

Nucleonics Week

Volume 49 / Number 47 / November 20, 2008

US-UAE cooperation pact initialed; approval left to Obama, new Congress

A bilateral nuclear cooperation agreement between the US and the United Arab Emirates, or UAE, was quickly negotiated, initialed by both countries two weeks ago, and is ready to be signed, Middle East diplomatic sources said.

According to sources, the UAE and the US will sign the agreement after President-Elect Barack Obama is inaugurated in January and after the UAE is confident that the US Congress will approve the accord.

The agreement was negotiated after UAE Sheikh Abdulla bin Zayed al Nahyan, and US Secretary of State Condoleezza Rice signed a memorandum of understanding on nuclear cooperation on April 21.

In parallel, the UAE is preparing to launch a nuclear power program, working with a group of international consultants. The UAE is also establishing the Emirates Nuclear Energy Corp., or ENEC. This organization would eventually become the owner of one or more

nuclear power plants set up in the UAE, provided that the UAE government makes a formal decision to implement a nuclear power program, said officials in Abu Dhabi, the UAE capital. Some sources, attending the MENA Nuclear Forum conference in Qatar last week, said that might happen in early 2009.

An ENEC official at that meeting said that the company is still in the process of formation, including the identification of shareholders and defi-

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EDF confirms target of starting up Flamanville-3 in 2012

Electricite de France last week confirmed its target of starting up the Flamanville-3 EPR in 2012, saying it and contractors had taken measures to make up for delays in civil works, including increasing the onsite workforce from 1,200 to 1,500 people.

EDF's November 12 press release confirming the 2012 startup target came after Areva CEO Anne Lauvergeon said in an interview with France Inter

radio the same day that Flamanville-3 would be put into operation in 2013. Her spokesman later said Lauvergeon erred.

After Lauvergeon's remark, French media were quick to see an attempt by the Areva CEO to demonstrate that EDF was having as much trouble building an EPR in France as Areva and Siemens have had in keeping to their contract schedule in Finland.

Finnish utility Teollisuuden Voima Oy last month said it expects the Areva-Siemens consortium to bring the Olkiluoto-3 EPR into commercial operation in 2012, three years after the original contract date of May 2009. Areva and Siemens, building that unit under a turnkey contract, have so far not confirmed that the Finnish project will slip past 2011.

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NEI without succession plan as CEO resigns

Nuclear Energy Institute President and CEO Frank "Skip" Bowman resigned suddenly November 14, without a successor in place, at a crucial juncture in the industry's plans to expand nuclear generating capacity in the US and abroad.

NEI released excerpts of a letter from Bowman to NEI Chairman John Rowe, in which Bowman said he wanted to clear the path for a change in leadership before the new administration and

Congress comes to power. By leaving immediately, he said in the letter, NEI would be able "to take stock of how best to meet the challenging energy and environmental issues that confront us."

But sources said Bowman was ousted after key members on the board of directors met November 13 to discuss the association's future. Over nearly four years that he had been at NEI, there were numerous complaints about

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Bowman's abrasive management style and interactions with NEI staff and members, a longtime industry observer said. After last week's board meeting, Bowman was told his services were no longer needed, and he was escorted out of the building, another source said.

NEI issued a press release to the media November 14 and posted it as the second item of "breaking news" on its home page. The news item was removed this week from the front page, but remained in a less visible place elsewhere on NEI's web site.

Following Bowman's departure, the NEI Executive Committee named as acting head Marvin Fertel, the organization's executive vice president and chief nuclear officer. Bowman's hasty exit and the absence of a managed transition is a marked contrast to previous hand-offs of the chief executive position, said one source. When Bowman joined NEI in January 2005, he worked with then-president Joe Colvin for several weeks during a transition period before taking the helm.

An NEI spokesman said last week that there was not yet a search effort under way to find a permanent replacement for Bowman, who previously was an admiral in the US Navy. Before retiring from the military, Bowman had been director of the Naval Nuclear Propulsion Program, serving as the third successor to Admiral Hyman Rickover, the innovator of the nuclear Navy program.

In the past, NEI's Organization and Compensation Committee has served as the search team for the leadership post. A spokesman said it was likely to take the lead again in finding a replacement.

Bowman's departure came a week after he pledged to work with the incoming administration of President-elect Barack Obama and the new Congress in developing a national energy policy that includes nuclear power and provides energy security while protecting the environment.

"If the United States is going to meet the predicted 25 percent growth in electricity demand by the year 2030, as well as achieve its environmental goals, we must begin that work now," Bowman said in a November 5 statement. "And we must recognize as a nation that we cannot reach our energy goals without the reliable, affordable and carbon-free electricity that nuclear power plants generate to power our homes, businesses, telecommunications, military and transportation infrastructure."

It was the same message that he gave when he first came to NEI. He told industry leaders and regulators at NRC's 2005 annual regulatory conference that the "primary reason I sought this job at NEI is that I firmly believe our energy security is inextricably linked to our country's national security."

Bowman leaves at a critical time for the nuclear industry, which has 17 applications pending before the NRC for

platts *Nucleonics Week*

Volume 49 / Number 47 / November 20, 2008
(ISSN: 0048-105X)

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Nucleonics Week is published 51 times yearly by Platts, a division of The McGraw-Hill Companies, registered office: Two Penn Plaza, 25th Floor, New York, N.Y. 10121-2298.

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licenses to build as many as 26 new reactors. During the election campaign, Obama did not embrace an expansion of nuclear power as enthusiastically as his Republican challenger, Arizona Senator John McCain. But Obama did say the US needs to have nuclear power as part of its energy mix.

An NEI spokesman said Bowman did not say what his plans were after leaving the organization.

—*Jenny Weil, Washington*

Questions linger, but industry sees Obama supporting nuclear power

Despite lingering questions over whether President-elect Barack Obama will be supportive of nuclear power, officials within the industry say they are confident that he will continue the path laid by President George W. Bush's administration.

Frank "Skip" Bowman, president and CEO of the Nuclear Energy Institute until late last week, said earlier this month that the industry will be aided by the new president because he needs nuclear energy to accomplish his climate change goals. Obama has said he wants to reduce CO2 emissions 80% by 2050 from 1990 levels.

"We cannot reach our energy goals without the reliable, affordable and carbon-free electricity that nuclear power plants generate ... Senator Obama recognized this linkage early in his campaign by noting, 'It is unlikely we can meet our aggressive climate goals if we eliminate nuclear power as an option,'" Bowman said in a November 5 statement.

Under the Bush administration's watch, DOE developed a program that offers utilities \$18.5 billion in loan guarantees to build new nuclear power plants.

