

COVER SHEET

FEDERAL ENERGY REGULATORY COMMISSION

**FINAL ENVIRONMENTAL IMPACT STATEMENT
FOR THE YADKIN AND YADKIN-PEE DEE RIVER
PROJECTS**

Docket Nos. P-2197-073 and 2206-030

**Section 4
Developmental Analysis
Pages 243 to 284
FEIS**

4.0 DEVELOPMENTAL ANALYSIS

In this section, we estimate the economic benefits of the projects and estimate the cost of various environmental measures and the effects of these measures on projects operations.

Under the Commission's approach to evaluating the economics of hydropower projects, as articulated in Mead Corporation, Publishing Paper Division (72 FERC ¶61,027, July 13, 1995), our analysis is based on current costs, with no assumptions concerning future escalation or de-escalation of the various cost components included in the cost of projects power or alternative power. The current cost economic analysis is not entirely a first-year analysis in that certain costs, such as major capital investments, would not be expended in a single year. The maximum period we use to annualize such costs is 30 years. Also, some future expenses, such as tax depreciation expenses, are known and measurable, and are, therefore, incorporated in our cost analysis. Although we do not explicitly account for the effects inflation may have on the future cost of electricity, the fact that hydropower generation is relatively insensitive to inflation compared to fossil-fueled generators is an important economic consideration for power producers and the consumers they serve. This is one reason project economics is only one of the many public interest factors the Commission considers in determining whether or not, and under what conditions, to issue a license.

4.1 YADKIN PROJECT

We base our analysis of the project's net benefits on the economic information and parameters shown in table 53. These values are common to all the licensing alternatives for the Yadkin Project. All dollars are year 2007 unless specified otherwise.

4.1.1 Power and Economic Benefits of the No-action Alternative

Based on the above information and an annual generation of 814,306 MWh (average annual generation over 1986-2005 period), the existing Yadkin Project has an annual power value of \$35,322,770, costs \$24,845,270 annually to operate thus resulting in a positive annual net benefit of about \$10,477,500 (or 12.87 mills/kWh).

4.1.2 Power and Economic Benefits of the Proposed Action

In its license application and subsequent Yadkin Settlement amongst a majority of the stakeholders, filed on May 7, 2007, Alcoa Generating proposes numerous operational and non-operational measures. Table 54 lists these individual measures and their costs. We convert all costs (capital and variable costs) to annual (levelized) costs over a 30-year period of analysis to give a uniform basis for comparing the benefits of a measure to its cost.

Table 53. Staff assumptions for the economic analysis of the Yadkin Project (P-2197). (Source: Alcoa Generating, staff)

Assumption	Value
Power rate (energy and capacity)	48.39 mills/kWh (on-peak) ^a 29.62 mills/kWh (off-peak) ^a
Period of analysis	30 years
Discount rate	8.0 percent ^b
Federal tax rate	35.0 percent ^c
Local tax rate	6.9 percent ^b
Insurance rate	0.25 percent
Term of financing	20 years
Escalation rate after 2007	0 percent
O&M costs	\$10,558,940 ^d
Net investment	\$58,543,010 ^e

^a Based on Alcoa Generating's filing on April 26, 2007.

^b Assumed by staff.

^c Alcoa 2006 Annual Report, pg. 28.

^d Includes operation and maintenance, property taxes, and FERC fees. From license application, exhibit D, table D.4-1, escalated from 2006 dollars.

^e Base value from license application, exhibit D, table D.3-1 (includes relicensing cost and cost of Narrows Unit 2 upgrade).

Table 54. Summary of capital, annual costs, and total annualized costs for environmental measures proposed by Alcoa Generating and recommended by staff and others for the Yadkin Project (P-2197). (Source: Staff)

Environmental Measures	Recommending Entities	Capital Costs (2007\$)	Annual Costs, Including O&M and Energy (2007\$)	Total Annualized Cost (2007\$)	Adopted By Staff?	Notes
Water Resources						
1. Upgrade High Rock units 1-3, Tuckertown units 1-3, Narrows units 1 and 3, and Falls units 1-3	Alcoa Generating	\$110,145,450	-\$5,461,000 (gained energy)	\$7,022,170	Yes	a
2. Operate High Rock reservoir within 4 feet of full pond during the summer and within 10 feet of full pond during the winter and all other project reservoirs at or above the normal minimum elevation as depicted on the proposed curves. Operate the project to provide daily average minimum flow from the Falls development of 1,000 cfs (June 1 to January 31); 2,000 cfs (February 1 to May 15); and 1,500 cfs (May 16 to May 31)	Yadkin Parties ⁵⁵	\$0	\$308,530 (lost energy)	\$308,530	Yes	b

⁵⁵Yadkin Parties are the parties to the Yadkin Settlement (see section 1.5.2.1 for list of parties).

Environmental Measures	Recommending Entities	Capital Costs (2007\$)	Annual Costs, Including O&M and Energy (2007\$)	Total Annualized Cost (2007\$)	Adopted By Staff?	Notes
3. Provide proposed minimum flows and operate High Rock lake with a maximum drawdown of 6 feet in the winter and 4 feet for the rest of the year and all other project reservoirs at or above the normal minimum elevations as depicted on the proposed curves	Save High Rock Lake	\$0	\$434,670 (lost energy)	\$434,670	No	b
4. Provide proposed minimum flows and operate High Rock lake with a maximum 2-foot drawdown year-round and all other project reservoirs at or above the normal minimum elevations as depicted on the proposed curves	Martin	\$0	\$7,632,610 (lost energy)	\$7,632,610	No	c
5. Limit maximum winter drawdowns of High Rock Lake to no more than 7 feet below full pond elevation	Davidson County	\$0	\$402,970 (lost energy)	\$402,970	No	c

