

Blue Ridge Environmental Defense League

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August 14, 2009

Charles P. Nicholson
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**Re: Programmatic Environmental Impact Statement; Integrated Resource Plan
Federal Register / Vol. 74, No. 113 / June 15, 2009**

Mr. Nicholson:

On behalf of the Blue Ridge Environmental Defense League and our members in the Tennessee Valley Authority service area, I write to recommend the following items be included in the proposed environmental impact statement.

Introduction

The Blue Ridge Environmental Defense League recommends that TVA: 1) Adopt an energy plan which promotes clean, renewable energy sources including wind and solar, 2) Adopt a comprehensive program of energy conservation and efficiency, 3) Phase out its nuclear and coal plants and 4) Rule out burning of garbage, animal manure, and other waste materials.

Most of the electric power in TVA's service area is provided by coal and nuclear power: fossil-fuel about 60%; nuclear power about 30%. Methane gas burning is included under TVA's Green Power Switch. These three are critically flawed forms of power generation with limited futures. As an alternative, TVA should adopt a "carbon negative" energy policy which invests in truly clean and renewable forms of power such as solar and wind.

1. Supply Side Options

Electrical energy power sources to be evaluated in TVA's PEIS include fossil fuels, nuclear, biomass, hydro, solar, and wind. Specific externalities for each resource should be accounted for include the effects of power production on air, soil, and water media. The following areas of investigation are specific to each power source:

- Fossil Fuels (coal, petroleum, natural gas)
 - Pollutants: SO₂, NO_x, CO, CO₂, particulate matter, VOC, heat, noise
 - Flora: forest damages, agricultural harvest losses, loss of species
 - Fauna: losses of fishery, animal husbandry losses, loss of species
 - Human: health damages, hospital and emergency room costs, reduced

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- quality of life
 - Material: corrosion and damages to buildings
 - Climate: health damages, harvest losses due to temperature changes, flooding
 - Mining effects: loss of natural habitat and water quality from high-impacts methods such as mountaintop removal, health impacts on miners.
 - Costs of production: permitting, fuel
- Nuclear Power
 - Pollutants: waste heat and radioactive isotopes of tritium, cesium, iodine, plutonium, etc.
 - Flora: forest damages, agricultural harvest losses, loss of species
 - Fauna: losses of fishery, animal husbandry losses, loss of species
 - Human: health damages from routine and accidental releases of radionuclides, reduced quality of life
 - Land: affected by contamination
 - Mining effects: uranium mill tailings, uranium processing and enrichment, accidents
 - Fuel transportation: routine and accidental radiation exposures
 - Costs of production: R&D of new technologies, permitting costs, accidental releases of radionuclides, radioactive waste disposal, decommissioning of nuclear plants.
- Renewable Energy (hydro, solar, wind)
 - Large scale hydro: land losses from reservoir, loss of wetlands, flora and fauna
 - Small scale hydro: loss of fauna
 - Solar: land occupation
 - Wind: land occupation, noise disturbance, visual impacts
- Biomass
 - Air pollutants from products of combustion
 - Soil erosion and water pollution from agricultural fuels and clear-cutting
 - Competition with food-producing agricultural resources including land, water, fertilizer
 - Human: health impacts of pollution, hospital and emergency room costs, reduced quality of life
 - Costs of production: fuel for biomass.

Continued reliance on coal and nuclear power for 90% of TVA's energy needs has real economic impacts resulting from medical treatments and early death. The League recommends that any true cost-benefit energy analyses must include human health impacts. We believe that clean energy means lower electric rates and reductions in air and water pollution. Therefore, the sooner TVA makes the transition to clean renewable sources of electric power, the greater the benefits to public health and the economy.

1.1 Fossil Fuel

TVA's coal fired electric generating units suffer from major problems which cannot be easily or cheaply overcome. And coal-fired power plants are the largest source of global warming gas, carbon dioxide. The Union of Concerned Scientists concluded:

[C]oal-burning power plants are the single largest source of carbon emissions, representing about one-third of the U.S. total—more than those from all our cars, SUVs, trucks, trains, and ships combined (EIA 2008d).¹

Tennessee's 33 operating coal-fired electric generating units all began operation between 1951 and 1973. (The four deactivated units at Watts Bar came on line in 1942-1945.) The total power potential of the 33 units is 8547 megawatts-electricity (MWe). The average age of these power plants, not including Watts Bar, is 52 years. All were grandfathered into the 1970 Clean Air Act's loophole because they were not expected to operate for 50+ years. Some upgrades have been made to pollution controls but, in effect, TVA is trying to make 1957 Chevy's meet 2009 tailpipe standards. It is worth noting that the Sierra Club's Beyond Coal Campaign announced that since 2001 one hundred proposed new coal-fired power plants have been rejected.² Changing times and better alternatives have undermined coal for the production of electric power.