Also, after 20 years of work, DOE submitted in June its Yucca Mountain license application to the NRC.

Since summer 2007, 17 utilities have submitted construction permit-operating license applications.

In another accomplishment trumpeted by his administration, Bush signed a nuclear deal with India under which the US would ensure fuel supplies to Indian reactors and sell new ones.

In contrast, Obama, during his campaign for the presidency, described himself as "agnostic on nuclear power." He said on numerous occasions that he could support new nuclear plants if spent fuel storage, proliferation and transportation are adequately addressed. He also said he opposes the development of a geologic repository at Yucca Mountain, 90 miles southwest of Las Vegas, and he has voiced concerns about the proliferation risk associated with reprocessing and recycling nuclear fuel.

David Cherry, spokesman for Democratic Representative Shelley Berkley of Nevada, who is a staunch opponent of the Yucca Mountain project, said nuclear energy is not necessary to meet Obama's clean energy goals.

"The industry needs to read the writing on the wall," Cherry said. The "renaissance" will not be fostered by this

Democratic administration, he said.

Cherry said he anticipates the nuclear industry will try to "ride the climate change coattails."

"That is where they will make their case," he said. The industry is in a "defensive," not offensive, position now, Cherry said. Without Bush and his Energy Department, the industry is going to have to come up with ways to justify nuclear energy's existence as part of the energy mix, he said.

In a Stanford Washington Research report, Christine Tezak and K. Whitney Stanco said, "We do not consider Barack Obama to be a strong advocate for nuclear."

They said if a nuclear renaissance did take place, it would be driven by "states instead as part of a diversification effort away from more carbon intensive fuels." One energy consultant involved in projects at DOE said he agrees states would drive a nuclear expansion. Regulated utilities in various states could get plants built and paid for through electricity rate increases, he said.

"In reality, it will be the individual states that will decide whether nuclear power plants will get built," the energy consultant said. "Interest in nuclear comes from [energy market] volatility and recent high prices of natural gas [and] the uncertainty of [future] electricity prices."

Obama has vowed that no spent fuel will go to Nevada, Cherry said. Obama has said there are questions about the geology, saying during his campaign that Yucca Mountain is built on a fault line and asserting it was a project "shoved down the throats" of Nevadans.

Cherry said he expects Obama will either pull the Yucca Mountain license application or deny funding to the program. "Obama could use the budget cycle as a way to chip away at the program," he said. Either way, he will stop Yucca Mountain to "make good on his [campaign] promise that [nuclear] waste will not come to Nevada."

DOE waste program director Edward Sproat said a few weeks ago that the Yucca Mountain program would need \$1.5 billion to \$1.9 billion a year to keep the construction of the disposal facility progressing at a reasonable pace. Congress has typically set the annual waste program funding at less than \$500 million a year.

Sproat, who expects to leave before Obama is inaugurated, appointed Christopher Kouts, a career employee at DOE, to manage the Yucca Mountain program, after his departure.

Sproat said last week that Obama could legally pull the application if he wanted to further thwart the program.

"If that were to happen, it throws into confusion DOE's requirement under the Nuclear Waste Act," to build a nuclear waste repository, to take title to waste at reactor sites and ship that waste to Yucca Mountain, Sproat said.

He has said that if the application were pulled, the new president would have to face 39 states that have spent fuel stored at reactor sites in their states.

Domenici's replacement?

In addition to the uncertainty about how Obama would handle the Yucca Mountain program, the nuclear industry is facing the departure of its congressional champion, Republican Senator Pete Domenici of New Mexico, who

leaves the Senate this year. The senator became one of Washington's leading advocates for programs to reprocess spent nuclear fuel, and secured billions of dollars in federal loan guarantees to help companies build new nuclear power plants.

Reprocessing is a central idea behind the Bush administration's Global Nuclear Energy Partnership or GNEP.

Earlier this year, Domenici introduced a bill that would set up a government corporation to help commercialize low-carbon technologies, including nuclear. No action was taken on the proposal in the Senate, but a group of House Democrats last month offered a similar bill in their chamber.

While some nuclear proponents remain, including Republican Senator George Voinovich of Ohio and Democratic Senator Thomas Carper of Delaware, Cherry said there were very few people on the Senate side that are going to "carry the water" for the industry.

Voinovich has proposed establishing a nuclear fuel management corporation to reprocess spent fuel, which he has said is needed because DOE is years behind schedule in opening Yucca Mountain. A nuclear energy lobbyist said, "GNEP has been so changed and refocused that it is really a question, 'Is the US going to go through reprocessing?'" Obama has said he would consider reprocessing as a way to manage spent fuel.

Most agree the nuclear energy picture will be clearer by December, when Obama will likely select a new energy secretary.—*Dipka Bhambhani, Washington*

Chamber of Commerce wants to see Obama act quickly on energy issues

DOE's loan guarantee program for new reactors should be expanded during the first six months of President-elect Barack Obama's administration, the US Chamber of Commerce said this week as it unveiled what it called its roadmap for securing the country's energy future.

Nuclear power is just one of several energy sources that the chamber says should be moved forward in order for the US to achieve energy independence. The chamber also proposed that a new White House office be created to coordinate energy policy actions among the 13 federal agencies and regulatory commissions, as well as several congressional committees, whose actions affect energy.

The chamber is recommending that the next administration and Congress have several actions under way by mid-2009. "During the first six months of 2009, we propose that our newly elected leaders begin taking steps that will create a 'renaissance' in nuclear power in the United States," General James Jones (retired), president and CEO of the chamber's Institute for 21st Century Energy, said November 17 as he unveiled the proposal. "This should include expanding the loan guarantee program so that it includes building a greater number of nuclear reactors, ensuring adequate funding for the Nuclear Regulatory Commission, and reaching a long-term solution for disposal of our nuclear

waste, which should include domestic recycling."

He said that the \$18.5 billion in loan guarantees now set aside for new reactors "will support, at best, two or three new projects, which is much too small to adequately accelerate a nuclear 'renaissance.'" The chamber also proposed that within six months the administration should increase the amount of federally stockpiled uranium available to nuclear utilities. Within the first two years of the Obama administration, a strategic reserve of low-enriched uranium should be created to guard against any supply disruptions, it said.

On the back end, the chamber recommended a multi-pronged approach to managing commercial spent fuel in the US. It said that within the first 100 days of an Obama presidency, his administration and Congress should set up a program to reprocess and recycle utility spent fuel and establish a corporation to coordinate the federal government's legal responsibility to dispose of utility spent fuel while not subsuming DOE's research and development mission into reprocessing technologies. "This entity should be provided long-term contracting authority and access to monies from the Nuclear Waste Fund," the chamber stated in its transition plan proposal.

