



**Leaders in Economic
Consulting in Puerto Rico**

ENVIRONMENTAL JUSTICE AND ECONOMIC IMPACT STUDY

Presented to Aspenall Energies LLC

August 2012

TABLE OF CONTENTS

I.	INTRODUCTION.....	1
II.	ENVIRONMENTAL JUSTICE STUDY	2
III.	ECONOMIC IMPACT ANALYSIS	20
	APPENDIX A.....	23

I. INTRODUCTION

Aspenall Energies, LLC (henceforth, Aspenall) proposes to develop an eolic park in a 234-acre farm in the Municipality of Santa Isabel. Santa Isabel is a municipality on Puerto Rico's south coast.

The site being considered for the renewable energy project, in the area known as Santa Isabel's Airport (intersection of PR routes 1 and 161), is currently used by the owner for agricultural production. The installation of wind turbines in the site will be designed to minimize the impact on the agricultural operation, which will continue in parallel with the eolic park.

Aspenall will install six (6) wind turbines to generate power to be sold to the Puerto Rico Electric Power Authority (PREPA) under an existing Power Purchase and Operating Agreement (PPOA) which provides for the purchase of up to 10 megawatts by the utility. An additional smaller turbine will be installed to provide power for the owner of the site and operator of the existing agricultural business.

Advantage Business Consulting (henceforth, Advantage) was asked to undertake an assessment of the project's impact from the viewpoints of environmental justice and the economics of the current agricultural operation and the proposed dual-purpose operation.

In this report, Advantage presents the results of the two interrelated studies integrated in a single document:

1. An environmental justice study for the project, and
2. An economic impact analysis.

Two major conclusions follow from the analysis in these studies: 1) There is no reason for an environmental justice concern in this project, and 2) the project will generate significant economic benefits.

NOTE: A project involving 44 power-generating wind turbines, operated by Pattern Energy, already exists in the vicinity of the proposed Aspenall eolic park. The addition of six turbines by Aspenall will have only a marginal environmental impact. This strengthens the case for the project, considering that it passes the environmental justice test with flying colors and is expected to make a significant economic contribution in the area.

II. ENVIRONMENTAL JUSTICE STUDY

The environmental justice study seeks to establish whether the proposed project will or will not have a disproportionate impact on communities with low socio-economic indicators in the area surrounding the proposed site (the “impact area”). The community in the very center of the impact area is **Felicia 1**, a ward of the Santa Isabel Municipality.¹

Santa Isabel

There are eight (8) wards in Santa Isabel, one of which is the municipality’s town center or *pueblo*. The other seven are:

- Boca Velázquez
- Descalabrado
- Felicia 1 (the “impact area” community)
- Felicia 2
- Jauca 2
- Jauca 1
- Playa

Advantage used data from the decennial censuses of the U.S. Census Bureau and from more recent and frequent surveys of the American Community Survey, also produced by the U.S. Census. The data provide a detailed socioeconomic profile of the wards in Santa Isabel and for the whole of Puerto Rico. Such community-level profiles were used by Advantage to construct a socioeconomic index to compare the impact area community (Felicia 1) to other neighboring communities and to the whole of Puerto Rico. *The result of the analysis, as will be seen in detail below, is that the Aspenall project will not impose a disproportionate/discriminatory environmental impact on a disadvantaged community. **There is no reason for an environmental justice concern in this project.***

¹ There are no counties or townships in Puerto Rico. The island’s local government consists of only two levels: the central government (Commonwealth of Puerto Rico) and 78 municipal governments. Each municipality is divided into “barrios” or wards, which are geographic, not political, subdivisions. The term ward will be used throughout this report.

The following map shows the location of Santa Isabel on Puerto Rico's south coast, bordering on the Caribbean Sea, and a blowup of the municipality showing the eight wards. As may be seen, the wards closest to the immediate impact area in Felicia 1 are the town area and, to a lesser extent, Jauca 1 and Playa.

The Municipality of Santa Isabel and Its Eight Wards



The data used for the socioeconomic analysis (and the calculation of the index) include the following variables:

