NUCLEAR ENERGY:

A critical pillar of a carbon-free future

EXECUTIVE SUMMARY

As the world continues to decarbonize the energy sector and strives to attain net-zero greenhouse gases to combat the threat of a warming planet, producing dependable, cleaner power is a global priority. As the most dependable source of carbon-free power generation providing around-the-clock energy supply without interruption, **nuclear energy is an important part of the power generation landscape, and it is a critical pillar in the transformation to a carbon-free future.** Countries of all sizes are setting their sights on carbon-free nuclear power generation as part of their energy mix to ensure a dependable source of cleaner power with the highest level of reliability, while supporting their own energy security. With the urgency of the climate challenge, decision makers should ensure nuclear energy is included in the discussion.

According to the International Energy Agency (IEA), nuclear already accounts for 10% of the world's total global power generation and 25% of all carbon-free power generation today with the United States, France, China, Russia and South Korea generating the most nuclear power. Over the past 50 years nuclear power generation has avoided CO_2 emissions by over 60 gigatons globally—nearly two years' worth of global energy-related emissions.

GE has been at the forefront of innovation in nuclear power generation since the mid-1950s, providing leading technology and services to our customers since the industry's early days. In 1957, GE connected its first nuclear reactor to the commercial electricity grid and continues to build on its nearly 65 years of experience having constructed more than 65 reactors in 10 countries. Today, GE's steam turbine technology operates in 50% of the world's nuclear power plants, producing 200 gigawatts (GW) for the global grid. We believe best-in-class technology, continued innovation and optimization, as well as a strong regulatory framework are critical to securing a carbon-free future with nuclear energy, following two parallel paths:

Maximizing the lifetime output of the existing installed fleet. As new technologies come online, it is critical to maintain existing carbon-free nuclear power generation as part of the cleaner energy mix. With some 450 nuclear reactors in the world, one of the most effective and economical solutions will be to extend operating licenses to support the shift to a zero-carbon economy. Market recognition of nuclear power as an emissions-free generation source is key to extending these licenses and keeping nuclear plants operating. Streamlining regulatory requirements and increasing investment to incorporate new technologies, including digital solutions, will further support efforts to reach carbon-free energy sector goals. Industry leaders are expected to continue to develop new offerings to help customers service their equipment, as well as improve efficiency, lower operating costs and extend the lifetime of their plants. GE estimates increasing the thermal power rating and retrofitting a typical steam turbine and generator can achieve up to 20% or more additional gross power output.

60+ YEARS
of innovation in nuclear power generation

1st NUCLEAR REACTOR
connected to the grid in **1957**

MORE THAN 65 reactors
constructed in 10 countries

50%
of the world's nuclear power plants operate with **GE steam turbines**

Building new nuclear plants with best-in-class technology, with a focus on innovating the next generation of nuclear technology and accelerating new large-scale projects. Continued innovation across the industry is expected to deliver world-class technology to reduce construction costs and schedule, as well as ensure operational reliability and safety. Small modular reactors (SMRs) have the potential to drive down investment cost per megawatt (MW). SMR deployment can be accelerated with government support. Nuclear industry leaders like GE, along with industry partners, are developing patented breakthrough reactor technology innovations to reduce cost and complexity. GE Hitachi Nuclear Energy (GEH), an alliance created by GE and Hitachi Ltd. to serve the global commercial nuclear power industry, has developed the BWRX-300 SMR, which GEH projects can be deployed by as early as 2028. The Natrium™ sodium fast reactor, in co-development by TerraPower and GEH, includes thermal energy storage and is well suited to support electricity grids with high levels of renewable generation sources. With respect to large- scale projects, while there are plans to phase out nuclear power plants in some countries, GE forecasts about 10 GW per year of demand for new nuclear power plants over the coming decade which is in line with the IEA's Net Zero Emissions by 2050 (NZE) forecast. Beyond 2030, nuclear deployment is only expected to accelerate in an increasingly carbon-constrained world. IEA's NZE forecasts an average increase of over 20 GW per year in net nuclear capacity between 2030 and 2040. With a global fleet of 53 GW, 99.96% reliability, and capable of generating 2% more power output than a previous turbine configuration, GE's industry leading Arabelle™ steam turbine is compatible with all large-size reactors.

