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Report No: 52920-MX

PROJECT APPRAISAL DOCUMENT 3

ON A 4

PROPOSED PURCHASE OF EMISSIONS REDUCTIONS 5

BY THE SPANISH CARBON FUND AND THE BIO CARBON FUND 6

IN THE AMOUNT OF 7
US$ 17,473,211

FROM THE 8

COMISION FEDERAL DE ELECTRICIDAD 9
(MEXICO)

FOR THE 10

WIND UMBRELLA (LA VENTA II) PROJECT 11

April 24, 2006 12

CURRENCY EQUIVALENTS

(Exchange Rate Effective {January 2006})

Currency Unit	=	Mexican Peso
1 Mexican Peso	=	US$ 0.095
1 US$	=	0.7916 €

FISCAL YEAR
January 1 – December 31

ABBREVIATIONS AND ACRONYMS

BLT	Build-Lease-Transfer
BM	Build Margin emission factor
BOT	Build-Operate-Transfer
CAS	Country Assistance Strategy
CDM	Clean Development Mechanism
CENACE	National Center of Energy Control (Centro Nacional de Control de Energía)
CER	Certified Emissions Reduction
CFE	National Electric Commission (*Comisión Nacional de Electricidad*)
CM	Combined Margin emission factor
CO2	Carbon Dioxide
CO2e	Carbon Dioxide equivalent
DOE	Designated Operational Entity
EMP	Environmental Management Plan
ER	Emissions Reduction
ERPA	Emissions Reduction Purchase Agreement
GEF	Global Environment Facility
GoM	Government of Mexico
GHG	Greenhouse Gas
GW	Gigawatt
GWh	Gigawatthour
IMNG	Interconnected Mexican National Grid
INEGI	National Institute of Statistics, Geography and Computer Science (*Instituto Nacional de Estadística, Geografía e Informática*)
IPER	Infrastructure Public Expenditure Review
IPP	Independent Power Producers
IRR	Internal Rate of Return
MW	Megawatt
NPV	Net Present Value
OM	Operating Margin emission factor
O&M	Operation and Maintenance
OPF	Publicly Finance Works (*Obra Pública Financiada*)
PEMEX	Mexican Petroleum (*Petróleos Mexicanos*)
PIDIREGAS	Projects with Deferred Impact in the Budgetary Registry (*Proyectos de Impacto Diferido en el Registro de Gasto*)

SEMARNAT	Ministry of the Environment and Natural Resources (*Secretaria de Medio Ambiente y Recursos Naturales*)
SENER	Ministry of Energy (*Secretaría de Energía*)
SHCP	Minstry of Finance and Public Credit (*Secretaría de Hacienda y Crédito Público*)
tCO2e	Metric tons of Carbon Dioxide equivalent
UNFCCC	United National Framework Convention on Climate Change
VER	Verified Emission Reductions

Vice President:	Pamela Cox
Country Manager/Director:	Isabel Guerrero
Sector Manager:	Susan Goldmark
Task Team Leader:	Demetrios Papathanasiou

MEXICO
Wind Umbrella (La Venta II)

PROJECT APPRAISAL DOCUMENT
LATIN AMERICA AND CARIBBEAN
LCSEG

Date: April 24, 2006 **Country Director**: Isabel Guerrero **Sector Manager**: Susan Goldmark **Project ID**: P080104 **Lending Instrument**: World Bank Spanish Carbon Fund	**Team Leader**: Demetrios Papathanasiou **Sectors**: Renewable Energy (100%) **Environmental Screening Category:** B **Themes**: Climate Change (P); Pollution management and environmental health (S)

Project Financing Data:

[ ] Loan [ ] Credit [ ] Grant [ ] Guarantee [X] Other: Carbon Finance

For Loans/Credits/Others: The project does not involve Bank financing. Total Bank Carbon Financing through the purchase of CERs for an amount of USD 17.5 Million.

Financing Plan (USDm.)

Source	Local	Foreign	Total
Spanish Carbon Fund (SCF)		16,663,211	16,663,211
Bio Carbon Fund (BCF)		1,215,000	1,215,000
Project Sponsor (CFE)	8,735,000	105,130,000	113,865,000
TOTAL	8,735,000	123,008,211	131,743,211

Responsible Agency: Comisión Federal de Electricidad (CFE)

Estimated payments (Bank FY/USD)

The Bank plans to purchase Emissions Reductions (ERs) for an amount of EUR 17.5 Million. Indicatively, this could lead to payments as in the following schedule:

FY/EUR	2007	2008	2009	2010	2011	2012	2013	2014
Annual	1,625,821	1,625,821	1,625,821	1,625,821	1,625,821	1,625,821	1,625,821	1,625,821
Cumulative	1,625,821	3,251,642	4,877,463	6,503,284	8,129,106	9,754,927	11,380,748	13,006,569

FY/EUR	2015	2016	2017	2018	2019			
Annual	1,625,821	1,625,821	405,000	405,000	405,000			
Cumulative	14,632,390	16,258,211	16,663,211	17,068,211	17,473,211			

Project implementation period: 2007–2019 (this is the period for the duration of the ERPA (Emissions Reduction Purchase Agreement) with the SCF (2007-2016) and the BCF (2017-2019). However, the initial crediting period is 7 years, renewable for another two 7 year-periods.
Expected effectiveness date: January 2007
Expected closing date: December 2019

Does the project depart from the CAS in content or other significant respects?	○ Yes ● **No**
Does the project require any exceptions from Bank policies? Have these been approved by Bank management? Is approval for any policy exception sought from the Board?	○ Yes ● **No** ○ Yes ○**No** ○ Yes ● **No**

Does the project include any critical risks rated “substantial” or “high”?	○ Yes ● **No**
Does the project meet the Regional criteria for readiness for implementation?	● **Yes** ○ No

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MEXICO
Wind Umbrella (La Venta II)

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A. STRATEGIC CONTEXT AND RATIONALE

1. Country and sector issues

1. Mexico has a good electricity system. However, the country relies heavily on fossil fuels for power generation. With an installed capacity of about 53 GW, an annual production of about 220,000 GWh, and an estimated population coverage of about 95 percent[1], electricity services in Mexico are among the best in Latin America. Average per capita consumption of electricity is in line with the level of economic development of the country (middle-income) and has been growing steadily. In the last decade, electricity demand grew on average 5.2 percent per year while at the same time economic growth was averaging about 3.5 percent annually. The rate of growth of demand for electricity is expected to remain at similar levels in the next few years, but it could increase if the pace of economic growth accelerates[2]. Significant investments in new generation capacity will be needed in the next decade to ensure that there will be adequate supply of electricity to meet the growing demand. Growing electricity demand coupled with significant thermal generation and recent trends towards high fuel prices create a need for diversification of energy supply options.

2. The Mexican electricity sector is dominated by two state-owned companies: the Federal Electricity Commission (CFE), which serves most of the Mexican territory; and *Luz y Fuerza del Centro* (LFC), which is responsible for providing electricity services in the area of Mexico City and its surroundings. CFE is a vertically integrated electricity company that controls the majority of generation, the transmission system and energy dispatching functions, while it is also responsible for the distribution and commercialization of electricity. LFC is primarily devoted to distribution and commercialization and owns a small part of generation. In 1992, the Electricity Public Service Law was introduced, reducing CFE's legal monopoly in power generation. The objectives of the reform were to foster private participation in electricity generation, to entitle open access to the transmission grid for all participants in the sector, and to optimize short and long-term costs.

3. CFE remains today the owner of the majority of generating capacity. However, Independent Power Producers (IPPs) are currently operating about 8.2 GW of generation -- mostly combined cycle plants using natural gas. The electricity market is now a monopsony. CFE is the main buyer carrying out bidding processes to develop major electricity generation projects. These processes include Build, Lease and Transfer (BLT) projects, and (IPP) schemes. The IPP scheme is becoming increasingly important in bringing new capacity, but specific conditions for the buying of electricity and responsibilities for the provision of fuel are set on a project by project basis. Based on the corresponding law issued in 1995, the Energy Regulatory Commission (CRE) issues generation permits for: (i) self-supply; (ii) cogeneration; (iii) small-scale production; (iv) independent power production, and (v) permits for imports and exports. CFE retains control of the long-term planning of the electricity system and, in coordination with the Ministry of Energy (*Secretaría de Energía*, SENER) issues multi-year plans of expansion that direct the majority of private, or public, investments in generating capacity.

[1] Data for 2003 available from the International Energy Agency (IEA)at: http://data.iea.org/mexico
[2] "Programa Sectorial de Energía 2001-2006"; "Prospectiva del Sector Eléctrico 2005-2014", México 2005, Secretaria de Energía –available at www.sener.gob.mx.

4. About 80 percent of the energy generated in Mexico is from thermal plants, although the installed thermal capacity is about 67 percent of the total. The remaining generation is hydro, nuclear and a small percentage of other renewables including geothermal. Oil and gas are the main fuels for the country's thermal plants, with coal representing a smaller percentage of the fossil fuel generation. Because a portion of the natural gas used for generation is imported from the north, generation costs have been exposed in the recent years to the spikes in natural gas prices experienced in the USA market, and the recent increases in oil prices have resulted in increased economic costs for electricity generation across the system. 1

5. The government of Mexico (GoM) publishes annually through SENER a ten-year plan for the expansion of the electricity system and has recognized the need to gradually increase the diversity of the fuel mix for electricity generation. Mexico has very good potential to develop alternative sources of energy and, especially in the South, the potential for wind energy is considerable. Nevertheless, today only a few MW of wind power are operating in the country. The country has ratified the Kyoto Protocol, while a special law to support the promotion of renewable energy is expected in the coming months. 2

2. Rationale for Bank involvement 3

6. The World Bank has been supporting for a number of years the GoM in its effort to further diversify the fuel mix for electricity generation, to improve the environmental performance in the electricity sector, and to promote renewable energy. A number of technical assistance activities3 and an upcoming Global Environment Facility (GEF) project focusing on the promotion of large-scale electricity generation using renewable sources are examples of the World Bank's recent involvement in the sector. 4

7. This project fits within the general framework of supporting renewable energy promotion in the country, and it would be the first wind energy project in Mexico under the Clean Development Mechanism (CDM). The Kyoto Protocol of the United Nations Framework Convention on Climate Change (UNFCCC) has recently entered into force (February 2005). This international agreement commits industrialized countries to reduce their carbon emissions by an average of 5.2 below their 1990 levels during the period 2008-2012. The Protocol provides for two flexibility mechanisms for meeting these obligations - the Clean Development Mechanism and Joint Implementation (JI). The CDM enables industrialized countries to meet some of their obligations through the purchasing of emissions reduction from projects that generate such emission reductions in developing countries (which do not have an obligation to reduce their emissions under the Kyoto Protocol). 5

8. The World Bank's involvement in the project would assist in demonstrating the potential of wind energy projects to realize significant additional income related to the reduction of greenhouse gas emissions using CDM. Income from carbon financing would assist the financial viability of wind energy projects and, as the projects are implemented, it would facilitate the transfer of environmentally and economically beneficial technology to Mexico. The World Bank has pioneered such transactions in Latin America (Colombia), and around the world 6

[3] A number of energy related studies funded by the Energy Sector Management Assistance Program, ESMAP, as well as energy sector activities within the Programmatic EnvSAL,

(Philippines). The Bank has also supported a number of CDM projects in Mexico for municipal solid waste management and their associated electricity generation projects, as well as a rapid transit system for public transportation in Mexico City. In the proposed project to purchase emissions reductions from the La Venta II wind energy project, the World Bank would assist CFE to develop its capacity to identify, develop and implement projects under the CDM framework.

9. The World Bank's involvement in carbon finance helps to ensure consistency between the individual projects it supports and the international dialogue on climate change, while providing the opportunity to mobilize global experts with experience in the field, technical support for project preparation, supervision capacity, and development of linkages with other sources of expertise and funding. By mobilizing the private and public sectors on an important new source of project finance, the Carbon Finance Unit of the World Bank (ENVCF) is developing an important knowledge base and is demonstrating how insights and experience from both sectors can be pooled to mobilize additional resources for sustainable development and address global environmental concerns.

10. The World Bank's involvement in this project, as a trustee of the Bio Carbon Fund and the Spanish Carbon Fund, allows purchase of emissions reductions beyond 2012 using the principles of the CDM mechanism. This arrangement reduces the uncertainty regarding the value of emissions reductions beyond the period mandated by the Kyoto Protocol and enhances the financial viability of the project.

3. Higher level objectives to which the project contributes

11. The project would contribute to the higher level objectives of poverty reduction and increased economic growth, by promoting the diversification of energy sources in power generation to control high electricity costs from fossil fuels. Furthermore, the project will contribute to the objective of promoting environmental sustainability in Mexico by demonstrating the potential of carbon financing to catalyze and advance economically beneficial investments in wind energy in Mexico.

12. The proposed Project is consistent with the Country Assistance Strategy (CAS) which proposes to support the GoM in four pillars: (i) reduce poverty and inequality; (ii) increase competitiveness; (iii) strengthen institutions; and, (iv) promote environmental sustainability. The CAS specifically mentions, under pillar (iv), that the Bank will support the GoM in its efforts to address the issue of GHG emissions.

13. The project is also linked to pillars (i) and (ii) because expensive electricity can hurt economic growth as it affects production costs, investments in productive activities, and therefore the overall competitiveness of the country. Because Mexico's electricity system is predominantly fossil-fuel based, when prices of combustibles are high the economic costs of power generation increase significantly. The recent high oil and gas prices combined with risks regarding their future values, present an important challenge for the electricity sector of the country. The proposed Project aims to introduce an alternative, indigenous, renewable, and competitive source of supply for electricity. The large-scale use of wind energy for power

generation could contribute in alleviating the high costs of electricity and therefore influence positively the country's economic growth and competitiveness.

14. Using wind energy for electricity generation is one of the most environmentally friendly technological options available today. Wind energy projects in Mexico would result in clear environmental benefits for the country. Moreover, wind energy projects would provide additional income to land-owners in rural areas because electricity plant operators pay a fee for placing the wind turbines. Further local benefits in areas where such plants are located include increased and diverse employment opportunities.

B. PROJECT DESCRIPTION

1. Purchase of Carbon Emissions Reductions

15. The proposed project will purchase a specific amount, to be agreed in the ERPA, of Verified Emissions Reductions (VERs) from the approximately 190,000 tCO2e of emissions reductions that La Venta II wind power plant is expected to generate annually. The project would reduce greenhouse gases emissions because it generates electricity using wind energy with no associated GHG emissions and would replace electricity, which would otherwise be generated using fossil fuel alternatives.

2. Project development objective and key indicators

16. The project aims to reduce greenhouse gases emissions from power generation in Mexico and promote investment in wind energy in Mexico to diversify the sources of power generation in the country.

