

# NUCLEAR TIMES

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## LAUNCHING NUKES AT UTPB

By Amanda Luna

Graduation day is quickly/slowly approaching, as a senior at UTPB. That means life is finally approaching. After being totally consumed with school for four years in college, the unknown after UTPB can be quite daunting. What's next? What exactly is out there to do? Feelings of panic and anticipation often come with the end being in sight. The closer I get to being done, the more I don't want school to be done. Like everyone else I have options, but choosing the right option is the scary part. The gamble taken between spending more time in school with the option of graduate studies versus joining industry and getting a job is enough to make anyone lose sleep. Luckily there are people and mentors that 'have been

there done that' and are willing to lend some friendly advice.

I sought the advice of the two most driven people I've ever met in my life: CJ Hernandez and Sterling Satterfield who graduated in 2011 as part of a class of five Mechanical Engineers (four being ME-Nuclear). To anyone that knows either CJ or Sterling, it's no mystery why their advice was sought-they are freaking brilliant! But they also chose two different career paths at either end of the spectrum. CJ chose to pursue a career straight out of UTPB while Sterling chose to continue with his studies; two very different decisions which could have very different outcomes.

Sterling, on one end of the spectrum, always wanted to attend grad school. "In general,

I enjoy school and believe that education is one of the best investments a young adult can make." Sterling is now part of the nuclear engineering masters program at North Carolina State University, which according to him is very different from life here at UTPB. There, 9 credit hours a semester is considered a full load along with the research required of a grad student. It's no secret, the trend is, usually, the more educated you are, the more money you can potentially make in your career. If grad school is your thing, Sterling recommends preparing by doing amazing in your undergraduate education. However,

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UTPB'S First Graduating Engineering Class

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## FUKUSHIMA DISASTER CAUSES FEAR TO PEAK OVER NUCLEAR SAFETY

By Lance Payne

The recent nuclear crisis, in Japan, resulting from a perfect storm of catastrophic conditions, has called into question the public and political perceptions of nuclear energy and related safety issues. This is a

global question that will have global implications, and most likely be solved in astronomical timeframes. However, several countries are taking immediate steps to improve safety.

In a CNN interview, on March 18, during the inci-

dent, U.S Deputy Secretary of Energy Daniel Poneman was asked, "Are you confident that they're (the Japanese) giving you the full story?" To which, Poneman level-headedly responded that the Japanese had a

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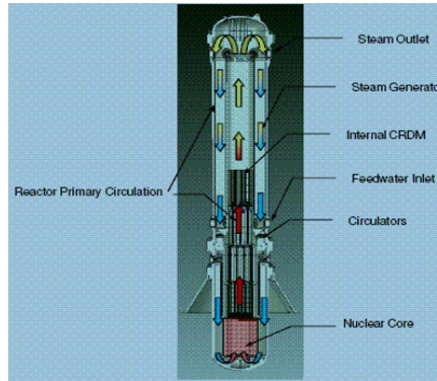
# NUCLEAR TECHNOLOGY: SMR

By Garnet Cameron

Oh no! Not another TLA (Three Letter Acronym) like FBI, NRC, EPA, and a slew of others. This one abbreviates Small Modular (Nuclear) Reactor (SMR) – the most recent design development in nuclear power. It is projected to revolutionize the US and world nuclear energy industry. Current nuclear power plants are giant Giga-Watt-electric (GWe), multi-billion dollar behemoths that can only economically service large population centers. In large part, this power output characteristic has yielded/limited deployment to large-city, eastern- and western coasts of the contiguous US. A dearth of nuclear power exists in the central US regions where population centers are smaller. Another variable in the viability equation has been the financial risk associated with billion-dollar, up-front capital investment.

SMRs address both the consumer base size and large unit cost of traditional nuclear power plant deployment. An SMR is “small” by design with output in the tens to hundreds of MWe range that costs that costs a few hundred million US dollars. Construction time is also reduced by modular design (large, prefabricated segments only need assembly at the installation site) e.g. the Babcock & Wilcox (B&W) Nuclear

Steam Supply System (NSSS) that ships as one piece shown in the diagram, versus the brick-by-brick, bolt-by-bolt construction



B&W mPower NSSS

approach of traditional nuclear power plants. All of the remaining and new US-based nuclear power plant design companies have SMR designs under review at the Nuclear Regulatory Commission (NRC) e.g. Babcock & Wilcox’s mPower (125MWe), NuScale (45 MWe), Westinghouse’s SMR (200 MWe), and GE-Hitachi’s PRISM (311 MWe). SMRs can also spawn a rebirth of the nuclear power support sector in the US. Much of that industry that started in the US, has migrated to other countries including

services like large machine and metal working shops, etc.

