JAPAN NRG WEEKLY

SEPT 25, 2023

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NEWS

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- August LNG imports see almost double-digit drop YoY

ANALYSIS

LOCAL TAXES ON RENEWABLES IS NOW A TREND – AOMORI PREFECTURE THE LATEST TO STEP UP

Local governments hitting renewable energy projects with taxes seems to be becoming a trend. Now Aomori Prefecture says it will target renewable operators across the board. The governor held a lengthy news conference to better explain his plan. So, will this phenomenon accelerate or limp along? Will more cities and regions decide to wield taxation as a weapon to control the development of renewables projects that can sometimes cause environmental impact and anger local residents?

COW MANURE AS A NEW ROCKET FUEL? JAPANESE SPACE STARTUP GETS READY TO LIFT OFF

This is the amazing story of how cows in Hokkaido might contribute to the space race. One Japanese firm has committed to flying a rocket with liquid biomethane into space. It would be a world first, using fuel made from cow manure. *Japan NRG* uncovers how farmers, gas manufacturers and rocket scientists came to work together. Meanwhile, there are other projects underway to use the same approach to replace fossil fuels in factories and in shipping.

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

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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 mulls adding tax breaks to incentivize battery production

(Nikkei, Sept 23)

- The govt will soon announce its October economic stimulus package. Among other items, it is considering adding tax incentives to cut production costs for firms involved in production of semiconductors, batteries and biotech. The measures would seek to support manufacturers over a 5-10-year period and prioritize sectors with a high market entry risk.
- PM Kishida will announce the pillars of his economic stimulus package on Sept 25. Some of it is said to draw inspiration from the 2022 U.S. Inflation Reduction Act (IRA) legislation.
  Other key elements of the package include corporate tax cuts for the production and sales of critical goods from the perspectives of decarbonization, digitization, and economic security.

Power industry body rules on anti-competitive behavior, backs up regulator's allegations

(FEPC statement, Sept 13)

- The Federation of Electric Power Companies (FEPC) acknowledged Japan Fair Trade Commission's allegations of anti-competitive conduct.
- FEPC confirmed that its members, the former regional power monopolies (EPCOs), shared information when they planned entry into markets outside traditional areas. However, it denied the JFTC's claim that business decisions and information related to power retail were shared among company employees.
- FEPC announced stronger antitrust compliance measures, including more staff training and new federation meeting rules.
- CONTEXT: *In March, the JFTC asked FEPC to probe if trade association functions were abused to organize anti-competitive conduct. Kansai Electric (KEPCO), Chubu Electric, Chugoku Electric, and Kyushu Electric had allegedly formed a cartel.*

- TAKEAWAY: After exposing the cartel in March, the JFTC continues to monitor the power sector. Fact-finding surveys on how former regional monopolies and independent operators compete continue. The results are expected to impact the on-going debate about fully separating the retail, power transmission and power generation units of the EPCO's, which should be arguably one of the biggest developments in the Japanese power sector in at least a decade.

  - SIDE DEVELOPMENT:
    FEPC to abolish presidents' meeting over cartel allegations
    (Asahi Shimbun, Sept 14)
    - FEPC, which is composed of Japan's ten major electric power companies, will abolish the "Presidents Meeting," where the heads of the utilities gather once a month.
    - The decision will take effect in FY2024, and was made in response to concerns raised by lawyers following allegations of cartel-like behavior in the power market.

- In March, the JFTC slapped the EPCOs with fines totaling ¥101 billion for violating the Anti-monopoly Act.
- The lawyers' investigation concluded that no illegal information exchange took place during the meetings. However, they raised concerns about the Presidents Meeting.
- CONTEXT: *FEPC was established in 1952 and about 200 representatives from among its 10 member companies participate in the organization's activities. The highest authority within the federation is believed to be the Presidents Meeting.*

METI to push for cleaner hydrogen with new regulation

(Japan NRG, Sept 20)

- METI is writing a new regulation to drive a shift to hydrogen with a lower carbon footprint, a ministry official told the INCHEM Tokyo 2023 conference.
- Murao Kozue, the Hydrogen and Ammonia Division assistant director, said building a hydrogen-centered economy defeats its purpose if the molecules are not "clean". The ministry plans to write numerical targets for industries on the usage of low-carbon or net zero hydrogen, encouraging a gradual shift, she said.
- CONTEXT: *The 2017 Basic Hydrogen Strategy was updated for the first time in June this year with a clear shift in tone to put more emphasis on clean hydrogen. The updated version added support for the fuel standards proposed by the International Partnership for Hydrogen and Fuel Cells. Japan's hydrogen supplies are derived from fossil fuels, releasing 10 tons of carbon for 1 ton of hydrogen production.*

- TAKEAWAY: Strong enforcement of the new regulation is not possible because Japan has almost no supply of green hydrogen. This will likely be more like a guideline. There are only two domestic producers supplying green hydrogen on a commercial basis: Obayashi Corp and Yamanashi Prefecture. Their combined production is several tons per year.

- SIDE DEVELOPMENT:
  Mitsubishi begins full-scale operation of Takasago Hydrogen Park
  (Company statement, Sept 15)
  - Mitsubishi Power (MP) announced the full operation of the Takasago Hydrogen Park, the world's first integrated hydrogen validation facility.
  - The site is dedicated to hydrogen production, storage, and utilization. It employs technologies such as an alkaline electrolyzer and large hydrogen-fueled gas turbines.
  - MP aims to validate hydrogen co-firing and 100% hydrogen firing in gas turbines, and verify the technologies for next-gen hydrogen production. The hydrogen created on-site will be used for validation in a grid-connected gas turbine combined cycle power plant, with the goal of implementing 30% hydrogen co-firing by late 2023, and 100% hydrogen firing in 2024.
  - Mitsubishi Power is also testing on-site "turquoise" hydrogen manufacturing.
- SIDE DEVELOPMENT:
  JFE Engineering to provide Nisshin OilliO with hydrogen co-firing
  (Company statement, Sept 21)
  - JFE Engineering will install a co-firing gas turbine for a cogeneration system of 8 MW capacity at Nisshin OilliO's Yokohama Isogo factory. The system starts commercial operation in April 2025. Nisshin aims for 30% hydrogen co-firing by 2027.

