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2023 OCT – DEC

DON'T DISMISS NUCLEAR POWER

FUTURE

WILL SHIPPING TURN A CORNER?

SPECIAL FEATURE

NUCLEAR POWER HAS A BIG ROLE TO PLAY IN THE ENERGY TRANSITION. HERE'S WHY

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OCT - DEC 2023 VOL. 5 NO.01

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Will Shipping Turn A Corner?

At the COP28 summit, consensus was reached on addressing fossil fuels and their 'ignominious' exit. Shipping may also see a glorious day, as it may also benefit from this agreement.

20 Special Feature:
Nuclear Power Has a Big Role To Play In the Energy Transition. Here's Why

Nuclear energy, contributing 10% of global electricity and serving as a zero-carbon source, offers potential in addressing the intermittency challenges of wind and solar power during the transition to clean energy. The development of a novel reactor at CERN aims to tackle key barriers associated with nuclear power, highlighting the role of innovation in advancing this technology.

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SAYING, WHAT NEEDS TO BE SAID

How very magnificent. And it was over, not because nobody could reach a consensus but was despite that.

It has taken decades of climate talks for the world to call on states to move away from fossil fuels. And each time that happens, somebody, somewhere stonewalls the move.

Cop28's final text was stating the obvious, but it needed saying, like how the Guardian newspaper said it. And they said it like it is – fossil fuels must go. There are no 'ifs' and no 'buts', except for where the exit door is.

For the record, as can be seen from the natural disasters across the globe there is no gainsaying that all of these are mostly climate-induced. Because temperatures soar to celestial heights they pack that much of force and energy in the storms they cause, and floods they maroon people in.

As there is more energy in these climate-induced disasters, they undoubtedly unleash greater fury, and that greater fury now lies at the angst of everything that is wrong with the world.

By any measure Cop28 is a turning point. What lies next, are the deeds to match the words heard in Dubai.

The Global North has some serious stocktaking to do, apart from the distractions in Ukraine and the Israel-Hamas conflict. Domestic politics in the rich world and concerns over municipal issues threaten to gain on the minds of policy makers. That in turn poses a serious enough 'distraction' for money to spend on beating off the climate challenge. A new compromise must now be found!

Such chest thumping is sure feed for whipping up resistance against projects and policies that do not align with voters' needs.

The compelling need for carbon capture technology is no more pressing than now. 'Transitional fuels' is also the buzzword as what the world needs now is to contain planet-burning hydrocarbons.

Still as how the Los Angeles Times correctly pointed out, the agreement is a milestone, nonetheless. There is now a baseline global consensus on the need to move beyond fossil fuels.

We may be seeing the end of the beginning. And the era of fossil fuels is clearly numbered, and all governments need to do is to make good on the words they uttered in Dubai.

Jaya Prakash
Editor

CORRECTION

Fuels & Power herein wishes to issue a correction in a Personality Profile it ran of David Kinrade.

We hereby wish our readers to know that in a Personality Profile we did in Fuels and Power, Mr David Kindrade is chairman of the IMarENG (Singapore Branch) and not otherwise.

Far from sitting back and taking in the joy of retirement and soaking in the sweet scent of 'insouciance', Chairman of the IMarEng (Singapore Branch)

THE OFFSHORE WIND OPPORTUNITY IN ASIA GAINS STRENGTH

While there have been significant increases in renewable energy capacity in recent years driven by commitments to Net Zero, there is still a long road ahead in emerging markets in Asia, where coal and natural gas still account for a significant proportion of the total energy mix.

Recognising this, ambitious goals for the increase of renewable energy have made their way into national power development plans for many countries and it is clear offshore wind has a key role to play in the energy transition agenda in emerging Asia. Allen & Overy partners, Xue Wang, Adam Moncrieff, Sarah Wilson, Ginting & Reksodiputro in association with Allen & Overy, Foreign Legal Consultant (Partner Level), Michael Tardif, and senior associate Jessica Lee offer observations on this proven but currently underutilised energy source.

OFFSHORE WIND – A PROMISING OPTION

Offshore wind is a promising cost-competitive and reliable option where land availability is limited and strong and consistent wind resources are available, for example in China, Taiwan, Vietnam, Japan, India, South Korea and the Philippines. The offshore wind market in Asia is set for rapid growth in the coming years, driven by the increasing demand for renewable energy, a supportive policy environment, strong investor appetite and ambitious targets in key markets.

According to the International Renewable Energy Agency, Asia could account for more than half of the global offshore wind capacity by 2050.

However, the development of the offshore wind industry in Asia has faced many head winds; affected by the challenges of cost inflation, supply chain tightening and vessel availability which also affect other offshore wind markets globally, as well as jurisdiction specific challenges.

BIG PLANS IN EMERGING MARKETS

China remains the global leader in the offshore wind market, with more than 30 GW of installed capacity and ambitious plans to expand further in the coming years.

Taiwan completed the first phase of its Round 3 offshore wind auctions at the end of 2022. Taiwan continues to be a focus for many investors, despite recent challenges and delays faced by some of its offshore wind projects. However, with the most recently awarded projects increasingly being dependent on corporate PPA offtake as the main revenue source, this will present additional challenges for their bankability.

A strong pipeline of large-scale projects, especially floating wind projects, are on the horizon in South Korea. South Korea has set a target of 14.3 GW of offshore wind capacity by 2030 (reportedly set to increase) and announced several mega projects, such as the 8.2 GW Sinan project and the 6 GW Ulsan floating wind project, which are expected to attract significant investment and create thousands of jobs.

With a 3,000-km coastline and strong wind speeds, Vietnam has the natural conditions required to develop a strong offshore wind market. The Vietnam government released the Power Development Plan 8 that sets an offshore wind target of 6 GW by 2030 and 70–91 GW by 2050 signaling the government's commitment to the industry.

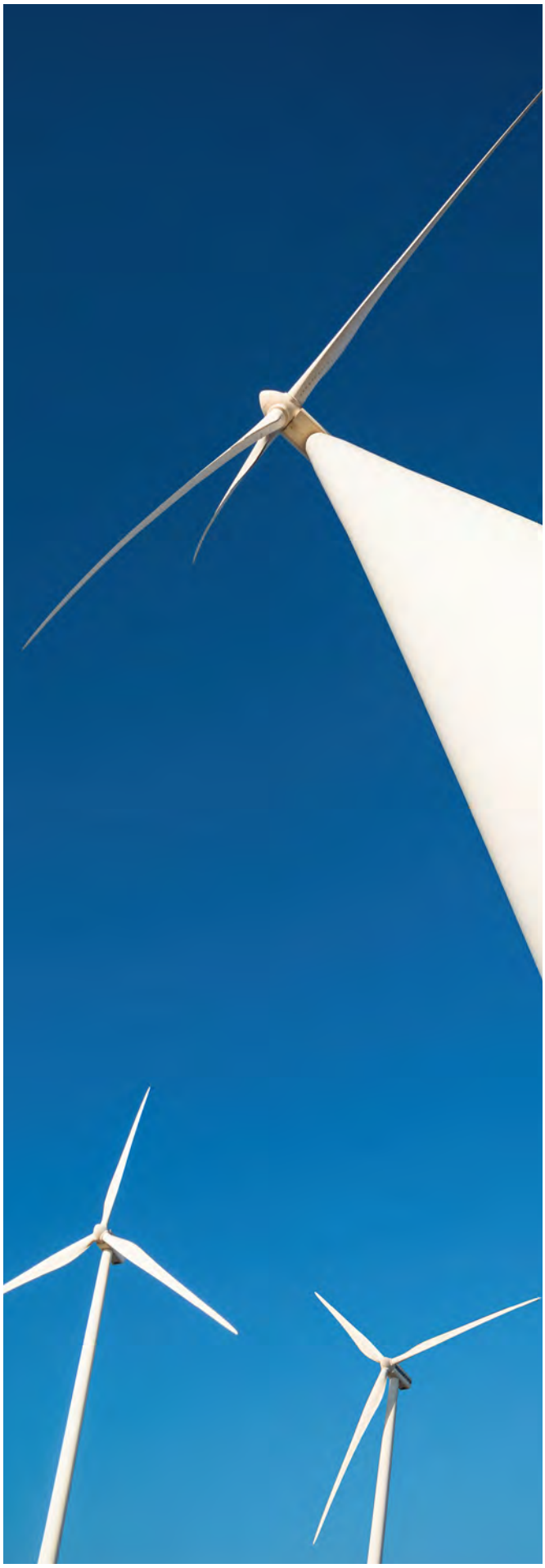
India has committed at COP26 to install 30 GW of offshore wind by 2030 and this year shared a strategy paper detailing the offshore wind auction trajectory for 2023 to 2030, pinpointing regions such as Gujarat and Tamil Nadu with the highest potential for offshore wind energy.