This **Positioning Pape**r will discuss GE's view on the critical role nuclear energy plays as the world transitions to a carbon-free future with a focus on:

1. Nuclear power's role in the world's climate challenge
2. Maximizing the lifetime output of the existing installed fleet
3. Innovating the next generation of nuclear power technology
4. Accelerating new large-scale nuclear power plant projects
5. Recommending policies to achieve CO_2 reduction targets

NUCLEAR POWER'S ROLE IN THE WORLD'S CLIMATE CHALLENGE

The world is facing a serious climate challenge. The discussion around increased CO_2 in the atmosphere and its impact on higher global average temperatures continues to intensify. Although other greenhouse gases such as methane, nitrous oxide and fluorinated gases contribute to increased global temperatures, CO_2 is the largest single contributor largely driven by transportation and electricity production. Rising to the challenge of achieving a carbon-free energy future will require all available sources of cleaner energy, including nuclear, with urgent support and action from governments, companies, non-government organizations and other stakeholders.

It's important to consider the whole energy system. As governments plan how to achieve their carbon reduction goals and determine their future energy mix, they will need to consider the risks and interdependencies of their own energy systems. The future of our global energy system should be more interconnected and integrated to share gains and efficiencies across economies. Policymakers and industry leaders must consider the whole energy system across multiple carriers, infrastructures and consumption sectors when making decisions.

A net zero-emissions energy system will also require power generation from a variety of cleaner technologies, including nuclear, renewables, energy storage, combined cycle gas turbines with carbon capture, and hydrogen. Low-carbon power generation, combined with system balancing such as interconnectors, demand-side response, storage, batteries, and hydrogen, will create the opportunity to decarbonize the power sector. The energy system as a whole must be addressed to significantly reduce carbon emissions, especially in energy-intensive uses like heating, transportation, and industrial manufacturing.

Nuclear energy is a critical pillar of a carbon-free future. Today, nuclear power generates approximately 10% of the world's electricity with over 400 GW in global installed capacity according to the IEA. The United States, France, China, Russia, and South Korea generate the most electricity from nuclear power generation sources. Nuclear power plays an important role in a country's energy security, providing affordable and stable cost of electricity largely independent from fuel market price fluctuations with long-term availability. While there are plans to phase out nuclear power plants in some countries, others are establishing or expanding nuclear generation. GE forecasts about 10 GW per year of demand for new nuclear power plants in the coming decade and increasing global commitments to decarbonization should only accelerate this trend. Indeed, the IEA's NZE forecasts a near doubling of installed nuclear capacity compared to today, reaching 812 GW by 2050.

> A typical 1000 MW nuclear unit reliably delivers 8 terawatt-hours (TWh) per year. That means 8 trillion watt hours of on-demand power generation with affordable and stable cost of electricity. That's enough power for 1.3 million people per year in Europe, and equivalent to the power generation of 750 4 MW windmills.

Based on its benefits, the IEA has called for greater contributions of nuclear energy in the global energy mix to achieve a scenario in which long-term global temperature increases are limited to 2°C (Sustainable Development Scenario). According to the IEA, by using nuclear power as a source of electricity generation, the world avoided more than 60 gigatons of CO_2 emissions over the past 50 years. The IEA indicates that nuclear power is a leading low-carbon source of electricity, and it is considerably harder to achieve a sustainable energy future without it, due to base-load requirements and the need for dispatchable power to enable a flexible system.

Nuclear power offers around-the-clock energy supply without interruption, with the highest capacity factor in the energy mix. With up to two years of fuel stored on-site, nuclear power plants are more reliable compared to other fuel sources that need to be delivered to the site. It is a carbon-free dispatchable source of electricity that provides the necessary 24/7 baseload capacity to flexibly support renewables with load-follow operation, helping to stabilize the grid and prevent blackouts when weather-dependent sources, such as wind and solar, are part of the mix. SMRs will be even more flexible and distributed in location. In addition, nuclear plants can also produce large amounts of power on less land than other cleaner energy source. A typical 1,000 MW US nuclear power plant footprint is only a little more than a square mile.