Also during the first 100 days, the administration should move to eliminate the existing 70,000 metric ton heavy metal cap on the disposal capacity of a DOE repository planned for Yucca Mountain, Nevada, the chamber said. Under federal law, the cap is to remain in place until a second repository is operating, after which the cap would be eliminated. The chamber also proposed that a radiation health standard be put in place "for a time period that can be reasonably demonstrated through scientific evidence." The US Environmental Protection Agency has finalized a standard that requires that a repository built at Yucca Mountain not exceed the agency's radiation dose limits for 1 million years.

The chamber said that if the administration and Congress cannot commit to building a repository at Yucca Mountain, they owe it to ratepayers to pursue such options as interim storage of utility spent fuel and industrial development of advanced reprocessing/recycling technologies to put the federal government in compliance with US law. Ratepayers have paid more than \$27 billion into the Nuclear Waste Fund.

Under the Nuclear Waste Policy Act of 1982, the federal government was to have begun disposing of utility spent fuel in 1998. DOE failed to meet that date and only submitted a repository license application to NRC this past June.

Energy importance

Creation of the new White House office would emphasize the importance of energy to economic and security considerations, Jones said. That is a perspective often lost among the array of federal agencies and commissions involved in energy policy, he said.

Similar proposals have surfaced in Washington with the presidential election earlier this month. Among the most prominent advocates of such an entity is the Center for American Progress, a liberal think tank headed by John

Podesta, the head of Obama's transition team.

Congress also should establish within a year a Clean Energy Bank, similar to what Republican Senator Pete Domenici of New Mexico proposed earlier, to finance deployment of non-emitting sources of energy, the chamber said.

The chamber's proposal is on the Web at www.energyxxi.org.—*Elaine Hiruo and Bill Loveless, Washington*

Options available to lessen risk of nuclear investing, analysts say

Many variables in the current economic climate make new nuclear power projects relatively risky investments, but options exist to help mitigate that risk, analysts said at a forum earlier this month.

Stephen Maloney, managing consultant at Towers Perrin, outlined some of the many difficulties faced by those attempting to finance construction of new nuclear units. He said in his November 13 presentation at the Carnegie Endowment in Washington, DC that "equity markets are still expensive for the earnings they generate" and "downward pressures continue" on such earnings. This signals "the potential for still lower market caps as utilities continue to deleverage balance sheets," and "lower market [capitalizations] limit a company's ability to invest," Maloney said.

"Long-term debt burdens will be expensive compared to recent history" because "credit markets are placing a high premium on risk" and "even highly rated companies face high capital costs due to expensive capital and expensive risk premiums on that capital," Maloney said. Additionally, "long-term investments with deferred payouts," such as nuclear plants, "are competing for capital with investments with a shorter payout, i.e., less risky investments." He said that on average, an investment with a seven-year payout will be about 2.6 times riskier than a comparable investment with a one-year payout.

Financing a nuclear power plant is "challenging under most circumstances," and construction risk is "demonstrable and known to kill companies," Maloney said. Capital will be at risk for about seven years before any revenue is generated, and "throughout that period of time, the project will be exposed to commodity price risk, vendor credit risk, engineering and construction contract performance risk, sovereign risk, and regulatory risk, he said.

"For the first few years into a project, an overrun trajectory is often hard to distinguish from the trajectory of a plant on schedule," and "should a project overrun, the magnitude of the overrun is often difficult to estimate while construction proceeds and even more difficult to rein in," Maloney said. A project which meets its 7.5-year construction schedule at a sunk cost of \$7.9 billion could cost \$11.8 to \$15 billion if construction overruns to 10-13 years, he said.

Stephen Goldberg of Argonne National Laboratory directed a 2004 study of nuclear power costs conducted by the lab and the University of Chicago (NW, 23 Sept. '04, 13). He agreed with Maloney that, as Goldberg said in his presenta-

tion, "the risk premium paid to bond and equity holders for financing is an important influential factor judging the economic competitiveness of nuclear energy."

Goldberg noted the potential for "significant bottlenecks" such as shortages of engineers and trained crafts workers and limited capacity to manufacture components and large forgings. "Additional plants will require increasing demand on materials that will likely be subject to currency fluctuations and commodity price spikes," he said.

Emphasizing that "the success of early movers will be important indicators to the financial markets," Goldberg said consideration should be given to enhancing such federal support mechanisms as standby risk insurance, federal loan guarantees and production tax credits. Also, "a more robust structure to finance and manage the back-end of the nuclear fuel cycle" is needed, he said.

Some potential alternate funding mechanisms for new power reactor projects, he said, include joint financing with electricity end users and "consideration of more direct financial linkages" between a future carbon policy and expanded nuclear power. Enhanced public-private partnerships, perhaps modeled on the Tennessee Valley Authority, could have a greater impact on project financing than the current federal loan guarantees, Goldberg said.

During the question-and-answer session that followed, Goldberg said the future of US nuclear power "depends a lot on federal policy," citing the issues of loan guarantees, nuclear waste policy, and regulation by the NRC. Such variables will determine how well new plant projects fare "once they get into the [construction] cycle," he said. Maloney noted that some companies are now trading in nuclear options, which allow them to "monetize" some of the risks involved in new nuclear projects.

—*Steven Dolley, Washington*

Legal memo outlines challenges for UK government nuclear policy

UK government policy to promote the construction of new nuclear power plants could face numerous legal challenges and substantial delays, particularly if the government tries to push the project too fast, according to a legal memo prepared at the request of a government department and made public by Greenpeace November 17.

The government aims to get a national policy statement to Parliament as quickly as possible next year, "but it will face further legal challenge, which is capable of knocking back the program by a year or more, if it continues to give the impression that the process is a foregone conclusion," said lawyers at Berwin Leighton Paisner LLP.

The warning came in a 14-page memo to the UK Department for Business, Enterprise and Regulatory Reform, or BERR. Until the October 3 creation of the Department for Energy and Climate Change, BERR was heading up the government's nuclear policy infrastructure work.

Under the national policy statement on nuclear power,

the government would identify specific projects as meeting national requirements. The national policy statement, or NPS, would then be submitted to Parliament for approval. When specific nuclear projects subsequently are presented for local planning consent before the yet-to-be-created Infrastructure Planning Commission, or IPC, major issues would have already been addressed and only specific local issues would remain.

The IPC is being created to handle planning consents for "nationally significant projects," a category that includes nuclear power plants.

The Planning Bill that would create the IPC passed the House of Lords on November 18 "fairly unscathed," according to one industry source, but it will have to go back to the House of Commons for approval of minor amendments.