Andrea Sterdis, Senior Manager, Strategic Nuclear Expansion, Tennessee Valley Authority (TVA) is currently working with Babcock & Wilcox to deploy the first scheduled SMR in the US at their Clinch River Site, Roane County, Tennessee, beyond 2020. TVA is the largest utility company in the US serving 9 million end-user customers across Alabama, Georgia, Kentucky, Mississippi, North Carolina, Tennessee, and Virginia. Andrea explains that SMRs not only solve the minimum consumer market size and financial risk issues. SMRs also present a migration path for most utilities by making piece-meal deployment possible. As power production demand/requirements increase, additional SMR units can be installed. Successful piloting at TVA will create a strong incentive for other utilities to certainly investigate this approach. Many international design companies are also taking notice and interest in SMRs including those based in Russia, South Africa, South Korea, and China (IAEA, October, 2011).

SMRs can be the beginning of the new wave of nuclear power that will provide reliable, affordable, risk-reduced energy for which the US economy (and the world) is hungry.

## DID YOU KNOW: INVISIBLE

By Stryker (outside contributor)

Hello my fellow science enthusiasts! I hope I find you bright and illuminated by our science discoveries and information that is constantly exploding around us! Because the science world is just like a

nuclear warhead, massive and about to blow us away with intense energy and power, and we can only stare in awe as it goes beyond our control and it brings about our imminent death and destruction. Apocalypse how!

The Harry Potter craze, after over a decade of going strong with no signs of

slowing down, finally seems to have reached its end with the release of the final installment of the series in theaters. However, one of the most iconic items in the Potter-verse, the Invisibility Cloak, seems to be within technical reach of our own Muggle world.

The good people at University of Texas at Dallas have developed a device, constructed out of a sheet of carbon nano-

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## OTHER ENERGY: STORAGE—PART I

By David Scribner

The discussion of the place of wind and solar power in America’s energy future has taken on increasing importance. Here in Texas, the national leader in wind energy production, it is difficult to drive for more than a few minutes in any direction without seeing a wind farm in the distance. And, indeed, the advantages of wind and solar - renewability, scalability, and low to

zero emissions - are obvious. Any discussion of the place of renewables in America’s energy future must take into account the need for base load power.

Base load power is the minimum amount of power that an electrical utility predicts that its customers will require at a given time. This base load will, of course, vary according to the time of year and the time of day. More power is needed, for

instance, during the hot summer months than is needed during the cooler months. Less power is needed at night than during the day. The problem that the need for base load power presents to wind energy and solar energy is that the times of peak energy availability, when the wind is blowing and the sun is shining, will not always coincide with the times of peak energy use.

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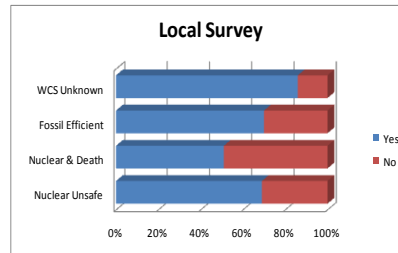
# LOCAL NEWS/OPINION

By Robert Anderegg

It would seem that here in West Texas, petroleum drives the economy and that is one of the reasons the area is constantly expanding. However, we are not afraid to venture into new forms of energy production, as can be witnessed as dozens of new windmills crop up every year. The question concerning West Texans is if the nuclear power route is a road we dare to explore.

