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US Nuclear Power : A Mixed Outlook

As the US Nuclear Renaissance moves forward, economic and other factors are having an impact on the new reactor builds. New build sponsors have yielded mixed outlooks since the last part of 2009 including the following highlights;

- TVA's plans for Bellefonte 3-4 (AP1000) site (Alabama) announced that the projected reactors was reduced to 1 at most and no formal target dates exist for completion of technical reviews.
- Dominion's North Anna-3 (ESBWR) review could lead to the FSER (Final Safety Evaluation Report) in February 2011 with one contention allowed by the ASLB (Atomic Safety & Licensing Board) hearing.
- Duke Energy's Lee 1-2 (AP1000) doesn't have a fixed date for the FSER (as of this writing) due to design cert. amendment on the Vogtle reference COL (Combined Operating License). Also, Duke's (IRP) Integrated Resource Plan states that startup is now anticipated to be between 2018 and 2021, 3 years later than originally planned.
- Progress Energy's Harris 2-3 (AP1000) FSER and FEIS (Final Environmental Impact Statement) have no firm target dates. ASLB hearings denied all interveners contentions with one under appeal. The Florida state cabinet approved this project mid 2009.
- Southern Co.'s Vogtle 3-4 (AP1000) are expecting a FSER in April 2011, depending upon the outcome of the AP1000 design cert. amendment.
- SCANA's Summer 2-3 (AP1000) have a signed EPC contract with an FEIS scheduled for February 2012.
- DTE's Fermi-3 (ESBWR) FSER is expected in early 2012 with 4 contentions allowed by

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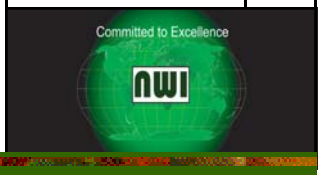

NWI

The New Nukes

The next generation of nuclear reactors is on its way, and supporters say they will be safer, cheaper and more efficient than current plants. If there ever were a time that seemed ripe for nuclear energy, it's now. For the first time in decades, popular opinion is on the industry's side.

A majority of Americans thinks nuclear power, which emits virtually no carbon dioxide, is a safe and effective way to battle climate change, according to recent polls. At the same time, legislators are showing renewed interest in nuclear as they hunt for ways to slash greenhouse-gas emissions. The industry is seizing this chance to move out of the shadow of Three Mile Island and Chernobyl and show that it has solved the three big problems that have long dogged it: cost, safety and waste. Researchers are working on reactors that they claim are simpler, cheaper in certain respects, and more efficient than the last generation of plants.

Some designs try to reduce the chance of accidents by automating safety features and minimizing the amount of hardware needed to shut down the reactor in an emergency. Others cut costs by using standardized parts that can be built in big chunks and then shipped to the site. Some squeeze more power out of uranium, reducing the amount of waste produced, while others wring even more energy out of spent fuel.

"Times are exciting for nuclear," says Ronaldo Szilard, director of nuclear science and engineering at the Idaho National Lab, a part of the U.S. Energy Department. "There are lots of options being explored." But nuclear is far from a sure thing. Yes, the plants of tomorrow—some of which could enter construction as soon as 2012—go at least part way toward solving some of the problems of yesterday. But they are still more expensive than fossil-fuel plants, and they still generate waste that must be stored safely somewhere. And while the industry is winning converts, plenty of powerful enemies remain. Many scientists and environmentalists still distrust nuclear power in any form, arguing that it can never escape its cost, safety and waste problems.

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Italy Needs More than 4 Nuclear Plants

