with carbon finance, FONADIN, and grant resources will reduce the risk.	L
Environmental management: While addressing greenhouse gas emissions, local airborne pollutants and air quality concerns may be ignored.	The options to be supported will render both global and local benefits and promote improvements in air quality, while reducing emission of greenhouse gases and air toxics. World Bank environmental safeguards apply to all the projects financed by the program, and there is substantial material developed for easing its implementation.	L
Development potential: The program does not reach its GHG reduction potential.	These additional IBRD and CTF funds will focus on activities to make possible the achievement of this potential.	M
Procurement, and the need to support private sector investments	The World Bank has clarified procedures with lessons learned from phase I and through that has now mitigated substantially the procurement risk.	L
Overall		Moderate

6.2. Energy Sector

6.2.1. Clean Energy Financing and Risk Mitigation Facility

109. There is currently some uncertainty with regards to the outcomes of the ongoing energy reform. But even if the status quo remains, the country has a strong institutional framework both in government and in the private sector. In the private sector, the self-supply market and the wind power IPP tenders have led to a thriving project development industry, accompanied with equipment suppliers and other supply chain participants for some technologies.

110. On the other hand, the Regulatory Commission (CRE) has strengthened its capacities in the regulation of renewable energy and cogeneration projects, and the LAERFTE law has also reinforced its legal attributions in both domains. The Law has also led to SENER implementing new policy instruments, including the renewable energy program, and the renewable energy outlook.

111. The table below summarizes the main risks and risk mitigation measures to the development of clean energy resources. Overall risk is moderate based on ongoing efforts by the Government to implement the LAERFTE Law. It is expected that long term market certainty will be addressed through the

existing legal, economic and technical tools gained through the leading role of the country in the Latin American context.

Table 12. Risk Table for Clean Energy Financing and Risk Mitigation Facility

Risk	Mitigation	Residual risk
Policy and regulatory framework: An incorrect implementation and regulation of the law could lead to misleading objectives	The LAERFTE Law indicates strong political will for scaling-up investment in clean energy, particularly by the private sector. IDB technical cooperation with SENER and CRE would be prioritized to support the design, development and implementation of appropriate incentives.	L
Implementation capacity: Limited human capacity resource and inadequate technology transfer	Substantial capacity already exists through institutions as the Electric Research Institute (IIE) and the Regional Wind Power Center (CERTE), established with GEF assistance. GEF resources will finance a Center of Excellence on Geothermal Energy to promote knowledge creation and exchange. NAFIN, the development Bank that implemented the first REFF program, has extensively increased its technical capacity. The National University of Mexico (UNAM) is currently offering a first degree in Renewable Energy Engineering.	L
Technology: Technology for solar, geothermal and biomass electricity generation are not sufficiently developed in Mexico	The technologies are either existing in Mexico or in other countries in the region. The IDB will ensure that knowledge exchange and technical advisory accompany the projects.	L
Finance: Lack of incentives for investing Uncertainty in future interconnection infrastructure and its financing	The self-supply market is currently driving the growth of the renewable energy and cogeneration industry, and it is expected that the energy reform will provide new opportunities. CRE is organizing "open seasons" to finance the construction of key transmission infrastructure linking areas that are rich in renewable energy resources.	M
Environmental management: Uncontrolled and unsustainable development of renewable energy projects degenerating in negative reputation for the sector	Based on lessons learned from the efforts undertaken in the first CTF IP, appropriate environmental safeguards will be continuously monitored and preventive measures will be implemented.	L
Social aspects: The opposition of local communities negatively affect project development	SENER, with the support of other federal agencies, state governments, MDBs, and other development partners, is currently designing a strategy to ensure that renewable energy projects benefit local community development.	M
Development potential: Market uncertainty and long term stability could affect investment	Private sector developers are active, with Mexico being the most representative market in LAC. The currently policy framework is increasing the expectations for continuity	M
Procurement: Absence of best practices and technical standards	Extensive experience with competitive international bidding lowers the risk	L
Overall		**Low**

6.2.1. Electricity Generation from Forest Residues

112. This program is located in the intersection of the energy and the forestry sectors. It shares energy sector implementation potential characteristics and risks with the previous program. However, it faces some specific risks in the forestry domain, as described below

Table 13. Risk Table for Electricity Generation from Forest Residues

Risk	Mitigation	Residual risk
Policy and regulatory framework: Communities face problems for complying with forestry sector regulations	Mexico has a solid regulatory framework for sustainable forest management, and an industry of forest experts has developed to support communities involved in forestry activities. CONAFOR will pay particular attention to support the communities involved in the program	L
Implementation capacity: Limited human capacity resource and inadequate technology transfer	The program will include specific activities to ensure that project implementers have the capacity to undertake these novel technologies.	M
Technology: This technology is unknown in Mexico	The technologies are either existing in other countries in the region. The IDB will ensure that knowledge exchange and technical advisory accompany the projects.	M
Finance: Lack of incentives for investing Uncertainty in future interconnection infrastructure and PPAs	CRE will assist project implementers in getting PPAs (either through the self-supply or the small producer modality) or letters of intention that make the projects bankable	M
Environmental management: Projects have negative environmental impacts on the forests or other ecosystems	CONAFOR will ensure that projects comply with the sustainable forest management requirements. The IDB will apply its stringent environmental safeguards	L
Social aspects: Some sectors of the local communities may be opposed to the project	The program will pay particular attention to ensure that the social aspects are adequately covered, so that projects get the support from the different stakeholders	M
Development potential: Market uncertainty and could affect long-term investment	A number of *ejidos, comunidades*, and private owners are engaged in sustainable forest management and interested in applying innovative technologies. The Program will include activities to raise awareness on the benefits of this technology	M
Procurement: Absence of best practices and technical standards	Extensive experience with competitive international bidding lowers the risk	L
Overall		**Medium**

6.3. Energy Efficiency

113. Since 1990, Mexico has engaged in an ambitious energy efficiency agenda as an effective strategy for (i) reducing GHG associated with avoided electricity generation and (ii) reducing the energy intensity, thus helping defer investments in new installed capacity (Figure 4). Also, since 1990, SENER, CFE, FIDE, CONUEE (formerly CONAE) and NAFIN have accumulated a wealth of practical experience with various types of energy efficiency programs. As indicated by the ENE 2013, energy efficiency remains a key element in the Mexican energy sector.

6.3.1. Energy Efficiency in the Residential Sector

114. The successful implementation of the Mexico Efficient Lighting and Appliances Project has resulted in:

    a) A new Mexican standard to phase-out incandescent bulbs from 2014, which was published in 2010.

b) Sustainability in the process of replacing old and inefficient refrigerators with new appliances without the necessity of a government subsidy, indicating that the private sector, in collaboration with government entities, is capable and willing to provide financing for energy efficiency services.
c) Increased institutional capacity for destroying and disposing old appliances.

115. The proposed program aims to build on the success of previous energy efficiency interventions to accelerate the incorporation of already available state-of-the-art technologies into the Mexican market. Given the regulatory framework and the experience and implementation capacity of government entities, the overall risk is moderate. The table below summarizes the main risks and risk mitigation measures.

Table 14. Risk Table for Energy Efficiency in the Residential Sector

Risk	Mitigation	Residual Risk
Policy and regulatory framework: Energy Efficiency is a key element of the National Energy Strategy and the National Climate Change Strategy, both published in 2013. As such, there exists the policy and regulatory support for this project.	Strong coordination between World Bank's team and responsible agencies for enforcing regulation, i.e. SENER and SEMARNAT	L
Implementation capacity: SENER's plan to target populations of less than 100,000 inhabitants for IBs replacement might represent an implementation challenge, particularly when deciding which entity should be in charge of final distribution. On the other hand, replacement of appliances should take advantage of the capacity building achieved during the implementation of the Mexico Efficient Lighting and Appliances project.	Technical, organizational and financial assistance to strengthen the relevant agencies once they have been identified. SENER will build on lessons learnt from the Mexico Efficient Lighting and Appliances project to replicate successful capacity building strategies developed for FIDE.	M
Upscale potential for the program will depend on total financing (IBRD, CTF and GoM counterpart)	SENER has not defined the total amount of GoM resources to be allocated to this project. A more accurate assessment of the risk for the scale up potential can be performed once SENER defines GoM co-funding.	M
Environmental management. During the implementation of the Mexico Efficient Lighting and Appliances Project, significant building capacity was achieved for environmental management, mainly by strengthening FIDE staff to properly conduct environmental audits to appliance-collecting facilities. Such capacity should be used, improved and expanded for the proposed operation. However, a pending task remains in terms of appropriate collecting and disposal of CFL once they are no longer useful.	Technical assistance will be provided to strengthen capacity specifically for CFL handling. A national collecting and disposal program should be designed, implemented and evaluated through environmental audits.	M
Development potential Low penetration of new technologies	Support in designing a phased approach will be provided together with the right incentives and supportive regulatory framework in order to ensure an adequate market uptake of the new technologies.	M
Procurement	Competitive bidding would be used to acquire equipment where necessary. Support will be provided in the development of the bidding documents using technical specifications based on best international practices.	L
Overall		**Moderate**

6.3.1. Energy Efficiency in the Agriculture Sector

116. Mexico has a number of institutions that work in the agriculture sector and that have experience in implementing EE, RE, and other climate change mitigation technologies such as biodigestors. This is the case of the Agriculture-Related Trust-Funds (FIRA), and the Share Risk Trust Fund (FIRCO). The table below summarizes the main risks and risk mitigation measures for the Energy Efficiency in the Agriculture Sector Program.

