DEVELOPMENT OF TECHNICAL ASSISTANCE TO EL SALVADOR:

CDM PORTFOLIO ASSESSMENT AND PROJECT IDEA NOTE DEVELOPMENT PAPER

Project: Energy and Climate Change

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UNIVERSITY OF CALGARY

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Executive Summary

OLADE / University of Calgary are implementing Phase IV of the Energy and Climate Change Initiative, which continues to support capacity building for OLADE's member countries to participate in the CDM.

As part of this Initiative within the Salvadorian context, this paper presents the outcomes of technical assistance to the CDM Designated National Authority of El Salvador, which during Phase IV included updating the CDM project portfolio for this country, preparing two Project Idea Notes (PINs) including one programmatic type project, participating in a Programmatic CDM seminar in San Salvador together with the *Asociación Salvadoreña de Industriales*, and a strategy to implement CDM programmatic activities, thereby making a concrete contribution to CDM strengthening in El Salvador.

El Salvador has five projects registered under the CDM (two for sugar–mill co–generation, one sanitary landfill, and two geothermal power plants), for an expected total of 475,444 tons of CO_2e per year. It has one new (hydro) project undergoing validation that would add an expected total of 6,881 tons of CO_2e per year, and 12 other projects have been identified and are starting prospection and development for consideration under the CDM, for a total of nearly 1,258,852 tons of CO_2e.

The technical assistance provided also included joint participation with the *Asociación Salvadoreña de Industriales* (ASI) in facilitating a seminar on Programmatic CDM.

Two CDM Project Idea Notes (PINs) have been developed in support of local project developers, including one Programme of Activities (POA).

The PINs that were developed included:

1. The "*Proyecto Géminis*" for bio–diesel production from recycled plant oils, for a total of 891 tons of CO_2e per year.

2. Programme of Activities (POA) of the *Asociación Salvadoreña de Industriales* (ASI) for the dissemination of electric energy efficiency technologies in the industrial sector of El Salvador with an estimated total of 39,000 tons of CO_2e per year.

Goal

OLADE / University of Calgary are implementing Phase IV of the Energy and Climate Change Initiative, which continues to support capacity building for OLADE's member countries to participate in the CDM.

As part of this Initiative within the Salvadorian context, this paper presents the outcomes of the technical assistance to the CDM Designated National Authority in El Salvador, which during Phase IV included updating the CDM project portfolio for this country, developing two Project Idea Notes (PINs), thereby making a concrete contribution to the country's project developers and to strengthening the CDM in the country.

Project selection was achieved with the help of the CDM Designated National Authority in El Salvador, represented by the Salvadorian Ministry of the Environment and Natural Resources, which has provided full support and facilitation to complete the technical work done.

The PINs that were developed include:

1. The "*Proyecto Géminis*" for the production of bio–diesel from recycled plant oil.

2. Programme of Activities (POA) of the *Asociación Salvadoreña de Industriales* (ASI) for the dissemination of electric energy efficiency technologies in the industrial sector of El Salvador.

We would like to acknowledge the support provided by Mrs. Rebeca Magaña, the CDM Coordinator for El Salvador, and the interest and support offered by the two project developers, Mr. Julio Handal of Geminis, and Mr. Carlos Saade and Mr. Julio German Reyes of the *Asociación Salvadoreña de Industriales*, for their help in carrying out this work.

Chapter 1. Updating the CDM Project Portfolio in El Salvador

1.1. Current CDM Project Portfolio in El Salvador

This chapter provides a November 2007 update on the status of CDM project development in El Salvador, and provides decision–making considerations for determining possible actions to support early formulation of project ideas in thematic areas that are relevant to the work of CDM developers and national authorities in El Salvador.

The technical visit that made data collection possible occurred within the context of implementing Phase IV of the Energy and Climate Change Initiative being executed by the OLADE / Universidad de Calgary consortium with financial support from CIDA in Canada.

El Salvador has various projects in different CDM project cycle stages and others in the formulation process to be submitted for consideration by the CDM.

Table 1 presents information available at the CDM Web site regarding projects that are already registered in the CDM.

Table 1. Salvadorian Projects Registered in the CDM

Registration Date	Project Name	Involved Countries	Methodology	CO2e Reductions Expected per Year	Project Reference in the CDM
12 Mar 06	Landfill Gas to Energy Facility at the Nejapa Landfill Site, El Salvador	Canada Luxemburg	ACM 0002 ver. 2	183,725	0167
25 May 06	LaGeo, S. A. de C. V., Berlin Geothermal Project, Phase Two	Holland	ACM 0002 ver. 4	176,543	0297
29 Jun 07	El Angel Cogeneration Project		ACM 0002 ver. 6 ACM 0006 ver. 4	25,285	1061
30 Nov 07	Central Izalco Cogeneration Project	Japan	ACM 0002 ver. 6 ACM 0006 ver. 4	45,750	1033
30 Nov 07	Berlin Binary Cycle Power Plant		ACM 0002 ver. 6	44,141	1218

Table 2 presents information regarding all Salvadorian projects that have entered the CDM validation, according to official data available on the CDM Web site.

Table 2. Salvadorian Projects that have Begun CDM Validation

Project Name	Methodology	CO2e Reductions Expected per Year	Time period open to international comments
Landfill Gas to Energy Facility at the Nejapa Landfill Site, El Salvador	ACM 0002 ver. 2	184,432	16 Jul 05 – 15 Aug 05
LaGeo, S. A. de C. V., Berlin Geothermal Project, Phase Two	ACM 0002 ver. 2	175,285	09 Sep 05 – 09 Oct 05
Central Izalco Cogeneration Project	AM 0015	37,470	20 Sep 05 – 20 Oct 05
El Angel Cogeneration Project	ACM 0002 ver. 1	37,543	30 Dec 05 – 29 Jan 06
Berlin Binary Cycle Power Plant	AMS–I.D. ver. 7	43,009	22 Feb 06 – 24 Mar 06
Central Izalco Cogeneration Project	ACM 0002 ver. 1	57,129	22 Feb 06 – 24 Mar 06
El Angel Cogeneration Project	ACM 0002 ver. 3	20,931	22 Aug 06 – 20 Sep 06
Berlin Binary Cycle Power Plant	ACM 0002 ver. 6	36,825	06 Oct 06 – 04 Nov 06
Papaloate Hydroelectric Project	AMS–I.D. ver. 12	6,881	08 Sep 07 – 07 Oct 07

1.2. Identified Projects at CDM Formulation Stages in El Salvador

Table 3 presents a list of projects –detected by the Salvadorian DNA– that are in the formulation process and are interested in preparing the Project Development Document (PDD) to begin the CDM project cycle.

