JAPAN NRG WEEKLY

NOV 20, 2023

CONTACT US: info@japan-nrg.com

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ANALYSIS

JAPAN'S SPENT NUCLEAR FUEL DILEMMA: KEPCO SEEKS A SOLUTION

As Japan's nuclear power industry faces a rebirth after a decade of dormancy, nuclear waste disposal is a priority. The largest nuclear power operator, KEPCO, is central to a solution. In the next six weeks, KEPCO must decide on an "interim" storage site for its spent nuclear fuel. Should it fail, then three of KEPCO's reactors could be shut. What happens to KEPCO will have an impact on the nuclear sector nationwide.

JOBS IN JAPAN: NON-COMPETE CLAUSES, DO THEY HOLD UP?

In Japan, employees are well protected and it's hard to fire them. Non-compete, confidentiality and 'garden leave' clauses appear in employment contracts worldwide, and Japan is no exception. How valid are these clauses in Japan? How can companies protect trade secrets and confidential information? Should employees be concerned about such clauses in their contracts?

GLOBAL VIEW

A wrap of top energy news from around the world.

EVENTS SCHEDULE

A selection of events to keep an eye on in 2023.

JAPAN NRG WEEKLY

PUBLISHER
K. K. Yuri Group

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OFTEN-USED ACRONYMS

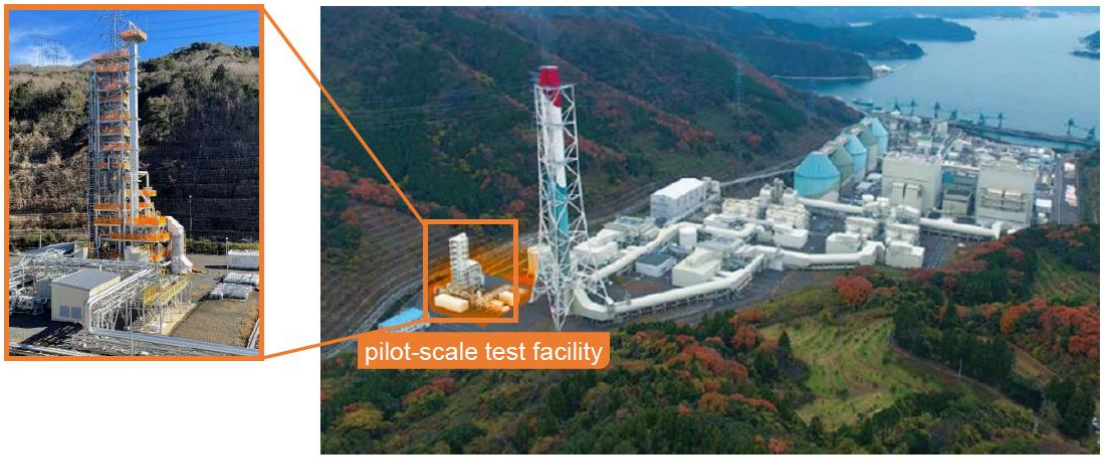
METI	The Ministry of Economy, Trade and Industry	mmbtu	Million British Thermal Units
MoE	Ministry of Environment	mb/d	Million barrels per day
ANRE	Agency for Natural Resources and Energy	mtoe	Million Tons of Oil Equivalent
NEDO	New Energy and Industrial Technology Development Organization	kWh	Kilowatt hours (electricity generation volume)
TEPCO	Tokyo Electric Power Company	FIT	Feed-in Tariff
KEPCO	Kansai Electric Power Company	FIP	Feed-in Premium
EPCO	Electric Power Company	SAF	Sustainable Aviation Fuel
JCC	Japan Crude Cocktail	NPP	Nuclear power plant
JKM	Japan Korea Market, the Platt's LNG benchmark	JOGMEC	Japan Organization for Metals and Energy Security
CCUS	Carbon Capture, Utilization and Storage		
OCCTO	Organization for Cross-regional Coordination of Transmission Operators		
NRA	Nuclear Regulation Authority		
GX	Green Transformation		

NEWS: ENERGY TRANSITION & POLICY

Japan targets technology shift to make CCS cheaper; to create new ships

(Japan NRG, Nov 15)

- Japan seeks to move Carbon Capture from the current chemical absorbent method to an approach based on solid absorbents, which should cut the cost of capturing one ton of CO2 in half. Further technological evolutions and cost reductions are also in the works, according to a presentation made by NEDO.
- It costs $40 to trap one ton of CO2 using a chemical reaction. Updating the process to physical absorption (which dissolves CO2 into a liquid) can lower this amount to $20-$30, but moving entirely to solid adsorbents should drop the number to $20, said Director General of NEDO's Environmental Dept, Fukunaga Shigekazu, speaking at the CCS Forum in Tokyo.
- The technological leap will be possible this decade and may be superseded by 2030 with the membrane separation method, which could take the costs to $15, he said.
- This year, NEDO started a pilot project using solid adsorbent materials at Kansai Electric's Maizuru coal-fired power plant. CO2 captured there will be liquified, put into CO2 storage tanks and shipped to a receiving facility in Tomakomai, Hokkaido. The latter is the only active CCS site in Japan at present.
- Ships that can carry 1,000 tons of liquified CO2 are in the works and will start operating in 2024; specialist storage tanks will also be ready soon, the official said. Annual shipments will total about 10,000 tons of CO2.
- The Maizuru facility will capture about 40 tons of CO2/ day.
- CONTEXT: *In addition to KEPCO, Kawasaki Heavy Industries and think-tank RITE are involved in developing CC technology. The transportation of the CO2 and its storage is spearheaded by the Japan CCS Co. consortium, the Engineering Advancement Association of Japan, trading house Itochu and Nippon Steel.*
- The pilot project, including the transportation and injection of CO2 into the Tomakomai site, will run through Feb 2027.



The Kansai Electric Power Company, Inc.
Maizuru power station

- SIDE DEVELOPMENT:
  METI to submit CCS Business Act to Parliament in early 2024
  (Japan NRG, Nov 15)
  - The ministry was unable to submit to Parliament the Act to govern the CCS industry this calendar year due to supplementary budget deliberations. However, it should be able to do so in the first parliamentary session of 2024, said Saeki Norihiko, Director for CCS Policy Office at the METI.
  - The CCS sector will not be amenable to companies looking for quick profits, but METI believes that market players that take a longer-term approach will do well because the technology will be vital for the economy.
  - The ministry will do its best to support the CCS sector and believes that Japan has companies that could play a role in every part of the CCS value chain.
  - Also, Japan has a greater carbon storage volume potential than METI drew up in its CCS strategy, but further reviews are needed to confirm this, Saeki said.
  - CONTEXT: *The national strategy for CCS calls for the sector to start operating on a commercial footing from 2030, collecting between 6 and 12 million tons of CO2 a year. By 2050, the goal is to store between 120 and 240 million tons of CO2 a year.*

- TAKEAWAY: The govt sees Carbon Capture, (Utilization) and Storage as one of the most important new industries, along with efforts to build a hydrogen-focused economy. The business models that will allow this to work, however, are less clear. METI's presentation at the CCS Forum had some inconsistencies. One was around the 2030 target for annual storage, which on one slide was described as 6-12 million tons and on another as 13 million tons, of which 30% (i.e. about 3.9 million tons) would be "exported overseas". That suggests Japan has negotiated specific storage volumes with Malaysia (where Mitsui & Co. leads a CCS project) and Oceania (where Mitsubishi Corp and Nippon Steel are leading a Japan-backed project).

  - SIDE DEVELOPMENT:
    About 400 CCS and transportation projects in the works globally
    (Japan NRG, Nov 15)
    - There were 392 carbon capture and transportation facilities in the works as of July 2023, double the number a year earlier, said the Global CCS Institute at the CCS Forum in Tokyo. Growth is driven by policy in North America and Europe in particular.