Table 15. Risk Table for Energy Efficiency in the Agriculture Sector

Risk	Mitigation	Residual Risk
Implementation capacity: Specific experience in financing projects that promote the sustainable use of natural resources is limited. Lack of information of financial intermediaries in terms of: i) business model eligible projects, ii) credit assessment of the eligible projects, iii) how to market financial products to eligible projects eligible production units iv) as eligible projects increase business solvency	The IDB is working with FIRA on a Green Line using CTF resources. This Line will provide technical capacity and will focus on awareness raising and demand structuring.	L
Environmental: The removal and disposal of old equipment is not done sustainably	The experience of the IDB with the current energy efficiency in agriculture grant with FIRA is successful and the lessons learned will be applied to the project. A protocol for the disposal and retirement of equipment will be development and implemented.	L
Development potential Low penetration of new technologies	The technologies are being identified and the Program will support the national development bank that will execute this program	M
Procurement	Competitive bidding would be used to acquire equipment where necessary. Support will be provided in the development of the bidding documents using technical specifications based on best international practices.	L
Overall		**Moderate**

VII. FINANCING PLAN AND INSTRUMENTS

117. Table 16 below summarizes the investment needs and proposed allocations across the various sources of financing (in USD million). It must be noted that these are notional amounts, revisable at the time of project/program design.

Table 16. CTF Financing Plan, Phase II

Program	MDB	Annex number	CTF	GoM	IBRD loans	IDB loans	Other; private sector	TOTAL
Green Freight Transport	IBRD	1	50	40	50			**140**
Sustainable Urban Transport	IBRD	2	50	400	50		240	**740**
Clean Energy Financing and Risk Mitigation Facility	IDB	3	80	140		80	70	**370**
Electricity Generation from Forest Residues	IDB	4	40	10		30	10	**90**
Energy Efficiency in the Residential Sector	IBRD	5	50	50	100		100	**300**
Energy Efficiency in the Agriculture Sector	IDB	6	30	10		20	10	**70**
TOTAL			**300**	**650**	**200**	**130**	**430**	**1,710**

VIII. MONITORING AND EVALUATION

118. In order to fully comply with the CTF Results Framework approved in December 2012,[39] the GoM and the participating MDBs are working in the development of procedures for the GoM to report on the CTF IP Results at a programmatic level to the CTF. Such internal mechanism is a work in progress and final results are expected by the end of 2013.

119. CIF programs have results frameworks approved by the respective Trust-Fund Committees or Subcommittees.[40] The Results Frameworks establish minimum indicators to be measured at both projects and programs, such as the IP. MDBs must report to the CIF results of projects or programs implemented by them, while governments must report aggregated results of PI. The Results Frameworks state that countries should use their own institutions and mechanisms for monitoring and evaluation of activities.

120. The objective of the consultancy under development is to design appropriate procedures to ensure compliance by Mexico of results reporting commitments established in the CTF and FIP results framework.

121. The consultancy includes the following activities:

- Consult with relevant agencies of the Federal Government the procedures for integrating the information generated by the CIF projects in existing information systems, particularly those related to the sectors of CTF and FIP.
- Consult with the Finance Ministry and relevant agencies the procedures to send that information to the CIF Administrative Unit.
- Review monitoring and evaluation frameworks included in the documents of the various projects of the MDBs, and consult with the leaders of these projects and the focal points in the implementing agencies or financial intermediaries the mechanisms for generating the information in each one of the projects or programs, and the appropriate procedures to channel this information to the aforementioned information systems.
- In the case of confidential information, the consultant shall propose specific mechanisms for the handling of such information and agree with stakeholders the degree of aggregation necessary to make the results public.
- From the information gathered in the above, the consultant will prepare a Manual of Procedures for Reporting Results of CIF in Mexico. The procedures should be agreed with the MDBs, executing agencies or financial intermediaries, and other relevant institutions. The Manual will include information sources, specific responsibilities, forms, procedures and schedules.

122. Note that the scope of the activities listed above is the IP-level indicators, i.e. those that fall within the scope of responsibility of the GoM.

123. Table 17 summarizes the results framework of all the interventions included in this investment plan.

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[39] See http://bit.ly/CTFrefr.

[40] See http://bit.ly/CIFrefr. For the Forest Investment Program (FIP), see http://bit.ly/FIPrefr

Table 17. Results framework of the Mexico CTF IP Phase II

Results	Results Indicator	Baseline	Expected Results in the CTF IP Phase II	Means of verification
GHG emissions reductions	Tons of GHG emissions reduced or avoided	National GHG emissions in 2010: 748 $MtCO_2e$	60.89 $MtCO_2e$ Cumulative reductions at the end of project's lifetime	National M&E System and M&E framework of the implementing agency
Financial resources leveraged	Volume of direct finance leveraged through CTF funding	None	USD 1,410 million (USD 980 million public sector and USD 430 million private sector)	National M&E System and M&E framework of the implementing agency
Renewable energy capacity	Installed capacity (MW) as a result of CTF interventions	1304.5 MW (2012)	330 MW	National M&E System and M&E framework of the implementing agency
Additional passengers	Number of additional passengers using low carbon public transport as a result of CTF interventions	None	4,400,000 Passengers/day	National M&E System and M&E framework of the implementing agency
Energy savings	Energy savings as a result of CTF interventions (GWh)	None	10,172 Cumulative GWh at the end of project's lifetime	National M&E System and M&E framework of the implementing agency

IX. STAKEHOLDER ENGAGEMENT

124. A meeting with relevant stakeholders from civil society was held on 28 August 2013, with the purpose of seeking their inputs on the projects proposed to be included on the Mexico CTF Investment Plan Phase II.

125. Representatives from the Mexican chapter of Transparency International, the Mexican Center for Environmental Law (CEMDA), the Global Green Growth Institute, and the Institute for Transportation and Development Policy (ITDP) participated with representatives of the GoM (SHCP and INECC) and of the MDBs in the discussion. They and expressed their interest in being informed on the process and asserted the relevance of the participation of civil society organizations (CSOs) in the IP.

126. Regarding the transport proposals, participants voiced the need to ensure a close link with municipal authorities. Regarding the clean energy finance facility, the participants emphasized the need to address the potential social and environmental impacts on a timely manner, to learn from the wind power process of the first phase. The creation of a social impacts discussion group to follow up on the projects was proposed.

127. A further meeting was held on 12 September 2013 with development partners in order to address possibilities for synergies between their activities and the CTF IP Phase II. Representatives from the German Technical Cooperation Agency GIZ, the German development bank KfW, the UK Embassy, the French Development Agency (AFD), and the Climate Works Foundation participated in the discussion with the MDBs and the GoM (SHCP).

128. The development partners described their work on all the fronts that the IP seeks to cover and possibilities for synergies were identified.

129. In particular, GIZ is involved in the design of several NAMAs with the GoM in a number of sectors. Following the experience of the Ecocasa project executed under Phase I of the CTF, and which builds on the framework of the NAMA for new housing, participants agrees that all CTF projects have the potential of being integrated into NAMA frameworks, so that they contribute to piloting these NAMAs.

ANNEX 1.
GREEN FREIGHT TRANSPORT
(IBRD)

Problem Statement

1. Mexico's freight Transport Sector is growing, dominated by trucks and likely to remain dominated by trucking in the near future. Though trucking is energy intensive, and the data suggest that truck-based freight already account for 26 percent of transport sector emissions; recent experience in Mexico and internationally indicate there remains significant potential to reduce emissions from this sector in the short term by (i) enhancing the fuel efficiency of the truck fleet; and (ii) increasing truck productivity (reducing empty km traveled). Mode shift away from trucks to less energy intensive modes, when possible would also materially reduce emissions. Fortunately, there is a convergence of agendas – initiatives that would enhance fuel efficiency and productivity of the trucking fleet would also materially improve profitability. Existing Federal programs targeting fuel efficiency improvements in the existing in-use fleet (*transporte limpio)* and fleet renovation and scrappage have had important successes in demonstrating significant fuel efficiency increases – but thus far these programs have not significantly penetrated small and medium sized firms. The goal of this project is to extend transport fuel-efficiency increases across the Mexican truck fleet, particularly among the small and medium truck owners.

Proposed Transformation

2. The use of CTF funds will focus on two key pillars:

Pillar 1 - Fleet modernization and renovation (USD 40 million CTF+USD 30 million IBRD).

3. There are a number of existing government programs that support fleet modernization and adoption of fuel efficiency technologies. Three programs in particular: "*transporte limpio*" managed by SEMARNAT that helps truckers identify and adopt fuel saving technologies; the Federal Government scrappage scheme implemented by SCT using fiscal stimulus funds; and the program for fleet modernization implemented by SCT. These programs have been successful and have delivered measurable benefits both in terms of GHG and in terms of environmental and productivity co-benefits. However, the evidence is that they have been most effective in working with the big firms and have struggled to make inroads with small and medium firms. The objective of the proposed CTF program is to expand the effectiveness of these schemes to small and medium companies and to maximize the GHG benefits of these schemes.

Pillar 2 - Complementary initiatives to reduce carbon footprint of the freight system (USD 10 million CTF +USD 20m IBRD).

4. These include support for incremental investments that reduce empty backhauls (such as support for modernization of logistics centers) and measures that support multimodal integration (such as equipment for multi-modal centers). An integrated multi-modal transport system is the cornerstone of any green freight strategy. On one hand, trucks offer a remarkable amount of flexibility, door-to-door speed, and transparency for shippers. Thus for many kinds of cargo, particularly high-value or time-sensitive cargo, trucks may always play an important role. However, much can be done to support the development of alternatives modes – rail, pipelines, inland and coastal shipping – in the context of freight movements in Mexico. In a market environment, these alternatives modes will be most competitive in the case of long-haul trips and for lower-value bulk products such as agricultural and mining commodities. There is also a strong alignment between economic and environmental

performance since these modes are more economical than trucking and, in general, market-driven shifts from road to alternative modes also reflect a reduction of overall logistics cost in the economy. For example, beyond a certain trip distance (typically 1000 km), long haul will be more cost efficient on rail than on trucks. Given this convergence of interest, development of multi-modal infrastructure has increasingly become a national priority.