But the lawyers at Berwin Leighton Paisner told the government that significant potential legal challenges still remain.

The first risk of legal challenge will come with the "justification process," which they called a "pinch point for potential judicial review." The fairness of presentation of the justification process "will no doubt be closely scrutinized by Greenpeace," according to the legal memo.

Under EU law, the use of ionizing radiation must be justified, that is, the project must be assessed to show that its benefits outweigh potential risks to the public.

The justification for a new nuclear construction program was prepared by the Nuclear Industry Association in cooperation with utilities interested in new nuclear plants and submitted to BERR June 4. A government decision document is to be issued "shortly," according to the November legal memo, and a public consultation to begin in January.

Legal challenges could follow next year in connection with the introduction of the strategic siting assessment, or SSA, of new power stations and under the strategic environmental assessment, or SEA.

The SSA and SEA are to feed into the national policy statement to be approved by the secretary of state for energy and submitted to Parliament. The government plans to open a six-week window next year, possibly in early April, for companies to nominate sites for new nuclear power plants for inclusion in the SSA.

The UK Nuclear Decommissioning Authority, which is planning to auction some of its sites for potential new nuclear build, has said it would nominate its sites under the SSA if it has not completed the sale of those sites by the time the government is accepting applications.

'Frustrating period'

The secretary of state for energy will approve sites proposed for the SSA, but the legal memo warned of "a significant danger of legal challenge, particularly if the sites chosen do not align well with the [SSA] criteria," since the secretary of state is "also the promoter of policy."

"However, if the issue is already properly dealt with, it ought to reduce the debate at the planning stage," the memo said.

Similarly, the lawyers warned, the SEA "is capable of

leading to legal challenge if the significant environmental effects are not properly assessed."

The policy statement itself, once approved by the secretary of state and submitted to Parliament, can be challenged within six weeks. The memo notes that BERR has already conducted extensive consultations on specific sites, but added, "There must, however, be a question as to whether this process has reached far enough."

The lawyers also warned that the application process with the IPC for planning permission by prospective reactor builders will be heavily front-loaded. The IPC, by law, must decide cases within restrictive time limits, meaning that applicants will have to do a lot of work before filing an application. "Getting it wrong at this stage will lead to delay at the time and may lead to legal challenge later," the memo said.

"Since there is only six months allocated for the processing of formally submitted applications, and the IPC will be acting transparently, it will be extremely careful, and not permit formal submission of development consent applications until it is certain that it can deal with them in the timescale," the memo said. "This then is likely to be a frustrating period for intending applicants."

The government has been working for several years to lay the groundwork for the construction of new nuclear power plants in the UK. It has already had several setbacks, starting with a 2006 public consultation and energy white paper on new nuclear energy, which was ruled "unlawful" after Greenpeace challenged the consultation in the courts (NW, 18 Oct. '07, 10). The government had to perform a second public consultation and issue a new white paper in 2008.

More recently, a tribunal of the Market Research Society, a board that sets standards for market research, ruled on October 16 that a contract polling agent for the government's second consultation violated the board's code of conduct (NW, 23 Oct., 12). The tribunal, acting again on a Greenpeace complaint, said there were a number of examples where they considered that information was inaccurately or misleadingly presented by the government polling contractor, or was imbalanced, "which gave rise to a material risk of respondents being led towards a particular answer."

The government has stood by its second consultation. The polling agent, Opinion Leader Research, said the Market Research Society was not qualified to judge its unique "deliberative polling" techniques.

But the perception problem could continue to plague the government's efforts going forward with a national policy statement on nuclear power that will identify specific local sites for new nuclear power plants.

The legal advisers warned that it is difficult to validate a policy at the national level "which has direct local implications without consultation, as the [national] government is more exposed in such consultation than are local bodies, and it will always be open to the charge that the consultation is a sham because ministers come to the consultation with minds already made up."

The memo is on the Greenpeace web site at <http://www.greenpeace.org.uk/media/reports/leaked-docu->

ments-legal-advice-government-new-nuclear-power.

—David Stellfox, *Barcelona*

Eskom to build initial reactors, but long-term plan to be curtailed

South African officials said last week that Eskom would have to curtail its long-term nuclear power plant construction program due to funding constraints, but a utility spokesman said Eskom was maintaining its initial reactor construction plans and aimed to choose a winning bidder by year-end.

Eskom had announced plans for 20,000 MW of new nuclear capacity by 2025, half of a generating capacity expansion aimed at catching up with rapidly growing demand that has led to blackouts and brownouts that have crippled mining and other enterprises and hurt the South African economy over the past two years. Eskom said it planned to build the first new reactors by 2017-2018. It invited bids that were received on January 30 of this year from consortia led by Areva and Westinghouse for both the initial "Nuclear 1" program — comprising 3,200 to 3,400 MW — and a larger "Fleet" program.

But Eskom has repeatedly postponed a decision on that bid, and its financial situation worsened in August as its debt was downrated by Moody's Investors Service, just before the international financial crisis that is now translating into economic recession in many countries. Since then, Eskom has gotten approval for rate hikes and has received assurance of a 60 billion rand (US\$5.8 billion) government loan. This week, Eskom signed with the African Development Bank for a US\$500 million loan. It is also talking to the World Bank about further funding. Eskom has estimated it needs ZAR 340 billion to finance the capacity investment program.

Last week, wire services and South African media quoted Tseliso Maqubela, acting deputy director general at the Department of Energy and Minerals, as telling a November 14 energy conference that "all our plans will have to be relooked-at and we will have to come to a happy medium" and "prioritize" the nuclear construction plans.

Maqubela was quoted as saying that South Africa's economy "will not be left unscathed" by the global financial situation and that "the impact is bound to be negative" on the energy sector, as demand for power slows, in particular from the once-booming mining sector.

But he said the government would consult with Eskom and that the utility's board would decide which projects should go forward and when.

Fani Zulu, Eskom spokesman, was quoted as saying Eskom was "still on course" for selecting a supplier for the Nuclear 1 project by the end of December, but he did not confirm the target date for completing the new nuclear units. Areva bid two 1,600-MW EPRs and Westinghouse three 1,134-MW AP1000s.

Maqubela and Zulu could not be reached for comment

by press time.

Both Areva and Westinghouse have invested significantly in the South African nuclear bid, on the back of government policy that aims to turn South Africa into the continent's nuclear powerhouse and an eventual supplier of nuclear goods and services. South Africa also has significant uranium resources and Areva, among other companies, is planning to produce uranium there.