Developers in Japan are eagerly awaiting the outcome of the Round 2 offshore wind auctions, which are expected to be announced in March 2024. Japan has a target of 10 MW by 2030 and 30-45 GW by 2040 and huge potential for offshore wind capacity (of which a significant proportion is floating wind, due to its deep coastal waters). However, the development of the offshore wind market has been slower than expected due to uncertainty around the auction process, limited scale of the projects, supply chain constraints and port availability, and extensive environmental assessment and stakeholder engagement processes.

The Philippines is making plans to conduct its first green energy auction for offshore wind and, this year, the Executive Order No. 21 was issued mandating the preparation of a policy and administrative framework for offshore wind in order to accelerate development of the offshore wind market in the Philippines (though there remains no specific target for offshore wind at present).

NEW FRONTIERS - FLOATING OFFSHORE WIND

On the horizon is floating offshore wind, where a handful of smaller projects around the world have provided valuable learning for the development of larger scale GW projects, starting in China where the PFS-1 Southeast Wanning project will be among if not the largest floating offshore wind project globally. However, higher costs and technical and logistical challenges as compared to its fixed-bottom counterpart, as well as supply chain issues, likely mean that widespread installation of large floating offshore wind is still some way off.



CHALLENGES AND HEAD WINDS

Like many global markets, the development of the offshore wind market in Asia is currently facing significant challenges in terms of managing project economics due to cost inflation, declining subsidies and price competition (where governments have largely moved away from feed in tariffs), as well as supply chain constraints. Analysis from the Global Energy Wind Council shows that by mid-2020s supply chain bottlenecks may become an issue in all regions, except China. Substantial investment in the offshore wind supply chain will be needed to facilitate the growth of the offshore wind market at the pace currently targeted.

In addition, many jurisdictions, especially emerging economies in Asia face additional challenges such as grid limitations, port availability, restrictive local content requirements, PPA bankability and the need for regional cooperation to avoid supply chain challenges and ensure availability of the vessels and skilled workforce needed for installation. Stability and certainty in the regulatory, permitting and seabed leasing regimes and auction rules is also lacking in emerging Asia and will need to be addressed.

A POSITIVE OUTLOOK

Notwithstanding the challenges, the offshore wind market in emerging Asia remains attractive and has huge potential. However, given global competition for supply chain and resources among the immense pipeline of offshore wind projects worldwide, it remains to be seen to what extent developers will prioritise and devote resources to projects in emerging markets in Asia. This will depend in part on whether and how well the challenges outlined above are tackled in emerging Asia though regulatory and framework development, incentives and regional collaboration.

This article is part of a new report from Allen & Overy: Perspectives on Energy Transition in Emerging Markets that looks at what transitioning to Net Zero means for emerging markets across Asia, the Middle East and Africa. Partners Xue Wang, Adam Moncrieff and Sarah Wilson, Foreign Legal Consultant (Partner Level) Michael Tardif, and Senior Associate Jessica Lee are members of Allen & Overy's projects and energy practice based in ASEAN with a focus on developing and financing renewable energy projects and assisting with broader energy transition strategies and implementation.

WILL SHIPPING

Image from the International Chamber of Shipping that shows the concept design showing the arrangement of nuclear reactor and supporting equipment. The original photo was from ABS.

TURN A 'CORNER'

"THE NEWS THAT GREETED THE WORLD IN DECEMBER AT THE COP28 SUMMIT COULD NOT HAVE BEEN BETTER. AT LONG LAST, CONSENSUS WAS REACHED ON HOW TO DEAL WITH FOSSIL FUELS AND ITS 'IGNOMINIOUS' EXIT. WILL SHIPPING TOO, SEE A GLORY DAY? IT POSSIBLY WILL. JAYA PRAKASH FILES THIS STORY."

Shipping must not ignore the "vast potential" nuclear power poses for emissions reductions and operational efficiencies, according to ABS CEO and Chairman Christopher J. Wiernicki. His comments follow the announcement of findings from what ABS has dubbed a "groundbreaking study" on the potential of advanced modern reactor technology for commercial marine propulsion.

In July of 2023, RINA in a news release said Fincantieri and RINA were working together on feasibility study for nuclear naval propulsion, ostensibly to power up decarbonisation in the maritime sector in the world.

In a newly inked agreement, three companies, newcleo, Fincantieri and RINA will combine international expertise and innovation experience to undertake a feasibility study for nuclear applications to the shipping industry, includ-

ing newcleo's lead-cooled small modular reactors (SMRs) technology. The deployment of newcleo's innovative LFR (Lead-cooled Fast Reactor) for naval propulsion would involve placing a closed mini reactor on vessels as a small nuclear battery producing a 30MW electric output.

One of the key upshots of the new deal is infrequent refuelling, very limited maintenance, and easy replacement at end of life.

There is little to doubt the utility of nuclear energy. Nuclear energy can rapidly decarbonise shipping now plagued and maligned by its greenhouse gas emissions (GHG). Also, using nuclear power on ships would safeguard the marine ecosystem in the event of an accident. With newcleo's design the liquid lead inside the reactor would solidify as it cools down in contact with the cold water, enclosing the reactor core in a solid casing, and containing all radiation thanks to the shielding properties of lead. Finally, the newcleo naval propulsion reactors would eliminate the current need for frequent refuelling, and at the end of its life, the whole LFR unit would be simply removed and replaced with a new one in the ship, and the spent unit taken away for decommissioning and reprocessing.

Stefano Buono, newcleo Chairman and CEO, commented: "I am delighted that we are launching a project for civil nuclear naval propulsion with this important feasibility study. Fincantieri and RINA are two global leaders in the shipping sector, and combining their expertise with our technology innovation can bring a real solution to the issue of carbon emissions in maritime transport. From our conception, newcleo's ambition is to contribute to accelerating decarbonisation and providing clean, sustainable, and affordable energy to meet the needs of communities and businesses. I look forward to the results of the feasibility study and the next steps of the project.

Ugo Salerno, Chairman and CEO of RINA, commented: "The improvement of fuel efficiency and vessel design is already giving good results in reducing shipping footprint.