RIMINI, Italy (MF-Dow Jones)--Italy will need more than four nuclear plants if it is to reach the government's target of generating 25% of its power from atomic energy, Enel SpA (ENEL.MI) Chief Executive Fulvio Conti said Tuesday. Enel and Electricite de France SA (EDF.FR), the companies planning to construct the four nuclear plants, are open to rival companies taking part in these projects as long as Enel and EDF have control, Conti said on the sidelines of a conference in Rimini. Enel is Italy's biggest utility by revenue. Earlier this month, Enel and EDF finalized a deal, valued at as much as EUR16 billion, to form a joint venture to develop nuclear power plants in Italy. They will study the feasibility of building at least four facilities. Edison SpA (EDN.MI), Italy's second-largest power generator by capacity, has said it wants to take part in the country's nuclear renaissance and is interested in the construction and management of the plants. Edison is controlled by EDF and Italian municipal utility A2A SpA (A2A.MI). A2A has criticized the Enel and EDF accord for pushing Edison to the side. "We have taken note of the Enel-EDF agreement that leaves Edison, under certain aspects, in a kind of limbo," said Giuliano Zuccoli, head of A2A's management board, also at the Rimini meeting. "In September, we will ask our partners what their plans are," Zuccoli told reporters Tuesday. Shortly after winning the election in 2008, the Italian government of Prime Minister Silvio Berlusconi said it would reverse a decades-old ban on nuclear facilities in the country and help reduce energy costs for companies and households. The Italian government has said that in the future it aims to generate 25% of Italian electricity from nuclear plants, another 25% from renewables, and the remainder from fossil fuels such as natural gas and coal. Industry Minister Claudio Scajola has said he expects Italy's first nuclear facility to be online by 2020.

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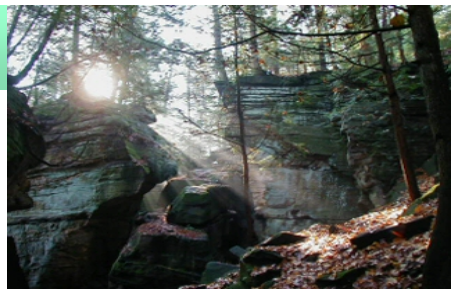

What's more, critics say, trying to solve the problems in one area, such as safety, inevitably lead to more problems in another area, such as costs. Here's a closer look at how the industry says it's addressing its longstanding problems—and where skeptics say nuclear energy is still coming up short. For many people, talk of nuclear power conjures up memories of two accidents: the partial meltdown at the Three Mile Island plant in Pennsylvania in 1979 and the more extensive power surge that destroyed the reactor at Chernobyl, Ukraine, in 1986. As a whole, though, the U.S. nuclear industry has a solid safety record, and the productivity of plants has grown dramatically in the past decade. The next generation of reactors—so called Generation III units—is intended to take everything that's been learned about safe operations and do it even better. Generation III units are the reactors of choice for most of the 34 nations that already have nuclear plants in operation. (China still is building a few Gen II units.) "A common theme of future reactors is to make them simpler so there are fewer systems to monitor and fewer systems that could fail," says Revis James, director of the Energy Technology Assessment Center at the Electric Power Research Institute, an independent power industry research organization.

The current generation of nuclear plants requires a complex maze of redundant motors, pumps, valves and control systems to deal with emergency conditions. Generation III plants cut down on some of that infrastructure and rely more heavily on passive systems that don't need human intervention to keep the reactor in a safe condition—reducing the chance of an accident caused by operator error or equipment failure. For example, the Westinghouse AP1000 boasts half as many safety-related valves, one-third fewer pumps and only one-fifth as much safety-related piping as earlier plants from Westinghouse, majority owned by Toshiba Corp. In an emergency, the reactor, which has been selected for use at Southern Co.'s Vogtle site in Georgia and at six other U.S. locations, is designed to shut down automatically and stay within a safe temperature range. The reactor's passive designs take advantage of laws of nature, such as the pull of gravity. So, for example, emergency coolant is kept at a higher elevation than the reactor pressure vessel. If sensors detect a dangerously low level of coolant in the reactor core, valves open and coolant floods the reactor core. In older reactors, emergency flooding comes from a network of pumps— which require redundant systems and backup sources of power—and may also require operator action.

Another big concern is how well a plant can handle a terrorist attack, especially the nightmare scenario of someone flying a jetliner into the reactor area. The Evolutionary Power Reactor from France's Areva SA, another Generation III design, guards against such an accident by putting the reactor inside a double containment building, which would shield the reactor vessel even if the outer shell were penetrated. The design also boasts four active and passive safety systems—twice the number in many reactors today—that could shut it down and keep the core cool in case of a mishap. Areva's EPRs are being built in Finland, France and China and four are under consideration for construction in the U.S. The Union of Concerned Scientists, a group critical of nuclear expansion, considers this the only design that is less vulnerable to a serious accident than today's operating reactors.