17. The project will contribute to the further development of the international carbon market in Mexico through the supply of Emissions Reductions under the Clean Development Mechanism (CDM) as set forth under Article 12 of the Kyoto Protocol. The project is expected to reduce about 4 million tCO2e over a 20-year operation period. Key performance indicator is the creation of VERs through the electricity generation of the power plant. Secondary indicators of success concern future operations of the same type that will appear in the country (demonstration effect).

18. This project supports the first large-scale investment in wind energy in the country and will create experience and knowledge in the development operation and maintenance of wind energy generation facilities.

3. Project components

Purchase of Carbon Emissions Reductions (Total Cost: US$17,473,221)

19. CFE uses a long-term power planning simulation model (DECADES) to select future power plants that are needed for the expansion of the country's electricity system. On the basis

of such modeling results it is possible to compare alternative scenarios of new generation plants and estimate emissions with- and without- the wind power plants in the long term. During the operational period the actual dispatching of energy generated from the wind power plant is controlled by the National Center for Energy Control (CENACE) and can be monitored in real time to record the amount of electricity produced from the plant and the equivalent avoided emissions for verification purposes.

20. According to the feasibility study, the La Venta II project consists of a wind energy power plant with a nominal capacity of 83.3 MW and its associated interconnection system. The plant would provide annually about 308 GWh on average, resulting in an annual reduction of GHG of about 190,000 tons of CO_2 (tCO2e). The plant will be owned and operated by CFE and will be the first large-scale wind energy plant in Mexico, located in the Ejido La Venta, in the municipality of Juchitán de Zaragoza, in the state of Oaxaca.

21. The project would reduce about 4 million tCO2e over its 20 year lifetime period. The World Bank would purchase on behalf of the Spanish Carbon Fund Verified Emissions Reductions (VER) from the project for the period 2007-2016 (total cost US$16,258,211) and on behalf of the Bio-Carbon Fund for the period 2017-2019 (total cost US$1,215,000).

22. The amount of VERs to be purchased annually by the World Bank is 180,000 tCO2e, for a total of 2.34 million tCO2e: 1.8 million tCO2e on behalf of the Spanish Carbon Fund (in a 10 year period) and 540,000 tCO2e on behalf of the Bio-Carbon Fund (in a 3 year period). The purchase of VERs under this project means that the emission reductions will be verified annually by an accredited organization and their statement will be transmitted to the carbon funds. An advance payment to the sponsor will occur upon reception of the power plant from the contractor responsible for construction and the remainder will be paid annually in the period 2007-2012 after subtracting the advance payment.

Wind Energy Power Plant and Interconnection Line (US$113,865,000)

23. Emissions reductions will be the result of CFE's wind energy project to be located in the *ejido* la Venta, municipality of Juchitán de Zaragoza, a region known as the Istmo de Tehuantepec, state of Oaxaca. CFE's wind energy project will use wind turbine generators that transform the kinetic energy of the wind to generate electricity. The project will install 98 wind turbines (Gamesa, G-52 850 kW) in four parallel lines oriented East to West, vertically to the prevalent wind direction. The engineering study provides for adequate distance between individual turbines and the turbine lines, while there is also a provision to reserve an area towards the North to ensure unobstructed wind currents to the plant. The actual use (agricultural, livestock) of the fields where the turbines will be located will not change as the footprint of the actual wind turbines and associated infrastructure (access roads, interconnection lines, etc) is only about 20 ha when the total project area is estimated to be about 1,300 ha. CFE has entered into an agreement with the local community (Ejido La Venta) and individual landowners to pay a fee (rent) for the power plant. The project will be connected to the national grid via an interconnection line of 230 kV with a length of about 18 km along existing roads.

24. The proposed project was selected by CFE on the basis of the exceptional wind energy resource available in the region of La Venta in Oaxaca and the short-term and medium-term expansion plans of CFE. CFE prepares its plans using simulation models (WASP and others) of the electricity system and relevant demand projections to prepare optimal expansion plans. The proposed project is a result of such a system optimization exercise. It should be noted that according to CFE's planning another 300 MW of wind energy plants could be installed in the same region in the next five years. The underlying assumption is that the demand growth in the Eastern part of the electricity system will be on average about 5.2 percent for the period 2004-2013.

4. Lessons learned and reflected in the project design

25. The World Bank has been involved, initially through the GEF, and more recently using carbon finance, in a number of projects that promote renewable energy and reduce GHG emissions and has supported a number of wind energy projects around the world (e.g. China, Colombia, Costa Rica, Philippines, and others). These projects have demonstrated the potential of carbon finance to provide additional income to power plant owners and to improve the environmental performance of electricity systems.

26. Lessons from such operations indicate that the availability of carbon financing is important for the financial viability of wind energy power plants, and that when operational and technical risks are well-managed, such projects can have an important demonstration effect to further promote clean energy technologies as an environmentally friendly alternative to power generation.

27. The project sponsor, CFE --a company with very good technical capacity-- has been operating a small pilot wind power plant in the same region for about a decade and has collected significant experience and data to ensure the management of the project's technical and operational risks.

28. Furthermore, CFE has developed links with the local community and has employed social and environmental specialists to work with the local community and individual landowners to agree on a fair compensation for the use of land for wind turbines, and to educate people on the benefits of wind energy in the region. The La Venta II project has benefited from a USAID-funded study on international practices regarding issues of compensation to land owners, and related activities to increase the understanding among local community members on the minimal impacts to land and the environment of wind energy.

5. Alternatives considered and reasons for rejection

29. CFE has considered alternative electricity system expansion options under its standard planning practice and the preferred solution for new electricity generation tends to be combined cycle generation turbines fueled by natural gas. However, given the volatility of natural gas prices, uncertainties regarding long-term supplies, and considering also the environmental benefits of wind energy, CFE concluded that wind energy could be a viable option for additional

power generation. Because of prevailing high winds, and proximity to the national grid, the region of La Venta in Oaxaca was selected as an optimal location for a larger scale wind plant.

30. A number of alternative engineering designs and nearby sites were also considered during the pre-feasibility stage, but given the experience of CFE in the particular area since 1994 with a smaller pilot project (capacity of 1.5 MW) and its relationship with the local community the proposed site was selected.

C. IMPLEMENTATION

1. Institutional and implementation arrangements

31. The owner of the La Venta II wind energy power plant is CFE, which would enter in an Emissions Reduction Purchase Agreement (ERPA) with the World Bank. The Bank acts as a trustee of the Spanish Carbon Fund and the Bio-Carbon Fund for the purchase of GHG emissions reductions.

32. CFE's investment in the power plant is authorized by a budgetary allocation from the central government under the scheme of Projects with Deferred Impact in the Budgetary Registry (*Proyectos de Impacto Diferido en el Registro de Gasto*, PIDIREGAS), using the Financed Public Project (*Obra Pública Financiada*, OPF) modality. Under the OPF scheme, the contractor is responsible for the construction phase, including its financing. CFE pays fully the contractor upon satisfactory reception of the project, at which point CFE becomes the project's owner. CFE finances the project, under financing modalities authorized by the Ministry of Economy and Public Credit (*Secretaría de Hacienda y Crédito Público*, SHCP), accessing the financial markets, or borrowing from national, or international, financial institutions.

33. CFE has conducted international competitive bidding processes for the wind energy plant and the associated interconnection line --following the country's norms-- for a "turn-key' contract that includes: detailed engineering design, procurement of equipment and materials, construction, insurance, and training of personnel. The contracts have been awarded to the consortium of two Spanish companies: Gamesa Eólica and Iberdrola Ingeniería y Construcción (Iberinco)[4]. Preliminary works on the site started in 2005, while the project is expected to be completed and enter into operation in November 2006.

34. A letter of intention (LoI) was signed with the World Bank as a trustee of the carbon funds to purchase emissions reductions from the project and a preliminary agreement has been reached for the amount of VERs, indicative prices, and payment arrangements for the purchased of emissions reductions from the operation. The World Bank, on behalf of the Spanish Carbon Fund and the Bio-Carbon Fund, will enter into an ERPA with the project sponsor (CFE).

35. The Clean Development Mechanism Designated National Authority for the Kyoto Protocol in Mexico is the Ministry of the Environment and Natural Resources (*Secretaría de*

[4] The contracts awarded are published at CFE's website, with the numbers: 18164093-004-05 and 18164093-027-04.

Medio Ambiente y Recursos Naturales, SEMARNAT). SEMARNAT is responsible for the CDM registration of the project for Mexico and provides confirmation that the project is consistent with the country's overall sustainable development priorities. SEMARNAT has also approved the Environmental Impact Assessment study for the project and has indicated in preliminary consultations that the project qualifies for the CDM mechanism in Mexico.

2. Monitoring and evaluation of outcomes/results

36. The monitoring of the emissions reductions will be carried out by an accredited Designated Operational Entity (DOE), as required by the CDM rules. The DOE is an independent entity accountable to the supervising bodies of the CDM and will be responsible for validating the project activities and verifying the project's anthropogenic GHG emissions reductions. In addition, the DOE will be responsible for disclosing any potential conflict of interest arising from the project, as well as maintaining records for the validation and verification of GHG emissions reductions. This would be part of the normal validation and verification process of the emissions reductions as required by the CDM project cycle.

37. The ERPA includes an accompanying Monitoring Plan (MP) defining the quantity, price and other delivery conditions to be purchased by the carbon funds, including the monitoring and verification systems and methods. To increase the likelihood that emissions reductions will be recognized by the parties to the Kyoto Protocol, independent experts provide baseline validation and verification/certification procedures for emissions reductions. The emissions reductions estimates are based on the findings of a baseline study, validated by independent experts. The actual dispatching of the electricity generated by the wind energy plant will be monitored by the regional office of CENACE in accordance with the guidelines set out in the MP. The Baseline Study and the Monitoring Plan will be finalized during appraisal.

38. The carbon funds will require that the DOE issues a Verification and Certification Report that includes: (i) a statement of the amount of verified emissions reductions the project has generated during the verification period; (ii) verification of compliance with World Bank safeguard policies, and (iii) any other matters required by the Kyoto Protocol.

3. Sustainability and Replicability

39. The project is expected to be sustainable. CFE has good technical capacity and its implementation plan involves training in plant maintenance for CFE personnel by the contracting companies. In addition, insurance and performance guarantees for the equipment have been included in the bidding documents.

40. Policy and regulatory changes in Mexico are not expected to affect the overall sustainability of the project. The GoM has indicated its commitment to the UNFCCC and the Kyoto Protocol, which creates a positive environment for additional projects of this type to be implemented in the country.

41. The project is in compliance with the Bank's safeguard policies (Indigenous Peoples Plan is currently finalized and will be published before appraisal) and is expected to remain so. The

ERPAs make specific references to the environmental management plan that accompanies the Environmental Impact Assessment as approved by SEMARNAT.

42. The project has a significant replicability potential and the World Bank is working together with SENER for the preparation of the GEF project "Large-scale Renewable Energy Development" that will further promote renewable energy. The GEF project includes a specific component to provide technical assistance that will allow CFE and CENACE to undertake the types of activities necessary to better manage both intermittent and firm system resources, thereby adding value to both. The topography of the Isthmus allows for accurate short term projection of wind availability. Moreover, the relatively consistent seasonal patterns of rainfall and wind availability if modeled and used appropriately can improve the ability of CENACE to dispatch the large hydro plants of the nearby Chiapas region to maximize the value of both wind and hydro resources.

4. Critical risks and possible controversial aspects

Risks	Risk Mitigation Measures	Risk Rating
Regulatory and institutional risks	Mexico has ratified the Kyoto Protocol and is advancing policies to promote renewable energy.	L
Owner and Buyer is the same entity (CFE)	CFE is responsible both producing and consuming the power generated for the plant. However, monitoring of the dispatching is handled by CENACE which is an internal client for the Generation unit of CFE. CENACE operates the system and monitors the power output of each generation plant independently.	
Technical Construction Risk	CFE has well qualified engineers for the detailed design of the project. The winning contractor consortium has significant experience in similar projects. The prevailing high winds provide a narrow time frame for the raising of the turbines, but this is accounted for in the construction plan. Construction is currently under way and on track to meet the planned commissioning.	L/M
Operational Risk This is an area with strong winds that could challenge the operation of the project in the long-term.	CFE has requested guarantees of performance through the bidding documents, and an accompanying training program for the maintenance of the turbines will be provided to CFE's personnel.	L/M
Resource Risks	CFE has been operating a small pilot plant in the same area since 1994. The accumulated records present a consistently good wind potential	L
Shortfall in Emissions Reduction due to resource variability and environmental mitigation measures	Contracted sales of emissions reductions (ER) were based on only 80 percent of the total expected generation. ERs are fungible between years, and shortfalls in one year can be made up in following years. If there are three consecutive years of shortfall, the Bank has the right to re-negotiate the contract at a lower ER quota.	L/M
Social Risks	Only eight out of a total two-hundred community land-owners (*ejidatarios*) have not signed an agreement on land use with CFE. The agreement and compensation proposed is in line with international practices. The works are conducted so that the lots of land of non-signatory *ejidatarios* are not affected	L
Overall Rating		**L**

S: Substantial; M: Moderate; L: Low

5. ERPA conditions and covenants

43. The ERPA contemplates only one effectiveness condition, the Issuance of a Letter of Approval from the Designated National Authority (in this case SEMARNAT) to the CDM.

D. APPRAISAL SUMMARY

1. Economic and financial analyses

44. The economic and financial analyses were done in April 2006, before ERPA negotiations took place, so they reflect the existing market conditions (i.e. CER prices) at that previous time. The two ERPAs (with the Spanish Carbon Fund and with the BioCarbon Fund) were signed on December 2006, and the terms agreed with CFE, which remain confidential, reflected market conditions at that later date.

Economic Analysis

45. The main economic benefits of the La Venta II wind energy project are: (i) the production of electricity; and (ii) the reduction of GHG emissions in the global atmosphere. Other economic benefits, not quantified for the purposes of this analysis but useful in evaluating the project in a qualitative manner as well, are: (i) local economic benefits of increased employment during construction, operation and maintenance of the wind power plant; (ii) increased income from land where the turbines are located --without altering the use of the land; (iii) better access to agricultural land due to improved local infrastructure (roads, etc); (iv) accumulation of experience in the operation of large-scale wind power in Mexico and accompanying demonstration effects; (v) avoided local pollution from fossil-fuel alternatives (NOx, SOx, etc); and, (vi) increased diversification in the fuel mix for electricity generation in the country.

46. The main economic costs of the wind energy project are: (i) the investment necessary for the construction of the project; and, (ii) the costs of operation and maintenance.