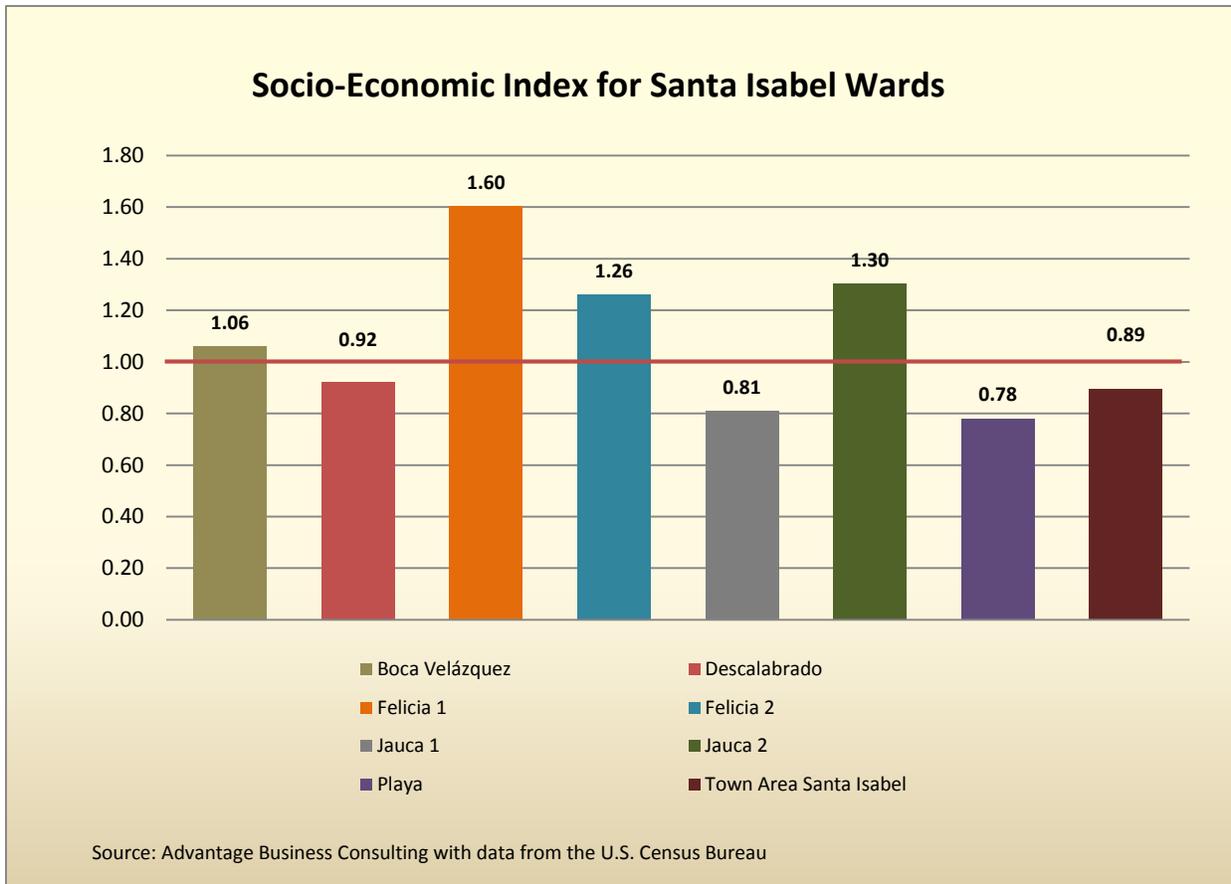
- Population and population growth
- Geographic distribution of the population by ward
- Household income
- Per capita income
- Households below poverty level
- Households receiving public assistance
- Households receiving social security
- Unemployment rate
- Educational attainment
- Number of households and housing units
- Median value of housing units
- Inadequate housing conditions
- Housing tenure (own or rent)

A Note on Methodology

The concept of environmental justice, as developed on the US mainland, focuses on the potential discrimination against racial and ethnic minorities in the siting of projects that may have an environmental impact on neighboring communities. The mainland notion of ethnic minority is not applicable to Puerto Rico, where virtually the entire population is of Hispanic origin. Therefore, it is customary for environmental justice studies on the Island to focus on potential discrimination based on socio-economic status, rather than looking at discrimination on racial/ethnic grounds. The summary product of this methodology is a socioeconomic index to rank communities in an impact area. This approach has been used by researchers on the Island for nearly two decades, and has been accepted by regulatory agencies in the U.S.

The Socioeconomic Index

The following chart shows the values of the socioeconomic index for the eight wards in Santa Isabel. [A technical note on the construction of the index is included in Appendix A.]



As may be seen in the chart, Felicia 1, the impact-area community, has the highest value of the index; a value significantly above the resulting figures for the other wards. This means that, contrary to what would happen in a case of flagrant environmental injustice, the impact-area community for this project is actually the most advantaged in socioeconomic terms.

A look at some salient characteristics of the Felicia 1 community explains why the index came out with such a high value. The ward had only 362 inhabitants in the year 2000, but it experienced a sharp increase in population (46.4%) in the decade up to 2010. Most of this increase was due to the

development of a relatively high-income residential area, which created a relatively well-to-do community in what had been a sparsely populated rural environment.

The Felicia 1 households are significantly ahead of the rest of Santa Isabel's wards in median income, employment condition, educational attainment, and poverty indicators. For example, in 2010, there were no households in Felicia 1 receiving public assistance, compared to a 6% average for the municipality as whole, and only 9.6% of the households were receiving social security payments, as opposed to 34.7% for the entire municipality. Moreover, Felicia1 had an unemployment rate of only 5.5% in 2010, compared to 39.5% for all of Santa Isabel, and the median household income was more than double the municipality-wide average (\$37,829 vis a vis \$17,605).

In short, Felicia 1 is the best positioned *ward* of Santa Isabel in socioeconomic terms. Therefore, there is no question that the proposed location of the Aspenall eolic park project passes the environmental justice test: it will not impact a disadvantaged community; rather the opposite is true.

Details of the Socioeconomic Index

This section presents a detailed analysis of each of the variables used to construct the socioeconomic index.

Population:

According to the 2010 census, the population in the municipality of Santa Isabel was 23,274 persons, about 0.6% of Puerto Rico's total population. In the 2000-2010 period, the population of Santa Isabel experienced a growth of 7.4% as opposed to a 2.2% reduction for the total population of Puerto Rico. Extrapolating to 2013, population in the municipality is expected to increase to 24,064 persons.

In the period 2000-2010, the immediate impact area (Felicia 1) experienced an increase of almost 50% in its population, but it still has the lowest number of inhabitants in all of the municipality's wards. The ward with the highest population in the municipality is the town area.

Population Growth in the Municipality of Santa Isabel					
<u>Wards</u>	<u>2000</u>	<u>2010</u>	<u>% Growth 2000-2010</u>	<u>2013*</u>	<u>% Growth 2010-2013</u>
Boca Velázquez	2,279	2,705	18.7%	2,848	5.3%
Descalabrado	3,918	4,138	5.6%	4,206	1.7%
Felicia 1	362	530	46.4%	594	12.1%
Felicia 2	1,889	3,230	71.0%	3,794	17.5%
Jauca 2	2,538	2,177	-14.2%	2,079	-4.5%
Jauca 1	3,504	4,554	30.0%	4,927	8.2%
Playa	840	807	-3.9%	797	-1.2%
Town Area Santa Isabel	6,335	5,133	-19.0%	4,819	-6.1%
Municipality of Santa Isabel	21,665	23,274	7.4%	24,064	3.4%
Puerto Rico	3,808,610	3,725,789	-2.2%	3,701,296	-0.7%

Source: US Census Bureau 2000 and 2010

*Projected by Advantage Business Consulting

Economic Variables

Household Median Income:

The household median income for the municipality of Santa Isabel is lower than the household median income for Puerto Rico as a whole. In the 2010 census, the median household income in the municipality was \$17,605, which is about 6% lower than the Island-wide figure.

