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Foreword

Dominic Palmer-Brown
Editor-in-Chief

"The increasing adoption of augmented and virtual reality (AR and VR) is fuelled by the growing integration of technology and digitization in the fields of healthcare, finance, education, and in everyday life. More generally, we can look forward to the further development of AI in addressing the fundamental challenges facing humanity, ranging from lack of clean drinking water and reliable food supplies, through to the modelling and interventions required to tackle climate change; and the vast opportunities that exist to advance our understanding of the functioning of the brain and nervous system.

AI technologies combined with AR and VR have great potential in many areas including healthcare; for example, in virtual training of surgeons in 3D operating room simulations of difficult surgical procedures, and in treating phobias and chronic pain management. VR also plays a major role in eye movement desensitization and reprocessing (EMDR) therapy, enabling the reframing of traumatic memories.

AR-based applications has the potential to provide improved care management for many more patients, including those with autism or depression, and in cancer therapy, and in assisted living. VR-based organ models have played a crucial part in preparing surgeons for delicate and complicated operations that demand greater precision and reduced trauma. At the same time, AR is a useful and powerful tool for training and education.

Increasingly, we can expect to see robots working in conjunction with VR and AR in healthcare, medicine, food manufacturing and many other areas. In such systems, human-machine dynamic equations allow the system to judge the intent of a patient's movement; and movement synchronization between robot and virtual model is achieved by interactive control strategies. In this rapidly evolving future, robot, virtual reality and human begin to behave as a single system, as the boundaries between them start to dissolve."

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An historic day for British Airways and Britain

"For nearly two years the Atlantic has felt more like a brick wall, separating two great nations from each other.

It was the right thing to do to prioritise public health, but we know that the global closures have come at a cost to our economies, our families and our mental health, which is what makes today such a pivotal moment for us all.

This morning our first flight to New York will take to the skies in a synchronised departure on parallel runways alongside our friends at Virgin Atlantic. Together, even as competitors, we have fought for the safe return of transatlantic travel - and now we celebrate that achievement as a team. Some things are more important than one-upmanship, and this is one of those things.

I will be travelling on this aircraft (aptly named the BA001, the flight number Concorde owned) and it will be the first time in nearly two years I have been able to see and thank our US team in person. With me on the flight will be businesses ready to meet and re-establish important connections face to face, and families who have not seen their loved ones in nearly two years. I'm sure the arrivals hall at JFK airport, our second home outside London, will be filled with emotion and expectation and I look forward to being part of the occasion.

Thanks for your continued support and we look forward to welcoming you on board our transatlantic flights as we fly our red, white and blue colours in honour of both countries and re-ignite our special relationship between the UK and the US."

Sean Doyle
Chairman and CEO, British Airways

British Airways Executive Club

Newham Action on Climate Change

In Newham, we are taking action on Climate change. In Glasgow this week, world leaders gathered to discuss what to do about Climate change. I am proud to share with you the action we have been taking.

We have pledged to deliver the most ambitious climate change plan for local government, pledging to achieve zero emissions in Council operations by 2030 and in the borough by 2045.

Did you know that 4,500 children are hospitalised and 96 people die each year due to poor air quality in Newham? Newham residents are exposed to high levels of toxic pollution from vehicles, contributing to the highest death rate in England according to the UK Health Security agency.

You have a right to breathe clean air and I am determined to take the steps needed to achieve that. As part of this, I am proud that we are once again supporting the London-wide anti-idling campaign 'Engine Off. Every Stop' this November, as part of our pledge to improve air quality for residents. The campaign runs through November and aims to improve air quality and reduce air pollution simply by asking London drivers to turn their engines off when stationary to stop the spread of this invisible killer.

We are determined to do what is needed, working with you, to make Newham a place where everyone can breathe clean air. Please help to improve Newham's air quality by doing your bit and switching off your engine when your car is stationary.

We all know about the health benefits of taking journeys by bike and we want to support our residents to feel confident to start cycling more in our borough. We are committed to making cycling a safe, enjoyable and practical method of transport, to do this we offer anybody who lives, works or studies in the borough support to cycle with confidence so I'd encourage you to sign up and get cycling.

I am very pleased to be able to share with you the news that Newham Council's Children's Services are improving, a new inspection by Ofsted has noted. In a report published in late October, inspectors found services for children in care and care leavers are improving, with managers having: '…a clear understanding of the areas where improvement is necessary with robust and realistic plans to address them'. The two-day inspection took place in September and reviewed progress since a 2019 inspection rated Children's Services 'inadequate'. Since then, significant changes have been made including the biggest investment in the service for a generation.

