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PROMOTING SUSTAINABLE ENERGY INTEGRATION IN CENTRAL AMERICA

Assessment for USAID/El Salvador and USAID Central America and Mexico Regional Program

Statistical Annex

SEPTEMBER 2010
This publication was produced for review by the United States Agency for International Development. It was prepared by Nexant, Inc. under Contract No. EPP-I-00-03-00007-00 Task Order No. 596-TO-10-00001.

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Contents

Section 1 Power Sector 1
1.1 Power Plants 1
1.2 Installed Capacity and Electricity Generation 8
1.3 Marginal Cost 13
1.4 Energy Intensity 16
1.5 Peak Demand 18
1.6 Regional Energy Market 19
1.7 Expansion Plans 22
1.8 Transmission and Distribution 23
1.9 Electricity Prices 24
1.10 Electrification Rate 25
1.11 Population Density 26
1.12 Regulatory Indicators 27
Section 2 Renewable Energy Resources 29
2.1 Potencial Capacity by Resource 29
2.1.1 Hydroelectric 30
2.1.2 Wind 32
2.1.3 Geothermal 33
2.1.4 Biomass 33
2.2 Resource Mapping 34
2.2.1 Wind 34
2.2.2 Solar 35
2.3 Installed Non-Conventional Renewable Capacity 36
2.4 Regulatory Regime 40
Section 3 Carbon Emissions and Project Activity 42
3.1 Emissions Factor 42
3.2 Registered CDM Projects 42
3.3 Volume of CERs 43
3.4 Emissions Inventory 44
3.5 Emissions Reduction and Carbon Sequestration Potential 46
3.6 Marginal Abatement Cost Estimates 46
Section 4 Energy Efficiency 48
4.1 Central America DSM Potential Model 48
4.2 Overview 49
4.3 Residential 53
4.4 Industrial 59
4.5 Commercial 63
Section 5 Liquid Fuels 67
5.1 Consumption by Use 67
5.2 Biofuels Production 70
5.3 Average Prices 71
Section 6 Donor Programs 72
6.1 Overview 72
6.2 Detailed Program Information 73
6.3 Action Matrix for Central American Energy Integration and Development 93
Section 7 Economic Data 99

7.1 GDP Growth 99
7.2 GDP Per Capita 99
7.3 Budget Balance 100
7.4 Inflation 101
7.5 Interest Rates 101
7.6 Currency and Exchange Rate 102
7.7 Cost of Imported Petroleum-Based Fuels Relative to Exports 102
Section 8 References 104

1.1 POWER PLANTS

Power plants by country, 2009

Costa Rica	Stations	Installed Power (kW)	Net Generation (MWh)
National Interconnected System	65	2500545	9235908.8
Public Companies	33	1886726	7414833.3
Hydroelectric	23	1306203	6094919.7
CNFL	1	96503	353152
Cooperguanacaste	1	17500	75490
Coopelesca	1	25500	83468
ESPH	1	19850	91200.5
ICE	18	1120381	5351969
JASEC	1	26469	139640
Geothermal	1	136160	973086
ICE	1	136160	973086
Wind	1	19800	80343.7
ICE	1	19800	80343.7
Thermal	8	424563	266483.9
CNFL	1	90000	84535.6
ICE	6	330863	181338.3
Zaret-R-Azul	1	3700	609.9

Continued on following page

Costa Rica, continued	Stations	Installed Power (kW)	Net Generation (MWh)
Private Companies	32	613819	1821075.5
Hydroelectric	23	204029	1129539.6
C. Grande3	1	3375	15889.4
Caño Grande	1	2905	17892.9
D. Julia	1	16470	105403
Don Pedro	1	14000	59529.1
El Angel	1	0	470.6
El General	1	42000	208233
Embalse	1	2000	8913.4
Esperanza	1	5506	31464.7
Hidrozarca	1	14208	78124.7
La Lucha	1	339	1827
Losko	2	2753	13327.2
Matamoros	1	3819	24998.8
Platanar	1	14594	95654.3
Q. Azul	1	300	1050
Rebeca	1	60	192.1
Rio Lajas	1	11000	54040.7
S. Lorenzo	1	0	67000.5
Suerkata	1	3000	1466.2
Tapezco	1	0	155.5
Tuis	1	0	6667.2
U. Fenosa	1	50700	280311
Volcan	1	17000	56928.4
Geothermal	1	29550	212754
G.G. Ltd.	1	29550	212754
Wind	4	99820	245838.9
Aeroenergia	1	6750	30946.9
GDF Suez	1	49700	51649.2
Movasa	1	20000	75081.4
P.E.S.A.	1	23370	88161.4
Thermal	4	280420	232943
Alston Power	1	99500	81869
El Viejo	1	20000	25690.2
Energy Int	1	140920	103466
Taboga	1	20000	21917.8

Source: CEPAL, 2010.

El Salvador	Stations	Installed Power (kW)	Net Generation (MWh)
National Interconnected System	24	1490307	5504890
Wholesale Market	19	1471111	5444700
Public Companies	5	572200	2103200
Hydroelectric	4	472000	1500400
CEL	4	472000	1500400
Thermal	1	100200	602800
Invers. Energeticas	1	100200	602800
Private Companies	14	898911	3341500
Geothermal	2	204400	1420800
LaGeo	2	204400	1420800
Thermal	12	694511	1920700
CASSA	1	60000	96400
CESSA	1	32600	83200
CLESA	1	0	100
Duke	2	383300	746400
E. Borealis	1	13600	69200
GECSA	1	11611	68100
Ing. Ángel	1	22500	49700
Ing. Cabaña	1	21000	14900
Inm. Apopa	1	6800	47200
Nejapa	1	144000	527500
Textufil	1	44100	218000
Retail Market	5	19196	60190
Private Companies	5	19196	60190
Hydroelectric	4	13696	60190
CECSA	1	7400	31750
De Matheu	1	1500	5237
Papaloate	1	2000	6871
Sensunapán	1	2796	16332
Thermal		5500	
EGI Holdco		5500	

Source: CEPAL, 2010.

Guatemala	Stations	Installed Power (kW)	Net Generation (MWh)
National Interconnected System	55	2349044	7978762
Wholesale Market	52	2344844	7973688
Public Companies	10	573600	1962632
Hydroelectric	9	496700	1959262
EGEE	9	496700	1959262
Thermal	1	76900	3370
EGEE	1	76900	3370
Private Companies	42	1771244	6011056
Hydroelectric	14	279000	930227
Comegsa	6	115900	309978
GEOCONSA	1	26000	113324
Montecristo	1	13500	47432
Pasabién	1	12800	40793
Renace	1	68100	215533
Río Bobos	1	10000	47032
S.Jerónimo	1	300	713
Secacao	1	16500	94073
Tecnoguat	1	15900	61349
Geothermal	2	49200	279939
Comertitlán	1	25200	154095
Orzunil	1	24000	125844
Térmica	26	1443044	4800890
Amatex	1	71000	166639
COENESA	1	10000	191
Duke E. C.	1	51000	3111
Duke E.I.G	2	239300	1367193
Electrogeneración	2	25800	73306
G E Central	1	53500	133978
Genor	1	46200	208366
Ingenios	9	350844	1068760
La Laguna	1	43000	944
Libertad	1	20000	89766
Poliwatt	2	151400	773475
PQPC	1	118000	244189
San José	1	139000	588717
Sidegua	1	44000	56265
TAMPA	1	80000	25990
Distributed Generation	3	4200	5074
Hydroelectric	3	4200	5074
Cuevamaría	1	1500	2612
Kaplan Chapina	1	2000	432
Sta. Elena	1	700	2030

Source: CEPAL, 2010; CEL.

Honduras	Stations	Installed Power (kW)	Net Generation (MWh)
National Interconnected System	45	1605871	6539549
Public Companies	10	502300	2533991
Hydroelectric	7	464300	2533811
ENEE	7	464300	2533811
Thermal	3	38000	180
ENEE	3	38000	180
Private Companies	35	1103571	4005558
Hydroelectric	12	57571	247508
Babilonia	1	4000	23732
Cececapa	1	2900	17018
Cortecito	1	3200	20407
Cuyamapa	1	12200	53635
Cuyamel	1	7800	33949
Esperanza	1	12761	31514
La Nieve	1	480	949
Las Gloria	1	5800	5123
Río Blanco	1	5000	38809
San Carlos	1	2300	16481
Yojoa	1	630	2819
Zacapa	1	500	3072
Thermal	23	1046000	3758050
Aguan	1	500	
AMPAC	1	10100	
AYSA	1	8000	
Azunosa	1	4000	3207
Cahsa	1	25800	43821
Celsur	1	16700	110828
Chumbagua	1	14000	7609
Ecopalsa	1	1000	72
EDA	1	1200	
ELCATEX	1	21800	2837
ELCOSA	1	80000	142580
EMCE	2	141600	101178
Enersa	1	276100	1383860
ENVASA	1	8000	44351
La Grecia	1	12000	21008
Lean	1	500	
Lufussa	3	386900	1835464
Nal. de Ings.	1	20000	5987
ParkDale	1	10000	33229
Tres Valles	1	7800	22019

Source: CEPAL, 2010.

Nicaragua	Stations	Installed Power (kW)	Net Generation (MWh)
National Interconnected System	18	974000	3195276.9
Wholesale Market	18	974000	3195276.9
Public Companies	6	402400	966355.2
Hydroelectric	2	104400	284664
Hidrogesa	2	104400	284664
Thermal	4	298000	681691.2
GECSA	4	298000	681691.2
Private Companies	12	571600	2228921.7
Hydroelectric	1	900	
ATDER-BL	1	900	
Geothermal	2	87500	216157.1
Gemosa	1	77500	151603
SJP	1	10000	64554.1
Wind	1	39900	109247
E. Amayo	1	39900	109247
Thermal	8	443300	1903517.6
CENSA	1	63900	209900
EEC	1	74000	528399
GEOSA	2	120000	516020
Gesarsa	1	6400	4559.6
Monte Rosa	1	67500	112902
NSEL	1	59300	122521
Tipitapa	1	52200	409216

Source: CEPAL, 2010.

Panama	Stations	Installed Power (kW)	Net Generation (MWh)
National Interconnected System	27	1771065	6660273.7
Wholesale Market	27	1771065	6660273.7
Public Companies	4	219800	681567.4
Hydroelectric	2	60000	209161.4
ACP	2	60000	209161.4
Thermal	2	159800	472406
ACP	1	119800	453677
EGESA	1	40000	18729
Private Companies	23	1551265	5978706.3
Hydroelectric	14	821315	3610216.7
AES Panamá	4	481960	1648954
Arkapal	1	675	2600
Candela	1	530	1698.1
Canopo	1	1470	1312.5
EGE-Fortun	1	300000	1803360
ESEPSA	4	22380	71378
HidroPanam	1	4300	25469.9
Istmus	1	10000	55444.2
Thermal	9	729950	2368489.6
COPESA	1	46000	15707.2
Egeminsa	1	280000	575752
ESEPSA	2	10000	
GENA	1	104400	61723.4
IDB	1	87000	488574
PAN-AM	1	99000	662821
Pedregal	1	55350	437124
TCaribe	1	48200	126788

Source: CEPAL, 2010.

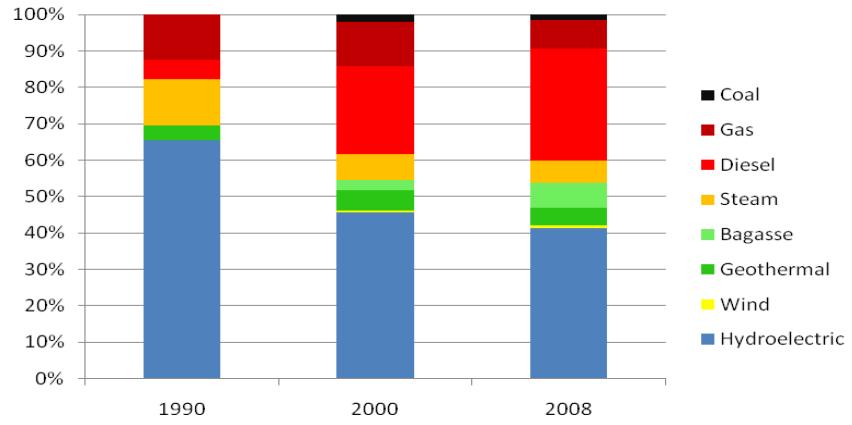
1.2 INSTALLED CAPACITY AND ELECTRICITY GENERATION

Installed Capacity (MW)

	1990	2000	2008	Growth, 90–00	Growth, 00–08	% of Total Capacity, 1990	% of Total Capacity, 2000	% of Total Capacity, 2008	% of Regional Growth, 90–00	% of Regional Growth, 00–08	Growth (MW), 90–00	Growth (MW), 00–08
Hydroelectric	2,708.6	3,312.9	4,257.0	22%	28%	66%	46%	41%	19%	31%	604	944
Wind	0.0	42.5	69.9	-	64%	0%	1%	1%	1%	1%	43	27
Geothermal	165.0	405.2	501.6	146%	24%	4%	6%	5%	8%	3%	240	96
Bagasse	0.0	205.3	684.7	-	234%	0%	3%	7%	7%	16%	205	479
Steam	519.6	507.6	634.1	-2%	25%	13%	7%	6%	0%	4%	-12	127
Diesel	218.5	1,744.8	3,148.6	699%	80%	5%	24%	31%	49%	47%	1,526	1,404
Gas	517.7	896.3	814.1	73%	-9%	13%	12%	8%	12%	-3%	379	-82
Coal	0.0	142.0	160.4	-	13%	0%	2%	2%	5%	1%	142	18
Total	4,129.4	7,256.6	10,270.4	76%	42%	100%	100%	100%	100%	100%	3,127	3,014

Source: CEPAL, 2009.

Installed Capacity (MW), 1990–2008

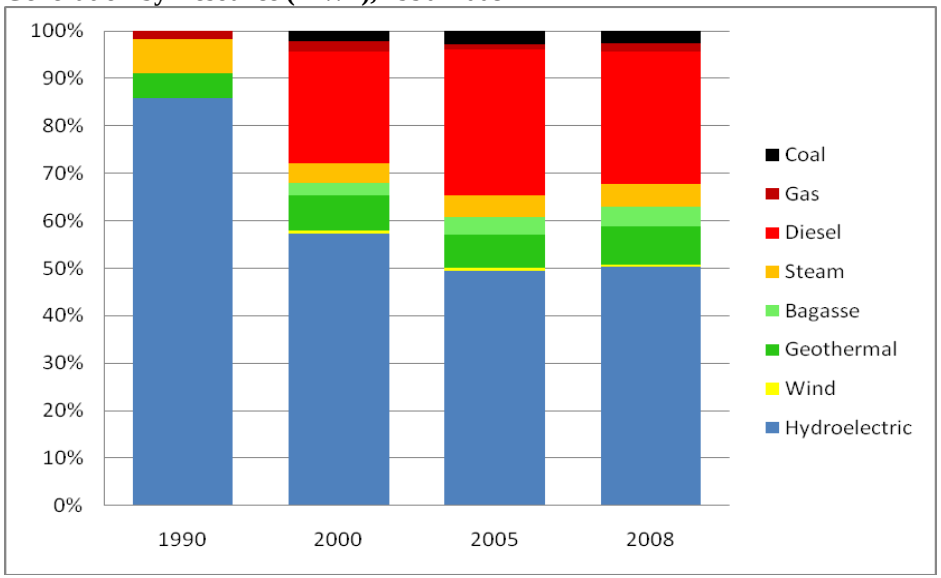


Generation by Resource (MWh)

	1990	2000	2008	Growth, 90–00	Growth, 00–08	% of Total Capacity, 1990	% of Total Capacity, 2000	% of Total Capacity, 2008	2005	% of Total Capacity, 2005
Hydroelectric	12165.9	15417.8	19759.3	27%	28%	85.8%	57.2%	50.4%	17050.3	49.4%
Wind	0	182.7	198.2	--	8%	0.0%	0.7%	0.5%	203.6	0.6%
Geothermal	747.6	1999.3	3130.9	167%	57%	5.3%	7.4%	8.0%	2461.5	7.1%
Bagasse	0	721.6	1661.8	--	130%	0.0%	2.7%	4.2%	1251.3	3.6%
Steam	1013.8	1133.8	1867.8	12%	65%	7.2%	4.2%	4.8%	1611.2	4.7%
Diesel	16.5	6351.1	10948.9	38392%	72%	0.1%	23.6%	27.9%	10601	30.7%
Gas	231.4	590.6	627.1	155%	6%	1.6%	2.2%	1.6%	346.5	1.0%
Coal	0	558.4	1047.6	--	88%	0.0%	2.1%	2.7%	978.5	2.8%
Total	14175.2	26955.3	39241.6	90%	46%	100.0%	100.0%	100.0%	34503.9	100.0%

Source: CEPAL, 2009.

Generation by Resource (MWh), 1990–2008

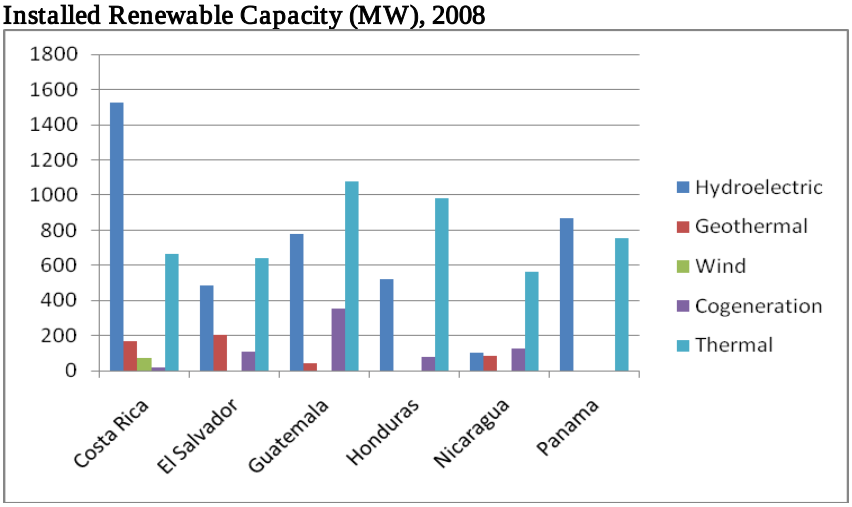


Installed Renewable Capacity (MW), 2008

	Hydroelectric	Geothermal	Wind	Cogeneration	Thermal	Total
Costa Rica	1524.3	165.7	69.9	20	666.7	2446.6
El Salvador	485.7	204.4	0	109	642.2	1441.3
Guatemala	776.4	44	0	350.8	1079.7	2250.9
Honduras	522	0	0	79.6	979.8	1581.4
Nicaragua	105.3	87.5	0	126.8	560.1	879.7
Panama	870	0	0	0	753.6	1623.6

Source: CEPAL, 2009.

Installed Renewable Capacity (MW), 2008

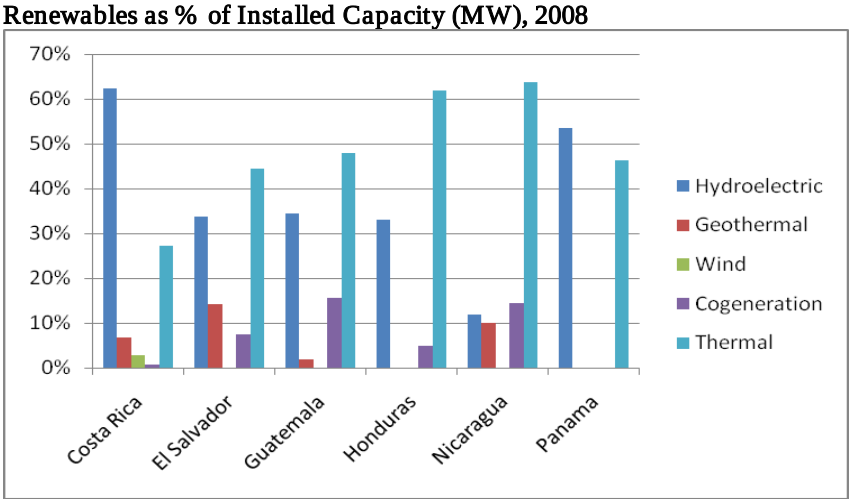


Renewables as % of Installed Capacity (MW), 2008

	Hydroelectric	Geothermal	Wind	Cogeneration	Thermal	Total
Costa Rica	62%	7%	3%	1%	27%	100%
El Salvador	34%	14%	0%	8%	45%	100%
Guatemala	34%	2%	0%	16%	48%	100%
Honduras	33%	0%	0%	5%	62%	100%
Nicaragua	12%	10%	0%	14%	64%	100%
Panama	54%	0%	0%	0%	46%	100%

Source: CEPAL, 2009.

Renewables as % of Installed Capacity (MW), 2008

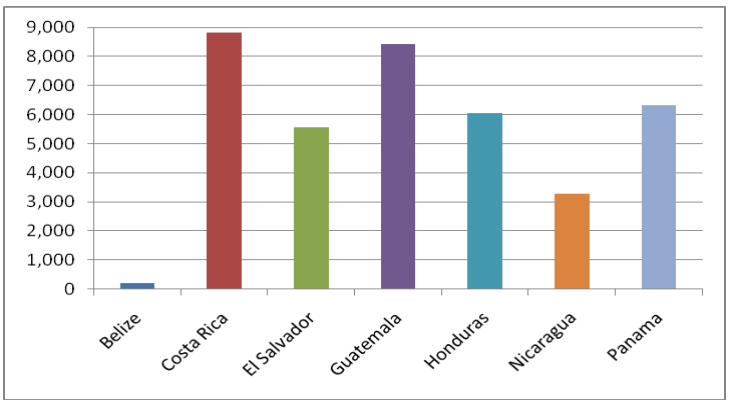


Energy Generation (GWh)

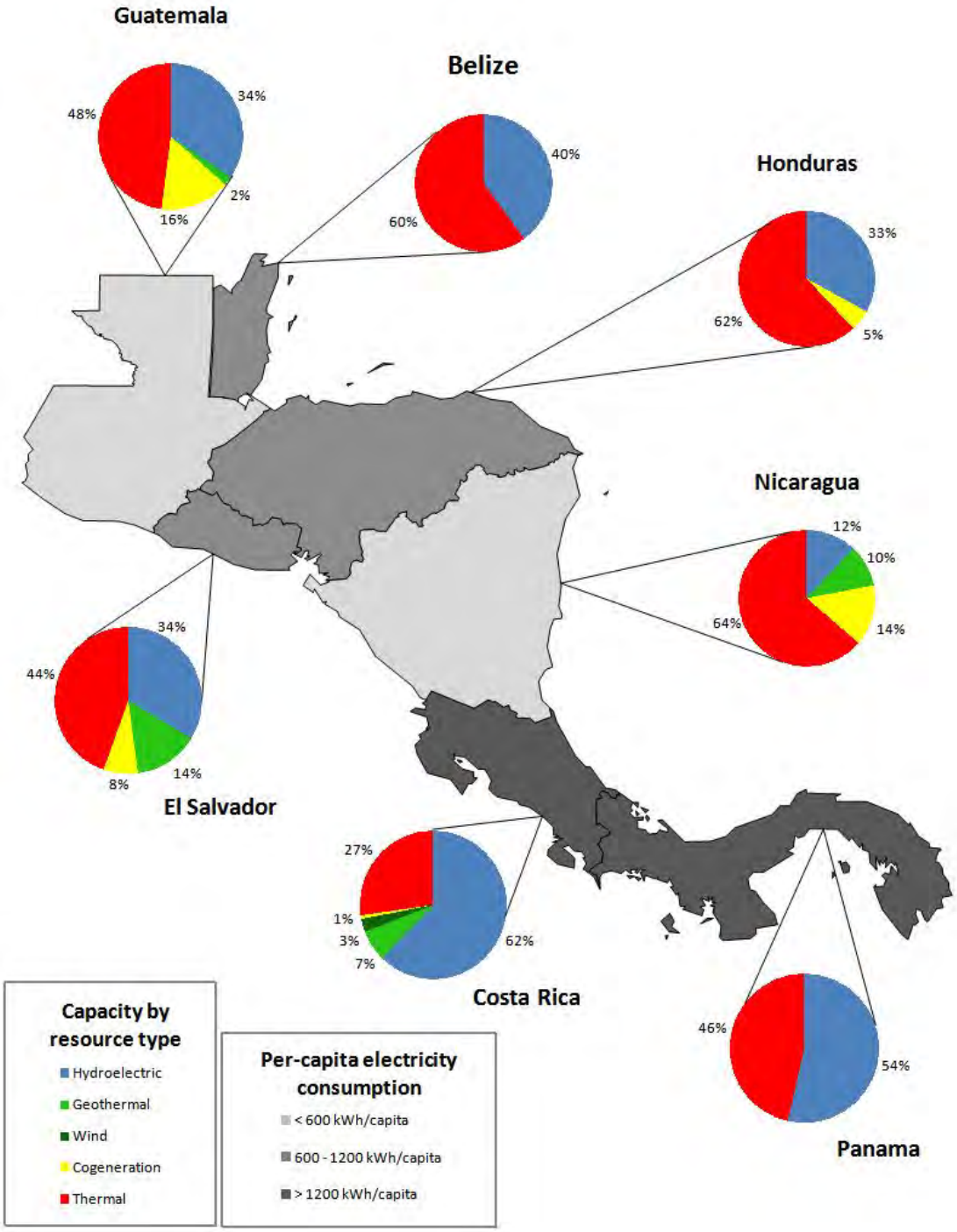
	2005	2006	2007
Belize	150	208	213
Costa Rica	8,124	8,510	8,808
El Salvador	4,586	5,370	5,559
Guatemala	7,273	7,643	8,425
Honduras	5,318	5,728	6,050
Nicaragua	2,945	3,022	3,286
Panama	5,664	5,865	6,322

Source: EIA.