> Nuclear can also be part of a hybrid energy system, which could use electricity and/or heat produced by the reactors to produce a clean source of hydrogen. According to the US Department of Energy (DOE), a 1000 MW nuclear reactor could produce more than 200,000 tons of hydrogen each year.

While nuclear power does not emit carbon during operation, as with all power generation technologies, there are carbon emissions associated with nuclear power across its lifecycle. According to the UN IPCC, nuclear lifecycle emissions are approximately 12 gCO_2eq/kWh, as compared to approximately 41-48 gCO_2eq/kWh for solar PV power and approximately 11-12 gCO_2eq/kWh for wind power.

10%
of **total global** power generation

60 gigatons
CO_2 emissions avoided in the past **50 years** due to nuclear

25%
of all **carbon-free** power generation

(Source: IEA)

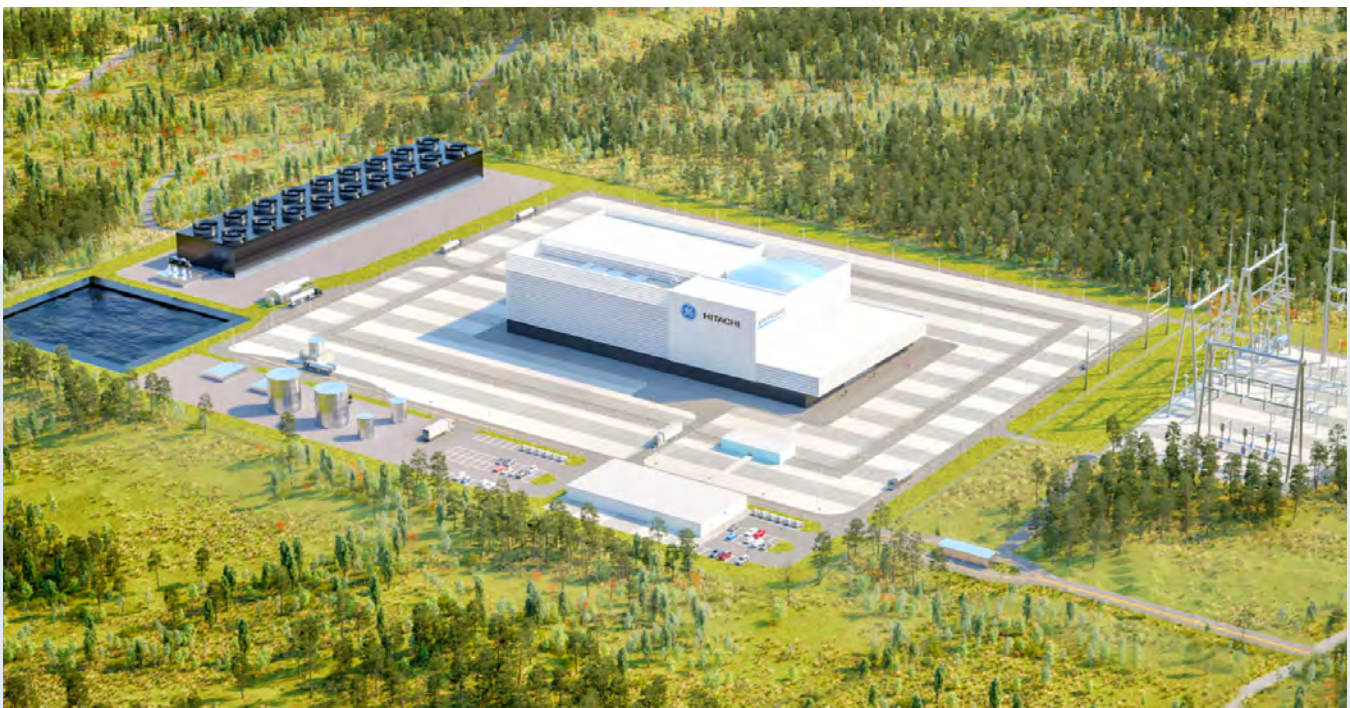
Nuclear energy is an investment in the future—affordable electricity, economic growth, and "green" jobs. Investing in nuclear energy is a long-term investment decision that will benefit generations to come and requires significant government support. While the initial investment to construct a nuclear power plant is considerable, its lifecycle can run up to 80 years. Throughout its entire lifecycle, it can produce enormous uninterrupted amounts of electricity over long periods of time with affordable and stable cost of electricity largely independent from fuel market price fluctuations with long-term availability.