Nothing is more important than our young people and that's why we have invested more than £36 million in services for young people since 2018, increasing the budget by 33 per cent and increasing the number of youth workers from three to 43. A big factor in our previous inadequate rating by Ofsted was prior to 2018 the council did not invest nearly enough in making our young people safe. I am determined that our young people get the support they deserve.

As I mentioned in my last message, and as we move towards winter, I am working closely with public health colleagues and would again emphasise the need for caution and to keep to the good habits of hands, face, space to protect ourselves and others. Please keep up with wearing face-coverings when you are out, particularly in crowded or unventilated places, and please get your Covid-19 booster and Flu jabs if you are eligible. You will find more about this in the stories below.

Whilst I'm on the topic of keeping us all healthy, across Newham our 5 Ways to a Healthier Life booklet has been delivered to our 121,700 households. Newham has been hard hit by Covid-19 but I am so inspired and proud of the way our community has worked together, showing great strength and resilience. Covid-19 has highlighted how maintaining a healthier lifestyle is great protection against becoming seriously ill, as well as supporting our general wellbeing and happiness. The information and services in our 5 Ways to a Healthier Life publication contains a range of support available to help you live a healthier and happier life.

I thought I would again mention our recent success in advocating for our fair share of government levelling up funds for Newham. We have been awarded £40million from the £65 million designated for London to support the Council's ambitious agenda for:

- Connected Communities to support economic growth, new jobs and skills linked to the use of data and digital technologies;
- 15 Minute Neighbourhoods to promote health and wellbeing and respond to the climate emergency through investment in upgrading neighbourhood infrastructure to support walking and cycling.

Mayor Rokhsana Fiaz OBE

Military Must Be Keen to Go Green

World leaders converged on Glasgow in November to discuss solutions to the global climate emergency. The armed forces and their contribution to meeting net-zero has already been discussed by Jens Stoltenberg, NATO Secretary General, at COP26. So, what are the armed forces actually doing to cut emissions?

The US Army this year awarded six contracts to companies to discover ways to power a 225,000 strong fleet of electric vehicles. Similarly, the UK has invested £10bn to transform its Man SV, Jackal and Foxhound vehicles into hybrids platforms. Meanwhile, the Royal Air Force aims to transition to sustainable fuel sources, synthetic training and carbon-free estates by 2040, to meet its net-zero pledges.

NATO forces are also investing in biofuels and solar energy to reduce their fossil fuel dependence. Overall, green technology promises exciting new avenues for defence, although investment in this area is slow. One hopes that COP26 can collectively encourage world leaders to spring into action, as the future of international security hinges on it.

NATO Secretary General Jens Stoltenberg poses for a picture during the UN Climate Change Conference (COP26) in Glasgow, Scotland, UK, November 2, 2021. REUTERS/Phil Noble

GLASGOW, Nov 2 (Reuters) - The world's armies must keep pace with global efforts to tackle climate change and cut their huge carbon footprints according to clearly defined benchmarks, NATO Secretary-General Jens Stoltenberg said on Tuesday.

Little reliable data exists on emissions created by military activities but there is no doubt they are big: a 2019 report conluded the U.S. military would be the world's 47th largest emitter of greenhouse gases if it were a country. read more

"There is no way to reach net zero without also including emissions from the military," Stoltenberg said in an interview at the COP26 climate conference, referring to the ambitions of many nations to hit net-zero emissions by mid-century.

Stoltenberg, a former U.N. special envoy on climate change, said work had already started within the alliance on a methodology to measure armed forces' emissions and that his aspiration was that this should be completed by end-2022.

"That is aim but of course I am dependent on agreement among 30 allies," he told Reuters.

Stoltenberg acknowledged the heavy existing footprint of the world's armies but said there were already efforts to address it: for example, the U.S. military using solar panels in its installations, the British army exploring alternative fuels and Spain planting trees on military land to capture carbon.

"There is an energy revolution taking place out there in civil society ... and this is about keeping up the pace, being part of that transformation," he said.

Stoltenberg began pushing for joint NATO moves on climate change some time ago but NATO diplomats said efforts to focus on the issue were stymied during Donald Trump's U.S. presidency.

He likened the current energy challenge facing militaries to the pre-World War I decision of Winston Churchill to replace coal with oil as the main fuel for the British navy - a move Stoltenberg said had both environmental and strategic benefits.

"We need to find a way to reconcile the need for green and environment-friendly armed forces with strong and effective armed forces," he said.

Editing by Gareth Jones

Laboratory Access via Cloud

Scientific organizations are striving for ways to enhance their processes, streamline their workflows, and implement technological advancements to ultimately achieve digital transformation. For many organizations, adopting a cloud-first strategy is a tactical decision which can provide many business advantages and support innovation.