Energy Generation (GWh), 2007



Regional Power Mix and Energy Consumption Per Capita, 2008



1.3 MARGINAL COST

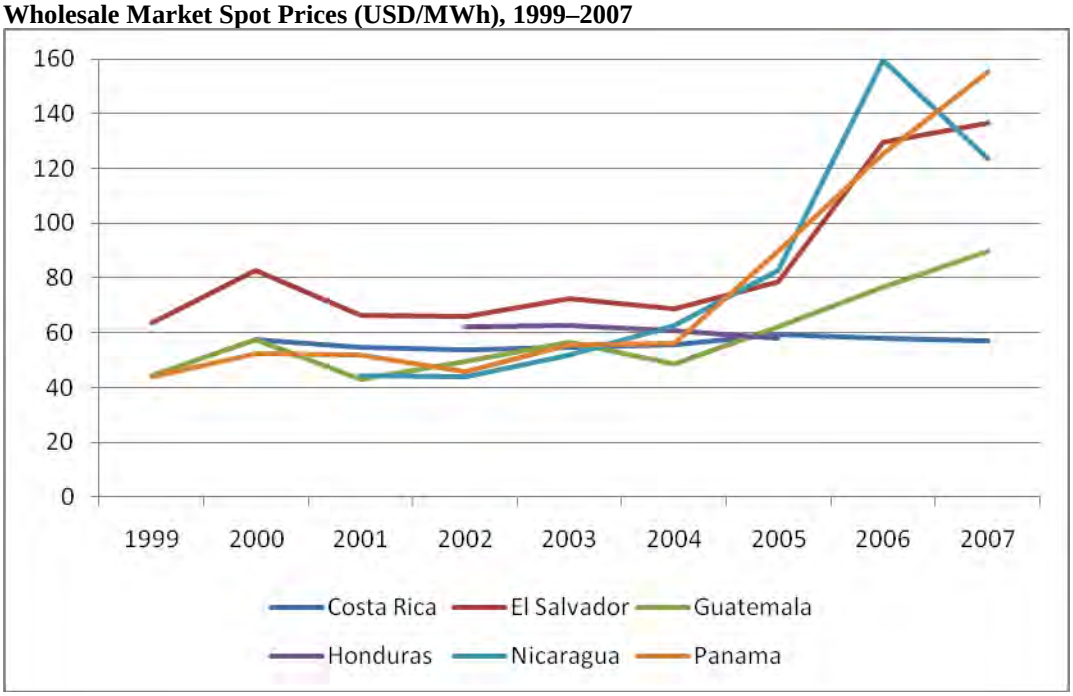
Wholesale Market Spot Prices (USD/MWh)

	1999	2000	2001	2002	2003	2004	2005	2006	2007
Costa Rica		57.4	54.8	53.7	54.6	55.7	59.4	58.1	56.9
El Salvador	63.6	83	66.6	66.1	72.5	68.9	78.6	129.5	136.6
Guatemala	44.3	57.3	43.1	49.6	56.5	48.8	62.2	76.9	89.6
Honduras				62	62.6	61	57.9		71.9
Nicaragua			44.2	43.9	51.8	62.8	82.6	159.6	123.4
Panama	44.1	52.5	51.7	45.6	55.6	56.1	90	125.6	155.5

Note: Costa Rica: regulated price for high-voltage customers. El Salvador: includes spot price, auxiliary services, and transmission charges. Honduras: projected short-term marginal costs.

Source: ESMAP, p. 68.

Wholesale Market Spot Prices (USD/MWh), 1999–2007



Average Short-Run Marginal Cost Projections (USD/MWh), 2009–2012

	2008	2009	2010	2011	2012
Costa Rica					
Reference Case (WTI USD 55/bbl)	127	123	98	**66**	**64**
Sensitivity (WTI USD 75/bbl)	127	129	128	**88**	**85**
Tariff Component	67	96	96	96	96
El Salvador					
Reference Case (WTI USD 55/bbl)	180	**72**	**64**	**52**	**53**
Sensitivity (WTI USD 75/bbl)	180	**72**	**85**	**68**	**70**
Tariff Component	91	102	102	102	102
Guatemala					
Reference Case (WTI USD 55/bbl)	180	**63**	**56**	**52**	**53**
Sensitivity (WTI USD 75/bbl)	180	**63**	**77**	**67**	**70**
Tariff Component	140	129	129	129	129
Honduras					
Reference Case (WTI USD 55/bbl)	127	69	66	**60**	**61**
Sensitivity (WTI USD 75/bbl)	127	69	88	77	78
Tariff Component	72	65	65	65	65
Nicaragua					
Reference Case (WTI USD 55/bbl)	140	**73**	**70**	**66**	**65**
Sensitivity (WTI USD 75/bbl)	140	**76**	**92**	**84**	**84**
Tariff Component	119	92	92	92	92
Panama					
Reference Case (WTI USD 55/bbl)	228	**128**	**91**	**66**	**62**
Sensitivity (WTI USD 75/bbl)	228	**128**	**119**	**89**	**84**
Tariff Component	146	158	158	158	158
Region*					
Reference Case (WTI USD 55/bbl)		89	74	60	60
Sensitivity (WTI USD 75/bbl)		89	98	79	78

Note: Number in bold if tariff component is sufficient to cover generation costs. Calculated using USD 10/MWh as capacity component.

*Average marginal costs were estimated as the average of the marginal costs obtained for the six energy markets in Central America.

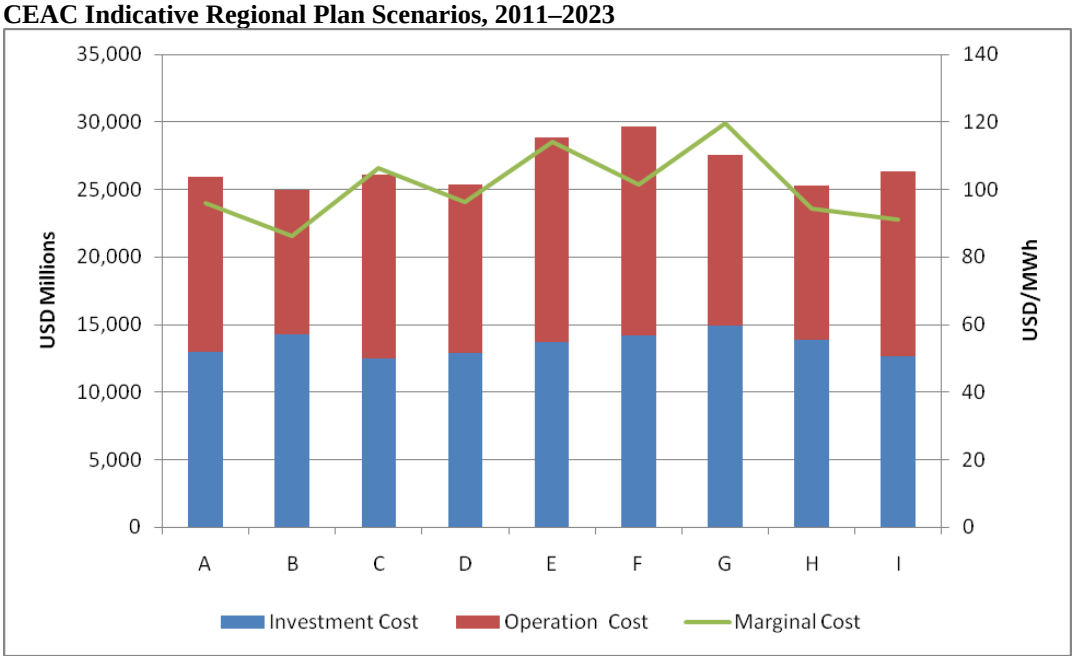
Source: ESMAP, p. 120.

CEAC Indicative Regional Plan Scenarios, 2011–2023

Units	USD/MWh	USD Millions	USD Millions	USD Millions
Scenario	**Marginal Cost**	**Investment Cost**	**Operation Cost**	**Total Cost**
A: Base	96.12	12,957	12,976	25,933
B: No restrictions on hydroelectric development	86.19	14,240	10,718	24,958
C: Strong restrictions on hydroelectric development	106.5	12,475	13,661	26,136
D: Interconnection with Colombia	96.24	12,908	12,484	25,392
E: High fuel prices	114.21	13,746	15,107	28,853
F: High demand growth	101.43	14,198	15,452	29,649
G: No hydroelectric restrictions and high fuel prices	119.77	14,936	12,594	27,529
H: Renewable generation	94.29	13,833	11,473	25,306
I: Thermal generation only	91.24	12,682	13,682	26,365

Source: CEAC Indicative Regional Plan, p. xii, xviii.

CEAC Indicative Regional Plan Scenarios, 2011–2023



Marginal Cost of Technologies

Technology	USD/MWh
Low-cost hydro	50–60
High-cost hydro	90–116
Wind	60–90
Coal	100–120
LNG combined cycle	77–96
Open-cycle gas or medium-speed diesel	140–170

Source: ESMAP, p. 10.

1.4 ENERGY INTENSITY

		2000	2001	2002	2003	2004	2005	2006	2007	2008
GDP	Constant 2000 USD Billions	71.0	72.3	74.4	77.2	80.5	84.4	89.9	96.4	100.6
	% Growth		0.02	0.03	0.04	0.04	0.05	0.07	0.07	0.04
Liquid Fuels Consumption	Thousand Barrels	78,132	83,413	85,717	92,552	95,944	94,891	99,220	108,439	103,723
	Intensity	1,100	1,154	1,153	1,199	1,191	1,124	1,103	1,125	1,031
	Intensity % Growth		0.07	0.03	0.08	0.04	-0.01	0.05	0.09	-0.04
End Fuel Consumption	Thousand Barrels	65,936	68,220	69,858	73,056	77,362	77,239	80,027	86,866	85,845
	Intensity	928	944	939	946	961	915	890	901	854
	Intensity % Growth		0.03	0.02	0.05	0.06	0.00	0.04	0.09	-0.01
Electricity Sales	GWh	22,599	23,224	24,552	25,857	27,413	28,403	30,202	31,971	32,824
	Intensity	318	321	330	335	340	336	336	332	326
	Intensity % Growth		0.06	0.06	0.06	0.06	0.04	0.06	0.06	0.03
Fossil-Based Electricity Generation	Thousand Barrels	12,196	15,193	15,859	18,896	16,891	17,651	18,681	21,573	17,878
	Intensity	172	210	213	245	210	209	208	224	178
	Intensity % Growth		0.25	0.04	0.19	-0.11	0.04	0.06	0.15	-0.17

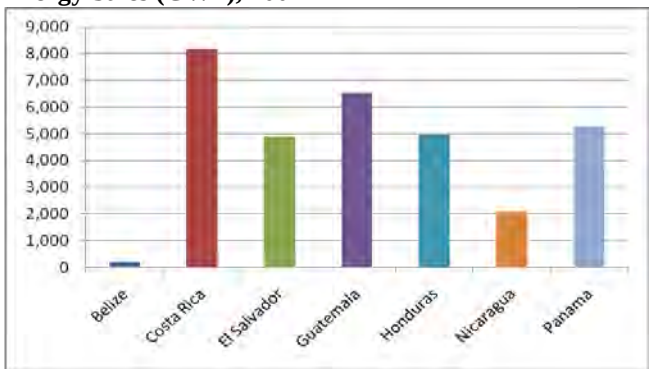
Source: Calculated by author using CEPAL 2009 energy data and World Bank GDP data.

Energy Sales (GWh)

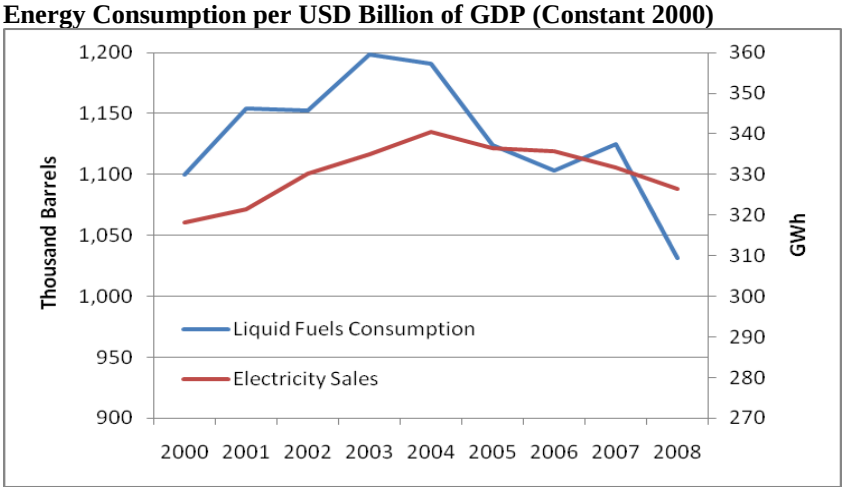
	2005	2006	2007	2008
Belize	-	-	-	406
Costa Rica	7,363	7,820	8,174	8,360
El Salvador	4,502	4,771	4,889	5,066
Guatemala	5,650	6,113	6,534	6,492
Honduras	4,256	4,511	4,979	5,227
Nicaragua	1,946	2,052	2,096	2,229
Panama	4,686	4,935	5,299	5,450

Source: CEPAL, 2010; BEL.

Energy Sales (GWh), 2007

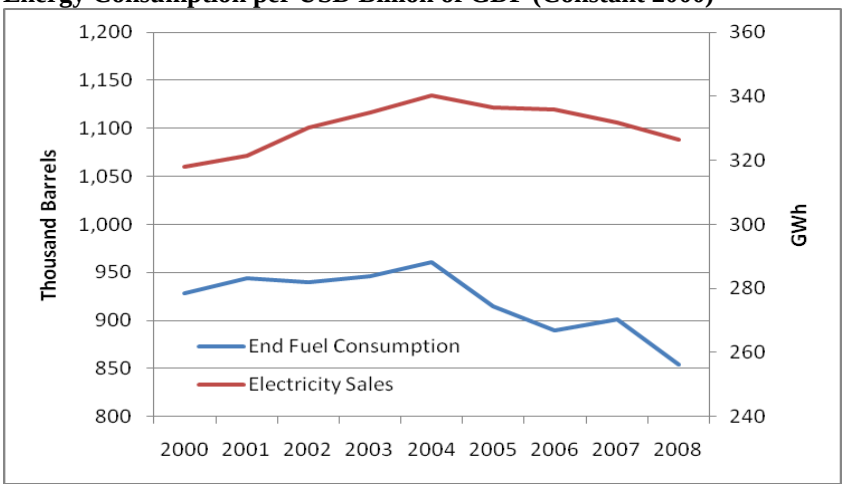


Energy Consumption per USD Billion of GDP (Constant 2000)



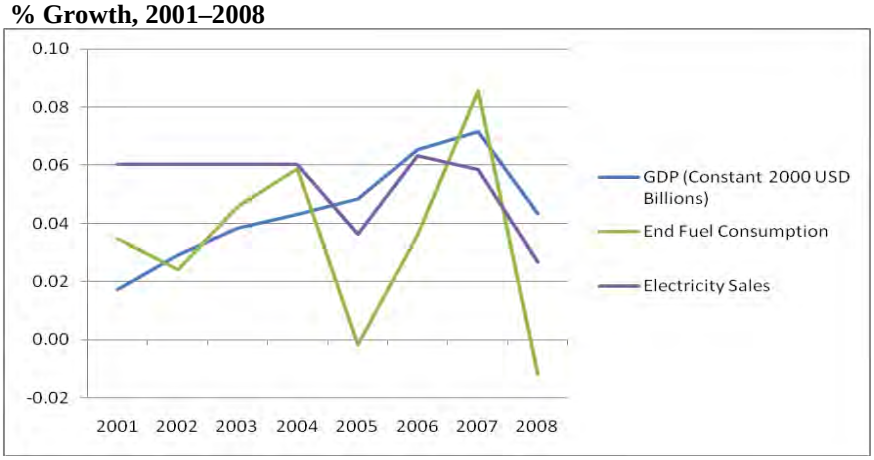
Note: Liquid fuels consumption includes those used for electricity generation.

Energy Consumption per USD Billion of GDP (Constant 2000)



Note: End fuel consumption excludes fuel used for electricity generation.

GDP, End Fuel Consumption Intensity, and Electricity Sales Intensity % Growth, 2001–2008



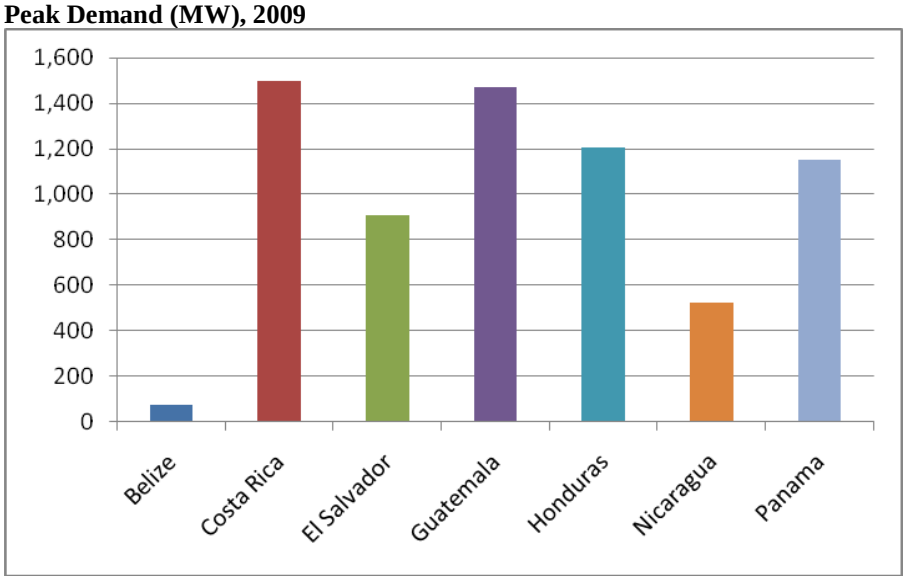
1.5 PEAK DEMAND

Peak Demand (MW)

	2005	2006	2007	2008	2009
Belize	64	67	70	74	76
Costa Rica	1,390	1,461	1,500	1,526	1,497
El Salvador	829	881	906	924	906
Guatemala	1,290	1,383	1,443	1,430	1,472
Honduras	1,014	1,088	1,126	1,205	1,203
Nicaragua	482	501	507	506	524
Panama	946	971	1,024	1,064	1,154
Total	6,014	6,352	6,576	6,729	6,832

Source: CEPAL, 2010; BEL.

Peak Demand (MW), 2009



1.6 REGIONAL ENERGY MARKET

Regional Market Transactions (GWh), 2009

	Injection	Withdrawal	Net Injection	Net Withdrawal	Contract Injection	Contract Withdrawal	Spot Injection	Spot Withdrawal
Total	367.85	367.85	142.07	142.07	317.12	318.11	50.72	49.73
Costa Rica	68.06	81.94		13.88	67.2	75.46	0.86	6.48
El Salvador	78.37	206.32		127.95	37.5	180.39	40.87	25.94
Guatemala	81.76	13.97	67.79		79.92	2.74	1.84	11.23
Honduras	46.16	0.23	45.93		46.16	0.12	0	0.11
Nicaragua	1.38	1.62		0.24		0.34	1.38	1.28
Panama	92.12	63.77	28.35		86.24	59.07	5.78	4.69

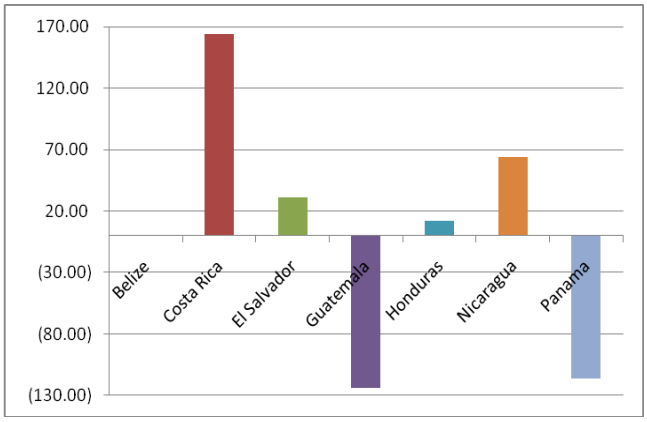
Source: EOR, "Informes Estadísticos Mensuales del 2009," via CEPAL, 2010.

Net Electricity Imports (Billion kWh)

	2005	2006	2007	2008
Belize	0.25	0.21	0.23	0.25
Costa Rica	-238.00	11.00	88.89	163.67
El Salvador	382.00	284.00	2.00	31.00
Guatemala	-423.00	-316.00	-82.00	-123.77
Honduras	393.49	56.07	7.70	11.80
Nicaragua	1.00	17.00	53.25	63.95
Panama	-51.00	-51.29	-47.68	-116.15

Source: EIA, BEL.

Net Electricity Imports (Billion kWh), 2008



Net Electricity Imports (% of Total Sales)

	2005	2006	2007	2008
Belize	0%	0%	0%	N.A.
Costa Rica	-3%	0%	1%	2%
El Salvador	8%	6%	0%	1%
Guatemala	-7%	-5%	-1%	-2%
Honduras	9%	1%	0%	0%
Nicaragua	0%	1%	3%	3%
Panama	-1%	-1%	-1%	-2%

Source: EIA; BEL; UN Statistics Division.

Flow of Energy in Interconnections (GWh), 2009

Countries	GWh
GU-SV	81.98
SV-GU	13.56
SV-HN	32.55
HN-SV	94.15
HN-NI	41.45
NI-HN	57.03
NI-CR	41.30
CR-NI	56.83
CR-PA	63.15
PA-CR	93.16
North to South	260.42
South to North	315.19

Source: EOR, via CEPAL, 2010.

Energy Exchanges (GWh)

	1985	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	00–07
Costa Rica export	60	32	11	497	240	440	119	312	70	26	5	1709
Costa Rica import	0	186	36	0	1	36	41	82	81	104	162	508
El Salvador export	0	10	65	112	44	51	103	84	38	9	7	445
El Salvador import	0	11	30	808	353	435	428	466	322	11	38	2861
Guatemala export	0	11	30	841	369	440	424	464	335	88	132	3094
Guatemala import	0	10	65	123	53	55	23	41	23	8	8	334
Honduras export	134	337	30	13	0	0	0	0	3	11	23	51
Honduras import	6	7	12	288	308	415	337	392	58	7	12	1818
Nicaragua export	11	7	77	1	0	7	21	22	8	0	0	59
Nicaragua import	198	71	63	116	17	15	12	23	23	53	64	323
Panama export	1	29	78	15	118	49	181	207	106	83	125	885
Panama import	0	119	85	133	43	35	2	78	55	34	9	389
Central America	206	422	290	1479	771	986	848	1089	560	218	292	6243

Source: CEPAL, 2007; ESMAP, 2010.

Planned Future Energy Exchanges

Interconnections	Date	GU-SV	SV-GU	GU-HN	HN-GU	SV-HN	HN-SV	HN-NI	NI-HN	NI-CR	CR-NI	CR-PA	PA-CR	MX-GU	GU-MX	CO-PA	PA-CO
Current System		67	44	0	0	125	101	42	54	48	78	39	0	0	0	0	0
Mexico-Guatemala (Initial)	Jan-09	67	44	0	0	125	101	42	54	48	78	39	0	200	70	0	0
SIEPAC 1st Circuit	Jan-10	300	300	300	300	300	300	300	300	300	300	90	300	200	70	0	0
Mexico-Guatemala (Increase)	Jan-13	300	300	300	300	300	300	300	300	300	300	90	300	300	300	0	0
SIEPAC 2nd Circuit	Jan-14	600	600	600	600	550	600	564	600	500	600	450	450	300	300	0	0
Colombia-Panama	Jan-15	600	600	600	600	550	600	564	600	500	600	450	450	300	300	300	300

Source: SNC-Lavalin International, via ESMAP, 2010.

1.7 EXPANSION PLANS

National Expansion Plans: Net Capacity Additions (MW), 2008–2022

	Hydro	Geothermal	Other RE	Thermal	Imports	Total
Costa Rica	1519	175	335	308	-	2337
El Salvador	327	77	-	850	30	1284
Guatemala	1464	44	80	717	200	2505
Nicaragua*	385	306	40	220	-	951
Honduras	821	-	268	859	-	1948
Panama	761	-	-	1017	-	1778
Region	5277	602	723	3971	230	10803
% of Total	49%	6%	7%	37%	2%	-

* Planning horizon is until 2014

Source: ESMAP, 2010.

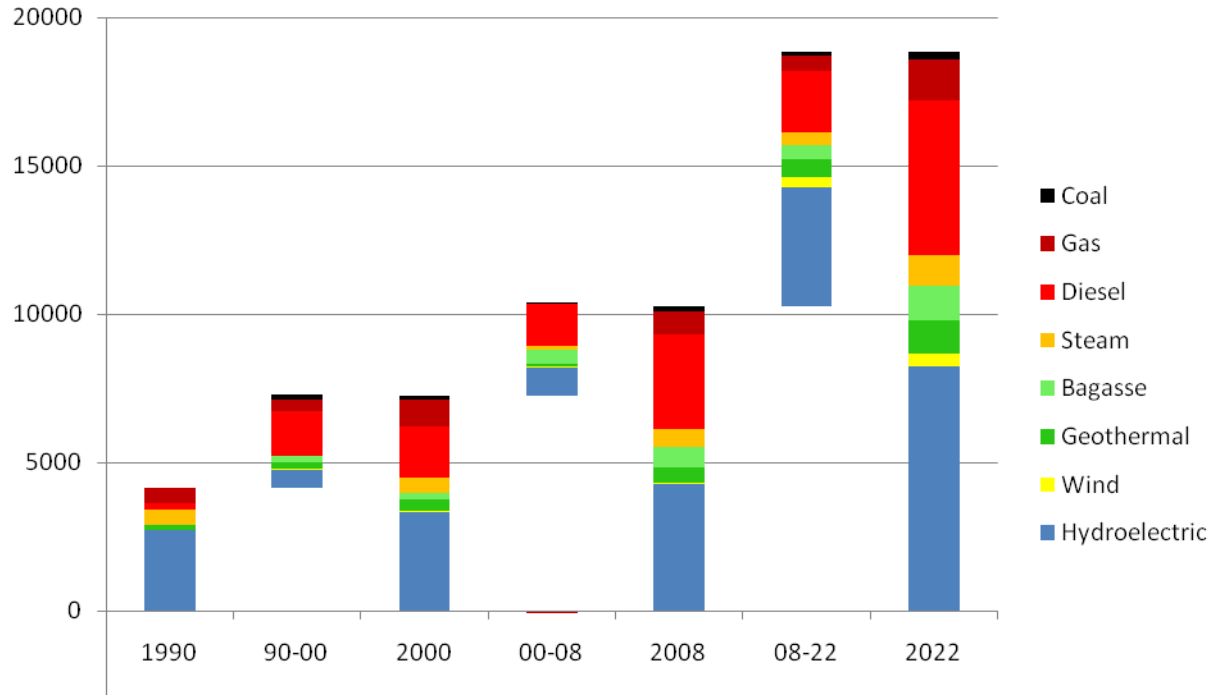
Share of biomass in total NCR additions: 63%

Regional Installed Capacity (MW), 1990–2022

	1990	Growth 90–00	2000	Growth 00–08	2008	Growth 08–22	2022
Hydroelectric	2,708.6	604.3	3,312.9	944.1	4,257.0	4000.0	8,257.0
Wind	0.0	42.5	42.5	27.4	69.9	350.0	419.9
Geothermal	165.0	240.2	405.2	96.4	501.6	600.0	1,101.6
Bagasse	0.0	205.3	205.3	479.4	684.7	479.3	1,164.0
Steam	519.6	-12.0	507.6	126.5	634.1	417.2	1,051.3
Diesel	218.5	1526.3	1,744.8	1403.8	3,148.6	2071.6	5,220.2
Gas	517.7	378.6	896.3	-82.2	814.1	535.6	1,349.7
Coal	0.0	142.0	142.0	18.4	160.4	105.5	265.9
Total	4,129.4	3127.2	7,256.6	3013.8	10,270.4	8559.2	18,829.6

Source: CEPAL, 2009.

