



NUREG-1437  
Supplement-33

# **Generic Environmental Impact Statement for License Renewal of Nuclear Plants**

## **Supplement 33**

### **Regarding Shearon Harris Nuclear Power Plant, Unit 1**

#### **Final Report**

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Impacts on minority and low-income populations due to the shutdown of HNP would depend on the number of jobs and the amount of tax revenue lost to the communities surrounding the power plant. Closure of HNP would reduce the overall number of jobs and tax revenue generated in the region that was directly and indirectly attributed to plant operations. However, given the rapid economic growth of Wake County and the Raleigh-Durham area, it is likely that these losses would be replaced by the development of new businesses and new sources of tax revenue in the region. Since CP&L's tax payments represent a small percentage of Wake County's total annual property tax revenue, it is unlikely that social services would be seriously affected. Therefore, minority and low-income populations in the vicinity of HNP would not likely experience any disproportionately high and adverse socioeconomic impacts from the shutdown of HNP.

The environmental effect of plant shutdown would reduce the amount of operational impacts on the environment. Therefore, minority and low-income populations in the vicinity of HNP would not likely experience any disproportionately high and adverse environmental impacts from the shutdown of HNP.

Impacts at other sites would depend upon the site chosen and the nearby population distribution, but would be SMALL to MODERATE.

### 8.2.5 Utility-sponsored Conservation

In the following section, NRC staff will evaluate the environmental impacts of a conservation<sup>(8)</sup> alternative to license renewal. Though CP&L currently employs a variety of conservation, energy efficiency, and other demand-side management measures, the NRC staff finds it reasonable to consider a conservation-based alternative to HNP license renewal based on several recent developments. First, in May 2007, CP&L announced plans to institute utility-based energy efficiency programs aimed at eliminating the need for 2000 MW of electrical generating capacity in the North and South Carolina service territories (Murawski 2007, Beattie 2007). Second, earlier in the same month, North Carolina's largest utility, Duke Energy Carolinas, indicated that an energy efficiency program would allow it to retire 800 MW of coal capacity, and would allow it to offset up to 1700 MW of capacity over four years (Fordney 2007). Duke also indicated that the cost of the program would be less than the cost of constructing new generation capacity. Third, the North Carolina Utilities Commission released a report in December 2006 indicating that North Carolina has a statewide potential to reduce projected energy consumption by 32.7% of total projected utility sales per year by 2017. The report deemed approximately 25,132 gigawatt-hours (GWh) of this savings (13.9% of statewide

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(8) NRC staff notes that conservation typically refers to all programs that reduce energy consumption, while energy efficiency refers to programs that reduce consumption without reducing services. For this section, NRC staff will use the terms interchangeably.

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electricity sales) to be cost-effectively achievable<sup>(9)</sup> (GDS Associates 2006). Though much of this savings potential likely exists during peak demand times, the magnitude of potential savings significantly exceeds HNP's capacity, and several major efficiency measures identified in the GDS Associates report would affect baseload generation needs. These announcements all indicate robust opportunities for energy efficiency or conservation in North Carolina, as well as costs consistent with other alternatives. As such, NRC staff will evaluate utility-sponsored conservation as a feasible and commercially-available alternative to HNP license renewal. Given the terminology used in the GDS Associates report, in announcements from CP&L, and in the GEIS, NRC staff will use "conservation" and "energy efficiency" interchangeably.

The GEIS notes that a conservation alternative would have mostly SMALL or negligible environmental impacts. NRC staff, in the GEIS, established that resource extraction and material disposal would be the most visible lifecycle impacts, and that some conservation measures may also affect indoor air quality. The GEIS noted, however, that studies had not identified direct impacts from conservation measures to indoor air quality, and that pre-existing contamination is a major determinant in determining post-weatherization pollution levels. The GEIS also noted that production of conservation measures would not require large amounts of materials, and those it does require are common to many manufacturing processes. In addition, the GEIS established that disposal involves normal procedures with sufficiently effective disposal methods and small enough amounts of hazardous compounds that no adverse health effects would result (NRC 1996).

According to the GDS Associates in their *A Study of the Feasibility of Energy Efficiency as an Eligible Resource as Part of a Renewable Portfolio Standard for the State of North Carolina*, conducted for the North Carolina Utilities Commission, energy efficiency potential varies across residential, commercial, and industrial building sectors (GDS Associates 2006). In each sector, GDS provided technical potential (an indication of complete and total implementation of all possible efficiency measures); achievable potential (an implementation level achieved by an aggressively funded and sustained campaign); and achievable cost-effective potential (an implementation level achieved by targeting aggressive and sustained implementation campaigns toward efficiency measures with a lifetime cost of \$.05 per kWh or less).