As countries consider "green recovery" from the economic impact of the COVID-19 pandemic, there is an opportunity to rebuild the economy by embracing technologies that reduce our carbon impact. The nuclear industry should be considered a part of this recovery plan for creating cleaner energy jobs and contributing to gross domestic product (GDP). The nuclear industry brings a wide range of jobs and presents a country with the opportunity to invest in its future workforce as it plans for long-term plant operations with highly skilled technical jobs.

According to the US Office of Nuclear Energy, nuclear plants support nearly 500,000 US technical jobs and contribute an estimated $60 billion to US GDP each year. A single US nuclear plant can employ up to 700 workers with salaries 30% higher than the local average. Refueling outages can bring over a thousand additional jobs that support the local supply chain, with workers staying in local hotels and eating in local restaurants.

According to Foratom, in the European Union, the nuclear sector provides more jobs per installed GW and has a larger impact on GDP than wind and hydro. It contributes 507.4 billion Euro to GDP and generates public revenues of nearly 124 billion Euro each year. Every Euro of the nuclear industry's direct contribution to EU GDP generates an indirect contribution of 4 Euro, totaling an impact of 5 Euro. The nuclear sector also supports more than 1.1 million jobs throughout the 27 Member states, nearly half of these being highly skilled jobs. Every job created in the nuclear sector sustains another 2.2 jobs, totaling 3.2 jobs in the labor market. About 70% of direct jobs are sustained as the industry maintains the plants over the long-term.

At the same time, more needs to be done to increase public support for nuclear energy. Safety and proper management of spent nuclear fuel are critical issues that the industry continues to focus on and improve. The IEA recognizes nuclear energy as the safest energy source in the world, but more needs to be done to educate the public about the protocols and regulations in place to ensure nuclear safety and proper management of spent nuclear fuel. When it comes to safety, reactors are designed to the industry's highest standards with the strictest protocols among the power generation fuels. Similarly, spent nuclear fuel must be carefully managed and is subject to extensive regulation by governmental authorities.



MAXIMIZING THE LIFETIME OUTPUT OF THE EXISTING INSTALLED FLEET

It is important to maintain existing carbon-free nuclear power generation as part of the cleaner energy mix. With some 450 nuclear reactors in the world that generate over 400 GW of carbon-free power today, maximizing the lifetime of the existing installed base is critical.

400 GW of carbon-free power **generated today from nuclear**

According to the World Nuclear Association (WNA), the US is the world's largest producer of nuclear power, accounting for more than 30% of global nuclear generation of electricity, and the IEA reports that, by using nuclear power as a source of electricity generation, the US avoided more than 23 gigatons of CO_2 emissions over the past 50 years.

France is the second largest producer of nuclear electricity with EDF operating and maintaining 56 reactors, and Canada is making significant investments in its current fleet. According to the WNA, one of the largest cleaner energy projects in North America is underway in Ontario, Canada with the refurbishment and lifetime extension at the Bruce and Darlington Nuclear Generating Stations.

According to the World Record Academy, Ontario Power Generation's (OPG) Darlington Nuclear Generating Station, Unit 1, generated power reliably for 1,105 continuous days without interruption, setting the world record for the longest continuous operation of a nuclear power plant.

At the same time, nuclear utilities are facing increasing pressure to reduce their operation and maintenance (O&M) costs to better compete with low natural gas costs and subsidies for renewables. Reducing O&M costs with digital solutions, extending lifetime plant operating licenses, increasing technology investments, and innovating more efficient and reliable fuels will be required to maintain the existing nuclear fleet, helping countries reach their decarbonization goals.

