June 19, 2010

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re: Comments in response to TVA's Final Supplemental Environmental Impact Statement for a single nuclear reactor at the Bellefonte site near Hollywood, Al submitted by the Blue Ridge Environmental Defense League (BREDL) and their local chapters, the Bellefonte Efficiency and Sustainability Team (BEST) and Mothers Against Tennessee River Radiation (MATRR)

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The Blue Ridge Environmental Defense League (BREDL), and their local chapters Bellefonte Efficiency & Sustainability Team (BEST) and Mothers Against Tennessee River Radiation (MATRR), respectfully submit the following comments on the Final Supplemental Environmental Impact Statement (FSEIS) for a single nuclear reactor on the Bellefonte site in our neighboring community of Hollywood, AL.

We strongly recommend that TVA choose the No Action (Alternative A) course, and immediately proceed to implementing Energy Efficiency Programs while preparing for Demand Response and Renewable Energy technologies. Due to our poor efficiency, Tennessee and Alabama consume more electricity per capita than any states in the country; so the logical, as well as the most cost effective, means of providing adequate energy to the region is through conservation of existing electric energy usage.

We applaud the stated goal of the TVA expansion-planning studies (FSEIS, v.1 Section 1.4.2, Power Supply, pp 10-11), "to select the combination of resources that provides the lowest-cost combinations of options while not subjecting customers to excessive levels of risk."

If, however, the TVA plunges back into nuclear power, you will leave our grandchildren with the extremely long-term expense of high-target security and storage of radioactive waste. More importantly, you will leave them with the serious cumulative effects on living DNA of the radionuclide poisons routinely released by nuclear power plants into our air, our water, and our food chain.

We do hereby alert TVA to the high costs and the "excessive levels of risk" regarding nuclear power plants and we do hold TVA responsible for your decisions regarding the financial burdens placed on Tennessee Valley citizens and the health and safety of our residents and of the Tennessee River.

High Cost of Nuclear

Financially, nuclear power is the most expensive form of energy, even without accounting for the human misery and highly inefficient extraction and milling costs, or for the on-site security, storage and/or transport of thousands-year highly poisonous radioactive nuclear waste - 20-30 tons, per reactor per year, of radionuclide waste produced on-site. Once an adequate storage facility is constructed, it must be supervised and guarded for 240,000 years. (Storm van Leeuwen, "Nuclear Power – Some Facts," August 10, 2005, p. 7.)

> Even theoretically [via the hypothetical concept of transmutation] it is not possible to convert all long-living nuclides originating from the fission and activation processes in a nuclear reactor into short-living or stable nuclides. (Storm van Leeuwen, "Nuclear Power Facts", January 9, 2006, v. 4, p. 7.)

We who live here will hold the TVA accountable for protecting our valley and its residents, but we also understand that the industry is highly persuasive. In fact, the nuclear power industry spent over $600 million lobbying Congress and buyers, and nearly $63 million on campaign contributions in a decade-long influence campaign, according to a January 2010 analysis by the Investigative Reporting Workshop at American University. http://investigativereportingworkshop.org/investigations/nuclear-energy-lobbying

In a study by the Congressional Budget Office, *Nuclear Power's Role in Generating Electricity (Study) May 2008*, Chapter 2. Framing the Analysis: Base-Case Assumptions and the Effects of Policy, p. 24-25, the financial risks are stated thus:

> CBO's assumption about the cost of building new nuclear power plants in the United States is particularly uncertain because of the industry's history of construction cost overruns. … Although no new nuclear power plants were proposed after the partial core meltdown at Three Mile Island in 1979, utilities attempted to complete more than 40 nuclear power projects already under way. For those plants, construction cost overruns exceeded 250 percent.[3] (An average of 12 years elapsed between the start of construction and the point at which the plants began commercial operation. The overruns in overnight costs did not include additional financing costs that were attributable to postaccident construction delays.)[4]

3. The calculation is based on data from Energy Information Administration, *An Analysis of Nuclear Power Plant Construction Costs*, DOE/EIA-0485 (1986). Those data include only plants of which construction was begun after 1965 and completed by 1986.
4. See Pietro S. Nivola, "The Political Economy of Nuclear Energy in the United States," *Brookings Policy Brief No. 138* (September 2004).

According to the Government Accountability Office, the average risk of default for taxpayer backed loans to the nuclear industry is 50% – that is a 50 percent default risk for taxpayer money. The current appropriation of taxpayer funds is the 3rd bailout for the nuclear industry in the last 3 decades. Hundreds of billions of taxpayer and rate-payer dollars have already been spent to keep the nuclear industry afloat. Read the Union of Concerned Scientists March 4, 2009, "Nuclear Bailout Report": http://www.ucsusa.org/

We ask you, as the TVA Board of Directors, why should Tennessee Valley residents be asked to shoulder the burden of living with the financial and health risks of nuclear power? Each reactor produces 20-30 tons of radioactive waste that remains dangerous for thousands of years requiring very expensive high security bunkers for on-site storage (and high security transport, if a national depository is available). Nuclear waste presents us with "a bill that keeps coming for centuries."

We here present excerpts from two articles citing the opinions of several industry experts and the data from highly respected research groups regarding the the overly-expensive option of nuclear power:

NUCLEAR POWER TOO EXPENSIVE, TOO DANGEROUS

Commentary by John LaForge

Duluth News Tribune, Monday, Jan. 11, 2010 http://www.duluthnewstribune.com/event/article/id/157141/

Lofty claims about the benefits of nuclear power have been coming from the Nuclear Energy Institute's lobbyists and others. Yet news journals, financial journals and energy journals all make clear that boiling water with uranium is the costliest and dirtiest energy choice.

Even *Time* magazine reported, on Dec. 31, 2008, that, "New [reactors] would be not just extremely expensive but spectacularly expensive."

... No less than Jeffrey Immelt, CEO of General Electric, one of the world's richest nuclear engineering firms, discouraged new reactor construction because of financial liabilities. In the Nov. 18, 2007, London Financial Times, Immelt said, "If you were a utility CEO and looked at your world today, you would just do gas and wind. You would say [they are] easier to site, digestible [and] I don't have to bet my company on any of this stuff. You would never do nuclear. The economics are overwhelming."

… The estimates never even include the cost of managing radioactive waste, a bill that keeps coming for centuries.

… Nuclear is so dirty Germany legislated a national phase-out of its 17 reactors by 2025. That 1998 decision was based partly on government studies that found high rates of childhood leukemia in areas near German reactors. In July 2007 the

European Journal of Cancer Care published a similar report by Dr. Peter Baker of the Medical University of South Carolina that found elevated leukemia incidence in children near U.S. reactors.

U.S. Rep. Ed Markey, D-Mass., complained to the Nuclear Regulatory Commission in 2005: "The nuclear industry and the NRC have automatically dismissed all studies that link increased cancer risk to exposure to low levels of radiation. The NRC needs to study — not summarily dismiss — the connection between serious health risks and radiation released from nuclear reactors."