Environmental Measures	Recommending Entities	Capital Costs (2007\$)	Annual Costs, Including O&M and Energy (2007\$)	Total Annualized Cost (2007\$)	Adopted By Staff?	Notes
6. From April 15 through May 15, maintain reservoir water surface elevations at all four project reservoirs no more than 1.0 foot below the elevation on April 15 (with provision for specific exceptions). No later than August 31, report the resulting water surface elevation at each reservoir during the April 15 to May 15 period in a letter to the North Carolina WRC	Yadkin Parties	\$0	\$0	\$0	Yes	d
7. Prepare and file with the Commission a final flow and reservoir elevation monitoring and compliance plan for the project	Yadkin Parties	\$52,000	\$0	\$4,990	Yes	e
8. Implement and maintain a data sharing program, including (a) collection and instantaneous electronic sharing of hourly water levels and flows at High Rock; (b) installation of suitable lake level and flow/discharge monitoring devices; and (c) completion and publication of annual surveys of the High Rock sediment delta size, location, thickness, and depth	City of Salisbury	\$0	\$0	\$0	No	d

Environmental Measures	Recommending Entities	Capital Costs (2007\$)	Annual Costs, Including O&M and Energy (2007\$)	Total Annualized Cost (2007\$)	Adopted By Staff?	Notes
9. Conduct flow monitoring at the High Rock and Falls developments in accordance with the flow and reservoir elevation monitoring and compliance plan	Yadkin Parties	\$0	\$104,000	\$67,600	Yes	e
10. Prepare and file with the Commission and the North Carolina DENR an annual flow monitoring report documenting compliance with minimum flow release requirements	Yadkin Parties	\$0	\$0	\$0	Yes	d
11. If conditions warrant, operate the project in accordance with the Low Inflow Protocol and the Hydro Project Maintenance and Emergency Protocol	Yadkin Parties	\$0	\$0	\$0	Yes	d
12. Install and operate aeration technology at High Rock and Narrows developments	Staff	\$2,483,940	\$70,120 (lost energy)	\$461,730	Yes	e

Environmental Measures	Recommending Entities	Capital Costs (2007\$)	Annual Costs, Including O&M and Energy (2007\$)	Total Annualized Cost (2007\$)	Adopted By Staff?	Notes
13. If DO monitoring demonstrates that aeration at High Rock and Narrows is not adequate to improve DO releases from Tuckertown and Falls developments, install and operate aeration technology at Tuckertown and Falls developments	Staff	\$0	\$0	\$0	Yes	f
14. Develop a DO monitoring plan and quality assurance plan for the project in consultation with the North Carolina DWQ and file it with the North Carolina DWQ. If the North Carolina DWQ notifies Alcoa Generating that project operations are resulting in water quality standards not being met, consult with the North Carolina DWQ to develop a DO corrective action plan	Yadkin Parties	\$52,000	\$0	\$4,990	Yes	e
15. Conduct DO monitoring pursuant to the DO monitoring plan required by the WQC	Yadkin Parties	\$0	\$155,950	\$101,370	Yes	e

Environmental Measures	Recommending Entities	Capital Costs (2007\$)	Annual Costs, Including O&M and Energy (2007\$)	Total Annualized Cost (2007\$)	Adopted By Staff?	Notes
16. Initiate, no later than October 30, 2008, and complete no later than October 30, 2009, the complete removal of the High Rock lake sediment delta and conduct annual maintenance dredging or sand mining to remove new sediment accumulation as it occurs	Rowan County, Town of Spencer	\$600M to \$1.4B	\$7M to \$17M	\$62M to 145M	No	c
17. Develop a sedimentation and flood protection plan that includes (a) specific measures to ensure dredging of sufficient volume and frequency such that the city of Salisbury's water intake remains clear of sediments, and (b) physical modifications to the facilities such as a protective dike for the pump station, improved access to the pump station with the road consistent with the city of Salisbury's design or other feasible options for achieving the same benefits, (c) planning level capital and operation and maintenance cost estimate for all alternatives, and (d) a recommendation as to which alternative to implement.	Staff	\$11,410,000	\$1,250,000	\$1,907,640	Yes	g

Environmental Measures	Recommending Entities	Capital Costs (2007\$)	Annual Costs, Including O&M and Energy (2007\$)	Total Annualized Cost (2007\$)	Adopted By Staff?	Notes
18. Develop a flood protection plan for the Grant Creek wastewater treatment plant that includes (a) protection from floods that may include maintenance dredging, physical modifications to the existing facility such as installation of a flood protection berm and roadway modifications using a berm, or other feasible options for achieving the same benefits, and (b) planning level capital and operation and maintenance cost estimates for all alternatives	Staff	\$6,838,670	\$0	\$656,380	Yes	g
19. Complete measures to protect the 3 rd Street and 7 th Street bridges in the town of Spencer	City of Salisbury	\$0	\$0	\$0	No	g
Aquatic Resources						
20. Reduce trashrack spacing at all powerhouse intakes to no more than 2.5 inches	FWS	\$575,000	\$0	\$55,190	No	c

Environmental Measures	Recommending Entities	Capital Costs (2007\$)	Annual Costs, Including O&M and Energy (2007\$)	Total Annualized Cost (2007\$)	Adopted By Staff?	Notes
21. Reserve authority to prescribe phased approach to fish passage for American shad and American eel on the Yadkin and Pee-Dee rivers	FWS, NMFS	\$0	\$0	\$0	Yes	d
22. Include in the RTE species management plan a plan for periodic monitoring of freshwater mussels in the project tailwater areas	Yadkin Parties, FWS	\$0	\$3,100	\$2,010	Yes	e
Terrestrial Resources						
23. Prepare and file an RTE species management plan for bald eagles, Yadkin River goldenrod, and Schweinitz's sunflower throughout the project area	Yadkin Parties, FWS	\$52,000	\$17,680	\$16,480	Yes	e
24. Prepare and file a transmission line corridor management plan for project transmission lines	Yadkin Parties, FWS	\$10,400	\$0	\$1,000	Yes	e
Cultural Resources						
25. Implement the provisions of the PA for the project	Yadkin Parties	\$0	\$0	\$0	Yes	e