Table 3. Projects in Portfolio with an Interest in Formulating the Project Development Document (PDD) for the CDM in El Salvador

Company and contact person	Project Type	Installed capacity	Yearly power generation in MWh	CO_2 equivalent sequestration expected per year
Ingenio Chanmico Delfina Solórzano Tel: (503) 2319–3319 dsolorzano@chanmico.com	Cogeneration with sugarcane bagasse	20 MW	36,000	25,632
Ingenio La Cabaña Mrs. Mariella Rivas Tel: (503) 2399–1233 rmariella@ilcabana.com	Cogeneration with sugarcane bagasse	22.5 MW	32,760	17,612
LaGeo S.A. de C.V. Mr. Rubén Loy Tel: (503) 211–6757 rloy@lageo.com.sv	Ahuachapán Optimization (geothermal)	20 MW	112,320	81,432
LaGeo S.A. de C.V. Mr. Rubén Loy Tel: (503) 2211–6757 rloy@lageo.com.sv	*San Vicente* Geothermal Field	54 MW	303,264	219,866
LaGeo S.A. de C.V. Mr. Rubén Loy Tel: (503) 2211–6757 rloy@lageo.com.sv	Chinameca Geothermal Field	54 MW	303,264	219,866
LaGeo S.A. de C.V. Mr. Rubén Loy Tel: (503) 2211–6757 rloy@lageo.com.sv	Lageo Bio–Fuel Project	NA	NA	NA
LaGeo S.A. de C.V. Mr. Rubén Loy Tel: (503) 2211–6757 rloy@lageo.com.sv	Ahuachapán Solar Heat Project	4–5 MW	NA	NA
Mr. Jaime Alfaro Alvarado (503) 2260–1669 Alfarolano@hotmail.com	Small–Scale Hydroelectric Plant	2.5 MW	13,000	9,425
CEL Mr. Luis Henríquez (503) 22116138 lhenriquez@cel.gob.sv	*El Cimarrón* Hydroelectric Plant	261 MW	691,100	501,047
		90 MW	92,750	

Company and contact person	Project Type	Installed capacity	Yearly power generation in MWh	CO_2 equivalent sequestration expected per year
CEL Mr. Luis Henríquez (503) 22116138 lhenriquez@cel.gob.sv	Hydroelectric Plant – September 15 (overhauling)			67,244
CEL Mr. Luis Henríquez (503) 22116138 lhenriquez@cel.gob.sv	*El Chaparral* Hydroelectric Plant	67.3 MW	233,200	116,000
CEL Mr. Luis Henríquez (503) 22116138 lhenriquez@cel.gob.sv	Hydroelectric Plant Micro–unit – November 5	600 kW	1,690	1,225

1.3. Other Potential CDM Projects in El Salvador

As part of the activities carried out during the technical visit to El Salvador, other activities were detected and potential projects of interest for the CDM were identified:

1. **Development of the CDM project identification programme established by the Ministry of the Environment and Natural Resources, the World Bank, and the *Alianza en Energía y Ambiente*:** Since late 2006, it has furthered a process of selecting potential CDM project activities that could be supported within the cooperation framework established by those institutions. This programme convened projects that might require help to develop the PDD and support during the validation stages. The following entities sent in the questionnaire for the purpose of taking their projects into account in the assessment process:

SABES (NGO): 2 small–scale hydroelectric plants: Gualpuca and Potrerillos

Energía Ecológica S.A. de C.V.: Sapo River small–scale hydroelectric plant

Ingenio Chanmico: Cogeneration project with sugarcane bagasse

Ingenio La Magdalena: Cogeneration project with sugarcane bagasse

Ingenio La Cabaña: Cogeneration project with sugarcane bagasse

CEL: 4 large–scale hydroelectric plants: overhauling the *15 de Septiembre* dam, *Cerrón Grande's* third unit, *El Chaparral* hydro–electric plant, and *El Cimarrón* hydroelectric plant.

Some of the above already appeared in the detection performed by the Designated National Authority, as shown in Table 3. The status of the selection process, progress made in the design stages, and validation of some of these potential projects is not clear at this point.

2. **Portfolio of project receiving support from the *Alianza en Energía y Ambiente* (AEA):** It has been supporting the development of various renewable energy projects in El Salvador. An update of the AEA Salvadorian portfolio, provided by officers of that programme during the visit, includes at least the following projects in the country:

Programme for self–regulation of the geothermal industry	LaGeo / ENEL Green Power / MARN	Create environmental laws and standards to provide a self–regulatory framework to develop geothermal projects in El Salvador.
Design and build a bio–diesel production plant using animal fats and plant oils.	Sun Energy Corp.	Design and build a mobile bio–diesel production plant
Charcoal production from thinning fuel–wood forests	Rodolfo Guillén Hernandez	Developing, designing and building a charcoal furnace in El Salvador, through technology transfers from other countries
Studying the feasibility of using raw plant oil to produce electricity and energy efficiency, using heat from the generator for refrigeration through an absorption system.	*Flexibodegas SA de CV*	Validation of a generating engine method using raw plant oil as a fuel and refrigeration using residual heat from engines via the absorption principle.

Although the AEA's primary purpose is to help promote renewable energy, it also has environmental goals related to climate change. Therefore, even under pilot conditions its portfolio shows an interest in project activity types that fit perfectly in the CDM context, as is the case of bio–fuels, primarily the bio–diesel type.

3. **Specific identification of potential CDM projects during the OLADE / University of Calgary technical visit:** Taking advantage of the expert consultant, and with the help of the Salvadorian DNA, technical visits were held to identify potential project ideas in the country. They identified at least following opportunities to support PIN formulation and short, targeted follow–up actions to be implemented in early 2008.

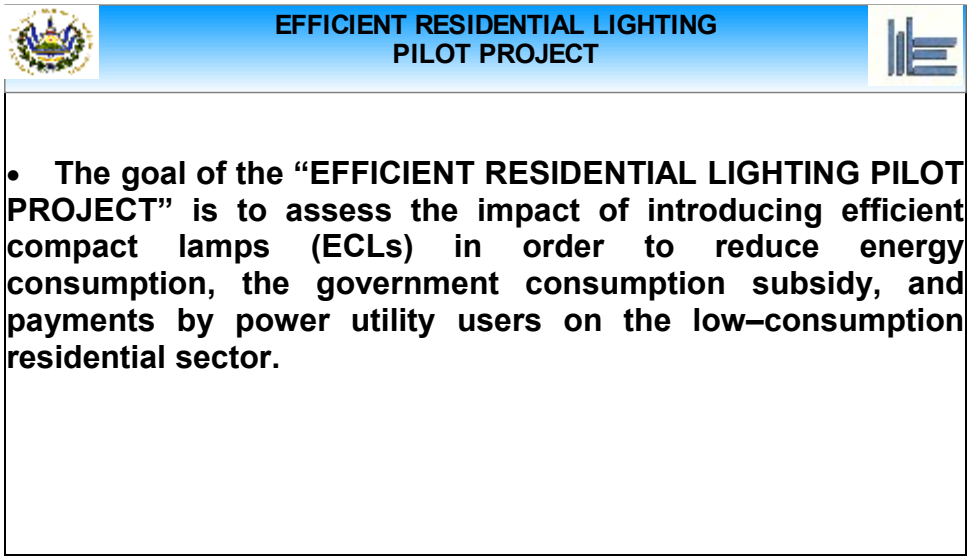
CDM and Bio–diesel in El Salvador: Considering the interest sparked in the country and detection of activities to develop bio–diesel from waste and novel crops, a potential case was identified to develop a PIN in support of the work being done by the E&D (*Empresa y Desarrollo*) Foundation with the *Asociación Salvadoreña de Industriales*, who are in the process of conceiving an initial pilot project to produce bio–diesel from jatropha. Together with this local actor, other local actors are interested in developing CDM projects involving bio–diesel. Developing a PIN on this topic would make it possible for clearly–identified local actors to become familiarized with this field in the