Phase II of the Environmental Protection Agency's acid-rain program began on 2000, and these plants reduced their SO₂ and NO_x emissions. However, the absolute levels of these two pollutants continue to present a major regional air pollution problem and carbon dioxide emissions during this decade have remained essentially steady (see Table A below).

Table A: Coal-fired Power Plants in Tennessee Combined Emissions³

Year	NO_x	SO₂	CO₂
2005	101,297	266,061	60,157,910
2004	109,715	303,308	60,476,574
2003	133,512	337,784	58,755,124
2002	154,274	333,560	63,601,819
2001	154,737	356,587	61,577,569
2000	155,865	424,961	64,545,366

Emissions in tons per year

¹ *Climate 2030 Blueprint*, Union of Concerned Scientists, (2009) p.57.

EIA2008d citation: Energy Information Administration (EIA), Emissions of greenhouse gases in the United States 2007. DOE/EIA0573(2007). Washington, DC: U.S. Department of Energy. Online at: <ftp://ftp.eia.doe.gov/pub/oiaf/1605/cdrom/pdf/ggrpt/057307.pdf>.

² To see the list of 100, go to <http://www.sierraclub.org/environmentallaw/coal/plantlist.asp>

³ Coal-fired Power Plants in Tennessee Combined Emissions, US Environmental Protection Agency Data compiled at http://www.bredl.org/air/tn_coal-fired_map.htm

Moreover, toxic releases of toxic to the air, land and water are an ongoing problem (see Table B, Attachment B)⁴. The trends of releases of heavy metals, products of incomplete combustion and organochlorines created by fossil fuel combustion are mixed. Regardless of whether they are within regulatory limits, these compounds are a public health hazard. Further, what is the net impact on public health and the natural environment if emissions of sulfur dioxide are reduced, but emissions of sulfuric acid are increased? H₂SO₄ emissions doubled between 2000 and 2004 while SO₂ decreased 30% (see Table B).

Dioxin releases from TVA fossil fuel combustion during the decade also spell bad news for coal fired power and for public health (Table C).⁵

Table C: Dioxin Releases (in grams) - source: EPA TRI

Chemical	Released	2004	2003	2002	2001	2000
Dioxin & Dioxin-like compounds	Air	12.5060000	12.0130000	12.7640000	12.6820000	24.8190000
	Land	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
	Water	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
	Total On-Site	12.5060000	12.0130000	12.7640000	12.6820000	24.8190000

Finally, the US environmental Protection Agency lists four TVA power plants as having high hazard potential because of coal combustion residues (CCR) (see Table D, below). The residues are a combination of fly ash, bottom ash, coal slag, and flue gas desulfurization residue and include arsenic, selenium, cadmium, lead, and mercury. The EPA states, "CCRs may cause a risk to human health and the environment and, in fact, EPA has documented cases of environmental damage."

Table D: TVA CCRs on the EPA List of 49 High Hazard Potential Units⁶

Facility	Unit	Location
Bull Run	Fly Ash Pond and Stilling Basin Area 2	Clinton, TN
Colbert	Ash Pond 4	Tuscumbia, AL
Cumberland	Ash Pond	Cumberland City, TN
Cumberland	Gypsum Storage Area	Cumberland City, TN
Widows Creek	Gypsum Stack	Stevenson, AL

TVA's PEIS should include the impacts of all these pollution factors on public health and the natural environment in its analysis.

1.2 Nuclear

Radioactive pollution from nuclear power is invisible, odorless, tasteless and deadly. In

⁴ Coal-fired Power Plants in Tennessee Combined Emissions, US Environmental Protection Agency Toxic Release Inventory Data compiled at http://www.bredl.org/air/tn_coal-fired_map.htm

⁵ *Ibid*

⁶ Fact Sheet: Coal Combustion Residues (CCR) - Surface Impoundments with High Hazard Potential Ratings, EPA530-F-09-006, June 2009, updated August 6, 2009.

<http://www.epa.gov/epawaste/nonhaz/industrial/special/fossil/ccrs-fs/index.htm>

addition to being a public health hazard, nuclear power is expensive. Without federal subsidies, it would not survive. Finally, nuclear power will not improve greenhouse gas emissions enough to matter and would undermine safer, cleaner, cheaper options.

1.2.1 Hazard

The nuclear industry has used its clout to make it easier to get licenses to construct and operate new nuclear plants. As a result, the health, safety and well-being of our communities take second place to so-called regulatory efficiency. In a world of computer crashes, product recalls, and financial failures, there can be no such thing as accident-free nuclear power.

Fifty-one nuclear reactor shut-downs longer than one year have occurred; 36 were for safety-related causes which, on average, cost nearly \$1.7 billion each to repair. Among all U.S. utilities, TVA ranks at the top for the number of extended reactor shut-downs. Dave Lochbaum of the Union of Concerned Scientists reported that “Year-plus outages represent prima facie evidence of how far safety levels have been allowed to drop below acceptable levels.”⁷

In 2005 Sandia National Labs determined that the fire barriers supposed to last one hour would fail in just 13 minutes. The Nuclear Regulatory Commission concluded: “As of December 2007, no fire-endurance tests have been conducted to qualify Hemyc as an NRC-approved 1-hour or 3-hour fire barrier for installation at [nuclear power plants].”⁸ The problem remains uncorrected.

