ALASKA STATE LEGISLATURE
HOUSE RESOURCES STANDING COMMITTEE
Anchorage, Alaska
June 5, 2009
3:04 p.m.

MEMBERS PRESENT

Representative Craig Johnson, Co-Chair
Representative Mark Neuman, Co-Chair
Representative Paul Seaton (via teleconference)
Representative Peggy Wilson (via teleconference)
Representative David Guttenberg (via teleconference)
Representative Scott Kawasaki (via teleconference)
Representative Chris Tuck

MEMBERS ABSENT

Representative Bryce Edgmon
Representative Kurt Olson

OTHER LEGISLATORS PRESENT

Representative Bob Lynn
Representative Wes Keller

COMMITTEE CALENDAR

OVERVIEW(S): TOSHIBA/WESTINGHOUSE 4-S, 10MWE DESIGN UNIT FOR ENERGY PRODUCTION IN ALASKA

- HEARD

PREVIOUS COMMITTEE ACTION

No previous action to record

WITNESS REGISTER

MARVIN YODER
MY:T Solutions LLC
Palmer, Alaska
POSITION STATEMENT: Provided an introduction to the 4S Reactor.

TONY GRENCI
Westinghouse Electric Company LLC
(no address provided)

POSITION STATEMENT: Provided a PowerPoint presentation about the 4S Reactor.

KAZUO ARIE, Senior Manager
Plant Project Engineering Department
Nuclear Energy Systems & Services Division
Power Systems Company
Toshiba Corporation
Japan
POSITION STATEMENT: Provided a PowerPoint presentation about the 4S Reactor.

STEVE STRAIGHT
(no address provided)
POSITION STATEMENT: Posed a question in regard to 4S Reactors.

ALEX GIMARC, Secretary
Board of Directors
Chugach Electric Association
Anchorage, Alaska
POSITION STATEMENT: Spoke in support of considering nuclear energy as a type of alternative energy.

DONALD ANDERSON, Ph.D.
Anchorage, Alaska
POSITION STATEMENT: Spoke in favor of nuclear power and provided copies of various papers he has written on this topic.

MICHAEL HARPER, Deputy Director
Rural Energy
Alaska Energy Authority (AEA)
Anchorage, Alaska
POSITION STATEMENT: Answered questions in regard AEA's involvement in looking at nuclear power.

MEERA KOHLER, President, Chief Executive Officer
Alaska Village Electric Cooperative, Incorporated
Anchorage, Alaska
POSITION STATEMENT: Supported continuing the interrogatory process for nuclear power generation.

MARILYN LELAND, Executive Director
Alaska Power Association
Anchorage, Alaska
POSITION STATEMENT: Suggested having a consortium of Alaska utilities join together for nuclear power.

ACTION NARRATIVE

3:04:21 PM

CO-CHAIR CRAIG JOHNSON called the House Resources Standing Committee meeting to order at 3:04 p.m. Representatives Seaton (via teleconference), Kawasaki (via teleconference), Guttenberg (via teleconference), and Johnson were present at the call to order. Representatives Wilson (via teleconference), Tuck, and Neuman arrived as the meeting was in progress. Also present were Representatives Lynn and Keller.

OVERVIEW(S): TOSHIBA/WESTINGHOUSE 4-S, 10MWE DESIGN UNIT FOR PRODUCTION IN ALASKA

3:05:06 PM

CO-CHAIR JOHNSON announced that the only order of business is the presentation regarding the Toshiba/Westinghouse 4S, 10MWe Design Unit for energy production in Alaska.

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MARVIN YODER, MY:T Solutions LLC, Palmer, Alaska, offered his appreciation for [Co-Chair Johnson's] introduction of HB 191 during the 2009 legislative session and said the bill would allow people to have another option when looking at what they want to do for power in their local communities. Toshiba first visited Galena, Alaska, in August 2003 to talk about this 10 megawatt [nuclear] reactor. This reactor has a 30-year life, does not require a lot of technology on site, and would be very competitive with other types of alternative energy. The 10 megawatt reactor is especially appropriate for rural areas and the 50 megawatt for others.