47. The cost-benefit analysis for the La Venta II project (see Annex 9) shows that the project has a positive Net Present Value (NPV) for a discount rate of 11 percent if the economic benefits of GHG emission reductions are taken into account[5]. The analysis also shows that without the emissions reductions the project would return a positive economic NPV only at a 9 percent discount rate. The following table summarizes the results of the sensitivity analysis with and without the contribution of benefits from carbon emissions reductions for a range of discount rates.

[5] The project's economic benefits are likely to be conservative estimates (see Annex 9 for more details).

Table D.1. La Venta II NPV at US$0.04/kWh 1

Discount Rate	Economic NPV	Economic NPV without ER
8%	$23,995,163	$14,508,892
9%	$15,446,065	$6,418,658
10%	$7,930,110	($671,135)
11%	$1,305,498	($6,899,435)
12%	($4,547,717)	($12,383,618)

2

48. Finally, the economic rate of return of the La Venta II project is highly sensitive to the estimates regarding the future costs of electricity generation in the system as presented in table D.2 below. The costs for electricity generation in the Mexican system are influenced significantly by the cost of natural gas and oil. It is estimated that at a reference price of US$46 per barrel of crude oil the average system generation cost is about US$0.045 per kWh. 3

Table D.2 Sensitivity analysis of economic rates of return of La Venta II in relation to avoided costs of electricity generation 4

	Economic Rates of Return	
Electricity Generation Opportunity Cost (in US$ cents/kWh)	Energy Benefits and Carbon Emissions Reductions	Energy Benefits only
3.7	10.0%	8.7%
3.9	10.8%	9.5%
4.0	11.2%	9.9%
4.2	12.0%	10.7%

5

Financial Analysis 6

49. The financial position of CFE (the La Venta II project sponsor) is closely related with the policies of the GoM applied through SHCP. With assets of about US$59Billion and an equity value of about US$33Billion, combined with its close relationship with the Federal Government of Mexico, CFE can be viewed as a solid company for the purposes of this project. Indeed, the company has good access to financial markets and has issued successfully bonds on its behalf in overseas markets in recent years. 7

50. The La Venta II wind energy project has been approved and assigned a budget allocation by the GoM under the general scheme of Projects with Deferred Impact in the Budgetary Registry (*Proyectos de Impacto Diferido en el Registro de Gasto*, PIDIREGAS), using the Financed Public Project (*Obra Pública Financiada*, OPF) modality. The winning bidder for the power plant 'turn-key' contract assumes the financing and construction risk of the project. CFE pays the contractor when the project is completed and received by CFE; CFE's payment to the contractor is fully backed by government guarantees. CFE then obtains long-term financing for the amount of the OPF contract through the commercial financial markets, with the approval of SHCP. 8

51. CFE is expected to fully finance the La Venta II project using debt. Under this special financial structure, and using the assumptions presented in Annex 9, CFE has a positive financial cash flow from the operation of the plant year after year. At a discount rate of 12 percent the present value of the project to CFE is about US$13m if the revenues from emissions reductions are considered and about US$7.2m without considering emissions reductions revenues.

52. A sensitivity analysis of the assumptions shows that as long as CFE has access to the expected adequate financing terms, allowing the company to service the debt and its taxes with project revenues, it is very likely to make a profit from the project. The analysis also shows that income from the selling of emissions reductions is important to ensure the financial viability of the project.

Table D.3: Financial Value of La Venta II

Financial Discount Rate	Financial NPV (US$)	Financial NPV no ER sales(US$)
8%	16,772,155	9,559,695
9%	15,696,185	8,886,218
10%	14,726,086	8,285,756
11%	13,848,671	7,748,635
12%	13,052,667	7,266,635

Fiscal Impact

53. Since the World Bank is not a lender in this project, there are no fiscal impacts of Bank-lending activities. The fiscal impact on the project will be related to the duty fee paid to the GoM by CFE on the net asset value of the La Venta II power plant. Such a fee will be determined by SHCP in future years depending on the overall profitability of the company. However, emission reductions' sales from CFE to the Spanish Carbon Fund and the Bio-Carbon Fund will contribute positively to the revenue stream of CFE and will influence positively either the equity of the company, or the fiscal position of the country.

54. There is, however, a broader fiscal impact because the wind energy project is financed through PIDIREGAS. Financial obligations under PIDIREGAS are being brought into the budget process as the outlays for interest and amortization of previous years' projects are registered in the spending budget. The fiscal impact of the La Venta II project will depend on the final financing terms authorized by SHCP for the project. For instance, a loan for the full project amount with a repayment period of 15 years, constant payments, and a fixed interest rate of 7 percent to 9 percent, would require annual payments of about US$12.5million to US$14.1million impacting accordingly the country's budget (the loan is in practice repaid by CFE, however from the central government's perspective a contingent liability is created –in this case of probably low risk).

2. Technical

55. An early feasibility study for a similar wind energy project in the same location was completed with funding from USAID in 2003 (Feasibility Study of the La Venta II 50 MW Wind Power Project in Oaxaca, Mexico – document available in project files). The feasibility study

demonstrated the wind project's viability and CFE has prepared various engineering studies for the project site including: evaluation of the wind resource, topography, ground mechanics, and an energy flows analysis of the electric system.

56. The bidding documents for the La Venta II project were prepared by CFE in accordance with international standards, and using technical assistance by international experts on matters related to wind plant design and performance characteristics of the wind turbines. Despite the high winds prevailing in the area, the technical design and the guarantees required by CFE for the project suggest low technical performance risks.

57. *Additionality.* The Kyoto Protocol requires for projects to qualify under the CDM need to be "additional". "Additionality" is assessed against a baseline, which describes what would happen in a "business as usual" scenario (i.e. without the proposed project). A project is therefore additional if it reduces the quantity of GHG emissions that would otherwise be released under a baseline scenario.

58. The La Venta II project is additional mainly because of other available alternatives for generation that are financially more attractive (natural gas –fired combined cycle power plants). Based on data provided by CFE, the new installed capacity programmed to be built from 2006 to 2013 will be composed by 62 percent of Gas Combined Cycle Plants, 14 percent of Renewable power plants, 4 percent of Coal power plants and 20 percent is not determined.

59. *Baseline.* The baseline scenario is "electricity that would have been otherwise generated by the operation of grid-connected power plants and by the addition of new generating sources". Following the selected methodology: ACM0002, the default baseline emission factor is calculated as a combined margin that consists of: (i) a weighted average of the operating margin emission factor; and (ii) the build margin emission factor -all margins expressed in tCO2/MWh. For wind-farm power plants the CDM Executive Board has ruled that an operating margin to build margin ratio of 3 to 1 would be acceptable. The project boundary for the project is the Mexican National Grid. Since no leakages or emissions were identified for the project, emissions reductions will be equal to the baseline emissions. The baseline emission for Mexico applying the above methodology is 0.62570 tCO2e/MWh. The annual project ERs are then estimated to be about 190,000 tCO2e (see detailed analysis in Annex 4).

3. Fiduciary

60. **Payment and Flow of Funds:** At the time of the signing of each ERPA, an anticipated schedule of payments based on the delivery of ERs will be prepared. The project sponsor(s) shall make requests for payment to the World Bank Carbon Funds under the ERPA. The first payment from the Carbon Funds will be agreed to in the ERPA and will occur upon declaration by the Carbon Funds that relevant conditions have been met. Thereafter, the Carbon Funds will only pay each eligible project upon successful transfer of ERs. The involvement of the World Bank Carbon Finance Business will expire after ERs up to the total contract amount, as established in the ERPA, have been delivered. In the event that the project sponsor fails to deliver the quantity of ERs for any given calendar year as set forth in the ERPA, the project sponsor will be required to make-up the shortfall over the course of the following calendar year or in any other period as

agreed in the ERPA. Apart from funds pertaining to the sale of emissions reductions, as described in the ERPA, the project does not include any World Bank or IFC financing. Payments will be made directly to CFE's bank account from the World Bank**.** The procedures are monitored and authorized by the World Bank's Trust Fund Unit under OPCS's supervision.

4. Social

61. The project is located in an area were the system of *ejidos* (communal land) is in place, and triggers OD 4.20 on indigenous peoples. The *ejido* was founded in 1951 with 5,815 hectares, and each *ejidatario* (communal land owner) was provided with a maximum of 10 Ha. According to the National Geography and Statistics Institute's (INEGI) data, the *ejido* has a population of 1,814 people. The inhabitants of the *ejido* la Venta belong to the ethnic group Zapoteco, which is one of the majority ethnic groups of the state of Oaxaca (16 groups total). Although the *ejido's* population has stopped speaking Zapoteco, they maintain the regional festive traditions and recognize themselves as Zapotecos and Mexicans.

62. Based on interviews with the *ejidal* commissioner and 20 *ejidatarios* of la Venta (conducted by the World Bank's social specialist consultant, April 2005), the *ejidatario's* perception about the project and the installation of air wind turbines in their land, is positive --it is seen as a good opportunity to obtain additional income from renting of land. However, for a number of years there has been confusion about the effects and potential economic benefits of wind energy projects in the area. CFE has conducted an extensive consultation process and negotiated compensations for the use of land in line with international practices. Thus, CFE has set a benchmark for agreements between project sponsors and land-owners that guarantee a minimum additional income to beneficiaries without compromising traditional uses for the land in the area.

63. The project will benefit directly the *ejidatarios* that own land in the project's zone of influence (such payments will on average double the annual income of beneficiaries) and indirectly all the *ejidatarios* of La Venta II according to a plan of social works negotiated between CFE and the local authorities of the *ejido*. The plan includes: (i) the creation of a trust fund (created in December 2005 and capitalized with 7million Mexican Pesos) to provide public lighting, paving of the principal streets of the *ejido* and computers for the secondary school; and (ii) the creation of an employment agency that would give priority to the *ejidatarios* in the works during the installation of the wind turbines. The plan will be executed by the authorities of the *ejido* with the support of CFE, the Ministry of Social Development (*Secretaría de Desarrollo Social*, SEDESOL) and the Ministry of Agriculture, Rural Development, Fishing and Food (*Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación*).

5. Environment

64. The project triggers *O.P. 4.01* (Environmental Assessment) and *O.P. 4.04* (Natural Habitats). The project sponsor complies with the requirements of O.P. 4.01 as follows: CFE has presented to SEMARNAT --as required by the Mexican norms-- a full Environmental Impact Assessment (EIA) for the project. The EIA was prepared by the *Instituto de Ecología* A.C. (available in Project files). SEMARNAT received the EIA on April 22, 2004 and approved it on

August 3, 2004, following consultations with a number of environmental experts in the country. An update to the EIA based on the final project design was approved by SEMARNAT in December 2005.

65. The EIA includes an analysis of impacts and presents measures to avoid, control, mitigate, or compensate any negative environmental impacts in an Environmental Management Plan (EMP), during both construction and operation phases of the project. On the basis of the EIA, environmental audits are planned to ensure compliance with the applicable norms of the project. Further, CFE is developing specific operational guidelines to monitor and prevent environmental impacts related to migratory birds (see Key Safeguard issues below).

66. SEMARNAT will use the experience from the proposed project during the operation phase to evaluate impacts on the migratory birds in the zone and will issue appropriate norms in similar future projects in the country.

Public disclosure

67. The EIA and EMP are posted on the Bank website, and on the website of a SEMARNAT. There are no negatively affected people from this project and all local communities have had access to the EIA and are currently able to lodge complaints directly with CFE and the local environmental authorities. SEMARNAT based its evaluation and approval of the EIA on consultations held with General Direction of Wild-Life (Dirección General de la Vida Silvestre, DGVS), the National Biodiversity Commission (Comisión Nacional de Biodiversidad, CONABIO), the State Institute of Ecology of Oaxaca (Instituto Estatal de Ecología del Estado de Oaxaca) and the Coordination of Conservation Programs in Central Mexico (DUMAC).

68. On April 20th 2006, the Federal Commission of Electricity conducted a one day public consultation with relevant stakeholders, bird specialists, NGOs and the academia to discuss the characteristics of La Venta III and its potential impacts on bird and bat populations. More than 40 people attended the consultation and in general terms it has been reported that the event resulted in a constructive dialogue and positive conclusions regarding the quality and usefulness of CFE's bird monitoring program. CFE had left an open e-mail address for further questions and answers about the project.

69. CFE is currently finalizing the Indigenous Peoples Plan that will be published in CFE's website and the World Bank Infoshop before project appraisal.

Key Safeguards issues

70. The key environmental impact concerns the potential collision of birds (native and migratory) with the blades of wind turbines during operation. Specifically, the Oaxaca portion of the Isthmus of Tehuantepec is recognized as one of the world's most important corridors for migratory birds. As noted in the Environmental Assessment (EA) report millions of birds (representing a wide diversity of species) funnel through the Isthmus area, especially during the autumn (southbound) migration that takes place late August to November. The general La Venta

region is particularly noteworthy for numbers of raptors (hawks and other birds of prey) that pass through the area.

71. The Project has established a number of measures to avoid and/or minimize impacts on bird and bat populations including: (i) as required by the environmental licensing for the Project, CFE has been implementing since 2004 a program of monitoring of the birds in the project's zone of influence (ii) the project has been re-designed during the final award to the contractor to involve a smaller number of turbines and to avoid areas where risks of collision where deemed higher during the monitoring program[6] (iii) a public consultation with relevant stakeholders and bird specialists to discuss prevention and mitigation measures was held on April 20, 2006 (iv) development of guidelines and specifications to ensure appropriate turbine design and arrangements as well as implementation of rules for turbine shutdown during migration season is currently under way. CFE is planning to implement a radar system that would detect the passage of big numbers of migratory birds and combine it with trained observers, so that it can temporary suspend the rotation of wind turbines to avoid collisions.

72. The above operational provisions will form part of the operational and monitoring plan used to validate and verify emissions reductions for the purposes of the Kyoto Protocol and as standard practice are part of the ERPA. An independent entity (DOE, see sections C1 and C2 above) will produce a report confirming that CFE is complying with all pre-established social and environmental conditions.

6. Safeguard policies

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment (OP/BP/GP 4.01)	[X]	[ ]
Natural Habitats (OP/BP 4.04)	[X]	[]
Pest Management (OP 4.09)	[ ]	[X]
Cultural Property (OPN 11.03, being revised as OP 4.11)	[ ]	[X]
Involuntary Resettlement (OP/BP 4.12)	[]	[X]
Indigenous Peoples (OD 4.20, being revised as OP 4.10)	[X]	[]
Forests (OP/BP 4.36)	[ ]	[X]
Safety of Dams (OP/BP 4.37)	[ ]	[X]
Projects in Disputed Areas (OP/BP/GP 7.60)*	[ ]	[X]
Projects on International Waterways (OP/BP/GP 7.50)	[ ]	[X]

7. Policy Exceptions and Readiness

73. No policy exceptions are anticipated for the proposed project.

74. The process for the selection of contractors for the project (international bidding process using Mexico's norms) was completed in 2005 (see section C.1 and footnote 4) while the actual

[6] SEMARNAT provided the environment clearance for the updated project in December 2005 (Official Memorandum in project Files)

* *By supporting the proposed project, the Bank does not intend to prejudice the final determination of the parties' claims on the disputed areas*

civil works are currently underway[7]. It is expected that the project will enter into operation in November 2006. 1

75. Condition of Negotiation: (i) Presentation of a draft Project Operational Manual, satisfactory to the Bank. 2

[7] The bidding documents for the wind energy plant are available in project files: *Bases de Licitación* 132 CE La Venta II.