Former NRC Chairman Klein said: “It should be recalled that the most significant nuclear event in the U.S.—the Three Mile Island incident in 1979—was a result of operator error resulting from inadequate training, and not a faulty design.”⁹ If operator error was indeed blameworthy for the accident at TMI, such failure would not be unique to that incident because all reactors have human operators and are therefore susceptible to error.

1.2.2 Economics

TVA has proposed constructing Westinghouse AP-1000 reactors at its Bellefonte site in Alabama. The total capital cost of a new AP1000 units is expected to be between \$5,492 and \$8,041 per kW.¹⁰ However, TVA’s application for a license to construct and operate

⁷ *Walking a Nuclear Tightrope: Unlearned Lessons of Year-plus Reactor Outages*, Dave Lochbaum, Union of Concerned Scientists, September 2006

⁸ *NRC’s Oversight of Hemyc Fire Barriers*, Case No. 05-46, Special Inquiry, Office of the Inspector General, January 2008 <http://www.nrc.gov/reading-rm/doc-collections/insp-gen/2008/el-05-46.pdf>

⁹ Chairman Dale E. Klein No. S-08-018, Remarks at the North American Energy Summit, University of Texas, San Antonio, May 1, 2008

¹⁰ Direct Testimony of Steven D. Scroggs, Florida Power & Light Company, before the Florida Public Service Commission, Docket No. 07____-EI (October 16, 2007) (“FPL 2007 Testimony”). On the Internet at <http://www.psc.state.fl.us/dockets/cms/docketFilings2.aspx?docket=070650>, (document number 09467-07, Exhibit SDS-8).

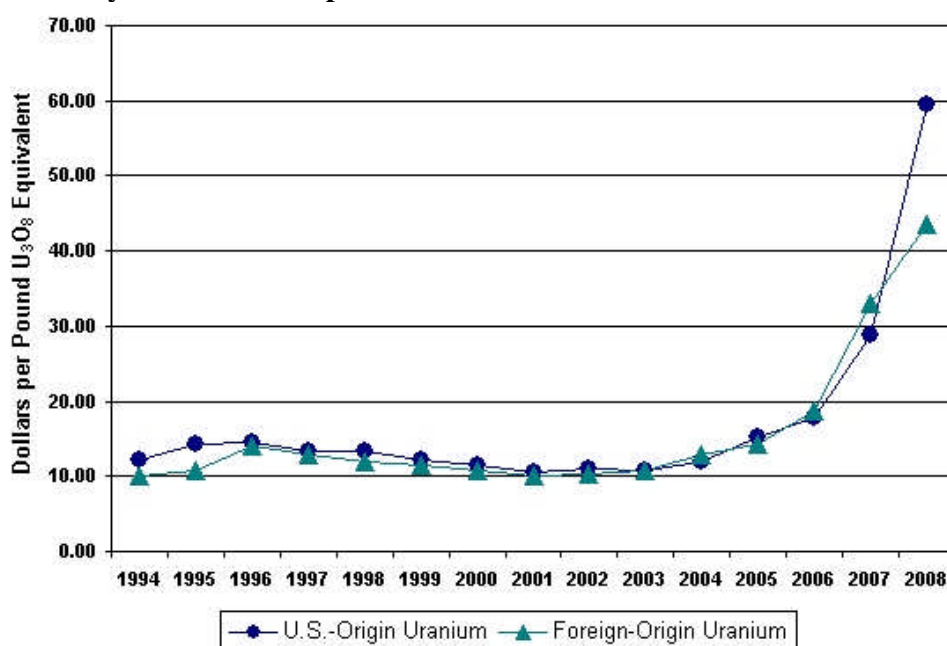
the AP-1000 was much lower: \$2,850 to \$3,200 per kW.¹¹ According to Dr. Arjun Makhijani, the FP&L values imply an electricity cost of about \$120 to \$170 per MWh (12 to 17 cents per kWh), even if fuel cost escalations of the last year are ignored.¹²

As financial investments, nuclear plants are a risky bet. The Congressional Budget Office estimated the historical default rate on nuclear loans amounted to 30% to 50% of capital costs. A trenchant essay published in fiscally conservative *Forbes* magazine opposed nuclear investments for the following reasons:

Pro-nuclear groups herald the coming flood of applications as proof that nuclear energy makes economic sense. Nonsense. The only reason investors are interested: government handouts. Absent those subsidies, investor interest would be zero.¹³

The cost of uranium fuel (U_3O_8) for nuclear power plants is continuing to rise sharply. The US Department of Energy chart below illustrates the problem for nuclear power plants' bottom line.