- Today, there are 41 facilities operating, capturing 49 million tons of CO2 per annum. A further 32 million tons of CO2 per year of capture capacity is under construction.
- That is still only a fraction of the 1 billion tons of CO2 that need to be captured globally by 2030 to achieve climate goals, according to the Institute.

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KEPCO and K Line ink contract for liquefied CO2 ship design

(Company statement, Nov 14)

- KEPCO and K Line plan to develop a CCS value chain. They completed a study on liquefied CO2, targeting emissions from KEPCO's thermal power plants.
- This project aims to address challenges in maritime CO2 transport, such as associated costs and technologies.
- SIDE DEVELOPMENT:
  KEPCO and Mitsui O.S.K. Lines ink contract for liquefied CO2 ship design
  (Company statement, Nov 14)
  - On the same day, KEPCO announced a similar contract with Mitsui O.S.K. Lines. The two will study ship design, transport and technology to build a CCS supply chain.

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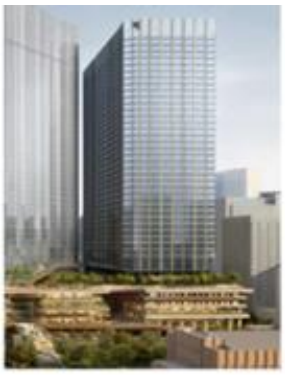
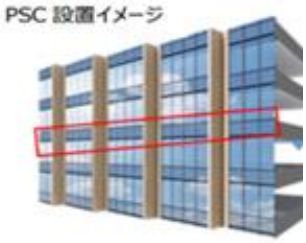
Sekisui Chemical to install 1 MW perovskite power system on high-rise building

(Japan NRG, Nov 15)

- Sekisui Chemical plans to install about 1 MW capacity perovskite solar (PSC) power system on a 45-story building in Tokyo; the world's first PSC on a high-rise building.
- Work on the building, called South Tower, begins in 2024 and will be completed in 2028 along with the PSC installation. The modules will be placed on wall spandrels.
- CONTEXT: *Solar panel installations on building walls have hitherto been limited due to the panel weight and their exposure to wind. Sekisui's PSC modules are thin perovskite crystal and electrode layers on films. The company says their flexibility makes them suited for building wall installations. Some researchers, however, warn film-based PSCs are vulnerable to moisture and will have short life cycles.*





- TAKEAWAY: This plan suggests the company is close to establishing a PSC mass production system, which would be a major breakthrough. PSC production involves nanostructure control of chemicals, making it difficult to automate the processes. Sekisui's PSC has a 15% power efficiency, which is not high, and thousands of PSC units would be required to achieve MW power capacities. Sekisui told *Japan NRG* that it plans to commercialize PSCs in 2025 but declined to elaborate where the modules will be produced.

METI allocates ¥860 billion for GX promotion, ¥2 billion to mitigate curtailment

(Denki Shimbun, Nov 13)

- The FY2023 supplementary budget was approved by the Cabinet. METI is given ¥860 billion to promote the GX program. Of this, ¥546 billion will go to strengthen the supply chain of semiconductors and storage batteries.
- To promote energy efficiency, ¥58 billion was allocated for subsidies for the introduction of high-efficiency water heaters. Also, METI seeks ¥2 billion for new technology aimed at mitigating curtailment of renewable energy.
- CONTEXT: *The FY2022 supplementary budget totaled ¥11.3 trillion, but it increased due to relief measures for consumers of gasoline, electricity, and gas.*

METI sets up DAC working group, to launch in January

(Denki Shimbun, Nov 13)

- METI set up a working group to focus on the technology of capturing CO2 from the atmosphere, known as DAC (Direct Air Capture).
- The group will begin discussions in January. During that meeting, participants will provide reports on the current status of DAC markets and businesses globally. A meeting in April is expected to present a report with recommendations.
- CONTEXT: *Japan's estimated future residual emissions amount to about 0.5 to 2.4 billion tons annually. According to METI, companies with significant emissions, such as those in the petroleum and aviation industries, have been noticeably investing in companies with DAC technology.*

ANRE outlines preliminary criteria for hydrogen supply chain subsidies

(Government statement, Nov 14)

- ANRE has outlined the preliminary criteria for providing subsidies to companies in large-scale hydrogen and ammonia supply chain projects.
- The govt will make decisions based on overall assessment, rather than projected costs, meaning policy priorities and compliance to govt standards will be reflected.
- The projects need to clear "S+3E" standards, which are safety, energy security, economic efficiency and environmentally friendly (low carbon intensity).

- TAKEAWAY: Under this framework, hydrogen production for local or in-house consumption will probably not be eligible for subsidies. Some argue that hydrogen – whether liquid or compressed gas – releases carbon when transported by trucks and such big projects defeat the purpose of decarbonization.

Obayashi and EG form JV to build hydrogen power plant in New Zealand

(Company statement, Nov 13)

- Obayashi, one of Japan's major construction firms, will acquire a 50% stake in Eastland Generation, a New Zealand-based renewables generation firm focusing on geothermal, hydro and solar projects.
- The two firms formed a JV for a hydrogen production plant using geothermal power. In 2021, they began test sales of the hydrogen.
- By 2027, EG plans to expand its renewables capacity to about 100 MW.
- CONTEXT: *New Zealand plans to reach a national power mix of 100% renewable energy by 2030.*

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Asahi Kasei, Gentari, and JGC start FEED for hydrogen project in Malaysia

(Japan NRG, Nov 15)

- Asahi Kasei, Gentari Hydrogen in Malaysia, and JGC signed a MoU for a FEED study for annual production of 8,000 tons of green hydrogen using a 60 MW alkaline water electrolyzer system. Support came from NEDO's Green Innovation Fund.
- FEED work begins in January 2024 and the operation is planned to start in 2027.
- In 2021, Asahi Kasei delivered a 10 MW system to Fukushima Hydrogen Energy Research Field. Six units of a similar 10 MW system will be deployed in Malaysia.
- CONTEXT: *Asahi Kasei is scaling up production by connecting multiple electrolyzers. In 2024, it plans to bring on-stream a pilot green hydrogen plant in Kawasaki City consisting of four 0.8 MW electrolysers.*

- TAKEAWAY: METI aims to bring down hydrogen cost to ¥30/ Nm3 by 2030, but according to one consumer, green hydrogen trades at ¥5,000/ Nm3. Development of new components to boost electrolysis efficiency, improving endurance and maintenance and increasing system life cycles, are key focus areas to cut capital costs, Asahi Kasei told *Japan NRG*.

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ENEOS and Air Liquide to develop hydrogen projects

(Company statement, Nov 15)

- ENEOS and Air Liquide will join forces to develop hydrogen projects.
- They plan to benefit from ENEOS' energy infrastructure in Japan and Air Liquide's expertise across the hydrogen value chain and know-how on CCUS.
- The companies seek to set up a global liquid hydrogen supply chain for Japan, as well as hydrogen mobility initiatives, including refueling station infrastructure.

IHI shows world's highest capacity H2 recirculation system for aircraft fuel cells

(Company statement, Nov 13)

- In partnership with aircraft fuselage manufacturer Sanei Kikai, IHI has developed an electric hydrogen turbo-blower, a 400 kW capacity hydrogen recirculation unit that achieved the world's highest hydrogen circulation volume in its class.
- This equipment was developed for use in aircraft fuel cells and achieved a large capacity by employing an ultra-high-speed motor with a proprietary gas bearing.
- IHI continues developing and enhancing electric hybrid propulsion systems to electrify aircraft for commercialization by late 2024.

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JR Central to begin test runs of hydrogen trains

(Company statement, Nov 16)

- This month, JR Central will start test runs of a hydrogen fuel cell train, to be followed by a hydrogen engine powered train after spring. The company is developing hybrid hydrogen locomotives powered by fuel cells, hydrogen engines and storage batteries.
- The company will assess the hydrogen rail systems' performance in mountainous areas, in addition to the overall performance.
- Toyota Motor is supplying the fuel cells, and iLabo the hydrogen engines.