RITE: Japan needs to capture 200 mln tons of CO2 by 2050

(Japan NRG, Sept 22)

- Japan will need to capture 200 million tons of CO2 to reach its 2050 neutrality goal, a researcher at the influential think tank, the Research Institute of Innovative Technology for the Earth (RITE), told the INCHEM Tokyo 2023 conference.
- RITE chief researcher Yogo Katsunori said Japan needs to rely on negative emission technologies if renewables costs remain high as today.
- To capture 200 million tons of CO2, Japan would need to install 10 units of 100 ton/ day direct air capture systems every year from 2030 to 2050. RITE plans to develop DAC equipment that can capture 0.5 ton/ day by 2025.
- CONTEXT: *Since September 2021, Swiss-based Climeworks has operated the world's first large-scale negative emissions facility. Eight collector containers at the company's Orca facility in Iceland remove 4,000 tons of CO2 a year, according to its website. It plans to scale that up. The global economy emits about 33 billion tons of CO2 annually.*
- SIDE DEVELOPMENT:
  JAPEX, Indonesian SKK Mingas to work on CCUS
  (Company statement, Sept 21)
  - Japan Petroleum Exploration (JAPEX) and Indonesian SKK Mingas, also known as the special task force for upstream oil and gas, signed a MoU on CCU and CCUS collaboration.
  - The two will build CCU and CCUS hubs and clusters in Indonesia using enhanced oil recovery methods.
- SIDE DEVELOPMENT:
  Chubu Electric joins BP to develop CCUS at Nagoya Port, storage in Indonesia
  (Denki Shimbun, Sept 12)
  - Chubu Electric will study CO2 storage in Indonesia together with BP. Since February, both have been studying CCUS potential at Nagoya Port in Japan.
  - A BP subsidiary will use the Tangguh gas field in Indonesia as a storage site and is evaluating technical requirements and costs.
  - The potential storage capacity is about 1.8 billion tons.

Pioneering carbon capture unit Petra Nova is operational again, says JX Nippon

(Powermag, Sept 13)

- JX Nippon Oil & Gas Exploration and Petra Nova resumed operation of what is often called the world's largest CCS facility.
- The facility restarted on Sept 5 after being shut since May 2020. It's one of only two CCS retrofits at a commercial power plant globally. The project, located in Texas, is designed to remove over 90% of CO2 emissions from a coal-fired unit at the W.A. Parish station.
- The $1 billion project, which started in 2016, uses the Kansai Mitsubishi Carbon Dioxide Recovery Process to capture CO2, which is then transported to an oilfield for enhanced oil recovery.
- The U.S. Dept of Energy supported the project and reported that Petra Nova captured 92.4% of CO2 emissions from flue gas during the demo. Cost problems led to the project's shutdown in 2020, but JX Nippon believes it has made breakthroughs and now plans to operate it year-round.
- The facility aims to capture about 1.4 million metric tons of GHGs annually.

Green steel R&D subsidy to more than double

(Government statement, Sept 15)

- METI plans to more than double the Green Innovation Fund financing of green steel development to ¥449 billion, up from an initial ¥193 billion.
- Nippon Steel, JFE Steel, Kobe Steel and Japan Research Development Center for Metals will receive the funds.
- CONTEXT: *There are four research projects in Japan on the use of hydrogen instead of coke to remove oxygen from iron ore. Steelmakers are expected to produce hydrogen in-house from LNG. The R&D projects started in FY2021 and are due to run to FY2030.*

- TAKEAWAY: Steelmakers will need GW-capacity electrolyzers to meet their massive hydrogen requirement. Decarbonizing steel production is essential in cutting global GHGs; iron and steel production are two of the most carbon-heavy industries. Sweden's H2 Green Steel appears to be the global leader in switching to hydrogen-aided steel production and says it will start producing green steel commercially in late 2025. There are efforts to introduce green steelmaking in other countries too, including Brazil, which make Japan's progress in this niche appear slow.

Enecoat to commercialize mini-PSC modules in 2024

(Japan NRG, Sept 14)

- Kyoto University startup, Enecoat Technologies, plans to launch the sale of small perovskite solar cell (PSC) modules for digital gadgets in 2024, said CEO Kato Naoya, at Smart Energy Week.
- In August, the company hit a 21.2% energy efficiency rate for a 7.5 cm3 module.
- In 2026, the company plans to start mass producing larger outdoor modules for power generation. It also aims to go public before 2026.
- CONTEXT: *Panasonic and Sekisui Chemical plan to commercialize PSC products in the next few years. Enecoat's main focus is large perovskite system installations in outdoor spaces, but it might be making this move into a different segment in order to be first-in-market, and to monetize its technology.*

- TAKEAWAY: Finding the right insulator that won't impact power efficiency is crucial in the success of PSC-mounted IoT devices. Solar modules heat up and may cause electric shocks when in direct contact, and require protection when used for indoor IoT devices.

- SIDE DEVELOPMENT:
  Panasonic to commercialize PSC manufacturing equipment
  (Japan NRG, Sept 14)
  - Panasonic Product Engineering plans to commercialize PSC manufacturing equipment, a company official told *Japan NRG*. The Panasonic group has applied an ink-jet printing mechanism to produce thin layers of perovskite crystals.
  - Presently, academic institutions are testing the prototype equipment. The company did not elaborate on the commercialization schedule.
  - CONTEXT: *Six years ago, Peccell Technologies, which was founded by the 'father' of perovskite, Professor Miyasaka Tsutomu, began to market PSC manufacturing equipment. Subsequently, producers of equipment for thin-film PV modules followed.*

- TAKEAWAY: Panasonic can supply not only the PSC film manufacturing equipment but also the perovskite ink, which is the raw material, which would be a competitive advantage. Early use and spread of the equipment may help establish ink-jet printing as the key production approach.

PSC manufacturing technologies

Meniscus coating	Toshiba
Ink-jet printing	Peccell Technologies, Kishu GK, Panasonic
Roll-to-roll	Sekisui Chemical
Spin/die coating and annealing	Enecoat Technologies
Spray coating	Aisin

Toyota to more than triple EV production in 2025

(Nikkei Asia, Sept 23)

- Toyota Motor plans to more than triple its Toyota and Lexus brand EV production to 600,000 units in 2025, according to notifications the automaker sent to major parts suppliers. The target output for 2024 is 190,000 units.
- Toyota sold just 24,000 EVs in 2022.
- If the targets are achieved in 2025, EVs will account for 5-6% of total sales.

Sumitomo completes EV battery station in Hokkaido

(Company statement, Sept 13)

- Sumitomo completed the construction of the "EV Battery Station CHITOSE" in Hokkaido, with a 6 MW output and a 23 MWh capacity. This facility, set to begin full operation in the second half of FY2023, will join the Supply and Demand Adjustment Market (also known as Balancing Market) and the Capacity Market starting FY2024.
- This battery station is the first private sector system that will have a direct connection to the grid's high-voltage network
- A Sumitomo-Nissan Motor joint venture, 4R Energy, supplied the batteries.
- CONTEXT: *Sumitomo began grid storage battery demos in 2015 and works with the govt to institutionalize grid storage battery businesses. Hokkaido is known for its renewable energy potential and power grid stabilization R&D. Since its grid is mostly separate from mainland Japan, it's a suitable location for Sumitomo's plans to develop 100 MW of energy storage by FY2027.*
- SIDE DEVELOPMENT:

  Yamato Transport introduces 900 small EV trucks

  (Company statement, Sept 12)
  - Yamato Transport will deploy 900 "eCanter" two-ton electric trucks made by Mitsubishi Fuso Truck and Bus.
  - Yamato deployed 25 of the first eCanter models in 2017, which proved successful.
  - eCanter goes 116 km with a fully charged battery; max speed of 89 km/h. It takes 50 minutes to recharge the battery in quick-mode; 8 hours for a normal charge.