Weighted-Average Price of U.S. and Foreign-Origin Uranium Purchased by Owners and Operators of U.S. Civilian Nuclear Power Reactors¹⁴



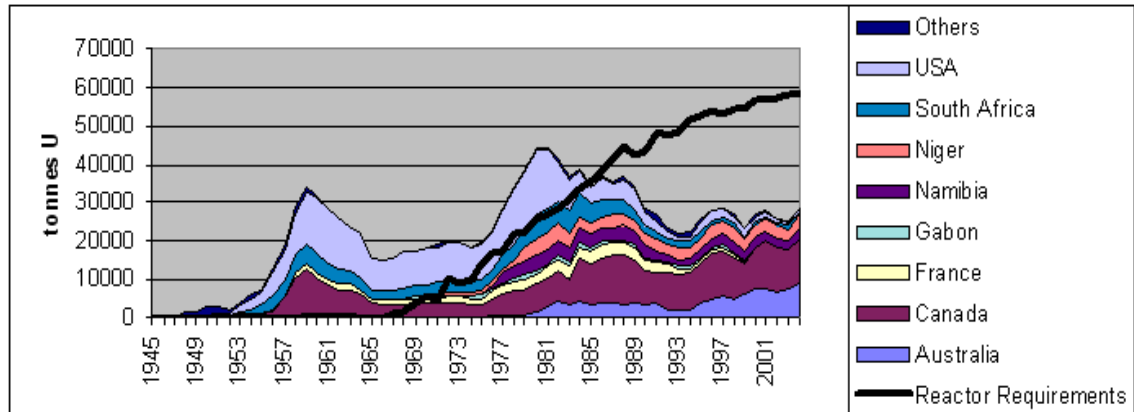
¹¹ TVA Bellefonte COLA Environmental Report at 10.4-7

¹² Petition for Intervention by Joint Intervenors in the matter of a combined operating license for Bellefonte Units 3 and 4, Nuclear Regulatory Commission Docket Nos. 52-014 and 52-015, June 6, 2008

¹³ Hooked on Subsidies, *Forbes*, Jerry Taylor and Peter Van Doren, November 26, 2007, <http://www.forbes.com/forbes/2007/1126/034.html>

¹⁴ Source: Report of May 26, 2009 by US DOE Energy Information Administration at <http://www.eia.doe.gov/cneaf/nuclear/umar/summaryfig2.html>

Reactor requirements for fuel have risen, but the production of uranium has been virtually flat for a decade, as can be seen in the graph below from the World Nuclear Association.¹⁵



1.2.3 Nuclear is no solution to Global Warming

Commercial nuclear electric *systems* emit about one-third as much greenhouse gas as natural gas-fired power plants. The problem centers on fuel production. Making uranium fuel requires large amounts of fossil-fueled energy, creating carbon dioxide and an energy debt equivalent to the power needed to make the fuel. Depending on the grade of the uranium ore, it can take over a decade for the nuclear plant to repay this energy debt.

Because Wall Street considers nukes an unsafe investment, the nuclear industry has convinced Congress to approve billions of taxpayer dollars for loan guarantees. The public funding and taxpayer dollars directed to the nuclear industry undermine less costly, cleaner forms of electric power generation. The current nuclear revival is an industry-led, taxpayer-financed attempt to revive a nuclear dinosaur. The public monies directed to the overweening nuclear industry would be better spent on less costly, cleaner forms of electric power generation.

1.2.4 Nuclear Hot Water

Thermoelectric stations require large amounts of water. Nuclear reactors need water for steam condensation, service water, emergency core cooling system, and other functions. Nuclear power plant cooling systems discharge large amounts of heated water into the lake or river, water which often contains radioactivity. Such releases are controlled and monitored; therefore, it is by design and not by accident.¹⁶

In 2007 drought forced a partial shutdown of Browns Ferry because of overheated water in the Tennessee River. Unit 2 was shut down completely, and Units 1 and 3 were

¹⁵ World Nuclear Association graph available at: <http://www.world-nuclear.org/info/inf23.html>.

¹⁶ *Got Water?* David Lochbaum, Union of Concerned Scientists Issue Brief, December 4, 2007

reduced to 75 percent capacity. Previously TVA itself had predicted that operations at Browns Ferry would have to be scaled back and could be completely shut down because of overheated discharge water

The dedication of water supply to nuclear power plants is wasteful and contrary to the principal purposes for which the Tennessee Valley Authority was created in 1933: that is, river navigability, flood control and agricultural and industrial development.¹⁷ Although the Tennessee Valley Authority Act did sanction the production of electric power, it was incidental; electric power was to be provided consistent with flood control and navigation and largely for the purpose of fertilizer manufacture.

According to Dr. Shawn Young, the Tennessee River Basin as a whole is considered to be the single most biologically diverse river system for aquatic organisms in the United States, and harbors the highest number of imperiled species of any large river basin in North America with 57 fish species and 47 mussel species considered to be at-risk.¹⁸

1.2.5 Radioactive Waste

As of June 30, 2008, no TVA nuclear power plants have a facility licensed to accept Class B, C or Greater-Than-C radioactive waste. Further, the director of the U.S. Department of Energy's Office of Civilian Radioactive Waste Management, Ward Sproat III, announced that the nation's legal limit of high-level nuclear waste—commercial irradiated nuclear fuel—for the proposed national waste dump will be surpassed in 2010.