In the last Census (2010), Felicia 1 has the highest household median income compared to the municipality of Santa Isabel, whereas Jauca 1 and Playa are significantly below the average for Santa Isabel.

Household Median Income					
Wards	<u>Household MI</u> <u>2000</u>	<u>Household MI</u> <u>2010</u>	<u>Household MI</u> <u>Estimated 2013*</u>	<u>% Change</u> <u>2000 / 2010</u>	<u>% Change</u> <u>2010 / 2013</u>
Boca Velázquez	\$9,028	\$17,000	\$20,554	88.3%	20.9%
Descalabrado	\$10,009	\$15,064	\$17,030	50.5%	13.0%
Felicia 1	\$11,016	\$37,829	\$54,773	243.4%	44.8%
Felicia 2	\$10,034	\$28,267	\$38,567	181.7%	36.4%
Jauca 1	\$12,102	\$9,972	\$9,409	(17.6)%	(5.6)%
Jauca 2	\$22,500	\$29,570	\$32,096	31.4%	8.5%
Playa	\$11,314	\$13,490	\$14,221	19.2%	5.4%
Town Area Santa Isabel	\$12,640	\$13,792	\$14,158	9.1%	2.7%
Municipality of Santa Isabel	\$11,895	\$17,605	\$19,802	48.0%	12.5%
Puerto Rico	\$14,412	\$18,791	\$20,348	30.4%	8.3%

Source: US Census Bureau 2000 and American Community Survey 2006-2010

*Projected by Advantage Business Consulting

Per Capita Income:

Per capita income in the municipality of Santa Isabel was \$5,903 in the 2000 census, which is lower than the figure for Puerto Rico (\$8,185). Per capita income almost doubled during the last decade, rising to \$8,530 in the 2010 census. The level of income per person is projected to rise to over \$9,000 by 2013.

In the immediate impact area (Felicia 1), per capita income increased nearly four-fold during the last decade. Also, per capita income more than doubled in the two wards—Descalabrado and Felicia 2. The worst performance was in Jauca 1, which suffered a 20.5% decline in per capita income during the decade.

Per Capita Income					
	<u>Per Capita Income</u>	<u>Per Capita Income</u>	<u>Per Capita Income</u>	<u>% Change</u>	<u>% Change</u>
Wards	2000	2010	2013*	2010	2010 / 2013
Boca Velázquez	\$5,045	\$7,045	\$7,787	39.6%	10.5%
Descalabrado	\$4,165	\$8,721	\$10,886	109.4%	24.8%
Felicia 1	\$3,194	\$11,965	\$17,782	274.6%	48.6%
Felicia 2	\$4,238	\$9,951	\$12,855	134.8%	29.2%
Jauca 1	\$8,199	\$6,521	\$6,088	(20.5)%	(6.6)%
Jauca 2	\$7,936	\$10,573	\$11,523	33.2%	9.0%
Playa	\$5,020	\$7,169	\$7,978	42.8%	11.3%
Town Area Santa Isabel	\$5,923	\$7,344	\$7,833	24.0%	6.7%
Municipality of Santa Isabel	\$5,903	\$8,530	\$9,526	44.5%	11.7%
Puerto Rico	\$8,185	\$10,355	\$11,112	26.5%	7.3%

Source: US Census Bureau 2000 and American Community Survey 2006-2010

* Projected by Advantage Business Consulting

Poverty Level:

The incidence of poverty in the municipality of Santa Isabel is higher than in Puerto Rico as a whole. The 2000 census recorded 54.7% of the area’s population under the poverty threshold, more than seven percentage points higher than the 47.3% recorded for all of Puerto Rico. At the municipal level, the poverty standards are projected to remain stable by 2013.

Felicia 1 presents a fall in its poverty level of 27.8% and it has the lower poverty level in comparison to the other wards in the municipality. This is in good measure due to new housing developments that have attracted middle class households to the area. Other wards that have experienced a reduction in poverty levels are Boca Velázquez, Descalabrado, Felicia 2 and Playa.

ENVIRONMENTAL JUSTICE AND ECONOMIC / AGRICULTURAL IMPACT STUDY

Households Below Poverty Level							
Wards	Households Below Poverty Level 2000			Households Below Poverty Level 2010			% Change
	Households	#	%	Households	#	%	# of Households
Boca Velázquez	690	481	69.7%	714	452	63.3%	-6.0%
Descalabrado	1,179	788	66.8%	1,385	755	54.5%	-4.2%
Felicia 1	89	54	60.7%	83	39	47.0%	-27.8%
Felicia 2	576	367	63.7%	915	319	34.9%	-13.1%
Jauca 1	821	450	54.8%	759	478	63.0%	6.2%
Jauca 2	1,126	401	35.6%	1,570	468	29.8%	16.7%
Playa	280	158	56.4%	231	139	60.2%	-12.0%
Town Area Santa Isabel	2,016	1,011	50.1%	2,023	1,063	52.5%	5.1%
Municipality of Santa Isabel	6,777	3,710	54.7%	7,680	3,713	48.3%	0.1%
Puerto Rico	1,261,816	596,466	47.3%	1,227,039	548,785	44.7%	-8.0%

