4.0. DEVELOPMENTAL ANALYSIS

In this section, we analyze the project's use of the Niagara River's available water resources to generate hydropower and estimate the economic benefits of the proposed project.

4.1 Power and Economic Benefits of the Project

Under the Commission's approach to evaluating the economics of hydropower projects, as articulated in *Mead Corporation, Publishing Paper Division*,[14] the Commission employs an analysis that uses current costs to compare the costs of the project and likely alternative power with no forecasts concerning potential future inflation, escalation, or deflation beyond the license issuance date. The basic purpose of the Commission's economic analysis is to provide a general estimate of the potential power benefits and the costs of a project, and reasonable alternatives to project power. The estimate helps to support an informed decision concerning what is in the public interest with respect to a proposed license.

The economic analyses used in this section include various parameters listed in table 4-1. Using these parameters, we assessed the value of generation output from the facility. The project operations in a peaking mode and is subject to the provisions of international treaties.

The power value is based on three years of recorded locational based marginal prices (LBMPs) from the New York Independent System Operator's (NYISO) electric marketplace. The project is located in the NYISO's generator/load West Zone. Based on historical West Zone LBMPs from 2001 through 2003, which was then escalated by an annual three percent inflation factor, the project's power value is estimated to be $42.18 per MWh (2007$).

This value is a reasonable estimate of total energy and capacity for measuring the economic benefits of project operation, and for the cost of replacing power for any alternative that would reduce project generation.

For our economic analysis of the alternatives, we use the parameters (2007$) shown in table 4-1.

[14] 72 FERC 61,027 (1995).

Table 4-1. Staff parameters for economic analysis of the Niagara Project (Source: Exhibit D of the license application or Staff).

Parameters	Value
Power Value (2007)	42.18 per MWh
Peak vs. of-peak Ratio	All hours average price
Capacity Value (2007)	20.96 per kW-year
Period of Analysis	30 years
Cost of Money	6.25%
State and Federal Income Tax Rate	0
Local income Tax Rate	0
Insurance Rate	Included in O&M costs
Term of Financing	30 years
Escalation Rate after 2007	0
O&M costs (2007)	$66,231,000
Net Investment (2007)	$59,161,000
Relicensing cost	$46,773,000

In addition to generating electricity, the project produces ancillary services that provide regulation service, operating reserve, voltage control, and black start capability to the NYISO market. The average of the ancillary services revenue for the period 2001 through 2003 was escalated by three percent to derive a 2007 value.

Table 4-2 below shows the total value of project power based on the current market values of generation, capacity, and other services. This assumes 13.7 million MWh of annual generation. The annual market value of the energy, capacity, and other services is approximately $672 million per year or $49.09 per MWh. We use this power value to estimate the cost of replacement power for any alternative that would reduce project generation.

Table 4-2. Value of the annual output of the Niagara Project

Energy @ $42.18 (13.7 Million MWh)	$577,866,000
Capacity @ $20.96 per kW-year (2,400 MW Dependable Capacity)	$50,304,000
Ancillary Services	$44,364,000
Total Value (Energy + Capacity + Ancillary Services)	$672,534,000
Total Value per MWH	$49.09

4.1.1 Proposed Action

For the proposed action, we present the annual cost that includes operating the Niagara Project with the Power Authority's proposed environmental measures.

Based on the parameters in tables 4-1 and 4-2 and the cost of measures identified in table 4-3 we estimate that the annual cost of the Power Authority's proposed Niagara Project would be about $133,532,953 (9.75mills/kWh). The annual power value would be $672,533,000 (49.09 mills/kWh) for the estimated annual generation of 13,700,000 MWh. The resulting annual net benefit would be $539,000,047 (39.34 mills/kWh).

4.1.2 Staff's Alternative

In this section, we present the annual cost of operating the Niagara Project with the staff recommended measures.

Based on the parameters in tables 4-1 and 4-2 and the cost of measures identified in table 4-3, we estimate that the annual cost of the Niagara Project under the staff alternative would be about $132,162,477 (9.65 mills/kWh). The annual power value would be $672,533,000 (49.09 mills/kWh) for the estimated annual generation of 13,700,000 MWh. The resulting annual net benefit would be $540,370,523 (39.44 mills/kWh).