IHI joins green ammonia production and export in Australia

(Company statement, Sept 15)

- IHI Corp's local subsidiary, IHI Engineering Australia, will join the North Queensland Clean Energy Project that plans to produce and export green ammonia.
- The project will annually produce and export 500,000 tons of green ammonia made with solar and wind power. FEED starts in Q1 of 2024; a final investment decision will be made in 2025.
- CONTEXT: *IHI is already quite active in the region. In May 2021, IHI joined Woodside Energy and Marubeni to research the production and export of green ammonia produced from hydro power in Tasmania. In July, IHI was awarded a contract to undertake pre-FEED to assess the feasibility of producing and exporting ammonia in New Zealand's Southland, where there's abundant hydropower.*
- SIDE DEVELOPMENT:

  IHI to start selling ammonia fueled ship engines in early 2024

  (Japan NRG, Sept 20)
  - IHI's ammonia-fueled ship engines will be commercially available as early as January 2024, an IHI Power Systems official told *Japan NRG*.
  - In April, the IHI group started test runs of the world's first four-stroke ammonia-fueled engine, with 80% ammonia and 20% fuel oil. The tests will be completed in December.
  - The company plans to market engines allowing 90% ammonia and 10% fuel oil combustion. It makes use of vanadium-based catalysts to detoxify NOx emissions.
  - CONTEXT: *IHI competes with Germany's MAN, which is developing a two-stroke ammonia engine for ships. IHI has teamed up with NYK Line to test sail a tugboat in June 2024. MAN collaborates with Mitsui OSK Lines.*

Hitachi Zosen's innovative technology will fuel ships with green methanol

(Nikkei Asia, Sept 19)

- Hitachi Zosen will collaborate with Germany's MAN Energy Solutions to develop technology that can convert ship engines to run on green methanol.
- This conversion process, expected to take one to two months, allows existing engines running on heavy fuel oil to use methanol. Test operations are set to begin in 2024.
- Converting engines is cost-effective, about one-third the cost of replacement, since ships typically have a 20-year lifespan.

MOL to launch first sightseeing ship using biofuel and hydrogen

(Nikkei, Sept 13)

- In April 2024, MOL launched Japan's first hybrid sightseeing ship powered by biofuel and hydrogen fuel cells. It is made by Hongawara Shipbuilding.
- It will reduce GHGs by 53 to 100% compared to conventional heavy oil-fuelled ships.
- CONTEXT*: Development of hydrogen-powered vessels is moving forward at various Japanese companies. Iwatani will operate a hydrogen fuel cell ship in 2025. Yanmar Power Technology, a subsidiary of Yanmar Holdings, is also working with Uyeno Transtech and Kyoto University to develop a hydrogen engine-powered ship.*

ENEOS and Suntory to use UCO as SAF feedstock

(Company statement, Sept 12)

- ENEOS will collaborate with Dynac, a Suntory Holdings subsidiary, to procure used cooking oil (UCO) as feedstock for Sustainable Aviation Fuel (SAF).
- Dynac will collect UCO from the 80,000 dining establishments in Suntory's network, to supply the planned SAF plant at ENEOS Wakayama Refinery (Wakayama Pref).
- ENEOS plans to start the SAF plant, with an annual capacity of 400,000 kiloliters, by 2026.
- CONTEXT: *SAF is a biofuel to power aircraft; it has properties similar to conventional jet fuel but with a much smaller carbon footprint, depending on the feedstock and technologies used to produce it.*

JERA invests £1 million in British advanced materials startup

(Denki Shimbun, Sept 21)

- JERA invested about £1 million in Inmaterial, a British startup that develops and produces metal-organic frameworks (MOFs). This is the first investment by JERA Ventures, a unit of the Japanese power and LNG conglomerate.
- CONTEXT: *MOF is used to separate and store gas molecules, and in addition to CO2 recovery, it is also expected to be used as a hydrogen carrier.*

NEWS: POWER MARKETS

KEPCO restarts Takahama Unit 2; all its NPPs now operational

(Japan NRG, Company statement, Nikkei, Sept 24)

- Kansai Electric, also known as KEPCO, restarted the 47-year-old Unit 2 at the Takahama NPP (Fukui Prefecture). Now, all of the company's seven nuclear reactors can be operated. However, two units recently went offline for regular maintenance.
- KEPCO is the most reliant of Japan's big utilities on nuclear generation. Without it, the company's spending on fossil fuels rises significantly. The utility expects nuclear stations to account for more than 30% of its power volumes this year.
- CONTEXT: *Unit 4 of Ooi NPP was idled for maintenance checks on Aug 31 and Unit 3 of Takahama NPP did the same on Sept 18. Both should be able to restart by January 2024, the winter power demand peak season, unless there are technical or other issues.*

- TAKEAWAY: The reduction in thermal fuel costs will positively impact KEPCO's earnings, leading to an additional annual profit of about ¥145 billion. From a consumer viewpoint, this is also good news – if you live and work in western Japan. All the 12 reactors (11.7 GW) that have been allowed to restart in the country are situated in the west of the country. One 1 GW of nuclear capacity displaces roughly 1 million tons of LNG imports a year. Thus it is no surprise that Japan's LNG imports were down 17% in July on a YoY basis and again almost 10% in August. The situation is completely different in eastern Japan, however, including the Tokyo area, which now regularly faces capacity shortages during peak demand seasons.

    - SIDE DEVELOPMENT:
      Chugoku Electric to restart Shimane Unit 2 in Aug 2024
      (Company statement, Sept 11)
        - Chugoku Electric will restart Shimane NPP Unit 2 in August 2024. This is the first time the company has provided a specific restart plan.
        - The plan is to load fuel in June and bring the reactor online in August, followed by the resumption of commercial power operations in September.
        - This will be the first restart for the facility in more than 12 years. It was shut for regular inspection in January 2012.
        - CONTEXT: *The station is located in western Japan.*

A city in Nagasaki area mulls the idea of hosting nuclear fuel disposal site

(Denki Shimbun, Sept 13)

- The Tsushima City Council (Nagasaki Pref) adopted a petition requesting acceptance of a so-called literature research as the first step towards being selected as the location for a final disposal site for high-level radioactive waste.
- Mayor Takanobu Hita plans to make a final decision by Sept 27. If the literature research request is accepted, Tsushima City would become the third municipality to undertake the review, following Suttsu and Kamoenai in northern Hokkaido.