CDM, taking advantage of the fact that there now exist recently–approved small–scale and large–scale methodologies for this type of project:

AMS–III.T.	Plant oil production and use for transport applications

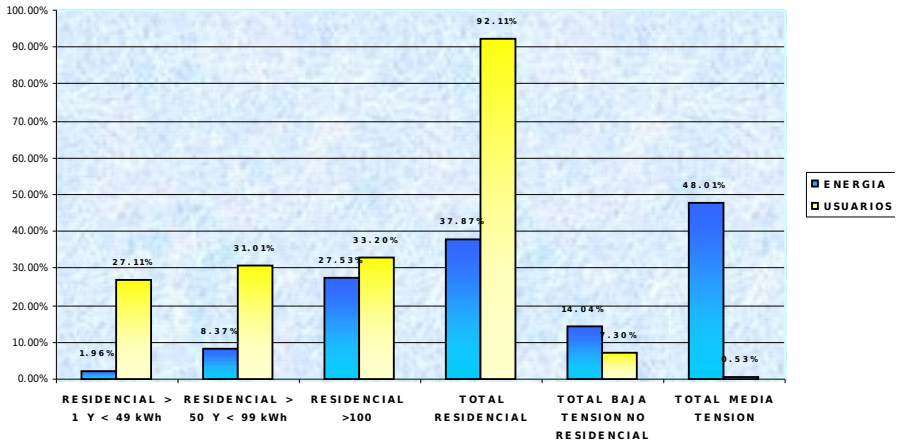
AM 0047	Production of bio–diesel based on waste oils and/or waste fats from biogenic origin for use as fuel —— Version 2

Promoting Efficient Lamps in El Salvador: The Salvadorian Ministry of Economy is in the process of developing a pilot and determining the appropriate scale for a national project to promote efficient lamps in the country. This type of project aims to:



EFFICIENT RESIDENTIAL LIGHTING
PILOT PROJECT

PERCENTAGE COMPARISON BETWEEN THE AMOUNT OF USERS AND THE AMOUNT OF ENERGY



Dirección de Energía Eléctrica/ Ministerio de Economía

EFFICIENT RESIDENTIAL LIGHTING
PILOT PROJECT

Possible typical loads by subsidized residential users with consumption under 99KWh / month

Device	Amount	Power	Daily Service (hrs / day)	Consumption (KWh / month)
Light bulbs	3	60	5	27.00
Radio Cassette player	1	25	5	3,75
Small TV	1	60	5	7,5
			Monthly total	**38,25**

ESTIMATED MONTHLY CONSUMPTION – EFFICIENT LAMPS				
Device	Amount	Power	Daily Service (hrs / day)	Consumption (KWh / month)
Light bulbs	3	15	5	6,75
Radio Cassette player	1	25	5	3,75
Small TV	1	50	5	7.50
			Monthly total	**18.00**
Electric Power Department / Ministry of Economy				

EFFICIENT RESIDENTIAL LIGHTING
PILOT PROJECT

Possible typical loads by subsidized residential users with consumption under 99 Kwh / month

ESTIMATED MONTHLY CONSUMPTION – INCANDESCENT LAMPS				
Device	Amount	Power	Daily Service (hrs / day)	Consumption (KWh / month
Light bulbs	4	60	5	36.00
Radio Cassette player	1	25	5	3,75
Small TV	1	50	5	7,5
Iron	1	800	0,4	9,6
Refrigerator	1	54,5	24	39,24
			Monthly total	**96,09**

ESTIMATED MONTHLY CONSUMPTION – EFFICIENT LAMPS				
Device	Amount	Power	Daily Service (hrs / day)	Consumption (KWh / month
Light bulbs	4	15	5	9.00
Radio Cassette player	1	25	5	3.75
Small TV	1	50	5	7.50
Iron	1	800	0.4	9.60
Refrigerator	1	54.5	24	39.24
			Monthly total	**69.09**

Electric Power Department / Ministry of Economy

EFFICIENT RESIDENTIAL LIGHTING
PILOT PROJECT

USER SAVINGS ACCORDING TO THE NUMBER OF LAMPS USED

	MONTHLY CONSUMPTION (KWh)		
Number of Lamps	Saving Bulbs	Incandescent Bulbs	Saving Bulb / Incandescent Bulb Difference
1	1.8	7.2	5.4
2	3.6	14.4	10.8
3	5.4	21.6	16.2
4	7.2	28.8	21.6
5	9	36	27

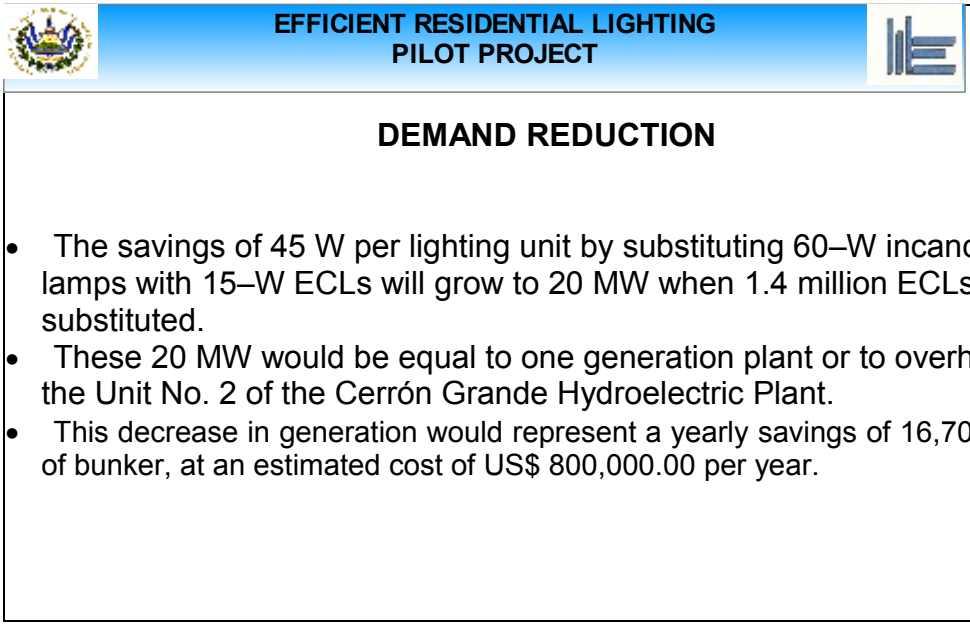
Electric Power Department / Ministry of Economy