Regional Installed Capacity (MW), 1990–2022



Planned Expansion Projects by Type

	Thermal	Hydro	Biomass	Wind	Geothermal	Unknown	Total
Belize	-	-	-	-	-	-	-
Costa Rica	11	12	5	4	3	-	34
El Salvador	-	4	-	-	5	-	9
Guatemala	13	28	-	-	1	-	42
Honduras	8	6	-	1	-	9	24
Nicaragua	-	8	-	-	2	-	10
Panama	14	11	-	-	-	-	25
Total	46	69	5	5	11	9	144

Source: ESMAP, 2010.

1.8 TRANSMISSION AND DISTRIBUTION

Line Losses

	2005	2006	2007	2008
Belize	13.4	13.9	13.0	12.2
Costa Rica	9.7	9.5	10.6	10.6
El Salvador	13.1	12.8	12.9	12.8
Guatemala	18.2	16.9	16.4	17.1
Honduras	23.3	25.0	21.2	20.6
Nicaragua	29.3	28.8	28.4	27.3
Panama	15.6	13.7	11.6	11.8

Source: CEPAL, 2010; BEL.

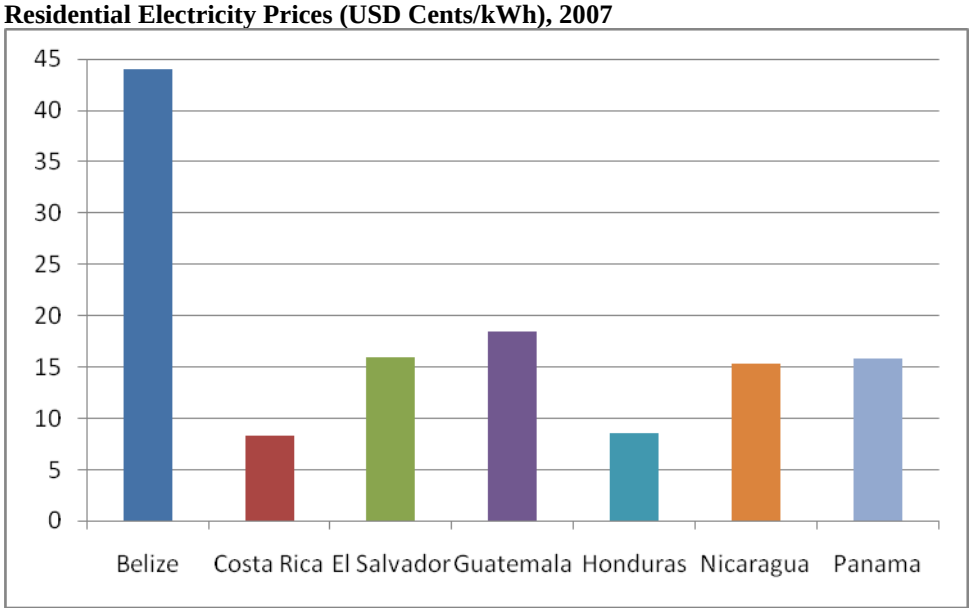
1.9 ELECTRICITY PRICES

Residential Electricity Prices (USD Cents/kWh), 2007

Belize	44
Costa Rica	8.3
El Salvador	16.0
Guatemala	18.4
Honduras	8.6
Nicaragua	15.3
Panama	15.8

Source: ESMAP, 2010; BEL.
Note: Belize's figure is an average for all sectors (not just residential).

Residential Electricity Prices (USD Cents/kWh), 2007



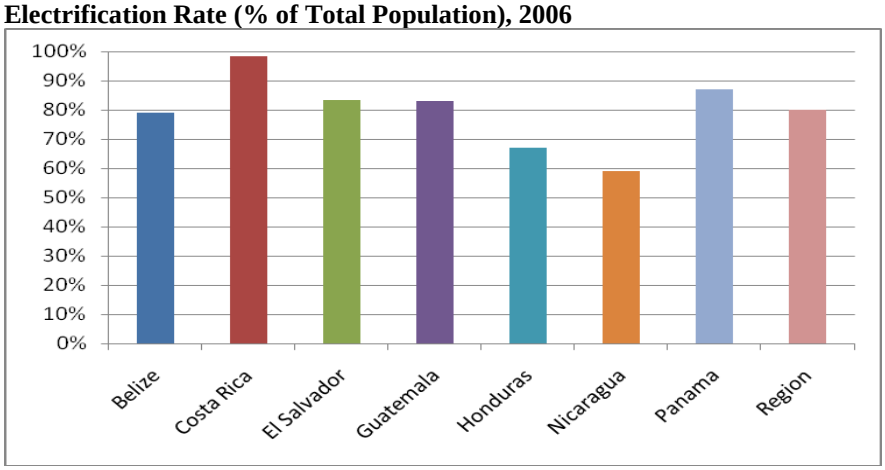
1.10 ELECTRIFICATION RATE

Electrification Rate (% of Total Population)

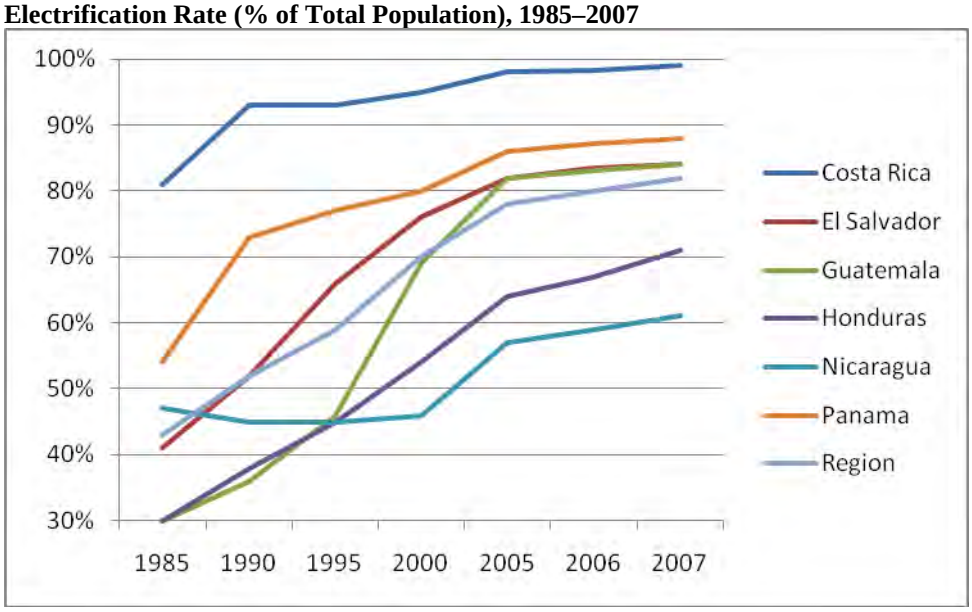
	1985	1990	1995	2000	2005	2006	2007	Population (Millions)	Unelectrified Population (Millions)	% of Region
Belize	-	-	-	-	-	79%	-	0.3	0.03	0.38%
Costa Rica	81%	93%	93%	95%	98%	98%	99%	4.5	0.08	0.96%
El Salvador	41%	52%	66%	76%	82%	83%	84%	6.1	1.01	12.76%
Guatemala	30%	36%	46%	69%	82%	83%	84%	13.4	2.26	28.54%
Honduras	30%	38%	45%	54%	64%	67%	71%	7.2	1.61	20.23%
Nicaragua	47%	45%	45%	46%	57%	59%	61%	5.6	2.52	31.76%
Panama	54%	73%	77%	80%	86%	87%	88%	3.3	0.43	5.36%
Region	43%	52%	59%	70%	78%	80%	82%			

Source: CEPAL, 2007; BEL.

Electrification Rate (% of Total Population), 2006



Electrification Rate (% of Total Population), 1985–2007



Energy Consumption Per Capita (kWh), 2008

	2008
Belize	675.6
Costa Rica	1,992.7
El Salvador	717.0
Guatemala	499.4
Honduras	684.3
Nicaragua	385.3
Panama	1,647.0

1.11 POPULATION DENSITY

Population (Millions), 2008

	2008
Belize	0.3
Costa Rica	4.2
El Salvador	7.1
Guatemala	13.0
Honduras	7.6
Nicaragua	5.8
Panama	3.3

Source: CIA World Factbook.

Population Density (Inhabitants/km^2)

	2007
Belize	14
Costa Rica	87
El Salvador	338
Guatemala	123
Honduras	67
Nicaragua	43
Panama	44

Source: UN Statistics Division.

1.12 REGULATORY INDICATORS

Market Structure

	First year of reforms	Government Entity	Regulator	Operator	Administrator	Transmission company	Vertical Integration	Horizontal Integration	Market Model
Costa Rica	1995	MINAET	ARESEP	ICE	ICE	ICE	Y	Y	Integrated
El Salvador	1997	DGE	SIGET	UT	UT	ETESAL	Y	Y	Retail competition
Guatemala	1998	MEM	CNEE	AMM	AMM	ET CEE	N	Y	Wholesale competition
Honduras	1994	GE & SERNA	CNEE	ENEE	ENEE	ENEE	Y	Y	Integrated
Nicaragua	2000	MEM	INE	CNDC of ENATREL	CNDC of ENATREL	ENATREL	N	Y, <25%	Wholesale competition
Panama	1998	CPE	ERSP	CND of ETESA	CND	ETESA	N	Gen. 25%, Distrib. 50%	Wholesale competition

Source: ESMAP, 2010.

Wholesale Market

	Economic Dispatch	Spot Market	Capacity Scheme	Pay for Capacity	Long-Term Contracts	Contracts	Limits for Large Customers
Costa Rica	Cost-based	N/A	N/A	N/A	N/A	N/A	N/A
El Salvador	Supply of prices	Average supply-based cost of dispatch generators with transmission limits	N	N/A	Negotiated	Physical	0 kW
Guatemala	Cost-based	SMRC w/o trans restrictions	Y, less than 25%	Regulated	Competitive Tender	Financed	100 kW
Honduras	Cost-based	N/A	N/A	N/A	N/A	N/A	1,000 kW
Nicaragua	Cost-based	SMRC w/o trans restrictions	Y, less than 25%	Regulated	Supply for 80% of demand	Financed	1,000 kW
Panama	Cost-based	SMRC w/o trans restrictions	Y	Market-based	Supply for 80% of demand	Financed	1,000 kW

Source: ESMAP, 2010.

Distribution

	Contractual Obligation	Cost Recovery	Distribution Charges
Costa Rica	N/A	N/A	N/A
El Salvador	N	Spot	VAD
Guatemala	Y	Contract and Spot	VAD
Honduras	N/A	N/A	N/A
Nicaragua	N	Spot	VAD
Panama	Y	Contract and Spot	VAD

Source: ESMAP, 2010.

2.1 POTENCIAL CAPACITY BY RESOURCE

	Net Hydroelectric	Utilizable Capacity	Considered in Expansion Plans	**Net Geothermal**	Utilizable Capacity	Considered in Expansion Plans	**Net Wind**	Utilizable Capacity	Considered in Expansion Plans	**Net Biomass**	Utilizable Capacity	Considered in Expansion Plans
Costa Rica	**25,500**	6,633	up to 2,175 MW	**856**	257	210 MW	**600**	274	up to 265 MW	**318**	95	up to 8 MW
El Sal-vador		2,165	330 MW: Chaparral (66) and El Cimarron (264)		500	90 MW in 3 projects: 2 existing and Chinameca (50)	**n.a.**	Evaluation in progress			n.a.	25 MW
Guate -mala	**n.a.**	5,784	2,600 MW in 29 projects	**1,000**	n.a.	75: Geo-I	**7,800**	Evaluation in progress			Relevant activity by sugarcane industry	50: Costa Sur
Hond -uras	**10,900**	4,991	820 MW in 6 big projects and 44 MW in small private projects	**n.a.**	120	300 MW in 6 projects	**n.a.**	n.a.	100 MW in a Mesoamerican Energy project	**n.a.**	Relevant activity by sugarcane industry	124 MW, including 110 MW bioenergy project
Nicar -agua	**n.a.**	2,000	400 MW in 9 projects, including Larreynaga (17), Boboke (70), and Tumarin (160)	**1,500**	12 sites		**800**	n.a.		**700**	200	
Pana-ma	**n.a.**	3,040	740 MW in 14 projects: Changhinola (223), Baitun (86), El Alto (60), and others	**n.a.**	100-450		**3,700**	n.a.	350 MW in 3 projects: Sante Fe (81), Toabré (120) and Mendoza (150)	**n.a.**	n.a.	

Source: ESMAP, 2010.

2.1.1 Hydroelectric

Planned Hydroelectric Projects in Region

Capacity (MW)	No. of Projects	Total Capacity (MW)	%
150+	14	4170	66
100–149	6	889	14
50–99	13	907	14
0–49	13	382	6
Total	46	6348	

Source: ESMAP, 2010.

Potential Hydroelectric Projects

Costa Rica	Installed Capacity (MW)	Year	Status
Total	2175		
El Encanto	8	2009	Confirmed
Pocosol	26	2010	Confirmed
Pirrís	128	2011	Confirmed
Toro 3	50	2012	Confirmed
Capulín	49	2013	Confirmed
Chucás	50	2013	Confirmed
Torito	50	2013	Confirmed
Cachí 2	160	2013	Confirmed
Echandi 2	15	2014	Confirmed
Reventazón	303	2014	Candidate
Diquís	631	2016	Candidate
Pacuare	158	2016	Candidate
Savegre	160	2016	Candidate
RC-500	58	2017	Candidate
Brujo 1	70	2018	Candidate
Brujo 2	60	2018	Candidate
Hidro proyecto 1	50	2014	Candidate
Hidro proyecto 2	50	206	Candidate
Hidro proyecto 3	50	2018	Candidate
Hidro proyecto 4	50	2020	Candidate

Source: ICE.

Guatemala	Installed Capacity (MW)	Year	Status
Total	2569.8		
AV VI	16	2016-2022	Candidate
Zacapa	32	2011-2022	Construction
Quiché I	94	2011-2022	Construction
San Marcos I	50	2013-2022	Candidate
AV I	181	2015-2022	Candidate
Quiché II	80	2020-2022	Candidate
Reu	25	2014-2022	Candidate
BV I	19	2019-2022	Candidate
Izabal	10	2012-2022	Candidate
AV II	20.6	2012-2022	Candidate
Xela	35	2014-2022	Candidate
AV III	163	2011-2022	Candidate
San Marcos II	16.5	2015-2022	Candidate
AV IV	340	2018-2022	Candidate
Quiché III	140	2018-2022	Candidate
Distribuida I	30	2012-2022	Candidate
Distribuida II	30	2016-2022	Candidate
Distribuida III	30	2020-2022	Candidate
Distribuida IV	30	2022-2022	Candidate
San Marcos III	15.7	2018-2022	Candidate
San Marcos IV	11	2018-2022	Candidate
Huehue I	198	2012-2022	Candidate
Huehue II	114	2013-2022	Candidate
AV VI	19	2009-2022	Candidate
Usumacinta I	200	2016-2022	Candidate
Usumacinta II	200	2018-2022	Candidate
Usumacinta III	200	2020-2022	Candidate
Usumacinta IV	200	2022	Candidate
Paz	70	2018-2022	Candidate

Source: ENEE.

Nicaragua	Installed Capacity (MW)	Year
Total	402	
Boboke	70	2012
Pantasma	15	2011
Larreynaga	17	2011
La Sirena	17	2012
Tumarin	160	2013
Pajaritos	30	2012
Valentin	28	2012
Piedra Fina	40	2013
Salto Y-Y	25	2011

Source: MEM.

Panama	Installed Capacity (MW)	Status
Total	1022.3	
Gualaca	25.2	Candidate
Lorena	33.8	Candidate
Prudencia	56	Candidate
Bonyic	31.3	Candidate
Sindigo	10	Candidate
Changhinola I	222.5	Candidate
Changhinola II	214	Candidate
El Alto	60	Candidate
Pando	32	Candidate
Monte Lirio	51.7	Candidate
Mendre	19.8	Candidate
Barro Blanco	19.8	Candidate
Bajo de Mina	52.4	Candidate
Pedregalito	20	Candidate
Potrerillos	4.2	Candidate
Cochea	12.5	Candidate
Macano	3.4	Candidate
Las Perlas Norte	10	Candidate
Las Perlas Sur	10	Candidate
El Porvenir Norte	3.3	Candidate
Los Algarrobos	9.9	Candidate
Baitún	86	Candidate
Tabasará II	34.5	Candidate

Source: ETESA.

2.1.2 Wind

Potential Wind Projects

Country	Project	Year	Installed Capacity (MW)	Status
Costa Rica	Eolico 1	2013	50	
	Eolico 2	2015	50	
	Eolico 3	2017	50	
	Eolico 4	2019	50	
	Tejona 2	2012	20	Confirmed
	Valle Central	2011	15	
Panama	Toabré	2011	120	
	Mendoza		150	
	Santa Fe		99	Approved
	Anton	2012	105	Initial study

Source: ESMAP, 2010; ICE, ETESA.

2.1.3 Geothermal

Geothermal Capacity by Country, 2009

	Geothermal Capacity (MW)	Geothermal Load Factor (%)
Belize		
Costa Rica	166	79
El Salvador	204	79
Guatemala	44	
Honduras		
Nicaragua	105	38
Panama		
Total	500	71

Source: ESMAP, 2010.

Potential Geothermal Projects

	Project	Year	Installed Capacity (MW)	Phase
Costa Rica	Geothermal 1	2015	35	Candidate
	Geothermal 2	2017	35	Candidate
	Geothermal 3	2019	35	Candidate
	Geothermal 4	2021	35	Candidate
	Geothermal 5	2022	35	Candidate
	Pailas	2011	35	Construction
El Salvador	San Vicente	2013	54	Developed
	Chinameca	2014	54	Developed
Guatemala	Geo-I	2010–2022	75	Candidate
Nicaragua	El Hoyo 1	2012	40	Exploration
	La Casita		100	Prefeasibility study not completed
	San Jacinto I	2010	44	
	Chiltepe	2013	40	
	Apoyo	2014	30	
	Nombacho	2014	30	

Source: ESMAP, 2010; ICE; ENEE; MEM.

2.1.4 Biomass

Potential Biomass Projects

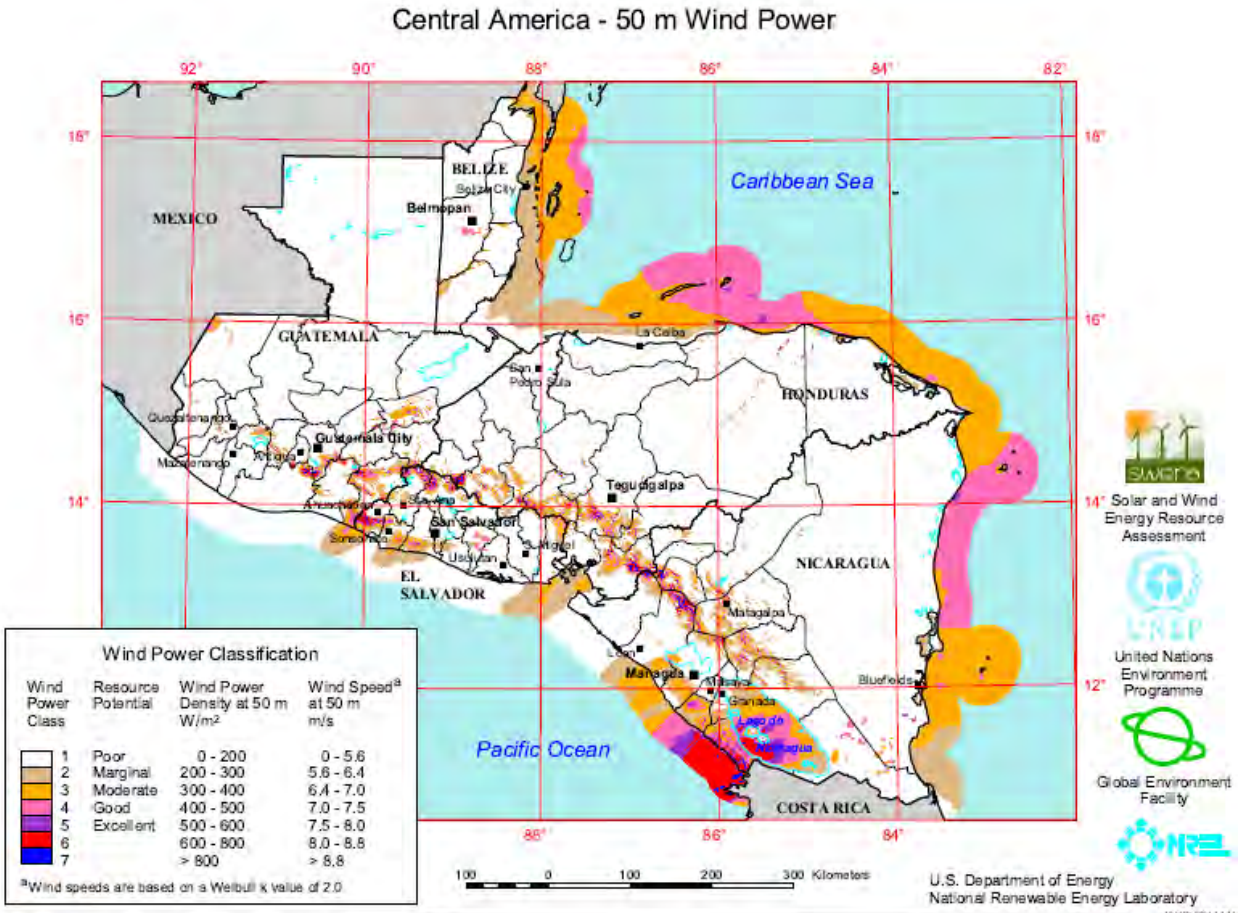
	Project	Year	Installed Capacity (MW)
Costa Rica	Cutres	2011	3
	El Palmar	2011	5
	CATSA	2010	8
	El Viejo (increase)	2011	18
Guatemala	Costa Sur	2008–2009	50

Source: ICE, CNEE.

2.2 RESOURCE MAPPING

2.2.1 Wind

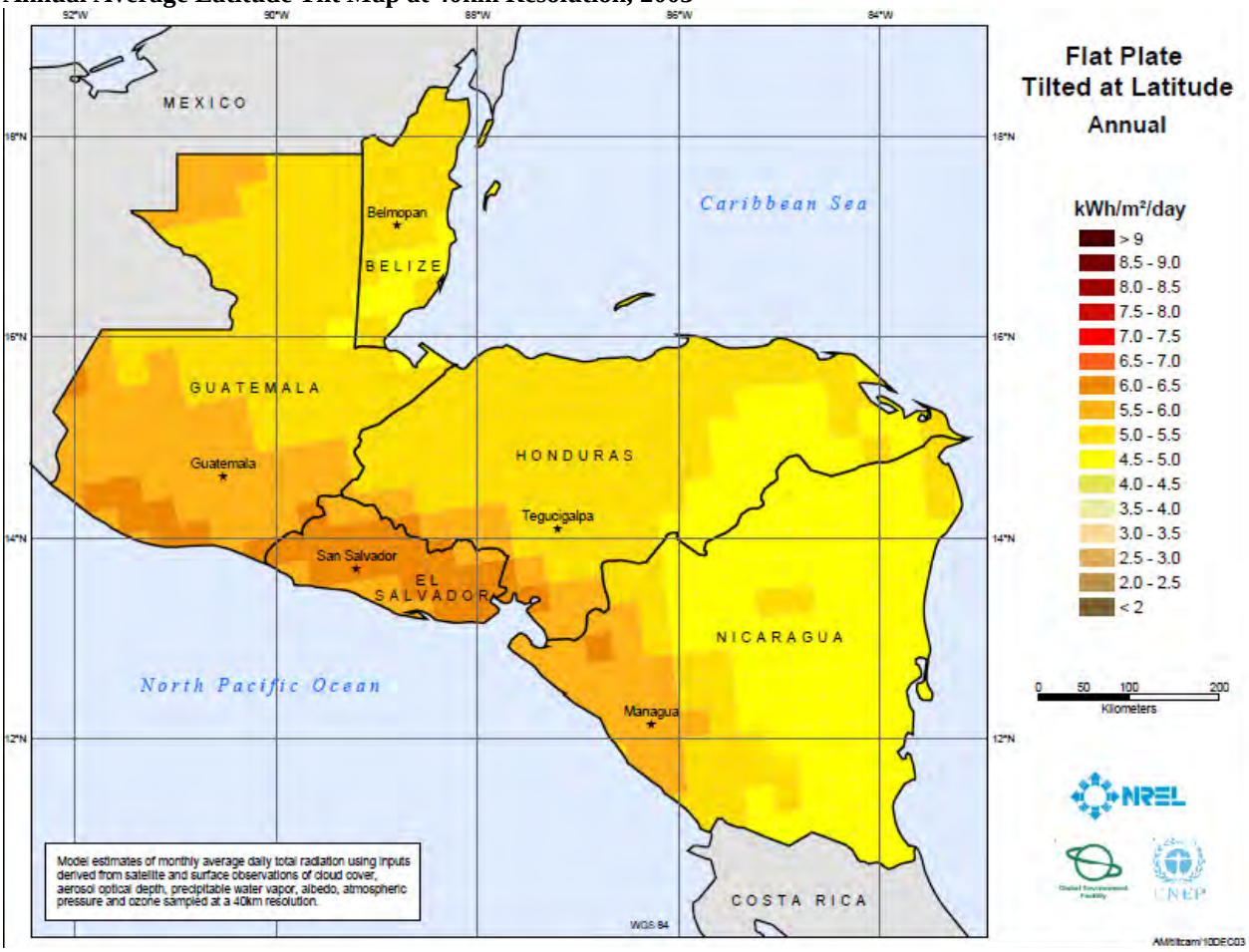
Wind Power Density Maps at 50m Above Ground and 1km Resolution, June 2004



Source: SWERA.

2.2.2 Solar

Annual Average Latitude Tilt Map at 40km Resolution, 2003



Source: SWERA.

2.3 INSTALLED NON-CONVENTIONAL RENEWABLE CAPACITY

Installed Non-Conventional Renewable Energy Capacity, 2009

Belize	No. of Stations	Installed Power (MW)
Hydroelectric	**3**	**37.8**
Chalillo	1	7.3
Hydro Maya	1	3.5
Mollejon	1	27.0
Biomass	**1**	**31.0**
Belcogen	1	31.0

Source: Launchpad, May, EBG.