But, to reach the targets fixed for this industry, we need alternative fuels with low carbon content from well to waste. Nuclear will be one of the answers to these objectives. In addition, small modular reactors will be the most efficient solution to apply nuclear to shipping. We are proud to cooperate with newcleo and Fincantieri to make feasible, as soon as possible, the implementation of SMRs on vessels".

This would require infrequent refuelling (only once every 10-15 years), very limited maintenance and easy replacement at end of life. Using clean nuclear energy to power marine vessels would help rapidly decarbonise a sector grappling with huge fossil fuel consumption and its consequent carbon emissions. The shipping industry, via the International Maritime Organization (IMO), approved last week at MEPC(80) the new targets for GHG emission reduction, to reach net-zero GHG emissions by or around (i.e. close to) 2050.

> *"TODAY FINCANTIERI REAFFIRMS ITS VOCATION TO BE A PIONEER AND CATALYST FOR PROGRESS IN THE MARITIME SECTOR WITH CUTTING-EDGE, EFFICIENT, AND SUSTAINABLE TECHNOLOGIES. INDEED, THE AGREEMENT ALLOWS US TO EXPLORE THE POSSIBILITY OF ADDING A NEW AND VISIONARY SOLUTION AMONG THOSE AT OUR DISPOSAL TO ACHIEVE THE AMBITIOUS DECARBONISATION GOALS THE INDUSTRY HAS SET FOR ITSELF. NUCLEAR POWER HOLDS ENORMOUS POTENTIAL AND, AS SUCH, IT NEEDS THE BEST EXPERTISE TO BE EXPRESSED, AND WE ARE PROUD TO JOIN WITH PARTNERS LIKE NEWCLEO AND RINA TO HELP GET THIS DONE"*
>
> *- PIERROBERTO FOLGIERO, CEO AND GENERAL MANAGER OF FINCANTIERI, WEIGHING IN, IN EQUAL MEASURE*

But, to reach the targets fixed for this industry, we need alternative fuels with low carbon content from well to waste. Nuclear will be one of the answers to these objectives. In addition, small modular reactors will be the most efficient solution to apply nuclear to shipping. We are proud to cooperate with newcleo and Fincantieri to make feasible, as soon as possible, the implementation of SMRs on vessels".

A CLARION CALL

That was just what seems to have cottoned on.

News reports have circulated that a Chinese shipyard namely Jiangnan has struck upon an innovative way. It is tinkering with a giant container ship offering a true 'zero-emissions' alternative.

The ship is mulling the use of thorium which is abundant and inexpensive and does not need large amounts of water to cool down, thus making it safer and more efficient. Such reactors can be placed anywhere such reactors including ships. The design for the new container ship – known as the KUN-24AP – was unveiled by the Shanghai-based Jiangnan Shipyard at the city's Marintec China exhibition.

The DNV Classification Society in excerpts taken from the South China Morning Post – one of the leading international shipping industry bodies – has already given the design an international certification that should increase international buyers' confidence about buying and using the design.

"In response to climate change and energy conservation requirements, Jiangnan Shipbuilding has actively explored container ship models and power systems solutions," the journal Maritime China posted on a its official WeChat account.

"The new ship model uses nuclear energy as a clean energy source and adopts an internationally advanced fourth-generation molten salt reactor solution. The proposed design of super-large nuclear container ships will truly achieve 'zero emissions' during the operation cycle of this type of ship," it added.

It is no secret that China's shipbuilding industry has made rapid progress in recent years and this year it accounted for more than 60 per cent of orders for new ships globally, according to industry analysts– many of them for technically demanding orders such as liquefied natural gas carriers. The development of the civil shipbuilding industry has also greatly accelerated the expansion of China's navy, including ships using advanced technology such as ultra-long-range radar and electromagnetic launch systems.

Mike Watt, Director, Future Shipping Team, South Asia & Pacific, Innovation Centre of Alternatives & Renewable Energy (iCARE) told Fuels and Power, "I see the use of New Nuclear and SMRs as the future in the fight for decarbonisation. Whether they are installed on ships or on power barges these are both possibilities in the future. I think the low hanging fruit is to use SMRs for floating power barges which can be dual purpose as e-fuel production plants or even marinized charging stations for electric craft. Whilst the idea of nuclear for propulsion is not a new one and even in commercial craft this has been done previously with vessels such as NS Savannah, Otto Hagn, Mutsu and Sevmorput (still in service). These vessels were using a different technology to the one which is now a popular discussion point and considered a game changer in the utilisation of nuclear technologies for commercial maritime vessels. There are however some barriers to this implementation and a lot needs to be done before we see an uptake in commercial craft, one of those barriers would be the updating of regulations around this technology with SOLAS Chapter 8 not being updated since the 1970s and still referring to LWPR and no other technologies."

Discussions on the topic is raging, added Watt and according to him many classification societies are pursuing different ways to cover this area. Bureau Veritas has been engaged with the Centre for Strategic Energy Resources (CSER) on the adoption of nuclear into green taxonomy.

> *"SO 'YES', I SEE THERE IS A FUTURE AND THERE IS A LIKELIHOOD WE WILL SEE THIS REALLY RAMP UP OVER THE NEXT 5 TO 10 YEARS AS PEOPLE REALISE THAT THE ONLY TRUE WAY TO DECARBONISE IS GOING TO BE WITH THE HELP OF NUCLEAR.*
>
> *- MIKE WATT, DIRECTOR, FUTURE SHIPPING TEAM, SOUTH ASIA & PACIFIC, INNOVATION CENTRE OF ALTERNATIVES & RENEWABLE ENERGY (ICARE)*

Maybe no more is the time now than ever, for shipping to turn a corner!

(Next page)
Image from the South China Morning Post showing China has plentiful reserves of the radioactive metal thorium. Photo: Reuters

COLONIAL TERMINALS ANNOUNCES ACQUISITION OF BUCKEYE'S WILMINGTON, NC TERMINALS

(SAVANNAH, Ga / WILMINGTON, NC) On December 1, 2023, Colonial Terminals, Inc. (CTI), a division of Savannah-based Colonial Group, Inc., acquired a bulk liquid terminal owned and operated by Buckeye Terminals, LLC (Buckeye). The terminal is located on the Cape Fear River and has approximately 550,000 barrels of storage capacity. This facility is adjacent to an existing bulk terminal owned and operated by CTI. The combined terminal complex will have over one million barrels of bulk liquid storage and offer marine, rail, and truck access into the fast-growing Southeastern United States.

"Colonial Terminals is committed to growth in markets that support our team's ability to deliver the highest levels of service to customers who value supply chain dependability and efficiency," said Ryan Chandler, president of Colonial Terminals. "This adjacent facility adds a new berth and substantial river frontage to our already large footprint on the Cape Fear River, and we're eager to offer new capabilities for existing customers as well as attract new customers and products to the market."

The acquisition increases CTI's storage infrastructure in Wilmington to more than one million barrels, 70 acres, and over a half mile of river frontage. Products stored at these facilities include industrial chemicals, specialty chemicals, petroleum, and others. CTI will retain all local employees who currently operate the acquired facility.