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TONY GRENCI, Westinghouse Electric Company LLC, in response to Representative Seaton, explained that the initial design configuration being presented to the U.S. Nuclear Regulatory Commission (NRC) is 30 megawatts thermal, which relates to 10 megawatts electric output (10MWe) [slide 3].

3:11:00 PM

KAZUO ARIE, Senior Manager, Plant Project Engineering Department, Nuclear Energy Systems & Services Division, Power Systems Company, Toshiba Corporation, began his presentation by stating that the main goal is to provide safe, clean, reliable, grid-appropriate power that is applicable to small, remote areas [slide 3]. Toshiba pays attention to high security and proliferation risks, he continued, as well as minimizing infrastructure, operation, and maintenance requirements. This sodium-cooled fast reactor was co-developed with Central Research Institute of Electric Power Industry (CRIEPI), a Japanese utility research organization. Developing partners now include Argonne National Laboratory (ANL) and Westinghouse.

MR. ARIE noted that the main features for both versions of the 4S include passive safety, long refueling intervals, low maintenance, and high inherent security. The plant's arrangement [slide 4] provides seismic isolation for the reactor building and places the reactor building underground.

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MR. ARIE outlined the advantages of the 4S Reactor [slides 5-8], the first being the long refueling interval of 10-30 years. This contributes to the economy of the reactor, especially given high and unpredictable diesel fuel prices. Other advantages are the reactor's simple operations, low maintenance passive safety systems, and pumps that have no moving parts, all of which contribute to low maintenance requirements.

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MR GRENCI, in response to Representative Seaton, explained that automatic burnup compensation [slide 6] occurs as the reactor's fuel is used up over the course of the core life. The reactor automatically compensates for burnup by moving the control mechanisms at a very slow incremental rate to properly position the reflector on the core, thus maintaining the reactor at 100 percent power. In further response, he said "Rx" is the abbreviation for reactor [slide 9].

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MR. GRENCI began his presentation by describing the three heat-exchanger loops in the 4S Reactor design [slide 10]. The first loop, depicted with a circle around it, is the sodium cooled reactor vessel which contains the fuel and pumps that move the sodium in that loop. A heat exchanger, also sodium cooled, transfers the heat to the intermediate heat transport system [the second loop], which in turn pumps the heat to a steam generator [the third loop]. The steam generator produces steam, which in this configuration is used to turn the turbine and produce electricity. There is also a version of the 4S Reactor which does not produce electricity and only generates steam for processed heat.

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MR. GRENCI advised that if the reactor is used to produce heat rather than electricity, the 10MWe version is 30 megawatts thermal and the 50MWe version is 135 megawatts thermal [slide 11]. Some of the components in the two different versions are identical in size - for example, the reactor building and the reactor vessel. The difference in the power output stems from the specific design of the fuel and how hard the fuel is run. Additionally, the heat exchanger components are sized differently for the two different outputs and the piping configuration is slightly different. In response to Representative Tuck, Mr. Grenci said electromagnetic [EM] pumps are being used to extend the life of the plant. One EM pump is located in the intermediate loop and one is in the reactor vessel itself.

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MR. GRENCI, in response to Co-Chair Johnson, related that nothing used in the 4S design is brand new technology; everything being used has some kind of experience somewhere in the world. For example, there are pumps that have been run in sodium test reactors in Idaho for 20 years. The various options being used in the 4S have not necessarily been used all together at the same time or in the same way, but they have all been used somewhere before in many countries around the world. In further response, he said Toshiba/Westinghouse is careful in design to not do anything that re-invents the wheel; rather the best features already developed somewhere in the world are applied.

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MR. GRENCI, in response to Representative Seaton, explained that the pathways depicted going out the top of the schematic [on slide 11] are the vent stacks for air passage. In response to Representative Keller, Mr. Grenci said the same size reactor vessel is used [for both the 10 and 50 megawatt versions]. The difference in the fuel life between the two versions is because taking out only 10 megawatts at a time makes the fuel last that much longer than in the 50 megawatt version. The 10-year number on the 50 megawatt version is somewhat of an approximation because, by varying the design, that number can be tweaked to perhaps 12 years.