EFFICIENT RESIDENTIAL LIGHTING
PILOT PROJECT

Selected Municipalities

- The municipalities of **La Libertad, Antiguo Cuscatlán and Caluco** were selected for lamp distribution, primarily because each has different characteristics in terms of their citizens and forms of labour. It is important to assess their actions and evaluate their urban and rural characteristics, in order to counter any problems that might arise in terms of citizen support for and acceptance of the programme.

Electric Power Department / Ministry of Economy



Electric Power Department / Ministry of Economy

This project can focus its discussion as a possible example of programmatic CDM project activity in El Salvador.

1.4. Conclusions

CDM project portfolios in El Salvador have been significant, but we note that:

4. Among the projects already registered in the CDM, there is still a significant concentration of projects that send renewable energy to the national power grid through power co–generation and geo–thermal technologies.

5. The new projects being developed that include hydro–electric type technologies will have a significant presence if the effort currently under development by CEL meets its goals of qualifying a series of projects that are in their PDD formulation stages.

6. There have been no CDM projects developed for industrial–type activities or for waste electric current management, partly because investments have focused on expansion in the sector, and possibly due to the lack of facilitators to promote them (as there are in other countries of the region such as Guatemala and Honduras).

7. Potential interest to develop Programmatic CDM has been detected in sectors such as efficient lamps in final use sectors, for which there is a technical pilot in the field of the residential sector that could serve as the basis for developing a CDM project. Other important sectors are related to the industrial sector and development of energy efficiency activities by the *Asociación Salvadoreña de Industriales* (ASI). Other potential programmatic interests can centre on the field of energy efficiency in water supply management systems and the local / municipal companies that provide that service.

8. Early potential and a pool of local actors have been identified for developing the pilot stages of new CDM project types centring on bio–diesel and the promotion of efficient lamps.

9. Although pilot projects are usually small–scale (as investments), they offer an opportunity to that community of actors who, with the support of Phase IV of this initiative, are able to assess the potential to develop CDM projects related with their interests.

10. We recommend developing a PIN around bio–diesel pilot project concepts managed by companies with the technologies to handle recycled fats and oils in the country and accompanying this PIN's development by designing a training activity for local actors identified by the Designated National Authority having an interest in the matter of bio–diesel. This session will last one morning, and include a brief introduction to CDM, the status of the methodologies, and matters relating to methodological applications in this field.

11. We recommend providing support to formulate a PIN for a programmatic project concept to be developed by ASI on energy efficiency in the industrial sector and to offer specific training on the Programmatic CDM and its modalities and procedures.

Chapter 2. Project Idea Note for the "*Proyecto Géminis*" to Produce Bio–diesel from Recycled Fats and Oils

2.1. Goal

Considering the interest and entrepreneurial developments seen in El Salvador with regard to the environmental issue of recycled fat and oil management, this PIN develops technical assistance actions in support of the "*Proyecto Géminis*".

2.2. PIN Development

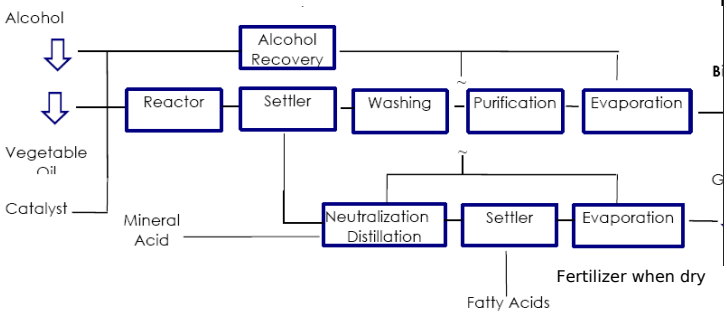
The developed PIN is presented below.

PROJECT IDEA NOTE

Name of Project: "Proyecto Géminis" for waste oil based bio–diesel production in El Salvador.

Date submitted: 31/03/08

Objective of the project	The main climate change mitigation objective of the "Proyecto Géminis" is that of mitigating carbon dioxide emissions due to the combustion of petro–diesel in mobile sources through the utilization of bio–diesel produced from waste oils recycled and converted into a suitable fuel to be used in engines. The project aims at contributing also to the Sustainable Development in El Salvador by providing the country and the local society with a more sustainable, smart, environmentally friendly and integral solution for the management of wastes oils and fats derived from biogenic origins, trough transforming it in a locally–sourced bio–diesel supply. The expected production capacity of the project at full operating conditions is around 430 ton of bio–diesel at year, aims at displacing nearly a 0.06% of the current petro–diesel demand in the country, contributing also to the energy sector development with regard to reduction of external and balance of payment deficits that currently characterized the energy economy in the country. The project contributes to the Sustainable Development of El Salvador through being in line with relevant policies as contain in The Ministry of Economics and Ministry of Agriculture are currently promoting the bio–fuel initiatives, programmes and regulations, with the involvement and support of the Environmental Minister of El Salvador. There is a strong relation of this project with the Energy Policy of El Salvador and with the proposed Industrial Development Policy currently under discussion.
Project description and proposed activities	"Proyecto Géminis" will have an installed capacity to process 600 gallons of waste oils in order to have 540 gallons per day throughput of bio–diesel that will be blended according to international standards in order to be used by end users consisting of either individual users or captive fleets in the country (either public transport or commercial/institutional users). In order to achieve its objectives the project consists of the following activities: 1. Identification and securing of waste oil sources needed to maintain the production capacity of the proposed plant 2. Development of the necessary capacity and

	related investment require assuring collection and transporting logistics both at the waste oil feedstock as well as the bio–diesel supply to final users. 3. Design, sitting, and construction of the Bio–diesel production facility. 4. Monitoring of relevant process characteristics in order to comply with relevant fuel specifications assuring final users quality aspects of the new fuel chain.
Technology to be employed	The processing facility to be established by "Proyecto Géminis" includes all relevant aspects of the new fuel cycle from collection to pre–processing and filtering of the feedstock, relevant unit process involving the esterification reactions operating by batch, that convert the waste oil into bio–diesel, and also the relevant bio–diesel final specification and preparations for blending. The technology under implementation has been well tested through initial stages of development at the current 350 gallons per day production facility that the project developer has been operating since 2006 "Proyecto Geminis" approaches bio–diesel production from the concept point of developing a bio–refinery process applicable to waste oils and fats, by which there are other products being obtained from the synthesis of unit processing operations, Amongst those are: fertilizer and glycerine. The proposed plant follows closely the following process diagram: 