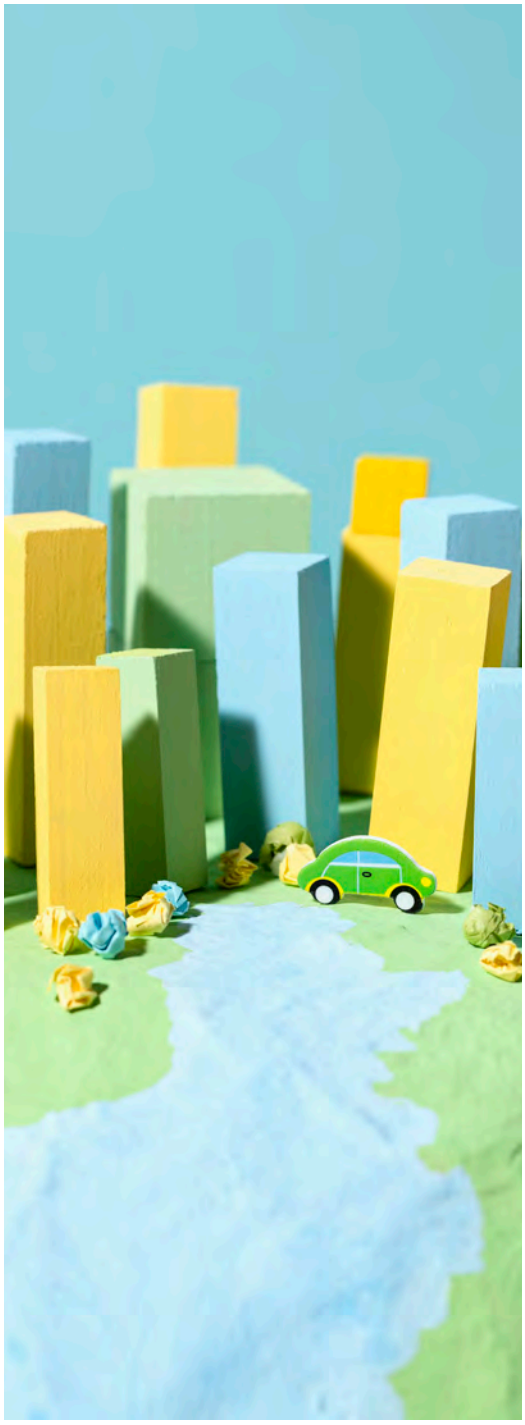
"Wilmington is a gateway to the growing Southeastern US market, and we believe this acquisition strongly positions our team to support current and new customer growth far into the future," said Chandler.

With the addition of the new facility, CTI now operates seven terminals, five in Georgia and two in Wilmington, with a total liquid capacity of approximately eight million barrels and a total dry capacity of approximately 200,000 tons of vertical storage, 400,000 square feet of covered flat storage, and significant outside storage acreage. Each terminal is strategically located in close proximity to a world-class container port and provides access to ocean and landside (road and rail) logistics networks, as well as global and regional sourcing and distribution pathways.

ABOUT COLONIAL TERMINALS, INC.

Colonial Terminals, Inc. (CTI) is an industry leader in the handling and storage of liquid and dry bulk products. Colonial Terminals began operations in 1934 with the construction of a 21-acre, deep-water terminal located on the Savannah River to serve the burgeoning import and export, petroleum storage market. Today, Colonial Terminals owns and operates the largest, independent, liquid and dry bulk storage facilities with breakbulk capability in the Southeastern United States. Colonial Terminals is a wholly owned subsidiary of Colonial Group, Inc. www.colonialterminals.com.

SINGAPORE SIGNS FIRST IMPLEMENTATION AGREEMENT WITH PAPUA NEW GUINEA TO COLLABORATE ON



CARBON CREDITS UNDER ARTICLE 6 OF THE PARIS AGREEMENT

Singapore and Papua New Guinea (PNG) signed an Implementation Agreement on carbon credits cooperation under Article 6 of the Paris Agreement today. The Agreement was signed by Minister for Sustainability and the Environment Grace Fu and Papua New Guinea Minister of Environment, Conservation and Climate Change Simo Kilepa on the sidelines of the 2023 United Nations Climate Change Conference (COP28). The Agreement comes after both countries signed a Memorandum of Understanding (MOU) on the sidelines of COP27 last year to collaborate on carbon credits.

This marks the first Implementation Agreement for Singapore. The Agreement sets out a legally binding framework and processes for the generation and international transfer of carbon credits aligned with Article 6 of the Paris Agreement, between Singapore and Papua New Guinea.

This collaboration will advance both countries' climate ambition and help to channel financing towards additional mitigation efforts through carbon credit projects which would otherwise not be possible. The carbon credit projects authorised under the Implementation Agreement will also promote sustainable development and generate benefits for local communities, such as creation of jobs, access to clean water, improved energy security, and reduction of environmental pollution.

As part of Singapore's Article 6 cooperation, project developers will be required to cancel 2% of the carbon credits authorised under the Implementation Agreement at first issuance to ensure additional contribution to overall mitigation of global emissions. They will also be required to make a contribution equivalent to 5% share of proceeds or authorised carbon credits towards climate adaptation in Papua New Guinea. This will help Papua New Guinea prepare for and adjust to the impacts of climate change.

Singapore is also supporting the development of carbon markets, by enabling the demand and supply of high-quality carbon credits to be matched. Under Singapore's International Carbon Credit (ICC) framework, Singapore-based carbon tax-liable companies can source for eligible ICCs generated under this Implementation Agreement to offset up to 5% of their taxable emissions. Trading these credits through Singapore will help to unlock new business opportunities in areas such as carbon services and sustainability solutions, strengthening Singapore's position as a carbon services and trading hub.

Minister Fu said, "High-integrity carbon markets can contribute to much-needed climate action globally. As an alternative energy disadvantaged country, effective international cooperation, such as through carbon markets, will also help us to achieve our climate ambitions. We are delighted to sign our first Implementation Agreement with Papua New Guinea, a fellow Alliance of Small Island States (AOSIS) member. We look forward to working with Papua New Guinea to advance climate action together."