Source: US Census Bureau 2000 and American Community Survey 2006-2010

Households Below Poverty Level							
Wards	Households Below Poverty Level 2010			Households Below Poverty Level 2013*			% Change
	Households	#	%	Households	#	%	# of Households
Boca Velázquez	714	452	63.3%	721	444	61.5%	(1.8)%
Descalabrado	1,385	755	54.5%	1,591	745	46.8%	(1.3)%
Felicia 1	83	39	47.0%	78	35	45.1%	(9.3)%
Felicia 2	915	319	34.9%	1,011	306	30.3%	(4.1)%
Jauca 1	759	478	63.0%	760	487	64.1%	1.8%
Jauca 2	1,570	468	29.8%	1,533	490	32.0%	4.7%
Playa	231	139	60.2%	242	134	55.2%	(3.8)%
Town Area Santa Isabel	2,023	1,063	52.5%	1,981	1,079	54.5%	1.5%
Municipality of Santa Isabel	7,680	3,713	48.3%	7,974	3,714	46.6%	0.0%
Puerto Rico	1,227,039	548,785	44.7%	1,216,794	535,238	44.0%	(2.5)%

Source: US Census Bureau 2000 and American Community Survey 2006-2010

*Projected by Advantage Business Consulting

Public Assistance:

About 40% of the households in the municipality of Santa Isabel received public assistance in 2000. For example, 24 of the 89 households in Felicia 1 received payments under one or more of programs such as welfare, WIC, TANF, and other.

According to the 2010 American Community Survey (ACS), the percentage of households receiving public assistance in the municipality of Santa Isabel is slightly higher than in all of Puerto Rico: 6.0% vs. 5.4%. It is also worth noting that, according to the ACS, there were no families receiving public assistance in Felicia 1 by 2010, although there had been 24 households in that condition ten years earlier.

ENVIRONMENTAL JUSTICE AND ECONOMIC / AGRICULTURAL IMPACT STUDY

Households Receiving Public Assistance							
Wards	Households	Households with Public Assistance 2000		Households with Public Assistance 2010		% Change	
		#	%	Households	#	%	# of Households
Boca Velázquez	690	138	20.0%	714	14	2.0%	(89.9)%
Descalabrado	1,179	234	19.8%	1,385	102	7.4%	(56.4)%
Felicia 1	89	24	27.0%	83	0	0.0%	(100.0)%
Felicia 2	576	225	39.1%	915	45	4.9%	(80.0)%
Jauca 1	821	250	30.5%	759	62	8.2%	(75.2)%
Jauca 2	1,126	227	20.2%	1,570	56	3.6%	(75.3)%
Playa	280	86	30.7%	231	16	6.9%	(81.4)%
Town Area Santa Isabel	2,016	402	19.9%	2,023	164	8.1%	(59.2)%
Municipality of Santa Isabel	4,243	1,586	37.4%	7,680	459	6.0%	(71.1)%
Puerto Rico	1,261,816	253,358	20.1%	1,227,039	66,401	5.4%	(73.8)%

Source: US Census Bureau 2000 and American Community Survey 2006-2010

Households Receiving Public Assistance							
Wards	Households	Households with Public Assistance 2010		Households with Public Assistance 2013*		% Change	
		#	%	Households	#	%	# of Households
Boca Velázquez	714	14	2.0%	721	7	1.0%	(49.7)%
Descalabrado	1,385	102	7.4%	1,454	80	5.5%	(22.1)%
Felicia 1	83	0	0.0%	81	0	0.0%	-
Felicia 2	915	45	4.9%	1,051	28	2.6%	(38.3)%
Jauca 1	759	62	8.2%	741	41	5.5%	(34.2)%
Jauca 2	1,570	56	3.6%	1,735	37	2.1%	(34.3)%
Playa	231	16	6.9%	218	10	4.4%	(39.6)%
Town Area Santa Isabel	2,023	164	8.1%	2,025	125	6.2%	(23.6)%
Municipality of Santa Isabel	7,680	459	6.0%	9,176	316	3.4%	(31.1)%
Puerto Rico	1,227,039	66,401	5.4%	1,216,794	44,433	3.7%	(33.1)%

Source: US Census Bureau 2000 and American Community Survey 2006-2010

*Projected by Advantage Business Consulting

Social Security:

The percentage of households receiving social security benefits in the municipality of Santa Isabel is lower than in Puerto Rico, but it is growing in both the island and the municipality. In the 2000 census, 35.3% of the households in the municipality were receiving social security payments, compared to 33.8% for all of Puerto Rico. However, by the 2010 census the percentage in the municipality dropped to 34.7%, while the island-wide share had increased to 40.8%.

In the last decade, the number of households receiving social security benefits in Felicia 1 declined 81%. The wards Boca Velázquez and Jauca 1 had a similar reduction of households with social security benefits. On the contrary, Descalabrado shows an increase in its number of households with social security.

Households Receiving Social Security							
Wards	Households with Social Security 2000			Households with Social Security 2010			% Change
	Households	#	%	Households	#	%	# of Households
Boca Velázquez	690	234	33.9%	714	179	25.1%	(23.5)%
Descalabrado	1,179	396	33.6%	1,385	590	42.6%	49.0%
Felicia 1	89	42	47.2%	83	8	9.6%	(81.0)%
Felicia 2	576	218	37.8%	915	244	26.7%	11.9%
Jauca 1	821	310	37.8%	759	307	40.4%	(1.0)%
Jauca 2	1,126	264	23.4%	1,570	355	22.6%	34.5%
Playa	280	107	38.2%	231	154	66.7%	43.9%
Town Area Santa Isabel	2,016	823	40.8%	2,023	825	40.8%	0.2%
Municipality of Santa Isabel	6,777	2,394	35.3%	7,680	2,662	34.7%	11.2%
Puerto Rico	1,261,816	426,429	33.8%	1,227,039	500,463	40.8%	17.4%