The Oxford Research Group's 2007 study, "Too Hot to Handle," called the hope of quickly building new reactors a "pipe dream." In his 2008 book, Carbon-Free and Nuclear-Free: A Roadmap for U.S. Energy Policy, Dr. Arjun Makhijani, president of the Institute for Energy and Environmental Research, said, "Even the leaders of the nuclear industry have said that they will not build new plants without 100 percent federal loan guarantees."

… The U.S. Commission on the Prevention of Weapons of Mass Destruction Proliferation and Terrorism has called for ending subsidies that would expand nuclear power. In its Oct. 21 report, "The Clock Is Ticking," the commission recommended that the "U.S. … work internationally toward strengthening the non-proliferation regime ... discouraging, to the extent possible, the use of financial incentives in the promotion of civil nuclear power."

Nuclear power's pollution burden already is carried by the public. This is bailout enough. The industry should not also be allowed to unload on us its overwhelming financial risks.

– John LaForge of Luck, Wis., is a staff member for the independent action group Nukewatch and edits its quarterly newsletter.

How Much Will New Nuclear Power Plants Cost?

by Dr. Benjamin K. Sovacool, Nov. 2, 2008

http://scitizen.com/future-energies/how-much-will-new-nuclear-power-plants-cost-_a-14-2287.html

...The nuclear industry generally reports construction costs of about $2,000 per installed kilowatt (kW).

... A collection of new studies, however, suggest that these figures may underestimate the cost of building new nuclear units by more than a factor of 3.

Researchers from the Keystone Center, a nonpartisan think tank, consulted with 27 nuclear power companies and contractors, and concluded in June 2007 that the cost for building new reactors would be between $3,600 and $4,000 per installed kW (with interest).

They also projected that the operating costs for these plants would be remarkably expensive: 30 ¢/kWh for the first 13 years until construction costs are paid followed by 18 ¢/kWh over the remaining lifetime of the plant. (For comparison, the average residential price for electricity was about 10 ¢/kWh last year).

Just a few months later, in October 2007, Moody's Investor Service projected even higher costs due to the quickly escalating price of metals, forgings, other materials, and labor needed to construct reactors. They estimated total costs for new plants, including interest, at between $5,000 and $6,000 per installed kW....

Remember, too, that these costs do not include the expense of storing nuclear waste**.** In August 2008, the U.S. Department of Energy offered an updated estimate of the cost for building and operating Yucca Mountain, the planned centralized repository being erected in Nevada. The DOE noted that the expected costs for Yucca Mountain jumped from $57.5 in 2001 billion to $96.2 billion today, and this latter figure only covers the costs of building the facility and transporting waste until 2133.

Furthermore, researchers at Georgetown University, the University of California at Berkeley, and the Lawrence Berkeley National Laboratory assessed financial risks for advanced nuclear power plants utilizing a three-decade historical database of delivered costs from each of 99 conventional nuclear reactors operating in the U.S. The study pointed out two unique features of advanced nuclear power plants that make them prone to unexpected increases in cost: (a) their dependence on operational learning, a feature not well suited to rapidly changing technology and market environments subject to local variability in supplies, labor, technology, public opinion, and the risks of capital cost escalation; and (b) difficulty in standardizing new nuclear units, or the idiosyncratic problems of relying on large generators whose specific site requirements do not allow for mass production.

... The Congressional Budget Office reported in May 2008 that the actual costs of building 75 of the existing nuclear power plants in the U.S. exceeded industry quoted estimates by more than 300 percent. The industry, in other words, reported average construction costs for these plants at $45.2 billion (in 1990 dollars) but the facilities ended up costing $144.6 billion (in 1990 dollars). This increased their construction costs from $938 per installed kW to $2,959 per installed kW. ...

For further reading:

Pam Radtke Russell, "Prices Are Rising: Nuclear Cost Estimates Under Pressure," EnergyBiz Insider (May-June, 2008), available at **http://a4nr.org/library/economics/may.june-energybiz/view**.

The Keystone Center, Nuclear Power Joint Fact-Finding (July, 2007), available at **http://www.keystone.org/spp/energy07_nuclear.html**.

Nathan E. Hultman, Jonathan G. Koomey, Daniel M. Kammen, "What History Can Teach Us About the Future Costs of U.S. Nuclear Power," Environmental Science & Technology (April 1, 2007), pp. 2088-2099, available at **http://rael.berkeley.edu/files/2007/HultmanetalNuclearViewpoint2007.pdf**.

"Nuclear Waste: Distant and Expensive Mirage," Electricity Journal 21(7) (August/September, 2008), pp. 23-24, available at **http://www.science-direct.com/science/journal/10406190**.

Congressional Budget Office, Nuclear Power's Role in Generating Electricity (Washington, DC: CBO, May, 2008), available at **http://www.cbo.gov/doc.cfm?index=9133**.

Beyond nuclear construction costs, we also point out the inherent financial liability for security from attack or accident. Although the Anderson-Price Act limits your financial liability, when TVA customers are required to cover the cost (of industry misinformation and negligence), both in loss of life and permanent evacuation of their homelands, the fallout could mean the end of the TVA as an energy provider.

We simply cannot condone leaving this legacy and burden to our children and grandchildren, and to their grandchildren for thousands of years. Here is an introductory abstract of calculations of the never-ending costs of safe sequestration by Storm van Leeuwen, Jan Willem and Smith, Philip, "Nuclear power - the energy balance", July 31, 2005:

> ***Radioactive Waste; conditioning and disposal***
>
> In the fourth chapter the energy costs of the safe sequestration of the immense amounts of radioactive substances produced by nuclear power are calculated. These calculations must, of necessity, be approximate since the gargantuan task of safe disposal has hardly been begun.

We do not agree with your conclusion in FSEIS v.1 Section 1.4.5 Average Cost of Power. Your projected cost figures do not correlate with any national databases and independent assessments, as indicated in the several articles above. Also, your conclusion, the "Operation of a B&W unit would be the least costly alternative for providing additional generation by 2020 and overall the most cost-effective alternative for providing base load energy." It simply is not as cost-effective or as quickly implemented as Energy Efficiency programs, which could save considerably more energy than the projected need by 2020. (see EEDR section below)

In FSEIS, v.1, Section 1.4.6, the report summarizes your choice of nuclear power:

> A nuclear unit at the BLN site would (1) supply reliable, low-cost power from a proven high-energy-producing resource; (2) afford increased operating flexibility in the face of increasing environmental constraints; and (3) provide TVA's customers with additional fuel cost stability to reduce risk from volatile fuel prices.

If you have read the cost-overun reports, the default reports, and the statements of leading experts in the field on the excessive, unreliable costs and liabilities (in articles above), we ask that you reconsider this FSEIS recommendation to plunge

us further into the economic quagmire of nuclear power and nuclear waste, the "bill that keeps coming for centuries."

Information on the dwindling supply of usable uranium, as well as the high CO2 cost of extraction, milling, and enrichment, is firm evidence that the fuel cost is not at all stable and TVA would not be shielded from "volatile fuel prices." Once the environmental costs of the nuclear fuel cycle are understood, the fallacy of available, low-cost nuclear fuel will be over.