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MR. GRENCI called attention to the top two lines on slide 12 which show the size of the core that is inside the reactor. He said the core is about three feet wide and eight feet tall, so the reactor vessel is tall and narrow. There are two fuel enrichment ranges - 17 and 19 percent. The important point in this regard is that the threshold for proliferation-grade fuel accepted around the world is 20 percent, so the enrichment used in the 4S is below that proliferation grade. In response to Co-Chair Johnson, he explained that proliferation-grade fuel is attractive to terrorist organizations and others. In further response, Mr. Grenci confirmed this means the fuel is below bomb grade. In addition to its other security factors, this makes the 4S a very unattractive target to someone wanting fuel. He further explained that the benefit of using sodium for heat transfer is that it remains liquid at high temperature and low pressure. Until now, the standard nuclear reactor used in the U.S. has had a design pressure of up to 2500 pounds per square inch (psi), but the design pressure for the 4S is 44 psi.

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MR. GRENCI discussed the core design depicted on slide 13. He noted that the schematic is a view from the top of the core, the reflector, and the 18 fuel subassemblies. He explained that the core is surrounded by the reflector, which is composed of six segments. Neutrons escape from the fission of the uranium and the reflector bounces those neutrons back into the core, which increases or stabilizes the power of the reactor. As the uranium is gradually depleted over the core life, the reflector is raised up from the bottom of the reactor so it overlaps more and more of the fuel and therefore bounces more and more neutrons back into fuel.

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MR. GRENCI, in response to Representative Kawasaki, stated that availability of fuel is not necessarily related to the size of the reactor. The raw material is procured on the worldwide uranium market, then processed into the configuration and type of fuel that is desired. Right now there is no real crunch on the availability of uranium for fuel. Because the 4S is a small and efficient reactor, it uses a lot less uranium and only needs to be refueled every 10 or 30 years, while a typical reactor requires refueling every 18 or 24 months.

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MR. GRENCI related that slide 14 is a side view of the previous schematic. He said there are two mechanisms for shutting down the reactor depending on whether it is a normal shutdown or a shutdown due to problems. The shutdown rod is a redundant shutdown system to the reflector - either the shutdown rod or the reflector can completely and independently shut down the reactor. Scram [slide 15] is the same thing as a shutdown, he continued. Burnup compensation is accomplished by the reflector as well as the fixed absorber. Located in the center of the reactor, the fixed absorber is pulled out halfway through core life to introduce positive reactivity to the core, which allows performance of the burnup compensation with the reflector over 30 years.

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MR. GRENCI specified that the primary EM pumps operate without any moving parts by using a moving magnetic field and the natural conductivity of the liquid sodium [slide 16]. Forming a cylinder are two EM pumps, one on top of the other, and an intermediate heat exchanger on top of them. This cylinder is a component that fits down into the reactor vessel and rests on the top shelf of the reactor vessel. The EM pumps move the sodium down around the outside of the reactor vessel. When it reaches the bottom of the reactor vessel the sodium changes direction and goes up through the core, picking up the heat. Once at the top of the reactor vessel the sodium is redirected down through the intermediate heat exchanger and the heat exchanger sends the heat off to the intermediate sodium loop and hence off to the steam generator to make steam. He reiterated that these EM pumps have been in use for decades in similar applications. A full-size EM pump for the 4S design is being fabricated in Japan for the testing facility, he continued, and a lot of the components that will be used in the plant are being tested right now.

MR. GRENCI noted that the name of the 4S is Super-Safe, Small and Simple. Part of the super-safe has to do with features like the two independent and redundant systems that remove the decay heat from the reactor [slide 17], he said. Even after the reactor is shut down, there is the heat that has already been placed in the reactor as well as heat that is still generated for a time as the fission products run their course and the fission winds down. There needs to be a means for removing that heat so the reactor does not heat up and damage itself. Either one of these two systems is capable of removing all of the residual heat from the reactor. He explained that the reactor vessel auxiliary cooling system takes air in from outside the reactor, moves the air past the reactor using natural convection, and takes the heat away by sending it out a stack. The reactor vessel auxiliary cooling system (RVACS) works somewhat similarly, he continued, by using an air cooler that is in line with the piping in the intermediate sodium loop. Two fail-safe dampers open at plant shutdown, causing air to move on a flow path past the air cooler which sets up natural circulation when power is lost.

