

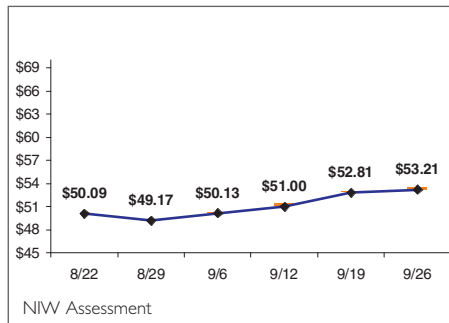
# NUCLEAR INTELLIGENCE WEEKLY

Incorporating Uranium Intelligence Weekly

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Vol. V, No. 39, September 26, 2011

## UPP: \$53.21/lb U3O8



## Market Points

The U3O8 spot price rose to \$53.21/lb, its highest price point in 10 weeks.

The Ukrainian government wants to allocate \$62.4 million to increasing uranium output by 23% in 2012, to 1,100 metric tons.

Producers and buyers say that uncertainty surrounding Usec is having a negative impact on both uranium and enrichment markets.

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## WEEKLY ROUNDUP

### German Electricity Imports Rise

- Germany's electricity imports have risen considerably in the wake of the government's post-Fukushima decision to shut down the country's seven oldest reactors, but the longer-term impact of the country's nuclear phaseout is more difficult to assess (p3). German companies, including utilities RWE and E.On, are likely to leave the field after Siemens announced its withdrawal (p5).
- French utility GDF Suez and Spain's Iberdrola will split a 25% stake to increase their shares in UK-based NuGen after Scottish and Southern Energy, owner of that stake, said it was pulling out. NuGen has plans for building up to 3.6 GW of nuclear capacity at Sellafield in northern England (p6).
- The International Atomic Energy Agency (IAEA) has set up a Nuclear Safety Action Team to oversee implementation of an agency nuclear safety action plan endorsed last week by the General Conference. "This team will oversee prompt implementation of the Action Plan and ensure proper coordination among all stakeholders," IAEA Director General Yukiya Amano told the Board of Governors at a one-day session Monday, Sep. 26. The safety plan calls for a number of steps already being undertaken by many member states, including emergency preparedness reviews. It also calls for IAEA peer reviews and greater transparency. Additionally, Amano said the agency was preparing to dispatch a mission to Japan (at Tokyo's request) to assist in the remediation of large areas contaminated as a result of Fukushima.
- India's government is facing a number of formidable obstacles to its nuclear expansion — including protests, liability issues and safety reviews — but will likely forge ahead anyway (p6).
- Westinghouse moved one step closer to US Nuclear Regulatory Commission (NRC) design certification for its AP1000 with the Advisory Committee on Reactor Safeguards (ACRS) agreeing with the staff's conclusion that a "revised design can be built and operated without undue risk to the health and safety of the public," according to a Westinghouse statement Monday, Sep. 26. That includes a controversial shield building designed to protect the reactor vessel from an aircraft crash. The ACRS, whose members are appointed by the commissioners, reports directly to them. Meanwhile, a probe continues into the likely cause of the North Anna shutdown during the Aug. 23 earthquake on the US East Coast, although the NRC says it's likely to be "weeks not months" before Dominion Virginia Power will be allowed to restart the two reactors (p7).
- Just days from another deadline for a \$2 billion government loan guarantee, Usec continues to struggle over plans for its American Centrifuge Plant. But the political climate surrounding the talks has gone from bleak to downright dismal with the bankruptcy of solar panel manufacturer Solyndra (p8).
- Rossing workers walked off the job again as Rio Tinto defended its policy of awarding more bonuses to management (p9). ☼

## MARKET

### U3O8 Price Continues to Strengthen

The U3O8 spot price continued its crawl back into the mid-\$50 range this week with a spot price of \$53.21 per pound U3O8, its highest valuation by the Uranium Price Panel (UPP) in 10 weeks — and a 21¢ increase from last week’s price of \$52.81.

“As it nears \$50 the demand materializes and at \$55 it goes away,” a seller said. “The price bounces around and then it’s falling at the end of the week. ... The market has hit equilibrium for the time being.” Until “something big happens,” the status quo is \$50-\$55, the seller declared.

No one is in a hurry right now, added a buyer, who said he hadn’t heard of any trades in the past week. “In all likelihood customers are looking for material for next year,” he said. “They’ll wait for producers to soften the price a little and then they’ll go.”

There are always sellers trying to increase the spot price at the end of the month as long-term contracts with payments tied to the spot price come due, a buyer said, speculating on the recent price increases. If that’s true they haven’t been successful until recently. A quick look at past UPP results shows that the price has actually dropped the last week of each of the past five months. Still, “they shouldn’t try to game the market like that,” the buyer said.

#### Ukraine Gearing Up U3O8 Output

The Ukrainian government wants to allocate \$62.4 million to a state program to increase U3O8 output by 23% in 2012, according to Ukrainian news agency UNIAN. The country’s expected output for 2011 is 892 metric tons and officials want to increase that to 1,100 tons.

“The corresponding forecast is contained in the government draft law ‘State program for the economic and social

development of Ukraine in 2012,’ which has been adopted in first reading and posted on the parliament website,” according to UNIAN.

Ukraine’s only mining enterprise, the state-run Eastern Ore-Dressing Combine, produced 848 tons U3O8 in 2010, about 34% of the 2,480 tons consumed by the country’s nuclear power plants each year.

Urenco has been on the market attempting to sell spot UF6, something that happens often this time of year, market participants said. “It’s definitely not uncommon,” a seller said. It’s excess material and the amount they sell depends on how customer orders come in a given year. “It’s a common feature on the market,” he said.

Meanwhile, Usec continues to cast a long shadow over the market with its efforts to market secondary uranium. The more desperate its situation gets, the more Usec relies on government lobbying and influence, a producer said (p8).

“They’re like a dying animal. As they flounder around as they’re dying they have the potential to hurt people,” he said. “I think many of us wish Usec would either just succeed in producing its own enrichment services or go away, but this reliance on corporate welfare gets tiring.”

A buyer agreed that Usec’s current predicament wasn’t good for the enrichment market either with uncertainty over the future of American Centrifuge Plant and the existing gaseous diffusion plant at Paducah, Kentucky. “It would be nice to see them help stabilize the enrichment market, but we’ll see,” he said.

“They seem weak but they have good lobbyists,” a second buyer said of their chances of getting a loan guarantee or at the very least some sort of stable business model. “They’ve pulled rabbits out of their hats before.” ☼

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## URANIUM PRICE PANEL

For the week ended September 23, 2011

### Weekly Spot Market Prices

|                    | Change | Sep.  |       |       |       |       | Aug.  |       |       |       |       | Jul.  |       |       |  |
|--------------------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--|
|                    |        | 26    | 19    | 12    | 6     | 29    | 22    | 15    | 8     | 1     | 25    | 18    | 11    | 4     |  |
| Price (\$/lb U3O8) | 0.40   | 53.21 | 52.81 | 51.00 | 50.13 | 49.17 | 50.09 | 50.19 | 51.42 | 51.59 | 51.83 | 53.30 | 53.75 | 52.00 |  |
| Total Assessments  | 3.00   | 14.00 | 11.00 | 13.00 | 9.00  | 9.00  | 12.00 | 11.00 | 12.00 | 12.00 | 12.00 | 14.00 | 12.00 | 11.00 |  |
| % within 1 StDev   | 20.13  | 92.86 | 72.73 | 53.85 | 55.56 | 88.89 | 91.67 | 90.91 | 91.67 | 83.33 | 91.67 | 92.86 | 83.33 | 90.91 |  |
| Low (\$/lb U3O8)   | 0.75   | 52.75 | 52.00 | 50.50 | 50.00 | 49.00 | 49.75 | 49.75 | 51.00 | 51.00 | 51.50 | 53.00 | 53.00 | 52.00 |  |
| High (\$/lb U3O8)  | 0.50   | 54.00 | 53.50 | 52.50 | 50.50 | 49.50 | 50.50 | 50.75 | 52.00 | 52.75 | 52.50 | 54.00 | 54.00 | 52.00 |  |
| Variability*       | 0.25   | 0.38  | 0.13  | 0.50  | 0.13  | 0.10  | 0.00  | 0.00  | 0.00  | 0.16  | 0.00  | 0.10  | 0.00  | 0.25  |  |