Project developer	
Name of the project developer	**Proyecto Géminis** **Eng. Julio Eduardo Handal Samayoa**
Organizational category	Private company
Other function(s) of the project developer in the project	Sponsor, lobbying, marketing/sales and technical advisor
Summary of the relevant experience of the project developer	The project developer is an industrial engineer with vast experience in projects, have owned business and consultancy services for local and US companies, and that is motivated for this project by the environmental impact of the waste oils in El Salvador. The project developer has operating experience with a bio–diesel pilot plant (half of the proposed new

	capacity), where concept, research, development, design, tests, methodologies, procurement, building, application, execution and trade have been done with in–house resources.
Address	Avenida Santa Gertrudis, Pol N, casa # 51, Residencial Santa Teresa, Ciudad Merliot, Santa Tecla, La Libertad, El Salvador, CA
Contact person	Mr. Julio Eduardo Handal Samayoa
Telephone / fax	Tel/fax: (503) 2288–7090, Mobile: (503) 7939–4346
E–mail and web address, if any	Juliohandal@hotmail.com.
Project sponsor	
Name of the project sponsor	The Project has received some sponsorships at its early stage of development: Ministry of Natural Resources and Environment in El Salvador has supported the project in the initial stages of application for financial support from the "Alianza en Energía y Ambiente", a joint Finnish– Central American programme aim at providing catalytic support for early stage pre–investment development of sound clean energy projects. (http://www.sica.int/energia/aea/aea_breve.aspx?IdEnt=117 The PIN presented in this document has been developed through technical assistance provided through the implementation of the Phase 4 of the Energy and Climate Change Initiative, implemented by OLADE/University of Calgary in collaboration with the Ministry of Natural Resources and Environment in El Salvador as the CDM DNA in the country.
Organizational category	
Address (include web address,	
Main activities	
Summary of the financials	
Type of the project	
Greenhouse gases targeted	CO_2 emission reduction: fossil fuel displacement
Type of activities	Abatement
Field of activities	**Energy supply**: bio–diesel generation (bio–fuel) as renewable energy through waste re–use, fuel switch in transport (petro–diesel with bio–diesel blends)
Location of the project	
Region	Central America
Country	El Salvador
City	Ciudad Merliot, Santa Tecla
Brief description of the location of the project	Specific sitting for the Project facility has not been finalized as yet, but several criteria are currently being used in performing the pre–investment activities related to field sitting of the new facility to be built: • Industrial area • Services for processing (electrical energy and water) • Close to the oil waste generators
Expected schedule	

Earliest project start date	The new facility is expected to be operational by early 2009.
Estimate of time required before becoming operational after the submitted date of this PIN	Time required for financial closure: 3 months Time required for assurance of standing legal contract for construction to start: 2 months (parallel activity) Time required for deliveries: 1 month (parallel activity) Time required for construction: 4 months
Expected first year of verified Emission Reduction or CER / ERU delivery	2009
Project lifetime	10 years. Jon H. Van Gerpen of University of Idaho, has mentioned during a workshop of Bio–diesel Economics last Feb, 2008 that depreciation time for equipment is between 7 to 10 years, with right maintenance.
Current status or phase of the project	Feasibility study finished for the new plant and looking for support and financing negotiations. An initial cash flow for the project is available.
Current status of the acceptance of the Host Country	The local DNA, which is the Ministry of Natural Resources and Environment in El Salvador, is aware of the project and has provides support for it, although no formal procedures have been started regarding national CDM approval processes.
The position of the Host Country with regard to the Kyoto Protocol	El Salvador has signed and acceded to the Kyoto Protocol in 30 November 1998 and has designed the MARN as CDM National Authority http://www.marn.gob.sv

B. Expected environmental and social benefits

Estimate of CO_2 abated (in metric tons of CO_2–equivalent)	Annually: 891 tCO_2–equivalent Up to and including 2012: 3,564 tCO_2–equivalent Up to a period of 10 years: 8,910 tCO_2–equivalent Initial estimations of project emissions reductions have been generated by using suitable GHG gas sources and types both for baseline and project emissions presented in AM 0047 production of bio–diesel based on waste oils and or waste from biogenic origin for use as fuel.
Baseline scenario	The currently applicable methodology for this type of project requires that: The baseline scenario should be separately determined for the following elements: • **Production of fuels (P)**: What would have happened at the production level in the abs CDM project activity? • **Consumption (C):** Which fuel would have been consumed in the absence of the CDM activity? • **Material (M)**: What would have happened to the material used as input for productio in the absence of the CDM project activity? At the production level, in El Salvador, there has been investment in 7 processing facilities to produce bio–diesel, but currently only 3 of those are in operation due to the nature of the price volatility for waste oils and fats, as well as for feedstock. It is anticipated that there will be no further investment in the development on new additional capacity for plants for bio–diesel production due to the already described issue of prices at the size level of the facilities.

	At the level of consumption, it is likely that consumption of petro–diesel will continue to be the baseline, since the capacity of production of any new bio–diesel plants is severely limited by the existing set of barriers and market price conditions for both waste oils as well as palm oil. At the material level it is possible to consider competing uses of the residues other that for fuel, therefore leakage effects will have to be considered in detail at a next stage of CDM development.
Specific global & local environmental benefits	Fossil fuel displacement/Fuel switching – the use of bio–diesel produced by waste oils, the combustion of which is carbon–neutral, will displace a percentage of the fossil fuel imported by El Salvador for transportation requirements,
Guidelines will be applied	Modalities and procedures for CDM projects, specialty AM 0047 v2. . "Production of bio–diesel based on waste oils and/or waste fats from biogenic origin for use as fuel" (valid from 10 August 07 onwards)
Local benefits	• Better environmental sound and cheaper waste management • Health of people • Environmental and health issues awareness
Global benefits	• Locally sourced Renewable Energy • Less emissions like CO, sulphur oxides, methane, HC and particulate emissions. Only Nitrogen oxides are highest • CO_2 emissions reduction
Socio–economic aspects What social and economic effects can be attributed to the project and which would not have occurred in a comparable situation without that project	• Savings in foreign investments for the country with the use of local source of fuel (bio–diesel) and resulting reduction in the consumption of imported and price increasing fossil fuels; • Long time reduction of the El Salvador's vulnerability by external factors, by a local energy supply and costs management actions. El Salvador does not produce their own petroleum and this activity is very sensible for worldwide reserve reduction and geo–political issues; • Energy matrix diversification; • Employment creation for the local communities in the processing and consumption of the bio–diesel • Technological development for the transferred bio–diesel knowledge (associated training to involved people); • New industry and a new market generated for both, raw material and bio–diesel; • Use of wastes for energy, fertilizer and raw materials production purposes (supplementary income for fertilizer and Glycerine); • Damage effects reduction of the gas emissions with petro–diesel.
Guidelines will be applied	Project will comply with the proposed new legislation for the support to renewable energy projects in the country,