1.3 Base Load Renewables

In April 2009 the *New York Times* reported that the Chairman Wellinghoff of the Federal Energy Regulatory Commission said “no new nuclear or coal plants may ever be needed in the United States.” The report continued:

Wellinghoff said renewables like wind, solar and biomass will provide enough energy to meet baseload capacity and future energy demands. Nuclear and coal plants are too expensive, he added. "I think baseload capacity is going to become an anachronism," he said. "Baseload capacity really used to only mean in an economic dispatch, which you dispatch first, what would be the cheapest thing to do. Well, ultimately wind's going to be the cheapest thing to do, so you'll dispatch that first." He added, "People talk about, 'Oh, we need baseload.' It's like people saying we need more computing power, we need mainframes. We don't need mainframes, we have distributed computing."¹⁹

¹⁷ 16 USC 831

¹⁸ Petition for Intervention by Joint Intervenors in the matter of a combined operating license for Bellefonte Units 3 and 4, Nuclear Regulatory Commission Docket Nos. 52-014 and 52-015, June 6, 2008

¹⁹ “Energy Regulatory Chief Says New Coal, Nuclear Plants May Be Unnecessary” *New York Times*, Noelle Straub and Peter Behr, Greenwire, April 22, 2009, <http://www.nytimes.com/gwire/2009/04/22/22greenwire-no-need-to-build-new-us-coal-or-nuclear-plants-10630.html>

Further, a study of the social costs of renewable energy technologies²⁰ found a net social *benefit* of 0.3 - 0.6 cents per kilowatt hour for wind energy and 0.9 - 3.3 cents per kilowatt hour for photovoltaic. These benefits result from employment gains and resultant wage and tax benefits from the installation of wind and solar technologies.

1.3.1 Wind (Base Load)

Wind energy is an abundant source of electric power. Experts estimate that the nation's potential wind energy resource is 10.8 trillion kilowatt-hours annually, three times the total U.S. electric power need. Wind power is becoming one of the lowest cost energy technologies and should be among TVA's highest priorities.

Wind powered turbines, when enough are deployed, can provide base load power. The efficiency of wind turbines approaches 100%, but their capacity factor is based on the quality of the wind resource. Utility-scale wind turbines, such as the units in Garrett, Pennsylvania, begin to generate electricity at wind speeds of 8 mph. Maximum output is achieved at 34 mph. They are shut down at speeds above 56 mph. So, they produce electric power when the wind is blowing from 8 to 56 mph. The wind farm there uses eight Nordex N60 1.3 megawatt units for a total power rating of 10.4 megawatts. A typical wind turbine capacity factor of 30% would mean a reliable delivered power of 3.12 MW times 8760 hours per year (or, 10.4 MW times 2626 hours--i.e. 30% of the number of hours in a year) for a 27, 331 megawatt-hours annual output. In other words, a regular, reliable, dependable 27 million kilowatt-hours of electric power every year with zero fuel costs and zero waste.

Most thermoelectric power plants, fossil fuel and nuclear, have an efficiency factor of about 33%; that is, two thirds of the power released by the heat source is wasted and is released to the environment as hot water. Therefore, the thermal power is about three times the electric power. To meet base load demand, thermoelectric plants build thermal capacity three times the desired electric power need. Similarly, base load power from wind turbines requires the construction of about three times to needed electric capacity to deliver reliable base load power.

1.3.2 Solar (Base Load)

According to Dr.Makhijani,²¹ solar photovoltaics built on commercial rooftops and parking lots can be built in modules of one to a few MW and have construction times on the order of a year or even less. Hence, new capacity can be closely tailored to rising demand. Also, solar thermal power plants can be built in modules of a few tens of megawatts to a few hundred megawatts. The lead time for such power plants is about three years.

²⁰ *Social Costs of Energy Consumption*, Olav Hohmeyer, Commission of European Communities, Document No. EUR 11519, Heidelberg, 1988, ISBN 3-540-19350-2

²¹ Petition for Intervention by Joint Intervenors in the matter of a combined operating license for Bellefonte Units 3 and 4, Nuclear Regulatory Commission Docket Nos. 52-014 and 52-015, June 6, 2008

The Department of Energy projects that if capacity increase goals are achieved, it would “put the U.S. industry on track to reduce the cost of electricity produced by PV from current levels of \$0.18-\$0.23 per kWh to \$0.05 - \$0.10 per kWh by 2015 – a price that is competitive in markets nationwide.”²²

1.4 Biomass

The false promise offered by waste biomass is that municipal solid waste, sewage methane, commercial and industrial wastes, and so-called special wastes cannot be dumped in a hopper and burned out of existence. At the high temperatures used in incineration and gasification, toxic metals including cadmium and mercury, acid gases including hydrochloric acid, and ozone-forming nitrogen oxides are released. Also, dioxins and furans are created in the cooling process following the burning of ordinary paper and plastic. These poisons are dangerous at extremely low levels and modern pollution control devices do a poor job of reducing these emissions into the atmosphere. Some including mercury and dioxin are persistent and bioaccumulative; they resist breakdown in the environment and are concentrated in the food chain. Proponents of biomass burners refer to their technology as “carbon neutral” and claim that they are only releasing greenhouse gases that would be released anyway. But waste is not a renewable resource just because we keep making it any more than coal is renewable because we keep mining it.