Just as oil is a limited resource, the present reserves and resources of uranium are estimated to last for about 50 years at the 2004 rate of consumption (67,000 tons per year fueling some 440 power reactors worldwide) . The extraction of uranium from low grade concentrations, including the diesel-fueled mining, extraction with earth-movers, the grinding into a fine powder and chemically treating with sulphuric acid and other chemicals to extract the uranium from the rock (milling), actually consumes over 30 times the energy generated in the reactor from the extracted uranium.

Storm van Leeuwen, J.W., Nuclear Power - Some Facts, v.4, January 9, 2006, p. 10.

In FSEIS, v.1 Section 1.4.3, Table 1-1, the improved plan's changes in TVA Emissions from 2010 to 2019 by Pollutant Type, you cite the reduction in emissions presuming nuclear energy is a positive contributor to emission reductions. Data shows the use of nuclear energy to replace coal CO2 emissions, however, is not a solution. In terms of environmental impact, to only measure a narrow part of the nuclear fuel chain is an incomplete view of the cycle. As global warming is in fact the issue, so must we think in terms of the global energy debt.

Here is the introductory abstract (and link) regarding CO2 emissions and nuclear power in Storm van Leeuwen, Jan Willem and Smith, Philip, "Nuclear power - the energy balance", July 28, 2005.

> ***The CO2-emission of the nuclear life-cycle***
>
> We devote Chapter 1 to one of the most controversial issues in the current environmental debate: the emission of CO_2. We calculate the ratio of the CO2 emission brought about by the use of nuclear energy and that of a gas-burning plant of the same net (electrical) capacity.
>
> If the uranium consumed by the nuclear energy system has been extracted from rich ores the ratio CO2 (nuclear/CO2(gas) is much less than unity, giving the impression that the application of nuclear energy would solve the global warming problem.
>
> However as rich ores become exhausted this ratio increases until it finally becomes larger than one, making the use of nuclear energy unfavourable compared to simply burning the (remaining) fossil fuels directly. In the long term the use of nuclear energy provides us with no solution to the problem.

In FSEIS v.1 Section 1.4.4, "Effect of Alternatives on Long-Term Resource Plan", you have again presented the Alternative A - No Action as if No Action on building a nuclear power plant at Bellefonte means there are few alternatives for assuring reliable and cost-effective power for the Tennessee Valley, as if choosing No Action on building a nuclear reactor is the same as no action at all.

It is difficult to understand TVA's reluctance to plan for Renewable Energy expansion. FSEIS Figure 1-6, shows a moderate rise in the use of Renewable Resources in the next few years, then by 2023 your plan drops the use of Renewable Energy down to the present paltry levels. This appears to be a denial of the state of our planet, as if the global warming issue will just go away in a few years and we can resume our old destructive practices. It also appears a denial of the blossoming of renewable technologies and the major role they will play in our nation's economic recovery.

Renewables are the future and they simply must be included in a serious plan for energy generation in the Tennessee Valley. The rest of the country and the world will be expanding the use of renewable resources over the next two decades, but TVA seems stuck in a rut, clinging to energy production from diminishing rather than renewable resources. This indicates an oddly incongruent lack of vision for a plan for the future. In fact, Bellefonte is an ideal site for manufacturing and implementing renewable technologies and this would be an excellent direction for long-term growth in the local economy, as well as an environmentally healthy and economically prudent plan.

All three TVA alternatives are presented with only a slight expansion of EEDR, a larger expansion of gas, and no expansion of renewables. We simply find this incomprehensible in our day and age, and challenge TVA to bring in young thinkers who understand the nature of global climate change and its inevitable impact on our energy choices.

"Excessive Levels of Risk"

In 2005, U.S. Rep. Ed Markey, D-Mass., complained to the Nuclear Regulatory Commission: "The nuclear industry and the NRC have automatically dismissed all studies that link increased cancer risk to exposure to low levels of radiation. The NRC needs to study — not summarily dismiss — the connection between serious health risks and radiation released from nuclear reactors." *Duluth News Tribune,* Jan. 11, 2010 http://www.duluthnewstribune.com/event/article/id/157141/

Again we remind TVA of the stated goal of the expansion-planning studies (FSEIS, v.1 Section 1.4.2, Power Supply, pp 10-11), "to select the combination of resources that provides the lowest-cost combinations of options while not subjecting customers to excessive levels of risk."

> In this day and age, nuclear power plants are also obvious targets for terrorists, inviting assault by plane, truck bombs, armed attack, or covert intrusion into the reactor's control room. The subsequent meltdown could induce the death of hundreds of thousands of people in heavily populated areas, and they would expire slowly and painfully, some over days and others over years from acute radiation illness, cancer, leukemia, congenital deformities, or genetic disease." (Caldicott, Dr. Helen, *Nuclear Power Is Not the Answer*, The New Press, New York, 2006, p. ix)

We understand that the TVA and FSEIS preparers have attempted to identify, understand, and analyze a myriad of factors to determine the valley's needs and the best way to provide electric power cost-effectively and safely, but it is fitting that an elaborate analysis recommending nuclear power would be calculated by a Monte Carlo simulation, because this is big-time gambling and the valley stands to lose our money, our health and life itself, and our homes with only one radioactive leak or accident. Can you think of any more "excessive levels of risk" to your customers?

Because TVA's decisions put our community at risk, we are including excerpts from *Secure Energy? Civil Nuclear Power, Security, and Global Warming*, edited by Frank Barnaby and James Kemp, Oxford Research Group Briefing Paper, March 2007:

Forward

Jürgen Trittin, German Federal Minister for the Environment, Nature Conservation and Nuclear Safety (1998-2005)

: . . . Most of the times, when we discuss the hazards of nuclear power, we think of the dangers of a meltdown at nuclear plants and the problem of the disposal of radioactive nuclear waste. We might also think of further disadvantages like the dependency on massive subsidies or the limited availability of uranium in the long run. All these are bad enough but an even worse aspect of nuclear technology is the creation of massive security risks such as nuclear weapons proliferation and nuclear terrorism. In the broad public debate, a naive optimism over nuclear power's peaceful application is still fairly widespread. . . .

. . . The risks of proliferation and nuclear terrorism by both state and non-state actors are simply uncontrollable. This report by Oxford Research Group gathers an impressive amount of evidence for the high security risk of nuclear technologies. At the same time, it shows that hopes for the climate-protecting potential of nuclear energy are entirely misplaced. We all have to work hard to spread this combination of insights into the international energy discussion very quickly and effectively, for decisions about future energy technologies are made today and have consequences far into the future. Although matters of global warming and global energy security obviously cannot be solved by one nation alone, the UK discussion is crucial in the current context. An influential player in Europe, with a cultural and political proximity to the United States, decisions taken in the UK are perceived and taken into account worldwide.

As for the German experience, quoted favourably in this report, we can take pride in an extraordinarily successful boost in renewable energies over the past ten years. A mixture of strong political support, quickly progressing technology and ambitious green entrepreneurship has helped to create a very dynamic scene in renewable technologies. Public support for renewable energy is high, businesses are successful and over 200,000 jobs have been created. But even against this background of an impressive demonstration of energy alternatives,

nuclear power has made a comeback in the public debates. It still does not convince a majority of the population, and there is no political majority in sight for a new nuclear build in Germany. But industry interests and its media allies are strong, so for now, nuclear energy is back in the game as a candidate. Therefore we need serious studies like this ORG report in order to gather the evidence and provide arguments for the political struggle against an unreasonable and potentially devastating technology.