Photo Credits: Ministry of Trade and Industryin Singapore

THE ADVANTAGES AND DISADVANTAGES OF NUCLEAR ENERGY

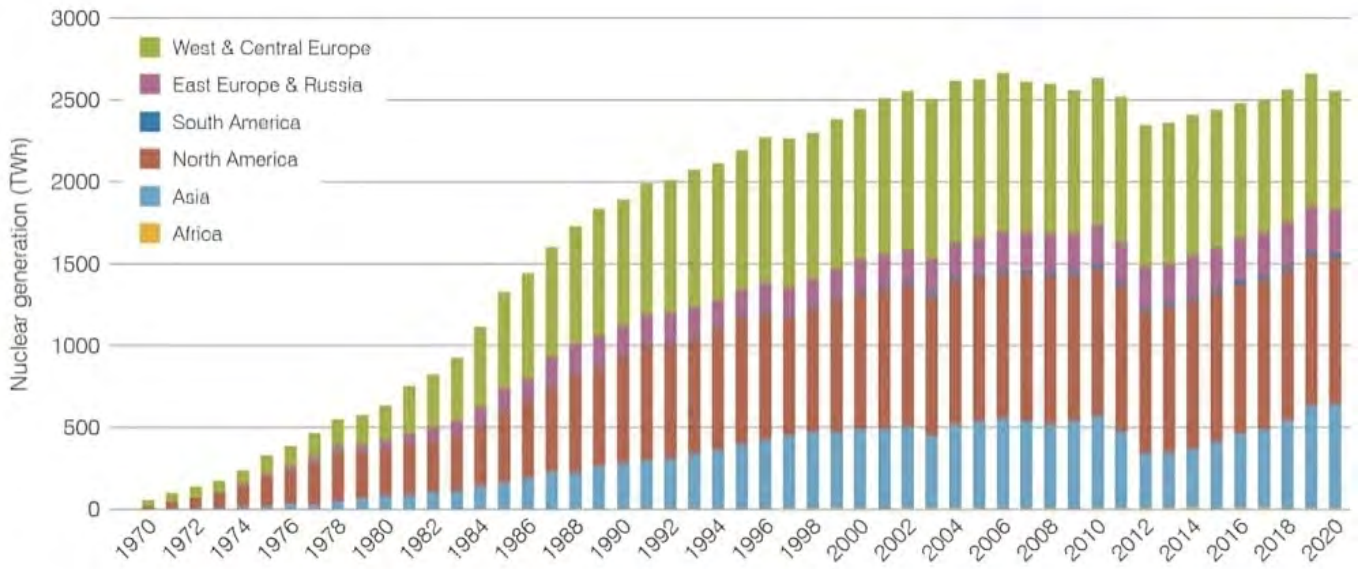
"SINCE THE FIRST NUCLEAR PLANT STARTED OPERATIONS IN THE 1950S, THE WORLD HAS BEEN HIGHLY DIVIDED ON NUCLEAR AS A SOURCE OF ENERGY. WHILE IT IS A CLEANER ALTERNATIVE TO FOSSIL FUELS, THIS TYPE OF POWER IS ALSO ASSOCIATED WITH SOME OF THE WORLD'S MOST DANGEROUS AND DEADLIEST WEAPONS, NOT TO MENTION NUCLEAR DISASTERS. THE EXTREMELY HIGH COST AND LENGTHY PROCESS TO BUILD NUCLEAR PLANTS ARE COMPENSATED BY THE FACT THAT PRODUCING NUCLEAR ENERGY IS NOT NEARLY AS POLLUTING AS OIL AND COAL. IN THE RACE TO NET-ZERO CARBON EMISSIONS, SHOULD COUNTRIES STILL RELY ON NUCLEAR ENERGY, OR SHOULD THEY MAKE SPACE FOR MORE FOSSIL FUELS AND RENEWABLE ENERGY SOURCES? WE TAKE A LOOK AT THE ADVANTAGES AND DISADVANTAGES OF NUCLEAR ENERGY."

WHAT IS NUCLEAR ENERGY?

Nuclear Energy is the energy source found in an atom's nucleus, or core. Once extracted, this energy can be used to produce electricity by creating nuclear fission in a reactor through two kinds of atomic reaction: nuclear fusio and nuclear fission. During the latter, uranium used as fuel causes atoms to split into two or more nuclei. The energy released from fission generates heat that brings a cooling agent, usually water, to boil. The steam deriving from boiling or pressurised water is then channelled to spin turbines to generate electricity. To produce nuclear fission, reactors make use of uranium as fuel.

For centuries, the industrialisation of economies around the world was made possible by fossil fuels like coal, natural gas, and petroleum and only in recent years countries opened up to alternative, renewable sources like solar and wind energy. In the 1950s, early commercial nuclear power stations started operations, offering to many countries around the world an alternative to oil and gas import dependency and a far less polluting energy source than fossil fuels. Following the 1970s energy crisis and the dramatic increase of oil prices that resulted from it, more and more countries decided to embark on nuclear power programmes. Indeed, most reactors have been built between 1970 and 1985 worldwide. Today, nuclear energy meets around 10% of global energy demand, with 439 currently operational nuclear plants in 32 countries and about 55 new reactors under construction. In 2020, 13 countries produced at least one-quarter of their total electricity from nuclear, with the US, China, and France dominating the market by far.

Fossil fuels make up 60% of the United States' electricity while the remaining 40% is equally split between renewables and nuclear power. France embarked on a sweeping expansion of its nuclear power industry in the 1970s with the ultimate goal of breaking its dependence on foreign oil. In doing this, the country was able to build up its economy by simultaneously cutting its emissions at a rate never seen before. Today, France is home to



World nuclear electricity production, 1970-2020. Image: World Nuclear Association.

56 operating reactors and it relies on nuclear power for 70% of its electricity.

ADVANTAGES OF NUCLEAR ENERGY

France's success in cutting down emissions is a clear example of some of the main advantages of nuclear energy over fossil fuels. First and foremost, nuclear energy is clean, and it provides pollution-free power with no greenhouse gas emissions. Contrary to what many believe, cooling towers in nuclear plants only emit water vapour and are thus, not releasing any pollutant or radioactive substance into the atmosphere. Compared to all the energy alternatives we currently have on hand; many experts believe that nuclear energy is indeed one of the cleanest sources. Many nuclear energy supporters also argue that nuclear power is responsible for the fastest decarbonisation effort in history, with big nuclear players like France, Saudi Arabia, Canada, and South Korea being among the countries that recorded the fastest decline in carbon intensity and experienced a clean energy transition by building nuclear reactors and hydroelectric dams.

Earlier this year, the European Commission took a clear stance on nuclear power by labelling it a green source of energy in its classification system establishing a list of environmentally sustainable economic activities. While nuclear energy may be clean and its production emission-free, experts highlight a hidden danger of this power: nuclear waste. The highly radioactive and toxic byproduct from nuclear reactors can remain radioactive for tens of thousands of years. However, this is still considered a much easier environmental problem to solve than climate change. The main reason for this is that as much as 90% of the nuclear waste generated by the production of nuclear energy can be recycled. Indeed, the fuel used in a reactor, typically uranium, can be treated and put into another reactor as only a small amount of energy in their fuel is extracted in the fission process.

A rather important advantage of nuclear energy is that it is much safer than fossil fuels from a public health perspective. The pro-nuclear movement leverages the fact that nuclear waste is not even remotely as dangerous as the toxic chemicals coming from fossil fuels. Indeed, coal and oil act as 'invisible killers' and are responsible for 1 in 5 deaths worldwide. In 2018 alone, fossil fuels killed 8.7 million people globally. In contrast, in nearly 70 years since the beginning of nuclear power, only three accidents have raised public alarm: the 1979 Three Mile Island accident, the 1986 Chernobyl disaster and the 2011 Fukushima nuclear disaster. Of these, only the accident at the Chernobyl nuclear plant in Ukraine directly caused any deaths.

Finally, nuclear energy has some advantages compared to some of the most popular renewable energy sources. According to the US Office of Nuclear Energy, nuclear power

has by far the highest capacity factor, with plants requiring less maintenance, capable to operate for up to two years before refuelling and able to produce maximum power more than 93% of the time during the year, making them three times more reliable than wind and solar plants.

DISADVANTAGES OF NUCLEAR ENERGY

The anti-nuclear movement opposes the use of this type of energy for several reasons. The first and currently most talked about disadvantage of nuclear energy is the nuclear weapon proliferation, a debate triggered by the deadly atomic bombing of the Japanese cities of Hiroshima and Nagasaki during the Second World War and recently reopened following rising concerns over nuclear escalation in the Ukraine-Russia conflict. After the world saw the highly destructive effect of these bombs, which caused the death of tens of thousands of people, not only in the impact itself but also in the days, weeks, and months after the tragedy as a consequence of radiation sickness, nuclear energy evolved to a pure means of generating electricity. In 1970, the Treaty on the Non-Proliferation of Nuclear Weapons entered into force. Its objective was to prevent the spread of such weapons to eventually achieve nuclear disarmament as well as promote peaceful uses of nuclear energy. However, opposers of this energy source still see nuclear energy as being deeply intertwined with nuclear weapons technologies and believe that, with nuclear technologies becoming globally available, the risk of them falling into the wrong hands is high, especially in countries with high levels of corruption and instability.