Costa Rica	No. of Stations	Installed Power (MW)
National Interconnected System	**38**	**530.9**
Hydroelectric	**25**	**191.7**
C. Grande3	1	3.4
Canalete	1	18.0
Caño Grande	1	2.9
Cooperguanacaste	1	17.5
D. Julia	1	16.5
Don Pedro	1	14.0
El Angel	1	0.0
Embalse	1	2.0
Esperanza	1	5.5
ESPH	1	19.9
Hidrozarca	1	14.2
JASEC	1	19.0
La Lucha	1	0.3
Losko	2	2.8
Matamoros	1	3.8
Menores ICE	1	6.0
Platanar	1	14.6
Q. Azul	1	0.3
Rebeca	1	0.1
Rio Lajas	1	11.0
S. Lorenzo	1	0.0
Suerkata	1	3.0
Tapezco	1	0.0
Tuis	1	0.0
Volcan	1	17.0
Geothermal	**5**	**159.0**
Boca de Pozo	1	5.0
Miravalles I	1	55.0
Miravalles II	1	55.0
Miravalles III	1	26.0
Miravalles V	1	18.0
Wind	**4**	**115.7**
Aeroenergía	1	6.0
Guanacaste	1	49.7
Tejona	1	20.0
Tierras Morenas	1	20.0
Tilarán	1	20.0
Geothermal	**1**	**29.6**
G.G. Ltd.	1	29.6
Biomass	**3**	**35.0**
El Viejo	1	14.0
Río Azul	1	2.0
Taboga	1	19.0

Source: CEPAL, 2010; ICE.

El Salvador	No. of Stations	Installed Power (MW)
National Interconnected System	**9**	**47.0**
Wholesale Market	**5**	**33.3**
Hydroelectric	**5**	**33.3**
CECSA	1	7.4
De Matheu	1	1.5
Guajoyo	1	19.6
Papaloate	1	2.0
Sensunapán	1	2.8
Geothermal	**2**	**204.4**
Ahuachapán	1	95.0
Berlín	1	109.4
Retail Market	**4**	**13.7**
Hydroelectric	**4**	**13.7**
CECSA	1	7.4
De Matheu	1	1.5
Papaloate	1	2.0
Sensunapán	1	2.8

Source: CEPAL, 2010; SIGET.

Guatemala	No. of Stations	Installed Power (MW)
National Interconnected System	**21**	**223.8**
Wholesale Market	**18**	**219.6**
Hydroelectric	**18**	**219.6**
Chichaic	1	0.7
Comegsa	6	115.9
El Porvenir	1	2.3
El Salto	1	5.0
Los Esclavos	1	14.0
Montecristo	1	13.5
Palin II	1	5.8
Pasabién	1	12.8
Río Bobos	1	10.0
S.Jerónimo	1	0.3
Santa Maria	1	6.9
Secacao	1	16.5
Tecnoguat	1	15.9
Geothermal	**2**	**49.2**
Comertitlán	1	25.2
Orzunil	1	24.0
Distributed Generation	**3**	**4.2**
Hydroelectric	**3**	**4.2**
Cuevamaría	1	1.5
Kaplan Chapina	1	2.0
Sta. Elena	1	0.7

Source: CEPAL, 2010; INDE.

Honduras	No. of Stations	Installed Power (MW)
National Interconnected System	**24**	**156.3**
Hydroelectric	**12**	**57.6**
Babilonia	1	4.0
Cececapa	1	2.9
Cortecito	1	3.2
Cuyamapa	1	12.2
Cuyamel	1	7.8
Esperanza	1	12.8
La Nieve	1	0.5
Las Gloria	1	5.8
Río Blanco	1	5.0
San Carlos	1	2.3
Yojoa	1	0.6
Zacapa	1	0.5
Bagasse	**4**	**26.8**
Azucarera Yojoa	1	8.0
Tres Valles	1	7.8
Chumbagua	1	7.0
Azunosa	1	4.0
Biomass	**8**	**71.9**
Aguan	1	5.0
Aysa	1	8.0
Cahsa	1	25.7
Celsur	1	14.0
Ecopalsa	1	1.0
Eda	1	1.2
La Grecia	1	12.0
Lean	1	5.0

Source: CEPAL, 2010; Proyecto ARECA, ENEE.

Nicaragua	No. of Stations	Installed Power (MW)
National Interconnected System	**8**	**232.7**
Wholesale Market	**6**	**232.7**
Hydroelectric	**3**	**105.3**
Hidrogesa	2	104.4
ATDER-BL	1	0.9
Geothermal	**2**	**87.5**
Gemosa	1	77.5
SJP	1	10.0
Wind	**1**	**39.9**
E. Amayo	1	39.9

Source: CEPAL, 2010.

Panama	No. of Stations	Installed Power (MW)
National Interconnected System	**9**	**39.4**
Wholesale Market	**9**	**39.4**
Hydroelectric	9	39.4
Arkapal	1	0.7
Candela	1	0.5
Canopo	1	1.5
ESEPSA	4	22.4
HidroPanam	1	4.3
Istmus	1	10.0

Source: CEPAL, 2010.

2.4 REGULATORY REGIME

Regulatory Regime for Renewables

Country	Feed-In Tariff	Tax Reduction	Competitive Bidding	Other
Belize				
Costa Rica		Import tariff exemption		Increased bank loan limits; ICE obligatory purchase
El Salvador		Exemption from import tariffs for capital goods and other inputs associated with the first 10 years for up to 20 MW plants; exemption from income tax the first 5 years for 10-20 MW power and 10 years for <10 MW; projects above 20 MW can deduct the cost of all studies related to the project from taxable income		
Guatemala		Exemption from customs duties for imports, including VAT and consular fees on imports of machinery and equipment exclusively used for renewable power generation during the pre-investment and construction period (no more than 10 years); exemption from income tax and the IEMA in the first 10 years of commercial operation		
Honduras	Generaton from projects less than 50 MW will be purchased 10% premium above the short-term marginal cost for 15 years	Sales tax and import duties exemption for all equipment through the construction phase; tax exemption for the first 10 years of commercial operation for plants up to 50 MW; tariff benefits for temporary imports necessary for construction and maintenance; income tax exemption for wages and contract honoraria for necessary workers	Contract award process	Obligatory dispatch

Country	Feed-In Tariff	Tax Reduction	Competitive Bidding	Other
Nicaragua	Spot pricing for hydro, wind, solar, biomass, geothermal (USD 0.055-0.065/kWh); guaranteed tariff payment for 10 years	Import tariff and VAT exemption for equipment during pre-investment and construction; sales tax exemption for up to first 7 years of commercial operation (including taxes from carbon credit sales); municipal tax exemption for first 10 years; natural resource exploitation tax exemption for up to 5 years		Distributors must include a certain percentage of renewable energy in tender processes
Panama		Up to 10 MW: no distribution or transmission charge; import tax exemption for equipment and spare parts for construction and operation; tax exemption of up to 25% on the income tax regarding direct costs of the project during the first 10 years of commercial operation. 10-20 MW: Transmission charge exemption of transmission for first 10 MW in first 10 years of the operation; no allowance to contract directly with the distribution company; fiscal incentive of up to 25% of direct cost based on CO2 emissions reduction is only applicable to 50% of tax income (not 100%). Above 20 MW: same as 10-20, but must pay transmission charge		Subsidies to finance up to 5% of direct costs of all projects foreseen to be of public use; allowance to sell up to 15% of electricity to any distribution company independently from the location of the plant; allowance to sell electricity on spot market

Source: CEPAL, 2009; Centro Nacional de Análisis y Documentación Nacional (Guatemala); Bouille; La Gaceta (Honduras); REN 21.

3.1 EMISSIONS FACTOR

Emissions Factor by Country (tCO_2/MWh)	
Belize	0.759 (no CDM project)
Costa Rica	0.128 (0.298 at La Joya Hydroelectric Project)
El Salvador	0.609 (0.737 LFG Nejapa)
Guatemala	0.715 (0.778 Amatitlan geothermal)
Honduras	0.662 (0.670 at Tres valles cogeneration)
Nicaragua	0.754 (0.857 San Jacinto Geothermal)
Panama	0.688 (0.713 Santa Fe Wind farm)

Source: Martens et al.

3.2 REGISTERED CDM PROJECTS

CDM Projects by Country and Type

	kCER 2012	No. of Projects	Registered	At Validation	Hydro	Biomass	Methane Avoidance	Landfill Gas	Wind	Geothermal	EE Supply Side	EE Industry	Reforestation
Belize	0	0	0	0	0	0	0	0	0	0	0	0	0
Costa Rica	2,989	9	6	3	3	2	0	0	2	0	0	0	0
El Salvador	3,395	7	6	1	2	2	0	1	0	2	0	0	0
Guatemala	6,252	17	11	6	9	1	4	1	0	1	1	0	0
Honduras	4,549	30	16	14	11	8	9	0	0	0	1	1	0
Nicaragua	4,221	8	4	4	2	1	1	0	2	1	0	0	1
Panama	4,077	18	6	12	14	2	0	1	1	0	0	0	0
Region	25,483	89	49	40	41	16	14	3	5	4	2	1	1

Source: Fenhann.

Registered CDM Projects by Country and Type

	kCER 2012	No. of Projects	Hydro	Biomass	Methane Avoidance	Landfill Gas	Wind	Geothermal	EE Supply Side	EE Industry	Reforestation
Belize	0	0	0	0	0	0	0	0	0	0	0
Costa Rica	2,989	6	2	2	0	1	1	0	0	0	0
El Salvador	3,395	6	1	2	0	1	0	2	0	0	0
Guatemala	6,252	11	6	0	4	0	0	1	0	0	0
Honduras	4,549	16	9	4	3	0	0	0	0	0	0
Nicaragua	4,221	4	0	1	1	0	1	1	0	0	0
Panama	4,077	6	5	0	0	0	1	0	0	0	0
Region	25,483	49	23	9	8	2	3	4	0	0	0

Source: Fenhann.

CDM Project Types, Registered vs. At Validation

Project Type	No. of Projects	Registered	At Validation
Hydro	41	23	18
Biomass	16	9	7
Methane Avoidance	14	8	6
Landfill Gas	5	2	3
Wind	5	3	2
Geothermal	4	4	0
EE Supply Side	2	0	2
EE Industry	1	0	1
Reforestation	1	0	1
Total	89	49	40

Source: Fenhann.

3.3 VOLUME OF CERS

Thousands of Certified Emission Reductions, 2012

	Hydro	Biomass	Methane Avoidance	Landfill Gas	Wind	Geothermal	EE Supply Side	EE Industry	Reforestation	Total
Belize	0	0	0	0	0	0	0	0	0	0
Costa Rica	494	371	0	1,633	490	0	0	0	0	2,989
El Salvador	191	690	0	1,231	0	1,284	0	0	0	3,395
Guatemala	4,168	38	714	689	0	419	224	0	0	6,252
Honduras	1,427	943	1,719	0	0	0	351	109	0	4,549
Nicaragua	45	392	1,140	0	638	1,965	0	0	40	4,221
Panama	2,115	176	0	1,165	619	0	0	0	0	4,077
Region	8,441	2,610	3,573	4,718	1,748	3,668	575	109	40	25,482

Source: Fenhann.

3.4 EMISSIONS INVENTORY

CO_2 Emissions Inventory by Country and Source

	Total	Energy	Industrial Processes	Agriculture	Change in Land Use	Waste	Data
Belize	2,994.10	617.53	1.74	58.81	2,056.37	259.66	1994
Costa Rica	2,321.60	5,688.60	672.50	4,603.90	-3,667.70	1,320.90	2000
El Salvador	8,644.94	4,224.18	490.12	n.a.	3,930.64	n.a.	1994
Guatemala	10,966.54	3,700.40	544.66	2,727.30	3,244.55	638.10	2000
Honduras	10,861.53	3,570.46	514.72	2,740.70	1,348.05	2,687.60	1995
Nicaragua	9,080.98	2,373.54	354.84	4,193.90	1,830.90	327.80	1994
Panama	18,787.96	5,873.12	412.94	1,992.90	8,902.50	1,606.50	1994
Region	63,657.65	26,047.83	2,991.52	16,317.51	17,645.31	6,840.56	

Source: UNFCCC National Communications.

Belize

Sector	Gg	% of Total
Energy	617.528	21
Industrial processes and solvents	1.735	<0.1
Agriculture	58.807	2
Land-use and forestry	2056.365	69
Waste	259.66	9

Costa Rica

Sector	CO_2	CH_4	N_2O	HFC	CO	NOX	NMVOC	SO_2	Total CO_2e
Energy	5492.7	4.9	0.3	NA	246.4	25.1	37.6	4.5	5688.6
Industrial processes and solvents	496.6	NA	NA	0.121	NA	NA	31.4	0.38	672.5
Agriculture	NA	100.4	8.05	NA	1.07	0.025	NA	NA	4603.9
Land-use and forestry	-3667.7	6.93	0.05	NA	60.6	1.72	NA	NA	-3506.7
Waste	NA	62.9	NA	NA	NA	NA	NA	NA	1320.9
Total	2321.6	112.2	8.4	0.121	308.1	26.8	69	4.9	
Total CO_2e	2321.6	2356.8	2604	175.9	ND	ND	ND	ND	8779.2

El Salvador

Sector	CO_2	CH_4	N_2O	CO	NOX
Energy	4224.18	18.09	0.52	437.48	31.03
Industrial processes and solvents	490.12				
Agriculture		88.14	12.69	70.65	2.86
Land-use and forestry	3930.64	0.52	0.0036	4.53	0.13
Waste		41.75			
Total	9644.94	148.5	13.21	512.66	34.02

Guatemala

Sector	CO_2	CH_4	N_2O	CO	NOX
Energy	3,700	34.4	0.52	725.6	36.8
Industrial processes and solvents	544.6	-	-	-	-
Agriculture		129.8	19.7	193.1	5.6
Land-use and forestry	3,244	4.89	0.034	42.8	1.2
Waste		30.4	0.4		
Total	7,489.7	199.5	20.78	961.6	43.79
Absorption (LULUCF)	-42,903				

Honduras

Sector	CO_2	CH_4	N_2O	NOX	CO	NMVOC
Energy	3570.46	0.57	0.26	29.87	367.3	50.86
Industrial processes and solvents	514.72					32.65
Agriculture		130.51	2.066	2.52	55.034	
Land-use and forestry	1348.05	126.43	2.02	31.41	1106.2	
Waste		127.98	0.83			
Total	5433.23	385.49	5.18	63.8	1528.5	83.51

Nicaragua

Sector	CO_2	CH_4	N_2O	Total CO_2e Emission	Total CO_2e Absorption
Energy	2373.54	296.45	64	2733.99	
Industrial processes and solvents	354.84			354.84	
Agriculture		4193.91	697.6	4891.51	
Land-use change	-14784.09	1830.89	163.2		-12790
Waste		327.81	57.6	385.41	
Total	-12.05571	6649.06	982.4	8365.75	4424.25

Panama

Sector	CO_2	CH_4	N_2O	NOX	CO	CVDM
Energy	5873.12	0.05		0.07	0.11	3.02
Industrial processes	412.94			0.01	0.31	1.95
Solvents and other products						0.61
Agriculture		94.09	8.87	1.57	22.01	
Land-use change	8902.5	59.69	0.41	14.83	522.31	
Waste		76.54	0.14			
Total	15188.56	230.37	9.42	16.48	544.74	5.58

3.5 EMISSIONS REDUCTION AND CARBON SEQUESTRATION POTENTIAL

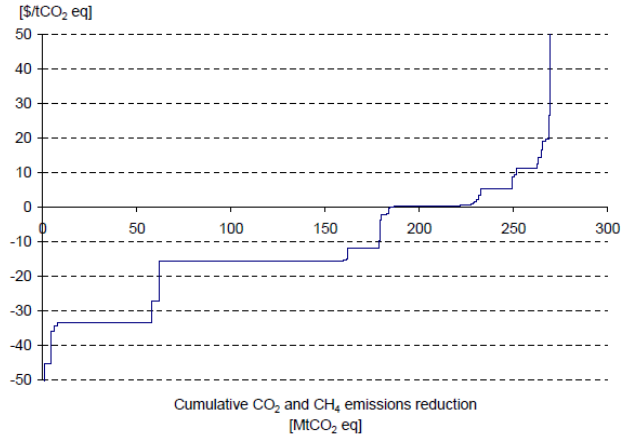
Emission Reduction Potential by Country, 2012 and 2020

	2012 $ktCO_2e$	2020 $ktCO_2e$	Issuance as % of 2012 Potential
Belize	0	0	
Costa Rica	2989	5304	1.5
El Salvador	3401	8421	12.2
Guatemala	8540	21574	10.3
Honduras	5466	13617	6.8
Nicaragua	4400	9585	13.1
Panama	8634	26663	0
Region	33430	85164	

Source: Fenhann.

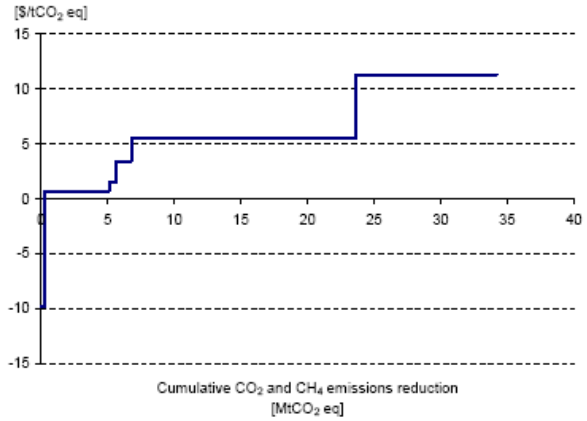
3.6 MARGINAL ABATEMENT COST ESTIMATES

Marginal Abatement Cost Curve for Central and South America (Excluding Brazil)



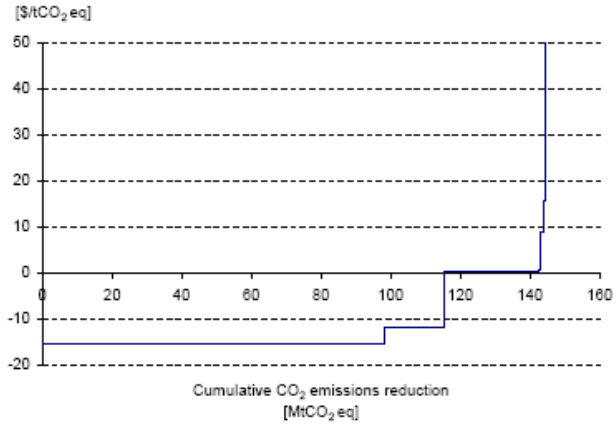
Source: Wetzelaer et al.

Extrapolated MAC Curve for the Agricultural and Forestry Sector in the Rest of Central and South America

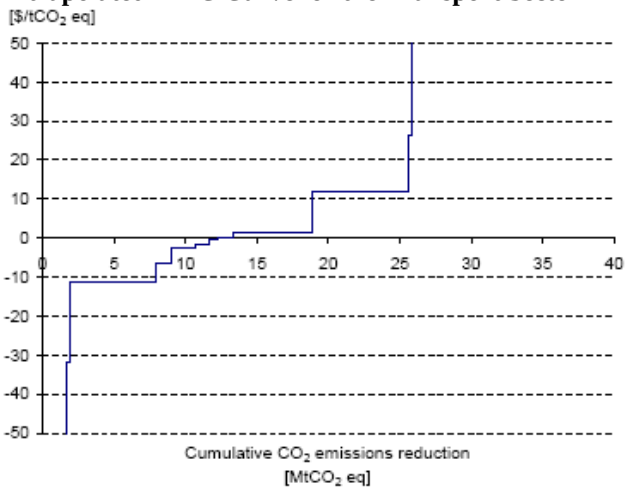


Source: Wetzelaer et al.

Extrapolated MAC Curve for the Electricity Sector in the Rest of Central and South America
Source: Wetzelaer et al.



Extrapolated MAC Curve for the Transport Sector in Non-Annex I



Source: Wetzelaer et al.

4.1 CENTRAL AMERICA DSM POTENTIAL MODEL

This model evaluates the potential annual energy and demand savings for the Central American region. This corresponds to the level of savings that would be achieved if an adequate energy efficiency-enabling policy framework was to be put in place in Central America.

To calculate the savings at the regional level, the model aggregates savings at the country-level. The country-level savings in turn are calculated through aggregation of savings at the individual measure level. Examples of measures include:

- Energy efficient refrigerators
- CFLs
- Variable Frequency Drives (VFDs) on motors
- Energy-efficient AC units

To calculate the savings from a refrigerator measure in a given country, the following equation is used:

Energy savings = number of energy efficient refrigerators sold * energy savings per refrigerator

The number of refrigerators sold in a country is based on the existing stock of refrigerators, their replacement rate and the market penetration of new energy efficient refrigerators.

Measure market penetration levels used in the model are derived from market data gathered for the region. When no local market penetration data was available, conservative numbers were used which have been set at a lower level than typically encountered in the United States. This is thought to be a reasonable assumption given the lack of maturity of the energy efficiency market in Central America compared to that of the United States.

Measure energy savings have been established in several ways:

- For some measures, actual energy savings achieved in Central America were available from studies, past energy audits, etc. This is the case for solar water heaters, commercial AC, fluorescent lights in commercial/industrial buildings.
- For weather dependent measures such as residential AC units, engineering estimates were performed which adjust for local climate conditions.
- For all other appliance-type measures (refrigerators, clothes washers), energy savings were derived from data from DSM potential studies performed in the United States. U.S. numbers might prove to be lower than what would likely be observed in Central America, where typical appliances tend to be less efficient. For this reason the results from the model are expected to be fairly conservative.

Additional data such as incremental costs and capacity factors were derived from typical numbers used in DSM potential studies in the United States or, when available, from local sources. Since costs in the United States are higher than in Central America, the model is expected to overestimate energy efficiency costs.

The model also introduces an “energy efficiency enabling environment” parameter to take into account the difference between countries in historical levels of efforts for energy efficiency programs.

4.2 OVERVIEW

Central America DSM Potential

	Energy Sales Savings (GWh), 2011	Demand Savings (MW), 2011	Energy Savings (%), 2011	Energy Generation Savings (GWh), 2011	Power Generation Savings (MW), 2011	Lifetime Cumulative Energy Sales Savings (GWh)	Incremental Cost (USD)
Residential	111.3	10.7	0.3%	129.5	12.5	864.7	45,048,227
Commercial	90.5	15.5	0.2%	105.2	18.0	1,368.8	38,744,374
Industrial	74.3	19.8	0.2%	86.4	23.0	1,273.8	34,339,561
Total	276.1	46.0	**0.7%**	**321.1**	**53.5**	3,507.3	**118,132,162**
						Overall EE Measures Implementation Cost per kWh	**0.03**

Assumptions

Average Electricity Sales Growth in Central America	4.37%	per year
Energy Losses	16.30%	(ratio (energy generation - energy sales)/energy generation)
Capacity Ratio	1.54	(installed MW/peak kW demand)

Central America Energy Consumption and Customer Breakdown (year 2000)

		Number of Accounts, 2011	Projected Energy Sales (GWh/yr), 2011
Belize	Residential	78,158.0	234.4
Belize	Commercial		86.3
Belize	Industrial		86.3
Belize	Total		407.0
Costa Rica	Residential	879,835	3,548.1
Costa Rica	Commercial		3,908.1
Costa Rica	Industrial		2,047.4
Costa Rica	Total		9,503.7
El Salvador	Residential	1,727,265	1,841.4
El Salvador	Commercial		1,634.2
El Salvador	Industrial		2,283.5
El Salvador	Total		5,759.0
Guatemala	Residential	2,268,981	2,465.7
Guatemala	Commercial		1,993.9
Guatemala	Industrial		2,920.5
Guatemala	Total		7,380.1
Honduras	Residential	1,817,304	1,993.2
Honduras	Commercial		2,608.1

Central America Energy Consumption and Customer Breakdown (year 2000), continued			
Honduras	Industrial		1,340.8
Honduras	Total		5,942.1
Nicaragua	Residential	550,484	798.8
Nicaragua	Commercial		1,106.2
Nicaragua	Industrial		628.9
Nicaragua	Total		2,533.9
Panama	Residential	520,151.8	1,834.1
Panama	Commercial		3,810.7
Panama	Industrial		550.7
Panama	Total		6,195.6
Total		7,842,179	37,721.4

Sources: CEPAL, 2010.

kWh Per Capita Per Country

	kWh Per Capita
Belize	
Costa Rica	1,839
El Salvador	827
Guatemala	473
Honduras	713
Nicaragua	393
Panama	1,608

Average Electricity Sales Growth

	2000	2001	2002	2003	2004	2005	2006	2007	2008	Avg. Growth (01–08)	Cumulative Growth by 2011
Belize											
Costa Rica	5.2%	5.2%	5.2%	4.1%	5.4%	5.9%	5.8%	2.2%	-1.0%	4.2%	150%
El Salvador	5.6%	5.6%	5.6%	5.2%	2.3%	5.7%	2.6%	3.5%	-3.0%	3.7%	140%
Guatemala	5.7%	5.7%	5.7%	6.5%	5.1%	6.5%	6.3%	0.2%	1.0%	4.7%	157%
Honduras	7.2%	7.2%	7.2%	7.2%	4.7%	8.4%	5.1%	4.1%	-1.3%	5.5%	168%
Nicaragua	4.9%	4.9%	4.9%	3.8%	3.9%	4.7%	1.6%	4.7%	4.3%	4.2%	150%
Panama	3.4%	3.4%	3.4%	4.2%	2.0%	2.9%	4.8%	3.1%	7.3%	3.8%	146%
Total										**4.4%**	

Source: CEPAL, 2010.

Distribution of Energy Consumption by Sector

	Industrial	Residential	Transportation	Other
Belize				
Costa Rica	27%	20%	42%	11%
El Salvador	28%	33%	33%	6%
Guatemala	8%	66%	22%	4%
Honduras	19%	46%	27%	8%
Nicaragua	24%	48%	17%	11%
Panama	17%	23%	48%	12%

Source: CEPAL renewables study, 2009.

Sectoral Consumption as % of Total Energy Consumption

	Industrial	Residential	Commercial	Agriculture/Mines	Construction
Belize					
Costa Rica	16%	38%	76%	41%	11%
El Salvador	21%	14%	70%	0%	100%
Guatemala	34%	4%	47%	0%	0%
Honduras	17%	11%	79%	0%	0%
Nicaragua	7%	5%	28%	14%	21%
Panama	9%	22%	89%	8%	0%

Source: CEPAL renewables study, 2009.