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Iwatani to produce hydrogen from plastic waste

(Japan NRG, Nov 14)

- Iwatani Corp plans to produce hydrogen from plastic waste, Yabuno Akihito, the head of Iwatani's hydrogen division, told a METI panel on hydrogen and ammonia.
- The company is studying the Nagoya port area as a production site and aims to start production in 2025-2030.
- It forecasts liquid hydrogen sales to increase to 90 million cubic meters in 2023, up from 80 million m3 a year earlier. Sales of compressed hydrogen will stay nearly flat at 79 million m3 in 2023, compared to 77 million m3 in 2022.
- Liquid hydrogen is gaining traction as large volumes can be transported and stored.

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Japan, U.S. hold economic "two plus two" to strengthen IPEF

(Government statement, Nov 16)

- Japan's METI minister, foreign minister, the U.S. secretary of state and secretary of commerce held an economic policy meeting to strengthen the Indo-Pacific Economic Framework for Prosperity (IPEF).

- The two countries will assess potential impacts of export restrictions on critical minerals that could significantly impact production of solar panels, semiconductors, and other essential inputs for EVs, computers, and smart devices.

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Ube-based chemical firms launch decarbonization initiatives

(Nikkei, Nov 14)

- Yamaguchi Pref and chemical manufacturers operating locally are speeding up net zero initiatives, eyeing state support for ammonia and hydrogen infrastructure.
- UBE and others in the Ube Sanyo-Onoda industrial zone began to co-develop a new cement kiln fueled by ammonia instead of coal. The companies aim to replace up to 30% of coal with ammonia, which may be a world first.
- In the Shunan zone, Idemitsu plans an ammonia import base of 1 million tons/ year.
- This year, Yamaguchi Pref set up a ¥6 billion fund to subsidize the kiln development and other net zero projects.
- CONTEXT: *Ube Sanyo-Onoda, Shunan and Iwakuni-Ohtake industrial zones in Yamaguchi have Japan's highest concentration of hard-to-abate petrochemical and steel plants. The 36 companies there have diverse plans including biomass-derived energy, synthetic methane and carbon recycling. But the Yamaguchi govt decided to focus on ammonia.*

- TAKEAWAY: UBE runs two coal power plants in the prefecture, but it is also a major ammonia producer. However, UBE hasn't yet revealed how it will meet growing energy sector demand. UBE told *Japan NRG* that it has no plan to introduce ammonia co-firing at the power plants, but it will develop an ammonia-fueled cement kiln.

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MHI invests with Element Energy for energy storage

(Company statement, Nov 15)

- Mitsubishi Heavy Industries (MHI) invested in Element Energy, a U.S. company focused on developing energy storage technology.
- The two plan to develop power system solutions for "behind the meter" applications, which involve energy systems on the customer's side of the utility meter, like solar panels, battery storage, or generators.
- CONTEXT: *Element Energy focuses on hardware and software designed to improve new and repurposed batteries. They are currently testing their technology on a large scale in the U.S., with plans to launch it in early 2024.*

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JFE Steel opens test facility for ammonia tank

(Company statement, Nov 16)

- At the end of October, JFE Steel opened a new test facility at Kurashiki Steel Works (Okayama Pref) to develop high-strength steel for ammonia fuel tanks.
- Ammonia causes stress corrosion cracks (SCC) that leads to leakages. The facility will test the strength of steel against corrosions, as well as measure electro-chemical properties of steel exposed to ammonia.
- CONTEXT: *All steel plates corrode when exposed to ammonia or hydrogen for a long period of time. However, there are a lot of unknowns when it comes to their reaction with steel and other materials when stored in large quantities. Japan presently limits ammonia storage to 40,000 tons in one tank, but larger tanks will be required for coal-ammonia co-firing at power plants.*

- TAKEAWAY: Steelmakers and tank manufacturers are divided on SCC. Some say chrome-nickel stainless steel (SUS304 grade) is acceptable. The de facto standard for steel used in hydrogen systems is chrome-nickel-molybdenum steel (SUS316), which has stronger anti-corrosion properties than SUS304. Idemitsu plans to use its LPG tanks, made of carbon steel, for ammonia storage. The Clean Fuel Ammonia Association proposes tanks made of pressed concrete that do not exist in Japan.

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IHI receives order for methanation system from NGK Insulators

(Company statement, Nov 8)

- IHI received an order from NGK Insulators for a methanation system that converts CO2 and H2 into synthetic methane.
- It features a standardized design to reduce installation costs and delivery times.

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Key broadcast stations disclose production carbon footprint

(Japan NRG, Nov 16)

- Key broadcasting media companies disclosed the carbon footprint of program production at the Inter BEE 2023 conference in Chiba.
- NHK reported 1.11 tons of CO2-equivalent were released per one hour program production. Fuji Television Network emitted 1.07 tons per one hour program.
- NHK's decarbonization plans include using less air conditioners, public transport where possible, reducing print outs, shift to EVs and subscriptions to renewable-derived power services.
- Fuji has offset its emissions with J-Credits. TBS Television has introduced one hydrogen-fueled relay truck and purchased green power certificates.
- CONTEXT: *Some 155 Japanese media companies formed an alliance for public awareness campaigns. To compare, UK and Canadian broadcast networks have made climate action pledges, including calculation of all in-house production emissions.*

- TAKEAWAY: Some TV sponsors are demanding full carbon footprint disclosures and this is also pushing broadcast networks to stronger climate initiatives. Virtual reality technologies are also spreading in commercial production. According to Dentsu, emissions from VR programs are nearly half of real-life filming.

Satellite data useful in CO2 counts: MoE

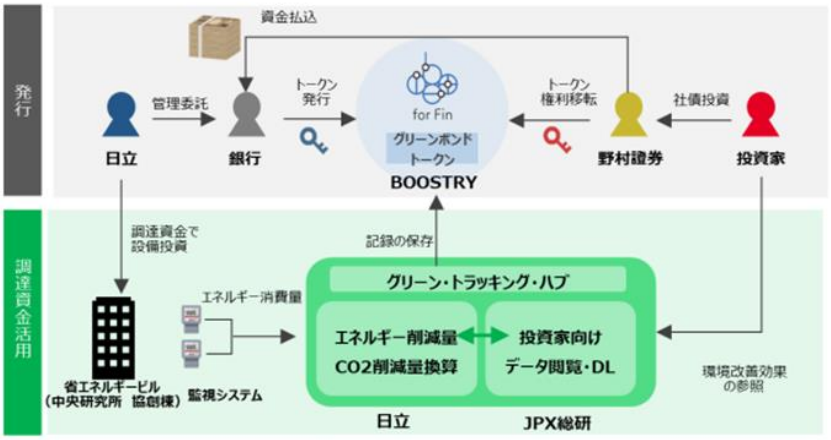
(Government statement, Nov 17)

- The Chuo University has verified that satellite data is instrumental in measuring carbon dioxide emissions.
- Mongolia's national emission counts matched the measurement based on satellite data. This week, Mongolia filed to the UN the world's first emission report using satellite data, which was collected by Chuo University in collaboration with a Mongolian govt research team.

Hitachi partners with securities companies for digital environment credits

(Company statement, Nov 16)

- Hitachi, Japan Market Innovation & Research (JPX), Nomura Securities, and Boostry, will cooperate on Green Digital Track Bonds, a digital environmental credit. They'll use Hitachi's technologies for the Internet of Things (IoT) and blockchain.
- Also, the companies will adopt a "Green Bond Token", a corporate bond type of digital credit on the blockchain.