Hokkaido Electric and IHI begins research of CCS at Tomakomai coal plant

(Denki Shimbun, Sept 22)

- Together with Hokkaido Electric, IHI began to assess the scale and specifications for CCS facilities at the coal-fired Tomakomai Atsuma Power Plant (1.65 GW).
- In June, JOGMEC selected seven projects to spearhead carbon neutrality efforts by 2050; the goal is to develop model sites that could demonstrate how CCS can be scaled and its costs reduced.
- CONTEXT: *IHI has been re-entrusted with some of the tasks for this project. Both companies conducted a desk study of CCS for Unit 4 of the same power plant in fiscal years 2021 and 2022 as part of the NEDO project.*
- Hokkaido Electric, Japan Petroleum Exploration (JAPEX), and Idemitsu Kosan are also exploring the Tomakomai area for potential CCS sites.
- SIDE DEVELOPMENT:
  KEPCO to test solid-based CCS
  (Japan NRG, Sept 22)
  - Kansai Electric (KEPCO) will begin test runs of a pilot carbon capture system, using solid-phase materials to absorb the gas. The pilot will run at its Maizuru coal power plant in December, according to the Research Institute of Technology for the Earth (RITE).
  - The system has a 40 tons/ day CO2 capture capacity and will be placed in 60 °C conditions. Zeolite and other materials will be used to capture carbon.
  - CONTEXT: *KEPCO together with RITE and Kawasaki Heavy Industries aims to develop a large-scale carbon capture system that uses solids. This would be an alternative to commonly used amine solution, which is kept at high temperatures and is flammable. Further, an onsite carbon liquefaction facility, to allow the CO2 to be transported over long distances, is under construction and is expected to be completed in 2024.*

Sumitomo and JR East launch corporate PPA using FIP

(Company statement, Sept 11)

- Sumitomo, JR East, Summit Energy (Sumitomo Group), and JR Chuo Line Community Design (JRCCD) will launch an offsite corporate PPA plan to trade electricity from wind farms using FIP.
- The electricity comes from Sumitomo's Summit Wind Power Kashima farm and will be supplied to shopping centers and department stores run by JRCCD via Summit Energy. With this PPA, starting October 2023, the electricity will be switched to 100% renewable energy. In case the power from Summit Wind Power falls short, Summit Energy will supply electricity with non-fossil certification.
- CONTEXT: *Deployment of corporate PPA plans has been spreading, mainly using electricity from solar PV. This is the first case of a corporate PPA using wind power generation, for which it is more difficult to anticipate generation volumes.*

Nagasaki Goto floating offshore wind project launch postponed to 2026

(Company statement, Sept 22)

- The consortium building the Goto floating offshore wind farm in Nagasaki Pref will postpone its launch by two years to January 2026.

- The delay is due to glitches in two floating structure units assembled onshore. One of the three units already installed offshore was brought onshore for checks. Two other units may be brought onshore depending on inspection results.
- CONTEXT: *The Goto project was Japan's first floating offshore wind project awarded by a state auction. It went to the consortium led by Toda Corporation, and which included Osaka Gas, INPEX, Kansai Electric and Chubu Electric. Construction began last year.*

- TAKEAWAY: Japan is aiming to build the world's third largest offshore wind capacity by 2040. Floating offshore wind capacity is expected to play a critical role in this plan.

Mitsui to join Taiwan offshore wind project with Canadian utility

(Company statement, Sept 22)

- Trading house Mitsui & Co. said it took the final investment decision to participate in a 1.02 GW offshore wind project in Taiwan with Northland Power, a major Canadian utility.
- The Hai Long project is expected to begin operations anytime from the end of 2025 to the end of 2026. It involves 73 wind turbines in the offshore area 45-70 km off Changhua County, Taiwan, and consists of three sections. Part of the electricity will be sold to Taiwan Power Co. under a 20-year PPA, and the rest to a private user in Taiwan under a 30-year PPA.
- The total project cost is expected to be approximately ¥960 billion, of which approximately ¥540 billion will be raised through project financing, in which export credit agencies including JBIC, Nippon Export and Investment Insurance, and others.
- Northland will take a 60% stake and Mitsui 40%.

MOL invests in TouchWind to develop next-gen floating offshore wind turbines

(Company statement, Sept 11)

- Mitsui OSK Lines (MOL) will invest in Dutch floating wind start-up TouchWind. MOL seeks opportunities in the supply chain of floating offshore wind turbines.
- TouchWind's tilted angle, one-piece rotor wind turbine is expected to reduce wind interference between wind turbines that often occurs in large wind farms (wake loss) and to improve overall generation efficiency.
- The company plans to build 10 turbines (12 kW each) with a rotor diameter of 6 meters; and conduct onshore and offshore testing from 2024 to 2025.

JR East plan a new onshore wind farm in Hokkaido

(Company statement, Sept 12)

- JR East Energy Development published its environmental assessment report on a new wind farm in south Hokkaido Pref for public consultation. The report is available from Sept 12 to Oct 25 for viewing.
- The company has two plans: one is to install a maximum of 35 turbines of 4.3 MW to 6.1 MW to generate as much as 200 MW of capacity, and another is to install 100 turbines of 4 MW to 5 MW to generate 400 MW to 500 MW of capacity.
- The company plans construction in April 2027; commercial operation in April 2031.

Japan Wind Engineering plans 104 MW onshore wind in Fukui and Shiga prefs

(Company statement, Sept 14)

- Japan Wind Engineering submitted METI an environmental assessment for a new onshore wind farm at Sanjusan-gen-zan, a mountain lying between Fukui and Shiga Prefs. The wind farm will have a maximum of 103 MW of capacity from 17 turbines (each 6.1 MW). Construction to start in April 2027; operations in June 2030. The report is available for public viewing until Oct 13.
- Nearby, the company also plans to build the Mihama Shinjo Wind Farm.

JRE submits environmental report for another wind farm in Hokkaido

(Company statement, Sept 13)

- Japan Renewable Energy (JRE) submitted an environmental assessment for a 354 MW onshore wind farm in Wakkanai City, Hokkaido.
- The company plans to build up to 59 wind turbines (4.2 - 6 MW each) for the Soya Kyuryo Hills South wind farm. Construction starts in 2027, operation in 2032.
- CONTEXT: *Hokkaido seeks to become a center of wind power generation. Nearby are 10 other wind farms that started the regulatory approval process or will apply.*
- SIDE DEVELOPMENT:
  Renova unveils plan for a 106 MW onshore wind farm in Akita Pref
  (New Energy Business, Sept 11)
  - Renova plans to build the 106 MW onshore Yuri-Honjo-Iwaki wind farm (Akita Pref).
  - The project consists of 16 to 24 turbines (3.2 to 6.6 MW each).
  - Construction starts in May 2029 and commercial operation in December 2032.