Electricite de France, which is part of the Areva consortium in the Eskom bid, has declared South Africa as one of four countries that it is focusing on as it seeks to become a world nuclear power plant builder and operator. The others are the UK, China, and the US.—*Ann MacLachlan, Paris*

Vermont Yankee renewal request heads toward an NRC decision

An NRC administrative licensing board is expected to rule soon, possibly by the end of next week, on three contentions in a proceeding on Entergy Nuclear Operations' request to renew Vermont Yankee's operating license by an additional 20 years.

Because there was a hearing on the renewal request, the NRC commissioners, rather than the director of the Office of Nuclear Reactor Regulation, will make the final decision on whether to grant or deny a license. A commission decision is expected within about 60 days following the Atomic Safety and Licensing Board's, or ASLB, ruling.

But while the NRC process is drawing to a close, Entergy must still receive the necessary state approvals. It is awaiting a determination on the issuance of a "certificate of public good" by the Vermont Public Service Board, or PSB, and approval from the state legislature to operate beyond the March 21, 2012 expiration of the plant's license. Actions by the state regulators and lawmakers are expected in second-half 2009.

With state regulatory decisions pushed into mid-2009 or beyond, three of Vermont's largest utilities are making contingency plans in case Vermont Yankee is not relicensed. Central Vermont Public Service, Green Mountain Power and Vermont Electric Cooperative issued two requests for proposals, or RFPs, November 14. One request seeks bids from suppliers for up to 100 MW of electricity, which includes up to 40 MW each for CVPS and GMP and 20 MW for VEC, beginning in March 2012. The other request is for an additional 150 MW of generating capacity, with 100 MW allocated for CVPS and 50 MW for GMP, also starting in March 2012.

The companies said in the two RFPs that "the uncertainty around VY's status and its position in our portfolios may be largely resolved as early as May, 2009 by which time the Vermont Legislature's 2009 Session is expected to have ended. However, resolution could possibly be as late as May, 2010 after the expected end of the 2010 Session."

All three utilities say they rely heavily on energy from Canada's Hydro-Quebec and Vermont Yankee and that they are considering diversifying their portfolios with long-term supply contracts. Contracts with these companies end

between 2012 and 2016. Currently, CVPS and GMP purchase nearly 300 MW of capacity from Vermont; VEC says it is a winter peaking utility with customers in 74 towns in northern Vermont.

The second contract for 150 MW of capacity is contingent on Vermont Yankee continuing operations past the original license term. CVPS President Bob Young said in a November 14 statement that his company wants to be prepared "in the event Vermont Yankee is not relicensed, or negotiations fail to produce an acceptable power contract."

The utilities said in a joint statement that they wanted to explore diversifying fuel sources, no matter what the outcome is for Vermont Yankee. They said extra value would be given to non-fossil or renewable supplies.

Relicensing

During a refueling and maintenance outage at Vermont Yankee that ended November 10, Entergy said it inspected the steam dryer, reactor vessel and containment structure and found all were in good condition. In fact, it said, the steam dryer has remained in "very good condition" since the plant completed implementing a 20% uprate in 2006.

Vermont Yankee spokesman Rob Williams said in a November 17 e-mail that crews "added 16 additional cracks to our database, which brings the total in the steam dryer to 63." He said there were 75 cracks noted in 2007 but that the number was lowered following an inspection that used "improved" equipment and engineering re-evaluation.

Williams said that NRC put a condition on its approval for the uprate that Entergy inspect the steam dryer during refueling outages to check for any fatigue-related damage caused by the uprate. "We have not found any such effect on [the] dryer from the uprate," he said.

The 16 cracks identified were due to intergranular stress corrosion cracking, or IGSCC, and not higher operating levels at the plant, he said. "IGSCC occurs in stainless steel in the presence of oxygen and welding-related stresses that are relieved through hairline cracking in the initial period of the plant's operation," Williams said, "so they have likely been present since early in the plant's operating life. The occurrence of this condition is normal and not a concern because it will not propagate in metal beyond metal directly [affected] by welding heat."

Entergy's assessment of the data collected from its aging management program for the steam dryer is one of the contentions being considered by the ASLB. Two other contentions, also submitted by the intervenor New England Coalition, challenge Entergy's program for managing the effects of metal fatigue and the company's plans for monitoring and managing the aging of piping due to flow-accelerated corrosion.

The ASLB's decision was expected to be issued 120 days from July 24, which marked the end of the four-day hearing held in Newfane, Vermont. According to the schedule, a decision would be issued by November 28.

Entergy submitted its renewal application to NRC in January 2006. The staff issued a final supplemental environmental impact statement in August 2007 and the final safety

evaluation report in February 2008.

State regulators

In Vermont, the PSB has scheduled hearings from May 18 to June 3, 2009. A final decision is expected in third-quarter 2009. "We have presented expert testimony on all aspects of the license renewal including economics, decommissioning funding, [and] environmental benefit," Williams said. "Clearly it is in the best interest of the state to continue with Vermont Yankee as part of the energy mix. A stable, in-state source of baseload power is a great asset for the economy."

Jay Thayer, vice president of nuclear operations for Entergy Services Inc., also stressed the importance of the plant to the state's economy in prefiled testimony to the PSB. He said the plant supplies about one-third of the state's electricity and helps the environment because it does not emit greenhouse gases.

The plant employs 620 employees and full-time contractors, plus an additional 600 to 1,200 contractors during refueling outages. Continued operation from 2012 to 2032 is expected to generate more than \$2 billion in additional income for local and state residents and more than \$300 million in state tax revenue, he said.—*Jenny Weil, Washington*

Outages at Hartlepool, Heysham cut half-year output by 9 TWh, BE says

Outages for repairs of boiler closure units at British Energy's Hartlepool and Heysham A-1 reactors have cost BE about 9 terawatt-hours in lost output in the six months ending September 28, the company said in its half-year results statement November 18.

During a conference call, BE Chief Executive Bill Coley said, "There is the opportunity for improved output and performance in the second half of the financial year as we expect to return five reactors to service before the end of December."

Coley said progress had been made at all four reactors at Hartlepool and Heysham A, "with installation of engineering modifications to enable return to service well advanced. Installation of the circumferential bands is complete on the lead unit, Heysham A-1, and 61% complete on Hartlepool-1. We currently plan to return two reactors to service by the end of calendar year 2008 and two in early 2009."

A refueling outage at Dungeness B-2 is ongoing, with return to service expected in December 2008, BE said. Heysham B-1 is in the process of returning to service following its planned statutory outage, according to the results statement.

"Following the return to service in August 2008 of Hinkley Point B-3 and Hunterston B-4 after planned outages, all four reactors at Hinkley Point B and Hunterston B have been operating at around 70% load, as planned," BE said in its statement.

