Approved: March 31, 2008
Date

# MINUTES OF THE HOUSE ENERGY AND UTILITIES COMMITTEE

The meeting was called to order by Chairman Carl Holmes at 9:15 A.M. on March 10, 2008 in Room 783 of the Docking State Office Building.

All members were present except:
Oletha Faust-Goudeau-excused

Committee staff present:
Mary Galligan, Kansas Legislative Research
Melissa Doeblin, Revisor's Office
Renae Hansen, Committee Administrative Assistant

Conferees appearing before the committee:
Ken Shultis, Professor of Mechanical and Nuclear Engineering, Kansas State University
Senator Roger Reitz, 22nd district

Others attending:
Ten were present including the speaker.

Presentation on:

Ken Shultis, Professor of Mechanical and Nuclear Engineering, Kansas State University, gave a presentation, (Attachment 1) on Nuclear Energy in the United States. He noted that while nuclear power plants are expensive to build they are inexpensive to operate, while the opposite is true of coal fired power plants: they are inexpensive to build but expensive to operate. Additionally, he noted that nuclear energy is also $CO_2$ emission free.

Senator Roger Reitz, 22nd District, spoke to the committee briefly about why it is important for us to look at nuclear energy electric generation as a viable clean and inexpensive source for electricity. He noted that there was a bill that came out of the Senate concerning Nuclear energy that is now in the House.

Questions were asked and comments made by Representatives: Tom Hawk, Terry McLachlan, Vern Swanson, Tom Moxley, Don Myers, Tom Sloan, Peggy Mast, Annie Kuether, Judy Morrison, Vaughn Flora, Forrest Knox, Bill Light, and Carl Holmes.

Representative Holmes noted that he would try to get a Wolf Creek power plant tour for the committee members soon. He also spoke to the committee on some talks he had last week with representatives of a foreign company potentially interested in helping to build and/or finance Wolf Creek II.

Additionally he spoke to the committee on the nationwide projected brown outs, by regional transmission organizations for the country, if no more base load generation is developed.

The next meeting was scheduled for March 8. 2008.

The meeting was adjourned at 10:39 a.m.

# HOUSE ENERGY AND UTILITIES COMMITTEE
# GUEST LIST

DATE: March 11, 2008

| NAME | REPRESENTING |
|---|---|
| Liz Brosius | KS Energy Council |
| John C. Bottenberg | Weston Energy & AIT |
| Steve Johnson | ONEOK, Inc. |
| Marci Hadsell | CEP |
| Paul Snider | KCPL |
| Mike Urban | KGS |
| Phil Wages | KEPCO |
| David Springe | Curb |
| Ken Fraith | KEC |
| Sen Roger Pine | SB 555 |
| Kimberly Svaty | KMH |
| Tom Day | KCC |
| Dave Holthaus | KEC |
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Testimony
Senate Committee on Utilities
February 21, 2008
Presented by Dr. Kenneth Shultis
Department of Mechanical & Nuclear Engineering
Kansas State University

Mr. Chairman, and Members of the Committee, I am Ken Shultis, Professor of Mechanical & Nuclear Engineering and Nuclear Engineering Program Director at Kansas State University. Thank you for the opportunity to appear before the Committee today.

Satisfying the ever increasing demand for electrical energy is one of the greatest challenges facing our society, particularly after a lull of many years in which few large, base-load, central power stations have been constructed. The solution to our society's insatiable demand for electric power certainly will not be achieved by using a single energy source; rather the solution must involve, in my opinion, the many proven technologies including conservation, wind and solar power, fossil fuels and nuclear power. All of these technologies have advantages and disadvantages involving economics, environmental concerns, public safety, politics, special interests, and national security. It is important that you, the lawmakers, are given as wide a perspective as possible about all our energy options. It is my pleasure to come before you today to present, from my perspective, some of the important facts about nuclear power as it is presently being developed in the US and elsewhere in the world.

**1. Nuclear Power in the US:**

- There are 104 Nuclear Power Plants in 34 states that provide 20% of the nation's electricity. The same percentage is true for Kansas.
- For large central-station electricity production, nuclear and fossil fuels are presently the only two choices. Development of large new hydro facilities is unlikely, and solar and wind power, while they will be important in the future, are presently limited to small to medium size installations and can operate only when weather permits.
- The nuclear plants that are being ordered today have much simpler passive safety systems than do existing plants and, consequently, have far fewer components, e.g., one design has only 10% of the pumps needed in the present operating plants.
- After decades without orders for new nuclear plants, last year applications for Construction and Operation Licenses (COL) for 4 new nuclear units were received by the USNRC, and 16 more COL requests are expected this year. Additionally, another 11 nuclear units are currently in the planning stage.
- US nuclear power has a demonstrated 40-year record of reliable and safe operation accompanied by negligible emissions of green-house gases or other pollutants.
- A basic economic fact: nuclear plants are expensive to construct but inexpensive to operate. Just the opposite is true for fossil-fired plants.