This decision can provide both financial and operational benefits, such as: a modernized infrastructure which ultimately lowers IT costs, a quick road to go-live with low capital expenditure and minimal resources, and unmatched scalability. These benefits ensure all aspects of your laboratory operations run more efficiently. In addition to the benefits of implementing a cloud-based solution, there is intrinsic value that the different type of cloud models can provide. Cloud is more than just a delivery model and it can provide a unique set of benefits and capabilities to help accelerate innovation.

This webinar will highlight the value of implementing a cloud-first strategy into your scientific organization and the unmatched proficiencies that cloud platform strategies can provide to your laboratory operations. Cloud expert and product manager, James Pena, will discuss:

- How to accelerate your digital maturity through cloud
- The fundamentals of cloud-based strategies and solutions
- Driving innovation in your organization and industry through cloud adoption
- The available cloud deployment strategies Thermo Fisher can provide

www.scientific-computing.com

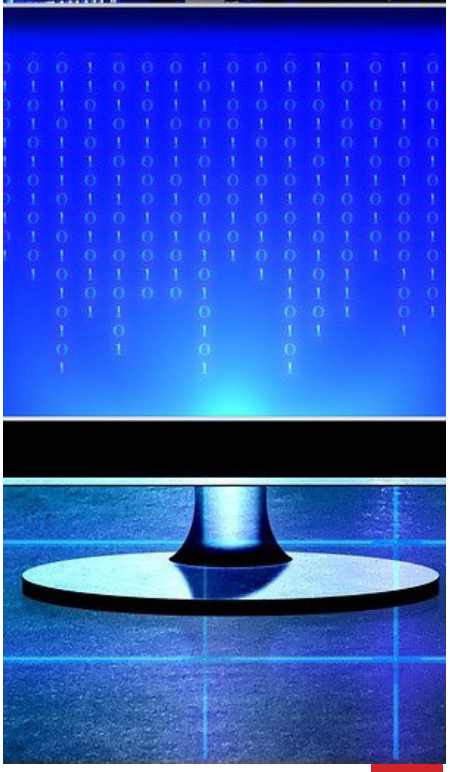
High Performance Computing (HPC) Solution

Oracle Cloud Infrastructure (OCI) is a highly performant and cost-effective HPC platform for industries, enterprises, and government bodies to solve complex mathematical and scientific problems faster. HPC on OCI rivals the performance of on-premises solutions with the elasticity and consumption-based costs of the cloud, offering on-demand availability and capability to scale tens of thousands of cores simultaneously. With HPC on OCI, you get access to high-frequency processors, fast and dense local storage, high throughput ultra-low latency RDMA cluster network, and the tools to automate and run jobs seamlessly in the cloud at a lower cost.

High performance computing (HPC) on Oracle Cloud Infrastructure (OCI) brings powerful, cost-effective computing capabilities to solve complex mathematical and scientific problems across industries. OCI's bare metal servers coupled with Oracle's cluster networking provide access to ultra-low latency RDMA (< 2 µs latency across clusters of tens of thousands of cores) over converged Ethernet (RoCE) v2.

HPC on OCI rivals the performance of on-premises solutions with the elasticity and consumption-based costs of the cloud, offering on-demand potential to scale tens of thousands of cores simultaneously. With HPC on OCI, you get access to high-frequency processors, fast and dense local storage, high throughput ultra-low latency RDMA cluster network, and the tools to automate and run jobs seamlessly.

oracle.com



Cambridge Quantum and Deutsche Bahn leverage quantum algorithms to optimise train scheduling

Cambridge Quantum (CQ) and Deutsche Bahn (DB) have announced a partnership to explore how quantum computers can improve the rescheduling of rail traffic as part of DB's long-term transformative plan, Digitale Schiene Deutschland, to digitise DB's infrastructure and railway system using next-generation technologies to achieve a higher capacity and optimal utilisation of the rail network.

Combining Cambridge Quantum's latest combinatorial optimisation algorithm Filtering Variational Quantum Eigensolver (F-VQE) - recently shown to outperform quantum algorithms - with DB's operations research expertise, the team re-optimised realistic train timetables after simulated delays and are now identifying areas for continued study. This collaboration evidences how innovations in both quantum algorithms and domain-specific modelling can inform a long-term vision for a faster and greener transportation network.

Ilyas Khan, CEO of Cambridge Quantum, said, 'We are very excited to be working with Deutsche Bahn to explore and demonstrate the utility of today's Noisy Intermediate Scale Quantum ("NISQ") processors to solve real-world problems in the transport and logistics sector. Deutsche Bahn's research and development efforts in this area are of critical importance, and we are confident that over time as quantum computers start to scale, our work with the will lead to a meaningful contribution towards a cleaner and greener future.'