The Uranium Price Panel (UPP) represents the average price assessment reported by active spot market participants for a transaction of 100,000 lbs of U3O8 by book transfer on the date given. In the UPP, participants are assigned a market position of seller, buyer or intermediate. Each week Energy Intelligence eliminates assessments that are statistical outliers, and double-checks the market position of intermediates. It then uses random elimination to maintain an equal number of buyer and seller assessments in the final average. “Variability” represents the absolute range of conceivable final averages resulting from this random elimination. “High” and “Low” assessments represent the extremes of the non-eliminated market assessments. For a detailed explanation of the price panel methodology, see [www.energyintel.com](http://www.energyintel.com).

## GERMANY

### The Impact of an Early Phaseout

Half a year since Germany halted the operation of its seven oldest reactors in the wake of the Fukushima crisis, the country's net electricity imports have risen considerably. However, the mid- and long-term impact of the shutdowns, or the government policy shift at the end of May that made them permanent and reintroduced a nuclear phaseout over the next decade, is not yet clear (NIW May31'11).

But data from Germany's Federal Office of Statistics reveal that a significant increase in German electricity imports occurred almost immediately after Chancellor Angela Merkel's government shut — at the time temporarily — seven reactors, for a total of 7 gigawatts of capacity. Although Germany has historically been a small net importer of power in the summer, and a net exporter the rest of the year, the reactors' closures accelerated the seasonal trend. By April, falling exports and rising imports were nearly in balance, and by May Germany was a significant net importer — at least a month earlier than in 2010.

The rise in imports was hardly a surprise, and is factoring positively into newbuild decisions (for both nuclear and other power generation) in neighboring countries - particularly the Czech Republic and Poland. "From a financial point of view, definitely I believe the German decision will drive up prices and increase the viability of any energy project, nuclear or not nuclear," Anders Jackson, who heads Westinghouse's efforts in Europe, the Middle East and Africa, told NIW in June (NIW Jun.27'11). "The Nordic region will go up, and Czech Republic prices will be affected. The German decision will have a positive effect."

The Czech Republic is already one of the largest electricity suppliers to Germany, year-round — with much potentially coming from the country's two 963 megawatt VVERs at Temelin, close to the German border. But the largest supplier is France, which saw its net exports to Germany soar to 2.3 terrawatt hours in July — up 17% over the same month a year earlier.

Although the increased exports to Germany may put more money into EDF's coffers, the French government remains less than thrilled about the German nuclear phaseout. Part of this may be due to the influence the German political decision has had within France, where the nuclear debate has become a national issue since the Fukushima crisis began (NIW Jun.20'11). Soon after Merkel announced her policy U-turn in May, the German and French energy ministers agreed to request a meeting of Europe's energy ministers to discuss the impact of national policy shifts.

"While recalling the sovereign right of each member state to define its energy mix," read a statement last week from Eric Besson, French minister of industry, energy and the digital economy, "the minister stressed the impact of EU national decisions in a

single market of electricity: price competitiveness, balance of networks, infrastructure investment, security of supply, and Europe's ability to stay the strategic course for a low-carbon economy."

At stake, of course, is how exactly Europe should meet its green energy goals. Advocates of nuclear power contend that it is impossible to achieve major carbon-reduction goals without nuclear power. "Additional production in fossil power plants and new build of coal and gas fired power plants will jeopardize Germany's targets for CO2 reductions," Ralf Guldner, president of the German Atomic Forum, said in a presentation to the World Nuclear Association's annual symposium earlier this month.

But if Germany succeeds in its stated goal of raising the percentage of renewables in electricity production from 17% in 2010 to 35% in 2020 — while at the same time scaling nuclear back from 23% in 2010 to zero by the end of 2022 — then nuclear starts to look much less essential.

#### Mid-term Impact Still Debated

"The question whether the climate problem is bigger or smaller than the problems caused by nuclear accidents is one that gets different answers from different people," stated Germany's government-

commissioned report released by the Ethics Commission on a Safe Energy Supply on May 30, "but basically there is no sensible basis on which the two can be compared ... The climate targets for the period during which nuclear power will be phased out have already been established. There is no clear evidence for the conjecture that these goals would be compromised by phasing out nuclear power."

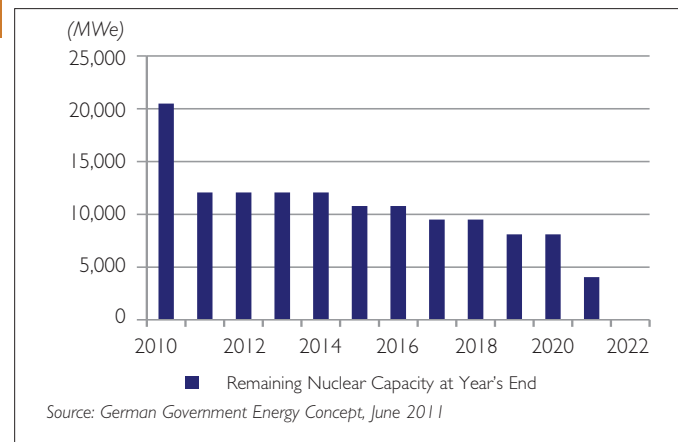
A number of separate studies reached a similar conclusion, including a paper from Greenpeace issued at the time of Merkel's May 30 decision, contending that the German

government could phase out its nuclear fleet by 2015 without impacting German supply security — and potentially without any short-term increase in the country's CO2 emissions.

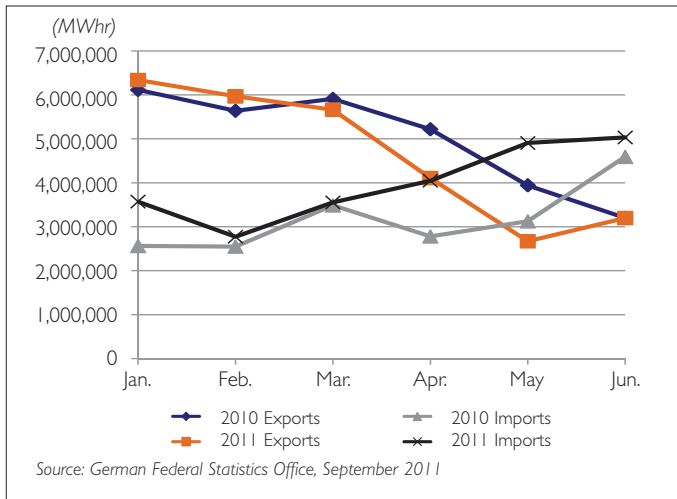
There's similarly little evidence, however, that the carbon emissions goals won't be compromised. A recent and less biased study from the Institute of Energy Economics at the University of Cologne (EWI) compared the government's May 30 plan (referred to in the study as scenario B) with the previously announced energy plan (scenario A) that had extended German reactor lifetimes (NIW Sep.7'10). "Because of the accelerated shutdown of nuclear plants in scenario B," reads the study, whose forecast appears to extend to 2030, "total CO2 emissions in scenario B are higher than in scenario A."