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MR. GRENCI said another design feature for safety is a double wall tube steam generator [slide 18]. Sodium and water must be kept separate because a sodium-water reaction is very violent, he explained. This double wall system provides a void between the two heat transfer surfaces. Water and steam are on the inside of the tube, sodium is on the outside of the tube, and a helium-filled void is between them. Thus, a failure of one of the barriers will be detected before the other barrier fails.

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MR. GRENCI next described the 4S containment building, explaining that two steel pieces closely surround the reactor vessel and its associated equipment [slide 19]. The bottom piece is called the guard vessel and the upper piece is called the top dome. The top dome is much wider than the guard vessel because it must encompass all the drive mechanisms for the reflector and other control rods. The guard vessel very closely follows the outline of the reactor vessel. Thus, even if the void between the guard vessel and the reactor vessel fills up entirely due to a leak of the reactor vessel, the cooling will be maintained because the sodium level cannot go down enough to uncover the fuel in the core.

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MR. GRENCI pointed out that because this is a low power reactor, it has low a low fission product inventory. Therefore, the amount of radioactive materials that could potentially be released in an accident is smaller than that of a typical large 1000 megawatt base load reactor. Also, sodium has a high affinity for these fission products so these products tend to be retained rather than released into the air. In addition, with a low pressure system there is less tendency to eject the fission products if there is a failure. Furthermore, the reactor vessel is sealed, there is a small number of penetrations and isolation, and there is no potential light water hazard such as direct containment heating, steam explosion, hydrogen burning, or missiles.

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MR. GRENCI explained that when presenting safety analysis results to the Nuclear Regulatory Commission (NRC), it must be shown what doses will accrue to the public in a hypothetical accident [slide 21]. When conducting the analysis, the assumption is that the worst possible accident has occurred even though it may not be plausible with this type of design. The analysis determines how far away from the reactor the security fence must be placed and how far away from the reactor that emergency planning must be in place, such as evacuation of the surrounding populace. The safety analysis for the 4S showed that with a fence distance of 50 meters, the roentgen equivalent in man (REM) for the exclusion area boundary would be 0.004 and for the low population zone it would be 0.2 REM, both of which are well below the acceptance dose criteria of 25 REM. Thus, he said there should be no emergency planning requirements beyond the fence for the 4S Reactor, which is in contrast to what would have to be done for a large light water reactor.

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MR. GRENCI, in response to Representative Seaton, said the dotted line depicted around the reactor [on slide 21] is equivalent to the protective fence being 50 meters distance from the reactor and, in the aforementioned analysis, both the exclusion area boundary (EAB) and the low population zone were included within this 50 meter boundary.

MR. GRENCI noted that a test facility was completed in December 2008 in Yokohama [Japan] and functional testing began in January 2009 [slide 22]. A full-size EM pump is currently being fabricated for installation and testing in the facility. Other testing will include verification of the leak detection systems for the steam generator, and testing of the modeling for the codes that are used to evaluate the flow of the sodium through the fuel and the reactor. He said he is pointing this out to show Toshiba's commitment to furthering its work and getting closer to receiving certification from the NRC.

3:52:01 PM

MR. GRENCI reviewed the current licensing schedule for preparing to build the 4S Reactor [slide 23]. To date, the Phase 1 meetings with the NRC have been completed, at which NRC was presented with the design and safety analysis. The Phase 2 technical reports have also been submitted to the NRC for review. The actual design will be submitted to NRC in late 2010 as part of Phase 3. He said the actual builder/owner/operator of the 4S Reactor will then have to prepare a separate combined operating license (COL) application and this application will reference the design approval that will have hopefully already been achieved. Physical construction of the plant would begin after the COL is received at the end of 2014. He anticipated a construction time of about two years for the 4S, which would mean completion of the plant by the end of 2016.

MR. GRENCI concluded his presentation by stating that the 4S Reactor is a mature technology ready for regulatory review and commercialization [slide 24]. Preliminary systems design has been completed and work on the detailed design is now in progress. A large body of test data for sodium reactors has been accumulated over the decades and the U.S. licensing process has begun.

