ANNEX 5: FURTHER DETAILS ON APPROACH TO COST–BENEFIT ANALYSIS

This annex contains supplementary information to the cost–benefit analysis (CBA), outlined in Section 5. It includes the following sections:

- Methodology
- Framing workshop parameters summary
- Financial assumptions
- Benefits assessment and valuation
- Results summary
- Limitations

A5.1 METHODOLOGY

Assessment Process Overview

A structured process has been used to evaluate ways to address the shortage of energy generation predicted to be caused by climate change. This process involved the following steps:

1. Identify the issue or dilemma requiring assessment, followed by background data review and discussions.
2. Conduct a formalized workshop process, carried out with stakeholders to frame the assessment overall.
3. Collect data and pursue consultation.
4. Conduct economic CBA modeling.
5. Present results.

The key steps in this process are discussed in more detail next.

Theoretical Basis for the Assessment

An economic model for assessing the benefits of environmental and social protection has been presented in Hardisty and Ozdemiroglu (2005). Based on this CBA method, it is possible to explicitly monetize a number of relevant external costs and benefits, thereby allowing these costs and benefits to be added into the conventional internal or private (company or developer) costs and benefits of a proposed project or action. This model, described below in more detail, is the basis upon which the analysis of options has been carried out.

Benefits

Objective setting must consider the benefits of achieving a given objective. In economics, the overall objective of any decision is assumed to be the maximisation of human welfare over time. To compare the different benefit and cost streams over time, the process of discounting is used and amounts over time are expressed as present values. Economic analysis recommends the decision with the maximum net present value (NPV) (present value of net benefits, or benefits minus costs, over time) or the highest benefit cost ratio (BCR) (ratio of the present value of benefits to the present value of costs). Benefits of environmental protection can effectively be expressed as the “damages avoided” by undertaking that action.

Net Benefits

What is important in a decision-making process is the overall comparison of the costs of action, with the benefits of action; hence the term *cost–benefit* analysis. To find net benefits, we deduct the flow of costs from the flow of benefits.

Thus, the present value of the net benefits (NPV) (benefits minus costs) of the selected project or action in any year, *t,* is given by:

$$NPV = \sum_{0}^{T} \left[\frac{(B_p + B_x) - (C_p + C_x)}{(1+r)^T} \right]$$

Where NPV is the total social NPV of project p, B_p and C_p are the private or internal costs and benefits of the project, B_x and C_x are the external benefits and costs of the project respectively and r is the discount rate.

Valuation of Benefits

For the equation to be calculated, both the costs and benefits of each adaptation option must be estimated in a common unit. Economic analysis uses money as this common unit, based on what individuals are willing to pay, and what one would have to spend on the actions to supplement the shortfall in energy generation due to climate change.

The value of the environment or natural resources includes: as an input to production or consumption (direct use value); its role in the functioning of ecosystems (indirect use value); or its potential future uses (option value). In the case of water, for instance (a key consideration in this study), people may also value water and be willing to pay for its protection unrelated to their own use of the resource (nonuse values) but because of its benefits to others (altruistic value), for future generations (bequest value) and for its own sake (existence value). The sum of these different types of economic benefits or values is referred to as *total economic value* (TEV) in economic literature.

Private Benefits

If the analysis is undertaken from the perspective of the problem holder, only the costs and benefits that accrue to the problem holder are considered. This approach, which is a financial (as opposed to economic) analysis, uses market prices of costs and benefits, which include subsidies or taxes. Private discount rates are used, which are determined by the cost of capital or rates of return from alternative investments in the private sector. Private discount rates are generally higher than social discount rates. Financial analysis does not deal with environmental or other external social impacts. Table A5-1 presents a selection of typical private benefit categories.