Section 1.3 The risk of nuclear terrorism

Frank Barnaby

*In July 2006 a Daily Mirror reporter planted a fake bomb on a train carrying a deadly cargo of nuclear waste. **

A major reason for opposing a nuclear expansion is that it would increase the risk of nuclear terrorism.

There are number of nuclear terrorist activities that a group may execute:

- stealing or otherwise acquiring fissile material and fabricating and detonating a primitive nuclear explosive;
- attacking a nuclear-power reactor to spread radioactivity far and wide;
- attacking high-level radioactive liquid waste tanks;
- attacking plutonium stores
- attacking nuclear materials in transit; and
- making and detonating a radiological weapon, commonly called a dirty bomb, to spread radioactive material.

Apart from exploding a dirty bomb, all of these types of nuclear terrorism have the potential to cause large, or quite large, numbers of deaths and disruption. At its most extreme, a crude nuclear explosive detonated in Parliament Square or Capitol Hill would cause catastrophic damage to those Governments. That the risk of all these types of nuclear terrorism will increase if more nuclear-power stations are built is, assuming the business-as-usual scenario, a matter of fact.

A new build would increase the risk because it would:

- create potential targets for terrorists, from waste tanks and generators at nuclear sites to moving targets such as ‘waste trains’ and MOX transporters;
- it would increase the availability of MOX and reactor-grade plutonium for use in a dirty bomb or crude nuclear weapon; and
- spread of the knowledge, materials and technology needed to develop nuclear weapons.

Attacks on nuclear facilities

Many nuclear facilities in the UK and elsewhere are vulnerable to terrorist attack. Terrorists could target a reactor or spent fuel pond by using a truck carrying high explosives and exploding it near a critical site; exploding high explosives carried in a light aircraft near a critical part of the target; crashing a high-jacked commercial airliner into the reactor building or spent-fuel pond; attacking the power station with small arms, artillery or missiles and occupying it; or by attacking the power lines carrying electricity into the plant. The terrorists would aim to create a criticality or loss-of coolant accident or both leading to a massive release of radioactivity from the reactor core or the spent fuel elements.
The damage caused by and the number of people killed by a successful terrorist attack on a nuclear-power plant could be so catastrophic that even a small risk of such an attack is unacceptable. . . .

* see, http://www.mirror.co.uk/catchall/tm_method=full%26objectid=17422378%26siteid=89520-name_page.html

The industry's insistence that their reactors and storage facilities are "robust" is dubious. Perhaps the government will pay more attention to Report 222 of the Parliamentary Office of Science and Technology (July 2004) before setting in motion a process which will increase the number of potential targets.[22] The report makes chilling reading. "No reactors have been designed specifically to withstand the impact of a large commercial aircraft". "Some of UK's older Magnox plants have design characteristics which may make them more vulnerable to terrorist attacks". It seems irresponsible to be adding yet more potential targets before we have secured the existing ones. . . .

Conclusions

A new round of nuclear power stations increases the targets for nuclear terrorism, increases the availability of MOX fuel and reactor-grade plutonium, and makes it harder to control nuclear weapons proliferation. Given the limitations of safeguards and other security measures at nuclear power and reprocessing plants, a decision to build more nuclear power plants undermines the regional and international security as well as fueling trends which would direct us towards a world with 20 or 30 nuclear weapons states.

Section 1.4 Nuclear terrorism: an exaggerated threat?

Paul Rogers

A terror group could acquire a stolen nuclear weapon, or enough material to develop a crude nuclear weapon.

Dr. Mohamed ElBaradei, IAEA Director-General .
Washington Post.
30th January 2005

... Following intelligence gathered after the fall of the Taliban, the US intelligence community "focused on the threat of nuclear terrorism to an unprecedented extent."[24] As recently as September 2006, al Qaida put out a call urging nuclear scientists to join its war against the West.[25]

. . . Supporters of the expansion of nuclear power point to the rarity of attacks involving nuclear facilities in spite of the widespread use of nuclear power over the past fifty years. It is also claimed that mass casualty terrorism is actually very rare, apart from the specific example of the al-Qaida movement, and that paramilitary groups have hardly ever had any economic impact, having avoided economic targeting in favour of attacks on security forces and centres of political power.

This chapter shows that the evidence does not support these claims. Mass casualty attacks and economic targeting have been employed by a range of paramilitary and terrorist organisations and will probably become more common as time passes. Nuclear terrorism is not the preserve of al Qaida and its off-shoots. It also explores the recent history of two specific strands of terrorism, mass casualty attacks and economic targeting. It examines trends over the past fifteen years and relates them to the risks likely to develop if the civil nuclear power industry is subject to rapid expansion in Britain and elsewhere.

. . . Trends in mass casualty terrorism and economic targeting, especially the trend towards the targeting of energy facilities, point to the particular dangers of the expansion of civil nuclear power. . . .

24. Zenko, M. "Intelligence Estimates of Nuclear Terrorism." *The American Academy of Political and Social Science*. ANNALS 607, September 2006. pp. 87 - 102.
25. Zimmerman, P. D. and Lewis, G. L. "Bomb in the Backyard." *Foreign Policy.* November/December 2006.

"Nuclear Power Invites Terrorism" – FBI director Robert S. Mueller said, before the Select Committee on Intelligence in the US Senate, Feb. 2005, "Another area we consider target rich and vulnerable is the energy sector, particularly nuclear power plants."

We continue to have questions about the dangers of nuclear power at Bellefonte. Have all of the sabotage security features recommended to the NRC in the 800 page report from industry experts in 1981 been implemented in the current reactor and premises designs, and in nuclear power plant security requirements? Have additional measures been studied and implemented to protect against intentional aircraft crashes? Do they protect spent fuel pools, as well as the reactor and control buildings? Can nuclear power plants be made safe from sabotage? Is it really worth the risk to American lives and future generations to develop such a dangerous and expensive source of power, when conservation measures and renewables can provide the needed electricity, are less costly, and are safe for the Tennessee Valley?

"In this day and age, nuclear power plants are also obvious targets for terrorists, inviting assault by plane, truck bombs, armed attack, or covert intrusion into the reactor's control room. The subsequent meltdown could induce the death of hundreds of thousands of people in heavily populated areas, and they would expire slowly and painfully, some over days and others over years from acute radiation illness, cancer, leukemia, congenital deformities, or genetic disease." (Caldicott, Dr. Helen, *Nuclear Power Is Not the Answer*, The New Press, New York, 2006, p. ix)

One example, cited at the October 2004 Chicago symposium, "Nuclear Power and Children's Health, What You Can Do" (presented by the Nuclear Policy Research Institute, the Nuclear Information and Resource Service, and Physicians for Social Responsibility), would be a terrorist attack on the Indian Point reactors, 35 miles from N.Y.C., which could incapacitate the world's major financial center for the rest of human time. As we learned from history, one nuclear accident means an effective meltdown for the entire industry. Investing in nuclear power – with the high construction costs, the rapid depletion of uranium resources, the dangerous waste, the extremely high level of necessary security – is gambling with our money, our valley, our health, and our lives.