Reducing O&M costs with digital solutions: Nuclear utilities are facing increasing pressure to reduce O&M costs of their existing fleet to stay competitive. Enabling best-in-class outage performance with digital solutions is one way for utilities to reduce costs. In addition, industry leaders are developing virtual reality technology to train fuel handling teams prior to the outage to improve on-the-job performance and overall outage efficiency.

Software solutions for predictive plant health and maintenance, such as GE's Asset Performance Management (APM) solution, can help nuclear plant operators detect potential issues and maintenance needs earlier, enabling better outage planning. This software can help reduce downtime and increase asset utilization, leading to typical O&M cost reduction of 3%. Several large nuclear plant operators are rolling out predictive analytics and O&M process automation as a single strategy across their units.

Outage Planning and Analytics (OPA) software, developed by GEH and GE Digital, maximizes the outcome of the entire nuclear refueling outage process, including planning, scheduling and execution. Using comprehensive data analytics and tools, it allows cross-functional teams to build and execute programs that minimize outage costs, duration and revenue loss. OPA was developed to address customer's desire to integrate all outage-related data to provide a single view form tracking outage progress, alerting risks, avoiding variances to plan and help reduce overall outage cycle time.

3% typical O&M cost reduction possible with **DIGITAL SOLUTIONS**

Beyond reducing the operating costs of existing plants, GE was awarded a contract with the US DOE as part of the Advanced Research Projects Agency-Energy's (ARPA-E) Generating Electricity Managed by Intelligent Nuclear Assets (GEMINA) program to develop digital twins and associated technologies, such as Humble AI, for GEH's BWRX-300 SMR, as the reference design, to significantly drive down O&M costs of the next generation of reactors. This project is a collaboration among GE, Oak Ridge National Lab, University of Tennessee in Knoxville and Exelon. The Massachusetts Institute of Technology (MIT) was also awarded a contract under US DOE to assemble, validate, and exercise high-fidelity digital twins of the BWRX-300 systems.

Extending lifetime plant licenses: More than 90% of existing nuclear power plants in the US were built in the 1970s and 1980s with a 40-year lifetime operating license expiration. Almost all the nuclear reactors in the US have received regulatory approval to extend their operating license from 40 years to 60 years. The industry is starting the second wave of license renewal for 80-year period of operation. Advocating for these extensions in the US as well as globally needs to be a priority, including support through zero-carbon emission credits.

According to the US Nuclear Regulatory Commission, the original 40-year term for reactor licenses was based on economic and antitrust considerations, not nuclear technology limitations. The lifetime extension of the existing nuclear fleet beyond 40 years to 60 or even 80 years is one of the fastest, most effective, and economical solutions to support the shift to a zero-carbon economy.

UP TO

80 YEARS

of nuclear plant operations possible with upgrades and lifetime extensions

Increasing technology investments: Increasing investments in new technology solutions for the existing fleet will further support efforts to achieve carbon-free energy goals. Extended power uprates (EPUs) involve reactor upgrades often with steam turbine retrofits, resulting in increased steam flows and therefore increased power output. GE estimates increasing the thermal power rating and retrofitting a typical steam turbine and generator can achieve up to 20% or more additional gross power output.

Since the early 1990s to date, the thermal power uprate campaign for GE boiling water reactors has resulted in additional power generation equivalent to 3 new 1500 MWe nuclear power plants. The extension of the operating license to 60 years and 80 years will significantly increase the investment payback to the utilities for these thermal power uprate projects.

Sweden's Oskarshamn 3 Nuclear Power Plant uprated its nuclear reactor and included a GE upgrade of the entire turbine island components, increasing output from 1200 MWs to more than 1450 MWs, improving availability and extending the plant's lifetime by more than 35 years.

GE estimates even simply retrofitting a typical steam turbine shaft line with no reactor flow changes can achieve an additional 2.5 to 4% gross power output and lengthen the time between outages from typically 6–8 years to 12 years. If such technology upgrades were applied to those older units with long residual lives remaining, this could increase carbon-free power generation by more than 4000 MW with an investment cost of 1.5–2.5 million Euro per MW, considerably less than new generating capacity.