Table A5.1: Private Benefit Categories—Examples

- Value of production realized from project or investment, from energy or water on-sale, for example
- Increased property value
- Elimination of corporate financial environmental liability
- Elimination of potential for litigation / prosecution (civil and criminal)
- Avoidance of negative public relations or even impact on company stock value
- Protection of a resource used as a key input to an economic process (e.g., water for irrigation or manufacture)
- Avoidance of exposure of on-site personnel to pollutants

A full economic analysis looks at those costs and benefits that accrue to society as a whole, and is therefore appropriate in helping to develop national policy. This includes costs and benefits to the project owner or state proponent as well as those to the rest of the society. The latter are also known as *external* costs and benefits (as they are external to the transactions in the market and hence not included in market prices) so long as they are not compensated by or paid to the problem holder. This different definition of costs and benefits requires them to be measured differently than in a financial (private) analysis.

The prices for marketed goods and services that are affected should no longer be market prices, but real or shadow prices. Shadow prices are estimated by subtracting (or adding) the subsidy and tax elements from (to) market prices. Subsidies and taxes are referred to as *transfer payments*—their payment does not cause a net change to the costs and benefits faced by the society as a whole but simply a transfer from one party to another within society. For example, litigation expenses are considered transfer payments. The proponent's costs for litigation become the benefits of the law firm, and hence cancel each other out when a social analysis is undertaken.

In practice, only some of the benefits identified during a CBA can be readily quantified and monetized. This is likely to include several of the key private benefits (such as land value). External benefits are less readily monetized, as there is often no market data that could be directly used for their estimation. Valuation methods applicable to problems of sustainable development include the following:

- *Actual market techniques*, where the good itself is priced on the open market as a saleable commodity. For example, water sold as drinking water has a price per unit volume, and land is bought and sold, and has a specific value, depending on location, zoning, and market conditions.

- *Surrogate market techniques,* in which a market good or service is found that is influenced by the externality that itself is not reflected in a market (or it is nonmarket). For example, water might be used to irrigate crops that are sold at market prices. The crop market in this example is a surrogate market and a proportion of the economic value of the yield is representative of the value of water as an input. This approach is especially useful when irrigation water is provided free or is subsidized resulting in lower prices than the water would have fetched in free markets in the absence of subsidies. If that water resource is polluted, another way to quantify the cost is to look at the expenditures people make to avoid the contamination damage (e.g., purchase of water filters or bottled water)—these markets act as a surrogate markets for the value of (clean) water.
- *Hypothetical market techniques* create hypothetical markets via structured questionnaires, which elicit individuals' willingness to pay (WTP) to secure a beneficial outcome or to avoid a loss, or their willingness to accept compensation (WTA) to forgo a beneficial outcome or to tolerate a loss. Among these stated preference techniques are contingent valuation and choice modeling.

WTP is a standard method used worldwide for estimating the economic value for goods and services for which no direct market exists. Economic valuations, transferred from a specific test group, location and subject and applied to other projects, are a common economic practice, known as Benefits Transfer, and a standard practice within WTP surveys.

In the process of undertaking a beneficial action, it is sometimes possible that secondary environmental impacts are produced by those actions, despite best attempts at mitigation. The economic value of these impacts should be included in the overall economic assessment. The costs of dealing with these effects (as a lower bound estimate), or the value of the damages that they cause, which are not borne by the problem holder, are termed *external costs of action* (Hardisty and Ozdemiroglu, 2005).

External costs of action (X) can be divided into two categories:

1. Planned or process-related external costs that cannot be mitigated against (X_p)
2. Unplanned or inadvertent external costs (X_{up}), such that:

$$X = X_p + (P \times X_{up})$$

where P is the probability that the unplanned external cost will occur.

External costs of action could include production of greenhouse gases from energy-intensive solutions, production of other airborne pollutants such as NOx and SOx, and secondary impacts on water quality, biodiversity, or community.

Modelling

The CBA modeling is based on published methodologies (Hardisty and Ozdemiroglu, 2005; UK Environment Agency, 1999), and follows conceptual approaches espoused and approved by a number of government organisations worldwide.