デジタル環境債のスキームイメージ図

- CONTEXT: *This is the second digital environmental credit in Japan, following one made by Japan Exchange Group.*

Sumitomo Forestry to develop woody biomass chemical products with GEI

(Company statement, Nov 15)

- Sumitomo Forestry inked a deal with Green Earth Institute to promote its biorefinery business using woody biomass.
- They'll seek to accelerate shifts from petrochemical products to biomass-based chemical products. Those woody components can be used for bioplastics, sustainable aviation fuels (SAF), foods, bio-rubbers, and more.
- CONTEXT: *Forest covers nearly two-thirds of Japan. But half of the trees exceed 50 years of age, which means they don't absorb CO2 as they used to. Accelerating wood consumption, and planting new trees, can help CO2 absorption. By 2030, Japan aims to introduce 2 million tons of bioplastics and replace 10% of jet fuel with SAF.*

Toyota Motor partners with startup on battery recycling at new U.S. factory

(Nikkei, Nov 17)

- Toyota Motor will cooperate with U.S. battery materials startup Redwood Materials, to utilize recycled materials in its new battery factory in South Carolina. The goal is to reduce dependency on foreign battery resources and promote recycling.
- The factory is set to start operations in 2025. It will have an annual production capacity of over 30 GWh by 2030, enough for around 400,000 EVs.
- CONTEXT: *Many EVs, such as the first-generation Prius models, are about to reach the end of their usable lives. Redwood Materials focuses on recovering rare metals from used batteries for reuse. Toyota has been collaborating with Redwood since June 2022.*

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KEPCO to work with Vertical Aerospace on e-VTOL charging facilities

(Company statement, Nov 15)

- KEPCO signed an MoU with the UK's Vertical Aerospace (VA) to develop charging facilities for electric Vertical Take-Off and Landing (e-VTOL) aircraft in Japan.
- VA is designing a 1-pilot, 4-passenger eVTOL aircraft and will showcase the e-VTOL (VX4) at the Osaka Kansai Expo in 2025.
- VA will define requirements for e-VTOL charging facilities. KEPCO will develop DC fast chargers, battery cooling systems, and energy management systems.

NEWS: ELECTRICITY MARKETS

METI sets price cap for Round 3 of offshore wind auctions

(Government statement, Nov 14)

- In the latest guidelines for the next auction round for the area off the Sea of Japan in Aomori Pref and Yusa Town in Yamagata Pref, METI has set the cap on the supply price at ¥18/ kWh, down ¥1 from the ceiling for the second round.
- While capital, operation and maintenance, as well as removal costs are estimated at a higher level than in the previous round, the cap on the supply price has been set at ¥18/ kWh, based on the outlook for an average 4.5% improvement in facility utilization due to factors such as superior wind conditions.
- The upper limit of the capacity offer has not yet been determined, but the lower limit is set at 96 MW off the coast of Aomori Pref and 360 MW off the coast of Yamagata, which is 20% less than the grid capacity already secured.
- The zero premium level will be set at ¥3/ kWh, just as in the second auction round.

- TAKEAWAY: Japan's decision to decrease the auction cap price is at odds with evidence in other markets that suggests inflation and rising materials costs are pushing up developer costs. However, Japan's original prices were more generous than in other markets and the latest price cap change is small. Feedback from industry players may yet adjust the auction parameters.

Offshore wind eyed in the EEZ, Japan prepares for deployment in multiple areas

(Government statement, Nov 15)

- Seeking to set up offshore wind power stations in the Exclusive Economic Zone (EEZ), a Cabinet Office experts panel began studies on international law issues while METI and MLIT focus on local issues.
- Aiming for multiple GW-class wind projects within the EEZ, METI and MLIT will come up with rules on deciding project locations, local jurisdictions, rights and liabilities since the EEZ falls outside most regulatory frameworks.
- The Cabinet panel is clarifying the definition of offshore wind facilities in light of the UN Convention on the Law of the Sea, and reviewing impact on Japanese regulatory rules for environmental impact assessment, notification processes to other governments, and other issues.
- CONTEXT: *Japan aims to introduce up to 45 GW of offshore wind power by 2040. The govt is looking at the potential of the EEZ to meet these ambitious targets.*

Carbon credit market reaches 12,000 tons; TSE to further boost liquidity

(Denki Shimbun, Nov 14)

- One month has passed since the Tokyo Stock Exchange (TSE) began trial trading in the Carbon Credit Market. J-Credits worth about 12,000 tons of CO2 were traded by Nov 11.
- J-Credits representing emission reductions via the installation of renewable energy accounted for 7,957 tons and credits representing CO2 cuts via energy conservation were 3,732 tons, representing 98% of the total.
- With several categories of credits trading, there are variations in prices. J-Credits linked to renewables ranged from ¥2,730 to ¥3,900; those associated with renewable energy and heat, from ¥2,000 to ¥2,480; and credits tied to energy conservation ranged from ¥1,510 to ¥2,850. Forest credits ranged from ¥6,046 to ¥9,900.
- CONTEXT: *The market opened on Oct 11. Only J-Credits are traded, with six categories representing various actions to reduce or avoid CO2 emissions. These include energy conservation, installation of renewable energy, the use of renewables to produce heat, and forest management.*
- To enhance the market, the TSE plans to introduce a Market Maker system on a trial basis starting this month until the end of February 2024. The govt will auction credits that it has issued to market makers (i.e. financial institutions such as securities firms and banks), which will then trade them on the broader market.

- TAKEAWAY: It's hard to make an assessment of a new market sector from its first month in action, but initial numbers seem good. The key to enhancing liquidity seems to lie in how buyers and sellers reach agreement on prices and how to increase the creation of credits. The introduction of govt auctions and market makers will expedite volume building as brokers look to expand their business. Still, there is a cautious mood in the market. Some worry about the limited scope of J-Credits and the perceived low incentives for buyers. Others point to recent negative media attention to carbon credits in other countries and uncertainty over this sector's future. If Japan can build a reputation for allowing trading of only easily verifiable, quality credits, then it could become a regional hub for credits.

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TEPCO addresses counter-terrorism measures at Kashiwazaki-Kariwa NPP

(Nikkei, Nov 14)

- TEPCO addressed four critical counter-terrorism measures at Kashiwazaki-Kariwa NPP. These are in response to an NRA order from April 2021 that halted operations.
- TEPCO said it completed these improvements. It now awaits the NRA's decision on whether to lift the operational ban.
- The NRA is reassessing TEPCO's ability as a nuclear operator following several incidents. Any restart will need approvals from the local community and the NRA.
- CONTEXT: *More than two years ago, the NRA issued an order that halted operations at the plant following failures in detecting intrusions and unauthorized entries into the main control room. Since then, TEPCO has made certain improvements, but in May the NRA identified deficiencies in four of 27 inspected items, prolonging the ban.*

- TAKEAWAY: NRA chairman Yamanaka said the inspections are about to end, and a report will be completed. Also, the NRA will announce its decision regarding TEPCO's ability to operate the plant. In theory, there is a

chance that the plant will be able to restart before year's end. Still, TEPCO needs local approval, and this may take a considerable amount of time.

- SIDE DEVELOPMENT:
  TEPCO detects 'abnormality' at Kashiwazaki-Kariwa NPP Unit 7
  (Company statement, Nov 14)
  - TEPCO detected an abnormality in the fuel cleaning equipment at Unit 7 of Kashiwazaki-Kariwa NPP. This happened during the cleaning of the 98th fuel assembly, and led to an immediate suspension of work.
  - They discovered a loose nut of about 1 cm in size within the piston valve device, which is used to control water flow direction.
  - CONTEXT: *A fuel assembly consists of a bundle of fuel rods. It requires regular cleaning, so as to prevent objects from entering and damaging the fuel rods.*

KEPCO seeks extension of operation of nuclear power plants to improve efficiency

(Nikkei, Nov 15)

- KEPCO seeks to extend the period of continuous operation of nuclear power reactors to 15 months, two months longer than the current period, to improve the utilization rate of its plants. Discussions with the NRA are underway.
- The firm will also examine if it could inspect diesel generators and other equipment while the plant is in operation, in a move to expedite inspections.
- CONTEXT: *The restart of KEPCO's Takahama Units 1 and 2 (Fukui Pref) earlier in 2023 has helped with the recovery of the utilization rate of its facilities to 70-80%.*

- TAKEAWAY: This move could potentially reduce demand for coal and goal for the utility.