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MR. GRENCI, in response to Representative Wilson, explained that the 18 fuel subassemblies are brought to the site in a cask. They are taken out of the cask with fuel handling equipment and placed into the core. At the end of 30 years the uranium in those subassemblies is expended to the point where it is no longer efficient to produce power. The reactor is then opened up and the 18 fuel subassemblies removed, put back into a cask, and transported to a disposal location. He added that while the subassemblies could no longer be used in the 4S, the remaining uranium could be reprocessed and reformulated into fuel for another 4S Reactor or some other reactor that uses lower enrichment.

MR. GRENCI, in response to further questions from Representative Wilson, stated there is no other waste generated from the fuel itself during that 30 years. Some paper waste or chemistry sampling waste may be generated from maintenance, but he said he thinks that would be low level waste in small volumes that is much easier to address than high level waste like the nuclear fuel. He added that nothing is released offsite that would have to be collected. In response to Co-Chair Johnson, Mr. Grenci clarified that it would be low level radioactive waste that is typically baled up and shipped somewhere.

MR. ARIE interjected that the reactor is sealed so nothing comes out of it for 30 years.

CO-CHAIR JOHNSON asked what kind of water supply is needed.

MR. GRENCI said he forgets the answer; however, once the water is processed, it is just a matter of dealing with whatever the small losses are because the steam water system recycles its water around [slide 11]. The closed loop between the cooling tower and the condenser will have evaporative losses [slide 21]. In further response, he said the water needs to be processed to some extent - for example, the water in the steam loop must be purified - but it can be raw water between the condenser and the cooling tower. He offered to get further information to members.

4:03:05 PM

MR. GRENCI, in response to Representative Wilson, related that the dump tank [slide 22] is part of the intermediate sodium loop system and serves as another safety feature. Should there be a leak somewhere, all of the sodium from the steam generator in the intermediate loop can be released directly to the tank via piping.

MR. ARIE pointed out that the dump tank [shown on slide 22] is for the test facility in Yokohama, not the 4S Reactor itself.

MR. GRENCI explained that the dump tank for the 4S Reactor is shown on slide 17. He said it works the same way and is a standard design feature for a sodium system. In response to Co-Chair Johnson, Mr. Grenci confirmed that the sodium is liquid and does not have to be replaced because it is sealed inside the system for the life of the plant.

4:05:02 PM

MR. GRENCI, in response to Representative Lynn, confirmed that the 4S Reactor would be ready for market by 2017, provided a customer appeared now.

CO-CHAIR JOHNSON inquired whether any analysis has been done in regard to getting construction materials to a rural site in Alaska, given the large amount of concrete associated with the reactor.

MR. GRENCI replied that specific sites have not been evaluated because the sites are unknown. The intention is to be able to install this reactor in remote locations because that is a good application for it, he continued, and it has been looked at from this aspect. He said he thinks the heaviest piece that has to be moved is the reactor vessel which weighs about 100 tons. Construction of a large portion of the reactor and the intermediate sodium loop is done ahead of time so they can be taken to the site already assembled, thereby minimizing the amount of welding that has to be done onsite. In further response, he confirmed that the reactor vessel is the heaviest piece at 100 tons. He said it could be brought up in two or more pieces and welded together onsite, but the preference would be to weld it in the shop.

CO-CHAIR JOHNSON said issues the state is looking at include safety, transportability, dependability, and "install-ability". He added that he is intrigued by the technology.

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MR. GRENCI, in response to Representative Seaton, said one advantage in using sodium is that it is very compatible with stainless steels, so the rate of degradation of the stainless steel is extremely small. It is actually much more compatible than using stainless steel and water in a light water reactor. While the design lifetimes of the 10 and 50 megawatt plants is 30 years, he said he did not see any reason why the plants would not be able to be run for 60 years. In further response, he said the neutrons do not degrade the type 304 stainless steel. This is something that must be looked at very carefully, he continued, because neutron embrittlement can change the properties of the stainless steel over time, but at this time it is not thought to be a problem. He pointed out that HT-9 steel is used as the cladding on the fuel [slide 12], and that HT-9 was developed by General Electric in the 1960s to specifically resist neutron irradiation. In response to a further question from Representative Seaton, he said the HT-9 steel is bonded to the fuel so it comes out with the fuel and is therefore replaced at refueling.

4:15:00 PM

STEVE STRAIGHT inquired what personnel would be needed for security and maintenance once the 4S is on line.