Electricity as Share of Country's Energy Consumption

	Industrial	Residential	Commercial
Belize			
Costa Rica	4%	8%	8%
El Salvador	6%	5%	4%
Guatemala	3%	2%	2%
Honduras	3%	5%	6%
Nicaragua	2%	2%	3%
Panama	2%	5%	11%

Sector's Share of Country's Electricity Consumption

	Industrial	Residential	Commercial
Belize			
Costa Rica	22%	37%	41%
El Salvador	40%	32%	28%
Guatemala	40%	33%	27%
Honduras	23%	34%	44%
Nicaragua	25%	32%	44%
Panama	9%	30%	62%

Energy Efficiency Sector Enabling Environment

	Enabling Environment	Comment
Belize		
Costa Rica	1	Diversified EE programs
El Salvador	0	
Guatemala	0	Diversified EE programs
Honduras	-1	Low electricity prices
Nicaragua	-1	
Panama	0	

Enabling environment: 1 = good, 0 = average, -1 = bad
Source: CEPAL renewables study, 2009.

Energy Efficiency Programs in Central America, 2009

	Belize	Costa Rica	El Salvador	Guatemala	Honduras	Nicaragua	Panama
CFL (millions)		1.5		X	6.0	1.8	3.0
Lighting		X	X				
TV		X					
C&I					X	X	
Street Lighting				X		X	X
Public Sector EE		X			X		X
High Potential Customers program		X					
Energy Audits		X	X			X	
Technical Assistance			X				
DSM Potential Studies				X		X	
Education Program				X	X	X	X
ESCOs (source: BUN-CA)		54	25			13	3
Public Transit Development		GAM train		X			X
Fleet Efficiency				X			
EV Incentives		X					
Others			water system pumps			transportation efficiency	
Total # of Programs		9	5	6	4	8	6

Sources: CEPAL renewables study, 2009; CEPAL energy efficiency study, 2009.

4.3 RESIDENTIAL

Country	EE Measure	End-Use Saturation	Potential Stock	Market Penetration Per Year	Number of Participants Per Year	Measure Life	Savings Per Measure (kWh)	Total Annual Energy Sales Savings (kWh)	Total Power Savings (MW)	Lifetime Cumulative Energy Sales Savings (kWh)	Incremental Cost (USD)
Belize	CFL	40%	6,253	33%	2,084	5	622	1,295,546	0.13	6,477,731.22	87,536.91
Belize	Refrigerator	80%	2,842	7%	189	22	108	20,463	0.00	450,189.81	67,642.16
Belize	AC	5%	217	7%	14	18	956	13,836	0.01	249,050.94	47,719.77
Belize	Clothes Washer	60%	3,350	10%	335	14	242	81,061	0.00	1,134,853.49	218,060.69
Belize	Solar Water Heater	50%	1,954	7%	130	20	410	53,408	0.00	1,068,158.70	91,184.28
Costa Rica	CFL	40%	53,244	50%	26,622	5	622	16,548,229	1.67	82,741,146.88	1,118,123.61
Costa Rica	Refrigerator	80%	31,994	10%	3,199	22	108	345,535	0.01	7,601,778.55	1,142,186.42
Costa Rica	AC	5%	2,444	10%	244	18	956	233,634	0.10	4,205,404.11	805,782.66
Costa Rica	Clothes Washer	60%	37,707	15%	5,656	14	242	1,368,773	0.03	19,162,816.76	3,682,111.48
Costa Rica	Solar Water Heater	50%	21,996	10%	2,200	20	410	901,831	0.06	18,036,627.34	1,539,712.09
El Salvador	CFL	40%	138,181	33%	46,060	5	622	28,631,146	2.88	143,155,727.69	1,934,536.86
El Salvador	Refrigerator	80%	62,810	7%	4,187	22	108	452,229	0.02	9,949,046.71	1,494,869.39
El Salvador	AC	5%	4,798	7%	320	18	956	305,775	0.13	5,503,943.80	1,054,591.27
El Salvador	Clothes Washer	60%	74,026	10%	7,403	14	242	1,791,421	0.03	25,079,888.59	4,819,069.50
El Salvador	Solar Water Heater	50%	43,182	7%	2,879	20	410	1,180,298	0.08	23,605,955.74	2,015,142.56
Guatemala	CFL	40%	181,518	33%	60,506	5	622	37,610,621	3.79	188,053,103.95	2,541,258.16
Guatemala	Refrigerator	80%	82,508	7%	5,501	22	108	594,060	0.02	13,069,327.69	1,963,699.49

Country	EE Measure	End-Use Saturation	Potential Stock	Market Penetration Per Year	Number of Participants Per Year	Measure Life	Savings Per Measure (kWh)	Total Annual Energy Sales Savings (kWh)	Total Power Savings (MW)	Lifetime Cumulative Energy Sales Savings (kWh)	Incremental Cost (USD)
Guatemala	AC	5%	6,303	7%	420	18	956	401,674	0.17	7,230,124.38	1,385,338.65
Guatemala	Clothes Washer	60%	97,242	10%	9,724	14	242	2,353,257	0.04	32,945,596.88	6,330,455.60
Guatemala	Solar Water Heater	50%	56,725	7%	3,782	20	410	1,550,470	0.11	31,009,400.18	2,647,143.92
Honduras	CFL	40%	76,813	17%	12,802	5	622	7,957,816	0.80	39,789,079.53	537,690.26
Honduras	Refrigerator	80%	66,084	3%	2,203	22	108	237,902	0.01	5,233,835.64	786,397.02
Honduras	AC	5%	5,048	3%	168	18	956	160,857	0.07	2,895,426.88	554,782.54
Honduras	Clothes Washer	60%	77,884	5%	3,894	14	242	942,402	0.02	13,193,627.35	2,535,139.14
Honduras	Solar Water Heater	50%	45,433	3%	1,514	20	410	620,912	0.04	12,418,244.29	1,060,094.02
Nicaragua	CFL	40%	23,467	17%	3,911	5	622	2,431,210	0.24	12,156,051.46	164,270.97
Nicaragua	Refrigerator	80%	20,018	3%	667	22	108	72,063	0.00	1,585,393.54	238,209.38
Nicaragua	AC	5%	1,529	3%	51	18	956	48,726	0.02	877,060.61	168,050.49
Nicaragua	Clothes Washer	60%	23,592	5%	1,180	14	242	285,465	0.01	3,996,512.88	767,924.99
Nicaragua	Solar Water Heater	50%	13,762	3%	459	20	410	188,082	0.01	3,761,639.76	321,115.59
Panama	CFL	40%	7,326	33%	2,442	5	622	1,518,037	0.15	7,590,183.01	102,570.04
Panama	Refrigerator	80%	18,915	7%	1,261	22	108	136,185	0.00	2,996,074.49	450,167.76
Panama	AC	5%	1,445	7%	96	18	956	92,082	0.04	1,657,467.91	317,581.58
Panama	Clothes Washer	60%	22,292	10%	2,229	14	242	539,472	0.01	7,552,604.46	1,451,223.58
Panama	Solar Water Heater	50%	13,004	7%	867	20	410	355,437	0.03	7,108,741.57	606,843.79

Savings Per Measure (kWh)	Total Annual Energy Sales Savings (kWh)	Total Power Savings (MW)	Lifetime Cumulative Energy Sales Savings (kWh)	Incremental Cost (USD)
Total Annual Savings	**111**	**11**	**743,541,817**	**45,048,227**

GWh **MW**

0.30% **of total electricity sales in Central America**

Market Penetration (Market Share of Energy-Efficient Appliances)

	EE Enabling Environment		
	-1	**0**	**1**
CFL	17%	33%	50%
Refrigerator	3%	7%	10%
AC	3%	7%	10%
Clothes Washer	5%	10%	15%
Solar Water Heater	3%	7%	10%

Savings and Participation Summary

	# Implemented Annually in Region	**Total Annual Savings (GWh)**	**Total Power Savings (MW)**
CFL	1,080,998	96	9.7
Refrigerator	17,208	2	0.1
AC	1,314	1	0.5
Clothes Washer	30,421	7	0.1
Solar Water Heater	11,830	5	0.3

Assumptions and Data

Lighting

7 lamps per household, 60% incandescent, assumed replace 50W incandescent with 13W CFL (37W savings)

Source: COPE.

CFLs already installed through existing EE programs are taken off the baseline stock as displayed in the table below:

	# of CFLs Already Installed via EE Programs
Belize	
Costa Rica	1,500,000
El Salvador	negligible
Guatemala	
Honduras	6,000,000
Nicaragua	1,800,000
Panama	3,000,000

Source: CEPAL energy efficiency study, 2009.

AC

Replacement of a SEER 9 AC unit with a SEER 14 AC unit

12000 BTU = 3.517 kWh

Existing SEER	9	Btu/Wh
New SEER	14	Btu/Wh
Average AC unit size	10,000	Btu
Existing AC unit BTU production	24,090,000	Btu
Existing AC unit energy usage	2,677	kWh
New AC unit energy usage	1,721	kWh

Clothes Washer and Refrigerator

Source: Idaho Power DSM study

Solar Water Heater

All of the household water heating energy is displaced by solar energy

Water heating energy use per household is proportional to the water usage

Electric water heater end-use saturation	50%	
Energy savings	410	kWh
Unit cost (USD)	100	(in Guatemala)

Source: Energy and Resources Group.

Country	Water Usage Per Person Per Day (m3)	Water Use Compared to US	Water Heating Energy Use (kWh)
US	202.56	100%	3,000
Belize	8.3	4%	123
Costa Rica	14.2	7%	210
El Salvador	11.06	5%	164
Guatemala	5.4	3%	80
Honduras	9.36	5%	139
Nicaragua	47.5	23%	703
Panama	54.6	27%	809

Source: Pacific Institute.

Capacity Factors

	kW/kWh ratio
CFL	0.000101
AC	0.000415
Refrigerator	0.000036
Clothes Washer	0.000019
Solar Water Heater	0.000072

Source: Idaho Power and CPS Energy, DSM potential studies (typical capacity factor for corresponding end-use)

Residential Electricity Consumption

	Number of Households	Panama Cooling Degree Days
Belize	78,158	2,409
Costa Rica	879,835	2,409
El Salvador	1,727,265	2,409
Guatemala	2,268,981	2,409
Honduras	1,817,304	2,409
Nicaragua	550,484	2,409
Panama	520,152	2,409

Incremental Costs

Measure	Annual Savings (kWh)	Lifetime	Lifetime Savings	Incremental Cost (USD)	kWh Cost
CFL	89	5	444	6	0.014
Refrigerator	108	22	2,376	51	0.021
AC	956	18	17,207	471	0.027
Clothes Washer	242	14	3,388	93	0.027
Solar Water Heater	410	20	8,200	100	0.012

Sources: Idaho Power and CPS Energy, DSM potential studies (typical capacity factor for corresponding end-use); McKinsey.

4.4 INDUSTRIAL

Country	Measure	Savings Potential	Number of Participants Per Year (% of Customer Base)	Participants' End-Use Energy Consumption	Total Annual Energy Sales Savings (GWh)	Total Power Savings (MW)	Lifetime Cumulative Energy Sales Savings (GWh)	Incremental Cost (USD)
Belize	Fluorescent lights	51%	4%	1	0.4	0.04	4.23	144,151
Belize	AC	36%	3%	1	0.2	0.11	3.85	144,353
Belize	Premium efficiency motors	3%	3%	0	0.0	0.00	0.14	6,904
Belize	VFDs on motors	20%	2%	0	0.0	0.02	0.53	1,467
Belize	VFDs on pumps	20%	2%	0	0.0	0.01	0.35	978
Belize	Refrigeration	10%	1%	0	0.0	0.00	0.46	1,570
Costa Rica	Fluorescent lights	51%	6%	25	12.5	1.26	150.36	5,130,115
Costa Rica	AC	36%	4%	21	7.6	3.80	136.89	5,137,300
Costa Rica	Premium efficiency motors	3%	4%	8	0.2	0.03	4.91	245,692
Costa Rica	VFDs on motors	20%	3%	6	1.1	0.55	18.80	52,210
Costa Rica	VFDs on pumps	20%	3%	4	0.7	0.37	12.53	34,806
Costa Rica	Refrigeration	10%	2%	8	0.8	0.14	16.38	55,884
El Salvador	Fluorescent lights	51%	4%	18	9.3	0.94	111.80	3,814,377
El Salvador	AC	36%	3%	16	5.7	2.83	101.78	3,819,719
El Salvador	Premium efficiency motors	3%	3%	6	0.2	0.02	3.65	182,679
El Salvador	VFDs on motors	20%	2%	4	0.8	0.41	13.97	38,819
El Salvador	VFDs on pumps	20%	2%	3	0.5	0.27	9.32	25,879
El Salvador	Refrigeration	10%	1%	6	0.6	0.10	12.18	41,551
Guatemala	Fluorescent lights	51%	4%	23	11.9	1.20	142.99	4,878,387
Guatemala	AC	36%	3%	20	7.2	3.62	130.17	4,885,220
Guatemala	Premium efficiency motors	3%	3%	8	0.2	0.03	4.67	233,636

Country	Measure	Savings Potential	Number of Participants Per Year (% of Customer Base)	Participants' End-Use Energy Consumption	Total Annual Energy Sales Savings (GWh)	Total Power Savings (MW)	Lifetime Cumulative Energy Sales Savings (GWh)	Incremental Cost (USD)
Guatemala	VFDs on motors	20%	2%	5	1.1	0.53	17.87	49,648
Guatemala	VFDs on pumps	20%	2%	4	0.7	0.35	11.92	33,099
Guatemala	Refrigeration	10%	1%	8	0.8	0.13	15.58	53,141
Honduras	Fluorescent lights	51%	2%	5	2.7	0.28	32.82	1,119,827
Honduras	AC	36%	1%	5	1.7	0.83	29.88	1,121,395
Honduras	Premium efficiency motors	3%	1%	2	0.1	0.01	1.07	53,631
Honduras	VFDs on motors	20%	1%	1	0.2	0.12	4.10	11,397
Honduras	VFDs on pumps	20%	1%	1	0.2	0.08	2.74	7,598
Honduras	Refrigeration	10%	1%	2	0.2	0.03	3.58	12,199
Nicaragua	Fluorescent lights	51%	2%	3	1.3	0.13	15.39	525,247
Nicaragua	AC	36%	1%	2	0.8	0.39	14.02	525,983
Nicaragua	Premium efficiency motors	3%	1%	1	0.0	0.00	0.50	25,155
Nicaragua	VFDs on motors	20%	1%	1	0.1	0.06	1.92	5,345
Nicaragua	VFDs on pumps	20%	1%	0	0.1	0.04	1.28	3,564
Nicaragua	Refrigeration	10%	1%	1	0.1	0.01	1.68	5,722
Panama	Fluorescent lights	51%	4%	4	2.2	0.23	26.96	919,970
Panama	AC	36%	3%	4	1.4	0.68	24.55	921,259
Panama	Premium efficiency motors	3%	3%	1	0.0	0.01	0.88	44,059
Panama	VFDs on motors	20%	2%	1	0.2	0.10	3.37	9,363
Panama	VFDs on pumps	20%	2%	1	0.1	0.07	2.25	6,242
Panama	Refrigeration	10%	1%	1	0.1	0.02	2.94	10,021
				Total Annual Savings	**74**	**20**	**1,095**	**34,339,561**
					0.20%	**of total electricity sales in Central America**		

Market Penetration (% of Customer Base Enrolled Every Year)

	EE Enabling Environment		
	-1	**0**	**1**
Fluorescent lights	2%	4%	6%
AC	1%	3%	4%
Premium efficiency motors	1%	3%	4%
VFDs on motors	1%	2%	3%
VFDs on pumps	1%	2%	3%
Refrigeration	1%	1%	2%

Savings Summary

	Total Annual Savings (GWh)	**Demand Savings (MW)**
Fluorescent lights	40	4
AC	25	12
Premium efficiency motors	1	0
VFDs on motors	4	2
VFDs on pumps	2	1
Refrigeration	3	0
Total	74	20

Assumptions and Data

Fluorescent Lights

Fluorescent lights 51% savings. Replacement of 4 lamp 40W T12 fixture (176W) with 4 lamp 25W T8 fixture (86W)

AC

Replacement of a SEER 9 AC unit with a SEER 14 AC unit

Existing SEER	9	Btu/Wh
New SEER	14	Btu/Wh
Energy savings	36%	

VFD

Assumed energy savings	20%

Capacity Factors

	kW/kWh ratio
Fluorescent lights	0.000101
AC	0.000500
VFDs on pumps	0.000500
VFDs on motors	0.000500
Refrigeration	0.000167
Premium efficiency motors	0.000114

Source: Idaho Power and CPS Energy, DSM potential studies (typical capacity factor for corresponding end-use)

Industrial Electricity Consumption

	GWh
Belize	86
Costa Rica	2,047
El Salvador	2,283
Guatemala	2,920
Honduras	1,341
Nicaragua	629
Panama	551

Electricity Consumption Breakdown

Lighting	20%
AC	26%
Motors	10%
Pumps	9%
Refrigeration	6%
Office equipment	20%
Other	9%

Incremental Costs

Measure	kWh cost (USD)	Lifetime
Fluorescent lights	0.034	12
AC	0.038	18
VFDs on pumps	0.003	17
VFDs on motors	0.003	17
Refrigeration	0.003	20
Premium efficiency motors	0.050	20

Sources: Idaho Power and CPS Energy, DSM potential studies (typical capacity factor for corresponding end-use); McKinsey.

4.5 COMMERCIAL

Country	Measure	Savings Potential	Number of Participants Per Year (% of Customer Base)	Participants' End-Use Energy Consumption	Total Annual Energy Sales Savings (GWh)	Total Power Savings (MW)	Lifetime Cumulative Energy Sales Savings (GWh)	Incremental Cost (USD)
Belize	Fluorescent lights	51%	4%	1	0.4	0.04	5.06	172,765
Belize	AC	36%	3%	0	0.1	0.03	1.22	45,606
Belize	Office equipment	5%	1%	0	0.0	0.00	0.00	11
Belize	VFD on pumps	20%	2%	0	0.0	0.01	0.19	348
Belize	VFD on motors	20%	2%	0	0.0	0.01	0.19	348
Belize	Premium efficiency motors	3%	3%	0	0.0	0.00	0.01	331
Costa Rica	Fluorescent lights	51%	6%	56	28.7	2.89	343.98	11,736,020
Costa Rica	AC	36%	4%	13	4.6	2.29	82.55	3,098,041
Costa Rica	Office equipment	5%	2%	1	0.0	0.01	0.22	747
Costa Rica	VFD on pumps	20%	3%	4	0.8	0.38	12.76	23,622
Costa Rica	VFD on motors	20%	3%	4	0.8	0.38	12.76	23,622
Costa Rica	Premium efficiency motors	3%	4%	1	0.0	0.00	0.45	22,511
El Salvador	Fluorescent lights	51%	4%	16	8.0	0.80	95.89	3,271,629
El Salvador	AC	36%	3%	4	1.3	0.64	23.01	863,635
El Salvador	Office equipment	5%	1%	0	0.0	0.00	0.06	208
El Salvador	VFD on pumps	20%	2%	1	0.2	0.10	3.56	6,585
El Salvador	VFD on motors	20%	2%	1	0.2	0.10	3.56	6,585
El Salvador	Premium efficiency motors	3%	3%	0	0.0	0.00	0.13	6,275
Guatemala	Fluorescent lights	51%	4%	19	9.8	0.98	117.00	3,991,858
Guatemala	AC	36%	3%	4	1.6	0.78	28.08	1,053,759
Guatemala	Office equipment	5%	1%	0	0.0	0.00	0.07	254
Guatemala	VFD on pumps	20%	2%	1	0.3	0.13	4.34	8,035

Country	Measure	Savings Potential	Number of Participants Per Year (% of Customer Base)	Participants' End-Use Energy Consumption	Total Annual Energy Sales Savings (GWh)	Total Power Savings (MW)	Lifetime Cumulative Energy Sales Savings (GWh)	Incremental Cost (USD)
Guatemala	VFD on motors	20%	2%	1	0.3	0.13	4.34	8,035
Guatemala	Premium efficiency motors	3%	3%	0	0.0	0.00	0.15	7,657
Honduras	Fluorescent lights	51%	2%	13	6.4	0.64	76.52	2,610,696
Honduras	AC	36%	1%	3	1.0	0.51	18.36	689,164
Honduras	Office equipment	5%	1%	0	0.0	0.00	0.05	166
Honduras	VFD on pumps	20%	1%	1	0.2	0.08	2.84	5,255
Honduras	VFD on motors	20%	1%	1	0.2	0.08	2.84	5,255
Honduras	Premium efficiency motors	3%	1%	0	0.0	0.00	0.10	5,008
Nicaragua	Fluorescent lights	51%	2%	5	2.7	0.27	32.46	1,107,312
Nicaragua	AC	36%	1%	1	0.4	0.22	7.79	292,305
Nicaragua	Office equipment	5%	1%	0	0.0	0.00	0.02	70
Nicaragua	VFD on pumps	20%	1%	0	0.1	0.04	1.20	2,229
Nicaragua	VFD on motors	20%	1%	0	0.1	0.04	1.20	2,229
Nicaragua	Premium efficiency motors	3%	1%	0	0.0	0.00	0.04	2,124
Panama	Fluorescent lights	51%	4%	37	18.6	1.88	223.61	7,628,999
Panama	AC	36%	3%	8	3.0	1.49	53.66	2,013,881
Panama	Office equipment	5%	1%	0	0.0	0.01	0.14	485
Panama	VFD on pumps	20%	2%	2	0.5	0.24	8.29	15,356
Panama	VFD on motors	20%	2%	2	0.5	0.24	8.29	15,356
Panama	Premium efficiency motors	3%	3%	0	0.0	0.00	0.29	14,633
				Total Annual Savings	**90**	**15**	**1,177**	**38,744,374**
					0.24%	**of total electricity sales in Central America**		

Market Penetration (% of Customer Base Enrolled Per Year)

	EE Enabling Environment		
	-1	**0**	**1**
Fluorescent lights	2%	4%	6%
AC	1%	3%	4%
Office equipment	1%	1%	2%
VFD on pumps	1%	2%	3%
VFD on motors	1%	2%	3%
Premium efficiency motors	1%	3%	4%

Savings Summary

	Total Annual Savings (GWh)	**Demand Savings (MW)**
Fluorescent lights	75	8
AC	12	6
Office equipment	0	0
VFD on pumps	2	1
VFD on motors	2	1
Premium efficiency motors	0	0
Total	91	15

Assumptions and Data

Fluorescent Lights

Fluorescent lights	51%	savings. Replacement of 4 lamp 40W T12 fixture (176W) with 4 lamp 25W T8 fixture (86W)

AC

Replacement of a SEER 9 AC unit with a SEER 14 AC unit

Existing SEER	9	Btu/Wh
New SEER	14	Btu/Wh
Energy savings	36%	

Source: COPE.

Capacity Factors

	kW/kWh ratio
Fluorescent lights	0.000101
AC	0.000500
Office equipment	0.000333
VFD on pumps	0.000500
VFD on motors	0.000500
Premium efficiency motors	0.000114

Source: Idaho Power and CPS Energy, DSM potential studies (typical capacity factor for corresponding end-use)

Commercial Electricity Consumption

	GWh
Belize	86
Costa Rica	3,908
El Salvador	1,634
Guatemala	1,994
Honduras	2,608
Nicaragua	1,106
Panama	3,811

Electricity Consumption Breakdown

Lighting	47%
AC	23%
Motors	3%
Pumps	2%
Refrigeration	2%
Office equipment	16%
Other	7%

Incremental Costs

Measure	kWh Cost (USD)	Lifetime
Fluorescent lights	0.034	12
AC	0.038	18
Office equipment	0.003	7
VFD on pumps	0.002	17
VFD on motors	0.002	17
Premium efficiency motors	0.050	20

Sources: Idaho Power and CPS Energy, DSM potential studies (typical capacity factor for corresponding end-use); McKinsey.

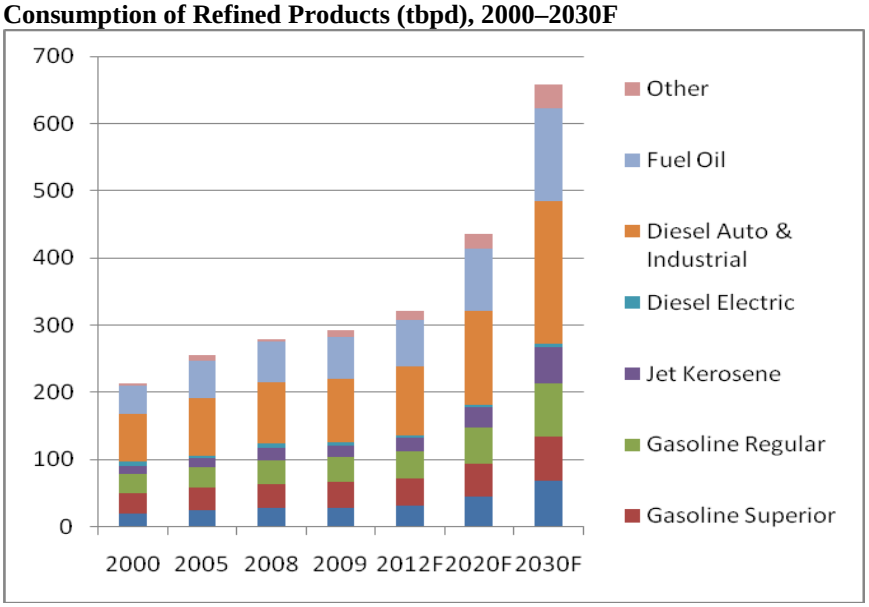
5.1 CONSUMPTION BY USE

Consumption of Refined Products (tbpd), 2000–2030F

	2000	2005	2008	2009	2012F	2020F	2030F
LPG	19.07	24.04	27.30	28.71	32.04	44.38	68.29
Gasoline Superior	30.75	33.59	35.96	37.24	39.80	49.47	66.42
Gasoline Regular	28.00	30.98	36.03	37.24	40.71	54.16	78.54
Jet Kerosene	12.65	14.10	17.37	17.27	19.35	29.22	53.62
Diesel Electric	6.37	2.96	6.90	5.51	4.44	4.78	4.78
Diesel Auto & Industrial	71.14	85.81	91.87	93.84	102.74	138.68	212.18
Fuel Oil	42.04	55.09	60.92	63.25	69.21	93.21	138.49
Fuel Oil Industrial	10.45	10.15	14.84	14.80	16.30	26.13	49.72
Fuel Oil Electric	27.04	40.20	42.08	44.41	48.79	62.67	83.99
IFO 380 ot	4.54	4.74	4.00	4.03	4.13	4.41	4.78
Other	4.04	8.21	3.47	9.06	12.38	21.68	34.99
Total	214.06	254.78	279.80	292.12	320.67	435.59	657.30

Source: CEPAL, 2008; Nexant.