4.1.3 Composite Alternative

The staff's alternative did not include all of the mandatory conditions in the water quality certification; therefore in this section, we present the annual cost of operating the Niagara Project with a composite alternative, which includes the staff recommendations plus the mandatory certification conditions

Based on the parameters in tables 4-1 and 4-2 and the cost of measures identified in table 4-3, we estimate that the annual cost of the Niagara Project with environmental measures under the composite alternative would be about $133,475,511 (9.74 mills/kWh). The annual power value would be $672,533,000 (49.09 mills/kWh) for the estimated annual generation of 13,700,000 MWh. The resulting annual net benefit would be $539,057,489 (39.35 mills/kWh).

Table 4-3. Summary of annual costs of the proposed and recommended measures for the Niagara Project (Source: Applicant and the staff).

Measures	Recommending Entity	NPV[1] Cost ($)	Annual Cost ($)
Strawberry island wetland restoration	Applicant, agencies and staff	1,729,000	133,311
Frog island restoration	Applicant, agencies and staff	3,368,000	259,682

Measures	Recommending Entity	NPV[1] Cost ($)	Annual Cost ($)
Motor island shoreline protection	Applicant, agencies and staff	1,603,000	123,596
Beaver island wetland restoration	Applicant, agencies and staff	2,345,000	180,806
Invasive species	Applicant, agencies and staff	709,000	54,666
Osprey nesting platforms	Applicant, agencies and staff	188,000	14,495
Common tern nesting	Applicant, agencies and staff	1,060,000	81,729
Fish attraction structures	Applicant, agencies and staff	281,000	21,666
HERF	Applicant, and agencies	16,179,645	1,247,000
Recreation plan with public access improvements	Applicant, agencies and staff	3,090,000	238,000
Parks and recreation fund	Applicant	9,260,000	714,000
Parks and recreation fund[2]	Staff	7,260,000	560,000
Niagara Falls water board capital improvement fund	Applicant, and Staff	19,000,000	1,465,000
Groundwater monitoring plan	Interior and Staff	175,000	13,493
Land management plan	Applicant, and Staff	30,000	2,340
Historic properties management plan	Applicant, and Staff	50,000	3,860
Land acquisition fund	Applicant and agencies	1,000,000	77,103
Tribal exhibit at the Power Vista	Applicant, and Staff	150,000	11,670

[1] These costs are estimated by the Power Authority and presented as annualized net present values in 2007 dollars.
[2] Staff measure excludes $2,000,000 for art park upgrades.

4.1.4 No-Action Alternative

Under the no-action alternative, the Power Authority would continue to operate the Niagara Project under the terms and conditions of the existing license, and no new environmental protection, mitigation, or enhancement measures would be implemented.

The estimated average annual generation of the Niagara Project is 13,700,000 MWh, providing an annual power value of about $672,533,000 (49.09 mills/kWh). The annual cost would be about $128,998,331 (9.42 mills/kWh). The resulting annual net benefit would be $543,534,669 (39.67 mills/kWh).

4.2 Cost of Environmental Measures and Economic Comparison of Alternatives

Table 4-4 presents a summary of the current annual net power benefits for the Power Authority's proposed action, staff's alternative, the composite alternative, and the no-action alternative.

Table 4-4. Summary of annual net benefits of the alternatives for the Niagara Project (Source: the staff).

Parameter	Proposed Action by applicant	Staff's Alternative	Composite Alternative	No-Action Alternative
Annual generation (MWh)	13,700,000	13,700,000	13,700,000	13,700,000
Installed capacity (MW)	2755.5	2755.5	2755.5	2755.5
Annual power value ($) Mills/kWh	672,533,000 49.09	672,533,000 49.09	672,533,000 49.09	672,533,000 49.09
Annual cost ($) Mills/kWh	133,532,953 9.75	132,162,477 9.65	133,475,511 9.74	128,998,331 9.42
Annual net benefit ($) Mills/kWh	539,000,047 39.34	540,370,523 39.44	539,057,489 39.35	543,534,669 39.67