In the residential sector, GDS Associates determined that most achievable cost-effective potential energy savings result from a combination of building insulation and weatherization, Energy Star windows, Energy Star programmable thermostats, and compact fluorescent light installation. Other energy reductions come from low-flow shower heads, water heater blankets, and insulation and weatherization programs targeted toward low-income populations. In the commercial sector, improved HVAC controls and motors, higher efficiency lighting and lighting controls, improved refrigeration, better compressed air systems, and upgraded transformers

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(9) GDS Associates determined \$.05 per lifetime kWh produced to be the cost-effectiveness threshold.

reduce energy consumption. In the industrial sector, improved lighting, motors, pumps, lubricants, controls, and system designs, as well as system optimization and upgraded transformers contribute to increased efficiency (GDS Associates 2006).

GDS Associates' analysis assumed that program administrators would have ten years to implement the programs, reaching full effect by 2017. NRC staff notes that HNP's operating license expires in 2026, and thus would allow for sufficient time to develop a suitable energy efficiency program.

NRC staff discusses the overall impacts of a new nuclear generating alternative in the following sections, and summarizes impacts in Table 8-6.

- Land Use

Since CP&L would continue to use the existing transmission lines, and would continue to maintain Harris Reservoir, land use impacts of an energy efficiency alternative would be SMALL. It would be possible that equipment replacements would increase waste generation and increased resulting landfill disposal, but given a ten-year timeline for program development and implementation, it would be likely that some proportion of replacements would occur at the end of the existing equipment's life (especially in the case of frequently replaced items, like lightbulbs). Many replaced items (like home appliances or industrial equipment) have substantial recycling value and would likely not be landfilled.

- Ecology

Ecological impacts would be SMALL, but positive, as withdrawals from and discharges to Harris Reservoir would cease. As no power generation alternative would take the plant's place, water levels in Harris Reservoir may rise and contribute additional water to Buckhorn Creek, which currently is nearly dry for part of the year, and to the Cape Fear River downstream of Harris Reservoir. These impacts would be SMALL, however. Also, there would be SMALL, but positive effects if plant staff stops controlling vegetation at the plant site. If CP&L allowed boat access to the auxiliary reservoir after plant shutdown, aquatic ecology may be affected by potential introduction of invasive species and increased boat traffic as well as fishing access, though this effect would be SMALL, as well.

**Table 8-6.** Summary of Environmental Impacts of a Conservation Alternative

Impact Category	Impact	Comments
Land Use	SMALL	Existing reservoir, transmission lines remain in use; possible minor, speculative effects on landfill area.
Ecology	SMALL	Withdrawal from and discharge to reservoir ceases; some land may

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Impact Category	Impact	Comments
		revert to other habitats; fishing may increase in former auxiliary reservoir and invasive species may be introduced, though this would have SMALL effects.
Water Use and Quality—Surface Water	SMALL	Water withdrawal and discharge would cease; additional water may flow into Buckhorn Creek downstream of Harris Reservoir, perhaps reducing stream intermittency.
Water Use and Quality—Groundwater	SMALL	Plant currently uses no groundwater; increased flow may affect groundwater around Buckhorn Creek, but aquifers are not currently used for water supply.
Air Quality	SMALL	Commuter vehicle emissions and diesel emissions would decrease, positively affecting air quality. This effect would be SMALL.
Waste	SMALL	Waste volumes generated by conservation programs would be mitigated by lengthening the program implementation timeline and through recycling. In addition, significance of other waste streams would likely swamp waste generated by an energy efficiency program.
Human Health	SMALL	Changes may occur to indoor air quality, but these are not well-established, and usually stem from pre-existing air quality issues.
Socioeconomics	SMALL	Loss of jobs offset by economic growth in area; speculative potential for additional contractor employment across North Carolina.
Socioeconomics (Transportation)	SMALL	Commuter traffic to the plant would decrease; additional traffic associated with efficiency programs would be widely distributed and would likely not be noticeable.
Aesthetics	SMALL	The existing plant would be decommissioned and an alternative structure would replace it; no noticeable impacts from energy efficiency improvements.
Historic and Archeological Resources	SMALL	No known effects.
Environmental Justice	SMALL	Depending on program design and enrollment, minority and low-income populations could benefit from energy efficiency programs.