Implementation Readiness

5. The proposed CTF-supported operation builds on a number of existing programs removing constraints in important ways that allows them to significantly expand their reach: the *transporte limpio* program run by SEMARNAT, the scrapping and fleet modernization programs operated by SCT; and SCT's logistics program. Though the scale of all of these programs is somewhat limited, and the scope of the fleet renovation and modernization programs is predominantly limited to the largest fleet operators (who own about 24 percent of the fleet) the fact that the programs already exist creates important advantages in terms of implementation readiness. The programs already exist, implementation and institutional arrangements are in place and successful. Though there is potential to scale the programs (which is the objective of this proposal) the programs operate already at a reasonable scale; for instance the *transporte limpio* project services over 100 firms with over 40,000 trucks; and the modernization and scrappage programs also serve thousands of trucks annually.

6. In the case of the *transporte limpio* program, essentially a voluntary partnership program that helps truckers identify fuel-efficiency enhancements for the in-use fleet, the most important achievement is that there exists a fleet of thousands vehicles that have adopted *transporte limpio* solutions and can demonstrate fuel-efficiencies and related cost-savings in a real world setting. The program helps truckers identify solutions such as better quality lubricators and tires, aerodynamic design modifications on the vehicle body, and in-use modifications such as eco-driving techniques and maintenance of optimal tire pressure. As noted, the program has had success helping over 40,000 trucks adopt these solutions – on the basis of their expected productivity impacts – and in the process saved over 2.4MtCO_2e emissions in a four year period. Though important adjustments will be needed to expand the penetration of this program beyond the well capitalized large fleet owners; the real-world success with over 40,000 vehicles and the associated demonstration potential provides a good implementation platform for the component of the proposed CTF financed operation focusing on scaling up enhancements of the in-use vehicle fleet.

7. In the case of SCT's vehicle scrappage and fleet modernization programs, the existing successful programs provide a similar platform of a tested prototype with institutional structures and implementation arrangements essentially in place. Perhaps most importantly, the vehicle modernization program has in place two financial incentive structures that have been tested, had some success and can be scaled up with minor adjustments:

    a) *Modernization.* SCT uses program funds delivered through NAFIN (a publicly owned development Bank) to lower financing costs for new vehicles purchased as part of this program, which provides a risk guarantee for approximately 5% of total vehicles financed (i.e. 1 million in the trust fund for 10 million financed), and
    b) *Scrapping.* SCT provides a subsidy in the form of fiscal stimuli of up to 15% percent of new vehicle cost (6 years or less when a vehicle of more than 10 years old is scrapped). The fiscal stimuli can be used against federal taxes by the manufacturer who reflects these stimuli in the purchasing price of the new unit.

8. Though important adjustments will be needed to (a) strengthen verification regimes for the scrappage program; and (b) adjust the incentives to attract more trucks to combine the vehicle modernization

with scrappage. Nevertheless, the structure of the existing program provides a real-world anchor for a scaled up program. This financial structure also provides a platform for expanding *transporte limpio* by providing truckers, particularly small and medium sized operators with financing.

Rationale for CTF financing

9. Currently, these programs though operational and somewhat successful do not maximize their potential impact on emission reductions. The goal of the proposed CTF operation is to remove structural constraints that currently limit the effectiveness of existing programs and scale them to their potential.

10. The *transporte limpio* program has helped reduce 2.4 MT CO emissions in the period 2008 – 2012, even though its penetration has been limited to less than 5 percent of Mexico's current in-use fleet of over 700,000 trucks. The program's potential has been limited by two key factors: (i) limited facilities and capacity to deliver eco-driving and eco-maintenance training, an important component that the program has found (a finding consistent with the international experience) to have fuel efficacy impacts of more than 10 percent; and (ii) inability to support truckers with financing support to adopt fuel efficiency technologies; a significant hurdle for all but the largest trucking firms - even though these technologies have a demonstrated payback period of less than 2 years in terms of fuel costs saved, the initial capital costs can be considerable.

11. The CTF resources will address both of these constraints. First, it will support the establishment of a network of training centers which will be able to offer certified energy-saving diagnostics and eco-driving training. Second, it will provide partial financing for medium and small sized truckers to help them adopt energy-saving technologies. This financing will be organized using the model used by SCT to implement financing support for its fleet modernization program. It is estimated that with these structural adjustments the program will be able to reach virtually all the large trucking operators and at least 50 percent of the small and medium operators. Estimates made by SEMARNAT suggest that expanding these two activities could produce emission savings of 70 $MtCO_2e$ over a twenty year period (2015-2035). A conservative top-down analysis that assumes that the CTF support will help *transporte limpio* scale its impact to 160,000 in-use vehicles over a four year support period (still less than 25 percent of even the current fleet) estimates savings of 14.3 $MtCO_2et$[41].

12. When it comes to modernization and scrapping the GoM numbers shows an investment of USD 16,300 per unit scrapped, and savings of 164.3 Ton/veh-yr, or 1.48MT/year. Although this program will continue to be largely financed by government funds – as it is a priority for the GoM-, the CTF project will expand the reach of this program to particular local settings - such as ports of urban settings where a scrappage/fleet modernization program can be complemented by enforcement regulations to increase the cost-effectiveness of the program. We will use USD20/ton of CO_2 equivalent to design interventions in this component.

[41] Assuming that each participating truck saves 10 percent in fuel, for a million lifetime km (10 years of 100,000km) over a base fuel efficiency of 32liters per 100km. The data collected by *Transporte limpio* in its 4 years of existence and a similar technology adoption program in the US (EPA's Smartway Program) suggest that these assumptions are conservative. For instance, Smartway started in 2005 and has been credited with saving 23MT of CO2 equivalent in the 2005-2011 period alone.

13. International experience shows that fuel consumption for new trucks has decreased over the past 30 years from about 50 liters/100 km to 30-35 liters/100 km, while the engine power has doubled from about 180 kW to 360 kW. The engines of today's trucks have high thermodynamic efficiency, but it is possible to decrease the fuel consumption further to about 25 litres/100 km, for example, by downsizing the engine, reducing aerodynamic drag, reducing rolling resistance and improving the efficiency of auxiliary systems. (OECD, 2011)

14. In the case of the logistics components, a shadow carbon price threshold of USD 20 per ton of CO_2 equivalent will be used to appraise feasibility for the use of CTF funds yielding savings of at least 1.25MT. However, this is conservative – note that if a logistics modification such as an online information brokerage that can help truckers access shippers helps to reduce empty back hauls (typically 30-40 percent of all VMT in both Brazil and China) by even 10 percent it has the impact of enhancing fuel efficiency of the affected fleet by 4-5 percent; with very significant reductions in CO_2 equivalent emitted.

Results Framework, Financing Plan and Preparation Timetable

Table 18. Indicators, Results Framework for the Green Freight Transport Project

Indicators	Baseline	Investment Program Results
Mexico's carbon intensity reduced	0.6 Mt CO_2e per million USD of GDP at PPP	Remains at 0.6 arresting anticipated increase
Number of vehicles participating annually in transporte limpio	10,000 vehicles	40,000 additional vehicles annually
Estimated annual GHG emissions from the transport sector decreased from transporte limpio	1 MT/year	14MT lifetime from a 4 year program.

Table 19. Financing Plan for the Green Freight Transport Project

Element	CTF (million USD)	IBRD(million USD)	GoM(million USD)	Total(million USD)
Pillar 1 - Fleet Modernization and Renovation				
Scrapping and fleet Substitution	15	5	40	60
Transporte limpio Centers	5	5	0	10
Fuel Efficiency Technologies	20	10	0	30
Pillar 2 - Complementary initiatives to reduce carbon footprint of the freight system				
Logistics hubs	5	10	0	15
Small Scale Infrastructure	5	20	0	25
TOTAL	**50**	**50**	**40**	**140**

Table 20. Preparation Timetable for the Green Freight Transport Project

Milestone	Date
Eligibility Meeting	October 2013
CTF Trust Fund Committee Approval	September 2014
Appraisal / negotiations	October 2014
Bank Board Approval	December 2014
First disbursement	August 2015
Project Completion	December 2019

ANNEX 2
SUSTAINABLE URBAN TRANSPORT
(IBRD)

Problem Statement

1. Mexico is facing the challenge of achieving sustainable and integrated cities' urban transport systems, which current flaws lead to a high level of GHG emissions that is growing fast. Growing urbanization in the country, an increasing middle class and demand for goods and services in urban settings is resulting in growing motorization rates. This intensifies the effects of the lack of sustainable and integrated urban transport systems in Mexican city. The combination of this two factors mean an accelerated increase in travel times, over supply of vehicles fleet, less maintenance or technology improvements, and other negative effects that, in turn, increase the sector's GHG emissions. As a result, transport represents 18 percent of the Mexico's GHG emissions. Mexico's transport emissions increased by 27 percent between 1990 and 2005 and now account for about 2 percent of the global transport sector's emissions and is currently increasing at a better than 2 percent per year. Currently, Mexico holds the sixth position among OECD countries regarding GHG emissions. Unless changes in urban transport modal share is affected, this will result in a continuous increase in emissions of GHG and air toxics of the sector with the combined negative effects on air quality, productivity and congested public space. Without a concerted effort from both public and private sectors that maximizes a modal shift toward mass transport systems, and fuel efficient vehicles, the business-as-usual scenario in the transport sector will see a rapid increase in Mexico's carbon footprint.

2. Additionally, an intervention in urban areas has great environmental and social co-benefits. Mexico is one of the countries more affected by urban transport related pollution in the entire World because of three reasons. First, some dense population areas, such as Mexico Valley, have special conditions that worsen the effect of local pollutants over people health. Second, Mexico is one of the most urbanized countries in the region. This means that more people lives in cities and suffer from transport related local pollutants. Third, Mexican cities rank in the top regarding transport related local emissions. With respect to social co-benefits, the project seeks to concentrate and professionalize urban transport sector by substituting the fostering the creation of big mass transit corridors concessionaire from the current one person owner-concessionaire-operator scheme. Furthermore, these investments will also bring benefits regarding productivity as time savings for transport users in the cities.

3. The GoM is carrying out a great effort to face these challenges through the successful implementation of a federal program (PROTRAM); still the private sector lacks incentives towards greener investment decisions and subnational entities can benefit from technical assistance to maximize programs benefits.