Annex 1: Country and Sector Background

MEXICO: Wind Umbrella (La Venta II)

Mexico has an advanced electricity system with an installed capacity of about 53 GW, an annual production of about 220,000 GWh, annual consumption of about 180,000 GWh, and an estimated population coverage of about 95 percent. Mexico's electricity system is one of the best in Latin America.[8]

Average per capita consumption of electricity is in line with the level of economic development of the country (middle-income) and has been growing steadily. Per capita consumption in Mexico was 1,785 kWh in 2003 –about a fifth of annual consumption in Japan, and slightly smaller than that of Chile, or Venezuela. In the last decade, electricity demand in Mexico grew on average 5.2 percent per year while at the same time economic growth was averaging about 3.5 percent annually. The rate of growth of demand for electricity is expected to remain at similar levels in the next few years, but it could increase if the pace of economic growth accelerates. The government forecasted for the period 2004-2013 an average rate of growth of 5.6 percent based on economic and demographic growth estimates[9]. Significant investments in new generation capacity will be needed in the next decade to ensure that there will be adequate supply of electricity to meet the growing demand.

The sector is dominated by two state-owned electricity companies: the Federal Electricity Commission (CFE), which serves most of the Mexican territory; and Luz y Fuerza del Centro (LFC), which is responsible for providing electricity services in the area of Mexico City and its surroundings. CFE is a vertically integrated electricity company that controls the majority of generation, the transmission system and energy dispatching functions, while it is also responsible for the distribution and commercialization of electricity. LFC is primarily devoted to distribution and commercialization and owns a small part of generation; almost 95 percent of the electricity distributed by LFC is bought from CFE. In 1992, the Electricity Public Service Law was reformed, and reduced CFE's legal monopoly in power generation. The objectives of the reform were to foster private participation in electricity generation, to entitle open access to the transmission grid for all participants in the sector, and to optimize short and long-term costs.

Electricity tariffs for the sale of electricity in Mexico are defined and authorized by the Federal Government through SCHP and, for certain categories of users, tariffs are set below cost. These tariff subsidies are balanced with taxes that CFE should pay to the government. According to CFE the average tariff charged to residential customers in 2003 covered 42 percent of the costs, and for agricultural uses only 28 percent. Residential tariffs are well below the OECD country average, while industrial tariffs are generally higher than in OECD countries. Compared to other Latin American countries, commercial tariffs are among the highest, while industrial and residential tariffs are close to the average. High industrial tariffs have led to an increasing trend towards self-supply by industries during peak-times[10].

[8] Data for 2003 available from the International Energy Agency (IEA)at: http://data.iea.org/mexico

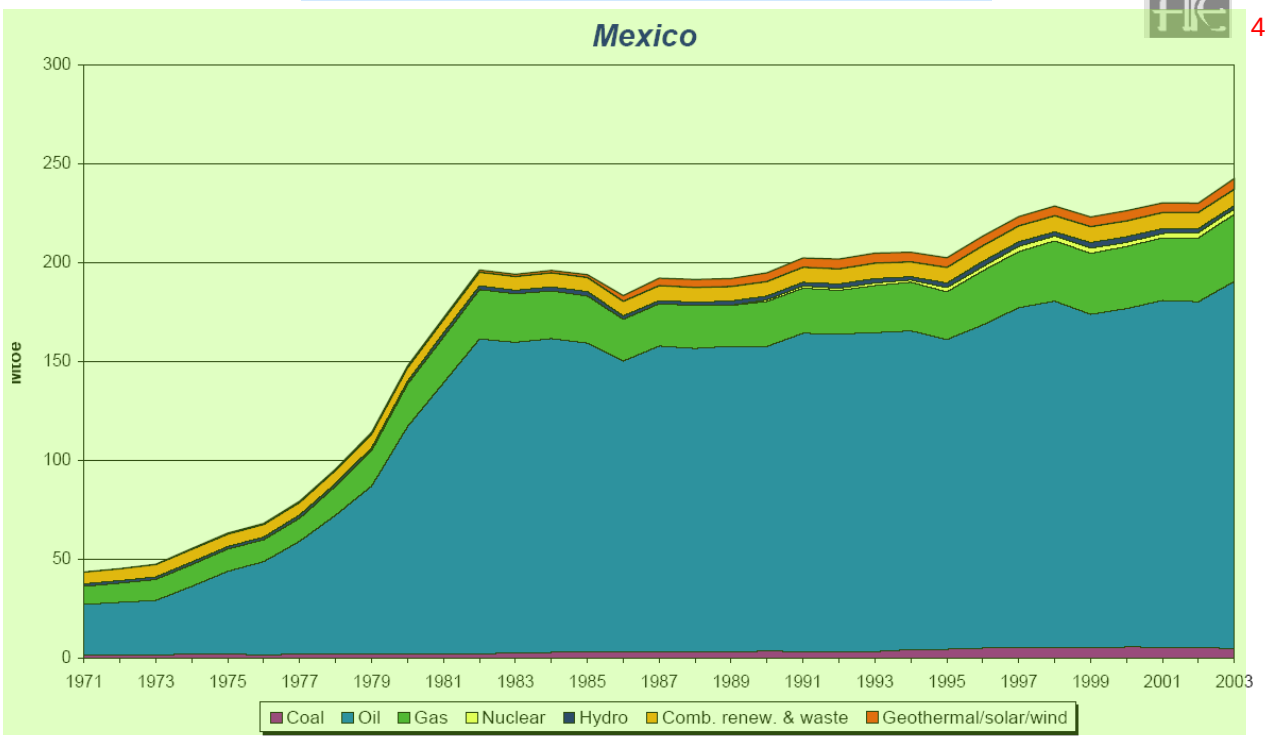
[9] "Programa Sectorial de Energía 2001-2006"; "Prospectiva del Sector Eléctrico 2005-2014", México 2005, Secretaria de Energía –available at www.sener.gob.mx.

[10] A more detailed analysis on electricity sector performance indicators is available in "Mexico Infrastructure Public Expenditure Review (IPER), Report No. 33483-MX, October 24, 2005. The World Bank.

CFE remains today the owner of the majority of generating capacity. However, Independent Power Producers (IPPs) are currently operating about 8.2 GW of generation --mostly combined cycle plants using natural gas. The electricity market is now a monopsony. CFE is the main buyer carrying out bidding processes to develop major new electricity generation projects. These processes include Build, Lease and Transfer (BLT) projects, and (IPP) schemes. The IPP scheme is becoming increasingly important in bringing new capacity, but specific conditions for the buying of electricity and responsibilities for the provision of fuel are set on a project by project basis. Based on the corresponding law issued in 1995, the Energy Regulatory Commission (CRE) issues generation permits for: (i) self-supply; (ii) cogeneration; (iii) small-scale production; (iv) independent power production, and (v) permits for imports and exports. CFE retains control of the long-term planning of the electricity system and, in coordination with the Ministry of Energy (*Secretaría de Energía*, SENER) issues multi-year plans of expansion that direct the majority of private, or public, investments in generating capacity. 1

About 80 percent of the energy generated in Mexico is from thermal plants, although the installed thermal capacity is about 67 percent of the total. The remaining generation is hydro, nuclear, and a small percentage of other renewables including geothermal. Oil and gas are the main fuels for the country's thermal plants with coal representing a smaller percentage of the fossil fuel generation (see graph below). Because a portion of the natural gas used for generation is imported from the north, generation costs have been exposed in the recent years to the spikes in natural gas prices experienced in the USA market, while the recent increases in oil prices have resulted in increased economic costs for electricity generation across the system. 2

Evolution of Total Production of Energy from 1971 to 2003 3



4

Graph Annex 1.1: Energy Mix in Mexico *(Source: International Energy Agency)* 5

To meet the increasing electricity demand, CFE defines the Program of Investments and Works in the Electricity Sector (*Programa de Obras e Inversiones del Sector Eléctrico*, POISE). The program is based on the sector policy established by SENER related with the costs and use of fuels, as well as CFE's projections on costs of operation and maintenance for generation and transmission. These data are incorporated in simulation models (WASP, PSS/E, MEXICO and others) of the National Electricity System, which are then used to estimate the minimum cost expansion of the system. 1

In the East area of the electricity system, demand is expected to be on average 5.2 percent for the period 2004-2013. POISE considers that a wind energy plant of 85 MW in the project area would contribute in meeting the increasing demand (the program aims to maintain a reserve margin of 27 percent and an operational margin of 6 percent, in line with accepted international practices). 2

The government of Mexico (GoM) publishes annually through SENER a ten-year plan for the expansion of the electricity system and has recognized the need to gradually increase the diversity of the fuel mix for electricity generation. Mexico has very good potential to develop alternative sources of energy and, especially in the South, the potential for wind energy is considerable. Nevertheless, today only a few MW of wind power are operating in the country. The country has ratified the Kyoto Protocol, while a special law to support the promotion of renewable energy is expected in the coming months. 3

Annex 2: Major Related Projects Financed by the Bank and/or other Agencies [1]

MEXICO: Wind Umbrella (La Venta II)

Project Name	ID	Product Line	Country	Status	Approved
Mexico City Insurgentes Bus Rapid Transit System Carbon Finance Project	P082656	Carbon Offset	Mexico	Active	04-Nov-2005
Methane Gas Capture and Use at a Landfill - Demonstration Project	P063463	Global Environment Facility – Grant	Mexico	Active (Highly Satisfactory)	15-May-2001
Second Programmatic Environment Development Policy Loan	P079748	Lending	Mexico	Closed	06-Se--2005
Introduction of Climate Friendly Measures in Transport	P059161	Global Environment Facility- Grant	Mexico	Active	29-Oct-2002
Waste Management and Carbon Offset Project	P088546	Carbon Offset	Mexico	Lending	18-Mar-2005

[2]

The United Nations Development Program is implementing since 2002 a US$10m GEF project aiming to promote commercial markets for wind energy in Mexico (project title: Action Plan for Removing Barriers to the Full-Scale Implementation of Wind Power in Mexico). [3]

The World Bank is also expected to approve in 2006 another US$25m GEF project aiming to promote large scale renewable energy in Mexico. [4]

Annex 3: Results Framework and Monitoring [1]

MEXICO: Wind Umbrella (La Venta II)

Results Framework [2]

PDO	Project Outcome Indicators	Use of Project Outcome Information
The project aims to reduce greenhouse gases emissions from power generation in Mexico and promote investment in wind energy in Mexico to diversify the sources of power generation in the country.	The key performance indicator is the creation of VERs through the electricity generation of the wind energy power plant	Emissions Reductions Purchase Agreement payments

[3]

Arrangements for results monitoring 1

	Target Values									Data Collection and Reporting			2
Project Outcome Indicators	Baseline	2007	2008	2009	…	2016	2017	2018	2019	Frequency and Reports	Data Collection Instruments	Responsibility for Data Collection	
VERs (2e) created	0	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	Annual Verifications by	Designated Operational Entity Reports	Designated Operational Entity	

Note: For the period 2007-2016 the ERPA is on behalf of the Spanish Carbon Fund, and for the period 2017-2019 the ERPA is on behalf of the Bio Carbon Fund. 3

Annex 4: Detailed Project Description [1]

MEXICO: Wind Umbrella (La Venta II)

Purchase of Carbon Emissions Reduction (US$17,473,211) [2]

The proposed project will purchase Verified Emissions Reductions (VERs) from the La Venta II wind power plant. The project would reduce greenhouse gases emissions because it generates electricity using wind energy with no associated GHG emissions and would replace electricity which would otherwise be generated using fossil fuel alternatives. [3]

According to the feasibility study the project consists of wind energy power plant of a nominal capacity of 85 MW (+/- 2 percent) and its associated interconnection system. The plant would provide annually about 308 GWh on average, resulting in an annual reduction of GHG of about 190,000 tons of CO_2 (tCO2e). The plant will be owned and operated by CFE and will be the first large-scale wind energy plant in Mexico, located in the *Ejido* La Venta, in the municipality of Juchitán de Zaragoza, in the state of Oaxaca. [4]

The project would reduce about 4 million tCO2e over its 20 year lifetime period. The World Bank would purchase on behalf of the Spanish Carbon Fund Verified Emissions Reductions (VER) from the project for the period 2007-2016 (total cost US$16,258,211) and on behalf of the Bio-Carbon Fund for the period 2017-2019 (total cost US$1,215,000). [5]

The purchase of VERs under this project means that the emission reductions will be verified annually by an accredited organization and their statement will be transmitted to the carbon funds. An advance payment to the sponsor will occur upon reception of the power plant from the contractor responsible for construction, while the remainder will be paid annually in the period 2007-2012 after subtracting the advance payment. [6]

Baseline and Additionality [7]

The provisions of the Kyoto Protocol require that "Reductions in emissions […] be additional to any that would occur in the absence of the certified project activity." This is the so called **additionality criterion** and constitutes the foundation of generating emission reductions (ERs) through CDM projects. [8]

"Additionality" is assessed against a baseline, which describes what would happen in a "business as usual" scenario (i.e. without the proposed project). A project is therefore additional if it reduces the quantity of GHG emissions that would otherwise be released under a baseline scenario. [9]

Emissions Reductions are not likely in the absence of the La Venta II project, because of barriers that wind power plants' developers need to overcome in Mexico and the existence of other available alternatives for generation that are more financially attractive i.e. natural gas –fired combined cycle power plants. The National Energy Sector Program 2001-2006, on page 26, affirms that Mexico has the 9th place in oil reserves and the 9th place in natural gas reserves and that its fiscal income strongly depends on the revenues generated by the oil national industry. Based on data provided by CFE, the new installed capacity programmed to be built from 2006 to [10]

2013 will be composed by 62 percent of Gas Combined Cycle Plants, 14 percent of Renewable power plants, 4 percent of Coal power plants and 20 percent is not determined. 1

Finally, the project will be the first large-scale wind power plant to be built in Mexico, there is only one other grid-connected wind power plant named La Venta I of 1.75 MW (a pilot plant) and an off-grid wind power plant (Guerrero Negro of 0.6 MW). This project will therefore serve as a technological example to demonstrate the value of the wind potential of Oaxaca. CFE believes that carbon finance revenues will alleviate the financial hurdles and other barriers faced by the project to some extent. 2

Baseline 3

The baseline scenario is "electricity that would have been otherwise generated by the operation of grid-connected power plants and by the addition of new generating sources". Following the selected methodology: ACM0002, the default baseline emission factor is calculated as a combined margin (CM), consisting of a weighted average of the operating margin emission factor (OM) and the build margin emission factor (BM) -all margins expressed in tCO2/MWh. The default weights for the OM and BM are 0.5, but for wind-farm power plants the CDM Executive Board has ruled that 0.75/0.25 would be acceptable due its technological characteristics. The project boundary for the project is the Interconnected Mexican National Grid (IMNG). Since no leakages or emissions were identified for the project, emissions reductions will be equal to the baseline emissions, which is to be calculated ex-post annually as outlined below. 4

The Operating Margin is calculated ex-post annually as the weighted average emission of all non-renewable sources in the Mexican Grid. The BM is defined as the generation-weighted average emission factor (tCO_2/MWh) of the latest 20 percent added capacity. 5

The IMNG generation in 2005 of non-renewable sources was 160,168 GWh, with total emissions of 112,176,682 tCO2, thus the operating margin (OM) gives 0.70033 tCO2e/MWh. As latest capacity addition was composed mainly by combined cycle natural gas fired plants according to CFE (latest capacity addition data has not been yet made available by CFE), this technology is deemed to be representative for a build margin (BM) conservative estimate, thus the BM would be 0.40185 tCO2/MWh, which is the tCO2/MWh of a typical gas-fired combined cycle plant in the IMNG. The resulting CM, calculated as the weighted average of the OM and BM would be 0.62570 tCO2e/MWh. 6

Finally, the annual project ERs are estimated to be: 7
Annual ERs (tCO2e) = 307,728 MWh x 0.62570 tCO2/MWh = 192,545 tCO2e.