Innovating more efficient and reliable fuels: Improving fuel cycle economics and enhancing safety are vital to maximizing the existing nuclear fleet. Global Nuclear Fuel (GNF), a GE-led joint venture with Hitachi, continues to innovate its fuel products for better performance, safety, and economics. GNF plays a vital role in the US DOE's Accident Tolerant Fuel (ATF) program, an initiative to produce advanced fuel solutions that improve plant performance economics while further enhancing safety margins. GNF was the first company to test new technologies IronClad and ARMOR at an operating nuclear plant. GNF is also pursuing higher uranium enrichment to reduce fuel load requirements, decrease spent fuel volumes and extend refueling intervals to 30-36 months.

UP TO

20% or MORE

additional gross power output possible with UPRATE **and** RETROFIT

2.5-4%

increased efficiency and **power output** possible with steam turbine upgrades alone

INNOVATING THE NEXT GENERATION OF NUCLEAR POWER TECHNOLOGY

Innovation in SMRs, advanced reactors, and steam turbines designed to reduce cost and complexity is critical as new plants enter the planning phase to ensure a carbon-free future with nuclear energy.

GEH's BWRX-300 SMR incorporates patented breakthrough innovation to reduce cost and complexity and is expected to be deployable by 2028, which GE believes will be sooner than any other SMR.

Utilities and governments in Canada and the US are proponents of advancing commercial nuclear power plant technology. Canada is investing significantly in its existing nuclear fleet and accelerating plans for SMR deployment with OPG's Darlington plant expected to host the country's first one. In the US, the Biden Administration's new climate plan includes actions to continue leveraging the low-carbon and carbon-free power generation provided by existing sources like nuclear, as well as investing in critical technologies like advanced nuclear reactors and advanced nuclear fuels.

Reducing construction costs and schedule, leveraging existing technology licenses, reducing operating costs, innovating more efficient and reliable fuels, and focusing on strategic partnerships are key to developing the next generation of nuclear technology.

Reducing construction costs and schedule: Taking a design-to-cost approach that drives innovative construction techniques or advanced reactor technology solutions, such as SMR, can reduce costs with no compromise on safety. SMR and steam turbine designs can be built and assembled in a factory with improved construction methods and shipped to site as a module, driving down investment cost per MW.

GEH's BWRX-300 SMR design results in about a 90% volume reduction in plant layout as compared to GEH's large-scale, Economic Simplified Boiling Water Reactor (ESBWR) design, as well as estimated 50% less construction material per MW as compared to large reactors, significantly decreasing construction time and cost. Other opportunities for construction cost and schedule optimization include shaft construction techniques from the tunneling industry and use of second-generation steel concrete composite modules.

GE also has a range of nuclear steam turbine designs from 50-400 MW that can be modular and factory built to reduce onsite work and costs. For example, GE's 70+ MW class steam turbine can be shipped to site fully assembled as a module.

Leveraging existing technology licenses: Leveraging existing technology licenses can achieve significant cost and schedule savings, by obviating the need to re-test already approved designs, materials, components, and fuel. By leveraging the existing ESBWR design certification, using the licensed and proven GNF2 fuel design, and incorporating proven components and supply chain expertise, GEH's BWRX-300 is positioned to become the lowest-risk, most cost-competitive and quickest to market SMR. Approximately 90% of its components are based on GE BWR designs already in operation. In addition, GE's standardized steam turbines for SMR draw on its existing utility and industrial portfolio which has demonstrated high reliability and flexibility.

Innovating more efficient and reliable fuels: Providing next-generation fuel to improve operations of conventional and small modular reactors by advancing accident tolerant fuel and other advanced fuel concepts is paramount. GNF technology is already improving fuel cycle economics on the installed base and GNF is seeking to leverage such fuel innovations to further enhance the expected performance and safety of GEH's BWRX-300 SMR design.

Reduced operating costs: The BWRX-300 was designed to reduce operating costs. The overall O&M costs are projected to be 40% less per MW compared to the existing fleet of large reactors. The optimized refueling outages are driven by simplification in the design, incorporating best practices and innovation, such as virtual reality, digital twins, and artificial intelligence, and the incorporation of a centralized fleet services approach to further optimize plant maintenance and operations.