Source: US Census Bureau 2000 and American Community Survey 2006-2010

Households Receiving Social Security							
Wards	Households with Social Security 2010			Households with Social Security 2013*			% Change
	Households	#	%	Households	#	%	# of Households
Boca Velázquez	714	179	25.1%	721	165	22.9%	(7.7)%
Descalabrado	1,385	590	42.6%	1,454	665	45.7%	12.7%
Felicia 1	83	8	9.6%	81	5	6.0%	(39.2)%
Felicia 2	915	244	26.7%	1,051	252	24.0%	3.4%
Jauca 1	759	307	40.4%	741	306	41.3%	(0.3)%
Jauca 2	1,570	355	22.6%	1,735	388	22.4%	9.3%
Playa	231	154	66.7%	218	172	78.8%	11.5%
Town Area Santa Isabel	2,023	825	40.8%	2,025	826	40.8%	0.1%
Municipality of Santa Isabel	7,680	2,662	34.7%	7,974	2,748	34.5%	3.2%
Puerto Rico	1,227,039	500,463	40.8%	1,216,794	525,085	43.2%	4.9%

Source: US Census Bureau 2000 and American Community Survey 2006-2010

*Projected by Advantage Business Consulting

Unemployment Rate:

During the last decade, two recessions had a severe impact on the labor market throughout the Island, spreading across most of the Municipalities. Santa Isabel wasn't the exception having its unemployment rate more than doubled during the last decade. Meanwhile, Felicia 1 ward represented the single outlier in terms of employment growth within the Municipality of Santa Isabel. During the last decade, the labor force in Felicia 1 increased 2.5 times, employment more than trebled, while unemployment decreased significantly, both in number and in as a percent of the labor force.

Unemployment Rate									
Wards	Labor Force		Unemployment 2000		Labor Force		Unemployment 2010		% Change # of Unemployed
	Employed	#	Rate	Force	Employed	#	Rate		
Boca Velázquez	684	526	158	23.1%	861	470	391	45.5%	147.6%
Descalabrado	1,044	727	317	30.4%	1,462	960	502	34.3%	58.3%
Felicia 1	54	40	14	25.9%	136	128	8	5.5%	(46.3)%
Felicia 2	474	365	109	23.0%	1,023	823	201	19.6%	84.1%
Jauca 1	749	616	133	17.8%	822	208	614	74.7%	361.4%
Jauca 2	1,175	924	251	21.4%	1,985	1,523	462	23.3%	84.1%
Playa	243	172	71	29.2%	184	70	114	62.0%	60.9%
Town Area Santa Isabel	1,661	1,258	403	24.3%	1,836	725	1,111	60.5%	175.6%
Municipality of Santa Isabel	6,084	4,628	1,456	23.9%	8,312	5,028	3,284	39.5%	125.6%
Puerto Rico	1,151,863	930,865	220,998	19.2%	1,383,734	894,150	489,584	35.4%	121.5%

Source: US Census Bureau 2000 and American Community Survey 2006-2010

Social Variables

Educational Attainment:

According to the US Census Bureau, three out of five citizens aged 25 and over had at least a high school diploma in Santa Isabel in the year 2000; the same proportion as in all of Puerto Rico. The Municipality kept abreast the rest of the island in terms of educational attainment for the population 25 year and older, with 67.9% of this age group achieving at least a high school degree in 2010. However, the Felicia 1 ward surged ahead of the rest of the wards in Santa Isabel, and outpaced the average for Puerto Rico as well, with 89.1% of its 25 and older inhabitants having a high school degree or more.

Persons 25 Years or Older With a High School Degree							
Wards	Persons with High School			Persons with High School			% Change # of Graduated
	Population 25 years +	Diploma or more (2000) #	%	Population 25 years +	Diploma or more (2010) #	%	
Boca Velázquez	1,154	640	55.5%	1,358	988	72.8%	54.4%
Descalabrado	2,075	926	44.6%	2,667	1,516	56.8%	63.7%
Felicia 1	166	68	41.0%	147	131	89.1%	92.6%
Felicia 2	1,067	497	46.6%	1,606	1,196	74.5%	140.6%
Jauca 1	1,560	919	58.9%	1,576	909	57.7%	(1.1)%
Jauca 2	2,042	1,518	74.3%	2,748	2,178	79.3%	43.5%
Playa	479	236	49.3%	411	155	37.7%	(34.3)%
Town Area Santa Isabel	3,595	2,407	67.0%	3,489	2,429	69.6%	0.9%
Municipality of Santa Isabel	12,138	7,211	59.4%	14,002	9,502	67.9%	31.8%
Puerto Rico	2,288,326	1,371,922	60.0%	2,429,729	1,641,529	67.6%	19.7%

Source: US Census Bureau 2000 and American Community Survey 2006-2010

According to the US Census Bureau, slightly over 4 out of 5 citizens of Santa Isabel, and Puerto Ricans in general aged 25 and over, had at least entered middle school in 2000. The Municipality’s 25 and over population with at least an elementary school degree followed the Island’s trend in terms of percentage attainment between censuses. Meanwhile, Santa Isabel’s educational attainment of the population 25 years and over with at least seventh grade grew at twice the pace of all Puerto Rico during the past decade. Felicia 1 was the only ward which had 100% of its 2010 population attaining at least seventh grade.

Persons 25 Years or Older With At Least a Seventh Grade Education							
Wards	Seventh Grade			Seventh Grade			% Change # of Graduated
	Population 25 years +	Education or More (2000) #	%	Population 25 years +	Education or More (2010) #	%	
Boca Velázquez	1,154	925	80.2%	1,358	1,201	88.4%	29.8%
Descalabrado	2,075	1,485	71.6%	2,667	2,154	80.8%	45.1%
Felicia 1	166	121	72.9%	147	147	100.0%	21.5%
Felicia 2	1,067	822	77.0%	1,606	1,345	83.7%	63.6%
Jauca 1	1,560	1,221	78.3%	1,576	1,240	78.7%	1.6%
Jauca 2	2,042	1,724	84.4%	2,748	2,403	87.4%	39.4%
Playa	479	386	80.6%	411	345	83.9%	(10.6)%
Town Area Santa Isabel	3,595	3,204	89.1%	3,489	3,102	88.9%	(3.2)%
Municipality of Santa Isabel	12,138	9,888	81.5%	14,002	11,937	85.3%	20.7%
Puerto Rico	2,288,326	1,867,257	81.6%	2,429,729	2,041,547	84.0%	9.3%

Source: US Census Bureau 2000 and American Community Survey 2006-2010

Housing Variables

Households:

Despite a few reductions in smaller wards, growth in households among the larger wards within the Municipality has driven an increase in total households in Santa Isabel during the past decade. A similar trend is expected to continue through 2013.