The Wind Energy Power Plant and associated Interconnection Line

(La Venta II Wind Power Plant: US$105,763,000
Associated Interconnection Line: US$8,10,2000
Total Cost: US$113,865,000)

An early feasibility study for a similar wind energy project in the same location was completed with funding from USAID in 2003 (Feasibility Study of the La Venta II 50 MW Wind Power Project in Oaxaca, Mexico – document available in project files). The feasibility study demonstrated the projects viability and CFE has prepared various engineering studies for the project site including: evaluation of the wind resource, topography, ground mechanics, and energy flows analysis of the electric system. 1

Wind Resource 2

One of the important factors for the technical feasibility of the project has been the analysis of data related to the direction and velocity of the wind. Driven by trade winds in the Caribbean, air flows south from the Gulf of Mexico, through a gap in the Sierra Madre Mountains, to the Pacific Ocean. The winds are channeled and accelerated through the mountain pass ('venturi' effect) across the coastal plains of the Isthmus of Tehuantepec. CFE has been monitoring the area with anemometers since 1993 and has collected data on various heights (20, 30 and 40m). The database of the resource has been analyzed and it shows, with a good degree of confidence, that the selected site is exceptionally well suited for wind project development. Annual average wind speeds for the area are over 9 m/s at a height of 30 m above ground level (see table below for monthly variability), with the prevailing direction from the north. In comparison with other locations the consistent direction of the wind is unique in the La Venta area. 3

Table Annex 4.1: Average Monthly Wind Speed (m/s). 4

	1996	1997	1999	2000	4-yr
January	11.7	11.5	12.3	13.3	12.2
February	10.2	12.7	11.6	11.0	11.4
March	10.5	10.4	9.3	6.9	9.3
April	8.6	9.2	7.9	8.7	8.6
May	8.5	9.7	6.5		8.3
June	6.3	5.6	4.7		5.6
July	8.7	12.6	9.7	10.3	10.3
August	8.4	12.4	6.9	10.5	9.5
September	5.7	8.6	6.2	6.7	6.8
October	8.7	8.3	10.1	12.5	9.9
November	13.1		14.4		13.7
December	13.7		13.8		13.8

5

Source: La Venta II Feasibility Study 6

At most sites, a slight variation in wind speed results in a large variation in energy output, due to the cubic relationship between wind speed and wind energy. At extremely high wind sites, like those in the La Venta region, this effect is reduced because the wind turbines operate at their rated output much of the time. Even if turbines experience slightly lower winds, they still operate at their rated output, minimizing the impact on the annual energy output. As a result, the variation of the wind across years may not be as important as in other sites.

Wind Turbine Equipment

Most of the commercial manufacturers offer today wind turbines of 1 MW, or larger, in size. Given the exceptionally high winds in La Venta, Class 1[11] wind turbines are required. For this project, the issue of logistics (transport of the wind turbines' blades) was also examined and it is expected that the port of Salina Cruz could handle the equipment; cranes for the wind turbines installation are available in the region. The winning bidder for the project (Gamesa Eólica) will supply 98 wind turbines rated at 850 kW, with a rotor diameter of 52 m.

Site Layout and Project Performance

The placing of the turbines in the project area is designed using computer models that take into account the wind speed, the wind power curve, and digitized terrain data to optimize the energy output from the power plant and estimate annual energy outputs. Various configurations for wind turbine placement were studied (one Row, two Rows with 10 diameter spacing, four rows with 10 diameters spacing, etc) to project annual outputs from the plant. Finally, to accommodate issues of land availability and the need to coordinate with a large number of landowners, a configuration of four rows with 10 diameters spacing was selected. Under the selected configuration, the net capacity factor of the plant is estimated in the range of 45 percent-49 percent which would produce on average 350 GWh annually.

Project Construction and Interconnection

The project will be interconnected at a new substation constructed within the project site. CFE has carried out load flow studies for a variety of system conditions and the results indicated that the wind power plant causes no adverse conditions and the transmission system can carry all planned generation capacity to the various lad centers in the CFE system. The turbines will be interconnected via underground cable to a pad-mounted transformer where the voltage will be increased to 34.5 kV. The 34.5 kV lines will run underground along the La Venta- El Porvenir road to the substation on the project site. La Venta II will be connected to the National Interconnection System with a 230 kV transmission line of about 18km along the road. It should be noted that the transmission line is designed to allow for the power transmission of future wind energy plants that are expected in the area.

As of April 2006 the project's construction is advancing according to schedule both for the foundations of the wind turbines, as well as the site preparation for the substation and the interconnection line. The contractor is closely supervised by CFE's technical unit. The project

[11] Four classes of wind turbines are defined in an International Electro technical Commission. Class 1 are recommended for areas with high winds where the average annual wind speed at hub height is up to 10 m/s.

is to undergo testing before delivery in October 2006 and appears to be progressing well. The only remaining risk is the raising of the blades that could be hindered if unexpectedly high winds appear over this summer. 1

Annex 5: Project Costs

MEXICO: Wind Umbrella (La Venta II)

Emissions Reduction Purchase

	Period	
Verified Emissions Reductions Purchase for	**2007-2016**	**2017-2019**
Spanish Carbon Fund	US$16,258,211	
Bio Carbon Fund		US$1,215,000

Wind Energy Power Plant and Associated Interconnection Line

A detailed analysis of costs incurred by CFE for the investments in the wind energy power plant is available at the feasibility summary. The following table summarizes the estimated values (US$) for the turn-key contract:

Wind Power Plant			
	Physical Investment	105,130,000	
	Supervision	633,000	
Sub-total			*105,763,000*
Interconnection Line			
	Physical Investment	7,951,000	
	Supervision	151,000	
Sub-total			*8,102,000*
Total Project			**113,865,000**

Annex 6: Implementation Arrangements [1]

MEXICO: Wind Umbrella (La Venta II)

Institutional and Implementation Project Arrangements [2]

The owner of the wind energy power plant would be CFE, which would enter in an Emissions Reduction Purchase Agreement (ERPA) with the World Bank as trustee of the Spanish Carbon Fund and the Bio-Carbon Fund for the sale of GHG emissions reductions. [3]

The project is authorized by a budgetary allocation from the central government under the Financed Public Works scheme (*Obra Pública Financiada*, OPF). Under the OPF scheme, the contractor is responsible for the construction phase, including its financing. CFE pays fully the contractor upon satisfactory reception of the project, according to the bidding document. CFE finances the project under financing modalities authorized by the Ministry of Economy and Finance (*Secretaría de Hacienda y Crédito Público*, SHCP) –accessing the financial markets, or borrowing from national, or international, financial institutions. [4]

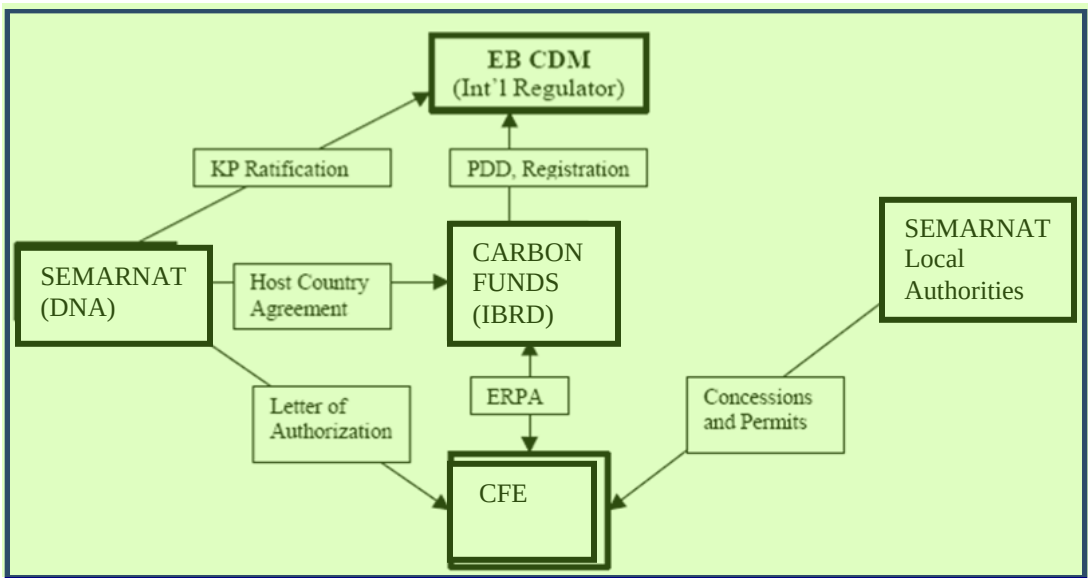
CFE has conducted international competitive bidding processes for the wind energy plant and the associated interconnection line --following the country's norms for turn-key contracts. The contract for La Venta II includes: detailed engineering design, procurement of equipment and materials, construction, insurance and training of personnel. The costs are US$105.763 million for the wind energy plant and US$8.1million of the interconnection line. The contracts have been awarded to the consortium of two Spanish companies: Gamesa Eólica and Iberdrola Ingeniería y Construcción (Iberinco)[12]. Preliminary works on the site have started in 2005, while the project is expected to be completed and enter into operation in November 2006. [5]

A letter of intention (LoI) was signed with the World Bank as a trustee of the carbon funds to purchase emissions reductions from the project and a preliminary agreement has been reached for the amount of VERs and indicative prices and payment terms for the purchased of emissions reductions from the operation (see section B.1). The World Bank, on behalf of the Spanish Carbon Fund and the Bio-Carbon Fund, will enter into an ERPA with the project sponsor (CFE). [6]

The Clean Development Mechanism Designated National Authority for the Kyoto Protocol in Mexico is the Ministry of the Environment and Natural Resources (*Secretaría de Medio Ambiente y Recursos Naturales*, SEMARNAT). SEMARNAT is responsible for the registration of the project in Mexico and provides confirmation that the project is consistent with the country's overall sustainable development priorities. SEMARNAT has approved the Environmental Impact Assessment study for the project and has indicated in preliminary consultations that the project qualifies for the CDM mechanism in Mexico. [7]

[12] The contracts awarded are published at CFE's website, with the numbers: 18164093-004-05 and 18164093-027-04. The bidding documents are available in project files.

General Institutional Arrangements for CF Projects



1

The monitoring of the emissions reductions will be carried out by an accredited Designated Operational Entity (DOE), as required by the CDM rules. The DOE is an independent entity accountable to the supervising bodies of the CDM and will be responsible for validating the project activities and verifying the project's anthropogenic GHG emissions reductions. In addition, the DOE will be responsible for disclosing any potential conflict of interest arising from the project, as well as maintaining records for the validation and verification of GHG emissions reductions. This would be part of the normal validation and verification process of the emissions reductions as required by the CDM project cycle. 2

The ERPA includes an accompanying Monitoring Plan (MP) defining the quantity, price and other delivery conditions to be purchased by the carbon funds, including the monitoring and verification systems and methods. To increase the likelihood that emissions reductions will be recognized by the parties to the Kyoto Protocol, independent experts provide baseline validation and verification/certification procedures for emissions reductions. The emissions reductions estimates are based on the findings of a baseline study, validated by independent experts. The Baseline Study and the Monitoring Plan are being finalized (drafts are available in the project files). 3

The carbon funds will require that the DOE issues a Verification and Certification Report that includes: (i) a statement of the amount of verified emissions reductions the project has generated during the verification period; (ii) verification of compliance with World Bank safeguard policies; and (iii) any other matters required by the Kyoto Protocol. 4

The actual dispatching of the electricity generated by the wind energy plant will be monitored by the regional office of National Center of Energy Control (*Centro Nacional de Control de Energía*, CENACE) in accordance with the guidelines set out by the DOE. 5

Annex 7: Financial Management and Disbursement Arrangements [1]

MEXICO: Wind Umbrella (La Venta II)

[This annex is not required for CF projects as they do not follow procurement and disbursement guidelines required under World Bank lending operations] [2]

Annex 8: Procurement Arrangements 1

MEXICO: Wind Umbrella (La Venta II)

[This annex is not required for CF projects as they do not follow procurement and disbursement guidelines required for World Bank lending operations] 2

Annex 9: Economic and Financial Analysis 1

MEXICO: Wind Umbrella (La Venta II)

The Project Sponsor 2

Comisión Federal de Electricidad (CFE) is a Decentralized Public Entity of the GoM of a technical, industrial and commercial nature, created by a Decree issued by Congress (Legislative Branch) on August 14, 1937, with its own legal identity and equity. CFE mainly renders public electric energy service throughout Mexico, including: generating, conveying, transforming, distributing, and supplying electric energy. CFE's also is planning and carrying out all the projects, installations, and works required by the national electricity system in respect to planning, execution, operation, and maintenance, with the applicable participation of independent energy producers, as provided for in the terms set forth in the Public Electric Energy Service and its Regulations"[13]. 3

CFE's financial position is closely related with the policies of the GoM applied through SHCP. The tariff rates applicable to electric power sales in Mexico are defined and authorized by the Federal Government, through the Department of Revenues of the Treasury Department of SHCP. CFE is required by law to pay a duty fee to the GoM for the assets it uses to provide electricity services. Duties are determined annually based on the profitability rate established for state owned entities in each year; for 2004 and 2003 the rate was 9 percent --authorized by SHCP. This rate is applied to the value of the net operating assets of the immediately preceding year and the resulting amount is charged to results of the year. This annual duty expense is compared with non-cash transfers from SHCP to supplement deficient electricity tariff rates (subsidies from the GoM to certain groups of electricity users). Up to 1999 a net liability had been generated in favor of the Federal Government, which was not payable, but was capitalized as equity in CFE at the close of each year. However, since the fiscal year 2000 the amount of the duties has been below that of the subsidy, with the insufficiency directly reducing the CFE's equity value[14]. Moreover, in 2004, SHCP requested that the company pay a onetime extraordinary government charge of about US$1.34Billion in conformity with the Organic Public Federal Administration Law. CFE made the requested payment to the Federal Treasury recording the amount paid as an extraordinary item in the statement of operations (see line 20 of *Table Annex 9.1*). 4

With assets of about US$59 billion and equity of about US$33 billion, combined with its close relationship with the Federal Government of Mexico, CFE can be viewed as a solid company for the purposes of this project. Indeed, the company has good access to financial markets and has issued successfully bonds on its behalf in overseas markets in recent years. 5

An abstracts summary of the audited financial statements of CFE for the last two years is presented in the following *Table Annex 9.1*. 6

[13] Source: Financial Statements and Independent Auditors' report (March 18, 2005) available at www.cfe.gob.mx
[14] For a more detailed analysis, see also "Mexico. Infrastructure Public Expenditure Review (IPER)", October 24,2005, Report No. 33483-MX, The World Bank.