KNOWN HEALTH RISKS

It is scientifically established that low-level radiation damages tissues, cells, DNA, and other vital molecules – causing programmed cell death (apoptosis), genetic mutations, cancers, leukemia, birth defects, and reproductive, immune and endocrine system disorders.

"Radiation from nuclear reactor emissions is most toxic to the fetus and infant," said Janette Sherman, MD, practising toxicologist and research associate with the Radiation and Public Health Project. Radiation poisoning is cumulative in the human body and children are the most vulnerable.

This is a very long term problem for a short term energy 'solution'. For example, the radioactive isotope tritium, which is released during normal operations, remains dangerous for 124 years, which means this everyday emission from a nuclear power plant will enter the food chain and will remain radioactive during the life of your grandchild's grandchild's child before that isotope is safe in our soil, air or water.

There are two reactors at McGuire Nuclear Power Plant, located about 17 miles north of Charlotte, NC. In the two decades since McGuire began operating, the cancer death rate for children and adolescents (0-24) rose 20%, versus a national cancer decline of 22%, in 8 of the 10 surrounding counties. Source: National Center for Health Statistics, http://wonder.cdc.gov, Underlying cause of death. Uses ICD-9 140.0-239.9 (until 1998) and ICD-10 C00-D48.9 (after 1998).

Given that TVA is making serious decisions about the future of our valley, it seems only fair to request that you read some of the recent articles on the health risks of nuclear power.

Reasonable Doubt: Children living near nuclear facilities face an increased risk of cancer.

by Ian Fairlie

Global Research, April 24, 2008
New Scientist

AMONG the many environmental concerns surrounding nuclear power plants, there is one that provokes public anxiety like no other: the fear that children living near nuclear facilities face an increased risk of cancer. Though a link has long been suspected, it has never been proven. Now that seems likely to change.

Studies in the 1980s revealed increased incidences of childhood leukaemia near nuclear installations at Windscale (now Sellafield), Burghfield and Dounreay in the UK. Later studies near German nuclear facilities found a similar effect. The official response was that the radiation doses from the nearby plants were too low to explain the increased leukaemia. The Committee on Medical Aspects of Radiation in the Environment, which is responsible for advising the UK government, finally concluded that the explanation remained unknown but was not likely to be radiation.

There the issue rested, until a recent flurry of epidemiological studies appeared. Last year, researchers at the **Medical University of South Carolina in**

Charleston carried out a meta-analysis of 17 research papers covering 136 nuclear sites in the UK, Canada, France, the US, Germany, Japan and Spain. The incidence of leukaemia in children under 9 living close to the sites showed an increase of 14 to 21 per cent, while death rates from the disease were raised by 5 to 24 per cent, depending on their proximity to the nuclear facilities (European Journal of Cancer Care, vol 16, p 355).

This was followed by a German study which found 14 cases of leukaemia compared to an expected four cases between 1990 and 2005 in children living within 5 kilometres of the Krümmel nuclear plant near Hamburg, making it the largest leukaemia cluster near a nuclear power plant anywhere in the world (Environmental Health Perspectives, vol 115, p 941).

This was upstaged by the yet more surprising KiKK studies (a German acronym for Childhood Cancer in the Vicinity of Nuclear Power Plants), whose results were **published this year in the International Journal of Cancer** (vol 122, p 721) and the **European Journal of Cancer** (vol 44, p 275). These found higher incidences of cancers and a stronger association with nuclear installations than all previous reports. The **main findings were a 60 per cent increase in solid cancers and a 117 per cent increase in leukaemia among young children living near all 16 large German nuclear facilities between 1980 and 2003.** The most striking finding was that those who developed cancer lived closer to nuclear power plants than randomly selected controls. Children living within 5 kilometres of the plants were more than twice as likely to contract cancer as those living further away, a finding that has been accepted by the German government.

Though the KiKK studies received scant attention elsewhere, there was a public outcry and vocal media debate in Germany. No one is sure of the cause (or causes) of the extra cancers. Coincidence has been ruled out, as has the "Kinlen hypothesis", which theorises that childhood leukaemia is caused by an unknown infectious agent introduced as a result of an influx of new people to the area concerned. Surprisingly, the most obvious explanation for this increased risk – radioactive discharges from the nearby nuclear installations – was also ruled out by the KiKK researchers, who asserted that the radiation doses from such sources were too low, although the evidence they base this on is not clear.

Anyone who followed the argument in the 1980s and 1990s concerning the UK leukaemia clusters will have a sense of déjà vu. A report in 2004 by the Committee Examining Radiation Risks of Internal Emitters, set up by the UK government (and for which I was a member of the secretariat) points out that the models used to estimate radiation doses from sources emitted from nuclear facilities are riddled

with uncertainty. For example, assumptions about how radioactive material is transported through the environment or taken up and retained by local residents may be faulty.

If radiation is indeed the cause of the cancers, how might local residents have been exposed? **Most of the reactors in the KiKK study were pressurised water designs notable for their high emissions of tritium, the radioactive isotope of hydrogen. Last year, the UK government published a report on tritium which concluded that its hazard risk should be doubled.** Tritium is most commonly found incorporated into water molecules, a factor not fully taken into account in the report, so this could make it even more hazardous.

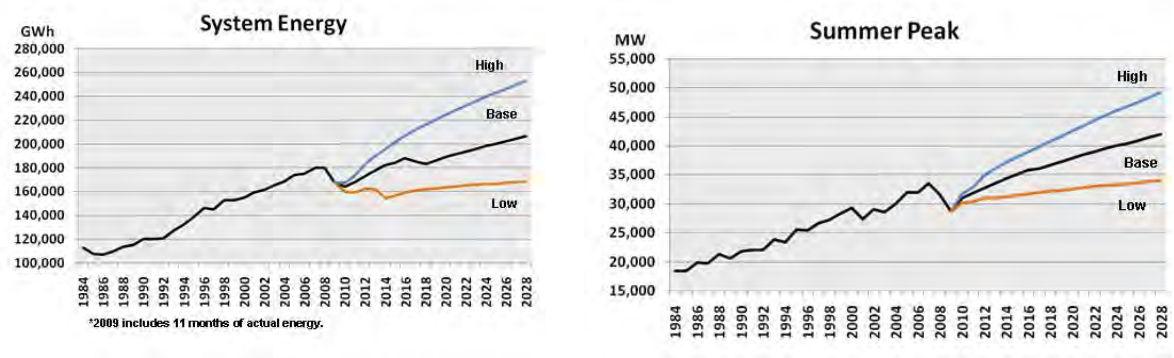
As we begin to pin down the likely causes, the new evidence of an association between increased cancers and proximity to nuclear facilities raises difficult questions. Should pregnant women and young children be advised to move away from them? Should local residents eat vegetables from their gardens? And, crucially, shouldn't those governments around the world who are planning to build more reactors think again?