Consumption of Refined Products (tbpd), 2000–2030F



Consumption of Refined Products (% Growth), 2000–2030F

	2000–2005	2005–2008	2008–2030F
LPG	4.7	4.3	4.3
Gasoline Superior	1.8	2.3	2.8
Gasoline Regular	2.0	5.2	3.6
Jet Kerosene	2.2	7.2	5.3
Diesel Electric	(14.2)	32.5	(1.7)
Diesel Auto & Industrial	3.8	2.3	3.9
Fuel Oil	5.6	3.4	3.8
Fuel Oil Industrial	(0.6)	13.5	5.7
Fuel Oil Electric	8.3	1.5	3.2
IFO 380 ot	0.9	(5.5)	0.8
Other	15.2	(25.0)	11.1
Total	3.5	3.2	4.0

Source: CEPAL, 2008; Nexant.

Consumption of Refined Products (tbpd), 2009

	LPG	Gasoline Superior	Gasoline Regular	Jet Kerosene	Diesel Electric	Diesel Auto & Industrial	Fuel Oil	Other	Total
Costa Rica	3.40	6.43	9.22	4.05	2.05	18.62	2.25	1.73	47.74
El Salvador	7.58	4.16	6.23	2.40	0.08	12.45	10.12	1.03	44.05
Guatemala	8.33	13.20	7.93	1.91	0.07	22.87	14.46	3.46	72.21
Honduras	2.56	6.04	4.56	1.95	0.34	14.87	19.24	0.09	49.65
Nicaragua	2.55	3.85	1.76	0.50	0.50	8.98	10.46	1.88	30.48
Panama	4.29	3.57	7.54	6.46	2.48	16.06	6.71	0.87	47.98

Source: CEPAL, 2008; Nexant.

Demand by Sector (tbpd), 2000–2030F

	2000	2005	2008	2009	2012F	2020F	2030F
Transportation	132.55	137.27	143.38	143.73	147.50	152.11	154.75
Industrial	34.29	35.73	33.41	40.93	48.02	42.60	46.80
Residential	13.81	13.90	14.64	15.49	16.44	16.92	17.70
Electricity	33.41	41.62	43.42	51.77	46.28	43.17	51.18
Total	214.06	228.53	234.85	251.92	258.24	254.79	270.44

Source: CEPAL, 2008; Nexant.

Demand by Sector (% of Total Demand), 2000–2030F

	2000	2005	2008	2009	2012F	2020F	2030F
Transportation	62%	60%	61%	57%	57%	60%	57%
Industrial	16%	16%	14%	16%	19%	17%	17%
Residential	6%	6%	6%	6%	6%	7%	7%
Electricity	16%	18%	18%	21%	18%	17%	19%

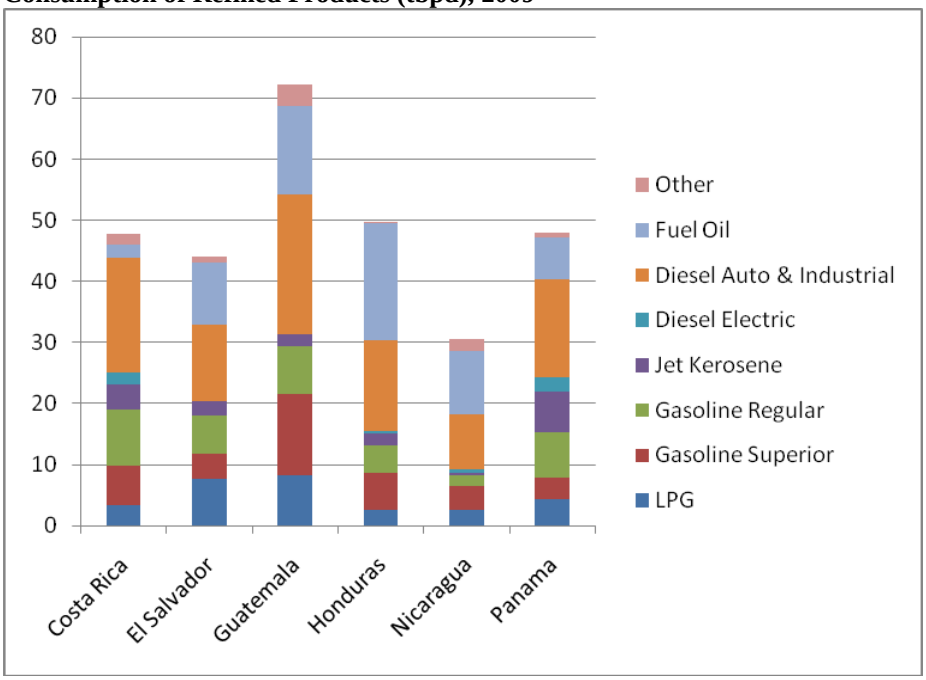
Source: CEPAL, 2008; Nexant.

Country Demand by Sector (tbpd), 2009

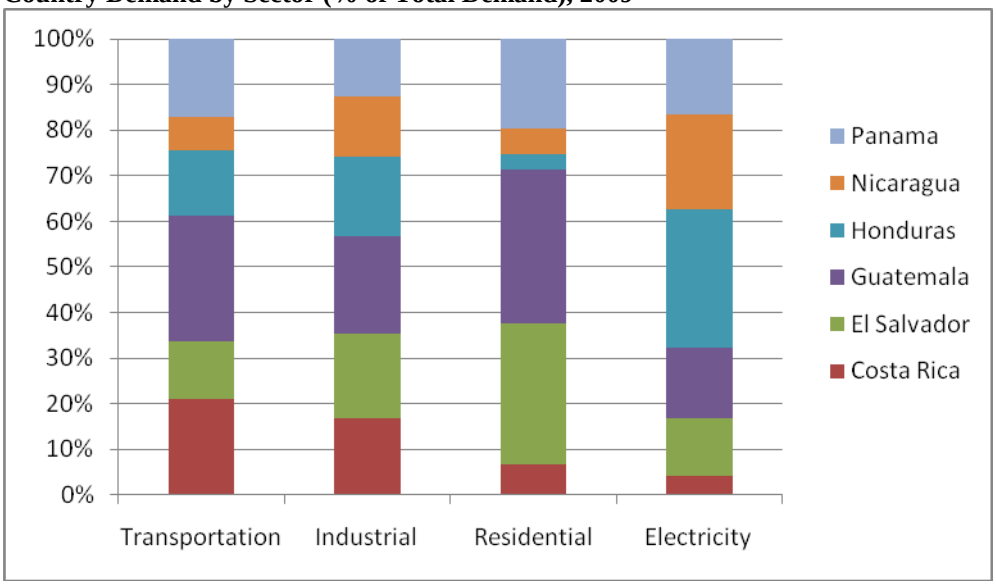
	Transportation	Industrial	Residential	Electricity
Costa Rica	35.61	8.69	1.34	2.10
El Salvador	21.98	9.55	6.26	6.26
Guatemala	46.60	11.03	6.81	7.77
Honduras	24.76	9.02	0.67	15.20
Nicaragua	12.09	6.85	1.19	10.35
Panama	29.33	6.46	3.95	8.24
Region	143.73	40.93	15.49	51.77

Source: CEPAL, 2008; Nexant.

Consumption of Refined Products (tbpd), 2009



Country Demand by Sector (% of Total Demand), 2009



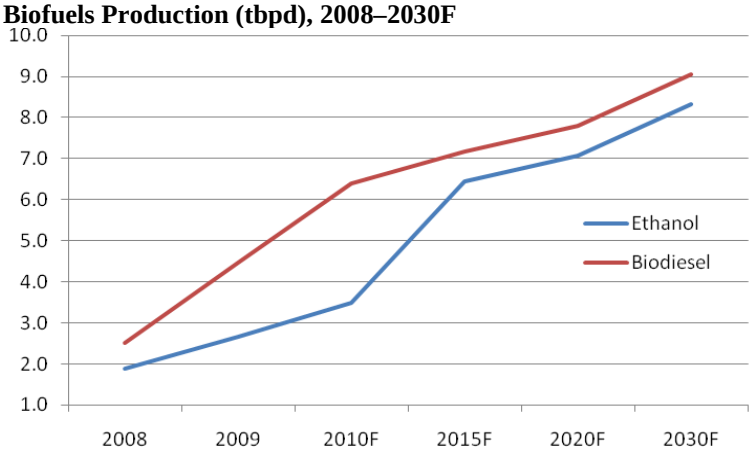
5.2 BIOFUELS PRODUCTION

Biofuels Production (tbpd), 2008–2030F

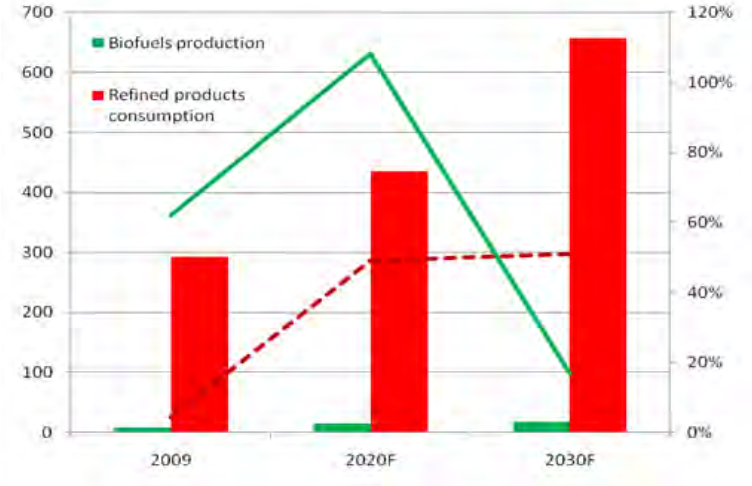
		2008	2009	2010F	2015F	2020F	2030F
Costa Rica	Ethanol	1.14	1.15	1.15	1.19	1.21	1.25
	Biodiesel	1.43	2.17	2.90	2.99	3.09	3.28
El Salvador	Ethanol	0.13	0.27	0.42	0.92	0.99	1.15
	Biodiesel	0.17	0.35	0.53	0.59	0.65	0.76
Guatemala	Ethanol	0.27	0.54	0.82	1.73	1.79	1.91
	Biodiesel	0.43	0.93	1.41	1.76	1.85	2.04
Honduras	Ethanol	0.12	0.25	0.40	0.99	1.21	1.65
	Biodiesel	0.22	0.45	0.70	0.86	1.05	1.45
Nicaragua	Ethanol	0.07	0.15	0.24	0.67	0.88	1.32
	Biodiesel	0.11	0.23	0.36	0.48	0.64	0.95
Panamá	Ethanol	0.15	0.30	0.46	0.96	0.99	1.05
	Biodiesel	0.17	0.34	0.50	0.50	0.52	0.56
Region	Ethanol	1.89	2.67	3.49	6.45	7.08	8.33
	Biodiesel	2.52	4.48	6.39	7.18	7.80	9.05

Source: CEPAL, 2008, 2010.

Biofuels Production (tbpd), 2008–2030F



Biofuels Production and Refined Products Consumption (tbpd and % growth), 2009–2030F



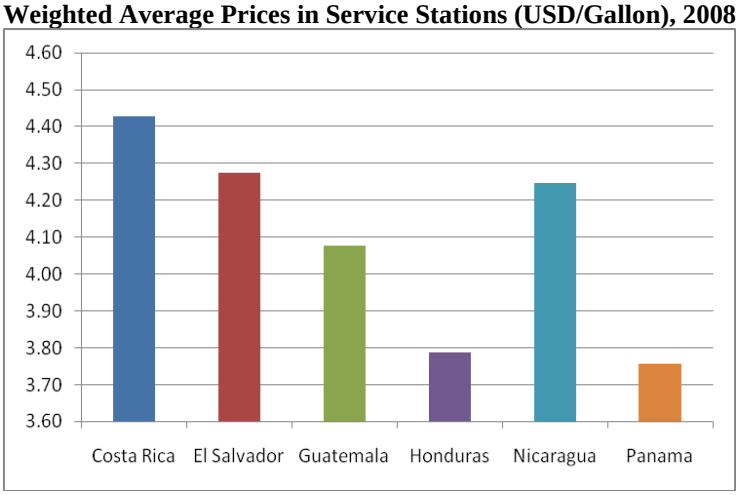
5.3 AVERAGE PRICES

Average Prices in Service Stations (USD/Gallon), 2008

	Superior Gasoline	Regular Gasoline	Diesel	Weighted Average
Costa Rica	4.58	4.48	4.33	4.43
El Salvador	4.36	4.17	4.32	4.28
Guatemala	4.15	4.06	4.03	4.08
Honduras	4.05	3.64	3.66	3.79
Nicaragua	4.38	4.26	4.17	4.25
Panama	3.89	3.73	3.74	3.76

Source: CEPAL, 2008.

Weighted Average Prices in Service Stations (USD/Gallon), 2008



6.1 OVERVIEW

Given the scale and regional scope of these donor programs, and the often overlapping arrangements for the implementation, it is difficult to determine the amounts involved with precision. The review of donor activities in the renewable energy sector presented here is inevitably incomplete and should be taken as a conservative estimate of the level of grant-based and development finance support provided to the countries and regional institutions to support renewable energy, energy efficiency and carbon-reduction investment, capacity building, and market development.

Estimated Programming by Major Donor: Renewable Energy, Energy Efficiency, and Climate Change (USD Millions), 2000–2010

	IDB (1)	GEF (2)	CABEI (3)	WB Group	UNDP (4)	Germany (5)	Japan	Finland	U.S. (6)	Canada	Europe	Total Grants	Total Loans
BZ Loans													0.00
BZ Grants					0.61		9.00					9.61	
CR Loans	1.50		268.00	72.00		235.00							576.50
CR Grants	3.30	152.00			0.14				0.51	0.10		156.04	
SV Loans			59.00			30.00							89.00
SV Grants	1.92						1.00		32.80			35.72	
GU Loans	1.21		84.00	35.00									120.21
GU Grants	1.30	15.00			0.37				0.05			16.72	
HN Loans	35.15		122.00	79.00						0.10			236.25
HN Grants	0.50	24.00			1.86				0.02	1.50		27.88	
NI Loans			9.00	73.00									82.00
NI Grants	2.23	103.00			27.20					21.00		153.43	
PA Loans	30.00			13.00									43.00
PA Grants	0.77	10.00										10.77	
Reg. Loans	10.11			0.20		62.00			6.00		154.00		232.31
Reg. Grants	7.67	65.00			0.14			12.00	16.37	0.80	55.00	156.97	
Total	**95.65**	**369.00**	**542.00**	**272.20**	**30.32**	**327.00**	**10.00**	**12.00**	**55.74**	**23.50**	**209.00**	**567.14**	**1,379.27**

Sources: IDB, GEF, CABEI, World Bank, UNDP, GTZ, KfW, JICA, AEA, USAID, USTDA, MCC, Canada, Europe.
Note: (1) Includes in cooperation with other MFIs and organizations. (2) Includes co-financing. (3) Loans to date, including funds from other organizations. (4) Does not include GEF resources. (5) Includes KfW (loans) and GTZ (grants). (6) Includes USAID (FENERCA/CCAD), USTDA (various), OPIC, MCC (El Salvador) (7) Regional programs may incorporate two or more countries, up to total of seven in the region

6.2 DETAILED PROGRAM INFORMATION

*: 1) regional or global programs with aggregated loan/grant amounts (no breakdown by specific CA country) and 2) aggregated approximate amounts of loan and grant commitments used to derive lower-bound figures for donor institutions in section 6.1

Agency	Program Name	Country	Date	Type	Amount	Focus
IADB	Access to Renewable Energy for Poor Communities in El Salvador	El Salvador	2010 - ongoing	grant and loan	$1.3MM	Sustainable use of RE technologies
IADB	MicroCarbon Development Fund	Regional*	2011 - ongoing	grant and equity	$12MM with $38MM co-financing*	Sustainable use of RE technologies
IADB/EIB/Norwegian MFA	Central America Electric Interconnection	Regional - El Salvador, Guatemala, Panama, Costa Rica, Honduras, Nicaragua*	1997 - 2010	loan	$430MM*	EE end-use technologies
IADB/USAID	Sustainable Energy in Mexico, Central America and Brazil	Regional*	2002 - 2004	grant	$.035MM*	Sustainable use of RE technologies
IADB/Japan Special Fund	Sustainable Market for Clean Rural Energy Services	El Salvador	2002 - 2007	grant	$.9MM	Sustainable use of RE technologies
IADB	Exploitation Geothermal Resources for Electricity Generation Projects	Guatemala	2002 - 2007	grant	$.4MM	Sustainable use of RE technologies
IADB	Promote the Mainstreaming of Sustainable Energy Projects in LA & Caribbean	Regional	2003 - 2004	grant	$.012MM	Sustainable use of RE technologies and low carbon development
IADB/USAID	Sustainable Energy for Latin America	Regional	2003 - 2004	grant	$.07MM	Sustainable use of RE technologies and low carbon development

Agency	Program Name	Country	Date	Type	Amount	Focus
IADB	Electric Interconnection between Guatemala and Mexico	Guatemala	2003 - ongoing	loan	$37.5MM	Sustainable use of RE technologies and low carbon development
IADB	Accelerating Rural Energy Coverage in Panama	Panama	2003 - 2007	grant	$.4MM*	Sustainable use of RE technologies
IADB	Renewable Energy, Regional Integration and GHG Mitigation	Regional*	2004 - 2009	grant	$.11MM*	Sustainable use of RE technologies and EE end-use technologies
IADB	Support for the PPP Energy Sector	Honduras	2004 - 2010	grant	$.15MM*	Sustainable use of RE technologies and EE end-use technologies
IADB	Mainstreaming Sustainable Energy in LAC	Regional*	2004 - 2010	grant	$.14MM*	Sustainable use of RE technologies and EE end-use technologies
IADB	The Energy Sector and Sustainable Development	Regional*	2005 - 2010	grant	$.15MM*	Sustainable use of RE technologies and low carbon development
IADB	Renewable Energy and Energy Efficiency in Latin America and the Caribbean	Regional*	2005 - ongoing	grant	$1.3MM*	Sustainable use of RE technologies and EE end-use technologies

Agency	Program Name	Country	Date	Type	Amount	Focus
IADB	Renewable Energy Microenterprise Initiatives for Low Income Rural Populations	Nicaragua	2005 - 2009	grant	$.7MM	Sustainable use of RE technologies and low carbon development
IADB	Support for the Development of a New Clean Energy Investment Framework for LAC	Regional*	2006 - ongoing	grant	$.24MM*	Low carbon development and GHG reduction
IADB	Energy for Poverty Reduction in Rural Areas	Guatemala	2005 - 2008	grant	$.11MM	Sustainable use of RE technologies and low carbon development
IADB	Comprehensive Review of Regulatory Framework and Policies of the Energy Sector	Panama	2006 - ongoing	grant	$.5MM*	Sustainable use of RE technologies and low carbon development
IADB	Renewable Energy, Energy Efficiency and Carbon Finance in LAC	Regional*	2006 - ongoing	grant	$1.03MM*	Sustainable use of RE technologies and low carbon development
IADB	Expanding the Pipeline of Energy-Related Carbon Credit Projects under the PPP	Regional*	2006 - ongoing	grant	$.38MM*	Low carbon development and GHG reduction
IADB/GEF	CleanTech Fund	Regional*	2006 - ongoing	grant	$1MM*	Sustainable use of RE technologies and low carbon development

Agency	Program Name	Country	Date	Type	Amount	Focus
IADB	Identification of Clean Energy Opportunities	Regional*	2006 - 2007	grant	$.1MM*	Sustainable use of RE technologies and low carbon development
IADB	Development of the Caribbean Energy Sector	Regional*	2006 - ongoing	grant	$.15MM*	Sustainable use of RE technologies and low carbon development
IADB	Harmonization of Energy Efficiency Regulation Systems	Regional*	2006 - 2009	grant	$.1MM*	EE end-use technologies and low carbon development
IADB	Support for the Implementation of the Country Energy Policy	El Salvador	2007 - 2009	grant	$.15MM	Sustainable use of RE technologies and low carbon development
IADB	Long-term Energy-Economy-Environment Scenarios for PPP Countries	Regional*	2007 - 2009	grant	$.15MM*	Sustainable use of RE technologies and low carbon development
IADB	Preparation of Energy Sector Support II Program	Honduras	2007 - ongoing	grant	$.15MM*	Sustainable use of RE technologies and low carbon development
IADB	Energy Efficiency and Biofuels Support Program	Honduras	2007 - ongoing	grant	$.35MM*	Sustainable use of RE technologies and EE end-use technologies

Agency	Program Name	Country	Date	Type	Amount	Focus
IADB	Support for the Implementation of the New SEP Strategy	Regional*	2007 - ongoing	grant	$.097MM*	Sustainable use of RE technologies and low carbon development
IADB	Fostering Energy Efficiency within the Private Sector In LAC	Regional*	2008 - ongoing	grant	$.85MM*	EE end-use technologies
IADB	Program Design of Rural Energy in Kuna Yala Communities	Panama	2008 - ongoing	grant	$.08MM	Sustainable use of RE technologies and low carbon development
IADB/IADB/CABEI/USAID	Energy Sector Support Program II - First Loan	Honduras	2008 - ongoing	loan	$28.55MM	Sustainable use of RE technologies and low carbon development
IADB	Support for Environmental and Social Work to Develop Renewable Sources Energy	Guatemala	2008 - ongoing	grant	$.5MM	Sustainable use of RE technologies and low carbon development
IADB	Fostering Energy Efficiency in the LAC Water Sector	Regional*	2008 - ongoing	grant	$.75MM*	EE end-use technologies and low carbon development
IADB	Regional Information System for Energy	Regional*	2008 - ongoing	grant	$.75MM*	Low carbon development
IADB	Energy Efficiency Integral Plan	Guatemala	2008 - ongoing	grant	$.6MM	EE end-use technologies and low carbon development

Agency	Program Name	Country	Date	Type	Amount	Focus
IADB	Energy Efficiency Program	El Salvador	2008 - ongoing	grant	$.67MM	EE end-use technologies and low carbon development
IADB	Energy Efficiency for Caribbean Water and Sanitation companies	Regional*	2008 - ongoing	grant	$.44MM*	EE end-use technologies
IADB	Bioenergy Action Plan	Honduras	2008 - ongoing	grant	$.75MM	Sustainable use of RE technologies and low carbon development
IADB	Exploring Alternatives in Bioenergy in Latin America and the Caribbean	Regional*	2009 - ongoing	grant	$1MM*	Sustainable use of RE technologies and low carbon development
IADB	Caribbean Hotel Energy Efficiency Action Program	Regional*	2009 - ongoing	grant	$1MM*	EE end-use technologies
IADB	Energy Efficiency and Renewable Energy Project for CARILEC	Regional*	2009 - ongoing	grant	$.53MM*	EE end-use technologies
IADB	Program to Promote Innovative Energy Project and Project Ideas	Regional*	2009 - ongoing	grant	$2MM*	Sustainable use of RE technologies and low carbon development
IADB	Energy Sector Consolidation Support Program I	Panama	2010 - ongoing	loan	$100MM	Sustainable use of RE technologies and low carbon development

Agency	Program Name	Country	Date	Type	Amount	Focus
IADB	Apoyo al Desarrollo de Mini-Centrales Hidroeléctricas (SERNA)	Honduras	2009 - ongoing	grant	$.25MM*	Sustainable use of RE technologies and low carbon development
IADB	DevCap 2007	Regional*	2009 - ongoing	loan/investment	$3.5MM*	Sustainable use of RE technologies and low carbon development
IADB	Promotion of Korea-LAC Green Growth Partnership Opportunity	Regional*	2009 - ongoing	grant	$.5MM*	Sustainable use of RE technologies and low carbon development
IADB	Collaborative ICT Research Virtual Institute:Selected Sectors Initiative	Regional*	2009 - ongoing	grant	$.4MM*	Sustainable use of RE technologies and low carbon development
IADB	Support to the Sustainable Electrification and Renewable Energy Program	Nicaragua	2009 - ongoing	grant	$.5MM	Sustainable use of RE technologies and low carbon development
IADB	Promotion Energy Security for the Americas	Regional*	2009 - ongoing	grant	$.24MM*	Low carbon development
IADB/IEA/EBRD	Energy Efficiency Governance in LAC	Regional*	2010 - ongoing	grant	$.35MM*	EE end-use technologies

Agency	Program Name	Country	Date	Type	Amount	Focus
IADB	Support to the Caribbean Sustainable Energy Road Map	Regional*	2010 - ongoing	grant	$.4MM*	Sustainable use of RE technologies and EE end-use technologies
IADB	Sustainable Electrification and Renewable Energy National Program	Nicaragua	2010 - ongoing	loan	$30MM	Sustainable use of RE technologies and low carbon development
IADB	Central American Renewable Energy and Cleaner Production (CAREC) Facility	Regional - Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama*	2004 - ongoing	loan/investment	$5.5MM	Sustainable use of RE technologies and EE end-use technologies
GEF/UNDP (with Instituto Costarricense de Electricidad (ICE) Ministerio de Medio Ambiente y Energía (MIN))	National Off-grid Electrification Programme Based on Renewable Energy Sources, Phase I	Costa Rica	2002 - ongoing	grant	$1.1MM with $.9MM co-financing	Sustainable use of RE technologies
GEF/IBRD/IFC	EcoEnterprises Fund	Regional - Costa Rica, Belize, El Salvador, Panama*	2002 - ongoing	grant & loans	$1MM with $9MM co-financing*	EE end-use technologies
GEF/UNDP (CARICOM)	Caribbean Renewable Energy Development Programme	Regional – Belize*	2002 - 2009	grant	$4.8MM with $12.45MM co-financing*	Sustainable use of RE technologies

Agency	Program Name	Country	Date	Type	Amount	Focus
GEF/UNDP/IBRD	Off-grid Rural Electrification for Development (PERZA)	Nicaragua	2002 - 2008	grant	$8.5MM with $27.2MM co-financing	Sustainable use of RE technologies
GEF/UNEP (with Ministry of Natural Resources and the Environment Belize)	Energy for Sustainable Development in the Caribbean (ESD-Caraibes)	Regional – Belize*	2010 - ongoing	grant	$4.9MM with $6.3MM co-financing*	EE end-use technologies
GEF/UNDP	Promotion of Environmentally Sustainable Transport in Metropolitan Managua	Nicaragua	2006 - ongoing	grant	$4.2MM with $60.6MM co-financing	EE end-use technologies
GEF/IBRD (with Mesoamerican Development Institute (MDI))	Renewable Energy and Forest Conservation: Sustainable Harvest and Processing of Coffee and Allspice	Nicaragua	2000 - 2004	grant	$.75MM with $1.4MM co-financing	Sustainable use of RE technologies & Low carbon development
GEF/IADB (with Econergy International Corporation (FMC))	CleanTech Fund	Regional - Nicaragua, Panama*	2006 - ongoing	grant	$1MM with $61.2MM co-financing*	Sustainable use of RE technologies
GEF/UNDP (with BUN-CA)	Regional Programme on Electrical Energy Efficiency in Industrial and Commercial Service Sectors in Central America	Regional - Costa Rica, Nicaragua, Panama, El Salvador*	2005 - ongoing	grant	$1.6MM with $12.45MM co-financing*	EE end-use technologies