Using various economic simulations to predict the feedback mechanisms Berlin's decision will have on energy and industrial sectors, the EWI's authors posit that the current government plan will over the next decade result in extended lives for 5.4

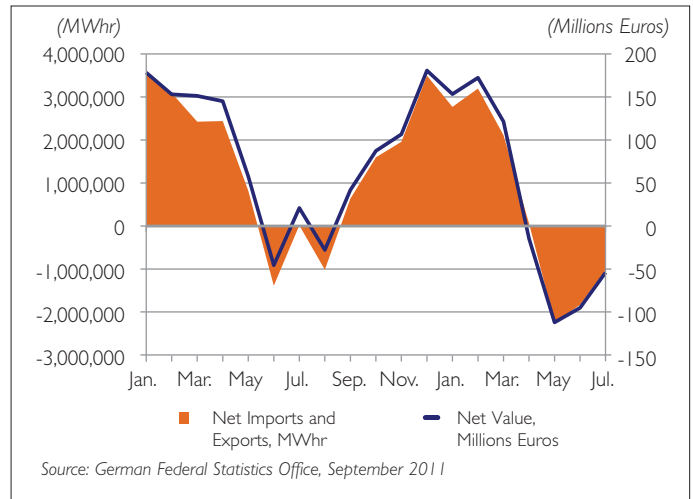
#### Planned German Nuclear Capacity, According to Current Law



## German Electricity Imports and Exports in HI 2010 and HI 2011



## Net German Electricity Exports, 2010 and HI 2011



GW of old coal-fired plants and new gas-fired power generation to come on faster. However, Germany's energy mix in both scenarios looks relatively similar by 2025 and 2030, according to the study, with the exception of extra capacity from natural gas-fired plants replacing nuclear power under the government's current plan.

The EWI report also predicts that by 2020, under the current plan, Germany will become a net electricity importer, "mainly caused by a reduction of power exports from Germany to the Netherlands, Poland and Switzerland while imports increase by 2.7 TWh." Most of these imports, concludes the study, will be provided by French and Czech generators — as is the case currently. Longer-term EWI predicts that current government policies will result in additional imports coming from Poland and the Netherlands. In the case of Poland, at least, this could mean the import of power generated by either coal or nuclear plants (assuming reactors are actually built in Poland) — a key prediction of nuclear advocates.

Those advocates could also be correct that the German policy shift could result in higher CO2 emissions in the mid-term. Even Greenpeace concedes that CO2 emissions could increase

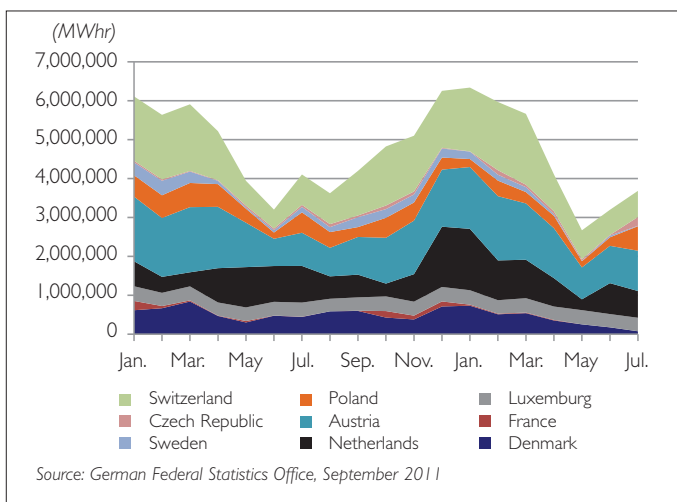
"in the short term" although adding that this "does not necessarily have to be true."

Greenpeace envisions renewable sources coming online at a slightly faster pace and in larger scale than EWI's researchers: an additional 30 GW of solar energy and 20 GW of wind power by 2020, compared to EWI's 27 GW of solar and 19 GW of wind by 2030. Much depends on how fast massive government subsidies for renewables called for under the plan can translate into online capacity. That plan also calls for a 10% reduction in total electricity consumption by 2020 — something the EWI researchers don't contest in their forecast.

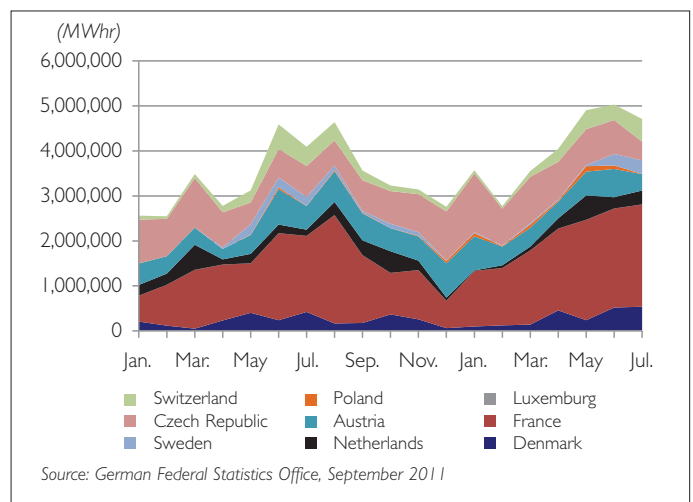
Indeed, while the dramatically worsening economic picture out of Europe could potentially have a negative impact on investment in new generation capacity — the government last week pleaded for German banks to fund offshore wind farms, with one economy ministry official telling a conference that the "restraint of German banks is a growing problem," according to Bloomberg — a dampening economy could also help Germany reduce its total electricity demand. ☼

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## German Electricity Exports by Country, 2010 and HI 2011



## German Electricity Imports by Country, 2010 and HI 2011



## German Utilities Might Follow Siemens' Lead

Siemens' exit from nuclear appears likely to herald an exodus of other major German companies from the field, particularly utilities RWE and E.On, reflecting what Siemens Chief Executive Officer Peter Loscher called "German society and politics' clear position on ending nuclear energy." (NIW Sep.19'11). That said, well before Fukushima there were signs that German corporate commitment to nuclear energy, both domestically and elsewhere in Europe, was beginning to flag.

RWE and E.On are understandably keen to continue their existing German nuclear operations until they are forced to shut them down, but their enthusiasm for newbuild projects outside Germany may be waning, and the German press is reporting that both are eager to sell their joint 33% stake in multinational enricher Urenco (NIW Sep.6'11).

The shift in strategic direction amounts to a U-turn from recent years when Angela Merkel's government was pushing for reactor lifetime extensions, raising hopes that new reactors might even be built in Germany (NIW Jul.6'09). Like Italy's Enel, barred from building new nuclear plants domestically, RWE and E.On actively sought reactor projects elsewhere in Europe.

But this was all before Fukushima, and as Loscher's comment made clear, the German government's decision to back out of nuclear completely has prompted a sea change in German corporate planning. "I don't see how E.On and RWE could realistically extend nuclear activities outside of Germany," one analyst who follows both companies told NIW last week.

### Withdrawing From Europe?

Even before the Japanese catastrophe, however, much of these German utilities' nuclear activities seemed a thing of the past. In 2009 RWE began to retract, withdrawing from a stake in the twin VVER project at Belene in Bulgaria (NIW Apr.11'11). In January the company — together with assorted other Western European utilities — pulled out of the project to build units 3 and 4 at Romania's Cernavoda plant, citing poor economics (NIW Sep.12'11).