Ian Fairlie is a London-based consultant on radiation in the environment

ENERGY NEEDS

As the TN Sierra Club pointed out in their response to the Draft SEIS:

TVA's projection for 2030 system energy and summer peak are inaccurate and cannot be used to determine the need for more generating capacity:



- The projections do not include the 1200 MW peak reduction that TVA currently is on-track

to delivering in 2012.
- The projections do not include the effects of the Time of Use pricing rate structure that will TVA will start charging its distributors in 2012.
- The projections do not reflect the anticipated legislation that will place a price on carbon.

The recession has reduced the consumption of electricity. Prior to the recession, electricity growth had been increasing 5 percent annually. Net power generation in the U.S. dropped by 7.6 percent in July 2009 from July 2008, according to the EIA, along with a drop in industrial production of 13 percent.

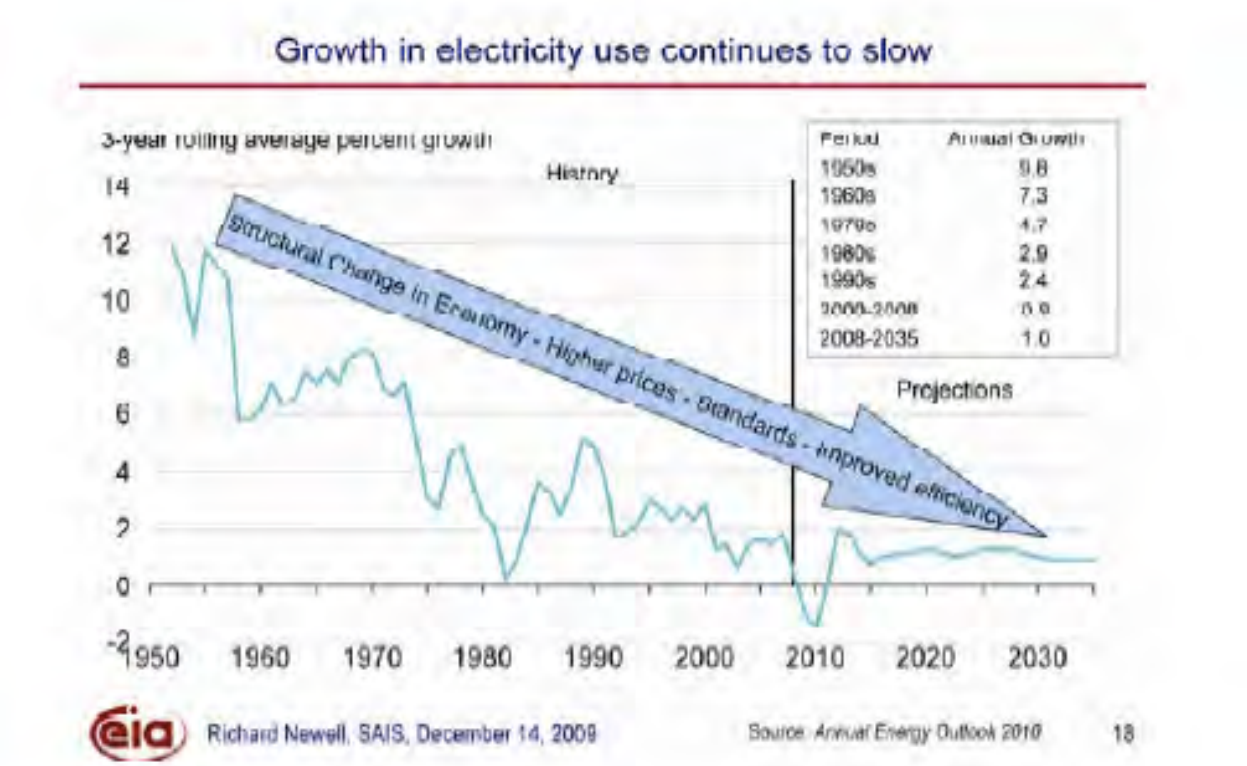
Many utility executives say that traditionally, electricity use recovers within a year or two after a recession, but they believe that this recession's recovery will not follow the pattern because of advances in energy efficiency.

In April 2009, chair of the Federal Energy Regulatory Commission, said that because of the combination of renewable energy and energy efficiency, the US might not need to build any coal or nuclear plants to meet the base-load. However, aging generation units approach, and in some cases, exceed their retirement, and the challenge will then to replace their capacity with the most forgiving electricity sources. Renewable energy sources are indeed the energy supply option of choice.

The Obama administration's seriousness in pursuing its energy efficiency transformation goals became clear with the unveiling of the American Recovery and Reinvestment Act, appropriating $97 billion in energy efficiency-related funding and aims to mobilize roughly $100 billion more in private capital. The unprecedented speed and scale of the government's commitment to technologies that use or generate energy efficiently, with minimal impact on the environment, will dislocate strategies and disrupt market shares in the energy sector for years to come. ARRA'sgoal is to create or retain roughly 300,000 jobs through the energy-related elements of the stimulus package. Some of the longer-term consequences include,

- Energy efficiency technology learning curves will accelerate
- Innovative new players should gain a measure of strength
- Successful programs sustained by future government support are likely to emerge.

In December 2009, the EIA released an updated projection of the growth in electricity. It shows that electricity use will continue to slow. Between the period 2008-2035, the EIA projects an annual electricity growth of 1%. TVA's base projection forecasts a 2% growth in the same time period. TVA needs to revise downward its need for additional capacity. TVA would have absolutely no difficulty exceeding a 1% annual energy savings.



Admittedly, this Environmental Impact Statement has had to adjust to many changes in its drawn out 34 year analysis of nuclear reactors impact on the Bellefonte site. However, this does not excuse this FSEIS being blatantly biased in ignoring the changing realities of our times – the environmental demands, the modern acknowledgment of the power of energy efficiency, and the rapidly emerging renewable energy technologies.

EEDRs will reduce the TVA need for power by a significant factor if the TVA only commits to bringing our valley up to the efficiency standards of the rest of the country. We realize that many excellent committed engineers have dedicated their careers to providing energy generation from nuclear and coal technologies, so it is difficult to change the paradigm and shift the thinking so that saved energy becomes even more advanced than newly generated energy, but this is our modern reality.

EEDR

We applaud the preparers of this FSEIS for expanding the Energy Efficiency and Demand Response (EEDR) plans for the Tennessee Valley from 1% to 6%, but based on data from various sources, we think the 6% EEDR is entirely too low.

TVA Industry Rankings

Generating capacity: Fifth in the nation
Energy sales: First in the nation
Power sales revenue: Third in the nation
Power rates: Better than the national average

TVA Energy Efficiency Ranking 2005: Last in the nation

According to U.S. Energy Information Administration (EIA) – Independent Statistics and Analysis, 2005, Table 5, Tennessee residential electric consumption rates were 30% higher than the national average, meaning we were 30% less efficient than the average U.S. resident. TN was also 57% less efficient than California and 54% less efficient than New York (the EE leaders). But, some progress is being made.