Focusing on strategic partnerships: Innovation driven through strategic partnerships across the industry will help to accelerate developing and deploying next generation nuclear power technologies. In the way of example only, GEH is partnering with Synthos Green Energy to explore opportunities for SMRs in Poland. GEH also entered into a teaming agreement with Fermi Energia OÜ to explore the potential deployment of a BWRX-300 in Estonia. GEH also continues to engage with several US utilities, including Tennessee Valley Authority (TVA), Dominion Energy and Exelon, to pursue possible BWRX-300 deployment.

GE is enthusiastic about generation IV advanced reactors, recognizing that additional work is needed on fuel, supply chain development and regulatory licensing. The US DOE's Advanced Reactor Demonstration Program (ARDP) is addressing some of these challenges with TerraPower, GEH, and Bechtel demonstrating generation IV technology with the Natrium™ reactor and energy system. A sodium fast reactor, the Natrium™ technology offers a cleaner, reliable generation source and flexible power storage to operate in tandem with other generation sources, such as wind and solar.

Patented GE Hitachi small modular reactor (SMR)

>90% VOLUME **REDUCTION***

>50% less CONSTRUCTION **MATERIAL***

Shipped to site as a **COMPLETE MODULE**

**Compared to large-scale design*

ACCELERATING NEW LARGE-SCALE NUCLEAR POWER PLANT PROJECTS

Many countries are looking to add new large-scale nuclear power plant projects to achieve their carbon emissions targets. GE forecasts approximately 10 GW a year of demand for new nuclear power plants over the coming decade.

Countries with established nuclear fleets, such as the UK, France and China, continue to invest in new large-scale nuclear power plant projects for the future. According to the WNA, about 20% of the UK's electricity comes from nuclear power, however all of the UK's currently operating nuclear plants, except Sizewell B, will be retired by 2030, making replacement power increasingly urgent. Construction has begun on the first of a new generation of nuclear plants at Hinkley Point C, which upon completion and startup of its two units is expected to produce 3.2 GW of dependable, carbon-free power generation for the UK grid for the next 60 years. Plans for Sizewell C are under development, and financing solutions are being explored. In France, EDF is exploring replacing older units of early generation technology with three pairs of modern, more powerful EPR2 reactors, subject to the French Government's final decision.

Taking a "fleet approach" to drive down cost and development time

TURKEY

4 UNITS

at Akkuyu to deliver **4.8 GW of carbon-free power generation**

INDIA

12 UNITS

to be built with its **PHWR-700 domestic reactor**

Looking forward, newcomer countries, like Poland and Saudi Arabia, are developing plans to add nuclear power to diversify their energy mix with cleaner generation sources. According to the WNA, Poland plans to move away from heavy dependence on coal and to add nuclear power to diversify its energy portfolio, beginning around 2033. Saudi Arabia plans to construct two large nuclear power reactors, projecting up to 17 GW of new nuclear capacity by 2040. It is also considering to use small reactors for water desalination.

Continued innovation and collaboration across the industry to reduce development costs, mitigate delays and increase technology investments are required to accelerate new large-scale nuclear power plant projects.

Reducing development costs: Deploying proven construction techniques will significantly decrease costs. One way is to establish and consistently use global standard, repeatable designs to benefit from volume effects and learning curves. Customers should consider the fleet approach by building multiple identical units, where and when possible. Akkuyu, Turkey's first nuclear power plant, includes four identical units featuring GE's Arabelle steam turbine. India's NPCIL plans to develop a fleet of at least 12 nuclear units built with its PHWR-700 domestic reactor. This approach can help drive down costs and development time in both countries.

Mitigating delays: Government support is needed to remove bottlenecks to complete design approval and regulatory processes, as well as support financing frameworks that facilitate access to financing to decrease development time and risk. Processes and approvals must be streamlined to mitigate delays. Another important opportunity is encouraging international cooperation between diverse national and international nuclear regulatory agencies to create approved designs for multiple countries or territories, eliminating unnecessary duplication of effort and expense to the extent feasible.