Aomori Pref plans new ordinance on offshore wind port access

(Government statement, Sept 12)

- Aomori Pref plans to write a new ordinance to define rules for the access of portal facilities by offshore wind project contractors.
- This follows the national govt proposal to designate the Sea of Japan off the coast of Aomori as an offshore wind farm site subject to a govt auction.
- CONTEXT: *See also the Analysis section for details of the new renewable tax proposal.*

Unit 3 of KEPCO's Kurobe River 2 Hydropower Plant to begin operation

(Denki Shimbun, Sept 19)

- On Sept 12, KEPCO conducted a wet test on the water wheel generator of Unit 3 at the Kurobe River 2 Hydropower Plant, which is being upgraded. Unit 3 begins commercial operation on Sept 27. With the upgrades for Units 1 to 3, maximum output will increase by 2.7 MW to 74.7 MW.
- The upgrade work for the 85-year-old Kurobe River 2 Power Plant has progressed sequentially since 2014. Efficiency has improved by over 3%.
- CONTEXT: *Japan has a total hydroelectric power capacity of about 50 GW, mostly small-scale installations. Since adding new hydro plants is considered hardly possible, most capacity additions will come through modernizing existing facilities.*

Subsidies for electricity and gas bills extended by 3 months

(Nikkei, Sept 20)

- METI officially extended measures to mitigate high electricity and city gas bills until the January 2024 billing (for December 2023 usage). The plan was originally scheduled to end with September usage.
- Based on average usage, electricity bills for households will be ¥910 lower per month, and city gas bills will be ¥450 lower per month.

Pacifico Energy hires sheep for grass-mowing at solar power station in Miyagi

(Company statement, Sept 20)

- Pacifico Energy started trucking in sheep from nearby farms to "mow" grass that grows under the solar panels at its Furukawa Mega Solar Power Station in Osaki city, Miyagi Pref.

NEWS: OIL, GAS & MINING

New U.S. sanctions target Arctic LNG 2 project, Japanese stakeholders impacted

(Japan NRG, Sept 20)

- The U.S. imposed new sanctions on Russia, targeting Arctic LNG 2 that includes Japanese stakeholders. Japan has said it will remain in the project for economic security reasons.
- The project, located in Russia's Arctic Circle, is led by Moscow-based Novatek, with Mitsui and JOGMEC holding a combined 10% stake.
- Japan's Chief Cabinet Secretary emphasized the country's main goal to ensure a stable energy supply; but the sanctions could complicate support for the Arctic LNG 2 project and delay its production.
- U.S. sanctions target Russian companies in the project, as well as a UAE firm providing services.
- CONTEXT: *Novatek aims to begin production at Arctic LNG 2 by end of the year, with a goal to reach full capacity by early 2024. The project is designed to have three production lines with a combined annual capacity of 19.8 million metric tons of LNG.*

- TAKEAWAY: Japan's official stance has been to balance energy security with reducing dependence on Russian energy sources where feasible. Despite condemning Russia's invasion of Ukraine, Japan continues to hold stakes in significant fossil fuel projects in Russia. This position has at times been challenged by G7 allies and may again come under scrutiny with the start of production at Arctic LNG 2.

Japan and Canada sign MoC on battery supply chains

(Government statement, Sept 21)

- METI, the Canadian Department of Industry, and other relevant ministries signed a MoC to build sustainable and reliable battery supply chains in the two countries.
- The agreement aims to fuel investments, cooperation in emergencies, promote the use of renewable energy in supply chains, standardize recycling, etc.
- A government-business sector round table was held on this subject. Participants included Panasonic Energy, PPES, Asahi Kasei, Toyota Tsusho, Mitsubishi Corp, Mitsui & Co, Sumitomo Corp, Canadian companies and representatives of the two governments.

- TAKEAWAY: This agreement is another step toward greater integration among G7 allies, who seek to lessen their dependence on China for metals and materials seen as crucial to clean energy technologies. According to the U.S. Geological Survey, lithium reserves in Canada are some of the largest in the world. However, in terms of output, Canada only has about 2% of China's production; so Canada's mining sector will need large investments over the next decade.

SBM Offshore and MHI to collaborate on FPSO carbon capture

(Company statement, Sept 15)

- SBM Offshore and MHI agreed to provide a CO2 capture solution for Floating Production Storage and Offloading vessels used in offshore oil and gas production.
- This partnership utilizes MHI's "Advanced KM CDR Process" technology that can capture CO2 emissions from onboard gas turbines, potentially reducing overall FPSO emissions by up to 70%.
- CONTEXT: Advanced KM CDR Process uses amine liquid to capture carbon. MHI is the world's largest manufacturer of amine-based carbon capture systems.

August LNG imports down 9.6% YoY

(Government data, Sept 20)

- August LNG imports were 5.67 million tons, down 9.6% YoY; import value was ¥501 billion, down 29.8%.
- Crude oil imports were 13.3 million kiloliters (84 million barrels), down 3% YoY, while their value was down 25.5% to ¥977 billion.
- Thermal coal imports were 8.4 million tons, down 31.5% YoY, while their value slumped 63.4% to ¥230 billion. Total coal imports including coking coal were 14.8 million, down 14.3%; while their value was ¥438 billion, down 48.6%.

LNG stocks fall to 1.62 million tons

(Government data, Sept 20)

- LNG stocks of 10 power utilities stood at 1.62 million tons as of Sept 17, down 4.7% from 1.7 million tons a week earlier.
- The end-September stocks last year were 2.66 million tons. The five-year average for this time of year was 2.06 million tons.

ANALYSIS

BY MAYUMI WATANABE

Local Taxes on Renewables Is Now a Trend – Aomori Prefecture the Latest to Step Up

Municipal governments hitting renewable energy projects with taxes seems to be becoming a trend in Japan. Next, the main question is whether this phenomenon will accelerate or just limp along meekly. Will more cities and regions decide to wield taxation as a weapon to control the development of renewables projects that can sometimes cause environmental problems and anger local residents?

What happens in the next six to twelve months could prove to be a pivotal watershed in Japan's plans to build renewable energy infrastructure in order to reach its clean energy goals by 2030, and eventually 2050.

Following recent action by Mimasaka City and Miyagi Prefecture, two weeks ago the Aomori Prefecture said it will soon unveil its own tax plan for renewable energy projects. Amori's decision came at a moment when the renewable energy sector was deliberating on the Minister of Internal Affairs and Communications' response to the Miyagi plan.