In Holland RWE was forced to lower its stakeholding in Borselle to 30% after Dutch utility Delta took it to court over its right to acquire Essent's 50% stake in the planned newbuild. In November 2010 Delta discussed teaming up with France's EDF to pursue the project (NIW Nov.8'10). But it remains unclear whether RWE will participate with any potential (although increasingly unlikely) EDF-Delta projects at Borselle (NIW May23'11).

In the UK, RWE and E.On partnered to form Horizon Nuclear Power, with plans for up to 3,000 megawatts of nuclear capacity at Wylfa on the Isle of Anglesey off the Welsh coast (NIW Apr.5'10). Backing out of Horizon would be relatively easy, particularly if both partners were on

board. Although Horizon talks about a 2020 target initial commissioning date, it is waiting for EDF to pave the way with a new reactor before committing in any major way.

That said, Horizon is considered to be in a stronger position sitewise than the NuGen consortium of France's GDF Suez and Spain's Iberdrola, which last week saw 25% partner Scottish and Southern Energy (SSE) announce that it was pulling out of the newbuild venture (p6). "There would need to be big, controversial transmission lines to get power out of Sellafield [NuGen's prospective site], whereas I would think a cheap upgrade would be enough for Wylfa," said Steve Thomas, of the University of Greenwich's Public Services International Research Unit. But neither consortium has made a final commercial decision to proceed with UK newbuild.

Of the two utilities, E.On is both financially and structurally better placed than RWE to pursue newbuild plans. Although it announced massive company-wide layoffs this summer, E.On's debt load is nothing next to that of RWE, which is in the middle of massive asset sales in order to pay for the Essent takeover (NIW Aug.15'11). E.On is also strategically more inclined to look outside Germany for investments and could remain involved in Finland, where it took a 34% stake in Fennovoima Oy, a new company that last year saw initial approval from the Finnish government for a greenfield nuclear plant (NIW Apr.26'10).

### A Closed Chapter

However, sources say that both companies have become much less enthusiastic about nuclear power, for the same reasons Siemens withdrew: the German public. "The chapter is closed for us," Siemens' Loscher told Der Spiegel in an interview published on Sep. 19, referring to the company's nuclear operations of nearly 50 years. "We will no longer be involved in managing the building or financing of nuclear plants."

It's unclear where this put Siemens in relation to Finland's Olkiluoto 3 project. In its 2010 annual report released this spring, Siemens lists itself as part of the Areva-led supplier consortium — due 27% of the payment from Fortum.

It was partially this project, with its many delays and lawsuits, that impelled Siemens to break off its decade-long relationship with Areva and attempt to form one with Russia's Rosatom (NIW Feb.9'09). But even that move was disastrous, as Areva took Siemens to arbitration for breach of contract, and the International Chamber of Commerce ruled in May that Siemens owes Areva €648 million (\$925 million) in penalties for violating its non-compete clause (NIW May23'11).

Although neither RWE nor E.On has had as harrowing an experience with nuclear power over the past decade, both have been slammed by Berlin's U-turn on nuclear power. Germany's nuclear power plants, reminded one analyst, were "essentially cash-generating machines" for their owners, and their unexpected closure (or planned closure) has dramatically hurt both current and forecasted earnings. It might therefore be tempting for both companies to remove the political uncertainties associated with nuclear.

Selling out of Urenco is unlikely to be so easy. The UK government has for several years expressed its desire to sell the stake (NIW Oct.12'09). But to do this, it would have to

secure agreement from the other partners and all three countries would most likely subject the decision to a national security review, as Urenco owns some of the most proliferation-sensitive technology in the world. Moreover, the conceivable buyers of a 33% stake in Urenco, let alone two 33% stakes, are few. One analyst suggested making a public offering for the company, which has long had very solid performance.

Clearly Germany now sees its energy security coming from a different direction: “Germany’s shift toward renewable energies is the project of the century,” Loscher told Der Spiegel. And Berlin is willing to put considerable political capital and cash into this project. In the coming decades, expansion into renewable energy — and away from nuclear and carbon-intensive power generation — may be the only way forward for German energy companies. ☞

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## UNITED KINGDOM

### GDF Suez and Iberdrola Buy SSE’s Stake in NuGen

French utility GDF Suez and Spain’s Iberdrola confirmed their commitment to the NuGen consortium, which plans to build up to 3.6 gigawatts of nuclear capacity at Sellafield, northwestern England, after 25% partner Scottish and Southern Energy (SSE) announced Friday, Sep. 23, it was pulling out of the venture. SSE says it wants to concentrate on renewable energy, gas-fired generation and possibly carbon, capture and storage (CCS) equipped power stations.

In a joint statement, GDF Suez and Iberdrola said they would increase their respective stakes in NuGen to 50% each, from a current level of 37.5%, buying up between them the 25% interest held by departing partner SSE. Both companies reiterated that the proposed timeline — a final investment decision by 2015 and commercial operation by 2023 — remains intact despite SSE’s exit from the consortium. No financial details of the deal have been given.

SSE said its “cautious” approach to nuclear in the UK meant the risks involved were too great to remain a consortium partner. The company repeatedly warned investors over the last 18 months that it had been “closely scrutinizing” the cost of nuclear.

SSE left the door open Friday, albeit narrowly, stating “we may become involved again at a future date, either as an investor or as a purchaser of [nuclear-generated] electricity.” Iberdrola is already active in the UK generation sector through its ownership of Scottish Power, one of the UK’s big six energy suppliers. GDF Suez is also invested in the UK through International Power, which owns power stations in the country and has 1,300 industrial and commercial (I&C) customers, but no retail base. It is the sixth largest supplier in electricity and fifth in gas to the UK’s I&C sector.

NuGen, formed in February 2009, paid £70 million (\$108 million) in October that year to the UK’s Nuclear Decommissioning Authority for the Sellafield land (NIW Nov.29’10). Also planning

newbuild in the UK are NNB Generation, comprising EDF and Centrica, which plans up to four reactors, and Horizon Nuclear Power, a joint venture between the UK arms of Germany’s E.ON and RWE; it plans 6 GW of nuclear capacity by 2025, although that venture is now in question (p5). ☞

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## INDIA

### Another Victory For Anti-Nuclear Forces

India’s ambitious plan to expand its nuclear fleet with help from international nuclear vendors has been plagued by problems lately: The festering liability issue continues to hamper Japanese-American projects, a new safety review looks set to delay the start of France’s Jaitapur project and — prompted by protests — the state of West Bengal last month said it would block Russia’s planned Haripur project, while the state of Tamil Nadu last week asked New Delhi to block the start-up of Russian reactors at Kudankulam. Despite these difficulties, Prime Minister Manmohan Singh’s government seems set to continue to pursue its nuclear plan.

Protesters have been fighting Kudankulam for years, but their ranks and visibility have increased since Fukushima. “People are well-informed. They watch TV news,” said S. P. Udayakumar, an Indian social activist and academic who has helped lead the anti-Kudankulam protests. “They see countries like Germany, Japan and Italy reassessing their nuclear plans. And then they see their government trying to open nuclear plants on every corner like grocery stores.” Says Coalition for Disarmament and Peace antinuclear activist Sukla Sen: “They are apprehensive that a nuclear plant is a ticking time bomb.”

Protesters concerned either about nuclear safety, or about the possibility of being forced off their land to make room for a nuclear plant (or both), have been particularly active in opposing France’s plans to build reactors at Jaitapur in the state of Maharashtra, the Nuclear Power Co. of India Ltd.’s (NPCIL’s) plans for reactors in Haryana, and Russia’s projects in Haripur and Kudankulam. Udayakumar was among more than 125 people who fasted for 12 days in an effort to block the start-up of the two nearly completed Kudankulam reactors.