Michael Küpper, lead of Capacity and Traffic Management System at Digitale Schiene Deutschland, said, 'The collaboration with Cambridge Quantum is a perfect example of how Deutsche Bahn is working as a partner with industry providers and combining our relative expertise towards a goal neither side can achieve alone. By working with Cambridge Quantum, we have fine-tuned our research and development plans and taken the first steps in defining a future quantum-advantaged train timetabling system. We are excited to continue working with Cambridge Quantum to address some of the key challenges and contribute to the rapidly evolving field of NISQ quantum algorithm research.'

www.scientific-computing.com

Credit: Bartlomiej K Wroblewski/Shutterstock

Credit: NERSC

The US Department of Energy announces the 2022 ASCR Leadership Computing Challenge

The US Department of Energy has announced the latest ASCR Leadership Computing Challenge inviting US researchers to apply for an allocation of HPC resources focused on high risk, high reward scientific projects.

The ASCR Leadership Computing Challenge (ALCC) is an allocation program for projects of interest to the Department of Energy (DOE), with an emphasis on high-risk, high-payoff scientific campaigns enabled via high-performance computing (HPC). The ALCC specifically focuses on projects or research areas directly related to the DOE mission, that respond to national emergencies, or that broaden the community of researchers capable of using leadership computing resources.

ALCC is currently soliciting proposals for allocation awards for the 2022-2023 allocation. HPC platforms available for the current allocation cycle include Summit, the 200-petaflop IBM AC922 at the OLCF; Theta, the 12-petaflop Cray XC40 machine; and Polaris, a new 44-petaflop accelerated system at the ALCF; and Perlmutter, a new accelerated system at NERSC.

Up to thirty per cent of the allocatable computing time will be made available on each of these machines to the ALCC program. In addition, limited access may be given to the exascale Frontier system at Oak Ridge National Laboratory, pending the pace of system acceptance, for nationally important, and exascale-ready projects.

However, in 2022 The DOE aims to ensure equitable distribution of projects by enforcing an allocation request cap. Any pre-proposal or proposal that requests more than 25 per cent of the available resources will be deemed non-responsive and will not be reviewed.

While projects do not need to be directly funded by the DOE, the website does note that proposals need to identify the relevant DOE Office/research priority area and provide the name and email of your program manager/ project sponsor. Program priority is part of the merit review and projects that do not have input from the sponsor program will not be competitive.

Pre-proposals for the ALCC are due on December 17, 2021. Full details of the ALCC can be found on the US DOE Office of Science website.

www.scientific-computing.com

Is Smartphone Technology Safe?

Motorola Solutions is aware of the Log4Shell vulnerability, CVEs-2021-44228 and CVE-2021-45046. The flaw is a remote code execution (RCE) vulnerability impacting the Java library Log4J for all versions 2.15 and earlier.

Based on our current analysis, the following Motorola Solutions products are not affected by the Log4J vulnerability:

IndigoVision Control Center suite of products (no use of Log4J)
IndigoReports (Log4J version used is not affected by the vulnerabilities listed)
All IndigoVision cameras except those indicated in the below section
We have determined that the following Motorola Solutions products may be impacted by the Log4J vulnerability:

Compass Decision Management System
Remediation: Mitigation procedure in progress. Hot fix with full resolution available by December 31, 2021.

Ultra X PTZ range
Remediation: Under Review
We will continue to send additional updates to you directly as needed. Our analysis currently applies to Motorola Solutions-developed software only.

As a general practice, we strongly recommend that our customers regularly take the following steps:

- Ensure that your security monitoring or managed detection and response service has applied detection controls for exploitation of the Log4J vulnerability. The Cybersecurity & Infrastructure Security Agency (CISA) provides guidance on operational security controls here.
- Contact your security device vendors (i.e., web application firewall vendors) to confirm that all detection or preventative capabilities have been applied.
- Apply all updates provided by Motorola Solutions and other vendors, as soon as possible.
- When possible, do not allow internet exposure for mission-critical devices and/or systems and, when internet exposure is required, always apply strong authentication controls.
- Review user and administrative accounts to ensure no unauthorized accounts are present.

www.indigovision.com

The future of small modular reactors and advanced reactors

Off-grid market applications

Small Modular Reactors (SMR) and Advanced Reactors (AR) are now shaping a new nuclear energy landscape, with designs no longer just targeting electricity generation. Vendors are exploring markets outside electricity supply, which exploit reactor features not offered by conventional large-scale nuclear power plants (NPP).