	Bio–diesel will be in compliance wit suitable local and international standards for bio–diesel production.
Possible direct effects	• New employment generation • Possibility to direct new opportunities for local investment in renewable energy. • Contribution to overall foreign oil dependency. • Entrepreneurial development of new breeds of sound environmental investment in the country.
Possible other effects	Training/education associated with the new processes, technologies and products and the effects of a project on petro–diesel and transportation industries Demonstrative project by replication
Environmental strategy/ priorities of the Host Country	The Ministry of Economics and Ministry of Agriculture are currently promoting the bio–fuel initiatives, programmes and regulations, with the involvement and support of the Environmental Minister of El Salvador. There is a strong relation of this project with the Energy Policy of El Salvador and with the proposed Industrial Development Policy currently under discussion. As the project uses only feedstock derived from the use of waste oils and fats, there are no issues relating to the impacts of bio–fuels on food supply policies in the country.

C. Finance

Total project cost estimate	
Development costs	10,000 €
Installed costs	38,000 €
Other costs	19,000 € (services)
Total project costs	67,000 €
Sources of finance to be sought or already identified	
Equity	40%
Debt – Long–term	60%
Total	67,000 €
Carbon finance contribution sought	NA but needed
Carbon finance contribution in advance payments	NA
Sources of carbon finance	NA, but starting to seek interested parties looking for small high value added carbon reductions both under the Kyoto as well as the voluntary markets.
Indicative CER/ERU or Ver Price (subject to negotiation)	€ 11/CO_2 ton
Total Emission Reduction Purchase Agreement (ERPA) Value	Annually: 891 tCO_2–equivalent Up to and including 2012: 3,564 tCO_2–equivalent Up to a period of 10 years: 8,910 tCO_2–equivalent
A period until 2012 (end of the first budget period)	39,204 €
A period of 10 years	98,010 €
A period of 7 years	n.a.
A period of 14 years (2 * 7 years)	n.a.

Financial analysis is available for the proposed CDM activity without the CER revenues.	Preliminary financial analysis shown a negative NCV of US$ 130,000, high influence of the cost of the row materials and it is expensive and it does not present an acceptable IR. With CER revenues, the situation improves, but VAN still negative.

Chapter 3. Development of a CDM Programme of Activities Idea Note for the *Asociación Salvadoreña de Industriales* (ASI)

3.1. Goal

The ASI is interested in –and has been working on– surveying alternatives to get involved in energy efficiency projects, having gained experience in audits, training and participation in early methods for assessing energy efficiency. The organization is interested in developing a project aimed to involve at least 100 to 200 companies in the experience of enhancing energy efficiency through activities such as substituting motors and implementing efficient lighting measures in its partners. The Programmatic CDM is an opportunity to accompany this interest and develop a PIN for this purpose.

3.2. PIN Development

The developed PIN is presented below.

PROGRAMME OF ACTIVITIES I DEA NOTE

Name of Programme: "Asociación Salvadoreña de Industriales (ASI) Industrial Energy Efficiency CDM Programme of Activities

Date submitted: 2/03/08

Objective of the Programme of Activities (POA)	The main climate change mitigation objective of the proposed CDM Programme of Activities (POA) is to assist in disseminating energy efficiency measures in the industrial sector in El Salvador, by which emissions reductions will be achieved by reducing the demand of grid electricity in the country, therefore attaining CO2 reductions that otherwise would have been generated through the electricity grid in the country. The project aims at involving an important number of medium size industries in the country, and is to be facilitated by the "Asociación Salvadoreña de Industriales" (ASI) as the CDM Programme Entity. The most relevant energy efficiency measures to be considered in this POA are: 1. Substitution of energy efficient electric motors, 2. Installation of energy efficient industrial lighting devices. The target size of the POA is that of reducing up to 60 GWh of electricity consumption in the industrial sector of El Salvador, with a targeted 39,000 tons CO_2/year reductions in greenhouse gases.
POA description and proposed activities	The proposed POA is to be implemented by ASI, as the declared POA programme Entity undertaking the programme of activities as a voluntary action. The stated goal of the POA is to establish an innovative mechanism, by which the industrial sector in El Salvador will adopt a series of activities aiming at energy efficiency resulting in the adoption of efficient lighting systems as well as replacement of electrical motors for industrial applications. The proposed activities under this POA are: 1. ASI will organize a suitable organizational structure in order to respond to the design requirements of both the energy efficiency as well as the programmatic CDM opportunity. 2. ASI will conduct the necessary technical studies as well as the sectoral base composition of target industries of relevance to the design of the CPA level of the POA. 3. ASI will design an innovative mechanism for the financing

	as well as the technical assistance required for EE dissemination. 4. ASI in conjunction with the participating industries will established a suitable procedure for the monitoring of the POA.
Technology to be employed	As part of the activities involved in the design of the POA, ASI will work in defining the most adequate and representative type of CPA. Relevant technologies and programme characteristics associated with the types of measures to be disseminated are based on a description provided in Task 3: Energy Efficiency programmes in El Salvador, prepared by KEMA Inc. in June 2005. **<u>Motor Driven Systems programme</u>** *programme Objectives* Motor–driven systems in industrial applications account for 39 percent of all electricity used in the Salvadoran economy. Motor systems consist of the motor itself, related controls, and the machinery that apply the motive power to the industrial process. Generic centrifugal processes such as pumping, air compression, and fans use over two–thirds of all electricity consumed by motor systems. Two basic technical strategies are available to capture efficiencies in industrial motor–driven systems. The first is to ensure that the most efficient components – motors, couplings, speed controls such as Variable Frequency Drives (VFDs), etc. — are used. Component–oriented strategies have the potential to save roughly 2 – 5 percent of motor system energy if implemented in a consistent fashion. System–oriented measures address the configuration of the entire system, with the general objective of matching motor output energy to load requirements as closely as possible. System–oriented strategies vary from one kind of machine to another. For example, typical measures in pump systems involve matching pump size and speed to load, and the use of multiple systems to meet large variations in load. For compressed air systems, preventing air leaks, elimination of inefficient end uses, use of air storage and controls to meet load, and reduction of input horsepower are typical strategies. These kinds of measures require significant diagnostic effort and engineering skill to design. However, they can yield average energy savings in the range of 10 – 20 percent of baseline system usage. Verified savings for projects of this type have ranged as high as 50 percent of baseline system usage. Such projects often have ancillary benefits, such as reducing factory downtime, waste materials, and emergency maintenance requirements. Most motor system programmes in both developing and