Table Annex 9.1: Summary of CFE's financial statements

1		2004	2003
2	**Balance Sheet**		
3	Total Assets	631,035,138	634,782,687
4	Total Liabilities	271,897,251	249,703,521
5	Total Equity	359,137,887	385,079,166
6			
7	**Income Statement**		
8	Revenues from Energy Sales	163,268,161	147,020,008
9	Costs and Expenses	167,910,767	154,636,657
10	Operating Loss	(4,642,606)	(7,616,649)
11	Net Comprehensive Financing Cost	(2,642,600)	(10,327,296)
12	Non-cash transfers from the Federal Government to supplement deficient rates	60,257,617	60,773,710
13	Shortfall of duties over non-cash transfers from the Federal Government	12,882,598	13,686,151
14	Income (Loss)	6,186,334	(6,336,840)
15	Extraordinary Item	(14,500,000)	
16	Net Loss	(8,313,666)	(6,336,840)
17			
18	**Statement of Cash Flows**		
19	Net Cash by operating activities before extraordinary item	28,860,129	10,863,941
20	Extraordinary Item	(14,500,000)	
21	Net Cash by operating activities	14,360,129	10,863,941
22	Net Cash by financing activities	179,863	11629725
23	Net Cash used in investing activities	(23,906,513)	(23,352,476)
24	Net Decrease	(9,366,521)	(858,810)
25	Beginning of the Year	18,776,747	19,635,557
26	End of the Year	9,410,226	18,776,747

All figures in thousands Mexican Pesos.
Source: www.cfe.gob.mx

Project Financing

The La Venta II wind energy project has been approved and assigned a budget allocation by the GoM under the general scheme of Projects with Deferred Impact in the Budgetary Registry (Proyectos de Impacto Diferido en el Registro de Gasto, PIDIREGAS), using the Financed Public Project (Obra Publica Financiada, OPF) modality. The winning bidder for the power plant 'turn-key' contract assumes the financing and construction risk of the project. CFE pays the contractor when the project is completed satisfactorily and received by CFE; CFE's payment to the contractor is fully backed by government guarantees. CFE then obtains long-term financing for the amount of the OPF contract through the commercial financial markets, with the approval of SHCP. The details of the commercial financing option to be employed for La Venta II have not yet been decided, but the company is exploring various options with financial institutions. CFE has received by May 2005 financing offers which, depending on the loan duration period and repayment terms, would result in annual interest rates of about 7 to about 9 percent.

Fiscal Impact

Since the World Bank is not a lender in this project, there are no fiscal impacts of Bank-lending activities. The fiscal impact on the project will be related to the fee paid to the GoM on the power plant as an asset. Such a fee will be determined by SHCP in the future years depending on the overall profitability of the company. However, emission reductions' sales from CFE to the Spanish Carbon Fund and the Bio-Carbon Fund will contribute positively to the revenue stream of CFE and will influence positively either the equity of the company, or the fiscal position of the country.

There is, however, a broader fiscal impact because the wind energy project is financed through PIDIREGAS. The financial obligations under PIDIREGAS are being brought into the budget process as the outlays for interest and amortization of previous years' projects are registered in the spending budget. The fiscal impact of the La Venta II project will depend on the final financing terms authorized by SHCP for the project. For instance, a loan for the full project amount with a repayment period of 15 years, constant payments, and a fixed interest rate of 7 percent to 9 percent, would require annual payments of about US$12.5million to US$14.1million impacting accordingly the country's budget (the loan is in practice repaid by CFE, however from the central government's perspective a contingent liability is created –in this case of probably low risk).

La Venta II Project Economic Analysis

The economic and financial analyses for La Venta II were done in April 2006, before ERPA negotiations took place, so they reflect the existing market conditions (i.e. CER prices) at that previous time. The two ERPAs (with the Spanish Carbon Fund and with the BioCarbon Fund) were signed on December 2006, and the terms agreed with CFE, which remain confidential, reflected market conditions at that later date.

The main economic benefits of the La Venta II wind energy project are: (i) the production of electricity; and (ii) the reduction of GHG emissions in the global atmosphere. Other economic benefits, not quantified for the purposes of this analysis but useful in evaluating the project in a qualitative manner as well, are: (i) local economic benefits of increased employment during construction, operation and maintenance of the wind power plant; (ii) increased income from land where the turbines are located --without altering the use of the land; (iii) better access to agricultural land due to improved local infrastructure (roads, etc); (iv) accumulation of experience in the operation of large-scale wind power in Mexico and accompanying demonstration effects; (v) avoided local pollution from fossil-fuel alternatives (NOx, SOx, etc); (vi) increased diversification in the fuel mix for electricity generation in the country. 1

Electricity Generation (benefits). Meeting the growing electricity demand of Mexico requires investments in generating capacity and the various options to meet the growing demand are examined by CFE's planning division using sophisticated simulation models. The economic benefits of electricity generation are set, for the purposes of this analysis, at the level of the avoided cost of generating electricity using other options. CFE's project presentation to SHCP implies that the opportunity cost of such electricity would be in the range of 0.036 to 0.04 cents/kWh. Nevertheless, this is an estimate subject to important fuel costs assumptions that cannot be predicted with accuracy over the long-term. 2

Given the significant exposure of the Mexican electricity generation to fossil fuels and uncertainties surrounding the future costs for combustibles, the optimal (least-cost) system expansion solution could vary. The estimated future costs for electricity generation in Mexico are strongly dependent on assumptions regarding the economic costs of oil and natural gas and, to a lesser extent, of coal. CFE's planners use reference values provided by SENER, which in turn elaborates such estimates with the assistance of the national petroleum company (*Petróleos Mexicanos*, PEMEX). Future generation plants in Mexico, according to CFE's plans, should mostly be natural gas cycle turbines (combined-, or open-), a technological option that has been used extensively in the previous decade to serve the growing demand. The estimates used for average prices for natural gas in 2005,2006, 2007 and 2008 were assumed to be in the range of 4 to 5 US$/mBtu (it should be noted that in 2005 the average price for natural gas in the Henry Hub natural gas index exceeded this range by a significant margin). The opportunity cost of 0.036 to 0.04 cents/kWh could therefore be an underestimate. 3

In addition, if data from a study[15] done in the USA for the hedging value of wind due to gas price volatility is applied, there would be a premium hedge value of about 0.5-0.8 US cents/kWh available for wind projects. Given the avoided cost of 4 cents/kWh this premium could be a significant value. The following table in the same study provides a range of the futures premium for gas for long term contracts. For the specific project referenced, the hedging premium is about 0.37 to 0.59 UScents/kWh 4

[15] Bollinger and Wiser(2004) Available at: http://calwea.org/Attached%20Documents/CALWEA_and_CBEA_comments_for_the_MPR_workshop_(final).pdf).

Period	Length	$/MMBtu
2004-2013	10 years	5.11
2004-2018	15 years	5.42
2004-2023	20 years	5.92

Reductions of GHG emissions (benefits). The economic benefit of reducing emissions of GHG is an issue of environmental externalities. The economic value of reducing such emissions is subject to complex factors, for which current knowledge is far from certain. The Kyoto Protocol is indirectly creating a market value for such emissions reductions. However, the nature of the Kyoto Protocol agreement, and the fact that not all countries are participating in the market created by the Clean Development Mechanism, suggest that prices reflect only part of the actual economic value of GHG emissions reductions. For the purposes of this economic analysis the agreed values and terms between CFE and the carbon funds are used, but this could be a low estimate of actual economic benefits.

Project Economic Costs. The main economic costs of the wind energy project are: (i) the investment necessary for the construction of the project; and, (ii) the costs of operation and maintenance. For the economic analysis all taxes (transfer payments) and debt service costs are ignored[16].

A summary of the main assumptions used for the economic analysis is available at the table below:

Table Annex 9.2: Key assumptions for the economic analysis

Rated Plant Capacity	85	MW
Net Capacity Factor	47.0%	
Project Lifetime	20	Years
Capital Cost[17]	1,268	US$/kW
Annual Electricity Produced	349,962,000	kWh
Fixed Operation & Maintenance (O&M) Costs	10	US$/kW
Variable O&M Costs	0.001	US$/kWh
Site Owner Royalty (% of revenues)	1.5%	
Insurance (% of Equipment and Balance of Station Costs)	0.1%	
Electricity Price (c/kWh)	4	US$cents/kWh
Emissions Reductions (tCO2e/yr)	180,000	tCO2e/yr
Emissions Reductions Sales Period	10	Years
Emissions Reductions Price ($/tCO2e)	6.3	US$/tCO2e
Value of Bio Carbon Fund Emissions Sales (2017-2019)	945,000	US$

[16] See "Handbook on Economic Analysis of Investment Operations", chapter. 5, Belli P. et al, World Bank, January 26,1998.
[17] Assumes a portion of the full cost of the transmission line in the capital cost, as it is expected that future wind power plants would also benefit from the interconnection line's capacity

Based on the above assumptions, the following results are obtained for a range of discount rates:

Table Annex 9.3: Economic Net Present Values

Discount Rate	Economic NPV	Economic NPV without ER
8%	$23,995,163	$14,508,892
9%	$15,446,065	$6,418,658
10%	$7,930,110	($671,135)
11%	$1,305,498	($6,899,435)
12%	($4,547,717)	($12,383,618)

Table Annex 9.3 shows the significance of the economic benefits of emissions reductions that render the project economically viable (note that economic benefits used for the analysis are likely to be conservative estimates).

A sensitivity analysis on the value of the opportunity cost of electricity generated by the wind energy plant is presented in the following table. The project's economic rates of return will be affected significantly by the actual future costs of electricity generation in the system. CFE might use the electricity generated by La Venta II in conjunction with nearby hydroelectric plants to supply electricity during peak-time demand, thereby increasing the actual value of the wind energy from La Venta II.

Table Annex 9.4: Sensitivity Analysis of Economic Rates of Return in relation to Electricity Opportunity Costs.

	Economic Rates of Return	
Electricity Generation Opportunity Cost (in US$ cents/kWh)	Energy Benefits and Carbon Emissions Reductions	Energy Benefits only
3.7	10.0%	8.7%
3.9	10.8%	9.5%
4.0	11.2%	9.9%
4.2	12.0%	10.7%

La Venta II Project Financial Analysis

CFE, under the PIDIREGAS scheme, will fully finance the La Venta II project using debt. Under this special financial structure and using the assumptions in *Table Annex 9.5* below, in addition to those in *Table Annex 9.2*, CFE has a positive financial cash flow from the operation of the plant year after year.

Table Annex 9.5 Assumptions for Financial Analysis 1

Financing Assumptions	
Debt Contribution in Financing	100%
Amount	$113,865,000
Loan Schedule Type	Level Mortgage
Debt Percentage (%)	100%
Interest Rate (%)	8.0%
Term (years)	20
Tax Rate (% of Net Asset Value)	9%

2

The table below presents the financial present value of the La Venta II project for CFE under a range of financial discount rates, for the above assumptions. 3

Table Annex 9.6: Financial Value of La Venta II 4

Financial Discount Rate	Financial NPV (US$)	Financial NPV no ER sales(US$)
8%	16,772,155	9,559,695
9%	15,696,185	8,886,218
10%	14,726,086	8,285,756
11%	13,848,671	7,748,635
12%	13,052,667	7,266,635

5

In effect, due to PIDIREGAS that allows for full debt financing for the project in generally favorable terms, CFE enjoys a positive financial benefit from the project. A sensitivity analysis of the assumptions showed that as long as CFE has access to adequate financing terms, allowing the company to service the debt and its taxes with project revenues, it is likely to make a profit from the project. The analysis also shows that income from the selling of emissions reductions is important to ensure the financial viability of the project. 6

Annex 10: Safeguards Policy Issues [1]

MEXICO: Wind Umbrella (La Venta II)

Environmental Issues [2]

The project is located in the *ejido* La Venta, municipality of Juchitán de Zaragoza, a region known as the Istmo de Tehuantepec, in the state of Oaxaca. [3]

CFE has presented to SEMARNAT, as required by the Mexican norms, a full Environmental Impact Assessment (EIA) for the La Venta II wind energy project, prepared by the *Instituto de Ecología* A.C. (available in Project files). The EIA has been elaborated on the basis of a 'typical' wind project in the area. SEMARNAT received the EIA on April 22, 2004 and approved it on August 3, 2004. [4]

The EIA includes an analysis of impacts and presents measures to avoid, control, mitigate, or compensate any negative environmental impacts in an Environmental Management Plan (EMP), during both construction and operation phases of the project. On the basis of the EIA, environmental audits are planned to ensure compliance with the applicable norms of the project. [5]

The relevant laws and norms applicable to the project, and used for the EMP, are: [6]

Laws: [7]

- General Law of Ecological Balance and Environmental Protection (*Ley General del Equilibrio Ecológico y la Protección al Ambiente*). [8]
- Law of Ecological Balance of the State of Oaxaca (*Ley del Equilibrio Ecológico del Estado de Oaxaca*).
- General Law for the Prevention and Integrated Management of Waste (*Ley General para la Prevención y Gestión Integral de los Residuos*).
- General Law for the Sustainable Development of Forests (*Ley General de Desarrollo Forestal Sustentable*).
- Law of National Waters (*Ley de Aguas Nacionales*).
- Federal Law of Water Rights (*Ley Federal de Derechos en Materia de Agua*).