- In 2006 electricity production costs in cents per kilowatt-hour (= O&M costs + fuel costs) were

| | | | |
|---|---|---|---|
| Nuclear | 1.72 (= 1.26 + 0.46) | Gas | 6.75 (= 0.52 + 6.23) |
| Coal | 2.37 (= 0.54 + 1.83) | Oil | 9.63 (= 1.20 + 8.43) |

- The annual *capacity fact*or is the ratio of the electrical energy produced in a year to the maximum energy a plant could produce running at full power all year: In 2006 the capacity factors for different energy sources were as follows:

| | | | |
|---|---|---|---|
| Nuclear | 90% | Coal | 71% |
| Gas (combined cycle) | 40% | Gas (steam turbine) | 16% |
| Oil (steam turbine) | 16% | Hydro | 33% |
| Wind | 31% | Solar | 19% |

**2. World Use of Nuclear Power:**

- Nations without large fossil fuel reserves have had to rely on nuclear power or the importation of oil to generate electricity.
- In 2006 France generated 78% of its electricity from nuclear, Belgium 54%, Sweden 48%, South Korea 38%, and Switzerland 37%.
- There are presently 439 nuclear power reactors operating in 30 countries.
- Today, 34 nuclear power plants are under construction in 14 countries
- China has recently started a nuclear expansion program and plans to begin constructing 2 new nuclear plants every year for the next 15 years.
- This increasing acceptance of nuclear power is largely motivated by nuclear power's attractive economics and the elimination of greenhouse gas emissions. Many environmentalists, once bitterly opposed to nuclear power, have now changed their minds and insist that nuclear power must be part of our energy solution. Patrick Moore, one of the founders of the Greenpeace movement, Stewart Brand, founder of the *Whole Earth Catalogue*, Gaia theorist James Lovelock, and Hugh Montefiore, former Friends of the Earth leader, all have stated their strong support for nuclear power.

**3. Fuel Recycling and Nuclear Waste**

- Nuclear fuel reprocessing separates uranium and plutonium from the fission products in spent fuel. Spent fuel still contains 95% of the potential energy contained within it. The uranium and plutonium are valuable nuclear fuels and can be recycled into new fuel rods.
- The merits of reprocessing include (1) separation of long-lived transuranics (other than plutonium) for possible transmutation, (2) recovery of fission products that have commercial value, (3) the volume of radioactive waste to be disposed of is smaller and, because the long-lived transuranics are removed, the waste needs to be sequestered for considerably shorter times (1000s of years vs 100,000s of years), and (4) recovered uranium and long-lived plutonium can be recycled as new fuel.
- France, the U.K., Germany, Japan and Russia all have working reprocessing facilities and benefit from the closed fuel cycle. In particular, the French have safely recycled spent fuel for over 30 years with no terrorist attacks, no plutonium thefts, and no accidental explosions. The French reprocessing facility at La

Hague has excess capacity, and France currently reprocesses spent fuel for other countries as well as using the recycled fuel to generate excess electricity to sell to other countries (in fact, electricity is France's fourth largest export product).

- The US, by contrast, has limited experience in commercial fuel reprocessing. From 1966-1972, Nuclear Fuel Services operated a facility at West Valley NY, and Allied General Nuclear Service built a facility at Barnswell SC but never processed any spent fuel because President Carter, in 1977, issued a ban on reprocessing hoping, futilely it turns out, that other countries would follow suit. This ban had little impact on the US because of its large uranium and coal resources. President Reagan lifted the reprocessing ban in 1981, but industry so far has been wary to adopt reprocessing because of uncertainty in government policy and questionable short-term economic benefits.
- In 1982, Congress mandated that various sites for a high-level waste (HLW) repository be explored and characterized, taking into account the geology, hydrology, chemistry. meteorology, earthquake potential and accessibility. In 1987, Congress decreed that studies at other sites should cease and Yucca Mountain near the Nevada nuclear-weapons test site should become the focus. Following lengthy legal challenges, site characterization began in 1991 and acceptance of the first spent fuel is presently scheduled for 2010. The DOE was to have begun accepting spent fuel in 1998 but has not complied because no waste repository yet exists. The cost and operation of the HLW repository is to be paid from a 1/10 of a cent per kWh surcharge on nuclear electricity. Presently this fund has accumulated $31.9 billion (about $300 million per reactor) and spent $9.5 billion.

1969 KSU has M-S

**4. Nuclear Engineering at K-State**

- I've been in the NE program at KSU since 1969 and have seen the nuclear power industry wax and wane. Presently, there is a great resurgence in nuclear engineering, driven largely by the future expansion of nuclear power and the retirement of nearly one-half of the nuclear work force in the next 15 years.
- At K-State we have had a renaissance in the NE program. Currently, we have about 60 undergraduates in our Nuclear Option and about 25 graduate students with the enrollment rapidly growing.
- Our research emphasis focuses on the design, fabrication and application of radiation detectors, an emphasis unique among US universities, and currently we enjoy considerable extramural funding, receiving more than $11.7 million over the last 5 years. Although most of our work is sponsored by various national security programs, one of our new detector designs is planned for inclusion in the core of a new type of power reactor, thereby, augmenting its safe operation.
- K-State's research reactor will be one of the first of the remaining 24 US research reactors to receive a renewed operating license. Our reactor is heavily used for various research projects and is an indispensable facility for the nuclear program.
- I invite anyone who would like a tour of our reactor and research facilities to contact me at jks@ksu.edu or 785-532-5626.

Thank you for your kind attention. Are there any questions?