	developed countries have targeted the following objectives. • Encourage motor equipment dealers to stock and promote efficient motors and drives. This has typically been accomplished through standards and labelling approaches, supplemented in some cases by end–user or vendor incentives for the sale of efficient units. • Encourage end–users, particularly those in industries with heavy motor usage, to establish purchasing policies that specify energy–efficient motors and drives. • Educate factory managers about the potential energy savings and other benefits associated with systems–oriented measures, and inform them how to identify and manage projects to implement such measures. • Train a cadre of engineers, equipment vendors, and installation contractors regarding diagnostic procedures to identify system–oriented measures, design approaches, and project implementation management. • Stimulate demand for services related to systems–oriented measures through public relations and information campaigns, as well as demonstration projects in prominent facilities. *programme Design and Operations* **Overview.** The supply chains for major motor systems such as pumps and compressed air are generally separate from those for motors and drives. That is, the two categories of products are manufactured, distributed, and installed by entirely different sets of companies. For the end–user's standpoint, motor purchases are usually regarded as expenses as opposed to investments. Purchase of compressed air and pump systems are generally large enough to be considered as investments. For these reasons, programmes to encourage the purchase of efficient motor system components have been developed and deployed separately from those designed to encourage system–level measures. Moreover, in most jurisdictions, separate programmes have been developed to target improvements in compressed air, fan, and pump systems. These programmes have generally involved partnerships between the programme sponsor, manufacturers, consulting engineers, and firms in the distribution chains. **Best Practices for programmes to promote efficient components.** programmes designed to promote efficient components such as motors and drives generally consist of the following components. • ***Standards, Testing, and Labelling.*** It is very difficult for purchasers to distinguish efficient units from standard equipment without the presence of a label. For example, the

	'cut point' between efficient and standard efficiency three–phase motors — representing the highest percentiles of available efficiencies — varies by horsepower and motor configuration. Thus, there are separate 'cut points' for more than 20 categories of motors defined by horsepower and configuration. This is too much information for purchasers to keep track of. Labels are required for customers to identify efficient equipment in the course of transactions and for vendors to promote them effectively. Of course, the availability of a meaningful label requires a Minimum Energy Performance Standard (MEPS) set either by legislation or by negotiated settlement among manufactures and other stakeholders. Finally, the stakeholders in the programme need to agree upon an acceptable testing protocol. Among countries in the region, Mexico and Costa Rica have developed MEPS for motors. Mexico has a voluntary labelling programme and Costa Rica a mandatory labelling programme for motors. El Salvador could take advantage of the extensive work that went into developing these standards and labelling rules in formulating its own policies. • ***Sales tools.*** Most programmes that promote efficient motors have developed software tools to help vendors promote and sell efficient equipment. Most of these tools are savings calculators combined with databases of product information. They enable vendors to identify efficient models that are appropriate for a given application. They also support comparison between alternative models in terms of life cycle cost and returns on investment. • ***Training and information campaigns.*** Most existing programmes have information dissemination campaigns designed to inform industrial purchasers of the benefits of efficient equipment. These campaigns often include various fact sheets, case studies, and end–user testimonials. These materials are generally distributed via press releases, direct mail, and the Internet. Some programmes also maintain information clearinghouses designed to respond to user inquiries. Finally, some programmes supplement broadcast information dissemination methods with training programmes targeted to facility managers and equipment vendors. Often the training focuses on effective use of the sales tools. • ***End–user incentives.*** Many programmes in developed countries offer incentives for the sale of efficient motors. In most cases the incentives are paid to the customer. In some they are paid to vendors, with bonuses paid when incentive volumes exceed specified levels. Some programmes use a combination of the two. Generally, this approach has drawn relatively low levels of participation from vendors and customers. According to evaluations of such programmes, these results have stemmed largely from the lack of interest

	on the part of motor dealers in promoting efficient products, and their reluctance to make investments in inventory of expensive efficient motors **Best Practices for programmes to promote motor system–oriented measures.** programmes to improve the efficiency of motor systems such as pumps and compressed air have been developed in the US and Europe. Government agencies have generally spear–headed this development. They have recruited representatives of manufacturers, industry associations, large end–users, engineering societies, and distributors onto various oversight and technical committees to provide programme direction. In some cases, administration of the programme has been contracted out to national laboratories or university departments. **Industrial Lighting programme** *programme Objectives* The objectives of this programme are to: • Educate commercial and industrial customers to the benefits of efficient lighting equipment and lighting system design. • Stimulate demand for efficient equipment and system design among commercial and industrial customers. • Educate designers, lighting equipment distributors, and electrical contractors regarding the techniques and business benefits of promoting, specifying, and installing energy–efficient equipment and designs. • Encourage designers, distributors, and contractors to promote efficient equipment and designs as part of their standard practice. ***programme Design and Operation*** **Measures supported.** Extensive programme experience in developed and developing countries has demonstrated that a broad range of commercial and industrial lighting measures yields cost–effective energy savings.

Typical Industrial Lighting Efficiency Measures Supported by Energy Efficiency programmes

MEASURE	TYPICAL APPLICATIONS	
	New Construction	Replacement/ Retrofit
Substitution of electronic for magnetic ballasts	X	X
Substitution of T8 or Super T8 lamps for T12	X	X
Use of LED exit lamps	X	X
Substitution of fluorescent for high intensity discharge (HID) lighting	X	
Efficient HID lighting for exterior and industrial applications	X	X
Occupancy and photocell controls	X	X
Reduction of lighting power density via layout designs	X	
Reduction of lighting power density via use of day–lighting	X	

Best Practices. In developing countries, commercial lighting efficiency programmes have relied heavily on end–user subsidies to stimulate sale and installation of efficient products. This approach is related to the highly cost–effective nature of various technical measures such as electronic ballasts and LED exit lamps. The savings from these items are so high relative to baseline equipment that high levels of programme expenditure can be justified from a policy point of view. Highest programme volume is achieved when contractors are allowed to market subsidized products and claim rebates.

In developing countries, the programme budgets required to support large scale incentive programmes are seldom available. Thus, programmes in developing countries have relied more on training of contractors and design professionals to identify energy efficiency opportunities in their lighting projects and to sell customers on the benefits of such projects.