TVA Energy Efficiency Ranking 2007: 46th in the nation
TVA Energy Efficiency Ranking 2008: 38th in the nation

Given this data, an achievable goal for the Tennessee Valley would be to cut our intensity (and thereby our capacity needs) by 30%, bringing us up to the national average. A mere 6% capacity reduction proposed by this FSEIS, appears highly irresponsible, given our efficiency ranking. In fact, with a 30% reduction in intensity as the EEDR goal, TVA would be providing the least expensive and most environmentally beneficial power, simply by decreasing the need for additional capacity, thereby providing the wisest use of our existing Tennessee Valley electricity. Nothing could be more modern than making efficient use of our planet's existing resources without continuing to fowl our atmosphere, and Energy Efficiency programs also provide the bonus of immediate local jobs in the construction industry.

As the American Council for an Energy-Efficient Economy states:

> Energy efficiency is the "first fuel" in the race for clean and secure energy resources. Faced with rapidly increasing energy prices, constraints in energy supply and transmission, and energy reliability concerns, states are turning to energy efficiency as the most reliable, cost-effective, and quickest resource to deploy. States are now investing two to three times as much as the federal government toward energy efficiency programs and resource. In the race for clean energy resources, states are adopting aggressive energy efficiency policies, increasing investments in efficiency programs, and improving efficiency in their own facilities and fleets. While some states have been making commitments toward energy efficiency for decades, others are just getting started, and still others fall far behind. (http://www.aceee.org/pubs/u004.htm)

As of 2009, the ACEEE (funded by the DOE and EPA) ranks Tennessee 38th (of 51 states) in Energy Efficiency and Alabama ranks 48th. Tennessee's EE ranking was raised by TVA's improved policies in just one year (2007-2008), from 46th to 38th - saving 63,547 MWh of electricity - an example of what can be achieved in just one year.

Here are the most recent figures on average monthly energy consumption from the U.S. Energy Information Administration – Independent Statistics and Analysis, Table 5. Average Monthly Bill by Census Division, and State 2008 (Report Released: January 2010):

Average Monthly Consumption (kWh)

	Residential	Commercial	Industrial
U.S. Total Avg	920	6,339	108,567
Tennessee	1,302	5,324	1,305,467

In the ACEEE's recent report card on Tennessee, they noted the improvements in TVA's policy and results during 2007: (http://aceee.org/energy/state/tennessee/tn_utility.htm)

The Tennessee Valley Authority (TVA), the largest publicly owned electric utility in the country, is the primary electricity provider in Tennessee. As a publicly owned utility, TVA is governed by a Board of Directors. Historically, TVA has provided few energy efficiency programs and services to its customers.

While past energy efficiency efforts have been modest, efforts are underway in Tennessee that could lead to much greater funding for programs, increasing energy savings.

In its 2007 Strategic Plan, TVA stated its commitment to be a leader in energy efficiency. Since the Plan's release, TVA has drafted an energy efficiency and demand response plan and an environmental policy.

TVA's most recent goals, approved by the Board in May 2008, are to reduce peak demand by 4% by 2012. As part of the ramp-up process, TVA released a suite of pilot energy efficiency programs, including in-home energy auditing programs and prescriptive incentive programs for HVAC technologies.

According to the Energy Information Administration, Tennessee utilities spent $10.0 million on energy efficiency in 2007, saving 63,547 MWh.

The 63,547 MWh saved in 2007 = (63,547/12) 5,295.58 MWh per month or 52,955 kWh per month. Since the TVA's EE program (at 1% EEDR capacity) achieved this savings in Tennessee, then the planned 6% EEDR reduction would achieve (52,955 x 6) 317,730 kWh (which is 31,773 MWh) per month, which is 3,177 GWh per month or (3,177 x 12) 38,124 GWh annual savings.

The FSEIS, v.1 Chapter1, Section 1.4.3, Resource Plan, p. 13, however, states the savings would only be 5,200 GWh by 2019 at the FSEIS planned 6% EEDR:

> The EEDR portion of the base case capacity mix increases from 1 percent in 2010 to 6 percent in 2019. While the specific programs and mix of EEDR continue to evolve, they are currently designed in the base case to achieve approximately 1,400 MW summer peak demand reduction by 2012, reaching 2,700 MW by 2019. This corresponds to energy reductions of approximately 1,800 GWh by 2012 and 5,200 GWh by 2019.

Given that TVA is 30% less energy efficient than the U.S. average, a 30% reduction is achievable. If we did achieve this worthy goal of joining the rest of the country in energy efficiency, and TVA implemented a 30% EEDR capacity share (even at the FSEIS estimation of 5,200 GWh savings at 6%), then at 30% (6% x 5) EEDR, TVA could save (5,200 x 5) **26,000 GWh** by 2019 - just by equaling America's average efficiency standards. And the
Enhanced EEDR could double that achievement.

The TVA stated needs for **22,000 GWh** additional capacity by 2019 (FSEIS, v.1, Section 1.4.3, Resource Plan, page 11), would be effectively removed, and bringing EE up to national standards could easily eliminate the need for additional generation.

We are baffled by TVA's reluctance to pursue this obvious course and the continued reluctance to accept that the rest of the country is already considerably more efficient than we would be with just a 10% increase in Energy Efficiency. This is not a request to implement some wild unproven technology - but simply to rise to the average efficiency standards of the rest of the country.

We challenge the TVA to increase the proposed 6% EEDR to 30% EEDR, which would correspond to energy reductions of about 9,000 GWh by 2012 and 26,000 GWh by 2019. This achievable goal could eliminate the need for new energy generation for the next two decades, given the projected overall energy need as discussed in Subsection 1.4.4 is 22,000 GWh by 2019. The beauty in EEDR is not only the unequivocal cost-savings, but also that it delays the inevitable use of renewable energy long enough for new technologies to develop more fully (and of course the subsequent price reductions).

We believe the renewable technologies are very much in a similar state to the home computer technologies of the 1980's, and see phenomenal leaps in renewables in this decade with America and the world focusing on the possibilities.

In this FSEIS discussion on Conservation (v.1, Section 2.4.1, Alternatives Not Requiring New Generating Capacity Energy, p. 56) we were pleased to see that the public comments on the Draft SEIS had actually initiated a review of the most recent studies on Energy Efficiency, and that the FSEIS acknowledged that the studies, "the potential of EE to effectively add capacity to power systems – through energy savings – to replace or delay the construction of new generating plants through 2020 and/or 2030."

> TVA received comments on the DSEIS that energy efficiency should be used to reduce demand. TVA has reviewed the most recently published studies (Brown et al. 2009; Chandler and Brown 2009) identified by comment providers as well as reports published since the close of the comment period (Brown et al. 2010). These studies estimate the potential of EE to effectively add capacity to power systems–through energy savings–to replace or delay the construction of new generating plants through 2020 and/or 2030. For comparative purposes, TVA also reviewed a study by the Electric Power Research Institute that forecasted energy efficiency potential in southern U.S. states (EPRI 2009a).