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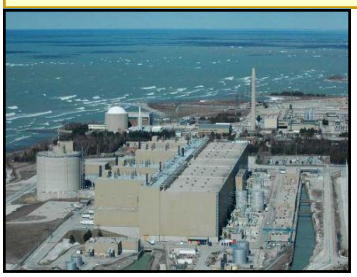
A Regulator's Perspective on the Globalization of the Nuclear Industry



Prepared Remarks of Commissioner Dale Klein, World Nuclear Association, London, England, September 10, 2009—We all know that the various steps in the fuel cycle, the design and construction of nuclear power plants, and the manufacturing of parts and components, have all become international enterprises, as this conference, and in fact, this panel, demonstrate. My colleagues sharing the podium with me are vendors or suppliers of nuclear energy in this marketplace. So, in a sense, some of them are competitors. But vendors in the nuclear marketplace also have a common agenda. Their goal is to design or build reactors or reactor components with the implicit assumption that this is the most significant step in the production of nuclear power. This agenda, and this assumption, is something they also share with many of you in the audience, particularly those of you from nations looking to enter the field of nuclear energy for the first time.

As a regulator, I have different priorities. I do not believe that the design and construction of a nuclear power plant is the most significant step toward creating a domestic nuclear energy program. In fact, I will go even further and say that in my opinion there is no such thing as a turn-key nuclear power plant. I say that because I believe that the safe and secure operation of a plant is at least equally important to its design and construction. And, furthermore, I believe that neither the safe design, construction, nor operation of a plant can be considered separately from the regulatory infrastructure of the nation where the plant is located. So how should we understand the relationship between international nuclear suppliers and national regulators? On the one hand, those of us who are regulators must be aware that the decisions we make in our home countries can have a profound effect on global energy policy. At the same time, industry must figure out how to operate in an environment where numerous different regulatory bodies have different methods and approaches.

When nuclear power was a largely domestic industry, as it mostly was in the United States when our currently operating plants were built, this was not an issue. But today, large multinational nuclear firms seeking to built standardized plants in more than one nation may be confronted with a number of differing standards, codes, and regulations regarding the construction of the plants. This can obviously be viewed as a burden, leading to duplicative work and higher costs. As a regulator, I am more anxious to see that these different regulatory regimes are not viewed as potential loopholes than can be exploited at the expense of high safety and security standards. In my time at the NRC, I have said many times that "an accident anywhere is a accident everywhere," so I want to help promote nuclear safety everywhere around the world. For this reason, I would encourage more standardized plant design and construction as a means for improving safety. Standardized design applications are easier to review and help regulators share information and best practices and standardized plants are easier to inspect. Regulators should also work together to harmonize our requirements, realizing that each country will have different regulatory structures.

To address this, an international movement to harmonize designs for new nuclear power plants is already being undertaken through the Multinational Design Evaluation Program, or MDEP. Through MDEP, the U.S. and nine other nations have been working to leverage knowledge and experience on nuclear power plant design, and promote global convergence in associated codes, standards, and regulations. With good communication, and a willingness to cooperate, MDEP has made excellent progress over the last several years. In part, this is because technical convergence is comparatively easy. After all, chemistry, physics, and engineering do not change from one country to the next. But there are also other considerations, such as rules about operator training and promoting safety culture, that may also affect how plants are licensed and allowed to operate. Of course, every nation possessing nuclear power can and will determine its own final standards for both safety and security. And interpretations of how to conduct regulatory oversight, or promote safety culture, are more likely to differ from nation to nation compared to specifications for rebar, for instance. In the United States, we have found the practice of stationing Resident Inspectors at each and every nuclear plant to be a highly effective way to provide regulatory oversight. It also has the benefit of promoting public confidence in the safety of nuclear power. This practice arose in part because the U.S. has 104 nuclear plants spread out across a large area. So while a Resident Inspector program works well for our country, we recognize that nations that are smaller in size, or which have fewer plants, may use different oversight strategies. I don't know whether we can build on the foundation laid by MDEP to promote harmonization in these less objective, non-technical areas.