Environmental Measures	Recommending Entities	Capital Costs (2007\$)	Annual Costs, Including O&M and Energy (2007\$)	Total Annualized Cost (2007\$)	Adopted By Staff?	Notes
26. Develop and file an HPMP for the project	Yadkin Parties	\$52,000	\$0	\$4,990	Yes	e
Recreational Resources						
27. Continue to operate and maintain existing recreation sites	Yadkin Parties	\$0	\$0	\$0	Yes	d
28. Maintain traditional tailwater access that the public has enjoyed in the past	FWS	\$0	\$0	\$0	Yes	d
29. Remove part 8 and safety signs from the Rowan County pump station access area to close the site in 2009	Yadkin Parties, Rowan County	\$0	\$0	\$0	Yes	d
30. Prepare and file with the Commission a final recreation plan for the project	Yadkin Parties	\$48,150	\$9,550	\$10,830	Yes	e
31. Provide ADA improvements at up to 10 public recreation sites	Yadkin Parties	\$67,230	\$950	\$7,070	Yes	e
32. Provide and maintain new portable toilets at several existing recreation sites, where such facilities are not currently available	Yadkin Parties	\$9,680	\$80	\$980	Yes	e

Environmental Measures	Recommending Entities	Capital Costs (2007\$)	Annual Costs, Including O&M and Energy (2007\$)	Total Annualized Cost (2007\$)	Adopted By Staff?	Notes
33. Install two ADA-compliant fishing piers at existing recreation sites, one on High Rock reservoir and the other on Tuckertown reservoir	Yadkin Parties	\$50,070	\$300	\$5,000	Yes	e
34. Modify existing tailwater fishing areas located at High Rock and Tuckertown tailwaters	Yadkin Parties	\$210,780	\$1,210	\$20,150	Yes	e
35. Improve the four project portage trails to North Carolina standards	Yadkin Parties	\$140,980	\$6,030	\$17,450	Yes	e
36. Construct a new public recreation site with a swimming area and beach on High Rock reservoir in Rowan County	Yadkin Parties	\$96,300	\$4,700	\$12,300	Yes	e
37. Construct up to 10 campsites dispersed throughout the project area	Yadkin Parties	\$9,170	\$430	\$1,160	Yes	e
38. Replace the Highway 49 boat access area when necessary	Yadkin Parties	\$65,030	\$2,860	\$8,100	Yes	e
Land Use and Aesthetic Resources						
39. Prepare a revised SMP for the project	Yadkin Parties	\$104,000	\$2,600	\$11,670	Yes	e

Environmental Measures	Recommending Entities	Capital Costs (2007\$)	Annual Costs, Including O&M and Energy (2007\$)	Total Annualized Cost (2007\$)	Adopted By Staff?	Notes
40. Provide payments in lieu of taxes for all project lands to be donated to others	Stanly County	\$0	\$3,400,000	\$2,210,000	No	i

^a Cost provided by Alcoa Generating in its license application.

^b Cost provided by Alcoa Generating in its additional information request response dated April 26, 2007.

^c Cost estimated by staff.

^d No additional cost is anticipated for implementation of this measure.

^e Cost provided by Alcoa Generating in table 1 of the Agreement in Principle dated June 23, 2006.

^f Alcoa Generating did not provide any anticipated capital costs for installation of aeration technologies at Tuckertown and Falls, but did estimate that, if warranted, the equipment would be installed and the operation of the equipment would be approximately \$300,000 per year for Tuckertown and \$100,000 for Falls.

^g Cost estimates based on estimates provided by the city of Salisbury. The cost of the sedimentation and flood protection plan for the Salisbury pump station was based on a staff estimate for sediment removal in the vicinity of the intake plus the projected costs for the construction of a floodwall and improvements to the access road. The cost of the flood protection plan for the Grant Creek wastewater treatment plant was based on the projected cost of a protective dike and improvements to the access road.

^h Most of the measures included in the plan are associated with the Yadkin-Pee Dee River Project and the costs are applied to that project.

ⁱ Cost estimated by Stanly County.

Based on the information in the above table, as proposed by Alcoa Generating, the Yadkin Project would generate an average of 947,100 MWh⁵⁶ of electricity annually, have an annual power value of \$40,309,100 (42.56 mills/kWh), and an annual costs of \$37,460,450 (39.55 mills/kWh), resulting in a positive annual net benefit of \$2,828,650 (3.01 mills/kWh).

4.1.3 Power and Economic Benefits of the Staff-Recommended Alternative

Resource agencies and nongovernmental organizations recommend the implementation of a variety of measures at the project. Staff reviewed each recommendation and determined which measures were the most appropriate for implementation. In section 5.0, *Comprehensive Development and Recommended Alternative*, we discuss our reasons for recommending the staff alternative and why we conclude that the environmental benefits are worth these costs. Table 54 lists these proposed measures and identifies the ones that were adopted by the staff. Rowan County's recommendation to remove the High Rock reservoir sediment delta and city of Salisbury's recommendation to relocate the Salisbury pump station are not listed in table 54 but are discussed in section 5.0.

Adding the cost of the measures that were adopted by staff to the cost of the Proposed Action, the Staff-recommended Alternative would generate an average of 940,000 MWh⁵⁷ of electricity annually, have an annual power value of \$39,965,530 (42.52 mills/kWh), and total annual costs of \$40,142,630 (42.70 mills/kWh), resulting in a negative annual net benefit of -\$177,100 (0.18) mills/kWh).

4.1.4 Comparison of Alternatives

Table 55 summarizes the cost of the No-action Alternative, the Proposed Action, and the Staff-recommended Alternative.

⁵⁶Alcoa Generating's reply to staff's additional information request, filed April 26, 2007.

⁵⁷Alcoa Generating's reply to staff's additional information request, filed April 26, 2007.