Total output for the period was 22.7 TWh, down 8 TWh during the six months to the end of September 2007. Nuclear output totaled 19.2 TWh, down from 27.8 TWh a year earlier,

and coal output was 3.5 TWh, up from 2.9 TWh a year earlier.

Adjusted net profit (excluding certain items) was 83 million pounds (US\$125 million), down from 288 million pounds for the six months to end-September 2007.

Revenue was down from 1.390 billion pounds to 1.281 billion pounds. Adjusted Ebitda (earnings before interest, taxes, depreciation and amortization) was 257 million pounds, down from 511 million pounds in the comparable period.

Increased operating costs, including higher staff costs and higher coal costs, were partially offset by higher realized power prices, BE said. The realized price was 47.2 pounds/MWh for the period, up 8.8 pounds/MWh from the comparable year-ago period.

“Investment in plant in financial year 2008/09 is expected to be around 305 million pounds,” the company said. “In addition, we expect to incur BCU modification costs of around 125 million pounds.”

As of November 9, BE had fixed-price contracts in place for 47.2 TWh for the financial year 2008/09 at an average price of 46 pounds/MWh, it said, including capped-price contracts at around 34 pounds/MWh.

“In addition, as at November 9 we had fixed-price contracts in place for approximately 35.4 TWh for the financial year 2009/10 at an average price of 44 pounds/MWh, excluding the impact of capped price contracts at around 35 pounds/MWh,” BE said.—*Henry Edwardes-Evans, London*

US-UAE ... *from page 1*

nition of its legal status in the UAE and its nuclear program organization.

Last month, the UAE hired CH2M Hill, or CH2, a US engineering consultant, to act as managing agent for the nuclear program over the next 10 years. Some sources said that CH2 would assist ENEC in its eventual decision to select a prime contractor for setting up and operating power reactors in the UAE. The prime contractor would likely be a consortium that would include a major plant-building firm, responsible for engineering, procurement, and construction; an NSSS vendor; and an experienced foreign nuclear power plant operating company.

Separately, the UAE has also hired Thorium Power, a US-based consultant, as a high-level strategic adviser to the nuclear project (NW, 25 Sept., 6). Thorium Power, sources said, is helping the UAE government set up an organization called the Federal Authority for Nuclear Regulation, or FANR.

Two months ago, the UAE government hired William Travers to head FANR. Travers is a 30-year veteran of US NRC, last serving as Regional Administrator for Region II in Atlanta, Georgia. In 2007 Travers had been hired as an adviser to the IAEA Department of Nuclear Safety and Security.

In a prepared statement released last month, the UAE government said that, through the adoption of six policies and actions — committing the UAE to “highest standards” of nonproliferation, transparency, operation, safety, and

security — the UAE “hopes to establish a new model through which non-nuclear states may explore and potentially deploy nuclear energy with the full support and confidence of the international community.”

In advance of any decision to deploy nuclear reactors, the UAE has said it would not develop any uranium enrichment or reprocessing capability.

The path to be embarked upon by the UAE, observers said, would considerably depart from that followed heretofore by other newcomer nuclear states to import turnkey reactors and would also differ from the generic road map recommended by the IAEA.

The IAEA, which since 2006 has been solicited by numerous countries to help them set up nuclear power programs, has advised newcomers to establish an organization it calls a Nuclear Energy Program Implementing Organization, or Nepio. After a number of years, under the IAEA model, the Nepio would be superseded by an independent regulatory organization.

However, the UAE is beginning immediately by setting up an independent regulatory authority, FANR, headed by Travers. ENEC, set up in parallel, some observers said, would function in effect as the Nepio for the UAE. It, together with government agencies, will draw on expertise provided by CH2 and Thorium Power to set standards for nuclear power excellence and manage the nuclear program. Unlike in the IAEA model, however, sources said, ENEC will not be superseded by another UAE organization but would continue indefinitely to own the nuclear power generating assets. From the outset, officials said, ENEC and FANR will be completely separate from each other.

Working with its consultants, this year UAE set up a road map with milestones for establishing a nuclear power program. Last month, UAE officials said that they aimed to have ENEC limit the technology choice for LWRs in 2009 and be prepared to select a reactor technology and sign contracts with the prime contractor before 2011 (NW, 9 Oct., 2).

On the basis of its hired expertise from independent consultants, which may eventually involve several hundred foreign staff working in Abu Dhabi, some sources said, the UAE may be able to avoid excessive reliance on any individual vendor seeking to market turnkey power reactors to newcomer countries.

Two weeks ago, the US and UAE completed negotiation of the nuclear cooperation agreement and initialed it.

Some sources last week said that the agreement might be signed during a visit to Washington by UAE leaders on November 16-17. The agreement was not signed; the two countries issued a joint statement which cited the MOU and their “pursuit” of a nuclear cooperation agreement.

According to a former US official, the UAE was unsure of the political support for the agreement in the US Congress and the Obama administration, which will take office in January. The UAE decided it would wait for the signing until the new administration is in power, he said.

Once the agreement is signed, it must be reviewed by Congress. If the agreement meets the requirements of the US Atomic Energy Act, it would not require a vote of approval.

Such an agreement could enter into force after lying before Congress for 90 days of so-called "continuous session."

In 2006, a deal in which Dubai Ports World, the port authority for the Emirate of Dubai, one of the UAE emirates, was to purchase operations of six US ports, ran into difficulty in the US Congress (2 March '06, 1). According to sources close to the current negotiations, the UAE government was stung by criticism of the Dubai Ports deal and concluded that it made mistakes in lining up congressional support for it.

There is no relationship between issues involved in the port operations deal and the UAE's plan for nuclear cooperation with the US. But sources said that the 2006 affair has prompted the UAE to carefully heed congressional opinion and it will therefore not sign the cooperation agreement until it is confident that US lawmakers will support it.

Beginning in the late 1990s, the US government learned that Abdul Qadeer Khan, in charge of Pakistan's uranium enrichment program, was meeting in Dubai with individuals later identified as members of a clandestine centrifuge procurement effort. When in 2003 the procurement ring was exposed, US officials said then that lax export control and customs procedures in the UAE had permitted Khan, the computer vendor Buhary Syed Abu Tahir, and others to operate with impunity in Dubai, and to ship and transship materials and equipment from there that were used to make enrichment plant parts in Malaysia and South Africa.

Since 2003, however, the UAE has joined US-sponsored initiatives to halt clandestine nuclear trade and shut down black market nuclear business activities. According to the UAE statement last month, the UAE is a partner in the Global Initiative to Combat Nuclear Terrorism, the US DOE Megaports Initiative, the US Proliferation Security Initiative, and the US Container Security Initiative.