2. Accountability

The Energy Independence and Security Act of 2007 requires TVA to consider adopting the new Public Utility Regulatory Policies Act (PURPA) standards. This process must be concluded by December 19, 2009. The standards under Section 111(d) of PURPA to consider include Integrated Resource Planning:

Each electric utility shall: (A) Integrate energy efficiency resources into utility, State, and regional plans; and (B) Adopt policies establishing cost-effective energy efficiency as a priority resource.

Preliminary Recommendation: TVA staff has considered this PURPA standard and recommends that it is appropriate to adopt this standard. This includes implementing policies that establish cost-effective energy efficiency as a supply resource, helping to promote energy efficiency options with customers, and ensuring ongoing integration of energy efficiency into TVA’s processes.²³

Under this standard, TVA should adopt an energy plan which promotes clean, renewable energy sources including wind and solar, adopt a comprehensive program of energy

²² “DOE Selects 13 Solar Energy Projects for up to \$168 Million in Funding” (March 8, 2007). On the web at <http://www.energy.gov/news/4855.htm>

²³ Tennessee Valley Authority Staff Report on Preliminary Recommendations on the Four PURPA Standards Under Section 111(d) of the Public Utility Regulatory Policies Act Pursuant to the Energy Independence and Security Act of 2007, June, 2009

conservation and efficiency, phase out its nuclear and coal plants and rule out burning of garbage, animal manure, and other waste materials.

Conclusion

We would be pleased to participate in a public review group to learn about the issues, discuss tradeoffs associated with different resource options, and work with TVA on what a model resource portfolio will look like.

A handwritten signature in black ink that reads "Louis A. Zeller". The signature is written in a cursive style and is followed by a horizontal line.

Louis A. Zeller, Science Director
Blue Ridge Environmental Defense League

Attachments

A: Tennessee Coal-fired Power Plants

B: Table B: Toxic Releases

ATTACHMENT A

**Tennessee Coal-fired Power Plants: Data compiled from DOE EIA
Posted at**

Allen Fossil Plant
2574 Plant Rd.
Memphis, TN 38109
Shelby County

Units -Year of operation (power)
Unit 1 - 1959 (248 Mw - 251 Mw)
Unit 2 - 1959 (248 Mw - 251 Mw)
Unit 3 - 1959 (248 Mw - 251 Mw)

- source: DOE

Air Pollution Control Devices	
SO₂:	
NO_x:	All 3 units use overfire air. Selective Catalytic Reduction (SCR) systems online for all units - 2002. Overfire Air on all 3 units.
Sources: Title V air permit, govt. agencies, industry, and/or media reports	

Bull Run Fossil Plant
1265 Edgemoor Rd.
Clinton, TN 37716
Anderson County

Units -Year of operation (power)
Unit 1 - 1967 (868 Mw - 870 Mw)

- source: DOE

Air Pollution Control Devices	
SO₂:	Scrubber system planned to be installed in 2005.
NO_x:	Selective Catalytic Reduction (SCR) online May 2004.
Sources: Title V air permit, govt. agencies, industry, and/or media reports	

Cumberland Fossil Plant
815 Cumberland City Rd.
Cumberland City, TN 27050
Stewart County

Units -Year of operation (power)
Unit 1 - 1973 (1238 Mw - 1264 Mw)
Unit 2 - 1973 (1224 Mw - 1250 Mw)

- source: DOE

Air Pollution Control Devices	
SO₂:	Both Units 1 & 2 use wet limestone scrubbers.

NOx:	Both units use low-NOx burners. Selective Catalytic Reduction (SCR) systems to be installed. (status as of June 2004)
Sources: Title V air permit, govt. agencies, industry, and/or media reports	

Gallatin Fossil Plant
 1499 Steam Plant Rd.
 Gallatin, TN 37066
 Sumner County

Units -Year of operation (power)
 Unit 1 - 1956 (225 Mw - 228 Mw)
 Unit 2 - 1957 (225 Mw - 228 Mw)
 Unit 3 - 1959 (263 Mw - 266 Mw)
 Unit 4 - 1959 (263 Mw - 266 Mw)
 - source: DOE

Air Pollution Control Devices	
SO₂:	
NOx:	All 4 units use low-NOx burners.
Sources: Title V air permit, govt. agencies, industry, and/or media reports	