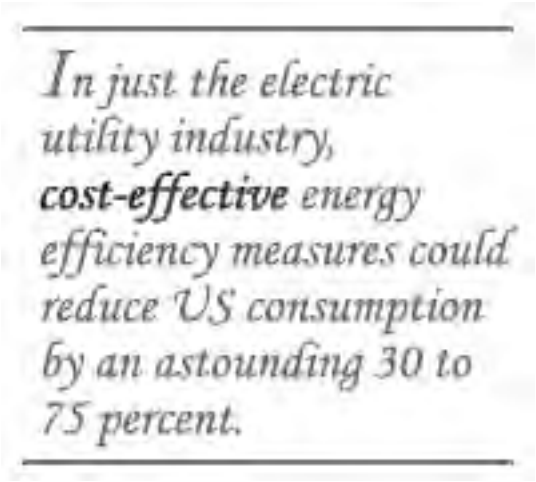
And that was pretty much it for discussion of the potential of EE, other than to state the TVA will be implementing EEDR programs, a whooping 6%. It is difficult to understand this denial of facts - to know from the pertinent literature that no new power plants are needed and that EEDR is the most cost-effective and valley friendly course to fulfill our energy needs and yet still persist in ignoring this knowledge is what Einstein called the definition of insanity, "To keep repeating the same behavior while expecting different results."

Here is an excerpt from the Nobel prize-winning authority on Energy Efficiency at Georgia Tech, Marilyn A. Brown:

> **A Source of Energy Hiding in Plain Sight**
>
> Imagine an energy resource so revolutionary it could improve energy security, strengthen the economy and protect the environment simultaneously.
>
> This resource is widely abundant in the United States and, according to some studies, offers more potential than any other known resource. It's commercially available, ready to be utilized without the need for subsidies or further research.
>
> It could provide thousands of high-paying jobs and does not need to be drilled, dug or drained out of the earth. It would not melt down in Pennsylvania, spill into the Prince William Sound, spit toxic-sludge into Tennessee rivers, seep contaminants into California's water supply, create Superfund sites in New Jersey, destroy Appalachian forests or release greenhouse gases into the atmosphere.

It would operate automatically, always "on," ready to be "dispatched" without delay or intervention by energy providers. Yet it's existed for years, with multiple time-tested, empirically proven and reliable varieties for use.

This resource is energy efficiency.



The term does not necessarily mean "doing less" or "suffering without," but instead what physicist Amory Lovins calls "doing more with less through smarter technologies." It's getting more bang for the buck, more economic activity out of less energy – with light bulbs that need less power, weather stripping around doors and windows, hybrid electric vehicles instead of the gas-guzzling behemoths, properly inflated automobile tires, more efficient industrial motors and renewable energy instead of coal and oil.

In just one sector, the electric utility industry, cost-effective energy efficiency measures could reduce national consumption by an astounding 30 to 75 percent. These measures are cheaper to implement than purchasing any form of electricity supply and could save up to three-quarters of the country's power bill....

Marilyn A. Brown and Benjamin K. Sovacool. 2009. "A Source of Energy Hiding in Plain Site" YaleGlobal Online, February 18. http://yaleglobal.yale.edu/display.article?id=11978

Anyone at TVA who still clings to the unfounded assertions that our valley needs nuclear power, must explain to valley residents why they insist on trying to justify the most expensive form of energy and the most dangerous. What exactly is the personal payback for TVA, that you would risk our finances and the health of our valley and our children?

As ECEEE recognizes, energy efficiency provides "our Nation's cheapest and cleanest energy resources". TVA can fulfill its mandates, for low-cost energy and environmental stewardship, by choosing the No Action Alternative on building a nuclear power plant at Bellefonte, and instead increase TVA's plan for EEDR capacity reduction from its current 6% plan to 30%, thereby removing the need for increased capacity for one to two decades.

FSEIS researchers must know that there are wiser and less expensive alternatives to nuclear power. We are not industry lobbiest with $600 million dollars to woo the decision makers at the TVA Board of Directors. We are simply concerned citizens who have volunteered to help educate ourselves and our community about the exceedingly long-term consequences of choosing nuclear power for our community.

We want to believe that TVA will honor its responsibilities to the valley and will protect our loved ones from this financial and radionuclide danger. We also know that the TVA can not only catch-up with the rest of the country, but can leap forward in EEDR. This is the quality of vision and leadership we would like to see TVA pursue and sustain.

We challenge the TVA to increase the proposed 6% EEDR to 30% EEDR, which would correspond to energy reductions of about 9,000 GWh by 2012 and 26,000 GWh by 2019. This achievable goal could eliminate the need for new energy generation for one to two decades, given the projected overall energy need as discussed in Subsection 1.4.4 is 22,000 GWh by 2019. The beauty in EEDR is not only the unequivocal cost-savings, but also that it delays the inevitable emergence of renewable energy long enough for the technologies to develop more fully.

With a vision toward the future for our children in future generations and with the strength to resist nuclear power industry pressure, the Tennessee Valley could cut our capacity needs by 30% with EEDR to bring us closer to the consumption rates of other states. In making this smart choice, TVA would fulfill its mandate by saving hugely on the cost of our energy, and could be assured that they are leaving a legacy of progress and consideration for the Tennessee Valley and its residents.

RENEWABLE ENERGY

Your charts (FEIS v.1 Section 1.4.3, p. 13) actually show a 1% reduction in renewable capacity between 2010 and 2019, due to the forecasted growth in peak load (although it isn't clear why that would eliminate this blossoming technology), and the text states that "TVA anticipates acquiring additional renewable resources beyond these recent announcements." We ask, if this is so, why is the renewable expansion not included in your long-range plans, and especially why isn't it studied as a serious long-range alternative to coal and nuclear power in this study? Again, the same old path, expecting different results, but gambling with our lives and our valley, and perhaps ignoring the evidence.

In 2007, 430 Trillion Btus of Waste Energy were consumed nationally. This presents an immense source of power, available simply by converting our waste into usable power. This technology is available now, is proven, affordable and sustainable. And we have only begun to implement the efficiencies of Combined Heat and Power (CHP) technologies.

In his chapter, "Nuclear power - from the sun," Storm van Leeuwen states the crux of the problem:

> Mankind has a perfectly functioning thermonuclear fusion reactor at his disposal. The reactor delivers its energy to man in a constant, abundant flow of clean, benign electromagnetic radiation, without radioactive wastes and harmful radiation. The only hurdle man has to take for exploiting that free energy source is collecting its energy. That hurdle is not technical, but paradigmatic.

(Storm van Leeuwen, "Nuclear Power Facts," January 9, 2006, v.4, p. 13.) He also reminds us that solar energy can be harvested as biomass, wind, thermal solar or photovoltaic (PV) panels.

If TVA embraces a vision of renewable energy for our valley, we could harness the talents of Huntsville and Oakridge to lead the country in developing solar energy, biomass, and co-generation. After all, solar is used successfully in the extreme conditions of outer space, so it does seem we could manage to harness that immense energy for our valley here at home.

With vision toward the future, energy efficiency programs, renewable energy, and emerging technologies can provide future energy needs for the Tennessee Valley without undue expenditures or risks.