A5.2 Framing Workshop Parameters Summary

Table A5.2 presents the parameters that were identified in Workshop 2, their importance to stakeholders in Albania, and how they were or were not incorporated into the CBA.

The average ranking for each parameter is presented based on the opinions of workshop attendees and discussions with other stakeholders during meetings including: an industrial consumer, an academic, engineering students, and a World Bank economist. The rationale for inclusion or exclusion from the CBA is also noted.

A number of parameters were identified as areas for further study: value of water, value of ecosystems, disturbance of people and properties, impacts on tourism, GDP impacts, and vulnerability to natural disasters. In these cases, parameters could not be fully integrated into the study (typically because of a lack of data at the appropriate level of abstraction) but may be important for future policy making. One example is tourism. In the absence of a good basis for quantifying the benefits or dis-benefits that might arise in a "typical" power generation setting in Albania, the tourism parameter was not included in the current analysis. However, tourism is very important to the local economy, and it would enhance the value of the study if the impact on tourism of a particular policy choice were captured.

Table A5.2: Parameters for the CBA Discussed at Workshops and Meetings

Class	Parameters	Workshop Attendee Rating	Interpreted Rating of 20 Engineering Students	Industrial Consumer's Rating	Academic's Rating	World Bank Economist's Rating	Average Scores	Rank in Class	Parameter Adopted in Analysis	Comment/ Rationale for Monetization
Environmental	Value of water	3	3	2.5	1	1.5	2.2	2nd	Yes	This parameter is recognized as being very complex, as there are many 'goods and services' provided by water (e.g. ecosytem support, irrigation, human consumption, recreation). Detailed analysis of this parameter is beyond the scope of this study and therefore 'proxy' values are needed to capture this important aspect. The unit 'price' of water has been taken as the Albanian cost to consumer and sensitivity.
	Cabon dioxide and other GHG	3	1		2	3	2.3	1st	Yes	EU trading price and industry norms for operational emissions.
	Particulate matter	2	1		2	3	2	3rd	Yes	There are no significant emissions from any of the analyzed technologies so PM has not been explicitly included in the analysis.
	Nox, Sox	3	1		2	1	1.8	5th	Yes	Operational Nox incorporated in the analysis using industry norms and international market values.
	Value of ecosystems	1.5	1.5		2	3	2	3rd	Yes	Footprint of power plant and associated land take (e.g. estimate of reservoir land area). Assumptions made that mountainous terrain is principal forest ecosystem and lowland terrain is coastal (as per examples such as Vlore and Porto Romano).

Class	Parameters	Workshop Attendee Rating	Interpreted Rating of 20 Engineering Students	Industrial Consumer's Rating	Academic's Rating	World Bank Economist's Rating	Average Scores	Rank in Class	Parameter Adopted in Analysis	Comment/ Rationale for Monetization
	Non-use values	1	0.5			1	0.8	6th	No	This parameter is difficult to monetize without in depth study that is beyond the scope of this study.
Social	Recreation benefits	1	0			1	0.7	6th	No	Low priority and complex to analyze. Assessment considered to be beyond the scope of this study.
	Impacts on tourism	2	2				2	2nd	No	Although this was seem as a priority by stakeholders, there is insufficient information regarding the likely impacts of energy generation on tourism in Albania to enable meaningful analysis in this study. Further study could be undertaken to quantify and monetize this parameter.
	Disturbance of people and property	3	1	3		1	2	2nd	Yes	It is clear that there are other disturban ces such as community relocation. The necessary data to make a detailed assessment is lacking at this stage so a proxy has been used to approximate part of this aspect.
	Overall number of employees per MW generated/ job creation		1		1.5		1.3	5th	No	Low priority and partially accounted for in OPEX and GDP parameters.
	GDP/ econmic development	2	1			3	2	2nd	Yes	It is is recognized tht energy supply to consumers enables them to generate wealth in excess of the cost of electricity. An 'electricity benefit' factor has been incorporated in the analysis. However this is a constant factor for all approaches (as users would get the same benefit where ever the electricity was generated and thus the marginal difference