Regulations: [9]

- Of the General Law of Ecological Balance and Environmental Protection on issues of [10]
  - Enviromental Impact Assessment (*Evaluación del Impacto Ambiental*).
  - Prevention and Control of Atmospheric Contamination (*Prevención y Control de la Contaminación de la Atmósfera*).
  - Hazardous Waste (*Residuos Peligrosos*).
- Environmental Protection against Noise Pollution (*Reglamento para la Protección del Ambiente Contra la Contaminación Originada por la Emisión de Ruido*).
- Regulation of the Forest Law (*Reglamento de la Ley Forestal*).
- Regulation of the Law of National Waters (*Reglamento de la Ley de Aguas Nacionales*).

- Regulation on Ground Transportation of Hazardous Materials and Waste (*Reglamento para el Transporte Terrestre de Materiales y Residuos Peligrosos*). 1

Official Mexican Norms: 2

- NOM-001-ECOL-1996,- maximum allowed limits for discharges in water. 3
- NOM-041-SEMARNAT-1999.- maximum allowed limits for emissions of polluting gases from motor vehicles using gasoline.
- NOM-50-SEMARNAT-1993, -NOM-045-SEMARNAT-1996.- maximum allowed limits for emissions of vehicles diesel motors.
- NOM-052-SEMARNAT-1993.- hazardous wastes.
- NOM-053-ECOL/93.- hazardous wastes testing and toxicity.
- NOM-054-SEMARNAT-1993.- incompatibilty of two or more materials established in NOM-052-SEMARNAT-1993.
- NOM-059-SEMARNAT-2001.- protection of native species of flora and fauna.
- NOM-080-SEMARNAT-1994.- maximum allowed limits of noise pollution from motor vehicles.
- NOM-081-ECOL-1994.- maximum allowed limits of noise pollution from fixed sources .

A list of general description of potential environmental impacts of the project is presented in the following table: 4

General Description of Environmental Impacts	
PHASE	
	AIR QUALITY
Site preparation, construction operation and decommissioning	Vehicle use and machinery increase the concentration of CO, HC, NOx Increase of dust due to vehicle traffic, transport of materials, civil works for ground leveling,
	NOISE
Site preparation, construction operation and decommissioning	Vehicle use, machinery and operation of wind turbines will increase the noise level
	SOIL – GROUND
Site preparation, construction operation and decommissioning	Civil works for site preparation, in particular ground leveling, could result in loss of soil. Movement of heavy equipment could result in compacting and loss of soil quality. Discharges of oils during construction works from vehicles and wind turbines could contaminate the soil.
	WATER
Operation	The opening of access roads could affect water drainage
	VEGETATION
Site Preparation	Civil works for the construction of the power plant and access roads will result in loss of vegetation coverage
	FAUNA
Site preparation, construction operation and decommissioning	Civil works, the use of machinery and vehicles and the presence of personnel could affect the mortality of the project zones fauna. This could take place primarily during the phases of preparation and construction when the number of workers will be greater. During operation and commissioning such impacts will be negligible. During operation there is a risk of birds (native and migratory) colliding with

5

	the wind turbines.	1
	LANDSCAPE	
Operation and Maintenance	The presence of wind turbines will have a visual impact on the landscape.	

Source: Manifestacion de Impacto Ambiental Modalidad Particular. Proyecto Eolico La Venta II – Oaxaca. Diciembre 2003. Instituto de Ecologia A.C. 2

SEMARNAT authorized the execution of the project in 2004[18]. To comply with the terms and conditions of the authorization, an EMP is in place. In summary the EMP includes: 3

- Program of Environmental Safeguarding (*Programa de Vigiliancia Ambiental*) that integrates all measures of prevention, reduction and/or compensation of adverse environmental impacts identified for every stage of the project, specifying the applicable activities and procedures. 4
- Reforestation program that will consider the use of native species of the region in the project site and in proportion similar to those affected by the project.
- Works to control erosion and reconstitute the ground in all areas where organic ground is removed during clearing for civil works.
- Program to monitor resident and migratory birds in the zone of influence of the project.

Key Environmental Safeguards issues 5

SEMARNAT, as a matter of policy, supports projects that use renewable energy sources. Wind energy projects are not covered explicitly by the national legislation in Mexico and SEMARNAT in its review of the project conducted a broad consultation with various entities and institutes (*Dirección General de la Vida Silvestre, Comisión Nacional de Biodiversidad, Instituto Estatal de Ecología del Estado de Oaxaca, Coordinación de Porgramas de Conservación Centro de México*) and received favorable opinions on the EIA presented by CFE. 6

The key environmental impact concerns the potential collision of birds (native and migratory) with the wind turbines during operation. Based on international practices for wind projects, mitigation measures for this issue aim to make visible the wind turbines to the birds, by painting the blades of the turbines appropriately. Other measures to be employed in the project, in accordance with international criteria, are: use of tubular structures for the wind turbines; monitoring and registering of dead birds, and quick removal of any dead birds to avoid ravens; and, ensuring that the height of turbines does not exceed 150m. CFE has been implementing since 2004, as presented in the EIA, a program of monitoring of the birds in the zone of influence of the project. In addition to the above, CFE is planning to implement a radar system that would detect the passage of big numbers of migratory birds, so that it can temporary suspend the rotation of wind turbines to avoid collisions. This radar has been purchased by the *Instituto de Ecología* (CFE's contractor for the avian monitoring). In addition, CFE is developing a plan to train observers that could advise the plant operator to shut down in advance specific turbines that might present risk to incoming birds. 7

[18] Authorization by SEMARNAT by the *Dirección General de Impacto y Riesgo Ambiental* No. S.G.P.A./DGIRA.DEI. 1836, July 29 2004.

Based on the monitoring plan carried out by CFE since 2004, it appears that the bird migration in the Project's zone of influence is concentrated during a period of only three weeks, usually in October. Observation of spring bird migration carried out in 2006 did not register birds migrating through the zone of influence (the prevailing winds appear to hinder the passage of birds from the area during that season). In addition, the monitoring program noted that migratory birds passing around the project zone do not fly during night time. Based on these observations, a shutdown plan would be at a maximum implemented over a period of three weeks in October, and mostly during daytime. During that time period it is possible that by shutting down only selected wind turbines the avian collision risk will be mitigated. 1

In terms of the economic/financial effects to the project if such a plan is implemented, it should be noted that during the month of October the plant has an output of about 8 percent of its total annual output. If shutdowns were to be implemented during the whole period of three weeks during daytime, the reduction of total output could be around 3 percent. However, it appears that only a small number of the turbines will have to be stopped and most likely only for a few hours during daytime –if the radar system and trained observers are employed. Finally, it is expected that CFE would schedule maintenance activities of the plant around that period, so the overall economic effect while negative it could be considered negligible. 2

SEMARNAT will use the experience from the proposed project during the operation phase to evaluate impacts on the migratory birds in the zone and will issue appropriate norms in similar future projects in the country. 3

The project triggers *O.P. 4.01* (Environmental Assessment). 4

Public disclosure 5

The EIA assessment was posted in SEMARNAT's website in August 2004 and is also posted on the World Bank's infoshop website. SEMARNAT based its evaluation and approval of the EIA on consultations held with General Direction of Wild-Life (*Dirección General de la Vida Silvestre*, DGVS), the National Biodiversity Commission (*Comisión Nacional de Biodiversidad*, CONABIO), the State Institute of Ecology of Oaxaca (*Instituto Estatal de Ecología del Estado de Oaxaca*) and the Coordination of Conservation Programs in Central Mexico (DUMAC). 6

Social Issues 7

The project triggers OD 4.20 as it is developed in indigenous peoples land. The project is located in an area were the system of *ejidos* (communal land) is in place. The *ejido* was founded in 1951 with 5,815 hectares and each *ejidatario* was provided with a maximum of 10 Ha. According to the National Geography and Statistics Institute's (INEGI), the *ejido* has a population of 1,814 people. The inhabitants of the *ejido* la Venta belong to the ethnic group Zapoteco, which is one of the majority ethnic groups of the state of Oaxaca (16 groups total). Although the *ejido's* population has stopped speaking Zapoteco, they maintain the regional festive traditions and identify themselves as Zapotecos and Mexicans. 8

More than half of the *ejidatarios* (55 percent) of La Venta are employed in the economy's primary sector, 30 percent of in the tertiary sector, and a 12 percent is dedicated to secondary sector. In this *ejido*, zapoteco peasants have been traditionally dedicated to agriculture, mainly to sugar cane crop and other products for family consumption such as corn, beans and pumpkin. With the fall of sugar prices, sugar cane cultivation is no longer the main economic activity; it has been replaced by cattle raising, and cultivation of sorghum crop, watermelons, peanuts, melons, cucumbers and sesame which are sold in regional markets. Because of the strong winds, land is being cultivated only during the spring/summer cycle, and even in irrigated land the crop outputs are below the national average. The land where the wind turbines are to be installed is being used for extensive cattle raising, although in the past it has been used for agricultural purposes (INEGI 2001). 1

According to INEGI the socioeconomic conditions of the ejido are: 2

Occupied Population in *ejido* La Venta 3

Localita	Occupied Population	Less than mw	Between and 2 mw	Between 2 and 5 mw	Between 6 and 10 mw	More than 10 mw	Population without job	Population not receiving remuneration
La Venta	486	33	273	107	18	3	4	42
Total	1814							

4

mw= minimun wage 5

Community Organization 6

The *ejido* is organized under the norms established by the Agrarian Law, and the land control is determined and headed by the *ejidatario's* assembly. Every three years, 326 *ejidatarios* elect representative authorities, 12 persons in all. These positions are exercised with out salary or other compensation; representation is a duty of all citizens that belong to the *ejido*. A municipal delegate is elected by the assembly of the *ejido* to act as a link with the municipality for official purposes. For the matters that have to do with the usufruct of land, the highest authority is the *ejidal* commissioner. The following table describes the community organization for matter related to land ownership and rights. 7

Comunal Property Commission	President Secretary Treasurer
Vigilante Council	
Auxiliar Judge	
Municipal Delegate	Link between the *ejido* and the municipality.

8

Community and stakeholders Consultation 9

Based on interviews with the *ejidal* commissioner and 20 *ejidatarios* of la Venta (April 2005), the *ejidatario's* perception about the project and the installation of wind turbines in their land is 10

positive --it is seen as a good opportunity to obtain additional income. The *ejidatarios* interviewed exposed in detail the negotiations that have been taking place with the CFE since 2001. 1

The majority of *ejidatarios* participated in early meetings with the CFE. At the beginning of the dialogue, the *ejidatarios* had little interest in the project, due to the existence of private sponsors in the region that promoted wind energy installation in communal lands and promised very attractive (and potentially speculative) rents for the land use. During the initial negotiations with CFE the *ejidatarios* were requesting free electricity service, cleaning of a nearby river, schools rehabilitation, water drainage works, and paved streets. 2

In 2002, in response to community leaders' and members' concerns about the lack of information on wind energy project developments, the State Government of Oaxaca, through the Secretariat of Industrial and Commercial Development (SEDIC) requested support from USAID to conduct a study on wind energy. The study would provide *ejidos* and others communities in the Isthmus of Tehuantepec region with information on the typical magnitude of payments, structure of agreements, and means of verifying actual generation or power sales revenues, and types of contracts typically used in the US and elsewhere between wind power projects developers and landowners. The study has been prepared for USAID Mexico and the State Government of Oaxaca and SEDIC by Winrock International, Global Energy Concepts, the American Wind Energy Association (AWEA), and the Mexican Rural Development Foundation (FMDR) –available in project files. 3

CFE continued negotiations with land owners and *ejidatarios*, for the rights to construct the plant on the basis of international practices. As a result of these negotiations, *ejidatarios* will receive payments for the energy generated and invoiced by the wind plant --in line with international practices. It should be noted that *ejidatarios* will receive the compensation from the energy plant and will also be able to continue with the farming activities in their land. 4

The project will benefit directly the *ejidatarios* that own land in the project's zone of influence and indirectly all the *ejidatarios* of La Venta II according to a plan of social works negotiated between CFE and the local authorities of the *ejido*. The plan includes: (i) the creation of a trust fund (created in December 2005 and capitalized with 7million Mexican Pesos) to provide public lighting, paving of the principal streets of the *ejido* and computers for the secondary school; and (ii) the creation of an employment agency that would give priority to the *ejidatarios* in the works during the installation of the wind turbines. The plan will be executed by the authorities of the *ejido* with the support of CFE, the Ministry of Social Development (*Secretaría de Desarrollo Social*, SEDESOL) and the Ministry of Agriculture, Rural Development, Fishing and Food (*Secretaría de Agricultura, Ganadería, Desarrrollo Rural, Pesca y Alimentación*). 5

Two hundred *ejidatarios*, out of a total 326, are participating in the project; 1,300 out of 5,815 hectares in the *ejido* will be incorporated to the CFE project and the land is registered in the National Agrarian Registry. In July 2004, most *ejidatarios* with rights to the *ejido* La Venta, signed an agreement for the construction of the wind power project La Venta II for a 100MW capacity and a surface of 2088.54 hectares (copy of the notarized agreement is available in 6

project files). The contract will last 30 years and will be reviewed annually for any necessary adjustments. The agreed payments are as follows:

Payment Criteria	Annual in Mexican pesos
Piece of land (*parcela*)within the polygon lot of influence without road construction, wind generators, offices or substations, payment by hectare.	1,000
Road constructed by hectare	13,100
Payment by wind generator *minimum 850 KW	8,000
Piece of land (*parcela)* out of the polygon lot project influence with a surface smaller than 10 ha., total payment	18,880
Piece of land (*parcela*) out of the polygon or building lot of influence with more than 10 hectares, payment by hectare.	100

There are, however, eight *ejidatarios* that have not signed the assembly agreement. The design of the project and the execution of the civil works has been modified to ensure that the land of the non-signatories is not affected by the project.

Cultural Property

On 2004 the *ejidal* authorities of la Venta asked the National Antrhopology and History Institute (INAH) to visit area to establish the non-existence of archeological remains. INAH prepared a report about the exploration indicating that archeological remains were found in the Rastro Tolistoque site, which is distant from the project's location. INAH extended to the *ejido*'s authorities the report of the findings and the location of the archeological site. The Protected Natural Areas Commission (CONANP) authorizes the *ejido* to keep and maintain the area called Ojo de Agua (1,306 ha) located in the Tolistoque hill.