Ports operated by Dubai Ports World participate in the Security Freight Initiative, a US Department of Homeland Security pilot program to test the methods used to screen US-bound cargo for radiation. Dubai Ports World has also been certified in the US Customs-Trade Partnership Against Terrorism, a government-business cargo security initiative, according to the UAE statement.

The State Department, it said, is also "helping the UAE improve its enforcement and licensing capabilities aimed at curbing the transshipment of illicit materials." Control over transshipments, according to US and UK officials in 2004, was revealed by the Khan network's activities in Dubai to be a serious loophole.—*Mark Hibbs, Doha, Qatar and Bonn; Daniel Horner, Washington*

Flamanville-3 ... *from page 1*

French media have made much of what they see as rivalry between Areva and EDF over who can finish its EPR first. EDF has historically done the architect-engineering and project management on its own nuclear power plants, while Areva and its predecessor Framatome have acted as nuclear steam supply system suppliers in France, and Areva has not previously tackled a turnkey power plant contract for a first-of-a-kind

unit. Siemens did supply turnkey nuclear units when it was an independent nuclear and turbine island supplier, before its nuclear business merger with Framatome in 2001.

EDF is not involved in the Olkiluoto-3 project beyond a minor engineering role through Sofinel, a joint venture with Areva.

The sparring over EPR schedules comes against a backdrop of corporate and personal conflict, in what some see as attempts by proponents of an Areva-Alstom merger to discredit Lauvergeon's management and strategy. Construction giant Bouygues is Alstom's largest shareholder, and Alstom chairman/CEO Patrick Kron has made no secret of his desire to take charge of a merged Alstom-Areva with Lauvergeon out of the way. Bouygues is involved in both Olkiluoto-3 and Flamanville-3 civil works.

The French government has been considering Areva's future ownership for more than a year, but Kron said recently that there had been no movement on that issue in recent months.

'Mistake'

On November 17, Areva chief spokesman Jacques-Emmanuel Saulnier said that Lauvergeon had "made a mistake" in citing the 2013 date for the Flamanville-3 startup instead of 2012.

He said that the two EPR projects, Flamanville and Olkiluoto, are "not in the same circumstances," but that in any case "Areva is not so stupid as to get into a race" to complete the Finnish EPR before EDF completes the French one.

"People have to stop looking at their watches" when it comes to building the first-of-a-kind reactors, he said, saying Areva's absolute priority is to build Olkiluoto-3 so that it is safe and robust enough to operate for more than 60 years without unexpected major maintenance.

Schedule

Speaking about the contract term of 48 months that Areva agreed to in signing with TVO in December 2003, Saulnier said Areva was obliged to accept that schedule because all its competitors had accepted it. Areva was competing with General Electric and with Atomstroyexport in the TVO tender.

Saulnier said that any supplier would have faced the same problems Areva has had on the Olkiluoto project and no one would have been able to build the plant in four years. Areva has faced several problems with concrete works, problems with containment liner welds, and component fabrication quality issues, but the Franco-German company has said the biggest problem has been TVO's inability to validate technical documentation within seven weeks, as was stipulated in the contract. Instead, Areva said TVO has taken an average of nine months to validate the documentation. Areva and Siemens have begun a first arbitration procedure against TVO to determine financial responsibility for the results of the delay.

In another French radio interview, Lauvergeon said that the Olkiluoto-3 project will be completed within six or 6.5 years from first nuclear island concrete, a schedule she said "isn't bad" for a first-of-a-kind plant and is equivalent to the

average of nuclear plant construction leadtimes for EDF's existing PWR fleet.

Asked whether Areva now has a better idea of how long it will take to build an EPR, Saulnier said that Areva will soon have experience from three EPR projects, at Flamanville, Olkiluoto, and Taishan in China. The lead time "will depend" on the circumstances of each project, notably how the utility customer and the local regulator perform, he said.

But "it will certainly take between five and six years," he said.

Westinghouse has announced a 36-month schedule from first nuclear concrete to startup for its AP1000, the first unit of which is just getting under way in China.

EDF from the outset targeted a lead time of 54 months for the Flamanville EPR, with officials saying that was an ambitious schedule.

French industry sources said EDF was maintaining ambiguity over what it means by "startup" in 2012.

Areva/Siemens' contract with TVO specifically targets commercial operation as the end of the suppliers' responsibility, because it's a turnkey contract. But a nuclear plant traditionally begins producing electricity well before it is declared in commercial operation. The period between first grid synchronization and commercial operation can be as short as two months or much longer, as was the case for the FOAK N4 units EDF built with Framatome at Chooz-B.

An EDF source said further that if the startup of Flamanville-3 is expected at the end of 2012, that means it could also slip into early 2013.

EDF is planning to invite financial analysts to a presentation in London in the first week of December for a comprehensive briefing on nuclear power plant construction worldwide, including anticipated costs and schedules, a utility spokesman said.

Meanwhile, EDF said that given difficulties encountered in excavating the land-based shaft for Flamanville-3's cooling water discharge structure with dynamite, it had decided early this month to use a tunnel boring machine to drill the main outlet shaft in order to complete the job in keeping with the original schedule.

Flamanville-3 construction manager Philippe Leigne told Agence France Presse that EDF would pay the extra cost of the tunnel boring machine compared to the original Eur 47-million contract with Vinci.

In a progress report on Flamanville-3 dated October 24, EDF said the metallic containment liner was being assembled and that safety system piping was being installed in the reactor building. Steel rebar stirrups were being installed for the turbine building basemat, in preparation for concrete pouring that is expected to begin in four months.

Drilling of the sea-based shaft for the cooling water discharge channel was completed September 11 and the metallic liner, 62 meters long (about 230 feet long) and 6 meters (about 19.7 feet) in diameter, was installed as of September 20. EDF said that job, which is under the responsibility of Vinci, was a world first for such a large-diameter shaft.

EDF said all the underground galleries between the buildings of the future power plant were finished, except for the

final connections to the buildings. It said that work will be done when the buildings are completed.

In addition to 1,200 contractor personnel, there are 60 EDF personnel onsite now, EDF said. The contractor workforce will be increased to 1,500 by year-end. It noted that it had taken measures both internally and with its contractors to strengthen quality control and oversight of the whole project.—*Ann MacLachlan, Paris*

TVO CEO sees improved workflow, potential for problems at Olkiluoto-3

Work on Olkiluoto-3 is going more smoothly since announcement of the latest delays in the project last month, new TVO CEO Jarmo Tanhua said in an interview November 12.

"Things are going better now," Tanhua said. "Work is starting on erection of the turbine hall, and erection and installation is where the supplier has the most experience."