Johnsonville Fossil Plant
 535 Steam Plant Rd.
 New Johnsonville, TN 37134
 Humphreys County

Units -Year of operation (power)
 Unit 1 - 1951 (107 Mw - 113 Mw)
 Unit 2 - 1951 (107 Mw - 113 Mw)
 Unit 3 - 1952 (107 Mw - 113 Mw)
 Unit 4 - 1952 (107 Mw - 113 Mw)
 Unit 5 - 1952 (107 Mw - 113 Mw)
 Unit 6 - 1953 (107 Mw - 113 Mw)
 Unit 7 - 1958 (141 Mw - 144 Mw)
 Unit 8 - 1959 (141 Mw - 144 Mw)
 Unit 9 - 1959 (141 Mw - 144 Mw)
 Unit 10 - 1959 (141 Mw - 144 Mw)
 - source: DOE

Air Pollution Control Devices	
SO₂:	
NOx:	Units 7 - 10 use low-NOx burners.
Sources: Title V air permit, govt. agencies, industry, and/or media reports	

Kingston Fossil Plant
 714 Swan Pond Rd.
 Harriman, TN 37748
 Roane County

Units -Year of operation (power)
 Unit 1 - 1954 (136 Mw - 139 Mw)
 Unit 2 - 1954 (136 Mw - 139 Mw)
 Unit 3 - 1954 (136 Mw - 139 Mw)
 Unit 4 - 1954 (136 Mw - 139 Mw)
 Unit 5 - 1955 (178 Mw - 180 Mw)
 Unit 6 - 1955 (178 Mw - 180 Mw)
 Unit 7 - 1955 (178 Mw - 180 Mw)
 Unit 8 - 1955 (178 Mw - 180 Mw)
 Unit 9 - 1955 (178 Mw - 180 Mw)
 - source: DOE

Air Pollution Control Devices	
SO₂:	Scrubber system planned to be installed in 2005.
NOx:	Selective Catalytic Reduction

<p>(SCR) online for 6 of 9 units. The remaining 3 units are under construction for SCR. Units 5, 6, 7, & 8 use low-NOx burners. (status as of June 2004)</p>
<p>Sources: Title V air permit, govt. agencies, industry, and/or media reports</p>

John Sevier Fossil Plant
 611 Old Hwy. 70
 Rogersville, TN 37857
 Hawkins County

Units -Year of operation (power)
 Unit 1 - 1955 (176 Mw - 178 Mw)
 Unit 2 - 1955 (176 Mw - 178 Mw)
 Unit 3 - 1956 (176 Mw - 178 Mw)
 Unit 4 - 1957 (176 Mw - 178 Mw)
 - source: DOE

Air Pollution Control Devices	
SO₂:	
NO_x:	All 4 units use low-NOx burners.
<p>Sources: Title V air permit, govt. agencies, industry, and/or media reports</p>	

Watts Bar Fossil Plant
 Hwy 68
 Spring City, TN 37381
 Rhea County

Units -Year of operation (power)
 ST 1 - 1942 (56 Mw)
 ST 2 - 1942 (56 Mw)
 ST 3 - 1943 (56 Mw)
 ST 4 - 1945 (56 Mw)
 - source: DOE

Watts Bar COLD STANDBY STATUS (deactivated, in long-term storage)

All Tennessee Coal-fired Power Plants Facility-wide (not just coal-fired units)