They broke their fast last week when Tamil Nadu Chief Minister J. Jayalalithaa promised a five-member committee of protesters, including Udayakumar, that her government would formally ask the central government in New Delhi to put the commissioning of the Kudankulam reactors on hold until the protesters’ concerns were addressed. This was only a partial victory, however, since the protesters’ “concerns” are that they want the project scrapped, which seems unlikely.

After all, the government has so far spent 20,000 crore rupees (about \$4.3 billion) on the two VVER-1000s, Udayakumar says he was told by officials — earlier estimates had put India’s expected cost at about \$3.5 billion. Unit 1 is already in commissioning and expected to start commercial operations in November; Unit 2 is slated to start in July 2012. Udayakumar and his colleagues are pressing to

convert the facility into a gas-fired power plant or to some other non-nuclear purpose, or just take the loss.

More likely, the government — which is under pressure to expand India's electricity generation capacity to help the country meet its target of 9% annual GDP growth — will try to work with local residents to ease their fears of nuclear power and then start up the plant. A spokesman for India's Department of Atomic Energy could not be reached by phone and failed to answer an email about the situation by press time. A spokeswoman for Russian reactor vendor Atomstroyexport declined to comment.

### Safety and Legal Woes

While Russia's projects at Kudankulam and Haripur face challenges because of anti-nuclear and anti-land acquisition protesters, the Japanese-American projects at Kovvada and Chhaya Mithi-virdi are still stalled because of nuclear liability issues, and the French project at Jaitapur is facing a new delay of up to one year.

Anti-Haripur protests won the support of the state government in West Bengal, which has vowed to block the project (NIW Aug.22'11). In Tamil Nadu, nuclear opponents have also won their state government's sympathy. Although the plants are central government projects, state leaders can block them in at least two ways, according to MP Ram Mohan, co-chair of the New Delhi-based Nuclear Law Association's Nuclear Regulatory Process working group. First, the states are in charge of acquiring land for industrial projects, and can refuse to do so. Second, "if the State feels that a project of any kind leads to a law and order issue that threatens public safety and security, they can act against the project," Mohan said.

While they have not been targeted by large-scale protests, the Japanese-American projects are stalled because the suppliers don't think they should face liability in the event of an accident. They think only operator NPCIL should have to pay, and that it should not have the right of recourse to recoup those expenses from suppliers, which it does under Indian law. Earlier this month, Westinghouse Electric chief Aris Candris said the big vendors aren't the ones shy of doing business in India because of this issue; it's their small suppliers, which might only get \$1,000 worth of business but could still face significant liability in the event of an accident, he said (NIW Sep.19'11).

Technically, "nothing would stop NPCIL from claiming its right of recourse against such small suppliers/sub-contractors," because "there is no clear understanding of the scope of the word 'supplier,'" said Indian nuclear liability specialist Mohit Abraham. However, from a practical perspective, "I do not think NPCIL would go after each small supplier," because the "direct contractual relationship" would be between NPCIL and the vendor.

Meanwhile, New Delhi has asked Paris to provide a new, post-Fukushima report from the French regulator on the safety of the EPR reactor design, which French nuclear vendor Areva hopes to build at Jaitapur, the *Press Trust of India (PTI)* reported last week. This follows an Indian Department of Atomic Energy spokesman's statement to NIW last month that "the

start of the project has been delayed" by about a year (NIW Aug.22'11). At the time, an Areva spokesman said he could not comment on the delay. Last week, two Areva spokespeople failed to respond to requests for comment on the situation.

### "The Electricity Will Have to Come From Elsewhere"

Despite these challenges, it seems likely that New Delhi will doggedly pursue its nuclear fleet expansion. Sen says that if anti-nuclear activists succeed in killing Kudankulam, "The electricity will have to come from elsewhere." For him, that would be a good thing. For Singh's government in New Delhi, however, it would be a major problem.

According to India's central economic strategy making organization, the Planning Commission, to keep the country growing and developing, to create jobs, to generate revenue for government social programs, India needs 9% annual GDP growth, which requires 6.5% annual electricity supply growth. To meet this demand for electricity, Singh's government has adopted what Republicans in the US might call "an all-of-the-above" energy strategy.

Right now, India gets 54% of its electricity from coal, 21% from hydro, 11% from renewables, 10% from gas, 3% from nuclear and 1% from diesel. For the five-year period ending Mar. 31, the Planning Commission had planned to add 78.7 gigawatts in electrical generation capacity — some from each fuel source — but now says the country will likely add at most 50 GW by then. That means that in the subsequent five years, it will need to add 100 GW of capacity to stay on track.

Increasing energy capacity irrespective of the source poses a challenge for India. The country does not have the natural resources to meet its own energy needs, faces land acquisition problems that hinder its use of the limited resources it does have and faces stiff competition in its efforts to acquire resources abroad. So if New Delhi were to turn away from nuclear, there is no obvious alternative which is likely to be easier to pursue.

In this context, the failure of its nuclear expansion plan does not seem to be an option for the Singh government. Indeed, last week, *PTI* quoted government sources as saying New Delhi had no plans to give up on nuclear and saw the Kudankulam issue as essentially a public-relations problem that could be solved. "We don't see this primarily as a question of safety or no safety, but about communicating effectively," a source reportedly told *PTI*. ☎

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## SAFETY NRC Has More Questions About North Anna

A US Nuclear Regulatory Commission (NRC) spokesman says it's likely to be "weeks not months" before Dominion Virginia Power will be allowed to restart the two reactors shuttered by the Aug. 23 earthquake. Officials are currently studying a summary report detailing the utility's evaluation of the impact of the quake, which shook the two units beyond their design basis (NIW Aug.29'11). "And we have more questions," NRC spokesman Scott Burnell told NIW by email.

NRC and plant officials will discuss preliminary findings in an Oct. 3 public meeting to be held near the southern Virginia plant. Dominion had hoped to restart Unit 1 on Sep. 22 and Unit 2 on Oct. 13, but NRC officials indicated early on that the Sep. 22 date was an unrealistic target (NIW Sep.12'11). "All the work is performed that would enable us to start up at the end of this month," said Dominion spokesman Richard Zuercher. "The NRC has to have concurrence on that."

The Oct. 3 meeting is for the NRC's Augmented Inspection Team (AIT) to give the basics of what it examined at the plant, Burnell said. "While the AIT's activities will inform the restart discussion, the meeting is not going to be a 'go/no-go' on plant restart," he said.

### Shaking Inside the Reactor Core?

The NRC is, among other things, still trying to determine the precise cause of the shutdown at North Anna. After the power loss, operators rushed to manually scram the reactors, making it theoretically possible that their actions were a factor in the reactor scram, although that is not thought likely. What's more intriguing is what happened in the milliseconds before the power loss: utility officials have quietly raised the possibility that sensors inside the reactor cores registered a change in the "negative flux rate" and that that may have caused the units to trip.

This last possibility is particularly worrying to the NRC because such a change might have been caused by shaking inside the reactor core - something the reactors are not designed to withstand. It also raises the possibility that such shaking could cause other triggers to react in ways that would adversely affect a reactor during such an event, said David Lochbaum, nuclear safety project director of the Union of Concerned Scientists. "That's not the preferred way to operate," he said.

The utility and the NRC are trying to determine precisely when the control rods dropped — milliseconds before power was cut, or afterwards? Sensitive to the issues raised by the possibility of a change in the flux rate, Zuercher would only say, "We don't have any more information on that. We're not ready to go into any detail on that."

Making this investigation worthy of a detective story is the added complication that "black box" information collected during the accident has gaps as a result of the brief loss of power, leaving scientists in the dark about that crucial, albeit brief, time period. "They're trying to determine who won that race [to shutdown]," Lochbaum said. "Part of the complication in making that call is that with the loss of power there's limited data available."