In a random poll taken at the malls in Midland and Odessa, we found that 69% of our sample believes nuclear power to be dangerous, and 51% associate nuclear power with death. Many people have no idea what nuclear power is, not to mention the strict regulation involved with produc-

ing it. Also, it will come as no surprise that 70% believed fossil fuels (especially petroleum) are a better or more efficient energy source than nuclear power. Halliburton, Saulsbury, and Huntsman companies employ at least one in 40 citizens in Odessa,



and there are several more prominent oil companies that drive our economy as well.

was quickly promoted when his employer realized his potential. When asked about how an engineer from a small school such as UTPB would fair in the real world, CJ had words of encouragement. "It's kind of funny because the graduate from UTPB is doing better than grads from D-I schools from all over the country. Don't ever let anyone tell you that they are better just because you are from UTPB." If you are leaning towards getting a job sooner, rather than later, CJ recommends taking school extremely seriously. "The market for engineers is highly competitive and depends on your academic success, including internships and research... If you really think about it, your future literally depends on your performance in school right now! Don't blow it," he warns. In the meantime, we need to keep our resumes filled with as many internships and research opportunities as possible.

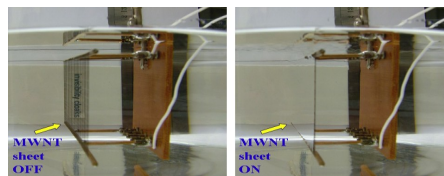
## LAUNCHING CONT'D FROM PAGE 1

some may question Sterling's decision to get his particular graduate degree in nuclear engineering, since America seems to have such a strong anti-nuclear sentiment at times. Sterling acknowledges this roll of the dice he has taken, "Believe me, I often lose sleep over all of this uncertainty but something to calm the nerves is that the majority of nuclear workers are near retirement age." Very soon, if not already, the nuclear industry will be begging for qualified engineers such as Sterling.

On the opposite end, there is CJ, who struck gold at April's American Nuclear Society (ANS) student conference in Atlanta. At the conference he was able to get an interview with Altran Solutions, who eventually hired him. He started off with the bland 'busy work' every entry level engineer gets, but

## INVISIBLE CONT'D FROM PAGE 2

tubes, which can make things seemingly invisible. It takes advantage of the carbon nanotubes incredible heat transferring ability in order to create a mirage effect, similar to the effect seen on hot desert roads where you can see magical pools of water disappear.



Right: "Cloaked" nano-tube sheet

The device is apparently heated with electricity, which heats the carbon nanotubes. The carbon nanotubes heat up the surrounding air, and the sharp rise in

In regards to WCS, 86% of those polled did not even know what it was, and of the ones who were familiar with it, roughly half support it. Upon explaining what it was to several participants, all said they were at least not against it. It is worth noting that the team polling at the Midland Park Mall was asked to leave by security due to several shoppers believing them to be terrorists. The fear of mentioning nuclear power is so severe that engineering majors are confused with terrorists, and storing nuclear waste is an act of terrorism.

In the coming months, we will see how public opinion changes once their economy grows and safety issues are dealt with first hand. I just hope the public (or west Texas at least) can view nuclear power in a positive manner.

No matter what career path you choose to take, it's a good thing to do the mechanical engineering with the nuclear option at UTPB. According to Sterling, "an education as a mechanical engineer with a nuclear emphasis is powerful combination and is unmatched by most other undergraduate degrees," I always knew mechanical engineers with the nuclear emphasis had it going on. But both Sterling and CJ have reached a consensus: KEEP YOUR GRADES UP, no matter what. With high grades in both school and on the GRE, doors will open for grad school. If you decide to go the other route, an employer will definitely lean towards those with higher GPAs. Depending on the career choice you choose, you should always be applying for something-grad school, fellowships/ financial aid, or a job. Real life is scary but we must prepare for it as much as we can, we are going to get there eventually, ready or not. We must keep our eyes on the prize and our nose to the grindstone; these are the

temperature causes the light to bend away from whatever the device is concealing, making it "invisible." Better yet, since it's activated with electricity, you can turn it on and off at will.

Although it's still quite young, this technology shows promise. And it looks insane!

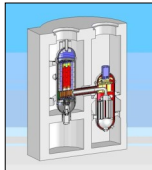
And with that I'm out the door. Take your protein pills and put your helmet on.