This whitepaper examines potential off-grid market applications of SMRs and ARs that could provide more than just power to remote communities and mining projects in Canada, as well as to U.S. military operations.

Featuring insights from:

Dr Ken Coates
Professor and Canada Research Chair in Regional Innovation, Johnson Shoyama Graduate School of Public Policy, and Musk Senior Fellow, Macdonald-Laurier Institute, University of Saskatchewan

Dr François Caron
Director of the Energy Sector and Bruce Power Chair for Sustainable Energy Solutions Mining Innovation Rehabilitation and Applied Research Corporation (MIRARCO)

Kerry A Mccabe
Research Scientist
Pacific Northwest National Laboratory

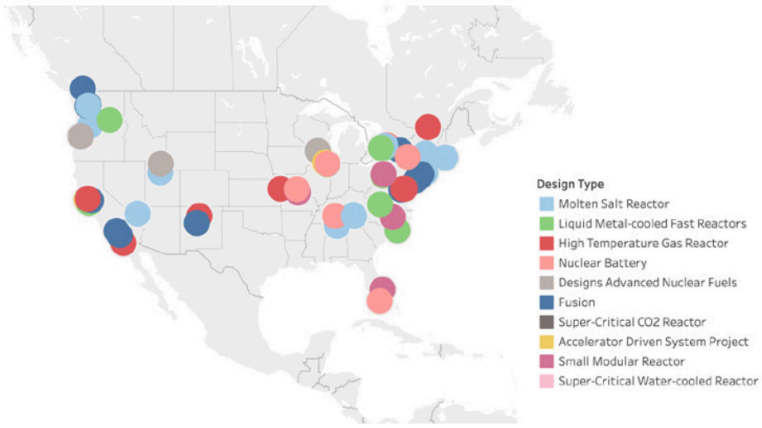
Overview

Argentina, China and the Russian Federation are on course to begin commissioning the world's first SMRs, and more additional designs are advancing through licensing and construction. North America will likely be the next to deploy an SMR, as the U.S. is looking to 2026 for the start of operations while Canada pursues its progressive regulatory regime to start up demonstration reactors in the same year.

As SMR and AR deployments become commercial realities, potential off-grid markets are opening up off the back of reactor applications that go beyond electricity supply. Russia's KLT-40S pressurized water reactor (PWR) has been developed for deployment on a floating nuclear power plant. However, its design also enables cogeneration of power and heat to remote, off-grid communities, power generation on oil rigs, as well as desalination. Likewise, China's ACP100 is designed for deployment in remote areas that have limited energy supply options or a lack of industrial infrastructure. Its applications also include desalination, cogeneration and district heating, as well as steam production.

Other off-grid sectors are also engaging with the nuclear industry and the range of applications is expanding. In addition to providing heat and power to remote communities, SMRs provide a cheaper, more reliable and sustainable energy source to mining and oil sands operations. Similarly, the commercial shipping industry has expressed interest in SMRs due to its consumption of expensive fossil fuels that results in high running costs, as well as contributing to global environmental pollution

A map showing advanced nuclear projects across North America



Credit: THIRD WAY

A Map Showing the Locations of Remote Communities in Canada

Credit: Canadian Nuclear Laboratories

and carbon emissions.

Finally, one sector that is revisiting the concept of using SMRs and ARs as mobile power sources is the U.S. military. Recognizing the constraints imposed by lack of power when conducting military operations in the field, the U.S. Department of Defense (DOD) is now actively pursuing the deployment of mobile nuclear reactors to accompany the U.S. Army deployed to remote and/or off-grid regions.

University of Saskatchewan
Dr Ken Coates, Professor and Canada Research Chair in Regional Innovation, Johnson Shoyama Graduate School of Public Policy, and Musk Senior Fellow, Macdonald-Laurier Institute

The SMR has great potential to bring stable and sustainable energy to hundreds of remote, off-grid communities in the provincial north of Canada, a region that runs from British Columbia to Labrador. All but one or two of these communities use very high-cost energy sources since most are in areas without ready access to transportation networks and bringing in diesel fuel is expensive. These communities endure extreme cold weather conditions for the majority of the year and they are seriously concerned about the increasingly urgent need to secure reliable and affordable energy.

Although renewable energy sources are also possible long-term solutions, hydroelectric power is an expensive proposition while early solar power installations in the far north have not worked due to the accumulation of snow and ice. Similarly, the geography and geology do not easily lend themselves to installing wind power. Therefore, even though the SMR is not yet a practical solution to meeting energy demand in Canada, it has potential to provide a cheap and reliable long-term solution to remote northern communities.