My purpose today is not to suggest any specific proposals or courses of action, but rather to lay out some challenges and issues that we need to confront. I do think it is clear, however, that maintaining open lines of communication among regulators will become more important than ever. The more we can harmonize our requirements and exchange information, the more we will improve the regulatory process. While there may be different national approaches to nuclear safety and security, each nation must have the capacity to understand and enforce its own standards. This is especially true of new entrants to the field of nuclear power. It is not enough to rely on the design certifications of other regulatory bodies. After all, plant design and construction is only the first step. Regulators must also oversee a plant's safe operation. So there must a

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US Nuclear Power : A Mixed Outlook

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the ASLB.

- Luminant's Comanche Peak 3-4 (US-APWR) FSER is targeted for 12/2011 with an FEIS in 1/2011. 2 contentions have been allowed by the ASLB.
- PPL's Bell Bend (US-EPR) FSER and FEIS are scheduled 3/2012 and 3/2011 respectively. The ASLB denied all contentions 8/2009.
- FPL's Turkey Point 6-7 (AP1000) COLA was submitted on 9/2009.
- UniStar/Amarillo Power's Amarillo 1-2 (US EPR) COLA submission may be delayed until 2010. The NRC web site as of 9/2009 no longer lists this site as an expected COL application.
- AEHI Idaho (Alternate Energy Holdings Inc) is no longer working with UniStar to develop an US EPR. The NRC web site as of 9/2009 no longer lists this site as an expected COL application. The site and reactor model(s) have not been determined.
- Three unannounced sites (Southern Co. & other applicants) previously anticipated new build initiatives and Transition Power Development LLC's Blue Castle project reactor models and sites have not been determined.

Regarding the latest in design certifications, the ABWR (previously certified by GE) will need modifications to employ digital instrumentation and controls. For STP's 3-4, Toshiba will have to get approval for design changes including the hear sink, I&C, and turbogenerator due to the US ABWR is the intellectual property of GE-Hitachi. Toshiba will have to draw from its Asian ABWRs.

GE-Hitachi's ESBWR design was submitted in 2005 and with Revision 6 (8/2009) is expected to address the issues raised by the NRCs RAIs. This is still under review by the NRC.

As can be seen by the examples above, a mixed outlook in the US is emerging regarding new reactor designs. Note, that of the 4 company's with signed EPC agreements, only NRG has gained in stock price (~ $6.00) since the signing, in which some attribute the positive change partially due to the defeated takeover attempt by Exelon. The remaining company's stock (Progress, SANA and Southern) all dropped between $1.5 and $5.77 since the signing.

(Source: ANS Nuclear News, 10/2009)

A Regulator's Perspective on the Globalization of the Nuclear Industry

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certain level of training and skills within each nation's regulatory body. For instance, you are aware that China is building several Westinghouse AP1000 plants. But they are not relying solely on the NRC's certification of those designs. We have provided training and analytical tools to the Chinese regulators regarding our licensing approach, so that they understand the process, and not merely the outcome.

The New Nukes

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Further out, Gen IV reactors, which use different fuels and coolants than Generation II and Generation III reactors, are designed to absorb excess heat better through greater coolant volume, better circulation and bigger containment structures. Advanced research into metal alloys that are resistant to cracking and corrosion should result in more suitable materials being used in plants, too, and giving them longer useful lives. Still, Generation III reactors are incredibly complex systems, requiring the highest-quality materials, monitoring and training of personnel. Critics say it's unrealistic to think they can operate flawlessly. Corrosion of vital equipment remains a potential problem, especially if it goes undetected deep within parts of the reactor that are difficult or impossible to directly inspect.

What's more, none of the Generation III designs have been cleared for construction by the Nuclear Regulatory Commission. Some Generation IV concepts haven't even been presented to the NRC for review, and they still are years away from crossing that threshold. "The designs are safer and the safety culture is better than 20 years ago," says Tom Cochrane, senior scientist with the nuclear-analysis team of the Natural Resources Defense Council, an environmental-advocacy group. But he's still not convinced reactors are safe enough to proceed. Critics remain concerned about possible physical breaches of security in the case of a terrorist attack.

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- Xcel's Monticello EPU Project Support
- Entergy—Nuclear Oversight/Safety Review





Thank You

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- Xcel Energy's Monticello Nuclear Generating Plant
- TVA Nuclear Power Group's Watts Bar, Sequoyah and Browns Ferry Nuclear Plants

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