Annex 11: Project Preparation and Supervision 1

MEXICO: Wind Umbrella (La Venta II)

	Planned	Actual
PCN review[19]	07/15/2002	02/14/2003
Initial PID to PIC		
Initial ISDS to PIC		
Appraisal	01/27/2006	05/25/2006
Negotiations	01/30/2006	12/12/2006
Board/RVP approval		
Planned date of effectiveness	November 2006	12/12/2006
Planned date of mid-term review		
Planned closing date	12/31/2016	12/31/2019

2

Key institutions responsible for preparation of the project: CFE, the project's sponsor. 3

Bank staff and consultants who worked on the project included: 4

Name	Title	Unit
Demetrios Papathanasiou	Energy Economist – Task Manager	LCSFE
Fernando Cubillos	Sr. Technical Specialist – Deal Manager	ENVCF
Flavia Rosembuj	Sr Counsel	LEGCF
Paola Solidoro	Consultant –Carbon Finance	ENVCF
Raffaella Maria Lisboa Mota	ETC Consultant	LCSFE
Tania Carrasco	Social Specialist - Consultant	LCSES
Dora Patricia Andrade Salaverria	Environmental Specialist - Consultant	

5

Bank funds expended to date on project preparation: 6

1. Bank resources: US$82,600 7
2. Trust funds:0
3. Total: US$82,600

Estimated Approval and Supervision costs: 8

1. Remaining costs to approval: US$30,000
2. Estimated annual supervision cost: US$80,000

[19] For Carbon Offset project PCN review. This is replaced by the approval by ENVCF of the Project Idea Note (PIN).

Annex 12: Documents in the Project File [1]

MEXICO: Wind Umbrella (La Venta II)

- *Manifestación de Impacto Ambiental Modalidad Particular. Proyecto Eólico La Venta II – Oaxaca. Diciembre 2003. Instituto de Ecología A.C.* [2]
- Mexico-La Venta II Carbon Financing wind energy project. Social Assessment -- Tania Carrasco, Consultant. May 2005
- Copy of notarized agreement between CFE and land owners regarding land use and compensation for the wind energy plant.
- *Información Sobre Arrendamiento de Tierras y Potencial de Generación de Empleos Relacionado con el Desarrollo de Proyectos Eoloeléctricos en México*, April 2003. Winrock Internacional, Global Energy Concepts, American Wind Energy Association.
- Feasibility Study of the La Venta II 50 MW Wind Power Project in Oaxaca, Mexico. April 2003. Global Energy Concepts, LLC. Funded by USAID
- *Bases de Licitación* 132 CE La Venta II
- Educational leaflet on wind energy for the local population

Annex 13: Statement of Loans and Credits [1]

MEXICO: Wind Umbrella (La Venta II)

[2]

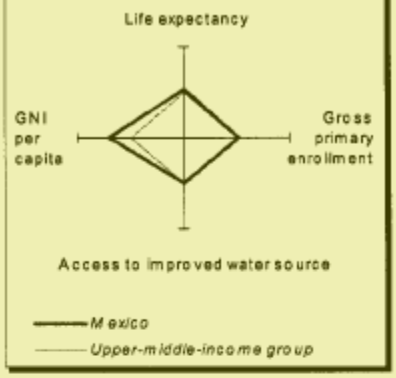
			Original Amount in US$ Millions						Difference between expected and actual disbursements	
Project ID	FY	Purpose	IBRD	IDA	SF	GEF	Cancel.	Undisb.	Orig.	Frm. Rev'd
P098299	2006	MX Competitiveness DPL	300.76	0.00	0.00	0.00	0.00	300.76	0.00	0.00
P091695	2006	MX Modernization Water & Sanit Sector TA	25.00	0.00	0.00	0.00	0.19	24.75	0.24	0.00
P089171	2006	MX GEF Environmental Services Project	0.00	0.00	0.00	15.00	0.00	0.26	0.00	0.00
P088732	2006	MX Access to Land for Young Farmers	100.00	0.00	0.00	0.00	0.75	97.01	21.76	0.00
P088728	2006	MX (APL1) School-Based Management Prog	240.00	0.00	0.00	0.00	0.00	240.00	27.00	0.00
P085593	2006	MX (APL I) Tertiary Educ Student Ass	180.00	0.00	0.00	0.00	0.00	180.00	21.35	0.00
P087038	2006	MX Environmental Services Project	45.00	0.00	0.00	0.00	0.00	45.00	0.00	0.00
P085851	2005	MX Basic Education Dev Phase III	300.00	0.00	0.00	0.00	1.61	99.84	-28.56	0.00
P074755	2005	MX State Judicial Modernization Project	30.00	0.00	0.00	0.00	0.00	30.00	7.00	0.00
P088080	2005	MX Housing & Urban Technical Assistance	7.77	0.00	0.00	0.00	0.00	7.13	3.55	0.00
P089865	2005	MX-(APL1) Innov. for Competitiveness	250.00	0.00	0.00	0.00	0.00	239.80	18.20	0.00
P087152	2004	MX (CRL1)Savings & Rurl Finance(BANSEFI)	75.50	0.00	0.00	0.00	0.38	25.29	-27.64	0.00
P080149	2004	MX Decentralized Infrastructure Developm	108.00	0.00	0.00	0.00	0.00	56.13	-7.87	0.00
P035751	2004	MX Community Forestry II (PROCYMAF II)	21.30	0.00	0.00	0.00	0.00	13.80	3.80	0.00
P035752	2004	MX Irrigation & Drainage Modernization	303.03	0.00	0.00	0.00	0.00	149.10	-17.93	0.00
P070108	2003	MX Savings & Credit Sector Strengthening	64.60	0.00	0.00	0.00	0.00	12.98	6.68	0.00
P059161	2003	GEF MX-Climate Measures in Transport	0.00	0.00	0.00	5.80	0.00	2.00	5.58	0.00
P065988	2002	GEF MX Consolidat.Prot Areas (SINAP II)	0.00	0.00	0.00	16.10	0.00	3.56	16.10	0.00
P077602	2002	MX Tax Admin Institutional Development	52.00	0.00	0.00	0.00	0.00	6.55	5.15	0.00
P060908	2001	GEF MX-MESO AMERICAN CORRIDOR	0.00	0.00	0.00	14.84	0.00	11.41	11.37	5.80
P066321	2001	MX: III BASIC HEALTH CARE PROJECT	350.00	0.00	0.00	0.00	0.00	265.74	240.44	42.99
P066674	2001	GEF MX-Indigenous&Community Biodiversity	0.00	0.00	0.00	7.50	0.00	2.61	6.82	0.00
P049895	1998	MX HIGHER ED. FINANCING	180.20	0.00	0.00	0.00	0.00	18.80	18.80	0.00
		Total:	2,633.16	0.00	0.00	59.24	2.93	1,832.52	331.84	48.79

Annex 14: Country at a Glance 1

MEXICO: Wind Umbrella (La Venta II) 2

POVERTY and SOCIAL	Mexico	Latin America & Carib.	Upper-middle-income
2004			
Population, mid-year *(millions)*	103.8	541	576
GNI per capita *(Atlas method, US$)*	6,790	3,600	4,770
GNI *(Atlas method, US$ billions)*	704.9	1,948	2,748
Average annual growth, 1998-04			
Population *(%)*	1.4	1.4	0.8
Labor force *(%)*	2.5	0.9	-0.9
Most recent estimate (latest year available, 1998-04)			
Poverty *(% of population below national poverty line)*	18	..	..
Urban population *(% of total population)*	76	77	72
Life expectancy at birth *(years)*	74	71	69
Infant mortality *(per 1,000 live births)*	23	28	24
Child malnutrition *(% of children under 5)*	8	..	..
Access to an improved water source *(% of population)*	91	89	93
Literacy *(% of population age 15+)*	90	89	91
Gross primary enrollment *(% of school-age population)*	110	123	106
Male	111	126	108
Female	110	122	106

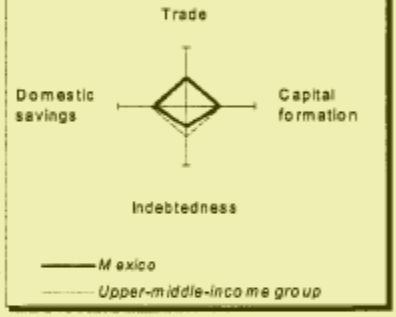
Development diamond*



KEY ECONOMIC RATIOS and LONG-TERM TRENDS	1984	1994	2003	2004
GDP *(US$ billions)*	175.6	421.7	639.1	676.5
Gross capital formation/GDP	19.9	21.9	20.6	21.3
Exports of goods and services/GDP	17.4	16.8	27.8	30.1
Gross domestic savings/GDP	27.7	17.1	19.0	19.9
Gross national savings/GDP	22.7	14.9	19.3	20.8
Current account balance/GDP	2.4	-7.0	-1.3	-1.1
Interest payments/GDP	6.4	2.1	1.8	1.8
Total debt/GDP	54.0	32.9	22.0	20.8
Total debt service/exports	45.1	25.7	17.6	15.0
Present value of debt/GDP	..	..	24.6	..
Present value of debt/exports	..	..	80.7	..

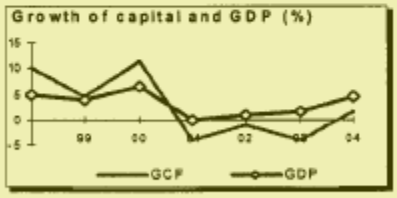
	1984-94	1994-04	2003	2004	2004-08
(average annual growth)					
GDP	2.7	3.3	1.4	4.4	3.0
GDP per capita	0.8	1.8	-0.1	2.9	1.6
Exports of goods and services	6.0	9.6	2.7	11.5	4.1

Economic ratios*



STRUCTURE of the ECONOMY	1984	1994	2003	2004
(% of GDP)				
Agriculture	9.4	6.0	3.9	4.1
Industry	34.9	26.8	25.8	26.4
Manufacturing	22.7	18.7	18.0	18.1
Services	55.7	67.2	70.3	69.5
Household final consumption expenditure	63.1	71.4	68.6	68.5
General gov't final consumption expenditure	9.2	11.5	12.4	11.7
Imports of goods and services	9.6	21.6	29.5	31.9

Growth of capital and GDP (%)



	1984-94	1994-04	2003	2004
(average annual growth)				
Agriculture	0.8	1.9	3.5	4.0
Industry	3.3	3.3	-0.2	3.8
Manufacturing	3.5	3.6	-1.3	3.8
Services	2.7	3.3	1.9	4.6
Household final consumption expenditure	3.6	3.7	2.3	5.5
General gov't final consumption expenditure	2.2	1.2	0.8	-1.2
Gross capital formation	5.6	4.8	-4.2	1.5
Imports of goods and services	14.8	10.6	0.7	10.2

Growth of exports and imports (%)

Note: 2004 data are preliminary estimates.

* The diamonds show four key indicators in the country (in bold) compared with its income-group average. If data are missing, the diamond will be incomplete.

PRICES and GOVERNMENT FINANCE 1

	1984	1994	2003	2004
Domestic prices				
(% change)				
Consumer prices	65.4	7.0	4.5	4.7
Implicit GDP deflator	59.1	8.5	8.5	6.1
Government finance				
(% of GDP, includes current grants)				
Current revenue	31.2	22.7	23.2	23.2
Current budget balance	-1.2	3.3	2.2	3.1
Overall surplus/deficit	-6.4	-0.3	-0.7	-0.3

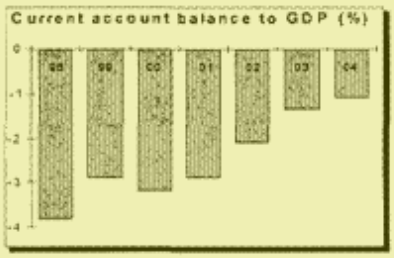
2

TRADE

	1984	1994	2003	2004
(US$ millions)				
Total exports (fob)	29,100	60,882	164,923	189,159
Oil	16,601	7,445	18,654	23,706
Agriculture	1,461	2,878	4,884	5,421
Manufactures	10,499	50,402	141,087	159,093
Total imports (cif)	15,916	79,346	170,546	197,247
Food	..	..	..	..
Fuel and energy	..	..	..	..
Capital goods	2,573	13,322	20,205	22,599
Export price index *(2000=100)*	114	90	105	117
Import price index *(2000=100)*	77	93	103	108
Terms of trade *(2000=100)*	148	97	102	108

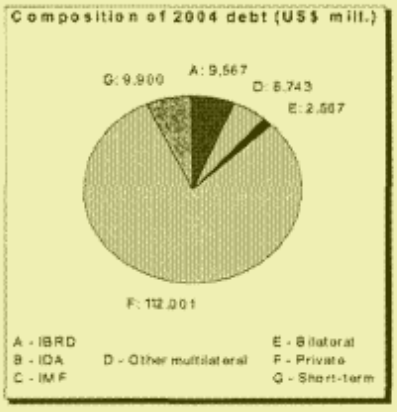
BALANCE of PAYMENTS

	1984	1994	2003	2004
(US$ millions)				
Exports of goods and services	33,926	71,184	177,299	201,911
Imports of goods and services	21,028	91,616	187,660	215,372
Resource balance	12,898	-20,432	-10,380	-13,460
Net income	-10,076	-13,012	-12,082	-10,938
Net current transfers	1,361	3,782	13,858	17,044
Current account balance	4,183	-29,662	-8,604	-7,355
Financing items (net)	-2,034	12,463	18,437	11,416
Changes in net reserves	-2,149	17,199	-9,833	-4,061
Memo:				
Reserves including gold *(US$ millions)*	7,355	6,300	59,027	64,204
Conversion rate *(DEC, local/US$)*	0.2	3.4	10.8	11.3



EXTERNAL DEBT and RESOURCE FLOWS

	1984	1994	2003	2004
(US$ millions)				
Total debt outstanding and disbursed	94,830	138,545	140,391	140,778
IBRD	2,852	13,038	10,717	9,567
IDA	0	0	0	0
Total debt service	16,960	20,076	34,279	33,568
IBRD	485	1,989	1,972	2,499
IDA	0	0	0	0
Composition of net resource flows				
Official grants	27	47	..	..
Official creditors	832	-583	-372	-182
Private creditors	791	5,298	-418	1,578
Foreign direct investment (net inflows)	390	10,973	12,625	17,377
Portfolio equity (net inflows)	0	4,084	..	..
World Bank program				
Commitments	576	2,380	888	621
Disbursements	682	942	1,258	767
Principal repayments	253	1,065	1,359	1,976
Net flows	430	-123	-101	-1,209
Interest payments	233	924	613	524
Net transfers	197	-1,046	-714	-1,733



Annex 15: Maps 2

mexico: Wind Umbrella (La Venta II) 1

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