Further to issues raised during initial consultations with stakeholders and potential SMR end-users reported by the Canadian Small Modular Reactor Steering Committee in its roadmap published in 2018, some communities are now reaching out and actively looking for engagement with the government and private industry. People living in the remote north are attending industry conferences and asking for more information and support to learn more about SMR technology. Government agencies are engaging in conversations about a full range of potential solutions, which include but are not exclusively about nuclear power.

In addition, SMR vendors and private companies are cultivating interest in SMRs rather than cultivating markets. Conversations between remote communities and industry are still in at a preliminary stage rather than exploring new features or tailoring designs to meet specific needs. Industry is anxious not to over-sell and is proceeding at an appropriate pace that ensures the science, regulations and economics are right. The latter is a fair concern due to the capital expenditure necessary to install an SMR, which is not yet a proven technology. It is likely that the first implementations will be for remote mining companies and other potential end-users will watch the SMR at work for a year or two before confirming it is a real solution.

Alternative applications are being actively explored, with heat generation almost equal to electricity in terms of the potential benefits of SMRs. Heat is central to people living in temperatures that drop 40C to 50C below zero during winters that stretch from end- September to end-May. There is also a lot of interest in natural resource development in the remote north and an SMR could dramatically change the economics in the region for projects including hydroelectric development, mining, and oil sands development.

The interesting challenge in the case of the north is that because all the energy has been so dear for so long and people are heavily reliant on diesel, there is not yet an entrepreneurial culture waiting to exploit all the SMR opportunities. The high cost of electricity and inconsistency of supply makes it really expensive to live in the north. However, the overall cost of living will diminish with a reliable, safe and cheaper supply of energy and electricity. Also, current business opportunities to develop food factories or greenhouses to grow fresh produce are limited to the ability to capture waste heat from buildings. The dynamics change completely if there is an SMR and a flood of interest and creativity is likely once the standard and obvious uses of the reactor have been justified and proven.

The most important part of the route to installing an SMR in a remote community is that it controls the project. This is a big issue for First Nations generally in that they are tired of relying on everybody else all the time. The other part of the process relevant to most places is that there is pressure on so many issues beyond power and energy that although people are very interested in the energy side of an SMR, they are not far enough along to be looking at nuclear as part of the puzzle overall.

MIRARCO Mining Innovation
Dr François Caron, Director of the Energy Sector and Bruce Power Chair for Sustainable Energy Solutions

MIRARCO and collaborators continue to pursue an SMR design and delivery model that would provide significant economic benefits to mines operating at remote sites, as well as supplying a carbon-free and reliable source of energy. The model includes transporting an SMR to site where it would produce power with cost savings of CAN $0.15/KWh for a typical 20-year mine lifecycle. By switching from diesel, a typical mine could save around CAN $300 million across two decades of mining operations.

The ease of deployment is central to the delivery model. More than one vendor is being considered since mining companies are interested in the possibility of an SMR with maximum portability at a certain price point. In addition, they want established nuclear operators with

experience in running a nuclear reactor and in licensing. This is especially pertinent since the reactor can be removed, recycled and replaced by the nuclear operator, who can also deliver further modules should there be a demand for increased power at the mining site.

A nuclear operator will also be very useful with respect to nuclear regulatory processes. The model currently being pursued by MIRARCO involves the mining client entering into a power purchase agreement (PPA) with a nuclear operator. The mining company and nuclear power company each have their own set of specific regulations for which they have the expertise and knowledge to manage individually, while the agreement enables them to come together to work on those regulations that can be done jointly.

Timelines to deployment vary from the mid- to late- 2020s in Canada. More precise dates depend, among others, on the progress of vendor reviews at the Canadian Nuclear Safety Commission (CNSC) and potential demonstration units getting up and running at the Canadian Nuclear Laboratories (CNL). There is considerable optimism, however, since there are a number of favorable factors that are converging to realise commercial operations.

Mining companies could also tap into the potential of using direct heat generated by the reactor for processes rather than producing electricity to heat up a process. Although somewhat confined by the ultimate reactor design, there is a wide range of potential applications that include having the SMR integrated into an energy park at the mine site. This would be a feature for clients located in more northerly locations that interested in other sources of green energy such as wind or solar since these types of power sources are not always as reliable or available as diesel or nuclear.

Pacific Northwest National Laboratory Kerry A Mccabe, Research Scientist

A desire for inexpensive, stable, sustainable electric power generation to support military operations at remote and inaccessible sites led the U.S. Army to create the Army Nuclear Power Program in 1954. One of the program's noteworthy efforts was the prototype development of a mobile, low-powered nuclear power plant, intended to furnish electrical power in remote locations.