Table 55. Summary of the three action alternatives for the Yadkin Project (P-2197).
(Source: Staff)

	No-Action	Proposed Action	Staff-Recommended Alternative
Installed capacity (MW) ^a	210.24	209.97	209.97
Annual generation (MWh) ^b	814,306	947,100	940,000
Annual power value (mills/kWh)	\$35,322,770 (43.38)	\$40,309,100 (42.56)	\$39,965,530 (42.52)
Annual cost (mills/kWh)	\$24,845,270 (30.51)	\$37,460,450 (39.55)	\$40,142,630 (42.70)
Annual net benefit (mills/kWh)	\$10,477,500 (12.87)	\$2,848,650 (3.01)	-\$177,100 (0.18)

^a The authorized installed capacity was increased by Commission order dated August 2, 2000, from 209.52 MW to 216.38 MW based on proposed upgrades of High Rock units 1-3, Narrows units 1-4, and Falls unit 2. Most of those upgrades have not yet been implemented (Narrows unit 4 has been upgraded and Narrows unit 2 is expected to be upgraded prior to issuance of the new license). The project as proposed by Alcoa Generating in the license application includes upgrades to all of the units at each of the four developments and an installed capacity of 210.24. Some of the proposed upgrades will increase capacity, while others will reduce capacity. The net change in installed capacity will result in an installed capacity of 209.97 MW.

^b The annual generation of the various alternatives are based on computer modeling runs using Alcoa Generating's OASIS model (Alcoa Generating letter filed April 26, 2007).

4.2 YADKIN-PEE DEE RIVER PROJECT

We base our analysis of the project's net benefits on the economic information and parameters shown in table 56. These values are common to all the licensing alternatives for the Yadkin-Pee Dee River Project. All dollars are year 2007 unless specified otherwise.

4.2.1 Power and Economic Benefits of the No-action Alternative

The project generates an average of 370,100 MWh of electricity annually,⁵⁸ has an annual power value of \$15,957,500 (43.12 mills/kWh), and total annual costs of \$7,416,460 (20.04 mills/kWh) resulting in a positive annual net benefit of \$8,541,040 (23.08 mills/kWh).

⁵⁸ Based on project generation for the period 1984-2003.

Table 56. Staff assumptions for the economic analysis of the Yadkin-Pee Dee River Project (P-2206). (Source: Progress Energy, staff)

Assumption	Value
Power rate (energy)	50.0 mills/kWh on-peak ^a 25.0 mills/kWh off-peak ^a
Period of analysis	30 years
Cost of capital	8.2 percent ^b
Discount rate	8.0 percent ^c
Federal tax rate	35.0 percent ^d
Local tax rate	6.9 percent ^e
Insurance rate	0.25 percent
Term of financing	20 years
Escalation rate after 2007	0 percent
O&M costs (2007\$)	\$3,266,160 ^f
Net investment (2007\$)	\$22,957,090 ^g

^a Based on the range of values provided by Progress Energy in its July 16, 2007, filing.

^b Source: Progress Energy letter dated December 12, 2006, AIR no. 9.

^c Assumed by staff.

^d Source: Progress Energy letter dated December 12, 2006, AIR no. 9.

^e Source: Progress Energy letter dated December 12, 2006, AIR no. 9.

^f Source: 2006 value including operation and maintenance, property taxes, and FERC fees from Progress Energy letter dated December 12, 2006, AIR no. 9. (escalated 2007 value shown).

^g Source: 2006 net investment value from Progress Energy letter dated December 12, 2006, AIR no. 8 plus relicensing cost from AIR no. 11 (depreciated 2007 value shown).

4.2.2 Power and Economic Benefits of the Proposed Action

In its license application and subsequent Yadkin-Pee Dee Settlement amongst a majority of the stakeholders, filed on May 8, 2007, Progress Energy proposes numerous operational and non-operational measures. Table 57 lists these individual measures and their costs. We convert all costs (capital and variable costs) to annual (levelized) costs over a 30-year period of analysis to give a uniform basis for comparing the benefits of a measure to its cost.

Based on the information in the table, as proposed by Progress Energy, the Yadkin-Pee Dee River Project would generate an average of 362,900 MWh⁵⁹ of

⁵⁹ Progress Energy's reply to staff's additional information request, filed July 16, 2007.

electricity annually, have an annual power value of \$15,317,500 (42.21 mills/kWh), and an annual costs of \$9,288,950 (25.60 mills/kWh), resulting in a positive annual net benefit of \$6,028,560 (16.61 mills/kWh).

4.2.3 Power and Economic Benefits of the Staff-Recommended Alternative

Resource agencies and non-governmental organizations recommend the implementation of a variety of measures at the project. Staff reviewed each recommendation and determined which measures were the most appropriate for implementation. In section 5.0, *Comprehensive Development and Recommended Alternative*, we discuss our reasons for recommending the staff alternative and why we conclude that the environmental benefits are worth these costs. Table 57 lists these individual measures and identifies the ones that were adopted by the staff.

Adding the cost of the measures that were adopted by staff to the cost of the Proposed Action, the Staff-recommended Alternative would generate an average of 362,900 MWh⁶⁰ of electricity annually, have an annual power value of \$15,317,500 (42.21 mills/kWh), and total annual costs of \$9,330,900 (25.71 mills/kWh), resulting in a positive annual net benefit of \$5,986,600 (16.50 mills/kWh).

⁶⁰Progress Energy's reply to staff's additional information request, filed July 16, 2007.