The first two municipalities took aim at narrow tax targets: Mimasaka on solar farm operators, and Miyagi on projects that caused deforestation. Aomori says it will target all renewable operators across the board. Recently, the Aomori governor gave a news conference to better explain his plan.

Tax for cohabitation

On September 12, Aomori governor Miyashita Soichiro announced his government's preliminary plans to introduce a new tax on renewable operators. Next, the prefectural government will begin studies on the scope and details of the new system in the current fiscal year and will decide by March 2024 whether to push ahead with the plan. The tax complements his other plan to set zones where renewable installations will be prohibited.

Miyashita made this major policy announcement only three months after his first election as governor in June. Previously he had served as a mayor of Mutsu City for nearly nine years. He was Japan's youngest mayor, elected at age 35.

The governor's message was strong. He wants to protect the region's interests, claiming that large renewables operators are exploiting Aomori's nature, transmitting power to users outside of the prefecture and not paying a cent. "Renewables need to harmonize with nature, communities and make economic contributions," he said.

He envisages taxes on existing installations, as well as new projects, and all types of renewables from solar, biomass, to onshore and offshore wind. The prefecture has no offshore wind installations but this year the national government selected Aomori's Sea of Japan coastal area as a potential site for a 600 MW national project.

As the tax base is broad, the proceeds will be used not only to protect the environment but also to finance public welfare projects, education and various other purposes. The new plan, Miyashita hopes, will systematically change renewable operators' behavior and will drive them to adapt more to local needs.

He emphasized that he is supportive of renewables and climate initiatives, but wants to see green energy primarily for local consumption. "Aomori can be 91% self-sufficient with green energy if the new offshore wind projects, and installed but non-operating capacities, come online," Miyashita said.

The tax plan will start with onshore wind and will gradually spread to other types of installations. Aomori currently has 794 MW of onshore wind power stations, the most of the country's 47 prefectures.

Type	Capacity	Prefectural ranking
Onshore wind	794 MW	No. 1
Solar	895 MW	30th
Biomass	102 MW	19th
Hydro	4 MW	30th
Total	1,795 MW	NA

Aomori won't copy Miyagi

When the Miyagi prefectural assembly passed the renewable tax ordinance in July, fears that this move spreads to other prefectures began to trouble renewable operators. They expected Miyagi's neighbors, such as Yamagata and Fukushima prefectures, to follow as they have coordinated in cross-boundary wind project reviews.

Nara, Yamanashi and Hyogo prefectures, which have ordinances to fine offenders of solar installation rules, were also eyed as possibilities, as well as Shizuoka which suffered landslides Blaine's on solar projects, but Aomori was off their radar. The second surprise is Miyashita's ambitious plan is to tax all renewables, not just locally unpopular solar or wind projects.

In Japan, municipalities require the approval of the Minister of Internal Affairs and Communications to levy local taxes. The ministerial review of the Miyagi tax began on July 19. Previously, the minister proposed Mimasaka City to hold more dialog with those facing taxation, which implies disapproval.

	Aomori	Miyagi	Mimasaka
Tax subjects	All renewables	New solar, biomass and wind projects involving deforestation	Non-residential solar panels
Purpose	Nature protection	Forestry protection	Disaster prevention
Tax spending	General purpose from nature protection, sustainable energy, education to welfare.	Tax purpose is not to raise income; not decided.	Recovering damage from solar-triggered disaster

The future of Miyashita's plan is marked by uncertainties. His rather explosive remarks at the news conference may trigger conflicts with various stakeholders, such as the national government and leading energy companies. Wind is a well-established sector in the area with over 100 players. Some municipalities in Aomori are investing in renewables, including large wind projects.

Rokkasho Village is a minority shareholder of the 51 MW Futamata Furyoku wind operator, and Yokohama Township has a stake in the 32.2 MW Yokohama Machi Hibari Taira wind station.

Some operators are running in the red. Tsugaru Furyoku Hatsuden, which operates the 34.5 MW Jusanko wind farm, recently posted a net loss of ¥259 million. Miyashita argues that since the tax will be evenly spread out, its large base should have negligible impact on each business.

While small community-based renewables are likely to escape the tax, there's still the question: How do you separate power that's consumed in Aomori with volumes transmitted outside the prefecture when it comes to accounting? Also, how do you position waste-generated biogas? Is it considered harmful to the environment and community interests? Will the tax slow the development of new types of renewables in Aomori, such as ocean wave energy?

The Aomori Wind Energy Promotion Council that comprises wind operators, component suppliers, contractors and investors told *Japan NRG* that it has no plan to hold direct dialogue with the governor or the prefectural government.

In the end, the draft tax plan may not resemble what Miyashita had in mind. His impact may be limited to new projects, including possibly the country's largest 320 MW Michinoku project. But his bold move has fueled anti-renewables sentiment in other parts of the country. An increasing number of municipality chiefs are openly expressing discontent with local solar and wind installations and plans. Following Sojitz scrapping the 109 MW Hokkaido wind project in June, Wakayama and Iwate governors declared that they were against large wind projects.

Some municipalities are talking of tighter regulations. The new projects are getting bigger amid the national push for more renewables. Of 11 onshore wind project plans filed with METI and MoE in the past year, six were over 100 MW. And so, perhaps soon a second, and even a third unruly prefecture will emerge with designs of new taxes leading to the potential for the situation to snowball. That's an administrative environment that renewable energy developers and operators would find highly unfavorable.

Major wind farms and plans in Aomori

Wind Station	Capacity	Key Investors	Recent Annual Profit
Tsugaru Wind Farm	121.6 MW	Green Power Investment (NTT Anode Energy, JERA, etc), Tohoku Electric	¥1.15 billion for the whole GPI group
Futamata Furyoku	51 MW	Japan Wind Development, Idemitsu Kosan, Rokkasho Village	¥215 million
Eurus Noheji Wind Farm	50 MW	Eurus Energy	¥1.38 billion (for year to March 2020)
Yokohama Machi Furyoku	38 MW	Osaka Gas, Tokyu Land Corp, Development Bank of Japan	NA
Nakazato Furyoku	36 MW	Vena Energy	NA
Noheji Mutsuwan Furyoku	36 MW	Osaka Gas, Tokyu Land Corp, Development Bank of Japan	NA
Jusanko Furyoku	34.5 MW	Mitsubishi HC Capital	Net loss of ¥259 million
Iwaya Wind Farm	32.5 MW	Eurus Energy	NA
Yokohama Machi Hibari Taira Furyoku	32.2 MW	Hitachi Sustainable Energy, Yokohama Twp	NA
Mutsu Ogawara Furyoku	31.5 MW	Cosmo Energy	NA
Rokkasho Village Second Wind Power	31.35 MW	Japan Wind Development	NA
Mutsu Ogawara Furyoku (Under construction, operational in 2026)	57 MW	Itochu, Hitachi Zosen	NA
Michinoku Furyoku (Under studies, operational in 2030)	320 MW	Eurus Energy	NA
Fukaura Daini Furyoku (Under studies)	190 MW	Green Power Investment, Tohoku Electric	NA
Noushi Wind Farm (Under studies)	150 MW	Cosmo Energy	NA