Class	Parameters	Workshop Attendee Rating	Interpreted Rating of 20 Engineering Students	Industrial Consumer's Rating	Academic's Rating	World Bank Economist's Rating	Average Scores	Rank in Class	Parameter Adopted in Analysis	Comment/ Rationale for Monetization
										between options is zero.
	Politics			2.5	3		2.8	1st	No	It is considered that the political process would utilize the output from the study to inform and support future decisions that are made. Therefore it is not appropriate to incorporate political views in the cost benefit analysis.
Financial	Cost per MW produced - CAPEX, OPEX	3	2	2	2.5	3	2.5	3rd	Yes	Industry norms and Albanian data.
	Efficiency (for every dollar in how much do you get out?)		1				1	6th	No	Efficiency is reflected in the CAPEX and OPEX to meet the required energy production (GWh).
	Land Value				3		3	1st	Yes	Land usage is reflected in the representaton of loss of ecosystem/ 'goods and services' that the land would otherwise provide.
	Reduction of liabilities (e.g. not paying penalties for turning off electricity)	3	1				2	4th	No	This parameter is captured in the assumption that all options being assessed would meet demand, and that the 'electricity benefit' factor captures this element to some extent.
	Investor/ funding agency confidence	3	1.5			1.5	2	4th	No	Considered by stakeholders as a low priority.
	Improved reputation	1	1				1	6th	No	Considered by stakeholders as a low priority.
	Loss in production	3	2			3	2.7	2nd	Yes	This is reflected in the 'electricity benefit' parameter.
	Vulnerability to natural disasters/ climatic							Not scored	Yes	This parameter has been captured by a sensitivity scenario within the analysis. This factor aims to represent

Class	Parameters	Workshop Attendee Rating	Interpreted Rating of 20 Engineering Students	Industrial Consumer's Rating	Academic's Rating	World Bank Economist's Rating	Average Scores	Rank in Class	Parameter Adopted in Analysis	Comment/ Rationale for Monetization
	vulnerabilities (e.g. landslide, seismic)									the fact that large hydroelectric power generation is often in remote areas with long transmission lines to supply consumers in southern Albania.

A5.3 Financial Assumptions

A summary of the overall capital expenditure (CAPEX) and operating expenditure (OPEX) (in real terms) for each option is shown in Table A5-3. OPEX is divided into non-energy operating expenditure and energy operating expenditure. This separation enables looking at an increase in energy (such as fuel) expenditure on a standalone basis in sensitivity analysis.

Table A5.3: CAPEX and OPEX Summary (U.S. Dollars, 2010)

Option	Description	Asset Size (MW)	CAPEX (USD $m)	OPEX (USD $m)- Non-energy	OPEX (USD $m)- Energy
1	Import	-	-	36	-
2	LHPP Update	78	14	1	-
3	CCGT	50	72	1	8
4	SHPP Update	88	106	4	-
5	New SHPP	88	132	4	-
6	Wind	130	286	7	-
7	CSP	88	311	2	-
8	New LHPP	78	468	1	-

CAPEX and non-energy OPEX values adopted are based on proprietary WorleyParsons data for industry norm (benchmark) values, data from purchased research databases to which WorleyParsons subscribes, and publicly available sources of information. Many local conditions may influence CAPEX, including: local policy and strategies, characteristics of local resources, and import chains. Non-energy operational costs depend on many local specifics as well, including: plant size, plant organizational structure, local legislation, and labor and material costs. Energy costs depend significantly on plant efficiency. Values used in the analysis were reviewed and adjusted in light of discussions with stakeholders in Albania and are considered to be sufficient for the purposes of this study. Values should be considered indicative only.