Households and Housing Units					
Wards	<u>Household</u> 2000	<u>Household</u> 2010	<u>Household</u> 2013*	<u>% Change</u> 2000/2010	<u>% Change</u> 2010 / 2013
Boca Velázquez	690	714	721	3.5%	1.0%
Descalabrado	1,179	1,385	1,454	17.5%	4.9%
Felicia 1	89	83	81	(6.7)%	(2.1)%
Felicia 2	576	915	1,051	58.9%	14.9%
Jauca 1	821	759	741	(7.6)%	(2.3)%
Jauca 2	1,126	1,570	1,735	39.4%	10.5%
Playa	280	231	218	(17.5)%	(5.6)%
Town Area Santa Isabel	2,016	2,023	2,025	0.3%	0.1%
Municipality of Santa Isabel	6,781	7,680	7,972	13.3%	3.8%
Puerto Rico	1,261,325	1,227,039	1,216,936	(2.7)%	(0.8)%

Source: US Census Bureau 2000 and American Community Survey 2006-2010

* Projected by Advantage Business Consulting

Median Value of Housing Units:

According to the 2000 Census, the median value of the housing units in Santa Isabel was around 78% the median value of houses in Puerto Rico. Felicia 1 had the lowest median housing value among all wards, about 60% the median value of houses in the Municipality. By 2010, the median housing value increased across the board in all wards in the Municipality, narrowing the gap between the Municipality’s and the Island’s housing median value. Felicia 1 underwent a dramatic change; the value of housing units rose to 2.5 times the 2000 figure, surpassing Santa Isabel’s median housing value.

Median Value of Housing Units					
<u>Wards</u>	<u>Median Value</u> <u>2000</u>	<u>Median Value</u> <u>2010</u>	<u>Median Value</u> <u>2013*</u>	<u>% Change</u> <u>2000/2010</u>	<u>% Change</u> <u>2010 /2013</u>
Boca Velázquez	\$53,800	\$83,700	\$95,567	55.6%	14.2%
Descalabrado	\$46,400	\$84,900	\$101,771	83.0%	19.9%
Felicia 1	\$37,100	\$95,000	\$125,959	156.1%	32.6%
Felicia 2	\$48,700	\$125,900	\$167,407	158.5%	33.0%
Jauca 1	\$53,100	\$100,000	\$120,913	88.3%	20.9%
Jauca 2	\$77,200	\$107,100	\$118,152	38.7%	10.3%
Playa	\$56,500	\$99,600	\$118,065	76.3%	18.5%
Town Area Santa Isabel	\$62,600	\$85,900	\$94,454	37.2%	10.0%
Municipality of Santa Isabel	\$60,300	\$94,500	\$108,135	56.7%	14.4%
Puerto Rico	\$77,000	\$112,600	\$126,198	46.2%	12.1%

Source: US Census Bureau 2000 and American Community Survey 2006-2010
 *Projected by Advantage Business Consulting

Housing Units with Substandard Conditions:

In terms of infrastructure conditions, housing units in Felicia 1 were generally better than in other Santa Isabel wards. Only 20% of houses in Felicia 1 had unfinished/incomplete plumbing and/or kitchen facilities according in the year 2000. The proportion for the municipality and all of Puerto Rico was close to one third.

Housing with Substandard Conditions - 2000			
<u>Wards</u>	<u>Housing</u> <u>Units</u>	<u>Housing with one</u> <u>or two conditions</u>	<u>%</u>
Boca Velázquez	747	251	33.6%
Descalabrado	1,356	419	30.9%
Felicia 1	103	21	20.4%
Felicia 2	669	236	35.3%
Jauca 1	900	279	31.0%
Jauca 2	1,276	434	34.0%
Playa	380	111	29.2%
Town Area Santa Isabel	2,138	654	30.6%
Municipality of Santa Isabel	7,569	2,405	31.8%
Puerto Rico	1,261,325	408,290	32.4%

Source: US Census Bureau

The percentage of housing with one or two conditions experienced a slight decrease from 2000 to 2010 in both Santa Isabel and Puerto Rico as a whole. A similar trend is expected to continue through 2013 as the quality of housing developments keeps improving. Felicia 1 experienced the greatest improvement in housing conditions between 2000 and 2013.

Housing with Substandard Conditions - 2010			
Wards	Housing Units	Housing with one or two conditions	%
Boca Velázquez	797	263	33.0%
Descalabrado	1,619	495	30.6%
Felicia 1	94	10	10.6%
Felicia 2	1,051	281	26.7%
Jauca 1	943	259	27.5%
Jauca 2	1,719	584	34.0%
Playa	296	122	41.2%
Town Area Santa Isabel	2,275	457	20.1%
Municipality of Santa Isabel	8,794	2,471	28.1%
Puerto Rico	1,227,039	349,588	28.5%

Source: American Community Survey 2006-2010

Housing with Substandard Conditions - 2013*			
Wards	Housing Units	Housing with one or two conditions	%
Boca Velázquez	813	267	32.8%
Descalabrado	1,707	520	30.5%
Felicia 1	91	8	8.8%
Felicia 2	1,204	296	24.6%
Jauca 1	956	253	26.5%
Jauca 2	1,880	638	34.0%
Playa	275	126	45.7%
Town Area Santa Isabel	2,318	410	17.7%
Municipality of Santa Isabel	9,199	2,491	27.1%
Puerto Rico	1,216,936	333,682	27.4%

*Projected by Advantage Business Consulting

Housing Tenure:

About 3 out of 4 households owned their residences in Puerto Rico, as well as in Santa Isabel in the year 2000. However, Felicia 1 ward was an outlier, not having a single renter among its householders in 2000, according to the Census Bureau.