MHI wins contract for Monju site research reactor

(Denki Shimbun, Nov 17)

- The Japan Atomic Energy Agency selected MHI as the contractor for the design and manufacture of a new test research reactor planned at the site of the prototype Monju fast-breeder reactor (Tsuruga City, Fukui Pref) that's now being decommissioned.
- The new test research reactor, with a output of about 10 MW, is based on JAEA's JRR-3 research reactor (in Tokai-mura, Ibaraki Pref).
- The construction cost is estimated to be about ¥550 billion.

Hitachi wins order for the next-gen Central Power Supply Command Center

(Japan NRG, Nov 16)

- Hitachi won an order for the next-gen Central Power Supply Command Center from "Transmission and Distribution Systems," in which 10 general power distribution companies are investors.
- The project aims to standardize and share specifications for distribution systems used by the major power companies, excluding Okinawa. This initiative will also contribute to reducing the cost of the system that each company independently built.
- Operation of the new unified system will begin in the latter half of the 2020s.
- Hitachi will utilize technology from Hitachi Energy. It will develop features such as wide-area load frequency control (LFC), a first for Japan, and optimization calculation functions for nationwide startup and shutdown of plans, as well as demand-supply control.
- CONTEXT: *Power distribution companies seek to standardize demand-supply and frequency control specifications, which currently differ among them, to allow for power adjustments across regional boundaries. This will also enhance flexibility and scalability in anticipation of future regulatory changes and leverage better information disclosure for demand-supply control. Currently, each company discloses information through its own disclosure server.*

- TAKEAWAY: This is one step toward improving the efficiency of Japan's power grids by elevating decision-making to the national level, rather than resolving balancing and other grid issues at a regional level. The goal is to achieve nationwide merit-order-based, demand-supply adjustment while taking into account congestion on inter-regional transmission lines and local systems.

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PowerX's PPA service to supply energy at night with solar power saved during day

(Company statement, Nov 15)

- PowerX launched a new service, "X-PPA", to supply electricity in the form of a PPA using biomass, solar PV, and wind power. Excess daytime solar power is stored in batteries, and discharges at night when power demand is high.
- The company plans to start this service in summer 2024, deploying 15 MW of capacity in TEPCO's operation area, targeting commercial real estate.
- CONTEXT: *PowerX is a Tokyo-based start-up and producer of energy storage systems. Japan has the world's third largest solar PV generation capacity; however, the capacity and price fluctuate depending on the season and climate.*
- SIDE DEVELOPMENT:
  PowerX corporate electricity sales service starts next summer; partners with Japan Post
  (Company statement, Nov 16)
  - PowerX will introduce an electricity sales service for corporations in urban areas that have limited capacity to install renewable energy sources and batteries.
  - The firm will offer 15 MW in the first phase, and 20 MW in the second phase with a ¥24/kWh tariff or less.
  - PowerX signed an agreement with Japan Post to optimize their electricity services. Mitsubishi UFJ Bank and Nomura Real Estate are also considering the system.

Orix inks one of Japan's largest PPAs to supply airports with solar power

(Company statement, Nov 15)

- Financial services firm Orix signed a PPA to deliver about 23 MW of energy for airports in the Kansai region. The installations are set to begin in the spring of 2025.
- Orix will set up a solar plant and a rooftop system on Kansai International Airport's cargo building, with a total capacity of 23 MW.
- The solar facilities can cover about 20% of Kansai Airports Group power needs.

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Hitachi to upgrade massive HVDC transmission system in Brazil

(Company statement, Nov 9)

- Hitachi Energy won an order to upgrade the Garabi high-voltage direct current (HVDC) converter station in Brazil for Taesa.
- Hitachi will install its digital control platform. The goal is to enhance the station's calculation capacity and to integrate control and protection functions.
- CONTEXT: *Taesa is one of Brazil's largest private electric energy transmission groups. The Garabi station has one of the world's most powerful "back-to-back" HVDC systems, transmitting up to 2.2 GW of electricity. It plays a critical role in enabling power exchange between Argentina and Brazil.*

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Tokyo Metro govt chooses Idemitsu subsidiary as clean energy supplier

(Japan NRG, Nov 13)

- The Tokyo Metropolitan Govt tapped Idemitsu Kosan's subsidiary, Idemitsu Green Power, as a supplier for its FY2023 electricity plan for the fourth consecutive year.
- Idemitsu will buy excess electricity from post-FIT residential homes at ¥11/ kWh (including ¥1.5/ kWh subsidy from Tokyo), and supply 100% renewable energy to municipal offices in Tokyo Pref.
- The purchase period will last from December 2023 to November 2024.

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Vena Energy, Tokyo's marine university unveil tech for use in offshore wind projects

(Company Statement, Nov 13)

- Vena Energy and Tokyo University of Marine Science and Technology (TUMSAT) have developed a new project management tool for offshore wind power.
- The researchers discovered new methods to gather meteorological and oceanographic information, streamline cooperation with local fisheries and communities, and also for technical aspects such as scour protection of offshore foundations and forecasting of waves in nearshore areas.

GPI to start of Japan's first large-scale offshore wind farm using jacket foundation

(Company statement, Nov 16)

- Offshore wind developer GPI completed the trial operation of all 14 Siemens Gamesa wind turbines at its Ishikari Bay New Port offshore wind farm near Hokkaido.
- This is Japan's first project with large-scale wind turbines for offshore power generation using a jacket foundation. Total capacity is 112 MW.
- The power will be sold to Tohoku Electric at ¥36/ kWh for 20 years via FIT.

NEWS: OIL, GAS & MINING

Opinion: As Japan aims to decarbonize, it needs to cut CRM reliance on China

(Toyo Keizai, Nov 14)

- *This opinion piece was written by Kitamura Shigeru, a national security advisor under ex-PM Abe and former head of the Cabinet Intelligence and Research Office.*
- The article argues that Japan's current decarbonization strategy makes it too dependent on imports of critical raw materials (CRMs) from China, such as lithium batteries and rare earths, which are used for technologies such as wind turbine motors.
- Without some control over the supply chain for key components, Japan's energy policies in renewables, EVs, and other clean technologies would be swayed by China.
- This is a risk to Japan's ability to meet its 2030 emission reduction targets, especially because China has a dominant position in the global renewables sector.
- Japan should build an energy strategy on technologies that have secure, diversified supply chains and home industry advantage, such as in Perovskite solar cells (PSC).
- CONTEXT: *Recent changes in the Chinese political landscape with the death of former PM Li Keqiang and the arrest of a top Japanese executive in the country will also impact ties between the two nations, according to the article.*
- Japan's dependence on China for clean energy tech is increasing; from China, Japan imports about 55% of lithium essential for EV batteries and 60% of rare earths.

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MOL signs long-term charter contract for LNG carrier with JERA-founded company

(Japan NRG, Nov 13)

- Mitsui O.S.K. Lines (MOL) signed a long-term charter contract for a new LNG carrier with a vessel management company funded by JERA.
- This is the sixth LNG carrier chartered for JERA. Completion is expected by 2027.
- The carrier is being built by Samsung Heavy Industries in South Korea.
- The vessel will run on engines that can use both fuel oil and vaporized LNG.

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LNG stocks reach 2.42 million tons, up 2%

(Government data, Nov 15)

- LNG stocks of 10 power utilities were 2.42 million tons as of Nov 12, up 2.1% from 2.37 million tons a week before.
- Since October, weekly stocks have increased for seven consecutive weeks; end-October stocks were 2.19 million tons.

- The end-November stocks last year were 2.55 million tons and the five-year average at this time of the year were 2.12 million tons.