A5.4 Benefits Assessment and Valuation

Overview

In a complete economic analysis, the benefits of a given course of action are compared to the cost. Actions that result in a net overall positive benefit to society as a whole are deemed *economic*. In this section, the benefits applicable to this analysis are identified and valued.

The approach for this analysis is to attempt to capture the maximum likely benefits that would accrue to institutions (private benefits) and to society (external benefits), should various generation alternatives be enacted. To do this, a conservative approach (from the economic point of view) has been adopted; with each external (societal) monetizable benefit valued using a method that will tend to overstate (rather than understate) the benefits. In addition, a qualitative examination of some likely nonmonetizable benefits is also included. Thus, in the CBA, likely costs are compared with conservatively high benefits, or disbenefits, as the case may be. In adopting this approach, the report is biasing the economic analysis towards the societal position. This is advantageous because it assures that the external perspective is fully considered and valued, and helps to deflect any possible criticism that the analysis favors the project proponent.

Scope and Basis of the Analysis

This analysis considers only the costs and benefits associated with the various options designed to provide enough electricity to supplement the expected supply shortfall caused by climate change. If an external asset is damaged by implementation of a particular option, this damage appears as a disbenefit (negative benefit). If the value of the asset is maintained as it is (undamaged), then there is no effect, and no benefit or disbenefit is created. So, for example, if a water resource is left intact, in place, the current ecological support and option values of the water remain, and there is no benefit or disbenefit included in the analysis. If forest, as another example, is cleared, a negative benefit (disbenefit) is included.

A5.5 BENEFIT/DISBENEFIT VALUATION

The following benefit categories have been considered in the analysis. These benefits are directly related to the Albanian energy sector and were included in the analysis based on the workshop proceedings.

Carbon Dioxide and Other Greenhouse Gases (GHGs)

Owing to concerns about the effects of greenhouse gas emissions on the Earth's climate, caps have been set on the total amount of GHG emissions in given areas, such as the EU. Permits, which are permissions to emit a portion of the total allowable GHG emissions, are traded like other commodities in open markets. The market price represents the value of the emissions based on supply (the cap is initially set based on current scientific knowledge) and demand (the desired amount of emission reductions); a balance between the interests of the people as a whole and the individuals or groups who wish to emit GHG. A spot value from the European market was used in the analysis, a value for GHG at USD $21.55 per tonne of $CO_{2\text{–}e}$ (European Market Price, 11 May 2009). Other studies, such as the Stern Review (Stern, 2005), use detailed models to project the cumulative economic impact of additional unit of GHG, called the social cost of carbon (SCC), estimated at approximately USD$75/t $CO_{2\text{-}e}$. This has been chosen as the 'high case' cost for this analysis. Firms may also strategically set an internal offset price based on their view of current markets and regulatory frameworks. The analysis calculated the GHG emissions associated with each option, and includes these costs over the range identified above.

Value of Water

The *total economic value (TEV) of water* can be broken down into three components: the direct use-value (used or potentially useable by humans); the ecological support value, and the option value (value to society from having the resource available at some time in the future to be used). Each option realizes different components, dependent on the final state of the water. In addition, the extent to which they are realized is dependent on the relative quality of the water resulting from the treatment level for each option. Within the sensitivity analysis, therefore, the TEV of water is varied around a base estimate of the value of water sold to enterprise users of USD$0.93 / m^3 (90 Lek / m^3) (Tirana Municipality, 2006).

Given the scarcity of readily accessible water that could develop under climate change, the high unit value of water can be taken to be the cost of replacing a similar amount of fresh water. The replacement value of fresh water is considered to be equivalent to the current cost of desalination by conventional means, with a premium added for the external costs associated with GHG emissions resulting from the desalination process. Wade (2004) has reported that the cost of desalination varies between about US$0.70/$m^3$ and US$5.30/$m^3$, depending on the scale of the facility (larger capacity facilities produce water at lower unit costs). Karagiannis (2008) indicated costs from US$1.60 for 2.70/$m^3$, with oil at US$23/bbl. Costs in the order of US$1.10/$m^3$ are typically used by government bodies and commercial operations. However, given the current high costs of fuel, for the capacity that would be required to replace the volumes of water discussed in this analysis, a value of US$3.00/$m^3$ has been chosen.