MR. GRENCI responded the final answer is unknown until it is hashed out with the NRC during the licensing process. He said he thinks a small reactor with a small number of simple, automatic systems should not have to have the same staffing as a large reactor, so perhaps three operators at a time and several security personnel at the same time.

CO-CHAIR JOHNSON surmised there would be people onsite all the time for safety and security purposes.

MR. GRENCI added that he thinks most of the saving in personnel will, proportionally, be reaped in the security area. A large nuclear plant has approximately five people in the control room and some operators out in the plant, and this number would not be reduced proportionally with the 4S plant.

4:18:42 PM

ALEX GIMARC, Secretary, Board of Directors, Chugach Electric Association, related that in November 2008, Chugach Electric Association passed a resolution supporting alternative renewable energy. He said this resolution states the association's commitment to move from a 90 percent reliance on Cook Inlet natural gas to 10 percent reliance over the next decade or so. The resolution asks that all forms of generation be considered on the same economic basis; all forms including "geo, hydro, wind, coal liquids, biomass, and nuclear". Currently, he continued, state law does not allow consideration of nuclear energy, although in the Lower 48 it produces almost 20 percent of all energy...(indisc.). The resolution also requests the legislature remove impediments for consideration of nuclear energy, something that was included in HB 191. The association does not know today what the best mix of future energy generation will be, it only knows that everything must be on the table at the start of the process and the association believes that reactors need to be part of that starting mix.

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DONALD ANDERSON, Ph.D., noted that while his small software company is unrelated to this topic, he has a long-time interest in nuclear power. He provided members with a paper he wrote about nuclear waste.

CO-CHAIR JOHNSON interjected that Dr. Anderson's paper is entitled "High Level Nuclear Waste" and can be found on the website for HB 191, a bill for which he is the prime sponsor.

DR. ANDERSON continued, saying he supports HB 191 because correcting state law is way overdue. He said the Alaska Energy Authority (AEA) is dealing with practically everything but nuclear. Most of the technology AEA is using is impractical, he contended, while nuclear is one of the most practical. He provided a copy of a letter he wrote the governor, also available on the HB 191 website, that mentions the locations he thinks would benefit from small reactors. Additionally, he provided a paper that he prepared at Mr. Gimarc's suggestion for the board of the Chugach Electric Association to bring them up to speed on nuclear power, available as well on the website for HB 191.

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CO-CHAIR JOHNSON remarked that he thinks this audience is probably pro nuclear power, but others may not be.

DR. ANDERSON added that a poll done late last year shows 66 percent of the U.S. population wants to increase the use of nuclear power for electricity.

4:26:15 PM

MICHAEL HARPER, Deputy Director, Rural Energy, Alaska Energy Authority (AEA), said the governor has asked Mr. Steven Haagenson [AEA's Executive Director] to look at energy policies and alternatives diesel, especially in rural Alaska where power is now at $1 per kilowatt hour. He agreed that nuclear seems to be another technology AEA should look at. In response to Co-Chair Johnson, he said AEA is not presently looking at nuclear power and does not have any special nuclear project at this point. However, he said AEA feels it should be viewed as an option for Alaska, especially for rural Alaska, and that AEA has been contacted by the Galena folks.

4:27:53 PM

CO-CHAIR JOHNSON inquired what size population base is needed in order to utilize the 4S Reactor, provided the costs are similar.

MR. GRENCI said he is unfamiliar with the sizes of Alaska's different communities, but that the 10 megawatt reactor would generally be appropriate for remote communities not connected to the grid and big enough to use 10 megawatts, whether for electrical load or some other process. A small mini-grid could be used to connect several remote communities if they are close enough to each other. A 50 megawatt plant is more appropriate for an area connected to the state's larger grid. He said he thinks it will be found that both versions will be competitive in those particular applications.

CO-CHAIR JOHNSON stated he is hoping Mr. Harper has a list of energy requirements for communities and might be able to determine which communities are capable of using the [4S Reactor] and the size needed. He understood AEA had conducted an energy assessment of some communities and asked which communities would be suitable for the volume of power that is be generated by a 4S, whether or not the source of that amount of generation is a 4S.