Proposed Transformation

4. The first Stage of CTF intervention in Mexican urban transport (under implementation as part of CTF Phase I financing) was essential to enable the articulation of the PROTRAM federal program that has kick-started the implementation of mass transit corridors in several Mexican cities. The implementation of this program is already having a transformative impact on the structure of Mexico's urban areas with important implications for the sustainability and long-term carbon footprint of these cities. That said, the evidence suggests the need for two kinds of structural adjustments to maximize the CO_2 reduction potential of these corridors in the short-term. As

described below, the proposed CTF intervention will be used to support these adjustments as well as to expand the potential of the program.

5. The experience with early PROTRAM financed projects suggest that in the short-term, most of the GHG savings will accrue from technology upgrades from the use of fewer, bigger and more modern buses. While the new improved services represent a step improvement in the quality of public transport supply; and subsequently offer significant welfare benefits to users; more will need to be done to maximize the mode shift potential of these projects (which is where much of the CO_2 reduction potential of these interventions lies). Particularly, the evidence from cities such as London, New York, Paris and Singapore that are indeed able to achieve significant mode-share related CO_2 benefits from incremental investments in mass transport suggests that two kinds of structural constraints need to be addressed to unlock the CO_2 reduction potential of PROTRAM investments:

    a) First, a critical threshold of mass transit investments are needed in a region in order to create an adequate high-quality public transport network that can reasonably serve as a robust modal alternative to trip-makers that potentially have the choice of a private vehicle. When starting from an environment characterized by poor quality public transport (such as is the common baseline for many PROTRAM projects) where most people with the ability to choose private vehicles do so; and rapidly rising incomes which facilitate such a choice for more and more people; in the short term a behavioral impact of high-quality transit is to postpone the private vehicle acquisition decision for 'satisfied' public transport users. However, in the case of most users, one or two high quality corridors are not enough to cause such changes in behavior. A network of high quality transport that is a true viable competitive alternative is needed. *CTF financing will be used to focus on creating networks of high quality public transport in a small number of metropolitan regions.*
    b) Second, to induce mode shift, mass transit interventions need to be embedded in a broader integrated strategy of complimentary investments and policies that reinforce the attractiveness of public transport and reduce/eliminate implicit subsidies for automobile travel. *CTF financing will be used to support such complementary investments that support transit-oriented development, and related initiatives (pricing, street design modifications) that prioritize non-automobile modes.*

6. Additionally, CTF funds can help to expand the reach of PROTRAM which is now over-subscribed; i.e. the size of PROTRAM's portfolio exceed expectations. The current amount of investments, including projects in identification and preparation, total almost USD 6bn, which is more than twice the USD 2.4bn projected in the ten year financing plan developed in 2009. USD 2.1bn in investments have already been authorized, and an additional USD 900m has been endorsed in principle. Actual need for investments is even larger. *The additional financing with CTF resources will make possible to support a greatest number of subprojects.*

Implementation Readiness

7. The proposed CTF intervention will build on the considerable experience and lessons learnt from implementing the Phase I CTF investment and the launch of the PROTRAM program. Though early stages of implementation were associated with significant birthing pains, both the PROTRAM and CTF project pipelines are now robust. Though important structural adjustments in program design will be needed to maximize the CO_2 reduction potential of the intervention there are a number of important lessons from the existing implementation effort that provides an important platform for the proposed effort such as the need to put in place harmonized procurement documents ahead of

demand particularly in response to an unusual variety of procurement and PPP approaches being experimented with in the Mexican urban context at the present time.

Rationale for CTF Funding

8. Without the second Phase of CTF financing, PROTRAM will continue to implement mass transit corridors (though at some point soon it run out of money unless complemented by additional resources) that will achieve significant benefits but will likely have only limited GHG impacts. Unless multiple interventions are focused in a region; and unless mass transit corridors are complemented with other reinforcing policies and investments; their potential mode shift impact will not be realized. At this point neither of these issues is a concern for PROTRAM; if anything a desire for regional/territorial balance orients the program to disperse its investments. Further the scope of the program in practice has been exclusively mass transit corridors – necessary for mode shift, but in themselves usually not sufficient. CTF financing will be used to enhance PROTRAM investments with complementary investments both in public transport improvement as well as other mobility enhancements to maximize the mode shift potential of these investments.

Results Framework

9. This intervention will support actions that maximize the modal shift potential of existing PROTRAM projects; a potential that would need to be realized to meet the original emissions savings estimation. More than 90 percent of total emissions savings estimated in Phase I depended on modal shift. However, due to the unexpected growth of the PROTRAM portfolio, federal resources are focusing in the infrastructure. Consequently, the program is not financing the complementary investment required to reach the potential modal shift. Without this enhanced modal shift, emissions reduction will be 50 percent lower than predicted. The proposed intervention intends to support the activities that will make possible to reach the 100 percent reduction potential of the program.

Results Framework, Financing Plan and Preparation Timetable

Table 21. Results Framework for the Urban Transport Project

Results	Indicator	Baseline	Target
Avoided GHG emissions	Tons of transport related GHG emissions reduced or avoided t CO_2e/yr t CO_2e over lifetime of the project	- None (Estimations of total transport related emissions for 2013 179,879.74 $MtCO_2$ (est. 2013) - 0 (Estimations of total transport related emissions over the next 20 years: 4,833,435 $MtCO_2$)	- 1$MtCO_2$ savings per year once all the projects are in place. - 15$MtCO_2$ total savings over the next 20 years.
Increased finance for low carbon development	Volume of direct finance leveraged through CTF funding (disaggregated by public and private finance) (USD million)	None	USD 740 million
Increased access to public transport	Number of additional passengers (disaggregated by men and women if feasible) using lower carbon public transport as a result of CTF intervention (nr. of passenger/ day)	- None (154,000 per benchmark corridor, 3,080,000 in the 20 corridors)	4,400,000 (220,000 per enhanced corridor)

These results correspond to the 50 percent of total emissions reduction estimated in Phase I of CTF. This reduction would not be achieved without further interventions to promote the required modal shift.

Table 22. Financing Plan for the Sustainable Urban Transport Project

Financing Source	Amount
CTF (IBRD) (million USD)	50
IBRD(million USD)	50
GoM(million USD)	400
Private Sector	240
Total (million USD)	740

Note: Notional amounts, revisable according to Government plans.

Table 23. Preparation Timetable for the Sustainable Urban Transport Project

Milestone	Date
Eligibility Meeting	October 2013
CTF Trust Fund Committee Approval	September 2014
Appraisal / negotiations	November 2014
Bank Board Approval	February 2015
First disbursement	July 2015
Project Completion	July 2020

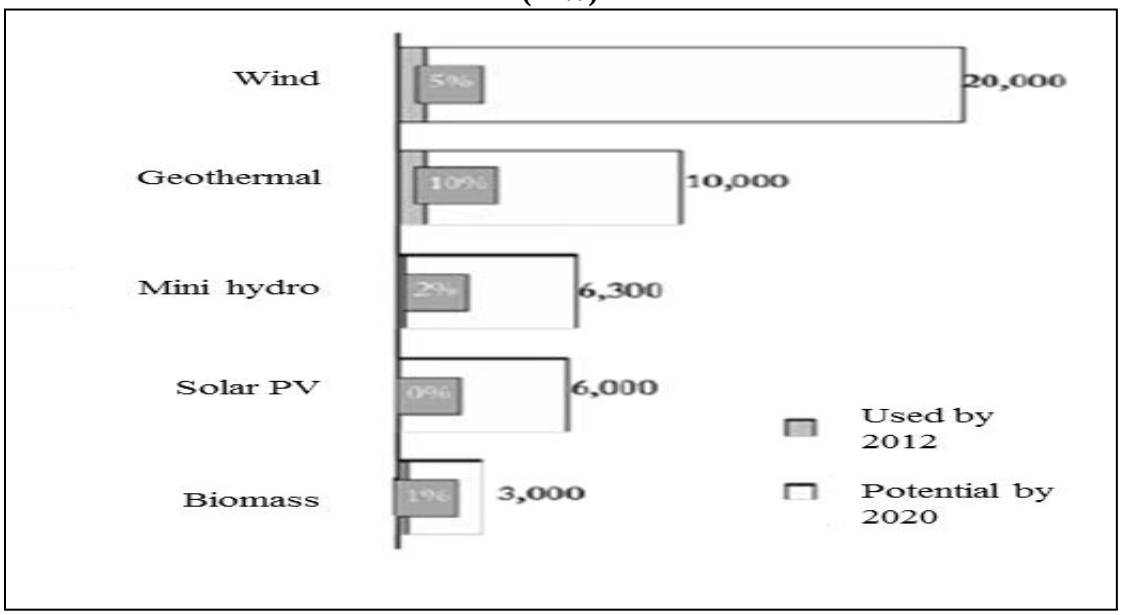
ANNEX 3.
CLEAN ENERGY FINANCING AND RISK MITIGATION FACILITY (IDB)

Brief Description of the Project and Objective

1. In 2012, Mexico increased its target for clean electricity generation to 35% by 2024. This imposes a major challenge: with a current share of electricity production from renewables of 19% (2012, CFE), the country needs to scale up investment in clean energy generation in a sustainable and cost-efficient way.

2. While currently 75% of its electricity generation comes from fossil fuels, Mexico has great potential for green power sources (see Figure 15). Wind and mini-hydro power are considered to have already gained momentum, although much more capacity is yet to be developed to reach the potential of these industries. No significant development has been made in Solar PV, even though Mexico is considered to have the best conditions for the implementation of PV systems in Latin America (PwC, 2012) and one of the countries with highest solar potentials in the world, receiving an average radiation of 5 to 6 kWh/m² per day in 90% of its territory. As for geothermal, despite ranking fourth in electric generating capacity worldwide, the country's current installed capacity stands at 1GW, roughly 10% of its potential reserves for geothermal energy (estimated in 10,644 MW). Finally the installed cogeneration capacity is approximately 2.5 GW, substantially under the potential for this technology.