As mentioned in the previous section, nuclear energy is clean. However, radioactive nuclear waste contains highly poisonous chemicals like plutonium and the uranium pellets used as fuel. These materials can be extremely toxic for tens of thousands of years and for this reason, they need to be meticulously and permanently disposed of. Since the 1950s, a stockpile of 250,000 tonnes of highly radioactive nuclear waste has been accumulated and distributed across the world, with 90,000 metric tons stored in the US alone. Knowing the dangers of nuclear waste, many oppose nuclear energy for fears of accidents, despite these being extremely unlikely to happen. Indeed, opposers know that when nuclear does fail, it can fail spectacularly. They were reminded of this in 2011, when the Fukushima disaster, despite not killing anyone directly, led to the displacement of more than 150,000 people, thousands of evacuation/related deaths and billions of dollars in cleanup costs.

Lastly, if compared to other sources of energy, nuclear power is one of the most expensive and time-consuming forms of energy. Nuclear plants cost billions of dollars to build, and they take much longer than any other infrastructure for renewable energy, sometimes even more than a decade. However, while nuclear power plants are expensive to build, they are relatively cheap to run, a factor that improves its competitiveness. Still, the long building process is considered a significant obstacle in the run to net-zero emissions that countries around the world have committed to. If they hope to meet their emission reduction targets in time, they cannot afford to rely on new nuclear plants.

WHO WINS THE NUCLEAR DEBATE?

There are a multitude of advantages and disadvantages of nuclear energy and the debate on whether to keep this technology or find other alternatives is destined to continue in the years to come. Nuclear power can be a highly destructive weapon, but the risks of a nuclear catastrophe are relatively low. While historic nuclear disasters can be counted on the fingers of a single hand, they are remembered for their devastating impact and the life-threatening consequences they sparked (or almost sparked). However, it is important to remember that fossil fuels like coal and oil represent a much bigger threat and silently kill millions of people every year worldwide.

Another big aspect to take into account, and one that is currently discussed by global leaders, is the dependence of some of the world's largest economies on countries like Russia, Saudi Arabia, and Iraq for fossil fuels. While the 2011 Fukushima disaster, for example, pushed the then-German Chancellor Angela Merkel to close all of Germany's nuclear plants, her decision only increased the country's dependence on much more polluting Russian oil. Nuclear supporters argue that relying on nuclear energy would decrease the energy dependency from third countries. However, raw materials such as the uranium needed to make plants function would still need to be imported from countries like Canada, Kazakhstan, and Australia. The debate thus shifts to another problem: which countries should we rely on for imports and, most importantly, is it worth keeping these dependencies?

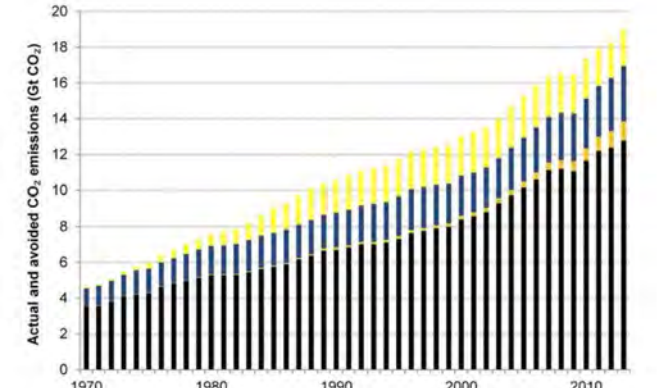
The above article was written by Martina Igini and first appeared on Earth.Org, a leading environmental news website. This is a reproduction.

SPECIAL FEATURE

NUCLEAR POWER HAS A BIG ROLE TO PLAY IN THE ENERGY TRANSITION. HERE'S WHY

Our planet needs a new energy system able to sustainably provide a reliable and incessant supply of electricity. Nuclear is among the energy technologies available today with the lowest GHG emissions, producing only 15 grams CO2-equivalent per kWh, when considered over a plant's entire lifecycle.

According to the International Energy Authority (IEA), between 1970-2013 the use of low-carbon energy sources meant we avoided 163 Gt of CO2 emissions. Nuclear power contributed 41%, while solar and wind accounted for 6%. Nuclear energy represents one of the lowest sources of GHG in the combined lifecycle of power-generating technologies, as shown in many independent analyses.



Without nuclear energy, CO2 emissions from energy generation would be a lot worse Image: IAEA

Nuclear plants today provide 10% of the world's electricity, all of it carbon-free – that's almost twice the combined contribution of solar and wind. To meet the key energy goals of the United Nations Sustainable Development Goals (SDG), the Paris Agreement has set a specific ambition for nuclear, targeting the doubling of present installed capacity by 2050. For the nuclear industry the challenge is double; it is about progressively replacing plants reaching the end of their lives, and adding new plants to the existing fleet. However, there is need for innovation.

CHALLENGES AND COST OF THE ENERGY MIX

Decarbonization requires a realistic proposal to substitute, by 2050, the 81% share of energy produced today from fossil fuels. Picking the right energy portfolio mix is a difficult matter, and technologies that not yet mature enough to make an impact before 2050, such as fusion power or carbon capture and storage, should not be relied upon. The low-carbon technologies that are currently adoptable are wind, solar, hydroelectric and nuclear. Excluding, limiting or restricting any of these technologies undermines the cost mitigation and delays the reduction of emissions. But the possibilities for growth are singularly limited.

The technical advances of solar and wind cannot overcome their intermittency, nor the physical laws that impose limits to their efficiencies. Mitigating the intermittence of wind and solar with energy storage systems is improbable; only small amounts of cost-efficient electricity storage will presumably be available at reasonable cost in near future. The most promising batteries are based on metals such as lithum, cobalt and magnesium that require energy-intensive energetic mining and whose reserves cannot fulfil theoretical global demand.

The contribution nuclear power can make to the energy transition lies in its ability to follow and assume the system costs generated by the intermittency of renewables. Ensuring a permanent balance between demand and supply, the nuclear baseload can offer "load tracking", adapting swiftly to seasonal, daily, and hourly variations in demand. These requirements become increasingly important, the higher the penetration of renewables into the market.

Nuclear sceptics point to its cost: there are many examples of cost and time overruns in nuclear plants, and it's true that

the costs for wind and solar are ever-decreasing. But when all factors are considered and the level of market penetration of a particular technology is measured, a cost analysis presents contrasting figures. Power plants do not exist in isolation; they interact with each other and their customers through the grid and within the surrounding economic, social and natural environment. That is why the assessment of total costs should include not only the capital costs, but also the costs for grid connection, extension and reinforcement, the technical and financial costs of intermittency, the cost of security of supply and its impacts, and the local and global environmental impacts.