- Water Use and Quality

Impacts to water use and quality from an energy efficiency program would be SMALL but positive, as withdrawals from Harris Reservoir would cease. Additional water may be available downstream from HNP in both Buckhorn Creek and the Cape Fear River as the plant would no longer evaporate water for cooling. As the plant uses no groundwater, a conservation alternative would not directly affect groundwater, though increased flow to Buckhorn Creek may affect groundwater in the immediate vicinity. As no one uses this groundwater, the effect would not be noticeable.

- Air Quality

Air quality impacts from a utility-sponsored energy efficiency program would be SMALL and positive. Emissions from commuter vehicles and diesel generators would decrease. The GEIS noted that indoor air quality may suffer from weatherization programs that fail to balance air quality concerns. The GEIS also noted that indoor air quality after weatherization is most strongly affected by pre-existing air quality issues.

- Waste

Waste impacts from energy efficiency programs would likely be SMALL, but somewhat dependent on the nature of the program. Improvements to heating and cooling systems would generate construction wastes, while appliance replacements may also generate wastes. Some of these replacements may occur in the course of normal retirement over the 10-year implementation period and thus constitute no change to normal waste streams. This would be particularly the case for frequently replaced items like light bulbs.

While projections of waste amounts from a conservation program are speculative, statewide equipment replacements and upgrades spread over 10 or more years, many of which would generate several pounds of waste per resident (e.g., lightbulbs, new shower heads, new thermostats), along with some which would generate hundreds to thousands of pounds of waste spread over many residents (replacing commercial ventilation systems or industrial motors), would keep impacts SMALL when compared to the 1.23 MT (1.36 tons) of waste disposed per resident in fiscal year 2005-2006 (NCDENR/DWM 2006). Furthermore, many replacements or upgrades generate waste materials with substantial recycling value (such as metal scrap from appliances, ductwork, and motors) and would thus not increase the burden on landfills. Some wastes, like fluorescent light bulbs, would need to be recycled as they contain hazardous compounds, though they generally operate much longer than their incandescent counterparts. The GEIS noted that amounts of hazardous compounds are small, and disposal methods are effective. Also, facilities to recycle these items currently exist in North Carolina. Waste impacts from the conservation alternative, then, would be SMALL.

- Human Health

An energy efficiency program is unlikely to have a significant effect on human health. Changes to most building appliances would not affect health, though upgrades to HVAC systems, insulation, and weatherization (including windows) may affect indoor air quality. The GEIS noted that this issue has not been sufficiently studied, but that mitigation measures would be available to correct problems. The GEIS also noted that hazardous chemicals in the waste stream would not affect human health. As such, NRC staff determines that these effects would be SMALL.

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- Socioeconomics

Socioeconomic effects of an energy efficiency program would be SMALL. As in the no-action alternative, loss of jobs at HNP would be offset by economic growth in the area. Additionally, a conservation program would likely employ additional workers, as noted in the GEIS. Low-income populations could benefit from weatherization and insulation programs. This effect would be greater than the effect for the general population because low-income households experience home energy burdens more than four times larger than the average household (OMB 2007).

- Transportation

Transportation impacts would also be SMALL as fewer employees commute to the plant site. Any transportation effects from the energy efficiency alternative would be widely distributed across the state, and would not be noticeable.

- Aesthetics

Impacts from energy efficiency programs would be positive, though small, as the plant is decommissioned and no alternative would replace it. The transmission lines and Harris Reservoir would remain after plant decommissioning. Traffic to the plant would decrease, however, as would the attendant noise and emissions. Noise impacts would occur in instances of upgrades to major building systems, though this impact would be highly intermittent and short-lived.

- Historic and Archaeological Resources

Impacts to archaeological resources from energy efficiency programs would be SMALL, if any, as a conservation alternative would not affect land use or the historical or cultural resources contained onsite or elsewhere in the state.

- Environmental Justice

GDS Associates identified weatherization programs targeting low-income residents as a cost-effective energy efficiency option (GDS 2006). Since low-income populations tend to spend a larger proportion of their incomes paying utility bills (according to the Office of Management and Budget, low income populations experience energy burdens more than four times as large as those of average households [OMB 2007]). Impacts to environmental justice from energy efficiency programs would be SMALL, depending on program design and enrollment.