Figure 15. Installed capacity and estimated potential in renewable sources of energy in Mexico (MW)



Source: SENER, PwC

3. On the other hand, cogeneration[42] is one of the biggest opportunities to reduce energy consumption, with significant benefits, environmental and economic, derived from efficiency gain in the industry. The operation of onsite cogeneration systems that satisfy 100% of thermal requirements of an industrial unit can lead to primary energy savings of 30–35%. The untapped electric potential of this technology is estimated on about 12 GW. This potential lies primarily in the industrial sector, where thermal and electrical energy are essential inputs. The Mexican industrial sector accounts for 25% of energy consumption in the country and has a potential for cogeneration of 7 GW, i.e. 60% of total generation potential of this technology in the country (11.8 GW). However, while cogeneration installed capacity in Mexico has been growing 10% annually over the last decade, so far it has achieved only 28% of its national potential (3.3 GW according to 2011 data), merely 6% of the installed capacity of the entire national electricity system (CFE / CRE / PwC, 2011).

4. In this context, the objective of this program is to contribute to increasing the share of clean energy (RE and cogeneration) technologies in Mexico's overall generation, which will bring about a more diversified energy matrix and increased energy security, while mitigating negative environmental impacts. This objective would be achieved by filling up the existing financing gap for clean energy projects through the provision to project developers of a range of financing mechanisms, designed to address the specific needs for resources in each stage of the development of such projects. CTF concessional resources will be used to structure these mechanisms aimed at improving financial terms of loans to developers and/or partially taking on risks associated to the projects, leveraging funds, both public and private, and thus scaling up private sector investments in clean energy, including **solar photovoltaic (PV), small scale hydropower, geothermal power**, and **cogeneration**.[43]

Potential for GHG Emissions Savings

5. The energy sector accounts for more than 20% (60 $MtCO_2e$) of the abatement potential in Mexico by 2020 (INE/SEMARNAT, 2010), second only to the forestry and agriculture sector.

6. The proposed program is expected to finance at least 300MW of additional capacity installed, which could lead to emissions savings of around 0.7 $MtCO_2$ per year.[44]

Cost-effectiveness

7. Based on estimated reductions of CO_2 emissions (see above) over the course of a 30 year lifetime of projects financed, and using indicative resources of USD 80 million from the CTF, the investment per ton is estimated at USD 3.80 per tCO_2e.

Demonstration Potential at Scale

8. Uncertainties specific to the sector (such as costs of certain technologies, regulatory framework, existence or volatility of the resource, etc.) critically influence investment decisions in clean energy.

[42] The process whereby a single fuel source, such as natural gas, is used to produce both electrical and thermal energy

[43] CTF concessional funding is sought to be put to better use in those technologies other than wind and mini-hydro. The possibility to include electricity generation though the use of biogas, for example, remains open.

[44] Estimations use the average emissions factor for electricity in Mexico (0.5 $kgCO_2/kWh$) and a capacity installed of 150MW of geothermal power and 150MW of solar PV power resulting from the program. Load factors used are 90% and 20% for geothermal and solar respectively.

In this context the demonstrative effect of public intervention becomes crucial in order to detonate private investment in technologies other than wind and hydro. A carefully designed structure of incentives, including financial and risk sharing mechanisms that facilitate the development of successful projects is likely to mobilize the local potential of an industry that has been growing exponentially in other parts of the world.

9. To this end, CTF resources will:

   a) Facilitate the structuring of a risk sharing mechanism for geothermal projects, to mitigate exploration and regulatory risks. The resources from IDB and from a national development bank will also be available for the development of the projects. The program currently under preparation in Mexico will also upgrade the national regulatory framework as well as the transparency regime on geothermal projects data, so as to increase private stakeholder's interest/confidence.
   b) Improve the financing conditions for solar PV projects, leveraging additional resources from both the public and the private sector, as well as encouraging complementary activities to address regulatory barriers. This should help generate a critical mass that will result in more competitive costs for solar power generation, and consequently reduce the levelized cost of energy (LCOE) to make solar generated electricity more accessible.

10. With these incentives in place, the banking system understanding of the economics of clean energy technologies will increase and the sector should benefit from reduced costs of financing, longer terms for their loans, and coverage from the uncertainties associated with the development of high risk projects.

Development Impact

11. Mexico's investment in RE increased more than fivefold in 2012, up to USD 2 billion in 2012, from USD 352 million in 2011 (REN21, 2013). The involvement of the public sector, both the competent authorities and the public banking system, and the Mexican private banking sector has been critical to this process.[45] Continuing these efforts should allow for the development of a sustainable framework in the long term, after demonstration of the benefits of investing in clean energy technologies has permeated the economy.

12. By further contributing to the scaling up of investment in clean energy generation, the program is expected to have positive effects in terms of:

    - Increased share of electricity generated from clean energy technologies (accomplishing goals set in the ENE).
    - A reduction in CO_2 and other GHG emissions.
    - Employment creation at the exploration, development and operation stages of projects.
    - Increased fiscal revenues.
    - Social development and better connections for communities located in regions with competitive renewable resources.

[45] As part of its first Investment Plan with Mexico, USD 70 million from the CTF were used for the implementation of the Renewable Energy Finance Facility (REFF), a program conceived as a means to catalyzing private sector investments in RE projects in Mexico. These moneys leveraged financing for a portfolio of investments valued at some USD 2,000 million, adding almost 1 GW of RE installed capacity, the majority of which was wind power.

- Creation of a competitive solar and geothermal sector.

Implementation Potential

13. The ENE outlines strategic objectives to which the proposed program is fully aligned. CTF financing will leverage funding from the IDB, the Mexican public sector (through a national development bank) and the private sector itself. The involvement of the public banking system will enable easier ways to leverage public funding and to build up on their already advanced efforts in the sector.

14. In addition, ongoing technical assistance programs, in execution both by the IDB and by a national development bank, will complement the program with regards to regulatory aspects, capacity building, dissemination of knowledge, creating synergies with other donors/institutions working with similar focus, etc.

Additional Costs and Risk Premium

15. Wind and mini-hydro technologies have gained momentum in Mexico. But investment in other green technologies has not taken off, despite their great potential (see above). The development of a sufficient pipeline of projects that can combine sources and technologies for generation will contribute to the much needed diversification of the sector, enabling the conditions for ensuring the supply of energy to support economic growth.

16. Geothermal installed capacity evolution has been rather slow, growing only 1.2% from 2000 to 2010 (wind generation capacity grew by 71% in that same period). This type of technology undertakes long development times (projects can take 5 to 7 years from resource discovery to commercial development) and significant upfront risk in the exploration phase. Lack of financing options forces developers to invest their own funds. Capital resources are scarce and expensive and relying exclusively on them slows investment decisions. Regulatory uncertainties impose an additional barrier to the initial development of these projects. Only once availability and sufficiency of the resource have been proven, do projects become viable for both investors and financiers, with considerably long lifetimes, which justify further investments.

17. Among ER technologies in Mexico, Solar PV has the largest potential to reduce its current CAPEX[46] as a result of economies of scale that a consolidation of the local industry would bring about (PwC, 2012). LCOE for a Solar PV plant, estimated at roughly USD 0.20 per kWh, is significantly high as compared to other technologies.[47] Catalyzing investments of this type of projects (specifically for small producers and self-suppliers) will help create a critical mass, while building knowledge and increasing efficiencies that will contribute to transforming the industry, making it more competitive and more accessible to the domestic market.

[46] Solar PV CAPEX per MW is similar to that of wind projects but returns a load factor 50% lower.

[47] LCOE is approximately USD 0.05 per kWh for geothermal and USD 0.08 per kWh for wind projects.

Gender Issues

18. It is suggested that, if possible, the outcomes of the projects financed by the program should be mapped keeping in mind the gender component.[48]

Results Framework, Financing Plan and Preparation Timetable

Table 24. Clean Energy Financing and Risk Mitigation Facility Results Framework

Results	Indicator	Baseline	Target
Avoided GHG emissions	Tons of GHG emissions reduced or avoided tCO_2e/yr tCO_2e over lifetime of the project	0	21 MtCO2eq (30 years life of projects)
Increased clean energy capacity	MW of new clean energy capacity installed	1,304.5 MW (2012)	300 MW of new capacity (Biomass, minihydro, solar and geothermal)

Table 25. Clean Energy Financing and Risk Mitigation Facility Financing Plan

Financing Source	Amount (USD million)
GoM	140
IDB	80
CTF	80
Private sector	70
Total	**370**

Table 26. Clean Energy Financing and Risk Mitigation Facility Preparation Timetable

Milestone	Date
Eligibility review meeting (ERM)	July 2014
Quality and Risk review (QRR)	September 2014
CTF Trust Fund Committee Approval	September 2014
Bank Board Approval	November 2014
Effectiveness	December 2014
First disbursement	March 2015
Project Completion	December 2018

[48] Currently, there is already some evidence that indicates renewable energy can play a major role in addressing energy security and gender issues in the long term, but available data are primarily related to community-based programs (household energy) and rural electricity grid extension.

ANNEX 4.
ELECTRICITY GENERATION FROM FOREST RESIDUES
(IDB)

Problem Statement

1. Forestry production in Mexico has declined steadily, from a production of 9.4 million m³ in 2000 to 5.5 million m³ in 2011, which has resulted, among other things, in the loss of jobs in the *ejidos* and *comunidades*[49] dependent on forestry and in a parallel deterioration or loss of forest areas, as forest use is no longer competitive with other uses such as agriculture and livestock. On top of this, other issues such as insecurity and illegal logging in forest areas have arisen. Faced with this problem, the Federal Government has set a goal in the National Development Plan 2013 -2018, to encourage and guide an inclusive green growth path and to preserve Mexico's natural heritage while generating wealth, competitiveness and employment.