### How Much Shaking?

Nuclear plants are built to survive a certain level of ground acceleration and a certain range in frequency in three different directions: north-south, east-west and vertical, depending on their location. North Anna exceeded those levels about 21% in the the vertical direction and about 12% in the north-south direction. Dominion's report didn't provide exact figures for

the east-west direction but the plant did exceed levels there too, it stated.

But contained in those averages are some pretty significant beyond-design basis shaking. For instance, in the north-south direction the plant shook at 62.9% beyond its design basis at 7.5hz, 40% at 4hz and 34% at 3.75hz. The NRC has said that lower frequency shaking is more damaging to plants structures and equipment than higher frequency shaking, generally speaking, and the plant didn't exceed levels in any direction at 2hz and 2.5hz.

When North Anna lost power during the earthquake, it also lost some of its earthquake analyzing equipment and had to rely on mechanical scratch plates, Lochbaum, who has read North Anna's latest report, said. "It was a pretty standard design in the 70s when the plant was built," he said. "They're going to provide backup power in the future." ☼

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## ENRICHMENT

### Usec's Latest Deadline Looms

Just days from Sep. 30, Usec's latest deadline for a \$2 billion US Department of Energy (DOE) loan guarantee, there is still no word from either Usec or the DOE about the likely outcome. While Usec claims it is still in negotiations over a loan guarantee for its American Centrifuge Plant (ACP), the political climate surrounding the talks has gone from bleak to downright dismal with the bankruptcy of solar panel manufacturer Solyndra, which got its \$535 million guarantee from one of two programs that Usec qualifies for.

The situation is essentially the same as it was in early August, said Paul Jacobson, Usec's vice president of corporate communications. "We are working with our strategic investors B&W (Babcock & Wilcox) and Toshiba and the DOE, which raised some issues back in August about adding financial depth," he said. "That process is ongoing."

The political climate wasn't exactly rosy in early August, when the US narrowly avoided a default on its \$1.5 trillion deficit and then had its credit downgraded for the first time on Aug. 5 by Standard & Poor's. And now, with that in the background and calls from both Democrats and Republicans for more scrutiny of loan guarantees, the DOE is likely to be even more cautious in its assessment of the troubled enrichment company than it has been in the past (NIW Jul.11'11).

### The Solyndra Effect

On Sep. 23, Solyndra CEO Brian Harrison and CFO W.G. Stover appeared before a US House of Representatives Energy & Commerce subcommittee investigating how the company got its loan guarantee in 2009 and then went bankrupt Aug. 31. Solyndra's loan came through the so-called 1705 program, added in 2009 as part of the federal stimulus package (NIW Jul.5'11). Usec qualifies under both that and the 1703 program for nuclear projects. The 1705 program is considered easier to negotiate, but it's also expiring Sep. 30 (NIW Sep.6'11).

The ire toward the loan programs seems to be from both sides of the isle, and spreading from solar companies to nuclear. In a press release also issued Friday, Rep. Edward J. Markey (Democrat Massachusetts) called for hearings on “the implementation of the nuclear power plant loan guarantee program, the issuance of the conditional nuclear loan guarantee that has been awarded, and the role the nuclear industry has had in altering the terms associated with subordination.” Markey’s press release seems directed at the 1703 program, under which a consortium led by the Southern Company won a \$8.3 billion conditional loan guarantee for two new units at the Vogtle nuclear power plant (NIW Jun.21’10). That program will be the only option left for Usec after Sep. 30.

“There are many legitimate public policy considerations that Congress should explore regarding the full suite of the Department’s loan guarantee programs,” Markey said in the press release. “We should subject the nuclear loan guarantee program to the same level of rigorous scrutiny as we are now insisting the solar loan guarantee program undergo.”

### Beyond the Deadline

So what happens if Sep. 30 comes and goes with no Usec loan guarantee? “Usec will try to come up with a plan, but what they can’t afford is waiting any longer. Every day is a huge strain on cash flow,” said Ben Elias, an analyst with investment firm Sterne Agee.

Adding to the strain is the possibility that Toshiba and B&W will pull out of Usec after Sep. 30, which they are allowed to do under terms of their agreement with the enricher. In late August Usec converted the two companies’ preferred stock to common stock, setting the stage for them to recoup the \$75 million they’ve invested thus far by selling their shareholdings. Under a revised agreement this summer, Usec must pay them back any money not recouped in a stock sale.

“I can tell you this,” Jacobson said of Toshiba’s and B&W’s investment with Usec. “They have been very supportive of the project all along. Everybody wants to see this move forward but there are still issues we are working on.”

The two companies stand to benefit from the project and “have a lot of skin in the game,” said an analyst with close ties to Usec. If the technology works, then Toshiba and B&W will stick with Usec past the deadline, he predicted. “Our view is that they believe in the tech and it’s really just a matter of getting the inertia of government to work,” the analyst said.

The market certainly needs more separate work units (SWUs) in coming years, Elias said. Projections have consumption rising from the 55-60 million SWUs used worldwide now to 80 million-90 million SWU in coming decades, he said. “From the start Usec is only going to be replacing what is shutting down, but then they hope to double their license,” he said. “Once they can go to 6 million SWUs a year, we have good profit projections for Usec.”

The idea that foreign investors might buy up Usec — there has been talk of Russian interest, among other things

— is considered unrealistic because of the sensitivity of the technology; access to it is controlled under Usec’s license with the DOE. There are limits on even Toshiba’s investment, in terms of what information they have access to, Jacobson said.

“The more likely scenario would be that Usec explores a joint centrifuge project in the US using Tenex or Urenco technology. I doubt the US would want other nations to get access to the ACP technology,” said Laurence Alexander, an analyst with Jeffries investment bank. “The GDP would be unsustainable in the long-term once the rest of the industry migrates to lower-cost centrifuge technology, barring some level of federal support. The US utility industries, and government, will likely encourage projects in the US in order to guarantee security of supply.” ☼

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## URANIUM

### Rossing Workers Strike Again

Rio Tinto’s Rossing uranium mine in Namibia was shuttered for the second time in three months this weekend due to a contentious dispute with its workers. The impact on output was not immediately clear, absent a statement from Rio, but local press reports claim that the company lost N\$20 million (\$2.4 million) during a previous three-day strike in July.

Although there are signs that the mine’s management is attempting to restart production without the striking workers, the situation is unlikely to calm down over the next week. The Rossing branch of the Mineworkers Union of Namibia (MUN) contends that management is illegally employing workers to do the jobs of the striking workers. For its part, management contends that the entire strike is illegal, and that the MUN should be pursuing its grievances via the courts. This argument will be heard by a court in Windhoek on Wednesday, Sep. 28.

The root cause of the strike is a relatively minor (from the perspective of Rio Tinto’s total cash flow) disagreement over bonuses. Rossing’s workers are furious that of the N\$50 million (\$7.4 million) set aside for bonuses in 2010, half went to Rossing’s 300 managers, while nonmanagement employees received an average bonus of only N\$11,000 (\$1,632) per person.

Workers want each nonmanagement employee to receive an additional N\$30,000 (\$4,247), and in July elected to informally strike without the MUN’s leadership approval (NIW Jul.18’11). That strike was quickly declared illegal by the Namibian Labour Court, which found that a 2007 labor law only permits strikes after certain conditions have been met, including 30 days of conciliation meetings.