Housing Tenure - 2000					
Wards	Housing	Owner Occupied		Renter Occupied	
	Units	Units	% of Total	Units	% of Total
Boca Velázquez	670	506	75.5%	164	24.5%
Descalabrado	1,180	904	76.6%	276	23.4%
Felicia 1	91	91	100.0%	0	0.0%
Felicia 2	592	444	75.0%	148	25.0%
Jauca 1	792	632	79.8%	160	20.2%
Jauca 2	1,138	968	85.1%	170	14.9%
Playa	295	225	76.3%	70	23.7%
Town Area Santa Isabel	2,023	1,428	70.6%	595	29.4%
Municipality of Santa Isabel	6,781	5,198	76.7%	1,583	23.3%
Puerto Rico	1,261,325	919,711	72.9%	341,614	27.1%

Source: US Census Bureau

By 2010, the ACS estimated the percentages of ownership and renters nearly identical at the Municipality and island-wide levels. Among wards, Felicia 1 went from having 100% owner occupied households in 2000 to having nearly 60% of its households occupied by renters in 2010. This suggests the arrival of new movers into the area.

Housing Tenure - 2010					
Wards	Housing	Owner Occupied		Renter Occupied	
	Units	Units	% of Total	Units	% of Total
Boca Velázquez	714	536	75.1%	178	24.9%
Descalabrado	1,385	1,110	80.1%	275	19.9%
Felicia 1	83	34	41.0%	49	59.0%
Felicia 2	915	684	74.8%	231	25.2%
Jauca 1	759	590	77.7%	169	22.3%
Jauca 2	1,570	1,290	82.2%	280	17.8%
Playa	231	193	83.5%	38	16.5%
Town Area Santa Isabel	2,023	1,254	62.0%	769	38.0%
Municipality of Santa Isabel	7,680	5,691	74.1%	1,989	25.9%
Puerto Rico	1,227,039	888,755	72.4%	338,284	27.6%

Source: American Community Survey 2006-2010

III. ECONOMIC IMPACT ANALYSIS

The Santa Isabel eolic park will generate substantial economic benefits for the municipality and all of Puerto Rico. As detailed below in this section, the project will have significant impacts on employment, the value of aggregate economic activity, and fiscal revenues for the state and municipal governments. In addition, the project will have spillover economic benefits to the extent that it helps to reduce the economic and environmental costs of Puerto Rico’s dependence on petroleum for power generation.

The highlights of the economic impact analysis are:

1. The construction phase of the project will generate 341 direct, indirect and induced jobs in the area.
2. The construction phase of the project will produce \$12.9 million in direct, indirect and induced salary income.
3. The operational phase of the project will generate \$4,140,000 in recurrent direct, indirect and induced business revenue, and over \$100,000 in direct, indirect and induced labor income.
4. The project will produce over \$800,000 in local tax revenues in the construction phase and a recurrent flow of over \$15,000 in taxes during the operational phase.

These are substantial economic benefits, considering that the project is a community-scale venture. In addition, the project would generate valuable externalities in the form of economic and environmental savings from the switch from petroleum to clean renewable energy.

Since the project will coexist with an agricultural operation, it is worth comparing the project’s economic impact to the **total** economic impact of agricultural activities in Santa Isabel, a municipality that ranks second only to Hatillo among Puerto Rico’s 78 municipalities in the value of agricultural output. Even with such a high agricultural rank, Santa Isabel’s agro-economy generates under 1,500 jobs and a little over \$7 million in salary income. This helps put the project’s economic contribution in perspective.

Economic Highlights of Santa Isabel's Agriculture Fiscal Year 2010	
Gross Agricultural Income	\$58,550,000
Employment	1,282
Gross Payroll	\$7,220,178

Source: Calculated by Advantage Business Consulting with data from the PR Department of Agriculture

Details of the economic impact analysis

This section presents a detailed discussion of each of the various dimensions of the economic impact analysis.

Economic Impact: Construction Phase		
<u>Concept</u>	<u>Factor</u>	<u>Total Project</u>
Production (Aggregate Economic Activity) : (millions of \$)		
Direct	1.00	\$30.0
Direct and Indirect	2.64	\$79.2
Employment:		
Direct	1.0	150
Direct and Indirect	1.8	267
Direct, Indirect and Induced	2.3	341
Salary: (millions of \$)		
Direct	0.16	\$4.8
Direct and Indirect	0.33	\$9.9
Direct, Indirect and Induced	0.43	\$12.9

Source: Puerto Rico Interindustry Multipliers: Input-Output Matrix 2001-2002

The multiplier used in the analysis is New Construction.

Economic Impact: Operational Phase		
<u>Concept</u>	Multiply by: <u>\$1 Million</u>	<u>Project Total</u>
Production (Aggregate Economic Activity):		
Direct	1.00	\$2,000,000
Direct and Indirect	2.07	\$4,140,000
Employment:		
Direct	1.00	2
Direct and Indirect	1.46	3
Direct, Indirect and Induced	2.92	6
Salary:		
Direct	(\$28,696 x 1 FTE)	\$57,392
Direct and Indirect	1.20	\$68,870
Direct, Indirect and Induced	1.88	\$107,897

*The multiplier used were those of electricity and irrigation from the Input-Output Matrix 2002.