Agency	Program Name	Country	Date	Type	Amount	Focus
GEF/IFAD (with National Environment Authority (ANAM); Ministry of Agricultural Development (MIDA))	Sustainable and climate-friendly development in Veraguas Province -Proyecto Participa	Panama	2009 - ongoing	grant	$2.5MM with $7.1MM co-financing	Low carbon development & GHG reduction
GEF/IBRD (with Fondo Hondureño de Inversión Social (FHIS))	Rural Infrastructure (Electrification Sector)	Honduras	2005 - ongoing	grant	$2.7MM with $18.7MM0 co-financing	Sustainable use of RE technologies
GEF/UNDP (with Consejo Empresarial Hondureno para el Desarollo Sostenible (CEHDES))	Energy Efficiency Measures in the Honduran Commercial and Industry Sectors	Honduras	2004 - ongoing	grant	$1,000,000 with $1,640,000 co-financing	EE end-use technologies
GEF/UNEP (with UN Economic Commission for Latin America and the Caribbean (ECLAC); Municipality of Guatemala City; Transit and Road Transport Authority of Panama (ATTT)	Promoting Sustainable Transport in Latin America (NESTLAC)	Regional - Guatemala, Panama*	2006 - ongoing	grant	$.99MM with $1.4MM co-financing*	EE end-use technologies

Agency	Program Name	Country	Date	Type	Amount	Focus
GEF/UNEP	Solar and Wind Energy Resource Assessment	Global - Honduras, El Salvador, Nicaragua, Guatemala*	2000 - nearing completion	grant	$6.8MM with $9.3MM co-financing*	Sustainable use of RE technologies
GEF/UNDP (wth Fundacion Solar)	Productive Uses of Renewable Energy in Guatemala	Guatemala	2005 - ongoing	grant	$2.55MM with $11.7MM co-financing	EE end-use technologies
GEF/IBRD (with Ministry of Environment and Energy (MINAE), National Forestry Financing Fund (FONAFIFO))	Mainstreaming Market-based Instruments for Environmental Management Project	Costa Rica	2006 - ongoing	grant	$10MM with $80.3MM co-financing	Low carbon development & GHG reduction
GEF/IBRD	Ecomarkets	Costa Rica	1999 - 2006	grant	$8.3MM with $51.9MM co-financing	Low carbon development & GHG reduction
GEF/IADB/UNEP (with Caribbean Development Bank, UNEP CAR/RCU, Government Ministries, Local Municipalities and Wastewater Mgmt Utilities)	Testing a Prototype Caribbean Regional Fund for Wastewater Management (CReW)	Regional - Costa Rica, Guatemala, Honduras, Panama*	2008 - ongoing	grant	$20MM with $251.5MM co-financing*	EE end-use technologies

Agency	Program Name	Country	Date	Type	Amount	Focus
GEF/UNDP (with CABEI)	Accelerating Renewable Energy Investments through CABEI in Central America	Regional - Costa Rica, Guatemala, Honduras, Nicaragua, Panama, El Salvador, Belize*	2004 - ongoing	grant	$7MM with $82.7MM co-financing*	Sustainable use of RE technologies
GEF/UNDP	5th Operational Phase of the GEF Small Grants Programme (RAF1)	Regional - Costa Rica, Guatemala, Honduras, Nicaragua, Panama*	2007 - 2009	grant	$13.6MM*	Low carbon development & GHG reduction
GEF/UNDP	6th Operational Phase of the GEF Small Grants Programme (RAF2)	Regional - Costa Rica, Guatemala, Honduras, Nicaragua, Panama*	2009 - ongoing	grant	$42.7MM with $43MM co-financing*	Low carbon development & GHG reduction
GEF/UNEP and KfW	Development of a Strategic Market Intervention Approach for Grid-Connected Solar Energy Technologies (EMPower)	Global - Costa Rica*	2003 - 2007	grant	$1MM*	Sustainable use of RE technologies
GEF/UNEP	Renewable Energy Enterprise Development - Seed Capital Access Facility	Global - Belize, Costa Rica, Guatemela, Nicaragua, Panama*	2005 - present	grant	$8.7MM with $40.5MM co-financing*	Sustainable use of RE technologies
IBRD/IDA	Private Participation in Infrastructure Technical Assistance	Guatemala	1997 - 2004	loan	$13MM	Low carbon development & GHG reduction
IBRD/IDA	Utilities Restructuring Technical Assistance Project	Panama	1998 - 2004	loan	$12.7MM	EE end-use technologies

Agency	Program Name	Country	Date	Type	Amount	Focus
IBRD/IDA	Ecomarkets Project	Costa Rica	2000 - 2006	loan	$32.63MM	Low carbon development & GHG reduction
IBRD/IDA	Sustainable Forestry Investment Project	Nicaragua	1999 - 2004	loan	$9MM	Low carbon development & GHG reduction
IBRD/IDA	Offgrid Rural Electrification (PERZA)	Nicaragua	2003 - ongoing	loan	$12MM	Sustainable use of RE technologies
IBRD/IDA/Supplemental Credit to Global Environment Project	Nicaragua Off-Grid Rural Electrification - SUPPLEMENTAL CREDIT	Nicaragua	2003 - ongoing	loan	$4.02MM	Sustainable use of RE technologies
IBRD/IDA/Carbon Offset	Umbrella Project for Renewable Energy Sources (El Cote - Smal-Scale Hydro Power Plant).	Costa Rica	2002 - ongoing	specific investment	$8.86MM	Sustainable use of RE technologies
IBRD/IDA	HN Rural Infrastructure Project	Honduras	2005 - ongoing	loan	$47MM	Sustainable use of RE technologies
IBRD/IDA/Carbon Offset	Guatemala, El Canada 43MW Hydroelectric Project	Guatemala	2003 - ongoing	specific investment	not provided	Sustainable use of RE technologies
IBRD/IDA/Carbon Offset	La Esperanza Hydro Project	Honduras	2004 - ongoing	specific investment	$1.4MM	Sustainable use of RE technologies

Agency	Program Name	Country	Date	Type	Amount	Focus
IBRD/IDA	Mainstreaming Market-Based Instruments for Environmental Management Project	Costa Rica	2006 - ongoing	loan	$30MM	Low carbon development & GHG reduction
IBRD/IDA/Carbon Offset	Precious Woods Project	Nicaragua	2006 - ongoing	specific investment	$7.98MM	Low carbon development & GHG reduction
IBRD/IDA	Power Sector Efficiency Enhancement Project (PROMEF)	Honduras	2009 - ongoing	loan (Republic of Honduras)	$30MM	EE end-use technologies
IBRD/IDA	Carbon Finance Assist (Central America)	Regional - Central America (all countries)*	2007 - ongoing	grant	$0.17MM*	EE end-use technologies
IBRD/IDA	NI Greater Managua Water and Sanitation (PRASMA)	Nicaragua	2008 - ongoing	loan	$40MM	EE end-use technologies
OAS/REEEP-funded	Sustainable Energy Policy Initiative (SEPI)	Guatemala	not provided	not provided	not provided	Sustainable use of RE technologies and low carbon development
OAS	Technical and Policy Assistance for Biofuels Market Development in El Salvador, part of Sustainable Energy Partnership for Americas	El Salvador	2009 - ongoing	not provided	not provided	Sustainable use of RE technologies and low carbon development

Agency	Program Name	Country	Date	Type	Amount	Focus
OAS	Feasibility Study on the Cellulosic Ethanol Market Potential in Belize	Belize	2005 - ongoing	not provided	not provided	Sustainable use of RE technologies and low carbon development
OLADE/Government of Austria	Energy Efficiency Program for Latin America and the Caribbean	Regional - El Salvador and Nicaragua*	not provided	not provided	not provided*	EE promotion, low carbon development, and GHG reduction
OLADE/CIDA	Sustainable Energy Program/Energy and Climate Change	Regional – Guatemala*	2004 - 2009	not provided	not provided*	Sustainable use of RE technologies and low carbon development
OLADE/CIDA	Sustainable Energy Program/Rural Electrification	Regional - El Salvador and Nicaragua*	2004-2007	not provided	not provided*	Sustainable use of RE technologies and low carbon development
OLADE/EC	Securing Energy Supply and Enlarging Markets through Cleaner Fossil Technology - Power Sector Review	Regional - Caribbean, Central and Latin America*	report issued in 2005	not provided	not provided*	Sustainable use of RE technologies and low carbon development
CABEI/NIB	Central American Bank for Economic Integration (CABEI) - Energy Onlending	Regional - Central America*	2010 - ongoing	loan	$30MM*	Sustainable use of RE technologies and low carbon development

Agency	Program Name	Country	Date	Type	Amount	Focus
CAF	Latin American Carbon Program (PLAC+e)	Regional*	currently active	not specified	not specified*	Sustainable use of RE technologies and low carbon development
JICA	Renewable Energy Master Plan	El Salvador	2010 - ongoing	not provided	not provided	Sustainable use of RE technologies
JICA	RE Promotion/Costa Rican Electricity Institute (ICE)	Costa Rica	2010 - ongoing	grant	$9MM	Sustainable use of RE technologies
EIB-KfW	Carbon Programme II	Global - with projects in CA countries*	2009 - ongoing	special investme nt	$120MM*	Low carbon development and GHG reduction
EuropeAid	EuroClima	Regional	2008 - ongoing	grant	$.75MM*	Low carbon development
EuropeAid	EuroSolar	Regional	2006 - 2010	grant	$14.5MM for CA region	Sustainable use of RE technologies and low carbon development
EuropeAid (with EIB, AFD, KfW, AECID, NIB, OeEB, SIMEST, SOFID, IADB, CAF, BCIE)	LAIF Programme	Regional	active	loan	total amount not provided	Sustainable use of RE technologies and low carbon development

Agency	Program Name	Country	Date	Type	Amount	Focus
EuropeAid/ KfW	Energy efficiency and renewable energy programme for SMEs in Central America (under LAIF program)	Regional*	2010 - ongoing	grant/loan	KfW $36MM, CABEI $4MM loan, EC/LAIF Program $3.6MM*	Sustainable use of RE technologies and EE end-use technologies
EuropeAid	Extension on the existing hydro power plant “5 de Noviembre” in El Salvador (under LAIF program)	El Salvador	pending approval	tbd	tbd	tbd
EuropeAid	Sustainable Electrification and Renewable Energy National Programme (PNESER) in Nicaragua (under LAIF program)	Nicaragua	pending approval	tbd	tbd	tbd
Ministry of Foreign Affairs of Finland (with Austria’s ADA)	Central American Energy and Environment Partnership	Regional*	2003 - ongoing	grant/loan	$7MM with $5MM co-financing for 2nd phase*	Sustainable use of RE technologies and low carbon development
SDC/UNDP/GEF	Small Hydroelectric Power Plants	Nicaragua	2007 - ongoing	grant	not provided	Sustainable use of RE technologies and low carbon development
SECO	Intended support for infrastructure and local public basic services	Nicaragua and El Salvador	tbd	tbd	tbd*	Sustainable use of RE technologies and low carbon development

Agency	Program Name	Country	Date	Type	Amount	Focus
KfW/CABEI	Environmental Credit Program for Small and Medium Enteprises	Regional -Central America*	2010 - ongoing	loan	$40MM*	Sustainable use of RE technologies and low carbon development
KfW	Carbon Fund	Regional -Central America*	2007 - 2012	special investment	over $220MM transactions closed to date*	Low carbon development and GHG reduction
BMZ/IBRD/IADB/EC	Initiative for Climate and Environmental Protection (IKLU)	Regional -Central America*	ongoing	not specified	not specified*	Sustainable use of RE technologies and low carbon development
BMU	International Climate Initiative (IKI)	Regional -Central America*	2008 - ongoing	not specified	not specified*	Sustainable use of RE technologies and low carbon development
KFW IPEX Bank of Germany (with Costa Rican Institute of Electricity (ICE))	Garabito Plant	Costa Rica	2009 - ongoing	loan	$235MM*	Sustainable use of RE technologies and low carbon development
KfW/Multisector Investment Bank (BMI)	Solar energy for Hotels Financing	El Salvador	2009 - ongoing	loan	$30MM*	Sustainable use of RE technologies and low carbon development

Agency	Program Name	Country	Date	Type	Amount	Focus
CIDA	Long-Term Urban Sustainability (PLUS) Program	Global - Costa Rica	2009 - ongoing	grant	$.03MM	EE end-use technologies
CIDA	Nicaraguan Electrification Project (PELNICA)	Nicaragua	2009 - ongoing	grant	$18.95MM	Sustainable use of RE technologies and low carbon development
CIDA	Project profile for Energy Efficiency in Industrial and Commercial Sectors	Honduras	2004 - 2008	grant	$1.5MM	EE end-use technologies
CIDA	Integrated Development Initiative	Nicaragua	2005 - 2010	grant	$2MM	Sustainable use of RE technologies and low carbon development
CIDA/OAS	Project profile for Inter-American Council for Integral Development (CIDI)	Regional - LAC and Caribbean*	2003 - 2010	grant	$8MM	Low carbon development
USAID	Increased Use of Renewable Energy Resources Program ((Financiamiento de Empresas de Energía Renovable en Centro America - FENERCA)	Regional	2000 - 2005	grant	$5.3MM	Sustainable use of RE technologies and low carbon development
USAID	Best Practices in Structuring and Targeting Energy Subsidies in Nicaragua	Nicaragua	2003	grant	not provided	Low carbon development

Agency	Program Name	Country	Date	Type	Amount	Focus
OPIC	E & Co Hydroelectric Project	Honduras	2004 - closed	loan	$.1MM	Sustainable use of RE technologies and low carbon development
OPIC	LATIN POWER TRUST III, L.P.	Regional*	2006 - closed	investment fund	$60MM*	Sustainable use of RE technologies and low carbon development
MCC	Rural Electrification Activity	El Salvador	2006 - ongoing	grant	not provided	Sustainable use of RE technologies and low carbon development
DOE	Low-Carbon Communities of the Americas (LCCA)	Costa Rica	2009 - ongoing	grant/enabling activity	not provided	EE end-use technologies and low carbon development

6.3 ACTION MATRIX FOR CENTRAL AMERICAN ENERGY INTEGRATION AND DEVELOPMENT

Authored by energy authorities of the Central American countries, with the help of the Interinstitutional Group (SG-SICA, SIECA, CCHAC, CEAC, CRRH, CEPAL, INCAE, BCIE, BID, USAID, and OLADE)
December 2009

Áreas de acción	*Objetivo*	*Acciones*	*Resultados Esperados*
• **USO RACIONAL Y EFICIENTE DE LA ENERGÍA**			
1. Educación/ Información	1.1. Modificar las pautas de consumo de los usuarios de la energía.	1.1.1. Diseño y Ejecución de campañas para el uso racional de energía. **(UCESICA/SG-SICA, BID, Direcciones de Energía y de Hidrocarburos).**	1.1.1.1. Campañas para el uso racional de energía, diseñadas y en completo funcionamiento con mecanismos de financiamiento, esquemas de evaluación y seguimiento definidos.
	1.2. Entrenar técnicos de los países del área en el desarrollo de programas de URE y FNRE.	1.1.2. Cursos de capacitación en URE y FNRE, en especial en los temas incluidos en la matriz. **(UCESICA/SG-SICA, Direcciones de Energía y de Hidrocarburos, Empresas eléctricas Estatales, INCAE, InWent OLADE).**	1.1.2.1. Técnicos de la región capacitados en temas de URE y FNRE.
2. Incremento de la eficiencia en el consumo de energía eléctrica	2.1. Reducir en 12% el consumo de electricidad para iluminación en los sectores residencial, industrial, comercial y alumbrado público en el período 2007-2020.	2.1.1. Diseño e implementación de programas de sustitución de luminarias incandescentes por eficientes en todos los sectores de consumo **(Direcciones de Energía, CEPAL, BID).**	2.1.1.1 24 millones de LFC y sistemas eficientes de alumbrado público instalados durante el período 2008 – 2020.
	2.2. Reducir en 35% el consumo de electricidad en refrigeración en el sector residencial, mediante la identificación de una cartera de proyectos de inversión.	2.2.1. Diseño e implementación de programas de refrigeración eficiente en el sector residencial **(UCESICA/SG-SICA, Ministerios de Industria y Comercio, Direcciones de Energía, CEPAL).**	2.2.1.1. 2,7 millones de refrigeradoras sustituidas en el período 2008 - 2020
	2.3. Incrementar la eficiencia energética en el bombeo de agua.	2.3.1. Impulso a proyectos de eficiencia energética en bombeo de agua. **(Direcciones de Energía, Municipalidades, industrias que utilizan el bombeo de agua, UCESICA-SGSICA, BID/GTZ).**	2.3.1.1 Un plan de eficiencia energética de los sistemas de bombeo a nivel regional, replicando la experiencia obtenida en el estudio de El Salvador.
	2.4. Reducir en 10% el consumo de energía eléctrica en la industria.	2.4.1. Diseño y aplicación de un programa de sustitución de motores convencionales por motores eficientes en la industria. **(Ministerios de Industria y Comercio, Direcciones de Energía, UCESICA-SGSICA, BID/GTZ).**	2.4.1.1 Programa de sustitución de motores convencionales por motores eficientes puesto en marcha.
3. Financiamiento de programas de ahorro y uso	3.1. Contar con los recursos necesarios para financiar programas.	3.1.1. Diseño y puesta en operación de un fondo regional para financiamiento de programas en eficiencia energética. **(Direcciones de Energía, UCESICA/SG-SICA, BCIE, BID, FIDE)**	3.1.1.1. Contar con los recursos para financiar los programas de eficiencia energética a nivel regional

Áreas de acción	Objetivo	Acciones	Resultados Esperados
eficiente de energía	3.2. Promover el desarrollo de programas de ahorro e introducción de equipos eficientes.	3.2.1. Elaboración de cartera de proyectos de inversión para sistemas de iluminación, refrigeración eficientes y motores (Direcciones de Energía, UCESICA/SG-SICA)	3.2.1.1. Proyectos de inversión identificados para la presentación al Fondo regional o bancos de desarrollo.
4. Reducción de pérdidas eléctricas	4.1. Llevar al menos, al 12%, el nivel de pérdidas de los sistemas eléctricos de los países de la región, mediante una cartera de proyectos de inversión.	4.1.1. Apoyo a los entes reguladores nacionales en la elaboración de estudios para poner en ejecución planes de reducción de pérdidas técnicas y no técnicas, en las redes de distribución eléctrica. (Entes reguladores nacionales, Direcciones de Energía, CEAC, empresas de distribución).	4.1.1.1. Planes de reducción de pérdidas técnicas y no técnicas, ejecutado.
5. Mejora del parque de equipos y sistemas que consumen energía.	5.1. Crear la normativa regional para la eficiencia en el consumo de energía y la transformación del mercado para equipos y sistemas eficientes.	5.1.1. Completar la normativa técnica para la eficiencia energética y ambiental de los equipos de mayor consumo energético. (Direcciones de Energía, Direcciones de Hidrocarburos, CCHAC, UCESICA/SG-SICA, CEPAL).	5.1.1.1. Aprobación, a nivel regional y/o nacional, de las normas de eficiencia de iluminación en tubos fluorescentes y alumbrado público, refrigeración residencial, equipos de cocción de GLP, uso de GLP en vehículos.
	5.2. Reducir en 10% el consumo de leña para cocción de alimentos.	2.5.1. Diseño y puesta en marcha de un programa de cocinas de leña eficientes, en hogares rurales de los países de la región. (Direcciones de Energía, UCESICA-SGSICA, BID/GTZ).	2.5.1.1. Un millón de cocinas eficientes instaladas a través de un mecanismo de financiamiento público-privado.
6. Ahorro de combustibles en la Industria	6.1. Promover la introducción de técnicas de eficiencia energética en los sistemas de generación y usos de vapor.	6.1.1. Apoyar, por medio de talleres y reuniones con industrias, el diseño y puesta en práctica de proyectos y programas de ahorro de energía, en sistemas de vapor. (CCHAC, Direcciones de Hidrocarburos, Ministerios de Industria, Cámara de Industrias de cada país).	6.1.1.1. Aplicación de medidas de ahorro de energía en sistemas de vapor (operación y mantenimiento) y cartera de proyectos de inversión para la búsqueda de financiamiento.
7. Ahorro de energía en el transporte.	7.1. Modificar las pautas de consumo de combustibles en vehículos automotores.	7.1.1. Desarrollo de programas de capacitación en conducción eficiente para administradores y/o operadores de flotillas vehiculares. (Direcciones de Hidrocarburos, CCHAC, SRE/México, BID).	7.1.1.1. Administradores de flotas y operadores de equipo móvil entrenados en técnicas de conducción eficiente.
	7.2. Reducir el consumo de combustibles en el transporte.	7.2.1. Definición y adopción de medidas de reordenamiento vial que puedan ser puestas en práctica en el corto plazo, sin necesidad de inversión. (Direcciones Generales de Hidrocarburos, Ministerios de Transportes, Alcaldías, CCHAC, BID).	7.2.1.1. Mejoramiento en las condiciones de circulación vehicular, obteniendo así un ahorro en el consumo de combustibles y la reducción de emisiones contaminantes del sector transporte en los países del Istmo Centroamericano.
	7.3. Crear el marco regulatorio para mejorar la eficiencia de la flota vehicular.	7.3.1. Apoyar la elaboración de normas a la importación de vehículos (nuevos y usados) que consideren criterios ambientales y de consumo de combustible. (Direcciones de Hidrocarburos,	7.3.1.1. Normas aprobadas y en aplicación, para mejorar la eficiencia energética del parque automotor en circulación y reducir el consumo de combustibles y la contaminación.

Áreas de acción	Objetivo	Acciones	Resultados Esperados
		Ministerios de Ambiente, Ministerios de Transportes, Ministerios de Economía, Importadores de vehículos, UCESICA/SG-SICA, CCHAC, CEPAL).	7.3.1.2. Flota vehicular en circulación con mayor eficiencia energética.
• **DIVERSIFICACIÓN DE LA MATRIZ ENERGÉTICA Y FUENTES NUEVAS Y RENOVABLES DE ENERGÍA**			
8. Participación del GLP en la Matriz energética regional	8.1. Analizar la viabilidad de promover el uso del GLP como combustible en diferentes sectores de consumo.	8.1.1. Elaborar estudios del impacto de la introducción del GLP como combustible en el transporte y cocción de alimentos. (Direcciones de Hidrocarburos, CCHAC, OLADE).	8.1.1.1. Elementos de análisis sólidos para definir una política de introducción sistemática del GLP en la matriz energética del transporte y cocción de alimentos en la Región.
9. Biocombustibles	9.1. Sustituir un 10% del consumo regional de gasolinas por bioetanol.	9.1.1. Complementar y avanzar las acciones tendientes a la producción y utilización del etanol y su mezcla con gasolinas (Direcciones de Hidrocarburos, Ministerios de Agricultura, CCHAC, UCESICA-SGSICA, CEPAL, República de Italia, BID).	9.1.1.1 Introducción sistemática de bioetanol en la matriz energética del transporte en la Región.
	9.2. Sustituir el 5% del consumo regional de diesel utilizado en transporte por biodiesel.	9.2.1 Elaborar estudios y complementar acciones para promover la producción y utilización del biodiesel en los países de la región, incluyendo un plan de acción para su implementación. (Direcciones de Hidrocarburos, Ministerios de Agricultura, CCHAC, BID).	9.2.1.1. Incorporación del biodiesel en el transporte.
10. Ampliación de la participación de las fuentes renovables en la generación eléctrica de los países de la región	10.1. Incorporar al mercado eléctrico proyectos sustentables de generación a partir de fuentes nuevas y renovables de energía	10.1.1 Apoyar al GTPIR del CEAC en la actualización del Plan Indicativo Regional de expansión de la generación eléctrica. (Direcciones de Energía, CEAC, GTPIR, CEPAL, BID).	10.1.1.1. Documento del Plan Indicativo Regional actualizado y aprobado.
		10.1.2. Sistematizar la información disponible de los proyectos de FRE seleccionados en los planes de expansión definidos por GTPIR. (CEAC, CRRH, Direcciones de Energía).	10.1.2.1. Cartera de proyectos financiables.
		10.1.3. Revisar los estudios e iniciativas existentes con el fin de actualizar los aspectos económicos, técnicos, ambientales y sociales de los proyectos de fuentes renovables identificados por el GTPIR, para llevarlos a su fase de financiamiento. (Direcciones de Energía, empresas públicas de electricidad).	10.1.3.1. Cartera de proyectos financiables.
	10.2. Aumentar la oferta de energía a partir de medianos y grandes proyectos	10.2.1. Revisar los estudios e iniciativas existentes con el fin de actualizar los aspectos económicos, técnicos, ambientales y sociales de los proyectos hidroeléctricos para llevarlos a su fase	10.2.1.1. Identificar necesidades específicas de financiamiento para las etapas de diseño y preparación de la cartera de proyectos

Áreas de acción	Objetivo	Acciones	Resultados Esperados
	hidroeléctricos, viables económica, social y ambientalmente.	de financiamiento. (Direcciones de Energía, CEAC, BID, BCIE).	
		10.2.2 Promover el estudio y diseño de proyectos de rehabilitación, modernización u optimización de centrales hidroeléctricas existentes. (Direcciones de Energía, CEAC, BCIE).	10.2.2.1. Identificar cartera de proyectos y necesidades de financiamiento
	10.3. Aumentar, la oferta de energía a partir pequeñas centrales hidroeléctricas, viables económica, social y ambientalmente.	10.3.1. Seleccionar, del inventario de 383 proyectos elaborado por el BID, una lista de 20 que se encuentran en etapa madura de preparación, y en una acción conjunta de los organismos internacionales de financiamiento, concluir los análisis y estudios y ayudar a estos proyectos a finalizar la documentación necesaria para llevarlos a la etapa de financiación. (Direcciones de Energía, BID).	10.3.1.1. Por lo menos 20 proyectos de pequeñas centrales hidroeléctricas social y ambientalmente responsables identificadas.
	10.4. Apoyar los estudios necesarios para fomentar el desarrollo de proyectos geotérmicos económica social y ambientalmente responsables.	10.4.1. Analizar los componentes necesarios para identificar soluciones a las barreras actuales para la explotación y diseño de esquemas de implementación de proyectos de geotermia. (CEAC, JBIC, BID).	10.4.1.1 Barreras eliminadas y proyectos geotérmicos identificados.
		10.4.2. Identificar alternativas para financiación de las etapas de prospección y exploración geotérmica. (CEAC, BID).	I10.4.2.1. Incorporar nuevos proyectos geotérmicos.
	10.5. Apoyar el desarrollo de estudios y proyectos eólicos y solares, particularmente en regiones distanciadas de las líneas de transmisión.	10.5.1. Completar y actualizar los mapas del potencial eólico y solar de la región. (Direcciones de Energía, CRRH, AEA).	10.5.1.1. Mapas actualizados de potencial eólico y solar de la región
		10.5.2. Elaborar la cartera de proyectos eólicos y solares. (Direcciones de Energía).	10.5.2.1. Cartera priorizada de proyectos para la búsqueda de financiamiento.
	10.6. Aumentar la oferta de energía a partir de la cogeneración en ingenios azucareros.	10.6.1. Evaluar el potencial económicamente factible de cogeneración no aprovechado en los ingenios azucareros existentes y preparar cartera de inversiones, aprovechando el MDL (Direcciones de Energía, Ministerios de Ambiente, CEAC, UCESICA-SGSICA).	10.6.1.1. Identificar cartera de proyectos, aplicación de los MDL y necesidades de financiamiento.
	10.7. Fortalecer a las Direcciones de Energía en su capacidad de interlocución con los actores de la sociedad civil afectados por los proyectos de centrales de producción eléctrica, en particular los hidroeléctricos.	10.7.1 Documentar los casos de negociación en el pasado con las comunidades afectadas por proyectos energéticos, ya sea que hayan sido exitosos o fracasos (Direcciones de Energía, CEAC, Empresas Públicas de Electricidad).	10.7.1.1. Informe de los principales casos de negociación, identificando experiencias y enseñanzas para futuros casos.
		10.7.2 Capacitar a personal de las Direcciones de Energía y otras instancias nacionales involucradas, en la implementación de procesos participativos de la sociedad civil, particularmente los actores afectados, en la elaboración de estudios, diseños,	10.7.2.1. Funcionarios nacionales capacitados para implementar procesos participativos de los actores afectados en la ejecución de proyectos energéticos.