Table 57. Summary of capital, annual costs, and total annualized costs for environmental measures proposed by the Progress Energy and recommended by staff and others for the Yadkin-Pee Dee River Project (P-2206). (Source: Staff)

Environmental Measures	Recommending Entities	Capital Costs (2007\$)	Annual Costs, Including O&M and Energy (2007\$)	Total Annualized Cost (2007\$)	Adopted By Staff?	Notes
Geology and Soil Resources						
1. Develop and implement a shoreline erosion plan for Blewett Falls reservoir	Staff	\$50,000	\$10,000	\$18,750	Yes	a
Water Resources						
2. Develop habitat duration analysis information as well as an analysis of measures necessary to mitigate peaking and load following operations	American Rivers	\$5,000	\$0	\$880	No	a

Environmental Measures	Recommending Entities	Capital Costs (2007\$)	Annual Costs, Including O&M and Energy (2007\$)	Total Annualized Cost (2007\$)	Adopted By Staff?	Notes
3. Provide minimum flows from Tillery dam of 330 cfs year-round and 725 cfs for 8 weeks during spring spawning period, beginning March 15-22 (in year 2010 or at the first passage of American shad above Blewett Falls dam)	Yadkin-Pee Dee Parties ⁶¹	\$0	\$535,000 (lost energy)	\$535,000	Yes	b
4. Provide minimum flows from Tillery dam of 800-1,000 cfs year round and provide minimum flows at Tillery dam during the spring fish spawning season of 1,500-1,800 cfs	FWS, city of Rockingham, American Rivers	\$0	\$1,227,500 (lost energy)	\$1,227,500	No	b

⁶¹Yadkin-Pee Dee Parties are the parties to the Yadkin-Pee Dee Settlement (see section 1.5.2.2 for list of parties).

Environmental Measures	Recommending Entities	Capital Costs (2007\$)	Annual Costs, Including O&M and Energy (2007\$)	Total Annualized Cost (2007\$)	Adopted By Staff?	Notes
5. Provide minimum flow releases from Tillery dam of 330 cfs (May 16 to January 31) and 725 cfs (February 1 to May 15) – for a period of 8 weeks or as determined by an agency team	NMFS	\$0	\$535,000 (lost energy)	\$535,000	No	b
6. Provide minimum flows at Tillery similar to the flow naturalization regime proposed for Blewett Falls	American Rivers	\$0	\$0	\$0	No	c
7. Install sluice gate or turbine capable of providing 800 to 1,000 cfs continuous year-round minimum flow below Tillery dam	FWS	\$0	\$0	\$0	No	c

Environmental Measures	Recommending Entities	Capital Costs (2007\$)	Annual Costs, Including O&M and Energy (2007\$)	Total Annualized Cost (2007\$)	Adopted By Staff?	Notes
8. Provide minimum flows from Tillery in such a way so as to avoid high temperature water from the uppermost surface of Lake Tillery if high temperature gradients are found to occur in the upper 6 inches	Yadkin-Pee Dee Parties	\$0	\$0	\$0	Yes	c
9. Provide minimum flow compliance and monitoring at Tillery dam	Yadkin-Pee Dee Parties	\$31,200	\$14,560	\$20,020	Yes	d
10. Provide minimum flow releases from the Blewett Falls powerhouse of 2,400 cfs from February 1 to May 15; 1,800 cfs from May 16 to May 31; and 1,200 cfs for the rest of the year	Yadkin-Pee Dee Parties, FWS, city of Rockingham	\$0	\$105,000 (lost energy)	\$105,000	Yes	b
11. Operate Blewett Falls to enhance spawning conditions with flow adjustment periods	Yadkin-Pee Dee Parties	\$0	\$0	\$0	Yes	c
12. Allow variances in the minimum flow	Yadkin-Pee Dee	\$0	\$0	\$0	Yes	c

Environmental Measures	Recommending Entities	Capital Costs (2007\$)	Annual Costs, Including O&M and Energy (2007\$)	Total Annualized Cost (2007\$)	Adopted By Staff?	Notes
releases for testing black-start capabilities of the turbines at the Blewett powerhouse and during Low Inflow Protocol periods	Parties					
13. Provide minimum flow compliance and monitoring at Blewett Falls	Yadkin-Pee Dee Parties	\$31,200	\$14,560	\$20,020	Yes	d
14. Provide minimum flows as proposed, but modified as determined by NMFS to protect shortnose sturgeon spawning and incubation	American Rivers	\$0	\$0	\$0	No	c
15. Comply with the requirements of the Low Inflow Protocol	Yadkin-Pee Dee Parties	\$0	\$0	\$0	Yes	c

Environmental Measures	Recommending Entities	Capital Costs (2007\$)	Annual Costs, Including O&M and Energy (2007\$)	Total Annualized Cost (2007\$)	Adopted By Staff?	Notes
16. Maintain Lake Tillery levels from April 15 to May 15 within 1.5 feet of the recorded water surface elevation on April 15 (with provision for specific exceptions). At all other times, maintain lake level fluctuations within 2.5 feet of full pool on weekdays, and 1.5 feet of full pool on weekends/holidays. Once every 5 years, maintenance drawdown of up to 15 feet would occur between September 15 and December 15.	Yadkin-Pee Dee Parties	\$0	\$0	\$0	Yes	c
17. Schedule a maintenance drawdown of up to 15 feet on Lake Tillery once in every 5-year period within the September 15 to December 15 timeframe	Yadkin-Pee Dee Parties	\$0	\$0	\$0	Yes	c

Environmental Measures	Recommending Entities	Capital Costs (2007\$)	Annual Costs, Including O&M and Energy (2007\$)	Total Annualized Cost (2007\$)	Adopted By Staff?	Notes
18. In case of a Low Inflow Protocol event, use storage at Lake Tillery to augment downstream flows	Yadkin-Pee Dee Parties	\$0	\$0	\$0	Yes	c
19. Operate Blewett Falls reservoir as run-of-river when flows greater than 7,400 cfs. Below 7,400 cfs, maintain year-round fluctuations up to 6 feet except for system emergencies and Low Inflow Protocol. Allow additional 2 feet of drawdown to safely replace flashboards at Blewett Falls Lake	Yadkin-Pee Dee Parties	\$0	\$0	\$0	Yes	c
20. Limit water level fluctuation at Blewett Falls reservoir to 2 feet during bass spawning season except when additional reservoir storage is needed to meet minimum flows	Yadkin-Pee Dee Parties	\$0	\$0	\$0	Yes	c
21. Provide a projection of	Yadkin-Pee Dee	\$0	\$0	\$0	Yes	c