MR. HARPER responded it would be the hub communities like Nome, Bethel, and Dillingham. Galena, with only about 600 people, would have to be hooked up to two or three other communities to make it work, even using a 10 megawatt unit. There are also the remote mining locations like the Donlin Creek Mine, he added. Nuclear might be preferable to the huge volumes of diesel that must currently be brought into communities.

4:32:59 PM

CO-CHAIR JOHNSON warned that future "cap and trade" legislation could hamstring diesel generation. He asked whether waste heat from the 4S could be used to heat buildings.

MR. GRENCI said absolutely. The reactor for the 10 megawatt electric version generates 30 megawatts thermal, so the 20 megawatts of rejected heat would be available for heating while the plant is generating the 10 megawatts of electric. In further response, he said he is unsure how far the waste heat could be transported, but it would be miles.

MR. GIMARC pointed out that greenhouses would be an additional application for the [waste] heat.

4:34:02 PM

MR. YODER, in response to Co-Chair Johnson, said using the waste heat would be very feasible because Galena is currently transporting jacket heat off the diesels over a distance of 1500 feet to heat the school. He further pointed out that the entire U.S. Air Force base taken over by Galena was heated by underground steam heat from one source.

MR. HARPER added that in the nearly 40 power plants built by AEA with Denali Commission funds, hot water jackets were used and heat is being transported up to 1200 feet.

4:35:04 PM

REPRESENTATIVE WILSON inquired how hard it would be to disassemble the 4S Reactor after 30 years of use.

MR. GRENCI replied it is not really any different than any other kind of industrial site remediation, with the exception that the fuel must be removed and some components, like the reactor vessel, will be radioactive so will need to be placed in a cask and shipped offsite. Basically, it would be taking down or burying the concrete structure, taking down the metal building that the turbine is installed in, and disassembling the equipment in the building.

REPRESENTATIVE SEATON, in response to Co-Chair Johnson's recognition that Representative Seaton's community [Homer] is nuclear-free, noted that Seward, the second-largest community in his district, is considering being a test location for this type of thing.

4:37:50 PM

REPRESENTATIVE KAWASAKI said he was a young child when "Three Mile Island" and "Chernobyl" happened, so he does not remember them. He likes the prospect of having nuclear options available in Alaska. However, he commented that it is fairly untested and the presentation did not address whether Alaska's extreme environment has been considered.

MR. GRENCI, in response to Representative Keller, said the 10 megawatt reactor's 30-year lifespan could not be increased to 60 years by pulling less power off of it.

4:40:06 PM

REPRESENTATIVE SEATON expressed interest in obtaining costs, even if they are rough estimates of the gross cost, in order to determine economic feasibility.

CO-CHAIR JOHNSON related that Toshiba has agreed to provide estimates as it goes through the process. He reminded members that the cost of the gas pipeline is currently unknown, yet lots of time is being expended on that. This is a bit of "tire kicking", he continued, and getting everything on the table allows for informed decisions.

4:42:18 PM

MR. GIMARC pointed out that excess hydrogen can be produced with a reactor like this, which might be of interest to the Bush. He said there is a workup that is looking at using small plants in the Bush to convert biomass to liquid to produce synthetic diesel. Additional hydrogen would make those plants operate more efficiently and this could enhance the ability of rural Alaskans to produce their own diesel because most everything in rural Alaska runs on diesel.

4:43:51 PM

MEERA KOHLER, President, Chief Executive Officer, Alaska Village Electric Cooperative, Incorporated, said the cooperative has a great interest in potential solutions for rural Alaska energy issues. She has followed this project since it first emerged several years ago and she supports continuing the interrogatory process.

4:44:26 PM

MARILYN LELAND, Executive Director, Alaska Power Association, related her observation that no one really wants to go first. As a solution, she suggested having a consortium of utilities from Alaska join together to do this.

CO-CHAIR JOHNSON noted that federal dollars - unrelated to renewable energy - might be available as the project proceeds further down the road.

4:46:02 PM

CO-CHAIR NEUMAN encouraged people to contact Mr. Yoder for further information.

CO-CHAIR JOHNSON added that there is more knowledge in Alaska on this issue than he had envisioned.

ADJOURNMENT

There being no further business before the committee, the House Resources Standing Committee meeting was adjourned at 4:46 p.m.