An analysis has been carried out in different countries to quantify these costs in respect to the penetration level of renewables in an energy mix, including nuclear, solar and wind. Introducing variable renewables up to 10% of the total electricity supply will increase the cost per MWh by between 5% and 50%, depending on the country, whereas satisfying 30% of demand could increase costs by anything between 16% and 180%. Country-by-country differences are more important than technology-by-technology differences. A comparison between two different markets – the UK and US – is shown below:

United Kingdom												
Technology	Nuclear		Coal		Gas		Onshore wind		Offshore wind		Solar	
Penetration level	10%	30%	10%	30%	10%	30%	10%	30%	10%	30%	10%	30%
Back-up costs (adequacy)	0.00	0.00	0.06	0.06	0.00	0.00	4.05	6.92	4.05	6.92	26.08	26.82
Balancing costs	0.88	0.53	0.00	0.00	0.00	0.00	7.63	14.15	7.63	14.15	7.63	14.15
Grid connection	2.23	2.23	1.27	1.27	0.56	0.56	3.96	3.96	19.81	19.81	15.55	15.55
Grid reinforcement and extension	0.00	0.00	0.00	0.00	0.00	0.00	2.95	5.20	2.57	4.52	8.62	15.18
Total grid-level system costs	**3.10**	**2.76**	**1.34**	**1.34**	**0.56**	**0.56**	**18.60**	**30.23**	**34.05**	**45.39**	**57.89**	**71.71**

United States												
Technology	Nuclear		Coal		Gas		Onshore wind		Offshore wind		Solar	
Penetration level	10%	30%	10%	30%	10%	30%	10%	30%	10%	30%	10%	30%
Back-up costs (adequacy)	0.00	0.00	0.04	0.04	0.00	0.00	5.61	6.14	2.10	6.85	0.00	10.45
Balancing costs	0.16	0.10	0.00	0.00	0.00	0.00	2.00	5.00	2.00	5.00	2.00	5.00
Grid connection	1.56	1.56	1.03	1.03	0.51	0.51	6.50	6.50	15.24	15.24	10.05	10.05
Grid reinforcement and extension	0.00	0.00	0.00	0.00	0.00	0.00	2.20	2.20	1.18	1.18	2.77	2.77
Total grid-level system costs	**1.72**	**1.67**	**1.07**	**1.07**	**0.51**	**0.51**	**16.30**	**19.84**	**20.51**	**28.26**	**14.82**	**28.27**

Grid-level system costs in the UK and US (dollars per MWh) Image: OECD, NEA

The increases in electricity costs linked with an increasing share of renewables results from a combination of higher investment costs, balancing and adequacy costs, and additional expenses for transmission and distribution. Balancing costs are those necessary to guarantee the system performance on a minute-by-minute basis of demand and supply, in the presence of uncertainty in demand and supply. Adequacy costs are incurred in satisfying demand at all times, taking fluctuations in demand and supply into account. These are the costs required to supply hospitals with electricity in the midst of a pandemic – even on cloudy or windless days.

Today, in countries where dispatchable technologies are present, these costs are zero; but introducing renewables while retiring old dispatchable capacity and adding new dispatchable capacity to produce when variable renewables are not available, makes for substantial adequacy costs. The integration of significant amounts of variable renewables is a complex issue that affects the structure, financing and operational mode of electricity systems. In most OECD countries, wind and solar power receive fixed tariffs for every MWh fed into the electricity system regardless of market prices. Such asymmetric treatment isolates variable renewables from the impacts they inflict on the market price. This is not to undermine renewables, but to highlight the fact that in the absence of a nuclear contribution, the energy transition will be slower, costly, and at risk of failure. Making these system costs transparent is meaningful to investors, customers and decision-makers.

THE FUTURE OF NUCLEAR

Many countries have committed to increase the share of power from nuclear energy in order to meet the Paris Agreement targets. But the political and economic environment, and the public lack of support, make the prospect of accomplish these ambitious objectives extremely difficult. As detailed above, the cost of nuclear – once all parameters are included – is not barrier. But waste, safety and nuclear proliferation are still roadblocks that should be tackled in order to enable deployment of this technology.

Today, some enterprises are proposing a new technological approach, built on a different type of fission energy production based on the coupling of particle accelerators and subcritical reactors. This technology – termed the 'accelerator driven system, pioneered in CERN in the 1990s – aims to reduce the lifetime of existing radiotoxic nuclear waste and to produce carbon-free energy at an affordable price of less than 5 cents per kWh. This technology is safer, scalable, sustainable and resistant to proliferation. The key innovation is the use of a proton accelerator to generate a high-intensity neutron source which induces fission reactions in the core. Yet as soon as the accelerator stops, the fission reaction also stops. The sub-criticality of the core implies an intrinsic safety; runaway accidents of the Chernobyl type are impossible. As the system proposed is equipped with passive heat removal, a meltdown accident of the Fukushima or Three-Mile Island types would also be impossible. The reduced waste produced from such a plant will have shorter lifetimes (around 500 years vs. 300,000 years) because the reaction uses thorium-based rather than uranium-based fuel. The system also provides the possibility of using present nuclear waste as fuel, therefore reducing the amount and radioactive profile of today's large waste inventory. With thorium fuel, plutonium production is negligible, eliminating the most common element for nuclear bombs. The IAEA states that the thorium fuel cycle would be "intrinsically proliferation-resistant".

Conclusion: This innovative but demonstrated nuclear technology could sustain the deployment of renewables, providing a stable and secure baseload and allowing the planet to meet the necessary carbon-free targets set by the Paris Agreement.

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LEGAL WATCH - PRACTICAL TAKEAWAYS FOR COMMODITY TRADERS - RISKS INVOLVED IN ISSUING LETTERS OF INDEMNITY

BY PRAKAASH SILVAM

"IT IS COMMON PRACTICE FOR COMMODITY TRADERS WHO HAVE CHARTERED VESSELS TO INSTRUCT THE SHIPOWNER TO DISCHARGE CARGOES WITHOUT PRODUCTION OF THE ORIGINAL BILLS OF LADING AND TO AGREE TO INDEMNIFY THE SHIPOWNER AGAINST THE CONSEQUENCES OF DOING SO. THIS IS DONE BY PROVIDING A LETTER OF INDEMNITY ("LOI"). IT IS OFTEN THE CASE THAT LOIS ARE GIVEN BY TRADERS WITHOUT A FULL APPRECIATION OF THE RISKS INVOLVED OR CONSIDERATION AS TO HOW THOSE RISKS MIGHT BE MINIMISED. THESE ISSUES HAVE RECENTLY BEEN BROUGHT INTO THE SPOTLIGHT BECAUSE OF THE COLLAPSE OF MAJOR OIL TRADING ENTITIES INCLUDING HIN LEONG TRADING (PTE) LTD AND HONTOP ENERGY (SINGAPORE). THIS ARTICLE IDENTIFIES THE RISKS INVOLVED IN THE USE OF LOIS FROM THE TRADER'S PERSPECTIVE, AND LOOKS AT WHAT STEPS MIGHT BE TAKEN TO MINIMISE THOSE RISKS."

WHEN ARE LOIS USED?

The bill of lading is commonly known as the "key to the warehouse". This is because the carrier's paramount obligation under a negotiable bill of lading is to only deliver the cargo on production of the original bill of lading. If the carrier delivers the cargo without production of the bills of lading, he may potentially face a claim for the value of the cargo from the holder of the bills of lading (including possible future holders of the bills of lading). Having said that, for the sake of commercial expediency, most carriers will agree (either at the time of entering into the charter or after) to give delivery of cargo without bills of lading if they are provided with an LOI in the standard P&I Club form. This is because the bill of lading's progress through the sale chain, especially where banks are involved, is often slower than the vessel's progress to the discharge port. In such circumstances, large demurrage claims would arise if discharge had to wait for the bill of lading to catch up. Therefore, in order to avoid demurrage liabilities, traders often instruct the carrier to discharge the cargo without bills of lading by issuing an LOI in favour of the carrier. The risks of doing this are limited so long as the trader issuing the LOI is reasonably confident that (i) he will be paid for the cargo (if he is the seller) and (ii) there will be no call under the LOI. Unfortunately, on certain occasions, confidence that there will be no call under the LOI proves to be misplaced.