Environmental Measures	Recommending Entities	Capital Costs (2007\$)	Annual Costs, Including O&M and Energy (2007\$)	Total Annualized Cost (2007\$)	Adopted By Staff?	Notes
expected reservoir levels for the day and record on Progress Energy's public messaging service and provide an annual notice on November 15 alerting the public to the drawdown limits that apply between December 15 and March 1 for the first 5 years of the new license	Parties					
22. Provide annual reservoir level compliance reports to FERC that include hourly readings of water levels at Tillery and Blewett Falls dams	Yadkin-Pee Dee Parties	\$0	\$0	\$0	Yes	c
23. Implement the new reservoir level management regime at Tillery and Blewett Falls within 120 days of receipt of a final license	Yadkin-Pee Dee Parties	\$0	\$0	\$0	Yes	c

Environmental Measures	Recommending Entities	Capital Costs (2007\$)	Annual Costs, Including O&M and Energy (2007\$)	Total Annualized Cost (2007\$)	Adopted By Staff?	Notes
24. Conduct a sediment survey in Blewett Lake and a gravel recruitment survey in the Blewett Falls tailwater	Yadkin-Pee Dee Parties	\$50,000	\$0	\$8,750	Yes	a
25. Implement a detailed plan for meeting water quality standards at Blewett Falls and Tillery dams related to DO as required by section 401 of the Clean Water Act	Yadkin-Pee Dee Parties	\$2,559,320	\$72,650	\$520,770	Yes	d
26. Implement adequate provisions and schedules for water quality improvement	FWS	\$0	\$0	\$0	Yes	e
27. Continue testing of DO enhancement at Blewett Falls and Tillery and achieve full compliance with state DO standards by December 2011	Yadkin-Pee Dee Parties	\$0	\$0	\$0	Yes	d

Environmental Measures	Recommending Entities	Capital Costs (2007\$)	Annual Costs, Including O&M and Energy (2007\$)	Total Annualized Cost (2007\$)	Adopted By Staff?	Notes
28. Provide continuous monitoring of flow, temperature and DO at the Blewett Falls and Tillery developments	Yadkin-Pee Dee Parties	\$52,000	\$21,230	\$30,330	Yes	d
29. Conduct post-licensing monitoring of aquatic life below Tillery development	Yadkin-Pee Dee Parties	\$0	\$30,000	\$30,000	Yes	a
Aquatic Resources						
30. Phase I Blewett Falls upstream fish passage – steel lift trap, sort, and truck (Trap) facility	Progress Energy (Fish Passage Agreement)	\$2,646,110	\$0	\$463,320	Yes	f
31. Blewett Falls upstream eel passage	Progress Energy (Fish Passage Agreement)	\$291,920	\$41,840	\$92,950	Yes	d, f
32. Blewett Falls upstream eel passage annual operations	Progress Energy	\$0	\$17,620	\$17,620	Yes	d

Environmental Measures	Recommending Entities	Capital Costs (2007\$)	Annual Costs, Including O&M and Energy (2007\$)	Total Annualized Cost (2007\$)	Adopted By Staff?	Notes
33. Initiate monitoring to determine specific sites or locations for American eel passage devices at Blewett Falls dam (3-year study to begin within 1 year of license issuance)	Progress Energy (Fish Passage Agreement)	\$0	\$2,290	\$2,290	Yes	a
34. Blewett Falls downstream shad passage – gulper upstream of dam with surface curtain	Progress Energy (Fish Passage Agreement)	\$1,223,090	\$0	\$214,160	Yes	d
35. Convert the Blewett Falls shad trap, sort, and truck facility to a full height Phase II fish elevator with fish exit flume for volitional upstream passage (construct in 2022 to 2025)	Progress Energy (Fish Passage Agreement)	\$0	\$0	\$0	Yes, but final design will not be known for many years	g
36. American Shad Monitoring Studies	Progress Energy	\$0	\$108,160	\$108,160	Yes	d
37. Annual Fish Passage Operations	Progress Energy	\$0	\$8,750	\$8,750	Yes	d

Environmental Measures	Recommending Entities	Capital Costs (2007\$)	Annual Costs, Including O&M and Energy (2007\$)	Total Annualized Cost (2007\$)	Adopted By Staff?	Notes
38. Annual American Shad Trap and Transport Program	Progress Energy	\$0	\$67,530	\$67,530	Yes	d
39. Install new intake trashracks at Blewett Falls and Tillery with spacing that does not exceed 2.5 inches	FWS, city of Rockingham	\$680,000	\$0	\$119,060	No	a
40. Monitor American shad in the tailwaters area of the Pee Dee River below Blewett Falls dam downstream to U.S. Route 74 beginning 1 year after license issuance	Progress Energy (Fish Passage Agreement)	\$0	\$30,000	\$30,000	Yes	a
41. Establish a resource management team to oversee fish passage programs and prepare annual reports on progress of program	Progress Energy (Fish Passage Agreement)	\$0	\$30,000	\$30,000	Yes	a

Environmental Measures	Recommending Entities	Capital Costs (2007\$)	Annual Costs, Including O&M and Energy (2007\$)	Total Annualized Cost (2007\$)	Adopted By Staff?	Notes
42. Participate in a comprehensive assessment in 2025 of the overall effectiveness and direction of the American shad and American eel passage and restoration programs	Progress Energy (Fish Passage Agreement)	\$14,590	\$0	\$2,550	Yes	a
43. Develop a written protocol by the end of 2013 for handling other fish species in the Trap facility	Progress Energy (Fish Passage Agreement)	\$3,680	\$0	\$640	Yes	a
44. Conduct a cooperative downstream passage methods evaluation for downstream American eel passage at Blewett Falls, in consultation with the state and federal fishery agencies, to begin 5 years after license issuance with passage recommendation due 12 years after license issuance	Progress Energy (Fish Passage Agreement)	\$0	\$3,440	\$3,440	Yes	a