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October oil/ gas/ coal trade statistics

(Government data, Nov 16)

Imports	Volume	YoY	Value (Yen)	YoY
LNG	5.4 million tons	6.4%	¥496 billion	-37.6%
Crude oil	11.7 million kiloliters (73.6 million barrels)	-7.3%	¥1.015 trillion	-16.8%
Thermal coal	8.6 million tons	-5.1%	¥244 billion	-52.4%

ANALYSIS

BY FILIPPO PEDRETTI

Japan's Spent Nuclear Fuel Dilemma: KEPCO Seeks a Solution

As Japan's nuclear power industry faces a rebirth after nearly a decade of dormancy, nuclear waste disposal is now a priority issue. There are roughly 19,000 metric tons of radioactive material stored on-site at power plants across Japan, accounting for 80% of capacity. Finding a solution is not just a matter of safety – there are politics involved.

No one is as deeply embroiled in the drama as Kansai Electric (KEPCO). It is Japan's largest nuclear power operator and the most reliant utility on the atom for electricity. Worse, it has made a commitment to the prefecture that houses all of its nuclear stations to relocate all of its nuclear waste elsewhere. That's a promise that KEPCO is finding harder and harder to keep as a key deadline approaches.

Within the next six weeks, KEPCO must decide on at least an "interim" storage site that can accommodate its spent nuclear fuel for several decades (before it can move to a final waste depository deep underground). Should it fail to do so, then three of KEPCO's reactors are at risk of being asked to shut down. While that's unlikely in the middle of winter's peak energy demand season, there's certainly a sense of urgency among KEPCO top management.

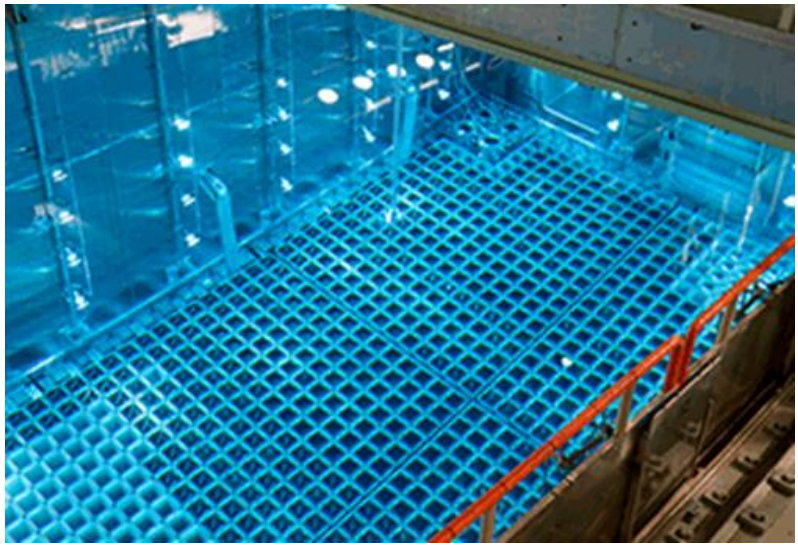
Recently, reports have surfaced that the company has identified potentially suitable sites for an interim solution, followed by vaguely positive government comments. But there's nothing official, as yet. Local government officials, no matter how sympathetic, will lose face should they allow KEPCO to ignore its own 2023 deadline to present a plan for removing the waste from Fukui Pref.

What happens to KEPCO will have an impact on the nuclear sector nationwide.

Spent nuclear fuel and storage facilities

Nuclear power relies on fuel made from pellets, which are hardened forms of processed uranium ore. After being utilized within a nuclear reactor for about four years, this fuel is removed as it no longer contains sufficient power levels. However, it still emits radioactivity and heat, and thus needs to be disposed of according to strict regulations.

The initial approach toward spent fuel involves placing it in on-site pools that are at least six meters deep, which are designed to cool the spent fuel and prevent radiation from escaping. Water is effective at blocking gamma rays and neutron radiation.



Pool for spent nuclear fuel storage
Source: KEPCO

Originally, these pools were intended only for short-term storage, with the plan to eventually transport the spent fuel to off-site locations for reprocessing — to extract plutonium, purify it, and recycle up to 95-97% of the material into new fuel. However, technical challenges have caused delays in the reprocessing agenda. METI notes that storage at power plants is reaching capacity, with about 80% of space already in use. This has led to safety concerns.

As an alternative, Japan is utilizing centralized "interim storage facilities" to house spent fuel, which alleviates the pressure on storage capacities at reactor sites. The idea is for the interim hubs to act as a placeholder until Japan identifies a final nuclear waste storage site deep underground.

One such interim facility is in operation in Mutsu, close to Rokkasho, which primarily stores spent fuel from the Tokyo Electric Power Company (TEPCO).

Interim storage facility.
SOURCE: KEPCO

KEPCO's commitment in Fukui Prefecture

Fukui Prefecture houses seven of KEPCO's nuclear reactors:
– Mihama nuclear power station's three units, (1.67 GW total capacity);
– Takahama nuclear power station's four units, (3.39 GW);
– Oi nuclear power station's three units, (4.71 GW).

The used nuclear fuel is stored in the NPP's pools, which are set to be full in about four to seven years. Their capacity has reached 77% at Mihama, 80% at Takahama, and 87% at Oi.

In the late 1990s, KEPCO made a commitment to locate a temporary waste storage facility outside the prefecture. The target date was set for late 2018, but later deferred to 2020; now it has been extended to the end of 2023. If not accomplished, this could lead to the shutdown of three reactors (Units 1 and 2 at Takahama, and Unit 3 at the Mihama).

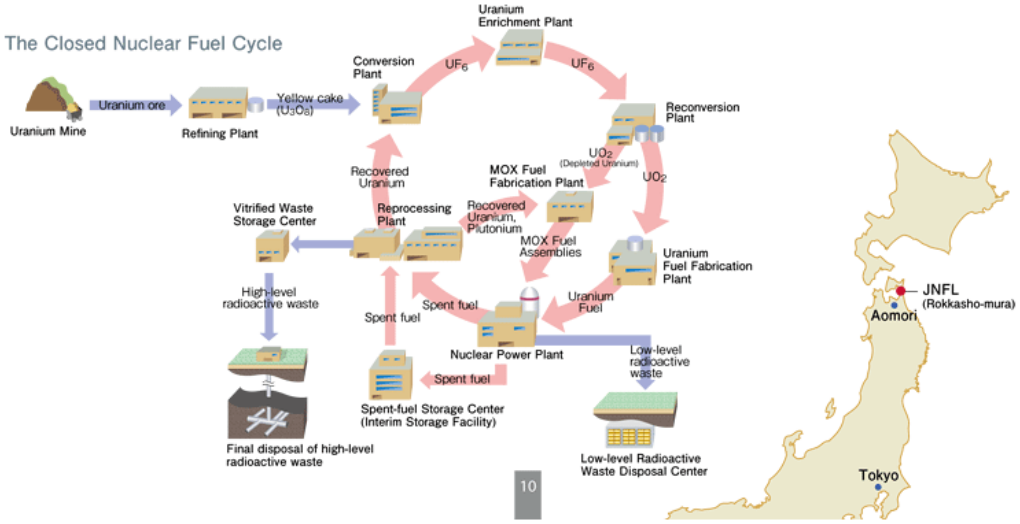
With no immediate solution in sight, KEPCO decided to get creative. On June 12, KEPCO's president, Mori Nozomu, informed Fukui Governor Sugimoto Tatsuji of their plan to transport 200 tons of spent nuclear fuel from Takahama to France for research purposes. KEPCO asserted that this was in line with their commitment, because the agreement didn't specify any geographical restrictions on "outside the prefecture".

The proposed amount to be sent to France represents 5% of the total spent fuel from the three nuclear plants in Fukui Prefecture. However, regional lawmakers are skeptical of Mori's assurances. But METI Minister Nishimura supports Mori, stating that KEPCO's approach was on a par with its pledge to find a temporary storage solution.