The success of training and incentive programmes can be enhanced by building codes. Most developed countries base their building codes on the International Energy Efficiency codes that

	prescribe lighting power density levels and control systems designs for various types of interior spaces. The success of these programmes depends significantly on the level of resources available for code enforcement. Even in developed countries, resources available for code enforcement tend to lag behind demand, which compromises the value of the codes as a policy instrument. A number of countries, including Columbia and Mexico also maintain product standards that require the use of electronic ballasts. programme approach for El Salvador. An appropriate approach to improving the efficiency of industrial lighting in El Salvador will include the following elements: • Adoption of product efficiency standards for common components of industrial lighting systems: magnetic and electronic ballasts, fluorescent lamps, exit lamps. • Adoption of building codes that require the use of efficient lighting designs. • Training courses for lighting designers and professionals in the application and use of efficient lighting. • Financing for efficient lighting installations by end users. • Marketing and consumer education on the benefits and design features of efficient lighting. • Continued implementation of specifications for lighting system procurement in government buildings that require efficient equipment and layouts. Implementation of pilot lighting system efficiency projects.

Project developer	
Name of the project developer	**Asociación Salvadoreña de Industriales (ASI)**
Organizational category	Industrial Sector Organization
Other function(s) of the project developer in the project	Sponsor, lobbying, marketing/sales and technical advisor to the industrial sector in El Salvador
Summary of the relevant experience of the project developer	ASI was established in 1958, has a membership of over 500 members in a wide array of industrial classifications. The mission and vision of ASI can found at www.asi.com.sv where it is clearly stated the commitment of ASI towards the sustainable development in El Salvador. ASI has had experience in the energy efficiency sector through:

	Organization of the Large Industrial Electricity Users Committee that takes part on the National Energy Committees as well as on the wholesale electricity market. Implementation of the Strategic Alliance with BUN–CA in the implementation of the PEER project aimed at removing barriers for industrial energy efficiency in El Salvador. (www.bun–ca.org).
Address	Calle Roma y Liverpool, Edificio ASI, Colonia Roma, San Salvador, El Salvador.
Contact person	Mr. Carlos Saade Hasbún. Director and President of the Energy Committee
Telephone / fax	(503) 2267–9226
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Project sponsor	
Name of the project sponsor	The Project has received some support at its early stage of development: Ministry of Natural Resources and Environment in El Salvador as the acting CDM DNA in El Salvador is very interested in supporting the development of programmatic CDM activities in El Salvador. The PIN presented in this document has been initially developed through technical assistance provided through the implementation of the Phase 4 of the Energy and Climate Change Initiative, implemented by OLADE/University of Calgary in collaboration with the Ministry of Natural Resources and Environment in El Salvador.
Organizational category	
Address (include web address,	
Main activities	
Summary of the financials	
Type of the project	
Greenhouse gases targeted	CO_2 emission reduction
Type of activities	Abatement
Field of activities	**Energy Efficiency in the consumption level**
Location of the project	
Region	Central America
Country	El Salvador
City	N.A. since the POA will apply to industries installed in El Salvador.
Brief description of the location of the project	Country wide, CPAs will be located at the site of participating industries in El Salvador.
Expected schedule	
Earliest start date of the POA	Early 2009.
Estimate of time required before becoming operational after the submitted date of this PIN	12 months
Expected first year of CER s	2009
POA lifetime	No final decision has been taken on the duration of the proposed POA, technical consultations will be carried at the

	level of participating CPAs in order to assess the rate of participation on one side and the adequate period of duration of the relevant technologies/measures supported in the POA.
Current status or phase of the project	PIN level, ASI is currently assessing the strategy and programme directives. ASI is interested in accessing the necessary support in order to move to pre investment stages of the energy efficiency programme and associated POA for the CDM.
Current status of the acceptance of the Host Country	The local DNA, that is the Ministry of Natural Resources and Environment in El Salvador is aware of the project and has provided support for it, although no formal procedures have been started regarding national CDM approval processes.
The position of the Host Country with regard to the Kyoto Protocol	El Salvador has signed and acceded to the Kyoto Protocol in 30 November 1998 and has designed the MARN as CDM National Authority http://www.marn.gob.sv

B. Expected environmental and social benefits

Estimate of CO_2 abated (in metric tons of CO_2–equivalent)	The initial information on estimated energy efficiency gains of the programme are based on sampling of a 20 % field of the industrial members of ASI, information that has identified that an initial target of up to 18,000 MWh electricity consumption reductions could be feasible at the start of the POA, increasing on a yearly basis as more industries join in the POA. The estimation conducted for emissions reductions accounts for a grid emissions factor of 0.61 tons CO2 /MWh for El Salvador (based on the most recent CDM register projects in the country), yielding an estimated initial emissions reductions in the order of 11,000 ton CO2/year at the start and at full capacity in the order of **39,000 tons CO2/year**.
Baseline scenario	The proposed POA will make use of the approved small scale methodologies under : 1. II.D Energy efficiency and fuel switching at industrial facilities or, 2. II.C Demand side energy efficiency for specific technologies.
Specific global & local environmental benefits	
Guidelines will be applied	Modalities and procedures for CDM projects, guidelines, norms for energy efficiency in the country
Local benefits	• More efficient industrial sector, transfer of sustainable development technologies, enhancement of the base of ancillary services to the sector and the economy, less dependency on imported fuels.
Global benefits	• CO_2 emissions reduction

Socio–economic aspects What social and economic effects can be attributed to the POA and which would not have occurred in a comparable situation without that POA	• Dissemination of EE technologies. • Increased secondary player development in the chain of supply for sustainable technologies. • Training and monitoring of energy efficiency gains in the economy.
Possible direct effects	• New employment generation • Possibility to direct new opportunities for local investment in renewable energy and energy efficiency. • Contribution to lessen overall foreign oil dependency. • Entrepreneurial development of new breeds of sound environmental investment in the country, as well as services to the industrial sector.
Possible other effects	Training/education associated with the new processes, technologies and products.
Environmental strategy/ priorities of the Host Country	El Salvador, through the different policy directives is keen in promoting and increasing the overall efficiency of the energy sector. Energy efficiency is part of the priorities of the country.

D. Finance

Total project cost estimate	
Development costs	100,000 $
Installed costs	2,500,000 $
Other costs	100,000 $ (services)
Total project costs	2,700,000 $
Sources of finance to be sought or already identified	
Equity	n.a.
Debt – Long–term	n.a..
Total	2,700,000 $
Carbon finance contribution sought	643,500 $
Carbon finance contribution in advance payments	n.a..
Sources of carbon finance	n.a..
Indicative CER/ERU or VER Price (subject to negotiation)	$16.5/$CO_2$ ton
Financial analysis is available for the proposed CDM POA without the CER revenues.	Investment costs for the targeted level of energy efficiency gains through the selected measures/technologies have been identified at this stage. No detailed financial assessments for the POA are currently available.