Over the past months these meetings have occurred. But while talks progressed slightly, on Sep. 20 the MUN Rossing branch served a notice of industrial action to both the management and the Namibian Labour Commission, setting a strike for 8 a.m. on the morning of Friday, Sep. 23. This set off intense

last-minute negotiations; MUN leadership and Rossing's management were in talks all day Thursday, and had agreed on a draft memorandum of understanding by 1:30 a.m. Friday.

But when it was presented to the MUN branch membership before work later that morning, the draft agreement was overwhelmingly voted down, and the strike began, as scheduled, at 8 a.m. The union members contended that while management had agreed to pay some N\$15,200 by Sep. 30, the MUN would have to drop all claims to both a 2010 and a 2011 bonus.

### A Philosophical Dispute

"The main issue was the principle of equity, fairness and transparency," MUN Branch chairman Ismael Kasuto told NIW, when asked why the workers voted against the proposed deal. "The current draft — there's no substance in terms of commitment," said Kasuto, saying that workers want the company to "address the issue of the incentive system."

This seems to be the last thing the company wants to do. In a Sep. 12 press conference in Swakopmund, Rossing's Managing Director Chris Salisbury attempted to explain Rio Tinto's thinking, explaining that "not all base pay, salaries or bonuses are the same for all employees."

"Besides the fact that incentive or bonus payments vary ... a proportion of the base pay for management employees is 'at risk,' i.e. it is not guaranteed and forms part of their incentive payment. Whereas employees in the Bargaining Unit have a guaranteed base salary and their bonus is precisely that: 'a bonus.' Direct comparison is invalid; it is like comparing apples to oranges."

"MUN's demands defeat logic and are unreasonable," continued Salisbury, according to a statement released by Rossing. "At the core of the current dispute are demands from [the] MUN that the Company pay additional bonus for no other reason than management level employees received higher payments, so Bargaining Unit employees, represented by the union, should as well."

"It would be irresponsible of me or any of my management team to simply accede to unreasonable demands that are contrary to sound business principles."

### Ongoing Legal Wrangling

The morning after the MUN Rossing Branch notified Rossing of its planned strike last week, Rossing management filed a motion with the Labour Court seeking a declaration that the MUN's demand for N\$30,000 was a "dispute of right," meaning it would have to be resolved through the court. It is this demand that the court will hear on Sep. 28.

Should the court rule again in favor of the Rossing management, then the current strike will be illegal, and make moot the MUN's complaint that management is attempting to pay remaining workers to do the jobs of their striking employees.

"The Union is aware that the Company is using non-striking employees (foremen, specialists and temps etc.) to come volunteer and perform the work of the striking employees as part of the Company contingency plans," wrote Kasuto to Salisbury in a 9:19 a.m. e-mail on Sep. 26. "The company action is in gross violation of the strike rules and undermine [sic] the legal object of the strike. ... Failure on the part of the Company to honour the rules of the Labour Act will leave the Union with no option but to seek an urgent court interdict to ensure compliance."

Clearly the center of action this week will be in the Labour Court, which, if it rules against management, might also have to consider a further application for interdiction on the part of the striking workers. Rossing, of course, is not the uranium production center it once was (NIW Jul.18'11). But the uranium industry — particularly Rossing's neighbors, Areva at Trekkopje and Paladin at Langer Heinrich — will no doubt be watching closely. If worker discontent proves contagious, the effect could be far greater for uranium production in southern Africa. ☸

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## CANADA

The company that owned the ship on which two drums of uranium spilled during a storm in July has gone into bankruptcy, leaving Cameco waiting to recover some \$19 million that it claimed it suffered as a result of the accident. The MCP Altona had been on its way to China to deliver some 770,000 lbs U3O8 from Cameco, when it encountered severe weather and noticed, on Jan. 3, that “two opened drums were outside of their sea container” (NIW Jan.18’11). The ship was forced to turn around back to Canada, and has since been stuck in port.

## FRANCE

Many French nuclear workers went on a symbolic one-day strike on Thursday, Sep. 22, to protest conditions for subcontractors throughout the country’s nuclear industry. The strikers, organized by the General Confederation of Labor (or CGT, from its French name), hope to gain improved benefits for subcontractors working for EDF, Areva and various government-backed organizations involved in nuclear research and waste management. No nuclear power output was affected by the strike. Subcontracting has been an increasingly problematic subject in the French nuclear industry; earlier this month the country’s nuclear regulator announced that it would extend the nuclear “stress tests” to examine the activities of subcontractors at the country’s nuclear facilities (NIW Sep.19’11).

## GERMANY

In an important victory for Germany’s nuclear operators, a Hamburg tax court last week issued a ruling against the government’s nuclear fuel tax, stating that it has “serious doubts” whether the tax is constitutional. The tax of €145/gram of uranium loaded into reactors had been a feature of Berlin’s decision a year ago to extend the lifetime of the country’s nuclear fleet. When Chancellor Angela Merkel reversed course on this policy in May, the tax remained — but with a legal challenge from E.ON. Although the Hamburg court’s decision, which has already been appealed by the government, is only one of several appeals working its way through the legal system, analysts declared it good news for both E.ON and RWE. “This is a very positive development as this is the first time courts in Germany have officially questioned the legality of the nuclear tax in line with the argumentation of the German utilities that this tax is unlawful,” wrote RBS analyst Peter Crampton in a note. But Crampton, like other analysts, predicts that it might take one to two years for the issue to be finally settled by Germany’s Supreme Court.

## INDIA

Following New Delhi’s pledge of a slew of post-Fukushima safety upgrades for its nuclear plants, India’s state-run nuclear operator has ordered 16 backup diesel generators. India’s Kirloskar Oil Engines announced in a Sep. 23 regulatory filing with the Bombay Stock Exchange that it had won an order worth 3.96 billion rupees (\$80.1 million) from Nuclear Power Corp. of India Ltd. for emergency backup diesel generating sets of 4.2 MW each to be delivered over the next 42 months. A July post-Fukushima safety assessment of India’s nuclear fleet recommended “additional options for power sources for cooling,” including “diesel driven electric generators (air cooled and not requiring external cooling) to cater to power needs” (NIW Aug.8’11). In August, Prime Minister Manmohan Singh’s government announced it would implement the post-Fukushima safety upgrade recommendations (NIW Aug.15’11).

India has 20 operating reactors, and seven in various stages of construction, including a pilot fast breeder reactor.

## LIBYA

It may take weeks for the International Atomic Energy Agency (IAEA) to secure stockpiles of uranium near Sabha, in the central desert of Libya. “We can confirm that there is yellowcake stored in drums at a site near Sabha in central Libya,” the agency told UK newspaper the Daily Telegraph, which contends that there are at least 10,000 drums of yellowcake, and that much of that material comes from Niger. “The IAEA has tentatively scheduled safeguard activities at this location once the situation in the country stabilizes.” The uranium is left over from the Libyan nuclear program that the now-deposed Muammar Qaddafi gave up in 2003 in a bid to re-enter the international community.

## SOUTH KOREA

A South Korean court on Sep. 20 rejected an effort by 97 residents of Busan to shut down the nation’s oldest nuclear reactor, which is located nearby, because of safety concerns, according to press reports. Gori-1 (sometimes translated as Kori-1), a Westinghouse pressurized water reactor connected to the grid Jun. 26, 1977, is run by state-owned Korea Hydro & Nuclear Power (KHNP). The residents argue the reactor, now more than 34 years old, was meant to run for only 30 years and should have been shut down, rather than relicensed for an additional 10 years. The court decided the reactor was safe, was being properly managed by KHNP and could continue to operate, according to press reports. South Korea has remained committed to nuclear energy despite the Fukushima crisis. President Lee Myung-bak told a United Nations meeting on nuclear safety and security Sep. 21 that “the use of nuclear energy is inevitable as there still remain technical and economic limits for alternative energy to meet the rapidly rising global energy demand or to tackle the problem of climate change.” South Korea has 21 operating nuclear reactors, and five more under construction.