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*Nuclear energy is our future.*



<http://Tiny.cc/ANSatUTPB>

## FUKUSHIMA DISASTER CONTINUED FROM PAGE 1

“huge task” in controlling the situation. “I think their focus and the world’s focus is properly getting that job done.” The two correspondents went on to direct all of the proceeding questions to the subject of radiation dangers and if the Japanese would keep that information from the world. Also, of major concern was: What would happen if such a disaster happens on U.S. soil? The interviewers even brought up the BP oil spill and Hurricane Katrina, during this line of questioning. Poneman assures the newsmen that safety is the primary concern. But, this exchange of dialog illustrates the rate at which fears can take over and escalate the panic, in a scary situation. Panic can lead to overreaction. In the case of Fukushima, West coast Americans emptied the shelves of Iodine tablets after hearing a cloud of radiation was going to cross the Pacific.

However, safety is a real concern and people are affected adversely by radiation exposure. The brave Japanese workers

## STORAGE CONT'D FROM PG 2

One possible solution to the problem that base load power poses to a transition to an all renewable energy future is a national energy storage system. The basic idea is that surplus power generated by wind and solar sources during times of peak availability could be stored. Then, at times of peak demand, this stored energy could be used to generate electricity.

Tom Murphy, Associate Professor of Physics at the University of California San Diego, looks at one possible storage solution in a post entitled “A Nation Sized

should be regarded as heroes for being tenacious and resolute enough to keep working and eventually stop the disaster. They were well-informed and they knew they were risking their lives for the greater good of public safety.

Of course, it is only natural to have the above expressed fears. And of course, Americans want to know if our installations are safe. President Obama called for a review of all U.S. facilities immediately after the Japanese crisis. The Obama administration is staying positive on nuclear energy. Energy Secretary Steven Chu, April 22, “President Obama and I believe that safe nuclear power has an important role to play in our energy mix as we move to a clean future.” It is reported, as of April 2011, “the Nuclear Regulatory Commission had not identified anything that requires immediate action.” However, there are some concerns about the current rules for station blackout procedures. While the U.S. is not making drastic changes, Japan is going another direction. It is expected that 60% of

Battery” at his blog “Do the Math.” Murphy’s blog, well worth a visit for nerds and hipsters alike, applies basic mathematics and physics to real world problems. His aim is not so much to arrive at final answers but to use the tools of physics to assess the general size and scope of various technical challenges in a way that is approachable to non-physicists.

In tackling the problem of base load power, Murphy imagines a lead acid battery, like a car battery, large enough to provide base load power for the United States for one week. Making calculations based on a rough estimate of the power load of the United States, Murphy concludes that such a battery would occupy “a volume of 4.4 billion cubic meters,

*American Nuclear Society (ANS) at UTPB is a student interest group at UTPB focused on nuclear energy being the most viable base-load energy future for the United States. Close connections exist with the High Temperature, Teaching, and Test Reactor (HT<sup>3</sup>R) Program.*

*The HT<sup>3</sup>R Energy Research Program is an important national energy security asset that will help lead the US and world to an energy-sufficient future! As the name implies, it’s purpose is to:*

- 1. Provide a pipeline of highly trained engineers and scientist; and*
- 2. Establish with Los Alamos National Laboratory (LANL), a Generation IV (Gen IV) development and test reactor center.*

*HT<sup>3</sup>R is supported by the Minority Serving Institution (MSI) Office of the US Nuclear Regulatory Commission (NRC).*

the Japanese nuclear capacity will be offline this year, much never to go back on-line. Japanese Prime Minister Naoto Kan has requested the shutdown of three major reactor units near Tokyo, citing the high probability of a major earthquake. This marks a major policy shift concerning Japanese nuclear energy.

But to leave with a positive word from a U.S. official: “Deputy Energy Secretary Daniel Poneman said nuclear power must be considered as part of any energy strategy, stating ‘we do see nuclear power as continuing to play an important role in building a low-carbon future. But be assured that we will take the safety aspect of that as our paramount concern.’” Nuclear power currently has less lost-time (work time) due to accidents than banking and insurance.

equivalent to a cube 1.6 km (one mile) on a side.” This battery would require 5 billion tons of lead and *that* presents a problem. Noting that the United States Geological Survey currently estimates that there are only 80 million tons of lead in known reserves worldwide (with, perhaps, total undiscovered lead reserves of 1.5 billion tons), Murphy concludes that a nation sized battery is not a viable option.

Another hurdle with storage is the losses that occur whenever energy changes form (with known processes). This effectively increases energy cost thereby reducing usability.