Despite the improvement, however, he added that "I'm quite sure there will be problems in the future. There always are in a big project."

Areva and Siemens are supplying the 1,600-MW EPR to Teollisuuden Voima Oy, or TVO, under a fixed-price turnkey contract. On October 17, TVO said startup of the unit is about three years behind schedule. The reactor was originally supposed to be online in May 2009, but the project has been dogged by problems.

Tanhua noted that because the Finnish EPR is the first of a kind, "the consortium hasn't had experience with this particular unit."

The latest problem to be revealed concerns welding on the containment liner that was not done according to specifications (NW, 30 Oct., 3).

Areva and TVO are involved in arbitration proceedings in the Arbitration Institute of the Stockholm Chamber of Commerce over what Tanhua described as "a technical issue," but he declined to elaborate. "It's been solved, but it's a question of who's going to pay," he said.

TVO is a cooperative that produces power for its shareholders at cost. Finnish utility Fortum is TVO's second-largest shareholder.

In a November 11 interview, Fortum CEO Mikael Lilius said, "We've all learned a lesson" from the Olkiluoto-3 delays. "A very expensive lesson."

He added that some of the delays are "because the Finnish authorities are very strict about what can and cannot be done. But it's less about TVO [causing delays] than the supplier who is not delivering on time."

Areva spokesman Jacques-Emmanuel Saulnier said November 17 that, in its contract with the Areva-Siemens consortium, TVO committed to get design and project documentation validated much sooner than has proved to be the case. TVO, as the go-between with the licensing authorities, was taking "an unbelievably long time" to return the documentation to Areva, several times longer than it had com-

mitted to, he said.

Saulnier also said Areva had proposed to do the construction work seven days a week, instead of six days as is now the case, but TVO had refused.

Saulnier said Areva's priority was not to "race" to finish the nuclear plant, but to build it in such a way that it will operate safely and without need for expensive repair outages for 60 or more years.

Lilius would not say what the delay is costing Fortum or whether the project's problems mean Areva and Siemens are out of the running to build another reactor in Finland.

TVO has included the EPR in a short list of potential designs for another Olkiluoto unit. Fortum is also considering building a new reactor, but the EPR is not on its short list.

One source at the Finnish Radiation & Nuclear Safety Authority suggested that if TVO chooses Areva and Siemens to build another EPR, it would help solve some of the problems with cost overruns at Olkiluoto-3 and who will pay for them. TVO could sign a contract with Areva and Siemens for a new reactor at a lower price to compensate for the cost overruns for Olkiluoto-3, the source said.

In a separate interview, Johnny Aakerholm, president of the Nordic Investment Bank, said the delays "of course will add to the cost [of Olkiluoto-3]. But the main thing is that the reactor is safe."

The bank provided a Eur 70 million (US\$88.5 million) loan to TVO in December 2005 for the reactor project.

—Ariane Sains, Helsinki; Ann MacLachlan, Paris

Fortum would take share in new Olkiluoto unit, CEO says

Fortum will participate in a new Olkiluoto reactor project if it goes ahead, even if the Finnish utility decides to build a nuclear unit of its own at a different site, CEO Mikael Lilius said in an interview November 11.

If Teollisuuden Voima Oy, or TVO, intends to build another Olkiluoto reactor, Fortum "would be there," Lilius said.

Fortum is a shareholder in TVO, with a 26.6% stake in Olkiluoto-1 and -2 and a 25% stake in Olkiluoto-3, which is under construction.

The third unit, a 1,600-MW EPR being supplied by Areva and Siemens, is about three years behind schedule. Lilius said he is "worried about the delay."

Lilius would not comment on what stake Fortum might take in a new Olkiluoto reactor.

Fortum management still has not applied to the government for a decision in principle on a new nuclear unit at Loviisa. But sources in the Ministry of Employment and the Economy, which handles nuclear issues, said they expect applications from both Fortum and Fennovoima within three months.

Under the Finnish system, the first step in building a new reactor is to ask the government for a decision in principle. If the government makes a positive decision, the application is sent to the Eduskunta (Parliament), which

makes a final decision. It is then up to the government to issue a construction license.

Lilius said Fortum would not become a shareholder in Fennovoima. Like TVO, the latter is a cooperative that plans to produce power for its shareholders at cost. But Fennovoima's single largest shareholder is E.On, and Lilius said "I don't think the competition authorities would be too happy to see us in a consortium with E.On."

For Loviisa, Fortum is considering a reactor that would produce both power and district heating for the Helsinki area, which is about 87 kilometers (about 54 miles) away.

"That would be very revolutionary, but it's do-able," Lilius said, provided that Helsinki utility Helsingin Energia allowed Fortum to use its heat distribution network. Several sources have said building a new network would be prohibitively expensive.

Fennovoima is also considering a combined-heat-and-power, or CHP, nuclear unit, which sources said would be more energy-efficient than a reactor that produces only electricity. A CHP reactor could be more acceptable to government and parliamentary politicians who are doubtful about more nuclear power or who want nuclear construction limited to only one new reactor, the sources said.

Although the Finnish government endorsed new nuclear power in its energy strategy released November 6 (NW, 13 Nov. 1), it is deeply divided over how many reactors should be built. But the strategy strongly emphasizes energy conservation and efficiency.

Lilius said nuclear power is "not the perfect solution" to cut carbon dioxide emissions, "but it is a good long-term interim solution."

He added there is no way to avoid construction of new fossil-fuel plants, especially in countries such as Russia that have large oil and gas reserves. Fortum owns Russian Territorial Generating Co. Number 10, which has about 3,000 MW of installed fossil-fired power. Fortum plans to increase that to 5,300 MW by 2013.

Lilius acknowledged that the acquisition significantly increases Fortum's CO₂ emissions, although he would not say by how much. He said that Fortum will announce in January its targets for CO₂ emissions reduction at its Russian plants.

Assuming a CO₂ cost of Eur 30 (US\$37.80) per metric ton in Western Europe, power from a new fossil-fired plant would have to be sold at a minimum of Eur 60 per megawatt-hour in order to justify building that plant, Lilius said. As a result, "emission costs make nuclear very competitive," he said.

Lilius noted that no more large hydropower capacity can be built in Finland and that wind can't meet baseload power needs in Europe. "Those countries that are talking about decommissioning their nuclear power plants at the end of the day cannot do it," he said.

He said that for now, Fortum has no plans to get involved with nuclear projects being considered in the Baltic countries.

"For the time being, we are interested only in Finland and in upgrading our Swedish acquisitions," he said. Fortum owns stakes in the Oskarshamn and Fortum plants, most of whose units are being modernized and updated.

—Ariane Sains, Helsinki

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