TERMS OF THE LOI

The vast majority of LOIs are issued in the standard wording recommended by the shipowners' P&I Clubs. The key features of such wording are that the party giving the indemnity will:

a. indemnify the shipowner in respect of any third party claims they may face by reason of delivering the cargo in accordance with the LOI issuer's request (i.e., without production of the original bills of lading);
b. provide security in respect of any third party claims brought against the shipowner for delivery without bills of lading should the vessel or any vessel or property in the same or associated ownership, management or control be arrested or threatened with arrest; and
c. provide sufficient funds to defend any third party claims brought in connection with the delivery of cargo without bills of lading.

Therefore, if a third party comes along claiming to be the holder of the bill of lading following delivery of the cargo, and makes a claim against the carrier backed up with a threat to arrest his vessel, the trader who has issued an LOI will be contractually required to:

i. arrange security for that claim;
ii. provide the carrier with the funds to defend the claim;
iii. in the event that the carrier does not succeed in defending the claim, indemnify the carrier in respect of that claim. In this regard, it bears mentioning that the third party's claim will almost invariably be for the full value of the cargo.

In circumstances where a trader puts up security and is also funding the defence of the claim from the third party, he will still have to rely upon the carrier to properly defend the claim in circumstances where the carrier no longer has any financial interest in the outcome of it. This is because the P & I Club standard form LOI wording does not give the party issuing the LOI any right to take over the handling of third party claims against the carrier, even after he has posted security in respect of that claim. In this respect, it is common for the trader to enter into a litigation cooperation agreement or a claims handling agreement at the time that security is put up with a view towards taking over conduct of the defence of the misdelivery claim, whether this is in arbitration or in court proceedings.

RISKS TO BE ASSESSED WHEN ISSUING AN LOI

The obvious risk of instructing a carrier to discharge cargo without bills of lading is that it renders the bills of lading worthless in the hands of the Cost and Freight ("CFR") seller issuing the LOI. This is because if the CFR seller were to subsequently bring a claim, as holder of the bills of lading, against the carrier for wrongful delivery of the cargo, that claim will rebound back at him under the LOI – the trader would have to indemnify the carrier against his own claim. Any trader who issues an LOI should, before doing so, be sure that he is going to be paid. In this regard, the fact that payment is to be received under a letter of credit often provides traders with what they believe to be a certain degree of comfort. However, we have seen cases where a seller, having issued an LOI, has been unable to obtain payment under the letter of credit due to a discrepancy in the documents that must be presented under the letter of credit. In that situation, the "unsecured" seller will be left chasing his buyer for payment.

The other risk of issuing an LOI is the risk of that LOI being called upon. That can happen in circumstances where the bills of lading do not make their way through the sale chain to the receiver to whom delivery of the cargo has been facilitated by the LOI. We have seen this happen on a number of occasions where the bank, who has paid the seller under the letter of credit, is not paid by its customer and thus retains the bills of lading. The bank then knocks on the door of the carrier, holding the bills of lading, and asks for delivery of the cargo. The carrier will then inevitably make a call under the LOI which will result in the seller, who has issued the LOI, having, in effect, to pay back the value of the cargo delivered. Furthermore, in those circumstances, the seller may have no remedy at all against the buyer. The seller has, after all, been paid for the cargo under the letter of credit. His loss will result from having entered into a separate contract (i.e. the LOI) with a third party to facilitate the early discharge of the cargo from the ship to minimise his demurrage exposure and not from any contractual failure by the buyer under the sale contract.

SEEKING TO AVOID THE PITFALLS WHEN USING LOIS

LOIs are an instrument commonly deployed in international trade to remove bottlenecks in the supply chain. It would, therefore, be uncommercial to suggest that LOIs should be avoided at all costs. LOIs have been used for decades and are here to stay. However, a careful scrutiny of a trader's security for payment and of the risk of the bills of lading not making it through the sale chain to the end receiver should be conducted before any LOI is issued.

As to the terms of LOIs issued, carriers tend to religiously demand for LOIs to be issued in the wording recommended by their P&I Club when asked to deliver without bills of lading and this wording is naturally very carrier-friendly. There is therefore little, if any, scope for seeking to negotiate on that wording by, for example, seeking the addition of a provision entitling the indemnifying party to take over the defence of any claim which is subject to the indemnity under the LOI.

Having said that, one area where there is scope to reduce risk through drafting is in the wording of the sale contract itself. As we have said above, there may well be no right of recourse against a buyer in the event that the carrier makes a call under an LOI. Such a route can, however, be created by a provision in the sale contract providing for an indemnity. Alternatively, this can be done by getting a back-to-back LOI from the buyer in suitable terms and ideally counter-signed by a bank. While obtaining a back-to-back indemnity from the buyer may mitigate the risk, this will ultimately depend on the financial state of the buyer at the time that the seller calls on the LOI. In cases where the buyer has become insolvent, it will not assist the CFR seller to have a back-to-back LOI. The only way for a trader to completely eliminate against such risk would be to sell on FOB terms and buy on CFR terms and also to decline providing any back-to-back LOIs when requested to do so. This will mean that the trader is completely out of the arrangements for the shipment of the cargo.

The contributor, Mr. Prakaash Silvam, is a Partner at Oon & Bazul LLP, Singapore, and heads their Shipping practice. He regularly appears in the Singapore Courts, and also acts as counsel in international arbitrations, both ad hoc and institutional, including LCIA, ICC, SIAC, KCAB, GAFTA, FOSFA, LMAA and SCMA arbitrations.

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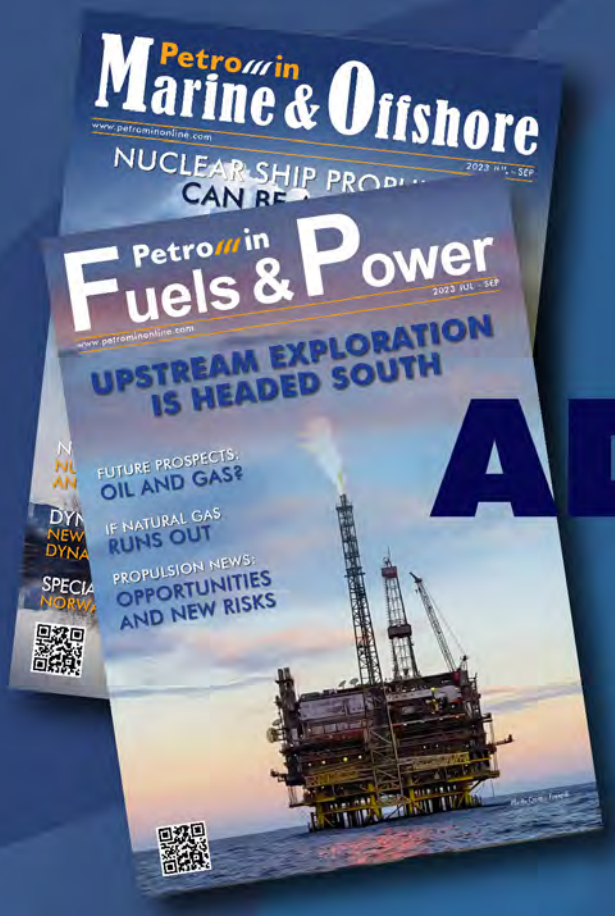

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So, 'Yes', with a big capital Y. We welcome your views; wholly, substantially, and not incrementally. Those views must generate a deeper understanding of the issues at play such that debate, knowledge and wisdom is concurrently, elevated.

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