2. One of the strategies of this goal is to increase the production and productivity of forests, with the aim of reaching by the end of the current administration's term a production of 11 million m³ of wood. To achieve this goal, one of the main challenges will be finding or creating new markets for products derived from sustainable forestry, being electricity generation through biomass one of the strategic options to be promoted. **The objective of the proposal is to generate electricity from residues of forest species with low or no commercial value, including waste and subproducts of the transformation process**, which will help and in many cases will allow the application of the best forest management practices and, therefore, take advantage of optimal integral and productive potential of managed forests and create new sources of employment and income to contribute to the development of the forest regions.

3. The proposed project would simultaneously tackle two pressing issues in Mexico: (i) expanding electricity production from renewable sources, as set in the goals of the National Energy Strategy 2013-2027 and (ii) improving the sustainable management of forests and promoting their adequate conservation, as set in the National Forestry Program.

4. Generating electricity though biomass would contribute to renewable energy generation, to conservation and sustainable management of forests, and to job creation. It would also contribute to the generation of welfare in areas of high marginalization and poverty in the country. Furthermore, and based on studies of the National Forestry, Agriculture and Livestock Research Institute (INIFAP),[50] it has been estimated that in Mexico 1,775,000 Mm³ of forest residues are generated of the two main genera (pine and oak), equivalent to 703,000 tons of dry basis biomass, of which 599,000 tons are pine and 104,000 tons are oak. This represents the feedstock available in the short term as a renewable energy source. In the medium term this amount will gradually grow with the additional volume that is expected to be produced during the coming years, to at least double the current availability.

5. To give added value to these forest residues, as well as to the production of small diameter species and unexploited species (oaks and other hardwoods), the strategy envisions among its action lines the

[49] *Ejidos* and *comunidades* are Mexico's two collective land ownership schemes. Most of the country's forests are located in such types of land ownership.

[50] Uso de los Residuos Forestales en la Producción de Bioenergía. INIFAP. 2012.

implementation of the National Wood Fuel Program, which includes the use of forest biomass currently not marketed to generate electric power in a self-supply scheme for community forest enterprises themselves and to sell the surplus to the grid (e.g. under the small producer modality). Where appropriate, electricity can be generated in cogeneration schemes, so that heat can be supplied as well to the forestry production line.

6. For the generation of electricity , it will be necessary to adhere to the regulatory models established in the Law of the Public Service of Electricity and its secondary regulation, as well as in the regulation concerned with renewable energy and efficient cogeneration established in the LAERFTE Law[51] and its secondary regulations.

7. The community forest enterprises that would mostly benefit from the Program would have to comply with the following requirements:

   a) Experience in forest management
   b) Wood processing and wood supply infrastructure
   c) Access to electricity transmission lines to deliver the generated electricity to the shareholders of the electricity cogeneration society, and surplus to the grid
   d) Available business organization schemes that allow the access to credit and the use of financial instruments

Potential for GHG Emissions Savings

8. The energy contained in the biomass can be technically and economically used for energy purposes. It is estimated that biomass is the fourth largest energy provider in the world, with a contribution of 14%. Projections until 2050 estimate that 38% of fuel and 17% of global electricity generation will come from biomass (Demirvas, 2004). According to the IPCC (1996) and Ranney (1992) Sudha & Ravindranath (1999), the large-scale use of woody biomass for energy can contribute to rural development in developing countries. Additionally, under sustainable resource management, electricity generation creates a net decrease in the emissions of CO_2 to the atmosphere, as fossil fuel generation is displaced.

9. In some circumstances, the use of biomass for electricity generation may have a double benefit: The displacement of fossil fuels, and the reduction in deforestation and forest degradation. Under these assumptions, it has been estimated that every MWh produced from forest biomass can avoid the emission up to 1 ton of CO_2e[52]. A third benefit can occur when in the process biocarbon is produced as a byproduct. This would increase the capture of CO_2 through the incorporation to the soil of 1.5 kg per MWh produced.

10. The proposal considers the construction of 6 pilots with a capacity of 5 MW each,[53] resulting in annual emission reductions of 210,000 tons of CO_2e. For an estimated operation of the plants of 26 years, roughly 5.46 $MtCO_2e$ would be avoided.

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[51] http://www.diputados.gob.mx/LeyesBiblio/pdf/LAERFTE.pdf

[52] México: Low-carbon Development Study (MEDEC), 2009.

[53] Considering a plant factor of 80%

Cost-effectiveness

11. The program has an estimated cost of USD 90 million[54] for the 6 plants (5 MW each). The amount of CTF resources requested adds up to USD 40 million, the remaining USD 50 million being cofinanced by the IDB (USD 30 million), CONAFOR (USD 10 million), and the final users (USD 10 million).

12. Taking into account the estimated reductions of 5.46 $MtCO_2e$ to be achieved by the operation, and the CTF resources invested adding up to USD 40 million, the cost effectiveness of the program is **7.32 USD/ton CO_2e**.

Demonstration Potential at Scale

13. There is a substantial potential for this technology in Mexico. According to one study,[55] up to 5 GW of capacity could be installed in Mexico, relying solely on the sustainable management of natural forests, and excluding natural reserves, or areas located far from roads. The same study shows that this technology can provide net economic benefits. All this shows that large potential for scaling up this technology.

14. In the short term, some strategic sites have been identified with high productivity of forest biomass. The studies show the sites, the existing biomass potential, the estimated calorific value (18.91 MJ / kg for genus Pinus and Quercus) and the capacity of electric power generation projects that can be installed from the identified potential, considering a plant factor of 80%, as shown below:

    a. Ejido El Largo, Chihuahua. It has a total area of 261,460 ha, of which 251,867 ha are forested and of these, 123,810.00 ha are commercial woodlands, has an annual harvest of 290,804 m³r[56] generating 27678 ton of dry matter, which would allow a plant capable of up to 5 MW installed.

    b. Region of El Salto, Durango. Comprised of the Ejido El Brillante, La Victoria and Pueblo Nuevo, which together have an area of 67251 ha, and have a 202,000 m³r/year annual use, obtaining 86,000 tons of waste from the sawmill industry and use, where a cogeneration electric power plant could be installed, with an installed capacity of 15 MW.

b) Projects resulting from the implementation of this proposal are candidates for development and implementation in the medium and long term.

Development Impact

15. CONAFOR is promoting an increase on the timber production that will necessarily result in a greater availability of forest biomass available for production of electricity through the use of the regulatory instruments approved by the Energy Regulatory Commission (CRE) in the area. The process of collection of the forest biomass, and the work associated with its transport and storage are activities with a high potential for direct employment (harvesting work, reforestation, mountain clearing, pruning and thinning, transportation, processing and operation of the power plant) may translate into

[54] Based on estimations of the project team of each plant costing app. USD15 mil.

[55] Johnson et al., 2010. Low-Carbon Development for Mexico. http://bit.ly/lcdmex

[56] m3r= metric roll of unsawn wood in roll,

higher incomes for families who depend on forestry in the heart of the country's rural areas, helping to raise their level of development and conservation of forest resources. Some of the expected impacts are:

a) Efficient use of forest resources and utilization of by-products and other species with low or minimal commercial value.
b) Improvement of efficiency of electricity generation and distribution processes.
c) Decreased degradation and deforestation by better management and by improving the competitiveness of forest land use.
d) Contribution to the increase of forest wood production.
e) Improved forest management.
f) Reduced emissions of greenhouse gases resulting from the switch of fuel for power generation.

16. On the other hand, the generation of distributed electricity using available forest biomass resources, represents savings of fossil primary energy due to the substitution of primary energy from renewable sources, contributes to the reduction of GHG emissions into the atmosphere (mainly CO_2) typical of burning fossil fuels, and promotes the reduction of technical losses in transmission and distribution of the SEN given the generation and consumption of electricity on the site.

17. It is also important to emphasize that the design of projects of electricity generation that use renewable resources such as forest biomass will establish the conditions necessary to replicate the model in other regions that have the potential of forest biomass and where regional economic development should be fostered.

Implementation Potential

18. Through the implementation of the National Forestry Program (PRONAFOR), which has as one of its main objectives the sustainable increase in production and forest productivity, the priority given by the Government and by CONAFOR to this program is ensured, especially reflected in the goal of doubling timber production between 2013 and 2018.

19. The Special Program for the Development of Renewable Energies aims at expanding the country's energy portfolio for the generation of electrical energy and specific goals are set for the generation of electricity with biomass.

Additional Costs and Risk Premium

20. The Program will be accompanied by a strong technical cooperation component in order to properly train the forest owners and the community forest enterprises to manage the credit schemes and ensure technical support to promote the proper integration of associations. The fiduciary agent, still to be defined, will play an important role in establishing the proper flow of resources. Grant resources will therefore be requested to allow adequate assistance schemes to be implemented and fit the requirements of community forest enterprises, owners of forests and jungles.

21. It is also essential to establish a robust monitoring and evaluation framework in order to ensure the adequate use of resources directed towards the most effective projects and the dissemination of the progress and lessons learned from the design, preparation and implementation of the projects.

Gender Issues

22. The project will require a lot of manpower in the entire production chain that results in jobs where there may be active participation of women, particularly in the following activities:

a) Reforestation for regeneration.
b) Pruning and Thinning.
c) Collection of biomass in harvesting areas and transformation centers,
d) Delivery of biomass to the gasifiers.
e) Others in the power generation plant (maintenance).