KEPCO's current plans

In theory, nuclear operators like KEPCO should be able to send their spent fuel rods to a reprocessing plant in Japan that would recycle the useful parts and use them to make new fuel and leave behind a much smaller waste footprint. The problem is, Japan's fuel reprocessing site in Rokkasho Village is not yet online.

So, in October 2023, KEPCO proposed a revised plan. The first measure calls for training specialists who can ensure the completion of the Rokkasho reprocessing plant so that it can hopefully be operational by 2025. Then, by 2030, it will gradually achieve an annual capacity of 800 tons of spent nuclear fuel.



Japan's closed nuclear fuel cycle program.
Source: The Federation of Electric Power Companies in Japan (FEPC)

In collaboration with power utilities, industrial manufacturers, and construction firms, Japan Nuclear Fuel Ltd (JNFL) is leading the effort to finalize construction of such a reprocessing facility. KEPCO has already assigned inspectors to assist with JNFL's oversight and inspection and it plans to train more specialists.

Second, from FY2027-FY2029, about 200 tons of the spent nuclear fuel will be sent to France's nuclear fuel cycle company Orano for research on reprocessing spent MOX (mixed oxide) fuel, specifically to see if MOX can be reprocessed in a sufficiently cost effective way that makes commercial sense.

Thirdly, KEPCO plans to begin use of a yet-to-be-determined mid-term storage facility by 2030. Until it becomes operational, the company intends to minimize the storage volume of spent nuclear fuel at its plants by adopting the two aforementioned strategies.

Also, studies are underway for a possible mid-term storage in Kaminoseki (Yamaguchi Prefecture). This will be a collaboration between KEPCO and Chugoku Electric, which needs a solution for spent nuclear fuel from Shimane NPP, whose Unit 2 last year received the green light for restart. A final decision on this facility's location has not yet been made.

Half-kept promises and Japan's nuclear strategy

Since October 13 when Governor Sugimoto Tatsuji of Fukui Prefecture approved KEPCO's amended strategy for disposal of spent nuclear fuel, the company can now extend operations of its three local reactors that have been running for over 40 years. This decision, however, has incited a backlash from the regional legislature.

The plan looks overly optimistic, and many are concerned that it lacks a concrete proposal for a location for the temporary storage facility. While the company reaffirmed its commitment to find a location and begin operation by 2030, there are fears that the spent nuclear fuel will remain within the prefecture for many years to come.

The central element of KEPCO's plan – the Rokkasho reprocessing plant – has been repeatedly delayed for 25 years. Compounding the problem is that the NRA's Chairman Yamanaka says that the review of the Rokkasho plant does not have a set finish date, since the facility must undergo additional upgrades before completion.

Meanwhile, KEPCO has sought approval from the NRA to extend the lifespan of Takahama NPP's No. 1 reactor, the country's oldest, beyond its 50-year operational limit set for November 2024. The company wants to have the reactor operating up to its 60th year.

The challenges faced by KEPCO and the entire nuclear industry in managing spent nuclear fuel are emblematic of a larger issue that casts a shadow over Japan's ambition to revitalize its nuclear sector. The complex plans and deferred deadlines for dealing with nuclear waste are undermining the national strategy to reinvigorate the nuclear industry at a moment when Japan desperately needs to increase carbon-free power generation capacity.

Moreover, KEPCO's apparent disconnect between the company's promises and fulfillment of its commitments does little to foster local acceptance of nuclear policy. If Japan will successfully navigate the sensitive path of nuclear energy reliance, then it must demonstrate more effective, transparent, and timely strategies for spent fuel management that align with the safety concerns and expectations of local communities and stakeholders.

ANALYSIS

BY ANDREW STATTER

Jobs in Japan: Non-compete Clauses, Do They Hold Up?

Non-compete, non-scout, confidentiality and 'garden leave' clauses appear in employment contracts worldwide, and Japan is no exception. How valid are these clauses in the Japanese market? What can companies do to protect their trade secrets and confidential information? And should employees be concerned about having such clauses in their employment contracts?

Employee protection is favored

Generally speaking, employees in Japan are very well protected, and both laws and courts tend to lean toward protecting the rights of individuals rather than the company. This stance is also seen when looking at dismissals, Japan is a notoriously hard market to fire people and companies must take clear steps toward dismissal with a verifiable paper trail. This is the opposite of Taiwan, where typically courts will rule in favor of protecting company interests.

As the Japanese constitution gives individuals the right to choose their job and employer freely, it requires a very clear and well-structured case for a company to restrict an employee from working for a competitor once their employment is terminated.

According to a publication on the topic by Nishimura & Asahi (1), the company will need to prove a clear necessity to restrict an employee from joining a competitor to protect the company's interests. Key points that are considered by a Japanese court will be:

- Nature, specificity, validity and depth of the proprietary information/trade secrets that the employee has access to.
- The position and seniority of the employee in question.
- Regional scope and duration of time of limitation to be imposed.
- Clear scope on what activities are prohibited, and with which parties such activities are limited.
- Importantly, the compensation that the company will pay the employee post-employment for bearing the restrictions.

As with many laws and regulations in Japan, the lines are not black and white, and are rather opaque and open to interpretation. Generally, wide and vague non-competes without a clear definition on the scope of activities to be limited tend not to be upheld. Another key point to consider is that non-competes which don't clearly specify a time period and a compensation structure during also tend to rule in favor of the employee.

The first and second points are also key to consider when deciding whether to try and enforce a non-compete or let the employee leave to a competitor unchallenged. For example, a senior leader in your firm who is leaving to a competitor in the same tender bid or RFP process, and could therefore clearly cause a loss of business, will be

much easier to enforce than a more mid-level employee leaving after said tender bid or RFP is submitted or won.

Points for employers on non-compete clauses

Be specific. A broad brush, one size fits all non-compete will fail to hold up more often than it will be upheld. Ensure that the length of 'garden leave', and compensation offered during that period are clearly stated in the employment contract as well, because omitting this is one of the leading causes of a non-compete being declared out of line with labor law and/or constitution.

Review and update non-compete clauses as employees move into new, and more senior positions in your company. The scope that was covered when a person was in charge of early stage project development will be significantly different from the scope if they are promoted to lead a competitive project bid.

Keep other clauses designed to protect your business separate from the non-compete. Data protection, confidentiality, non-scout, intellectual property clauses, etc, do not have the same protections from the Japanese constitution and therefore are highly enforceable.

https://www.nishimura.com/sites/default/files/images/80459.pdf

Points for employees looking to leave

Look at how specific your non-compete is, and consider the nature, specificity, depth of competitive information you currently possess, and how much potential damage it could cause your current employer at this given moment in time. Check for specifics on 'garden leave' and compensation, as this may affect enforceability. If you're not sure, take the time to consult with a labor lawyer.

Don't sign anything new! It's quite common that once you hand in your resignation, the company wishes to enforce the non-compete. However, they are aware that in most cases, what's written in your employment contract is too broad, vague and will not stand up in court. Often in these cases the company will bring a new, much more strongly structured non-compete to the table and attempt to have you sign and agree to this. You have no obligation to sign this, and bear in mind that if you do, that new document will be used against you if the case proceeds to legal action. In many cases it is advisable to sign nothing new, as the original non-compete is likely weaker than what the company produces at resignation timing.

Ignore cease and desist letters. Before taking legal action, a company or their legal firm may send you a letter threatening legal action. They may or may not follow through, this is very much case by case, however by responding to such letters you are acknowledging receipt, and depending on your response, may be providing evidence that you are knowingly violating a legal obligation. Bottom line, if they are going to take legal action, it will happen anyway, so don't give them anything else to build a case against you.

Don't poke the bear. Generally speaking, it's hard for your ex-employer to stop you working at the new employer. On the other hand, it's much easier for them to chase you for poaching employees, customer accounts, or using competitive information

against them. Same as your ex-girlfriend can't really stop you dating her friend, but she can certainly sue you for stealing her belongings on the way out the door!