Loss of Ecological Resources

Any options that involve significant land clearing to make way for power plants will cause direct ecological damage. For this analysis, it is assumed that these habitats would not otherwise have been destroyed or damaged. Valuation estimates for the surface ecology in the project area are provided by several sources, which provide estimates of the willingness-to-pay (see hypothetical market techniques in Section 5.1 of this Annex) for preservation of similar native vegetation (UNEP, 2001) of US$30 ha/yr for mountain ecosystems and US$117 per ha/yr (Ladenberg *et al*., 2007) for coastal ecosystems. For each option that involves land clearing, estimated impacted areas have been calculated.

Disturbance of People and Property

Construction of power plants can affect people and property in a negative way. For instance, given two houses that are exactly the same except that one is closer to a power plant, the one in the vicinity of a power plant will generally be cheaper. This reflects the value that people place on the possible health troubles (real or imagined), and the general preference for a natural view rather than neighboring a large industrial facility. The base value of this disbenefit was US $1.82 /hh/ha/pa (Ladenburg, 2001). This value was prorated for the other asset types based on the population density of the area and the footprint of the asset at hand.

Electricity Financial Benefit

The revenue received through the sale of produced electricity represents both the value of the production of the electricity and its contribution to macroeconomic activity. The electricity revenue is based on the stated average energy price, to all consumers, of 8.23 Lek per kWh (US$0.085 per kWh) (Tugu, 2009). To account for the fact that the climate change projections indicate that there will be less water available for hydropower electricity production, the electricity revenue from hydropower assets has been adjusted downwards as time progresses. The hydropower was adjusted downward on the basis of a total of a 15 percent decrease in generation capacity over the next 40 years, which is consistent with the projections based on climate modeling (Annex 8). It is applied on a cumulative yearly basis, with approximately 0.4 percent less capacity each year than the year before.

Benefits Summary

Based on information provided in Section 5, the range of expected values for each of the major benefit categories is provided below in Table A5.4. Each of the values in the table is based on a reference, as discussed in Section 5. As can be seen, the unit values for benefits vary over a considerable range. Base-case estimates have been deliberately chosen to reflect a reasonable value for the parameters and the 'high case' estimates aim to bracket the likely uppermost value, and also to provide an indication of the *likely future value trend*. It is highly probable that all environmental assets will steadily increase in value over time, given the increasing scarcity of these resources worldwide and the increasing demand for natural resources as the world population continues to grow. Despite this, the analysis presented does not assume any future increase in values, but holds the current values constant over time.

Table A5.4: Monetized Unit Benefit Values (U.S. Dollars)

Benefit Category	Units	Base	High
Value of water	m^3	0.93	3.00
Carbon dioxide and other GHGs	Tonne	21.55	75.00
NOx	Tonne	62.00	80
Value of ecosystems: mountain	/ha/yr	30	200
Value of ecosystems: coastal	/ha/yr	117	200
Disturbance to people and property	$/hh/km^2/yr$	1.82	5.00

A5.6 RESULTS SUMMARY

Benefits Realized by Each Option

Table A5-5 presents the net present value (NPV) in USD of the benefits (or disbenefits) accrued by each option.