Fiscal Impact	
<u>Concept</u>	<u>\$</u>
Construction Phase:	
Operating Municipal Taxes "Patente"	\$ 60,000
<i>Total Municipal Construction</i>	<i>\$ 60,000</i>
Internal Revenue	\$ 150,000
Income Tax	\$ 678,239
<i>Total State Construction</i>	<i>\$ 828,239</i>
Government Revenue- Construction Phase	\$ 888,239
Operational Phase:	
CRIM (Municipal)	\$2,574
Direct Income Tax (State)	\$12,569
Government Revenue- Operational Phase	\$ 15,143

APPENDIX A

Construction of the Socio economic Index

A central part of the environmental justice (EJ) analysis is the calculation of a socioeconomic index to compare the socioeconomic conditions of the immediately impacted ward against the rest of the wards in the given municipality (Santa Isabel, in this instance). The index is constructed using the following eleven indicators:

Indicators Used to Create the Socioeconomic Index
Household Median Income
Per Capita Income
Households Below Poverty Level
Households Receiving Public Assistance
Households Receiving Social Security
Unemployment Rate
Educational Attainment
Persons with Seven Grade
Housing Units
Housing Units Median Value
Housing Selected Conditions

The data were obtained from US Census Bureau 2000 and the American Community Survey 2006-2010

The index for the wards is calculated in two steps. First, each individual value of an indicator for a given ward is divided by the value of the indicator for the reference area (in this case, the Santa Isabel Municipality). This produces a relative measure for the ward *vis a vis* the municipality (Santa Isabel). Second, all of the relative measures calculated in the first step are averaged (using a geometric mean) and this produces the index.

The logic behind this analysis is that in most of the indicators, the higher the proportions of the geographic subunit with respect to the larger geographic subunit (wards vs. municipality) the better off is the ward in comparison to the other wards in the reference area. A ratio value of 1 indicates that there is a complete equality between the values of the indicator of the wards with respect to the indicator of the reference area. In other words, any value above 1 indicates that the ward presents a more favorable condition than the average for the reference area, while any value below a 1 indicates that the ward presents a less favorable condition than the average for the reference area.

Certain variables are such that a ward's socioeconomic condition deteriorates as the variable increases (for example, unemployment and incidence of poverty). In this case, the reciprocal of the variable is used in the calculation of the index. This is the procedure applied to the following:

Inverse Indicators used to Create the Socioeconomic Index
Housing Selected Conditions
Households Below Poverty Level
Households Receiving Public Assistance
Households Receiving Social Security
Unemployment Rate

The data were obtained from US Census Bureau 2000 and the American Community Survey 2006-2010

In the previous five indicators, a higher value represents a worse socioeconomic situation for the geographic area under evaluation. In order to be able to compare these variables with the other six, the inverse of the variable ($1/X$) must be used to present congruency between the variables. Using the inverse of the variable guarantees that the geometric mean is consistent with the other indicators which presents consistency between the larger the value the more favorable the socioeconomic condition of the area.

The following three tables show the ranking of the wards in Santa Isabel for the eleven variables used in the index. It is clear that the immediate impact community, the Felicia 1 ward, ranks significantly better than the rest in most of the variables, resulting in a significantly higher value for the overall index.

ENVIRONMENTAL JUSTICE AND ECONOMIC / AGRICULTURAL IMPACT STUDY

Ranking of Wards by Economic Variables												
<u>Wards</u>	<u>Per Capita Income</u>		<u>Household Median Income</u>		<u>Poverty Level</u>		<u>Public Assistance</u>		<u>Social Security</u>		<u>Unemployment</u>	
	<u>Rank</u>	<u>Quartile</u>	<u>Rank</u>	<u>Quartile</u>	<u>Rank</u>	<u>Quartile</u>	<u>Rank</u>	<u>Quartile</u>	<u>Rank</u>	<u>Quartile</u>	<u>Rank</u>	<u>Quartile</u>
Boca Velázquez	7	4	4	2	8	4	2	1	3	2	5	3
Descalabrado	4	2	5	3	5	3	6	3	7	4	4	2
Felicia 1	1	1	1	1	3	2	1	1	1	1	1	1
Felicia 2	3	2	3	2	2	1	4	2	4	2	2	1
Jauca 1	8	4	8	4	7	4	8	4	5	3	8	4
Jauca 2	2	1	2	1	1	1	3	2	2	1	3	2
Playa	6	3	7	4	6	3	5	3	8	4	7	4
Town Area Santa Isabel	5	3	6	3	4	2	7	4	6	3	6	3

Ranking of Wards By Educational Attainment				
<u>Wards</u>	<u>Persons 25 years or older - High School Degree or More</u>		<u>Persons 25 years or older - Seventh Grade or More</u>	
	<u>Rank</u>	<u>Quartile</u>	<u>Rank</u>	<u>Quartile</u>
Boca Velázquez	4	2	3	2
Descalabrado	7	4	7	4
Felicia 1	1	1	1	1
Felicia 2	3	2	6	3
Jauca 1	6	3	8	4
Jauca 2	2	1	4	2
Playa	8	4	5	3
Town Area Santa Isabel	5	3	2	1

Ranking of Wards By Housing Variables						
<u>Wards</u>	<u>Tenure: Owner vs. Renter</u>		<u>Household Median Value</u>		<u>Selected Conditions</u>	
	<u>Rank</u>	<u>Quartile</u>	<u>Rank</u>	<u>Quartile</u>	<u>Rank</u>	<u>Quartile</u>
Boca Velázquez	5	3	8	4	6	3
Descalabrado	3	2	7	4	5	3
Felicia 1	8	4	5	3	1	1
Felicia 2	6	3	1	1	3	2
Jauca 1	4	2	3	2	4	2
Jauca 2	2	1	2	1	7	4
Playa	1	1	4	2	8	4
Town Area Santa Isabel	7	4	6	3	2	1