Chemical	Released	2004	2003	2002	2001	2000
1,2,4-Trimethylbenzene	Air	0	0	3,000	3,000	3,000
	Land	0	0	0	0	0
	Water	0	0	0	0	0
	Total On-Site	0	0	3,000	3,000	3,000
Ammonia	Air	27,255	505	255	0	0
	Land	0	0	0	0	0
	Water	1,000	0	255	0	0
	Total On-Site	28,255	505	510	0	0
Antimony compounds	Air	255	0	255	1,005	1,005
	Land	14,200	0	15,200	55,950	40,000
	Water	250	0	250	500	500
	Total On-Site	14,705	0	15,705	57,455	41,505
Arsenic compounds	Air	2,520	2,020	2,770	5,375	7,770
	Land	159,850	214,000	243,250	232,300	189,350
	Water	24,405	23,300	18,900	16,100	11,500
	Total On-Site	186,775	239,320	264,920	253,775	208,620
Barium compounds	Air	6,305	15,405	16,455	13,055	14,105
	Land	3,300,900	4,192,420	4,103,910	4,473,015	3,497,010
	Water	82,555	74,250	63,500	45,600	44,900
	Total On-Site	3,389,760	4,282,075	4,183,865	4,531,670	3,556,015
Benzo(g,h,i)perylene	Air	0	0	0	0	0
	Land	1	1	0	1	0
	Water	0	0	0	0	0
	Total On-Site	1	1	0	1	0
Beryllium compounds	Air	510	510	510	255	255
	Land	13,700	18,700	24,500	16,200	5,600
	Water	5	250	250	250	250
	Total On-Site	14,215	19,460	25,260	16,705	6,105
Chromium compounds	Air	4,260	4,265	4,715	2,770	2,765
	Land	329,000	397,400	462,600	483,850	388,600
	Water	4,550	4,450	3,200	2,750	4,600
	Total On-Site	337,810	406,115	470,515	489,370	395,965
Cobalt compounds	Air	1,265	1,520	1,520	1,275	1,770
	Land	77,550	116,250	129,000	243,400	204,650
	Water	500	250	0	1,005	2,560
	Total On-Site	79,315	118,020	130,520	245,680	208,980
Copper compounds	Air	2,765	2,265	3,265	4,020	4,265
	Land	346,400	416,500	470,800	452,150	356,200
	Water	25,650	25,850	25,350	18,500	22,000
	Total On-Site	374,815	444,615	499,415	474,670	382,465
Hydrochloric acid	Air	26,090,035	23,640,035	25,660,035	19,070,035	26,260,035
	Land	0	0	0	0	0
	Water	0	0	0	0	0
	Total On-Site	26,090,035	23,640,035	25,660,035	19,070,035	26,260,035
Hydrogen fluoride	Air	2,009,035	2,155,035	2,221,035	1,492,235	1,379,735
	Land	0	0	0	0	0
	Water	0	0	0	0	0
	Total On-Site	2,009,035	2,155,035	2,221,035	1,492,235	1,379,735
Lead compounds	Air	2,422	2,376	3,343	1,794	1,770
	Land	221,411	276,530	332,560	379,424	275,850
	Water	258	307	589	348	3,050
	Total On-Site	224,091	279,213	336,492	381,567	280,670
Manganese compounds	Air	5,750	5,605	6,855	4,760	4,715
	Land	600,500	711,920	782,060	886,455	847,900
	Water	21,755	27,655	30,350	21,900	30,800
	Total On-Site	628,005	745,180	819,265	913,115	883,415
Mercury compounds	Air	2,020	2,023	2,130	2,420	2,860
	Land	912	949	1,135	785	806
	Water	3	5	7	50	54
	Total On-Site	2,935	2,977	3,272	3,255	3,720
Naphthalene	Air	1,750	0	0	0	0
	Land	0	0	0	0	0
	Water	0	0	0	0	0
	Total On-Site	1,750	0	0	0	0
Nickel compounds	Air	4,560	4,020	4,170	2,270	3,265
	Land	343,600	408,600	494,500	462,350	364,100
	Water	4,500	2,800	3,150	4,855	6,305
	Total On-Site	352,660	415,420	501,820	469,475	373,670
n-Hexane	Air	0	0	3,000	3,000	3,000
	Land	0	0	0	0	0
	Water	0	0	0	0	0
	Total On-Site	0	0	3,000	3,000	3,000
Nitrate compounds	Air	0	0	0	0	0
	Land	0	0	0	0	0
	Water	110,000	75,000	430,000	450,000	460,000
	Total On-Site	110,000	75,000	430,000	450,000	460,000
Polycyclic aromatic compounds	Air	178	154	181	178	183
	Land	94	248	107	177	97
	Water	0	0	0	0	0
	Total On-Site	272	402	288	355	280
Selenium compounds	Air	13,810	13,910	14,610	11,810	14,010
	Land	17,400	16,700	17,450	24,300	21,550
	Water	3,250	3,150	3,800	2,250	4,600
	Total On-Site	34,460	33,760	35,860	38,360	40,160
Sulfuric acid	Air	11,977,035	3,239,035	5,639,035	3,600,035	5,130,035
	Land	0	0	0	0	0
	Water	0	0	0	0	0
	Total On-Site	11,977,035	3,239,035	5,639,035	3,600,035	5,130,035
Thallium compounds	Air	505	510	505	10	10
	Land	45,000	58,500	78,000	20,300	23,250
	Water	250	250	250	250	250
	Total On-Site	45,755	59,260	78,755	20,560	23,510
Vanadium compounds	Air	3,860	4,010	5,210	6,465	7,510
	Land	682,900	806,300	953,150	1,431,260	1,117,205
	Water	11,250	22,950	17,250	33,065	48,010
	Total On-Site	698,010	833,260	975,610	1,470,790	1,172,725
Zinc compounds	Air	11,960	12,010	14,610	11,965	13,960
	Land	820,950	1,240,450	1,452,400	1,213,455	998,505
	Water	7,900	8,550	8,300	7,500	11,650
	Total On-Site	840,810	1,261,010	1,475,310	1,232,920	1,024,115
TOTAL	Air	40,166,305	29,105,213	33,607,464	24,237,732	32,856,023
	Land	6,974,368	8,875,468	9,560,622	10,375,372	8,330,673
	Water	298,081	269,017	605,401	604,923	651,029
	Total On-Site	47,438,754	38,249,698	43,773,487	35,218,028	41,837,725