The ML-1 prototype was a trailer-mounted system employing a gas-cooled, water moderated reactor, coupled to a compact closed-cycle gas-turbine power conversion unit. Designed to produce 300-500kW of electricity, the system was transportable by air, sea, rail or truck. The ML-1 program was terminated in the early 1960s as resources were diverted to the Vietnam War effort. However, the U.S. Government, specifically the DOD, has recently begun to re-examine nuclear power generation for military operations.

The emergence and utility of SMRs for military operations was recently identified by the Defense Science Board in a 2016 report on Energy Systems for Forward and Remote Operating Bases. In response, the Army Deputy Chief of Staff for Logistics (G-4) conducted further study of the topic in 2018. The Army study assessed the political, economic, social, technological, environmental and legal/regulatory/licensing issues surrounding the use of nuclear energy and particularly very small modular reactors (vSMRs) for mobile nuclear power plants (MNPPs) that generate electricity in support of ground operations.

Energy supply imposes limits on military power and maneuverability. The delivery, storage and handling of conventional liquid fuel is costly, time consuming and can come with a significant cost to lives, as liquid fuel logistics is a military target. Leveraging the density of nuclear power enables operational flexibility and supports a ground force's maneuver options, while reducing its fuel supply vulnerabilities. Using MNPPs to provide electricity at forward and remote locations negates the need to continually resupply fuel, providing energy assurance and resiliency in austere locations.

The MNPP micro-reactor is designed with robust design and emphasis on transportability, enabling it to be rapidly moved multiple times during its operating life. Future efforts aimed at miniaturization of the reactor and components are expected to improve mobility and expand the utility of nuclear power for both military operations, as well as other functions such as humanitarian and disaster relief.

For example, clients are looking to take advantage of the economy of smaller multiple reactors as opposed to having a large station generate power. More widely, the demand for power in remote areas is very strong especially as consumers look to saving on not only financial costs but also to reducing their carbon footprint. There is a set of possibilities offered by installing an SMR including electricity production, district heating used to produce food, for example, in greenhouses in remote northern areas of Canada.

The DOD prototype effort is examining design options, trade-offs and their impacts on military doctrine, transportability, staffing, training and life cycle support. An example of this is an examination of the utility and potential impact of a segmented design (involving two

20ft containers separately carrying the reactor and power conversion unit, which would be coupled together at the site) against an all-in-one design with everything in a single 20' or 40' container.

Safety is also being examined in detail to influence key design characteristics necessary for success when operating in a military environment. The DOD target for prototype design is 2023, with immediate operation and testing to follow. Shutdown and movement from the development/test site to a remote operational setting where the MNPP would provide power for a period of time, is envisioned as the prototype programs capstone event.

The MNPP effort is examining and assessing avenues for nuclear industry involvement in commercialization of the capability. Supply chain issues are being examined to understand how to best engage and support the market place in delivering low cost, high quality reactors, components and fuel over the long term. A desired outcome is the creation of a business model that can keep costs down while supporting a healthy industrial base to meet both military and civilian mobile power demands for decades.

Developing a commercial market for vSMRs is pivotal to ensuring commercial business and DOD costs are kept at a reasonable level, while facilitating a successful path through regulatory and licensing requirements. The plan is for the DOD's Strategic Capabilities Office (SCO) to enable reactor designs selected for potential adoption to be commercialized by their vendors.

The DOD selection and development program for reactor designs has two phases. The down-select for the first phase has been completed, with the most promising designs now being taken to a preliminary design review. An expert panel will next evaluate each preliminary design against criteria to qualify for phase two. The field will be narrowed further in phase two for completion of a detailed design and eventual development and construction.

The prototype reactor will be licensed and regulated by the DOE. Eventual military acquisition of an MNPP capability would likely see the devices licensed under DOD authorities. Close coordination with the Nuclear Regulatory Commission (NRC) on the project assists with potential commercial licensing of future vSMR and SMRs. The NRC will be brought into the process during the preliminary and final design phases, as will other entities to conduct nuclear health and safety assessments and provide input and guidance to the prototyping effort. While DOD is only building a prototype at this point, it is interesting to think of potential applications and opportunities a spin- off commercialized small mobile power plant could create in business areas such as mining, oil and gas exploration and remote communities.

Conclusion

SMRs and ARs present the nuclear industry with diverse market opportunities, especially for those vendors willing to engage with potential end-users so designs can be tailored to specific applications. Business models that include reactor innovations which adapt to and exploit those niche off-grid sectors with an urgent need for safe, reliable and sustainable energy, have a head start in the marketplace. Bringing down costs will also prove attractive to clients and consumers, while additional features will enhance the commercial viability of SMRs and ARs. Once the benefits of off-grid applications are clearly demonstrated, demand is likely to grow rapidly.