Environmental Measures	Recommending Entities	Capital Costs (2007\$)	Annual Costs, Including O&M and Energy (2007\$)	Total Annualized Cost (2007\$)	Adopted By Staff?	Notes
Terrestrial Resources						
45. Perform bald eagle monitoring in year 1 and then every 3 years	Progress Energy	\$0	\$3,590	\$3,590	No	a
46. Prepare and implement a bald eagle management plan which includes annual monitoring	FWS	\$3,000	\$10,000	\$10,530	Yes	a
47. Conduct monitoring surveys for Yadkin River goldenrod	FWS	\$0	\$510	\$510	Yes	a
Cultural Resources						
48. Implement and enforce the new HPMP for Tillery	Yadkin-Pee Dee Parties	\$25,000	\$0	\$4,380	Yes	a
49. Implement and enforce the new HPMP for Blewett Falls	Yadkin-Pee Dee Parties	\$25,000	\$0	\$4,380	Yes	a
Recreational Resources						
50. Provide recreational boating flow releases at Tillery dam during the summer recreation period	Yadkin-Pee Dee Parties	\$0	\$0	\$0	Yes	c

Environmental Measures	Recommending Entities	Capital Costs (2007\$)	Annual Costs, Including O&M and Energy (2007\$)	Total Annualized Cost (2007\$)	Adopted By Staff?	Notes
51. Prepare a plan for recreational flow releases downstream of Tillery dam	Yadkin-Pee Dee Parties	\$80,000	\$0	\$14,010	Yes	a
52. Provide an electronic link on the Progress Energy website to USGS gage at Rockingham and gage to be installed by Progress Energy downstream of Tillery dam and provide information on website related to recreational boating flows to be released at Tillery dam	Yadkin-Pee Dee Parties, city of Rockingham	\$500	\$0	\$90	Yes	a
53. Maintain minimum streamflows of 1,200 cfs during daylight on weekends and holidays each year from May 16 to September 15, as measured at a new gage to be installed below Tillery dam at the North Carolina Highway 731 bridge	City of Rockingham	\$0	\$129,600 (lost energy of 2,592 MWh/yr)	\$129,600	No	a

Environmental Measures	Recommending Entities	Capital Costs (2007\$)	Annual Costs, Including O&M and Energy (2007\$)	Total Annualized Cost (2007\$)	Adopted By Staff?	Notes
54. Complete navigation/instream flow study of the Tillery reach to evaluate all recreational uses including non-motorized boating, fishing, and swimming	American Rivers	\$75,000	\$0	\$13,130	No	a
55. Submit a plan and schedule for the implementation of recreational improvements	Yadkin-Pee Dee Parties, city of Rockingham	\$75,000	\$0	\$13,130	Yes	a
56. Meet formally with Stanly and Montgomery counties on recreation issues every 4 years to review public recreation needs and trends related to public use and access	Yadkin-Pee Dee Parties	\$0	\$0	\$0	Yes	c
57. Establish and administer a Recreation Management Committee	City of Rockingham	\$0	\$0	\$0	No	c

Environmental Measures	Recommending Entities	Capital Costs (2007\$)	Annual Costs, Including O&M and Energy (2007\$)	Total Annualized Cost (2007\$)	Adopted By Staff?	Notes
58. Provide funding for a period of 10 years for North Carolina WRC operation and maintenance of recreational facilities that are part of the license	Yadkin-Pee Dee Parties	\$249,600	\$0	\$43,700	Yes	h
59. Undertake measure to improve navigability of project reaches	City of Rockingham	\$0	\$0	\$0	No	e
60. Establish and undertake a cooperative program to manage recreational use, law enforcement, and emergency communication at project sites	City of Rockingham	\$0	\$0	\$0	No	e
61. Provide \$50,000 per year to fund one trained peace officer to provide law enforcement services	City of Rockingham	\$0	\$50,000	\$50,000	No	i

Environmental Measures	Recommending Entities	Capital Costs (2007\$)	Annual Costs, Including O&M and Energy (2007\$)	Total Annualized Cost (2007\$)	Adopted By Staff?	Notes
62. Investigate, purchase, and install radio repeaters at an appropriate location to assist law enforcement and public safety personnel operating within the Yadkin-Pee Dee River corridor	City of Rockingham	\$0	\$0	\$0	No	e
63. Make improvements at Stony Mountain, Norwood, Swift Island, Lilly's Bridge public access areas and relocate the Clarks Creek access area	Yadkin-Pee Dee Parties	\$293,700	\$27,800	\$79,230	Yes	d
64. Make improvements at the Anson County (Pee Dee) and Mountain Creek (Grassy Islands) access areas on Blewett Falls Lake	Yadkin-Pee Dee Parties, city of Rockingham	\$48,150	\$4,560	\$12,990	Yes	d
65. Upgrade the existing canoe portage at Blewett Falls dam to applicable North Carolina state standards	Yadkin-Pee Dee Parties	\$14,440	\$1,910	\$4,440	Yes	d

Environmental Measures	Recommending Entities	Capital Costs (2007\$)	Annual Costs, Including O&M and Energy (2007\$)	Total Annualized Cost (2007\$)	Adopted By Staff?	Notes
66. Provide a one-time matching contribution within 24 months of license issuance up to a minimum of \$25,000 for the enhancement and/or expansion of the Yadkin-Pee Dee River trail	Yadkin-Pee Dee Parties	\$25,000	\$0	\$4,380	Yes	h
67. Provide North Carolina WRC access across project lands and matching funds, up to \$25,000, for a shoreline public fishing area in Stanly County	Yadkin-Pee Dee Parties	\$26,000	\$0	\$4,550	Yes	h
68. Co-fund with North Carolina WRC a joint-use boathouse and boat ramp facility to be used by North Carolina WRC for enforcement purposes on Lake Tillery and by Progress Energy for lake management purposes.	Yadkin-Pee Dee Parties	\$26,000	\$2,490	\$7,040	Yes	h