Governors against wind projects

Governor	Date officially opposed	Project name	Operator
Hokkaido	June 16	109.2 MW Otaru Yoichi Furyoku (*scrapped*)	Sojitz
Aomori	August 4	320 MW Michinoku Furyoku	Eurus Energy
Wakayama	August 23	94.6 MW Inami Hidakagawa Furyoku	Tokyu Land
Iwate	September 4	140 MW Yabukawa Furyoku	Green Power Investment

ANALYSIS

BY MAYUMI WATANABE

Cow Manure as a New Rocket Fuel? Japanese Space Startup Gets Ready to Lift Off

Generations of kids around the world have grown up with tales that drinking milk will make them big and strong. Soon, milk retailers might be able to tap into another childhood dream, by linking the popular dairy product with space travel.

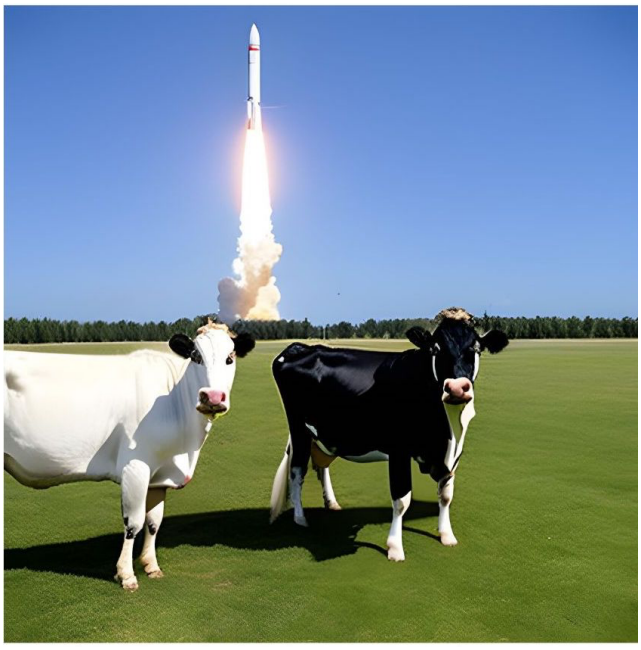
The amazing story of how Japan's dairy cows might contribute to the space race started with a local problem. The northern island of Hokkaido had an issue with power supply, which constrained local farmers from ramping up operations. So, the farmers decided to find a novel solution.

One thing that's plentiful on any dairy farm is manure. It might not be pretty, but the chemical properties of cow manure carry energy potential. The excrement can be partially converted into biogas, which naturally contains methane.

This biogas has been used for micro power plants in farming communities, offering enough to fuel 50-300 kW-sized generators. But studies over the last year have shown that the manure could offer a better end-product: liquid biomethane (LBM). This fuel could be powerful enough to fire rockets.

Were the tale to end here, it might serve as an amusing anecdote. Except that one Japanese firm has committed to flying a rocket with LBM into space. It would be a world first, using fuel made from cow manure. Meanwhile, there are projects underway also to use LBM to replace fossil fuels in factories and for ships.

So, how did farmers, gas manufacturers and rocket scientists get on board in the same room? *Japan NRG* has the full story.



This is an illustration only; Source: Canva AI generator

Hokkaido: a land of milk and manure

Hokkaido produces a quarter of the country's milk. It also produces 20 million tons of livestock manure, which is around a quarter of the national total. Dairy cows are raised to grow larger than in past years and today produce much more milk. This means they eat more and release more manure. In Hokkaido, almost all manure is used as fertilizer.

The odor released from wet manure has actually led to community conflicts. So, as a solution, the Sanei Farm in the Taiki Township built the country's first biogas power generation plant in 2013; it treats the manure from about 1,600 dairy cows and removes the odor before dumping it onto farmland. Biogas and electricity were "secondary byproducts".

The Sanei Farm has done well. It grew its milk business, almost doubling in size over the past decade. Other local farms then built power plants to run on biogas. But facing transmission capacity shortages, they approached an Osaka-based gas manufacturer, Air Water, to ask if there was a way to apply biogas outside of electricity generation.

Among Air Water's clients is a space startup called Interstellar Technologies (IST), which also happens to be based in Hokkaido. IST had built a rocket launch base in Taiki and was buying oxygen and other gases from Air Water to fuel its vehicle. And so, the rocket developer, the gas maker and dairy farms came together to develop an LBM supply chain as a natural consequence of their needs.

Cow manure, when heated and fermented at 40 C, starts to release biogas consisting of around 59% methane and 39% CO2, as well as traces of sulfur, water and nitrogen. The gas is cooled into a liquid state, and in the process non-methane gases are removed.

Last year, Air Water tested if it were possible to create a gas that could be used as fuel from biogas. The results were surprising. The company managed to achieve a methane purity of over 99% using a proprietary carbon capture technique that deploys heat exchange membranes and refrigeration methods via liquid nitrogen used for food processing. Air Water has a division that supplies chilled food products to supermarkets.

That level of methane content meant that LBM could be used as a substitute for LNG. In fact, LBM was more efficient than LNG, which carries only about 70-80% methane.

IST needed a fuel with particularly high energy density. Rocket fuels combust at 3,000 C and most elements burn off, but the less impurities they contain the better for the safety of other rocket components. Methane with 99% purity is good enough.

"We were planning to use LNG and were going to build an LNG distillation plant because LNG's methane content is 70-80%; but LBM is much better," said Horie Takahiro, IST's founder, in his YouTube channel.

And so, IST developed a six-ton rocket called ZERO, which will be fueled with LBM. The first test launch is in October.

Methane in space

Methane as a space fuel is being considered by a few countries. In 2022, China's LandSpace launched the world's first liquid-methane propelled rocket, and SpaceX also plans methane-propelled space travel.

But the world has yet to see a rocket fueled by cow manure. A rocket specialist confirmed to *Japan NRG* that 99% methane LBM is good enough to launch rockets.

"It is not a question of purity; 99.9% is not necessarily better than 99%. It depends on the entire combustion mechanism affected by the type of oxygen used to ignite the methane," he said, adding that rocket launchers are focused on methane-propelled systems because they eye landing on Mars and using methane collected on that planet's surface to fuel the return journey.

In contrast, on Sept 7, Japan's space agency, JAXA, launched its HIIA rocket to the Moon with liquid hydrogen.

Is it sustainable?