Results Framework, Financing Plan and Preparation Timetable

Table 27. Electricity Generation from Forest Residues Results Framework

Results	Indicator	Baseline	Target
Avoided GHG emissions	Tons of GHG emissions reduced or avoided tCO_2e/yr tCO_2e over lifetime of the project	0	5.46 MtCO2eq
Increased renewable Energy capacity	Increased renewable Energy capacity (MW)	0	30 MW

Table 28. Electricity Generation from Forest Residues Financing Plan

Financing Source	Amount (USD million)
GoM	10
IDB	30
CTF	40
Other (ejidos, comunidades, or private sector)	10
Total	**90**

Table 29. Electricity Generation from Forest Residues Project Preparation Timetable

Milestone	Date
Eligibility review meeting (ERM)	October 2014
Quality and Risk review (QRR)	December 2014
CTF Trust Fund Committee Approval	December 2014
Bank Board Approval	February 2015
Effectiveness	April 2015
First disbursement	June 2015
Project Completion	June 2019

ANNEX 5.
RESIDENTIAL ENERGY EFFICIENCY
(IBRD)

Problem Statement

1. Electricity consumption in Mexico is expected to grow 4.4% annually between 2010 and 2025, from 215.9 TWh in 2010 to 404.8 TWh in 2025. In particular, electricity consumption in the residential sector is expected to have one of the highest growth rates for the same period of time. As a result of the expected dynamic growth of the electricity sector, energy efficiency remains as an effective strategy for (i) reducing GHG associated with avoided electricity generation and (ii) reducing the energy intensity, thus helping defer investments in new installed capacity.

2. The residential sector accounts for about 16% of total end-use energy in Mexico. Lighting, air-conditioning and home appliances remain as the main drivers for electricity demand at the residential level in Mexico.

3. The IBRD has engaged in a strong partnership with the GoM to reduce the country's carbon footprint, particularly through energy efficiency and renewable energy interventions. Recognizing the mitigation potential from energy efficiency interventions in the residential sector, the GoM, in partnership with the IBRD, designed and implemented the Energy Efficiency Lighting and Appliances project to replace (i) 22.9 million Incandescent Bulbs (IBs) with Compact Fluorescent Lamps (CFLs), and (ii) 1.7 million of old and inefficient appliances (approximately 90% refrigerators and 10% air conditioners). Such program was included in the Mexico CTF IP Phase I, with an allocation of USD 50 million of CTF funds.

4. As of September 2012, the Energy Efficiency and Appliances Project had achieved the following:

    a) Replacement of 22.9 million incandescent bulbs (IBs) (100% of target), which granted the GoM a Guinness Record to the highest number of IB replacement at no cost to the final consumer.
    b) Replacement of 1,781,561 appliances (1,590,959 refrigerators, or 89.3 %, and 190,602 air conditioners, or 10.7%), which represents 104.8% of the original target (1.7 million appliances).

5. In particular, CTF funds (USD 50 million) were used to leverage a total of USD 553 million in counterpart funds to provide loans for appliance exchanges (USD 195 million from IBRD, USD 127 million from NAFIN, USD 55 million from GoM and USD 176 million from consumers). Given the degree of awareness created through the successful implementation of the CTF co-financed Energy Efficiency and Appliances Project, coupled with the payment mechanism envisioned by the project (through the power bill), the GoM estimates that the replacement of old and inefficient refrigerators with more efficient refrigerators (already available in the Mexican market) can continue without government subsidy.

6. While the further scaling-up of efficient refrigerators can be self-sustainable, the GoM believes that incentives should be required to promote the introduction in the Mexican market of state-of-the art technologies for refrigerators. These include technologies which replace hydro fluorocarbon gases (HFC) with natural refrigerants, such as Hydro Carbons (Isobutane – R600, or Propane – R290), Ammonia (NH_3 – R717), or Carbon Dioxide (CO_2 – R744), and Hydrochlorofluorocarbon (HCFC – 141b) foams with U-HFC (HFO) and HC (CO_2) foams.

7. For the Mexico CTF Phase II, the proposed intervention aims to build on the success of the Mexico Efficient Lighting and Appliances Project to replace inefficient refrigerators with state-of-the-art

technologies, expand adoption of IBs in small-size cities, , and develop world class energy efficiency standards. Specifically, the proposed residential Energy Efficiency Project will include the following three components:

a) State-of-the-art energy efficient refrigerators (USD 50 million CTF): Replacement of inefficient refrigerators with improved energy efficiency and more environmentally friendly appliances (foams and refrigerant gases). The CTF funds would be exclusively used for this component, since the new appliances, although already available, remain expensive and unlikely to enter the Mexican market in the short term without appropriate incentives.
b) Replacement of IBs in cities with less than 100,000 inhabitants (without funding from CTF). Expansion of IBs exchange to reach customers who were not benefited during the first phase.
c) National standard in Energy Efficiency for appliances (without funding from CTF): Support in the elaboration of a new Mexican Energy Efficiency standard, aligned with the best international practices.

Proposed Transformation

8. The proposed Residential Energy Efficiency Project under the Mexico CTF Phase II will build on the success of the CTF co-financed Mexico Efficient Lighting and Appliances Project, which was partially financed by CTF resources[57], had a significant impact on (i) supporting GoM efforts to publish a new Mexican Official Standard to ban incandescent bulbs, and (ii) promoting self-sustainability for replacement of inefficient appliances. The proposed Residential Energy Efficiency Project aims to consolidate the shifting towards energy efficient equipment through (i) expanding the exchange of incandescent bulbs in cities/towns with less than 100,000 inhabitants, (ii) promoting the incorporation of state-of-the-art refrigerators into the Mexican Market, and (iii) publication of a new Mexican standard for energy efficiency in appliances.

9. According to GoM estimations, around 8 million old and inefficient refrigerators remain in use in the residential sector in Mexico. Under the proposed intervention (component b), the GoM aims to exchange around 950,000 refrigerators (around 12% of the estimated market), with improved energy efficiency and more environmentally friendly appliances (foams and refrigerant gases), using CTF resources to facilitate the introduction of such technologies in the Mexican market. The GoM expects that, as a result of CTF intervention, state-of-the-art appliances will become affordable for Mexican consumers, which could facilitate the replacement of the remaining 7 million refrigerators.

Implementation Readiness

10. Given the successful implementation of previous energy efficiency interventions in general, and of the Mexico Efficient Lighting and Appliances project, the GoM has expressed its interest in strengthening its partnership with IBRD through an enhanced Residential Energy Efficiency supported by CTF resources. The following factors will strengthen chances of success for the implementation of the proposed CTF program:

[57] CTF funds were exclusively used for appliance exchange.

- The GoM has put in place an ambitious regulatory framework for promoting both renewable energy and energy efficiency. According to LGCC, Mexico must achieve 30% reduction of emissions by 2020 with respect to a baseline and the 50% reduction by 2050 with respect to emissions in 2000. LGCC also sets a goal of clean energy penetration into electricity generation, which must reach 35% of total installed capacity by 2024. Such ambitious targets can only be achieved not only by increasing the renewable energy share in the national energy matrix, but also by keeping energy intensity in a downward trend through energy efficiency programs.
- The agencies responsible for implementing the Mexico Efficient Lighting and Appliances project have gained significant experience and identified areas of opportunity for better implementation of subsequent energy efficiency programs.
- SENER has indicated that Mexican consumers have successfully engaged in replacement of inefficiency appliances due to the innovative mechanisms for loan repayment.

Rationale for CTF Funding

11. The proposed CTF intervention aims to replicate the success of the Mexico Energy Efficiency Lighting and Appliances Project, where the CTF funds provided leverage to incentive large-scale replacement of old and inefficient appliances and resulted in a self-sustainable practice for Mexican consumers. For the Mexico CTF Phase II, the GoM intends to use CTF funds to leverage resources with the purpose of facilitating the introduction to Mexican markets of state-of-the art technologies for refrigerators, such as those which replace hydro fluorocarbon gases (HFC) with natural refrigerants, such as Hydro Carbons (Isobutane – R600, or Propane – R290), Ammonia (NH_3 – R717), or Carbon Dioxide (CO_2 – R744), and Hydrochlorofluorocarbon (HCFC – 141b) foams with U-HFC (HFO) and HC (CO_2) foams. Such technologies not only represent efficient alternatives for old appliances, but also represent important mitigation alternatives since they discourage the use of HFC gases in the industry. By using the CTF funds for this component, the GoM aims to pave the way for a larger operation which could target the reminder 7 million old appliances in use (assuming this intervention successfully replaces around 1 million appliances), and eventually to achieve self-sustainability in the never-ending process of replacing older-than-10 year refrigerators in the future. Such large-scale operation would take longer to be achieved without CTF leveraging, since there would be no demonstration effect to incentive Mexican consumers and appliances distributors.

Results Framework, Financing Plan, and Implementation Timetable

Table 30. Results Framework for the IBRD Residential Energy Efficiency Project[58]

Results	Indicator	Baseline	Target
Avoided GHG emissions	Tons of GHG emissions reduced or avoided tCO_2e/yr tCO_2e over lifetime of the project	No avoided emissions in 2013	3.0 $MtCO_2e$ in a life span of 10 years once appliance replacement begins (only due to energy savings)
Increased energy efficiency	Annual energy savings as a result of CTF interventions (GWh/yr)	No savings in 2013	6000 GWh in a life span of 10 years once appliance replacement begins
Increased finance for low carbon development mobilized	Financing leveraged through CTF funding (USD million)		USD 250 million (USD 50 million from the GoM, USD 100 million IBRD loans and USD 100 million from consumers)

Table 31. Financing Plan for the IBRD Residential Energy Efficiency Project[59]

Financing Source	Amount (USD million)
GoM	50
Consumers	100
IBRD	100
CTF	50
Total	**300**

Table 32. Preparation Timetable for the IBRD Residential Energy Efficiency Project

Milestone	Date
Eligibility Meeting	October 2013
CTF Trust Fund Committee Approval	September 2014
Appraisal / Negotiations	October 2014
Bank Board Approval	December 2014
First Disbursement	February 2015
Project Completion	December 2019

[58] The GoM is in the process of standardizing methodologies for GHG avoided emissions from refrigerant gases capture and foams disposal. For this reason, this IP only includes GHG avoided emissions from energy savings.

[59] The Financing Plan only includes the budget for refrigerators replacement. Preliminary budget from the GoM for replacing incandescent bulbs and the new norm is USD 100 million, but it has to be confirmed.