Áreas de acción	Objetivo	Acciones	Resultados Esperados
		construcción y operación de proyectos energéticos (Direcciones de Energía, Ministerios de Ambiente y Agricultura, Empresas Públicas de Electricidad).	
• ACCESO A LA ENERGÍA			
11. Electrificación de zonas rurales que no cuentan con el servicio.	11.1. Ampliar la cobertura eléctrica regional llevando el servicio a las poblaciones de las zonas rurales aisladas.	11.1.1. Apoyar la identificación y desarrollo de proyectos de electrificación rural, mediante programas de ampliación de la red o en forma descentralizada. (Direcciones de Energía, CEAC, Empresas eléctricas, OLADE).	11.1.1.1. Aumento de la cobertura eléctrica al 90%, mediante una cartera de Proyectos de electrificación rural.
		11.1.2. Intercambiar experiencias en el desarrollo de proyectos de electrificación rural. (Direcciones de Energía, CEAC, UCESICA-SG-SICA, Empresas eléctricas, CEPAL, BID).	11.1.1.1. Funcionarios nacionales capacitados en el desarrollo de proyectos de electrificación rural.
• ENERGIA Y CAMBIO CLIMATICO			
12. Desarrollo energético y cambio climático.	12.1. Incorporar en la estrategia de desarrollo energético, los aspectos asociados al cambio climático.	12.1.1. Elaboración de estudios específicos para sustentar opciones del sector energético centroamericano para enfrentar los impactos del cambio climático. (Direcciones de Energía y de Hidrocarburos, autoridades nacionales responsables del ambiente, CEPAL, SG-SICA).	12.1.1.1. Incorporación del impacto del cambio climático en las alternativas de desarrollo del sector energético.
	12.2. Impulsar el desarrollo de proyectos de fuentes renovables de energía	12.2.1. Apoyar iniciativas públicas y privadas para la comercialización de créditos de carbono e incentivar el uso del mecanismo de desarrollo limpio (MDL) como fuente complementaria para el financiamiento de proyectos que tengan reducción de gases efecto invernadero. (Direcciones de Energía, Ministerios de Ambiente, CEAC, BCIE, BID y otros entes financieros).	12.2.1.1. Proyectos financiados con mecanismos MDL
	12.3. Valorar el impacto ambiental del uso de combustibles en el transporte.	12.3.1. Elaboración de estudio sobre la eficiencia e impacto ambiental del uso de combustibles en el transporte. (Direcciones de Hidrocarburos, Ministerios de Ambiente, Ministerios de Transportes, CCHAC, CEPAL).	12.3.1.1. Propuesta de mejora de la flota vehicular, desde el punto de vista energético y ambiental para los países de la región.
• INTEGRACIÓN REGIONAL			
13. Integración eléctrica regional	13.1. Consolidar la expansión de la integración eléctrica regional.	13.1.1 Dinamizar el proceso de armonizaciones regulatorias nacionales que impulsen la gradualidad continua en el proceso de integración SIEPAC. (CRIE, CEAC, GD-SIEPAC, BID).	13.1.1.1. Sector eléctrico centroamericano completamente armonizado en el 2009, integrado con México en el 2009 y con Colombia en el 2010.

Áreas de acción	Objetivo	Acciones	Resultados Esperados
		13.1.2. Concluir la interconexión SIEPAC y línea México-Guatemala. (INDE, CFE, BID).	13.1.2.1. Integración México-Guatemala concluida a principio de 2009.
		13.1.3. Apoyar la inversión en los sistemas de transmisión nacionales, en especial aquellos que se requieren para que los países participen eficazmente en el Mercado Eléctrico Regional MER. (Entes Nacionales encargados, CEAC, BCIE, BID).	13.1.3.1. Sistemas nacionales de transmisión en capacidad de operar en el MER.
		13.1.4. Promover la Interconexión eléctrica de Centroamérica con Suramérica mediante el proyecto de interconexión Colombia–Panamá. (ISA, ETESA, CEAC, BID).	13.1.4.1. Interconexión concluida en 2010.
14. Introducción del gas natural en la región	14.1. Apoyar los esfuerzos para la introducción del gas natural como fuente de energía en la región Centroamericana	14.1.1. Presentar los resultados de los estudios a los Ministros de Energía y definir la estrategia para avanzar en las siguientes etapas del proceso. (SG-SICA, CCHAC, CEAC, CEPAL, BID).	14.1.1.1. Desarrollo de proyectos con gas natural en la región.
15. Integración y armonización de los mercados de hidrocarburos de la región.	15.1. Apoyar la consolidación de los procesos de integración del sector hidrocarburos de la región.	15.1.1. Evaluar la posibilidad de desarrollo de infraestructura petrolera regional (refinerías, almacenamiento, ductos). (CCHAC, CEPAL, BID).	15.1.1.1. Construir una refinería regional de alta conversión en un país de Centroamérica
• INSTITUCIONAL			
16. Fortalecimiento de la institucionalidad regional del sector energía	16.1. Contar con un entorno institucional con mayor capacidad de ejecutar los Planes y Programas de Desarrollo Energético Centroamericano.	16.1.1. Apoyar y fortalecer al Comité de Cooperación de Hidrocarburos de América Central, CCHAC, al Consejo de Electrificación de América Central, CEAC y la Unidad de Coordinación energética del SICA, para el desarrollo de las actividades de la Matriz. (SG-SICA, CCHAC, CEPAL, BID, OLADE).	16.1.1.1. Organizaciones regionales responsables del sector energético con mayor capacidad de respuesta y fortaleza para definir y ejecutar programas y proyectos de integración.
		16.1.2. Apoyar y fortalecer las unidades responsables de los programas de ahorro de energía y de eficiencia energética en cada país. (Direcciones de Energía, OLADE).	16.1.2.1. Organizaciones nacionales responsables con mayor capacidad de respuesta para poner en práctica acciones de eficiencia y ahorro.

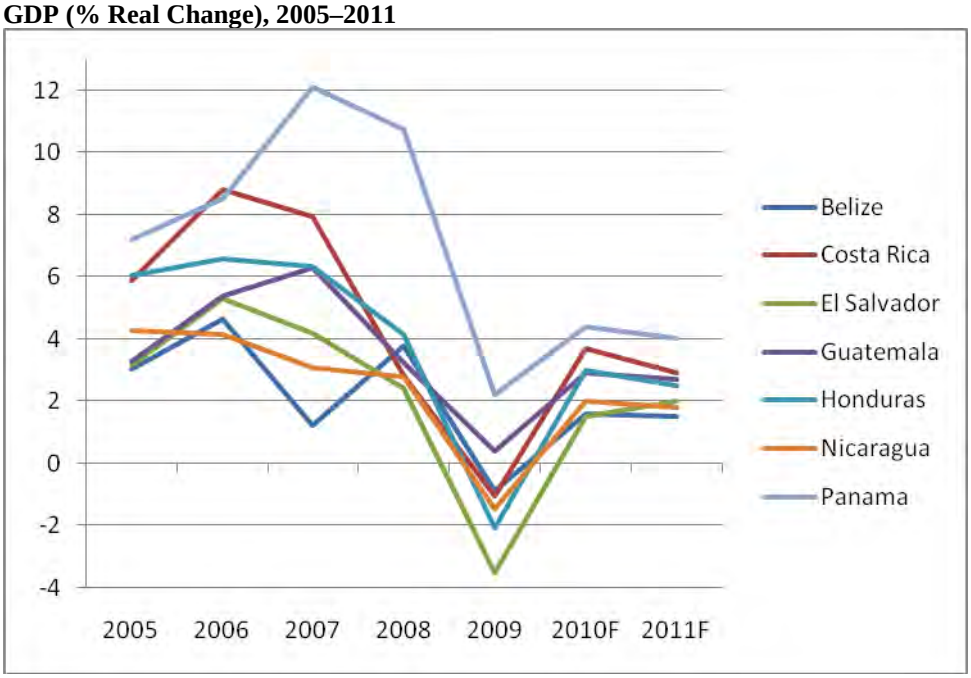
7.1 GDP GROWTH

GDP (% Real Change), 2005–2011

	2005	2006	2007	2008	2009	2010F	2011F
Belize	3.0	4.6	1.2	3.8	-0.9	1.6	1.5
Costa Rica	5.9	8.8	7.9	2.8	-1.1	3.7	2.9
El Salvador	3.1	5.3	4.2	2.4	-3.5	1.5	2.0
Guatemala	3.3	5.4	6.3	3.3	0.4	2.9	2.7
Honduras	6.1	6.6	6.3	4.2	-2.1	3.0	2.5
Nicaragua	4.3	4.2	3.1	2.8	-1.5	2.0	1.8
Panama	7.2	8.5	12.1	10.7	2.2	4.4	4.0

Source: EIU.

GDP (% Real Change), 2005–2011



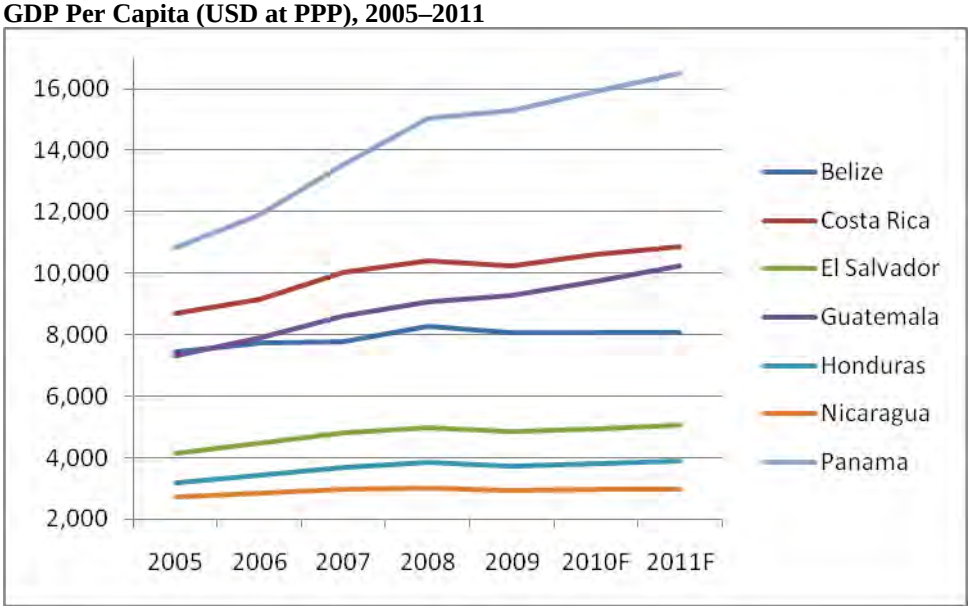
7.2 GDP PER CAPITA

GDP Per Capita (USD at PPP), 2005–2011

	2005	2006	2007	2008	2009	2010F	2011F
Belize	7,425	7,746	7,797	8,263	8,050	8,050	8,070
Costa Rica	8,716	9,166	10,040	10,402	10,251	10,600	10,870
El Salvador	4,149	4,495	4,793	4,997	4,850	4,950	5,050
Guatemala	7,319	7,917	8,608	9,054	9,280	9,750	10,230
Honduras	3,199	3,451	3,700	3,855	3,740	3,830	3,890
Nicaragua	2,733	2,860	2,960	3,030	2,940	2,960	2,970
Panama	10,819	11,925	13,522	15,040	15,300	15,920	16,490

Source: EIU.

GDP Per Capita (USD at PPP), 2005–2011



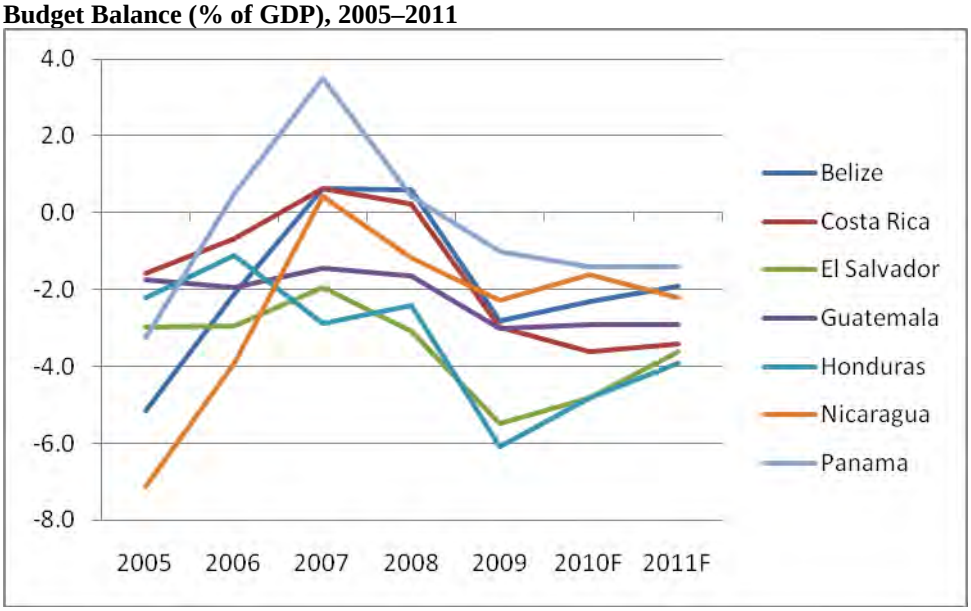
7.3 BUDGET BALANCE

Budget Balance (% of GDP), 2005–2011

	2005	2006	2007	2008	2009	2010F	2011F
Belize	-5.1	-2.1	0.6	0.6	-2.8	-2.3	-1.9
Costa Rica	-1.6	-0.7	0.6	0.2	-3.0	-3.6	-3.4
El Salvador	-3.0	-2.9	-1.9	-3.1	-5.5	-4.8	-3.6
Guatemala	-1.7	-1.9	-1.4	-1.6	-3.0	-2.9	-2.9
Honduras	-2.2	-1.1	-2.9	-2.4	-6.1	-4.8	-3.9
Nicaragua	-7.1	-3.9	0.4	-1.2	-2.3	-1.6	-2.2
Panama	-3.2	0.5	3.5	0.4	-1.0	-1.4	-1.4

Source: EIU.

Budget Balance (% of GDP), 2005–2011



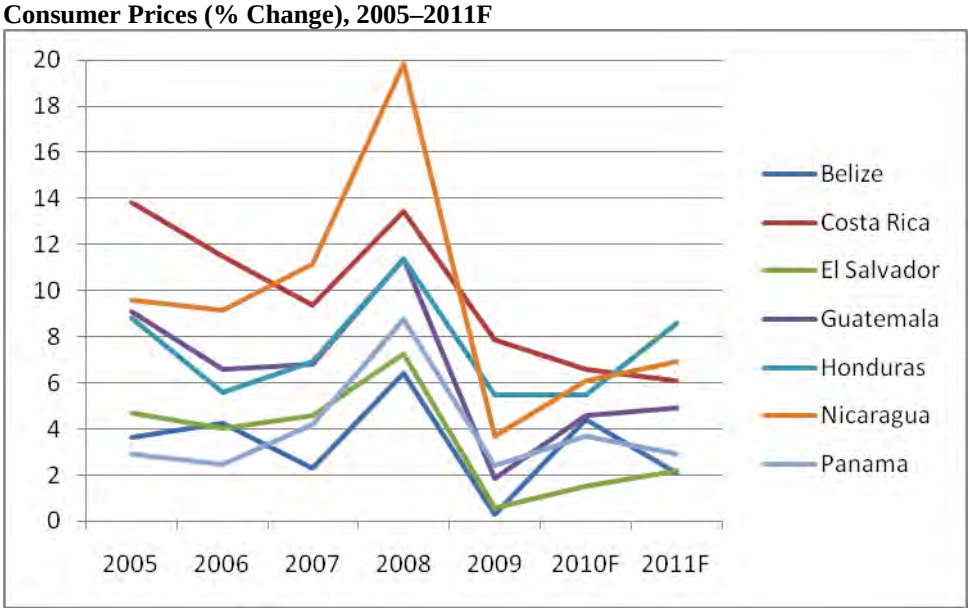
7.4 INFLATION

Consumer Prices (% Change), 2005–2011

	2005	2006	2007	2008	2009	2010F	2011F
Belize	3.7	4.2	2.3	6.4	0.3	4.4	2.1
Costa Rica	13.8	11.5	9.4	13.4	7.8	6.6	6.1
El Salvador	4.7	4.0	4.6	7.3	0.6	1.5	2.2
Guatemala	9.1	6.6	6.8	11.4	1.9	4.6	4.9
Honduras	8.8	5.6	6.9	11.4	5.5	5.5	8.6
Nicaragua	9.6	9.1	11.1	19.8	3.7	6.1	6.9
Panama	2.9	2.5	4.2	8.8	2.4	3.7	2.9

Source: EIU.

Consumer Prices (% Change), 2005–2011F



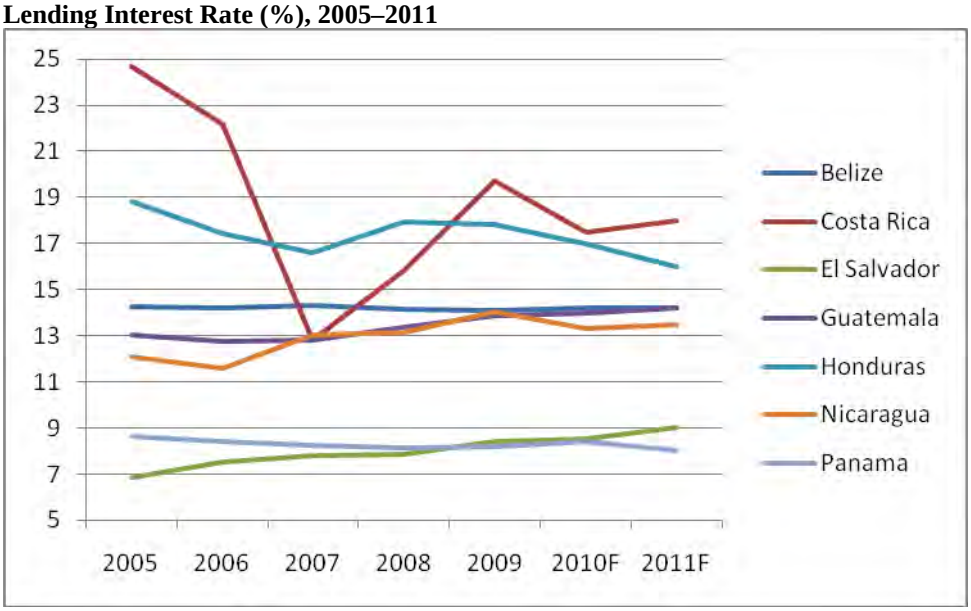
7.5 INTEREST RATES

Lending Interest Rate (%), 2005–2011

	2005	2006	2007	2008	2009	2010F	2011F
Belize	14.3	14.2	14.3	14.1	14.1	14.2	14.2
Costa Rica	24.7	22.2	12.8	15.8	19.7	17.5	18.0
El Salvador	6.9	7.5	7.8	7.9	8.4	8.5	9.0
Guatemala	13.0	12.8	12.8	13.4	13.8	14.0	14.2
Honduras	18.8	17.4	16.6	17.9	17.8	17.0	16.0
Nicaragua	12.1	11.6	13.0	13.2	14.0	13.3	13.5
Panama	8.7	8.4	8.3	8.2	8.2	8.4	8.0

Source: EIU.

Lending Interest Rate (%), 2005–2011



7.6 CURRENCY AND EXCHANGE RATE

Exchange Rate (LCU:US$, avg), 2005–2011

	2005	2006	2007	2008	2009	2010F	2011F
Belize	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Costa Rica	477.8	511.3	516.6	526.2	573.3	522.8	515.9
El Salvador	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Guatemala	7.6	7.6	7.7	7.6	8.2	8.1	8.2
Honduras	18.8	18.9	18.9	18.9	18.9	19.2	21.5
Nicaragua	16.7	17.6	18.4	19.4	20.3	21.3	22.4
Panama	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Source: EIU.

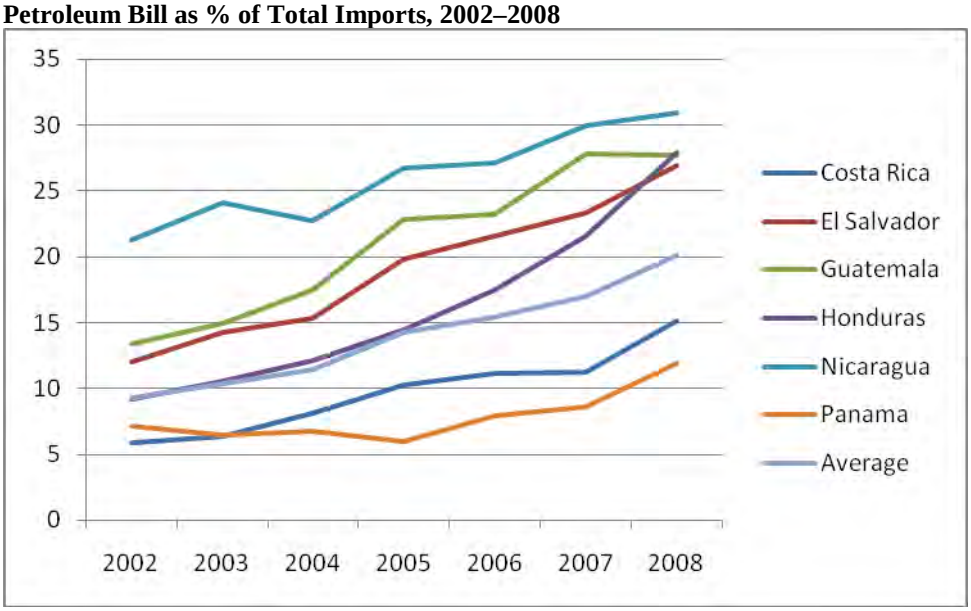
7.7 COST OF IMPORTED PETROLEUM-BASED FUELS RELATIVE TO EXPORTS

Petroleum Bill as % of Total Imports, 2002–2008

	2002	2003	2004	2005	2006	2007	2008
Costa Rica	5.9	6.4	8.1	10.3	11.1	11.2	15.1
El Salvador	12	14.3	15.3	19.8	21.6	23.3	26.9
Guatemala	13.4	14.9	17.5	22.8	23.2	27.8	27.7
Honduras	9.2	10.6	12.1	14.5	17.5	21.6	27.9
Nicaragua	21.3	24.1	22.7	26.7	27.1	29.9	30.9
Panama	7.1	6.5	6.8	6	7.9	8.6	11.9
Average	9.3	10.4	11.4	14.3	15.4	17	20.1

Source: CEPAL, 2008.

Petroleum Bill as % of Total Imports, 2002–2008

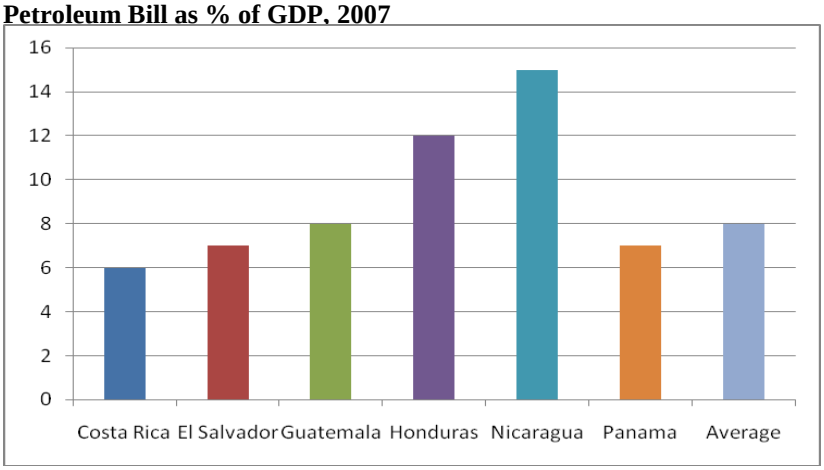


Petroleum Bill as % of GDP

	2005	2007
Costa Rica	5	6
El Salvador	5	7
Guatemala	6	8
Honduras	9	12
Nicaragua	11	15
Panama	5	7
Average	6	8

Source: CEPAL, 2007.

Petroleum Bill as % of GDP, 2007



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Agencia de los Estados Unidos para el Desarrollo Internacional (USAID)
Embajada de los Estados Unidos de América
Bulevar y Urbanización Santa Elena
Antiguo Cuscatlán, La Libertad, El Salvador
Phone: 011 (503) 2501-2999
Fax: 011 (503) 2501-3401
http://www.usaid.gov/sv/