According to IST's Horie, the beauty of the LBM ecosystem is its sustainability. After all, the biogas is generated from cow manure and is thus a non-fossil fuel. Biogas is classified as carbon neutral, and while it emits greenhouse gases in its production, they're not accounted for in the carbon inventory system.

What's more, thanks to this ecosystem, the dairy farms hardly need to use outside power sources. They also use the methane they produce as a heat source to treat the manure.
IST's Horie sees further emissions reduction potential through the construction of a liquefaction plant on IST premises to save on the need to transport the fuel.

Of course, for all these improvements to be considered a "carbon neutral" development, the emissions from space launches themselves have to be included in the calculations. Once a rocket takes off, it releases carbon, methane and other gases into the atmosphere. At launch, IST's rocket burns 37 kg of fuel every second, with fuel quantities diminishing as it goes higher and starts to separate.

To test the sustainability premise of this undertaking, *Japan NRG* calculated the carbon emissions of the LBM supply chain based on public data and estimated them at a minimum of 130 tons of CO2/ year. (*See table below for details*).

Air Water declined to elaborate on our emissions calculations, but it did say that using LBM instead of LNG allows for a 60% reduction in emissions in various industrial supply chains.

Besides IST, a number of Japanese companies are planning to introduce LBM to replace LNG. These include Panasonic, Yotsuba Milk Products, and Obihiro Gas. Mitsui OSK Lines and its customer JERA also tested LBM for sailing ships.

Air Water plans to invest ¥60 billion to expand its 360 ton/ year LBM supply chain to 10,000 tons/ year. The investment includes spending on biogas and liquefaction plants.

Manure happens

As attractive as the manure-enabled system sounds, it might be tough to replicate outside of Hokkaido. In other regions, there are more meat cattle raised than dairy cows. The former produce manure with a lower liquid ratio, which would then require additional water to process. Drier dung tends to congest pipes.

Most Japanese farms are small, keeping less than 100 heads of cattle, which would hardly make it worthwhile to install the necessary processing equipment. Even worse, many of Japan's graying farmers worry if anyone will want to take over their business when they hang up their boots amid a shrinking population. A regular sized biogas plant costs ¥200 million and takes 20 years to depreciate.

Recent spikes in global energy and grain prices are just the latest concerns for Japanese dairy farmers, with some closing their business altogether.

Now, perhaps more than ever, the message of supporting local agriculture needs to be amplified if sustainable farming systems like the LBM supply chain are to take root.

For the youngest generation in Japan, supporting climate action could start by drinking a glass of milk a day.

LBM life cycle assessment (*Japan NRG* estimate)

Process	Calculation details	Annual emissions
Manure to biogas in Taiki	Energy sources are methane and self-generated power	Negligible (If 1,000 kl/ year of oil were used for heating, emissions are 714 tons)
Transport of biogas to Obihiro liquefaction plant	20 liters of diesel fuel consumed per trip, 2 trips a day, 365 days a year	15 tons
Liquefaction	Almost equivalent to LNG liquefaction, 0.32 kg CO2 for 1 kg of LNG	115 tons
Total		130 tons

NOTE: *The gas liquefaction plant is located in Obihiro City, 50-60 km from the Taiki farm. 30-ton trucks are used for transport, releasing 200 kg of carbon daily. Also, more fossil fuels could be consumed if additional heating is required on the back of an unexpected drop in temperature.*

Cost comparison: LBM production vs. LNG imports (*Japan NRG* estimate)

LBM production cost per ton	¥6 million
LNG import cost per ton	¥0.4 - ¥1.6 million

NOTE: *Production cost is estimated on the basis of Air Water's ¥60 billion investment plan for a 10,000 ton/ year facility. The import cost reflects the range of LNG import value in the past three years.*

GLOBAL VIEW

BY JOHN VAROLI

Below are some of last week's most important international energy developments monitored by the Japan NRG *team because of their potential to impact energy supply and demand, as well as prices. We see the following as relevant to Japanese and international energy investors.*

Australia/ LNG

Chevron's Wheatstone LNG export facility returned to full production after a fault at the plant cut output by around 25% last week. The problem coincided with escalation of labor strikes at other Chevron facilities that collectively account for about 6% of global LNG supply. That strike was resolved on Sept 21.

Canada/ Oil exports

The long-delayed Trans Mountain oil pipeline expansion (TMX), which will nearly triple the flow of crude from Alberta to the Pacific Coast, will launch early next year. This will shake up North America's supply by diverting barrels now mainly delivered to refiners and exporters in the U.S. Midwest and Gulf Coast.

Congo/ Hydropower

The Democratic Republic of Congo is still looking for partners in potentially the world's biggest hydropower project. Talks with Australia's Fortescue Future Industries have stalled regarding development of the 44 GW Grand Inga project.

Oil prices

This week, Brent crude climbed above $95 a barrel, but ended the week at $94.10, as supply cuts by Saudi Arabia and Russia raised concerns of a shortfall. "Saudi Arabia and Russia are in solid control of the oil market," said Bjarne Schieldrop of Norwegian bank SEB. In 2024, Brent prices are expected in the $80 and $105 per barrel range, said Goldman Sachs.

Qatar/ Natural gas

Qatar contract awards could exceed $20 billion this year as expansion projects gain momentum. The two expansion phases at North Field are expected to increase Qatar's LNG production from 77 million tpa to 126 million tpa by 2027.

Russia/ Oil and gas

Russia's oil and gas revenues are set to rise to around 733 billion roubles ($7.6 billion) in September, up 14% from August, according to Reuters calculations. The corresponding figure in September 2022 was 688 billion rubles.

UAE/ Oil

In August and September, the UAE began receiving the first cargoes of CPC Blend from Russian producers. This opens up a new export route as Moscow looks to find new customers and skirt Western sanctions. Russia is the world's third largest oil exporter, and has rerouted most of its oil to China, India and Turkey over the past year.

UK/ Nuclear power

The UK plans a 3.2 GW nuclear power plant, Sizewell C. But the govt is creating new security criteria for investors. Last year, the UK bought out a Chinese company's share in the project due to security concerns. The UK has set a target of building 24 GW of

nuclear capacity by 2050, a huge ambition that's been met with skepticism due to the costs.

Uruguay/ Oil exploration

State-run energy company Ancap will issue seven offshore exploration licenses. While no oil or gas has been found in Uruguay's waters, there's much interest due to recent discoveries in Namibia, across the Atlantic. 120 million years ago the two areas were connected.

U.S./ Coal

Billionaire Michael Bloomberg pledged $500 million to fight fossil fuel power generation. He wants to close "every last coal plant in America" and cut natural gas capacity in half by 2030. Bloomberg already has spent over $500 million to support the Sierra Club's Beyond Coal campaign, which originally aimed to retire 30% of the U.S. coal fleet by 2020.

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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