Bottom line: Talk to a professional

As mentioned above, labor law, like many regulations in Japan, is opaque and open to interpretation. Though in most cases a general non-compete won't be easily enforceable, there are cases where you can protect your company's interests and will have a court rule in your favor. Also, in most cases the threats upon exit from a company are more bark than bite, there are cases where due to legitimate business or even personal reasons a company will aggressively look to uphold a non-compete or other protectionist clauses.

***Disclaimer**: Titan is not a certified legal advisor, and our advice is intended to be used as a guideline, and not to be taken as legal advice. If, as either an employer or employee, you wish to attain quality legal advice on labor issues, Titan can put you in touch with registered Japanese labor law firms through their partner network.*

ASIA ENERGY REVIEW

BY JOHN VAROLI

This new weekly column will replace Global View and will focus on energy events in Asia and those that directly impact markets in the region.

China / Coal power

As of January, China will start guaranteeing payments to coal-fired power plants based on installed capacity. The state planner, the NDRC, said that most thermal power plants would be able to recover about 30% of their capital costs in the next two years.

Fossil fuel demand

Demand for oil and natural gas, especially LNG, will stay strong for decades, driven by population growth and industrialization in economies across Asia, said Woodside Energy CEO Meg O'Neill. Asian countries will secure fossil fuel supplies as they simultaneously boost renewables in their power mix.

Indonesia / CCS

ExxonMobil will invest up to $15 billion in a petrochemical project and carbon capture and storage (CCS) facilities in Indonesia. Also, Exxon and Indonesia's Pertamina agreed to evaluate $2 billion in CCS using two underground basins in the Java Sea. It would store at least 3 gigatons of CO2 emitted by industries in Indonesia and the region.

Indonesia / Floating solar

President Widodo inaugurated a 192 MW floating solar power plant on a reservoir in West Java. The $109 million project was developed by PLN Nusantara Power, a unit of Indonesia's state utility PLN.

Indonesia / Renewable power

State utility Perusahaan Listrik Negara (PLN) plans to build an additional 31.6 GW of renewable power capacity between 2024 and 2033. This would represent 75% of the additional generation for the period, while the remaining capacity is expected to come from natural gas power plants.

LNG exports

North American LNG exports will more than double by 2027 to meet growing Asian demand. There are a total of 10 new projects in Canada, Mexico and the U.S.; production will expand to 24.3 billion cubic feet per day (Bcf/d) from the current 11.4 Bcf/d, as Mexico and Canada start their first LNG export terminals and the U.S. adds to existing LNG capacity.

LNG transport

Shipping of LNG from the U.S. to Asia is now more expensive due to increased transportation costs. The Panama Canal, through which much LNG travels from the Gulf coast to Asia, plans to reduce the number of slots due to a severe drought, as 2023 ranks as the second driest year.

Philippines / Nuclear power

Major power distributor Manila Electric will work with U.S.-based Ultra Safe Nuclear Corp to explore setting up small nuclear reactors. The two companies will undertake a pre-feasibility study to use micro-modular reactors, in which they will estimate the environmental impact, investment and operating costs.

SAF

Addressing the Assembly of Presidents of the Association of Asia Pacific Airlines, Subhash Menon said a global framework that enables the cost-effective supply of sustainable aviation fuel (SAF) is crucial for aviation to attain its net zero emissions goal by 2050. He called on governments, fuel producers, airports, etc to work together.

Southeast Asia

Southeast Asia continues to rely heavily on fossil fuels, which contributed 83% of its energy mix in 2020; just 14.2% came from renewables, according to the ASEAN Center for Energy. Unless governments introduce green policy initiatives, fossil fuels could account for 88% of the region's energy supply by 2050.

2023 EVENTS CALENDAR

A selection of domestic and international events we believe will have an impact on Japanese energy

January	○ METI Minister Yasutoshi Nishimura met with US DOE Secretary Jennifer M. Granholm in Washington D.C ○ PM Kishida met with IEA Executive Director Fatih Birol in Paris ○ Kishida-Biden summit meeting (January 13) ○ Last day to solicit public comments about GX (January 22) ○ Indonesia takes over as chair of the ASEAN for 2023 ○ JCCP (Japan Cooperation Center for Petroleum and Sustainable Energy) Symposium (January 26) ○ Japan's parliament convenes (January 23) ○ Lunar New Year (January 21-27) ○ Ammonia as Fuel World Summit (January 30-February 2) ○ Toyota group launches trial runs of FC truck transport system ○ IMO carbon regulation enters into force for all ships ○ China expected to announce the volume of rare earth production permitted by the government for the first months of 2023
February	○ Japan Energy Summit (February 28-March 2) ○ FIT solar auction (February 20-March 3) ○ IEA Global Methane Tracker 2023 release (TBD) ○ GX roadmap to be approved in a Cabinet meeting (February)
March	○ REvision 2023 Symposium by Renewable Energy Institute (March 8) ○ Japan Atomic Industrial Forum Seminar (March 13) ○ World Smart Energy Week (March 15-17) ○ Small solar, wind operators subject to tighter technical rules due to Electricity Business Act amendments (March 20) ○ FIT on-shore wind auction (March 6-17) ○ IPCC to release sixth assessment report ○ End of 2022/2023 Japanese fiscal year ○ WTO conference on steel decarbonization standards (March 9) ○ China hosts National People's Congress to appoint top government officials
April	○ Enforcement of Acts to Promote Non-Fossil Energy and Sophisticated Supply Structure enters Phase II (April 1) ○ Amendments to Energy Conservation Act take effect (April 1) ○ Process for non-firm renewable connection to local transmission lines starts (April 1) ○ Rare earth mining will require state licensing (April 1) ○ Canadian Sigma Lithium to start commercial production at its Brazilian mine, one of the five largest lithium projects in the world ○ GX League becomes fully operational ○ Eurus, Cosmo and Looop to bring online Japan's largest onshore wind farm ○ Japan holds local elections for governors, mayors and legislatures ○ G7 ministers meeting on climate, energy and environment in Sapporo (April 15-16)

May	○ May Golden Week holidays (May 3-5) ○ General election in Thailand (May 7) ○ World Hydrogen Summit (May 9-11) ○ G7 Hiroshima Summit (May 19-21)
June	○ 35th OPEC and non-OPEC ministerial meeting (June 4) ○ IEA annual global conference on energy efficiency (June 6-8) ○ General and presidential election in Turkey (June 18) ○ Lithium Supply and Battery Raw Materials 2023 (June 20-22) ○ Happo Noshiro, Murakami-Tainai, Oga-Katagami-Akita and Saikai-Eshima wind project auctions close (June 30) ○ JERA, Shikoku Electric start running new coal power plants
July	○ LNG 2023 World Conference (July 10-14)
August	○ China expected to announce the volume quota allowances of rare earth production for the balance of 2023
September	○ G20 New Delhi Summit (September 9-10) ○ 2023 UN SDG Summit (September 19-20) ○ 24th World Petroleum Congress (WPC) in Calgary, Alberta, (Sept 17-21) The theme is "Energy Transition: The Path to Net Zero"
October	○ IEA World Energy Outlook 2023 Release ○ BP Energy Outlook 2023 Release ○ Connecting Green Hydrogen Japan 2023 ○ Japan Wind Energy 2023 summit ○ FIT on-shore/offshore wind, biomass auctions (October 16-27)
November	○ COP 28 (November 30-December 12) ○ U.S. hosts the APEC summit in San Francisco ○ FIT/FIP solar auction (November 6-17)
December	○ ASEAN-Japan summit to mark 50 years of cooperation ○ Last market trading day (December 30)

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K.K. Yuri Group: Hulic Ochanomizu Bldg. 3F, 2-3-11, Surugadai, Kanda, Chiyoda-ku, Tokyo, Japan, 101-0062.