ANNEX 6.
ENERGY EFFICIENCY IN THE AGRICULTURE SECTOR (IDB)

Brief Description of the Project and Objective

1. Rural consumption of resources is high and inefficient. At the same time, natural resource depletion and degradation reduces rural productivity. As a result, the adoption of measures for energy efficiency (EE), renewable energy (RE) and the rational use of water is essential to ensure the sustainability of the country's natural resources, agricultural sector growth and the welfare of the population in the medium and long term.

2. In Mexico, agriculture accounts for 7% of total greenhouse gas (GHG) emissions and forests and land-use change account for 14%, for a total of 21% of the country's emissions. Unleashing the EE potential is a major challenge that Mexico has to face in the short term in order to protect and strengthen their energy balance. However, the implementation of EE projects requires investments for which funding is scarce. The funding shortage is accentuated in rural areas where productivity is low, limiting the ability to accumulate resources and increasing the perceived risks when trying to access to investment financing.

3. In this context, the IDB is working with FIRA agricultural trust funds on the design of a financing line to promote investments on EE and other low-carbon technologies (including biogas and off-grid renewable energy) in rural areas. Based on priority and high potential sub sectors identified, the IDB is in the process of preparing a pilot operation, using CTF resources from the first investment plan and leveraging additional resources from both the IDB and FIRA.[60] The proposed program aims to top up this initiative, for a subsequent phase that will increase the scope of the pilot and enable the sector to exploit its potential for EE by replicating it on other rural sub sectors.

Potential for GHG Emissions Savings

4. The study conducted as part of the preparatory activities for a pilot program[61] has shown a potential of GHG emission savings of 46,000 metric tons of carbon dioxide equivalent (tCO_2e) per year for a pilot investment of USD 11.5 million. Based on these results, and assuming conservatively that the requested CTF resources for the proposed program could help finance investments for up to USD 70 million (CTF, IDB, GoM, and private sector resources) (only 130% of one sub sector's market, as per the study results), the potential for GHG emission savings of the project would represent around 0.243 $MtCO_2e$ per year.[62]

[60] The IDB is currently requesting approval of a dedicated credit line for FIRA to finance green investments.

[61] The study was conducted by the IDB and FIRA, as part of the preparatory activities for the development of a "green" credit line. The results for a pilot sub sector (fruit and vegetable processing and packaging) indicate an investment potential of USD 88 million, for a target of approximately 350 SMEs based on specific EE technologies such as high efficiency motors, replacement of electric by hydraulic motors in conveyors, efficient boilers, solar water heaters, compressed air distribution, efficient air compressors, cooling and freezing, compressors cooling/freezing, cogeneration.

[62] Figures are based on the results of a study in one sub sector for specific EE technologies. It should be noted that the numbers may vary once sub sectors and specific technologies for intervention are properly defined.

Cost-effectiveness

5. Based on the estimations of emissions savings of 0.243 $MtCO_2e$ per year, and considering the program would require USD 30 million from the CTF, the cost of emissions reductions is estimated on USD 12.34 per tCO_2e over the course of 10 years, average lifetime of EE technologies which would potentially be considered for the program.

Demonstration Potential at Scale

6. Several studies conclude that the potential for EE on the rural sector is important:

    a) On bio digesters (equipment used to digest organic matter, capturing and possibly using the created biogas), a study shows that Mexico's potential for energy production could be 649MW in the short term[63].
    b) On pumping systems, two studies show 82,600 potentially eligible sites in Mexico, for an estimated energy saving of 30 to 50%.[64]
    c) In the dairy sector, there are 2,000 production units with a production of 500 l/day, where *Shiller* type refrigeration equipment could be installed.
    d) The market study carried out by the IDB and FIRA indicated that the replication potential of the specific technologies analyzed on various sub-sectors is high, identifying a target of 4,900 potential borrowers, total investments of USD 1,100 million with an average recovery period of four years and estimated savings of USD 430 million per year.

7. The involvement of both public and private financial institutions in the deployment of the financial mechanism, as well as the strengthening of the key factors that will consolidate the demand, should produce a significant demonstration effect and ensure the sustainability of this type of investments.

Development Impact

8. There are several public benefits associated to the EE programs that will have important development impacts for Mexico. It is expected that, in addition to reducing CO_2 emissions, the program will contribute significantly to: (i) an increase in productivity of rural production units; (ii) reductions in energy subsidies; and (iii) enhanced climate change adaptation capacity by those units which invest in EE projects.

9. The energy savings resulting from the projects financed by the program will have a direct impact on the productivity of beneficiaries. A recent study from SAGARPA illustrates a very direct causal chain between natural resources degradation and low productivity for 80% of the agricultural production units. Moreover, the program will be designed to target sectors where productivity levels are lower.

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[63] Romero et al., 2011

[64] Comité Técnico del Fondo para la Transición Energética y el Aprovechamiento Sustentable de la Energía – Novena Sesión Ordinaria – March 2011 http://www.conuee.gob.mx/work/sites/CONAE/resources/LocalContent/7548/2/Informe_bombeo_AgricolaVF.pdf

Table 33. Productivity indexes of economic sectors

Sector	Global labor productivity index based on employment – 2012[a]
Global economy	98.9
Primary sector	96.4
Sector 31-33: Manufacturing	110.3
Sub-sector 311: Food manufacturing	105.3
Sub-sector 3114: Fruit & Vegetables conservation[b]	99.8

Source: INEGI – Índices de productividad laboral y del costo unitario de la mano de obra 2012.
[a/]Base 2008 =100
[b/]Closest sector to pilot program under preparation: fruit and vegetables packaging and processing.

10. Additional socio-economic benefits from EE projects in rural areas include:

- Increased food supply at more competitive prices
- Increased annual revenue of producers, which means social improvement
- Better working conditions and higher income levels, contributing to reducing migration problems
- Job creation
- Technology transfer
- Strengthening of local professional associations and of the business environment
- Development of the foundations for sustainable business and production practices

Implementation Potential

11. Energy efficiency and the optimization of the use of natural resources in rural areas are in line with the government's priorities for the CTF in Mexico. The National Energy Strategy 2013-2027 (ENE) clearly establishes objectives to promote efficient use of energy across sectors. The ENE recognizes the need for strengthening the technical capacities for the development of EE projects as well as providing better information on the benefits of the efficient use of energy to potential beneficiaries.

12. Being a second tier public development bank with a sound presence in rural areas, FIRA is strategically placed to channel dedicated funds and to play a catalytic role in supporting involvement of local financial institutions in the financing of EE projects.65 Moreover, FIRA is already active in the markets targeted by the program. In 2012, total authorized funding for environmental projects was roughly USD 150 million. FIRA is also involved in two guarantee schemes to promote sustainable practices in the rural sector: FONAGA Green and FONAGUA.

13. The program will provide a national development bank with long-term funding as well as optimized conditions by a sovereign guarantee, which will enable it to venture more actively in these new markets.

[65] FIRA has channeled nearly MXN 100 billion over the last three years, benefiting more than 1.65 million farmers per year, 95% of which are small farmers.

Additional Costs and Risk Premium

14. Many barriers have impeded the scaling up of investment in EE projects, especially in the rural sector. These projects involve the deployment of new technologies, which entails new risks and additional costs for unprepared and weakly structured market players. Strong capacity building efforts are necessary to:

    - Disseminate the rationale for investments, improving information available and educating on the potential benefits of EE projects (e.g. promotion strategies).
    - Support the structuring of the demand and improve the number of bankable projects (e.g. set-up of project incubators and technical assessment units).
    - Structure effective financial mechanisms considering: (i) the most efficient blending of funds and risk-mitigation tools, to ensure participation of the private banking sector and to adjust the financing offer to the demand; (ii) the involvement of quality stakeholders such as reliable technology providers and strong sector associations; and (iii) the provision of standardized contractual relationship between all parties.

15. It is expected that, as a result of increased access to financing and stronger demand, the program will enable the scaling up of investments on EE, thus contributing to reducing energy consumption in the rural areas of Mexico. Concessional resources would cover the financing needed for both the offer and demand structuring and the necessary resources for appropriate coordination, impact monitoring and evaluation.

16. CTF resources are considered key to the effective implementation of this program as they will help reduce the costs to potential beneficiaries of making these investments, while improving the sector's knowledge and capacity for the development of EE projects. Highly concessional terms to finance potential project requirements such as the ones described are all the more necessary in a context of abundant liquidity and historically low interest rates in Mexico, especially if we are seeking private sector involvement.

Gender Issues

17. The benefits attributed to EE are multiple and range from sectorial benefits, such as productivity and survival rates, to economy wide benefits, including national competitiveness, GHG emissions mitigation, poverty alleviation and gender-inclusiveness.

18. While about a quarter of all Mexicans live in rural areas, 60 percent of Mexico's extreme poor are rural. This means that more than half of rural Mexicans live in poverty and 25 percent live in extreme poverty.[66]

19. Women represent half of the rural population and 29% of them work outside of home. Of those, 28.6% work in agriculture and 25.6% in industrial production (finer granularity data is not available). It is expected that improvements in productivity will impact their daily life, freeing time and labor for other tasks, such as child care, chance of further education or higher-value work both inside and outside of the home.

[66] BreadfortheWorld Institute, Briefing paper, January 2011

Results Framework, Financing Plan, and Implementation Timetable

Table 34. Energy Efficiency in the Agriculture Sector Program Results

Indicators	Baseline	Investment Program Results
Electricity consumption reduced	0	4,172 GWh over 10 years
Estimated annual GHG emissions reduced	0	0.243 $MtCO_2e$ per year, or 2.43 Mton CO_2e over 10 years

Table 35. Energy Efficiency in the Agriculture Sector Financing Plan

Financing Source	Amount (USD million)
GoM	10
IDB	20
CTF	30
Private sector	10
Total	**70**

Table 36. Energy Efficiency in the Agriculture Sector Preparation Timetable

Milestone	Date
Eligibility review meeting (ERM)	July 2014
Quality and Risk review (QRR)	September 2014
CTF Trust Fund Committee Approval	October 2014
Bank Board Approval	November 2014
Effectiveness	November 2014
First disbursement	January 2015
Project Completion	January 2018