Increasing efficiency and reliability: Investing in best-in-class technology, such as GEH reactors and GE steam turbines, to make plants more reliable and efficient is vital. With a fleet of 53 GW globally, GE's Arabelle steam turbine is compatible with all large size reactors and can generate 2% more power output than previous turbine configurations while delivering 99.96% reliability. Today, the world's most powerful steam turbine is operating at China's Taishan Nuclear Power Station, generating 1750 MW of power output per unit. The two Taishan units can generate 3.5 GW of carbon-free power generation, enough to prevent 21 million tons of CO_2 emissions a year. The UK's Hinkley Point C plant is expected to break this record; the steam turbines for those units are fitted with a 75-inch last stage blade, generating an additional 20 MWs per unit.

GE's Arabelle steam turbine can generate 2% more power output with 99.96% reliability

CHINA

Taishan Nuclear Power Station can deliver up to

3.5 GW

of carbon-free power generation, enough for

5 MILLION

Chinese users

UK

Upon completion Hinkley Point C will deliver

3.2 GW

of carbon-free power generation, enough for

6 MILLION

homes in the UK

RECOMMENDING POLICIES TO ACHIEVE CO_2 REDUCTIONS

A range of technologies are needed to meet the Paris Agreement targets and achieve the CO_2 reduction commitments by country. Each country faces a unique set of circumstances and constraints that could be historical, geographical, or political in nature. GE believes policymakers must address highly-emission intensive power systems by urgently requiring action from technologies that can be deployed today. Countries must consider both existing low-carbon and emissions-free technologies and innovative new solutions to ensure a cleaner energy transition around the world.

Governments must consider nuclear power as a dependable emissions-free generation option, while planning for the transition and their future energy systems. To maintain the nuclear power generation option, GE supports policies that:

- Value low-carbon and emissions-free energy sources, such as nuclear power generation, to reduce greenhouse gas emissions
- Embrace the important role of existing (and future) nuclear power plants in the energy mix to provide reliable base-load electricity
- Fund research, development, and demonstration projects to encourage early adoption of cleaner technologies, such as advanced reactors and SMRs
- Create financing frameworks that facilitate access to capital for new and existing nuclear plants at a cost aligned with the risk profile and lead-time of nuclear projects
- Educate the public about nuclear power as a dependable and safe emissions-free technology
- Protect and develop a well-trained workforce to sustain and build the next generation of nuclear power plants
- Ensure the licensing process enables safe operations and does not cause unnecessary cost increases or delays
- Promote the commercial application of nuclear power technologies beyond electricity generation, including industrial heat, district heating, water desalination, and electrolysis to produce cleaner hydrogen.

SUMMARY

Decarbonizing the energy sector and attaining net-zero greenhouse gases to combat the threat of a warming planet must become a more urgent worldwide priority, with a focus on significant investments, national commitments and consistent policy and regulatory frameworks. It will require cooperation across national boundaries, sectors of the economy and the political spectrum.

Nuclear power, as the largest source of carbon-free electricity generation, today, should continue to be a pillar in the energy transition to a carbon-free future and in helping countries achieve energy security. As the most dependable source of carbon-free power generation providing around-the-clock energy supply without interruption, **nuclear energy is an important part of the power generation landscape and is a critical pillar in the transformation to a carbon-free future.** GE recommends the following steps for the power generation industry:

- **Invest** urgently in a combination of nuclear, renewables, energy storage, combined cycle gas turbines with carbon capture, and hydrogen.
- **Advocate** for policies aligned with the Paris Agreement and its goals to reduce CO_2 emissions while ensuring safe, affordable, and reliable sources of electricity.
- **Increase** funding in research, development, and deployment to innovate and adopt cleaner energy technologies.
- **Promote** international cooperation and free flow of goods and services aligned with the World Trade Organization.
- **Encourage** cross-sectoral cooperation to reduce CO_2 emissions, including providing hydrogen produced from emissions-free energy.

Addressing climate change will require intense government and consumer action. A key player in the power generation industry since inception, GE's scale, breadth, innovation, global reach and suite of complementary technologies—including nuclear power, renewables, energy storage, combined cycle gas turbines with carbon capture, and hydrogen—makes it uniquely positioned to play a critical role in combating climate warming and transitioning to a carbon-free future.

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