Table A5.5: Benefits Realized by Each Option (U.S. Dollars, 2010)

	Environmental					Social
	GHG	Ecosystem (coastal)	Ecosystem (mountain)	Value of water	NOx	Disturbance to people
Import	-39,336,650			-4,809,838	-94,308	
LHPP Update				-89,551,619		
CCGT	-39,336,650	-3,371		-4,809,838	-94,308	-57,302
ESHPP Update						
New SHPP			-89,453			
Wind						-9,993,205
CSP		-593,244		-3,644,669		-3,325,316
New LHPP			-491,777	-89,551,619		-467,808

Present Value Benefits Calculation

The present value sum of benefits is calculated using the following formula, in the case of a uniform annual flow:

$$P = A\frac{(1+i)^N - 1}{i(1+i)^N} + C$$

where:

P = Present Value

i = discount

N = number of years

A = uniform series amounts (e.g., if the benefit is worth USD$100 / year)

C = one off benefit

The discount rate is an issue of controversy, with differing opinions on the value that should be used. In this study a base discount rate of 4.5 percent has been used as a base value. Variation in this discount rate is explored through sensitivity analysis. This base value for discount rate has been adopted following discussion with the World Bank's economist in Albania. The value is higher than the social discount rate used in other developed European economies (e.g., the United Kingdom uses 3.5 percent) and reflects the higher potential growth rates that a developing economy, such as Albania's, may experience. This discount rate is perturbed in the sensitivity analysis.

A5.7 LIMITATIONS

There are limitations to this analysis, largely the result of assumptions that are required to be made, and also due to the often-subjective nature of selections and appraisals that must be made by the user. The methodology presented in Hardisty and Ozdemiroglu (2005) depends necessarily on the expert input of the user. In reality, these are the same limitations inherent in most, if not all, such methodologies for economic analysis: they depend heavily on the assumptions made, the expertise and experience of the user and stakeholders. As such, this methodology is seen as a tool for deliberation over options with stakeholders, each of whom will tend to value various resources and potential risks slightly differently.

These tables contain the data for the charts presented in the results section in Section 5.

Table A5.6: Base-case Parameters Results (U.S. Dollars, 2010)

	Financial			Environmental					Social	
	CAPEX	OPEX	Electricity Benefit	GHG	Ecosystem (coastal)	Ecosystem (mountain)	Value of Water	NOx	Disturbance to People	NPV
Import		-519,255,000	431,228,000	-39,337,000			-4,810,000	-94,000		-132
Update existing LHPP	-13,650,000	-13,833,000	420,148,000				-89,552,000			303
CCGT	-72,000,000	-140,062,000	431,228,000	-39,337,000	-3,000		-4,810,000	-94,000	-57,000	175
Update existing SHPP	-105,600,000	-51,875,000	417,824,000							260
New SHPP	-132,000,000	-51,719,000	417,824,000			-89,000				234
Wind	-286,000,000	-96,833,000	431,228,000						-9,993,000	38
CSP	-311,380,000	-31,816,000	431,228,000		-593,000		-3,645,000		-3,325,000	80
New LHPP	-467,000,000	-13,833,000	420,148,000			-492,000	-89,552,000		-468,000	-152

Table A5.7: High-case Parameters Results (U.S. Dollars, 2010)

	Financial			Environmental					Social	
	CAPEX	OPEX	Electricity Benefit	GHG	Ecosystem (coastal)	Ecosystem (mountain)	Value of Water	NOx	Disturbance to People	NPV
Import		-519,255,000	431,228,000	-136,902,000			-15,516,000	-122,000		-241
Update existing LHPP	-13,650,000	-13,833,000	420,148,000				-288,876,000			104
CCGT	-72,000,000	-140,062,000	431,228,000	-136,902,000	-6,000		-15,516,000	-122,000	-157,000	66
Update existing SHPP	-105,600,000	-51,875,000	417,824,000							260
New SHPP	-132,000,000	-51,719,000	417,824,000			-596,000				234
Wind	-286,000,000	-96,833,000	431,228,000						-27,454,000	21
CSP	-311,380,000	-31,816,000	431,228,000		-1,014,000		-11,757,000		-9,135,000	66
New LHPP	-467,000,000	-13,833,000	420,148,000			-3,279,000	-288,876,000		-1,285,000	-355