Environmental Measures	Recommending Entities	Capital Costs (2007\$)	Annual Costs, Including O&M and Energy (2007\$)	Total Annualized Cost (2007\$)	Adopted By Staff?	Notes
69. Maintain the traditional level of tailwater access that the public has enjoyed in the past	FWS	\$0	\$0	\$0	Yes	d
70. Construct and maintain recreational facilities in the vicinity of the Highway 109 landing	City of Rockingham	\$0	\$0	\$0	No	d
279 71. Conduct a feasibility study to identify and recommend cost-effective facilities and locations for public boating access point on the east side of the Tillery riverine reach between the Highway 109 access site and the Grassy Islands access area	American Rivers	\$50,000	\$0	\$8,750	No	a
72. Upgrade the informal SR 1744 access site or provide a new site within the general vicinity	Staff	\$40,000	\$0	\$7,000	Yes	a

Environmental Measures	Recommending Entities	Capital Costs (2007\$)	Annual Costs, Including O&M and Energy (2007\$)	Total Annualized Cost (2007\$)	Adopted By Staff?	Notes
73. Additional improvements beyond proposed measures at the Pee Dee access area (install lighting and study feasibility of installing overnight campsites)	City of Rockingham	\$15,000	\$0	\$2,630	Yes	a
74. Additional improvements beyond proposed measures at Grassy Islands access area (vault toilets, trash receptacles, lighting, and study feasibility of overnight campsites)	City of Rockingham	\$25,000	\$0	\$4,380	Yes	a
75. Install a port-a-john at the Blewett Falls tailrace access area	Staff	\$10,000	\$0	\$1,750	Yes	a

Environmental Measures	Recommending Entities	Capital Costs (2007\$)	Annual Costs, Including O&M and Energy (2007\$)	Total Annualized Cost (2007\$)	Adopted By Staff?	Notes
Land and Aesthetic Resources						
76. Place a restrictive covenant for conservation purposes on certain lands Progress Energy owns near the mouth of the Uwharrie River, except as required for operation, maintenance, repair, or improvement of the project or Progress Energy's transmission or distribution system.	Yadkin-Pee Dee Parties	\$0	\$0	\$0	Yes	c
77. Lease to the state of North Carolina lands Progress Energy owns between Morrow Mountain State Park and the Pee Dee River.	Yadkin-Pee Dee Parties	\$0	\$0	\$0	Yes	c

Environmental Measures	Recommending Entities	Capital Costs (2007\$)	Annual Costs, Including O&M and Energy (2007\$)	Total Annualized Cost (2007\$)	Adopted By Staff?	Notes
78. Place a restrictive covenant for conservation purposes on certain lands Progress Energy owns in the Grassy Islands area at the upper reaches of Blewett Falls, except as required for operation, maintenance, repair, or improvement of the project or transmission or distribution system	Yadkin-Pee Dee Parties	\$0	\$0	\$0	Yes	c
79. Prohibit private access, except foot access, to Blewett Falls across project lands except at the designated public access areas	Yadkin-Pee Dee Parties	\$0	\$0	\$0	Yes	c
80. Place restrictive covenant for conservation purposes on Progress Energy lands along current canoe portage route at Blewett Falls dam prohibiting development on lands needed for portage, except as required for	Yadkin-Pee Dee Parties	\$0	\$0	\$0	Yes	c

Environmental Measures	Recommending Entities	Capital Costs (2007\$)	Annual Costs, Including O&M and Energy (2007\$)	Total Annualized Cost (2007\$)	Adopted By Staff?	Notes
operation, maintenance, repair, or improvement of the Project or Progress Energy 's transmission or distribution system						
81. Implement and enforce the Tillery SMP	Yadkin-Pee Dee Parties	\$0	\$0	\$0	Yes	c
82. Develop and implement a written shoreline management policy for Blewett Falls prohibiting private access across project lands, except at designated public access areas	Yadkin-Pee Dee Parties	\$30,000	\$0	\$5,250	Yes	a

^a Cost estimated by staff.

^b Energy losses provided by Progress Energy in its additional information request response dated July 16, 2007.

^c No additional cost is anticipated for implementation of this measure.

^d Cost provided by Progress Energy in its additional information request response dated December 12, 2006.

^e Not enough detail to estimate cost.

^f Cost provided by Progress Energy in its alternative prescription filing dated June 8, 2007.

^g No estimate was provided for this measure. It is expected that this measure would only be implemented if the trap and truck operation is not considered to be successful at some point in the future.

^h Cost provided in the draft settlement agreement.

ⁱ Cost provided by the city of Rockingham in its letter dated May 14, 2007.

4.2.4 Comparison of Alternatives

Table 58 summarizes the cost of the No-action Alternative, the Proposed Action, and the Staff-recommended Alternative for the Yadkin-Pee Dee River Project.

Table 58. Summary of the three action alternatives for the Yadkin-Pee Dee River Project (P-2206). (Source: Staff)

	No Action	Proposed Action	Staff-Recommended Alternative
Installed capacity (MW)	108.6	108.6	108.6
Annual generation (MWh) ^a	370,100	362,900	362,900
Annual power value (mills/kWh)	\$15,957,500 43.12	\$15,317,500 42.21	\$15,317,500 42.21
Annual cost (mills/kWh)	\$7,416,460 20.04	\$9,288,950 25.60	\$9,330,900 25.71
Annual net benefit (mills/kWh)	\$8,541,040 23.08	\$6,028,550 16.61	\$5,986,600 16.50

^a The annual generation of the various alternatives are based on computer modeling runs using Progress Energy's CHEOPS model (letter from Progress Energy to the Commission, filed July 16, 2007).