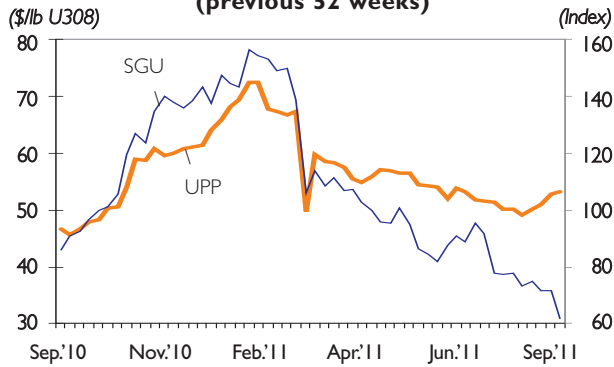
## UNITED STATES

Local and state police in Vermont are investigating an arson fire Tuesday, Sep. 20, at Vermont Yankee’s corporate offices in Vernon, about 17 miles north of the embattled reactor. According to Brattleboro police an unknown number of people entered the building through a broken window sometime before 3 a.m. and started a fire on the three-story building’s first floor. When firefighters arrived a sprinkler system was active. Damage was minor and the blaze was quickly put out, Fire Chief Michael Buccossi said. Vermont Yankee spokesman Larry Smith, suggesting the fire was started by nuclear opponents, expressed shock, telling the Brattleboro Reformer, “There’s never been anything someone’s done that was malicious or that was meant to harm any of the employees.” Plant opponents also expressed dismay, with one even questioning whether it was an “inside job” aimed at garnering sympathy for the plant operator. Kevin Kamps, of Maryland-based Beyond Nuclear, noted that one of his colleagues had been in Vermont helping to organize peaceful protests. “The irony is the antis spent all day Sunday doing nonviolence planning — for how to bridle the passions of large number of people in the area who want to shut that plant down,” he told NIW. ☞

# ENERGY INTELLIGENCE URANIUM MARKET UPDATE

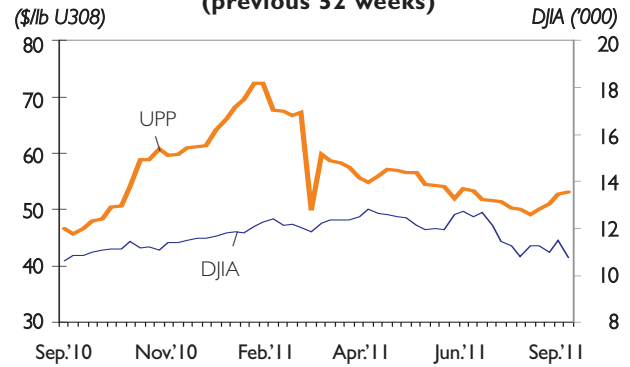
For the week ended September 23, 2011 (All figures as of Friday close unless otherwise indicated.)

**UPP vs. Solactive Global Uranium Index\***  
(previous 52 weeks)



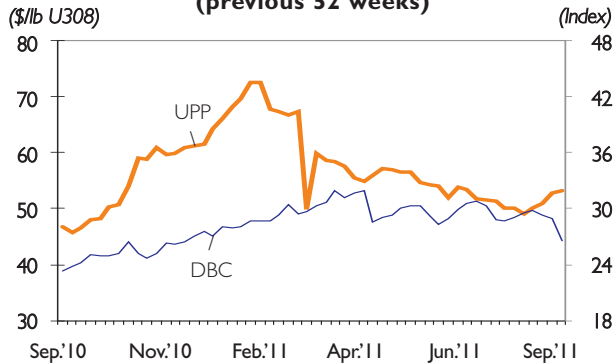
\*Solactive Global Uranium Total Return Index, created by Structured Solutions AG, tracks the price movements in shares of companies active in the uranium mining industry. Calculated as a total return index and published in USD, its composition is ordinarily adjusted twice a year.

**UPP vs. Dow Jones Industrial Average\***  
(previous 52 weeks)



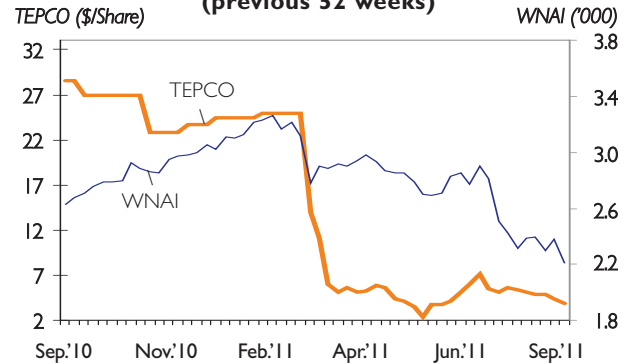
\*Roughly two-thirds of the Dow Jones Industrial Average's 30 component companies are manufacturers of industrial and consumer goods. The others represent industries ranging from financial services to entertainment.

**UPP vs. PowerShares DB Commodity Index\***  
(previous 52 weeks)



\*The PowerShares DB Commodity Index Tracking Fund is designed to provide investors with a broadly diversified exposure to the returns on the commodities markets. It is based on the Deutsche Bank Liquid Commodity Index, which is composed of futures contracts on 14 of the most heavily traded and important physical commodities.

**TEPCO vs. WNA Nuclear Stock Index\***  
(previous 52 weeks)



\*Maintained by the World Nuclear Association, the World Nuclear Association Nuclear Energy Index includes companies that build nuclear power facilities, design and service reactors, operate nuclear reactors, supply nuclear components, technology, and fuel.

## Monthly Spot Market Prices

|                      | Change | 2011    |         |         |         |         |         |         |         |         | 2010 |
|----------------------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|------|
|                      |        | Aug.    | Jul.    | Jun.    | May     | Apr.    | Mar.    | Feb.    | Jan.    | Dec.    |      |
| Uranium (\$/lb U3O8) |        |         |         |         |         |         |         |         |         |         |      |
| Low                  | -2.00  | +49.00  | +51.00  | +52.00  | +55.00  | +55.00  | +50.00  | +67.00  | +61.50  | +59.50  |      |
| High                 | -2.00  | +51.50  | +53.50  | +54.50  | +57.00  | +58.00  | +67.00  | +72.50  | +69.50  | +61.50  |      |
| Conversion (\$/kgU)  |        |         |         |         |         |         |         |         |         |         |      |
| Low                  | -0.50  | +10.00  | +10.50  | +11.00  | +11.00  | +11.00  | +11.00  | +12.00  | +11.00  | +11.00  |      |
| High                 | -0.25  | +11.25  | +11.50  | +11.50  | +11.50  | +11.50  | +12.00  | +13.00  | +12.50  | +12.50  |      |
| Enrichment (\$/SWU)  |        |         |         |         |         |         |         |         |         |         |      |
| Low                  | -      | +148.00 | +148.00 | +150.00 | +153.00 | +154.00 | +154.00 | +154.00 | +154.00 | +153.00 |      |
| High                 | -1.00  | +150.00 | +151.00 | +152.00 | +154.00 | +155.00 | +155.00 | +155.00 | +155.00 | +155.00 |      |

NIW monthly UF<sub>6</sub>, SWU and U<sub>3</sub>O<sub>8</sub> prices rely on the general consensus of direct market participants and is informed by actual market transactions. This section was previously known as the Nukem Weekly Report and the Nukem Price Bulletin. The methodology for NIW's weekly UPP price is different – more information about the methodology behind that price is available on page two.

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