On an international scale, governments, industries and communities that are actively seeking carbon- free energy sources to reduce their carbon emissions have an expanding range of advanced reactor technology that not only meets their demand for power, but also offers a widening range of applications. SMRs and ARs have the potential to secure a long-term future for the nuclear industry and its supply chain if the technology can be proven in a rapidly evolving energy landscape. This future will be further enhanced if alternative applications are fully developed to attract more alternate end- users.

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Student Loans Company sacks three for computer misuse

Staffers face disciplinary action for examining private accounts of family members, sharing content on Facebook linked to criminal activity and sharing inappropriate content via work emails and Microsoft Teams.

London 3rd November 2021: The Student Loans Company (SLC) has formally dismissed three members of staff for computer misuse over the last four years, according to official figures.

The data, obtained by niche litigation practice Griffin Law, revealed that a total of 23 employees have faced some form of disciplinary action for offences including examining private accounts of family members, sharing content on Facebook linked to criminal activity and sending inappropriate content via work emails.

In 2021, seven employees in total have been punished for cases of computer misuse, including one instance where an employee has been suspended, pending investigation, for accessing their family or friend's Student Finance accounts. This year, five cases of computer misuse resulted in punishment via 'informal action' – these included two scenario's where inappropriate language was used in an email to a line manager, and two instances where employees were punished for inappropriately 'liking' a negative post.

In 2020, there were only two recorded punishments for computer misuse, including a summary dismissal where perpetrator shared inappropriate and offensive material over Microsoft Teams. Experts have suggested that instances were low this year as the pandemic and home working prevented managers from being able to track employee behaviour as closely.

In 2019, there were six punishments in total, including one instance of dismissal for wrongfully accessing a personal, friend, or family member's Student Loan account, and one case of resignation following excessive use of internet during work time (amongst other allegations).

In 2018, five punishments were handed out due to misconduct with the social networking site Facebook, four of which were due to the use of 'offensive', 'derogatory' or 'aggressive language' and/or images targeting colleagues, which resulted in written or verbal warnings. In one case an employee was dismissed because they shared content via social media which linked a colleague to criminal activity, potentially bringing their company into disrepute.

Donal Blaney, Founder, Griffin Law comments: *"Students are among the most vulnerable members of society – often naively trusting those in authority to always do the right thing. The idea that the Student Loans Company fails to protect the data of students it lends money is sickening, and they should be ashamed of themselves for failing to clamp down on wrongdoing harder and faster".*

Torsten George, Cyber Evangelist, Absolute Software comments: "Organisations like the Student Loans Company oversee some of the most sensitive data imaginable, including personal financial details, statements payments information of millions of people. The risk of SLC employees walking away with sensitive data or selling their access credentials has never been greater now that a record number of individuals have been made redundant and face financial hardship due to the COVID-19 health crisis.

"All too often, large organisations like the SLC are aware of the challenges related to external threat actors, and they therefore focus their efforts on creating deterrents to protect against these cyberattacks. In doing so, they often overlook the fact that the biggest threats can arise from within.

"Although insider threats can come from malicious employees and contractors, insider threat stats have revealed that many of them originate from negligence on the part of your employees and other close associates. For example, endpoints containing sensitive data pose a more serious risk. With more workers off-network and often struggling with reliable network connectivity, more information was stored on local machines."

Torsten refers to Absolute's recent 'Endpoint Risk' report, which revealed that the sensitive data contained on each device has risen by 10 percentage points, from 7 per cent to 17 per cent, overall. However, in financial services, the amount of data per device has risen by 15 percentage points to 30 per cent, and in healthcare, this has risen by 12 percentage points to 15 per cent.

He continued: *"Under the current economic conditions, IT security professionals need to quickly re-assess their approach to defending against insider threats. Since the near-term deployment of behavioural analytics tools for monitoring insider activities is not a viable option for most organisations, consider leveraging endpoint visibility and control tools that allow for the needed insights to determine if data is at risk, how the device is being used, and even where the device is located."*

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The pandemic has brought about new dynamics in life and business. The paradigm shift in post pandemic in all sectors has left huge gap for us to develop our understanding and how to re-calculate the status quo. The increase in demand and the lag to meeting those has never been greater.. Innovative ways to better services are invented only through extensive market researches and constant reflections, that require advance application in business, information and communication technologies. Our understanding on knowledge management in the broad sense are becoming all the more important to cope with gigantic gap in many sectors created by the pandemic.

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