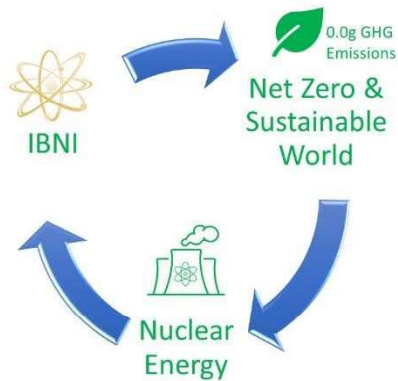


## Executive Summary

### Key Points

- The International Bank for Nuclear Infrastructure (IBNI) is a conceptual new international financing institution (IFI) that will focus on financing and providing other forms of support to qualified nuclear energy projects and programs within its member states that are developing or expanding their nuclear programs as an integral part of their multi-sectoral decarbonization strategies necessary to achieve their 2050 Net Zero commitments.
- IBNI will be a technology neutral IFI, financing and supporting all nuclear technologies (including large reactor, small modular reactor (SMR), advance reactors, micro reactor, and potentially nuclear fusion).
- IBNI will finance and support a range of qualifying nuclear project types, including new build; lifetime extension and restart; refinancing and restructuring; fuel cycle and decommissioning projects.
- IBNI financing and support programs will be uniformly available on an open and inclusive basis to each of its member countries, which will range from developing countries to highly developed countries.
- While 32 countries have operational nuclear reactors, there are some 20 additional countries currently pursuing new nuclear programs and it is predictable that many more nations may determine that nuclear energy should be a significant component of their 2050 net zero strategies and policies.
- Currently, there are insufficient available and affordable capital resources from the global financial markets to support many existing planned nuclear projects, let alone any significant global expansion of nuclear energy, which will be required in order for nuclear to provide a meaningful contribution toward sustainable 2050 Net Zero.
- The existing nuclear financing structures (predominantly utility and state-sponsored models) are inadequate for the purpose of attracting new sources of global capital.
- IBNI is the 'missing link' and the 'game changer' in nuclear finance and it offers a single comprehensive solution to overcome the numerous and multi-dimensional challenges and impediments which currently inhibit the nuclear sector's access to affordable capital resources (and the ability for many nuclear projects and programs to progress).
- Using proven IFI models, IBNI will serve as the global *leader* and *catalyst* which unlocking vast new capital resources to finance a new wave of nuclear programs and project, which will allow the world to achieve 2050 net zero in the most sustainable manner.
- It is targeted that IBNI will be established early-2023 by a coalition of governments.



### Net Zero needs Nuclear – Nuclear needs IBNI

The required collective actions and commitments which need to be undertaken to achieve global net zero GHG emissions by 2050, so as to limit the rise in global temperatures to not more than 1.5°C, are an extraordinary challenge of humanity. Accomplishing 2050 net zero will require systemic transformations of our fundamental global economic establishments and will also entail unprecedented levels of global cooperation.

Full decarbonization of the global energy generation sector over the next three decades is of paramount importance if the world is to achieve the broader objective of 2050 global net zero. The electricity generation sector is responsible for approximately 26% of all global greenhouse gas (GHG) emissions (13.6 gigatons CO<sub>2</sub>/annum)<sup>1</sup>. In all pathways toward achieving 2050 net zero, a very significant share of our global energy systems will need to become electrified (either directly or indirectly through hydrogen and other electrofuels). In addition to replacing fossil fuel consumption in the power generation sector, the transportation, industrial and built environment sectors will each need to become intensively electrified (or otherwise converted to hydrogen and electrofuels produced from low carbon sources). Any residual GHG emissions from the industrial sector will need to be offset by carbon sinks or sequestered through carbon capture utilization and storage (CCUS). Accordingly, not only will there be the monumental challenge of transforming today's fossil fuels dominated economic systems over the course of the next three decades, but there will also be very significant increases in global electricity demand arising from the increasing electrification of other sectors. Global population growth and the desire for sustainable economic development will necessarily drive this increased demand for electricity – which will be massive, even with the adoption of improved energy demand management techniques. In particular access to affordable, reliable, secure and modern electricity, hydrogen and electrofuels (and also heat, cooling and desalinated water) supply will be required in order to address both global population growth and sustainable economic development. All of this incremental energy demands from the power generation sector will need to be met by affordable and reliable low-carbon generation sources.

2050 projections for global electricity generation range widely from 27 to 95 petawatt hours (PWh) per year<sup>2</sup>, and which are largely correlated with both the pace and intensity of global economic development and electrification. The world is currently able to meet only 39% of global electricity demand with low-carbon generation sources<sup>3</sup>. The remaining 61% of the world's existing electricity demand is currently sourced from carbon-intensive fossil fuel generation plants. Herein lies the enormity of the challenge ahead of us. How

<sup>1</sup> Source: [1] and [2] – Summary.

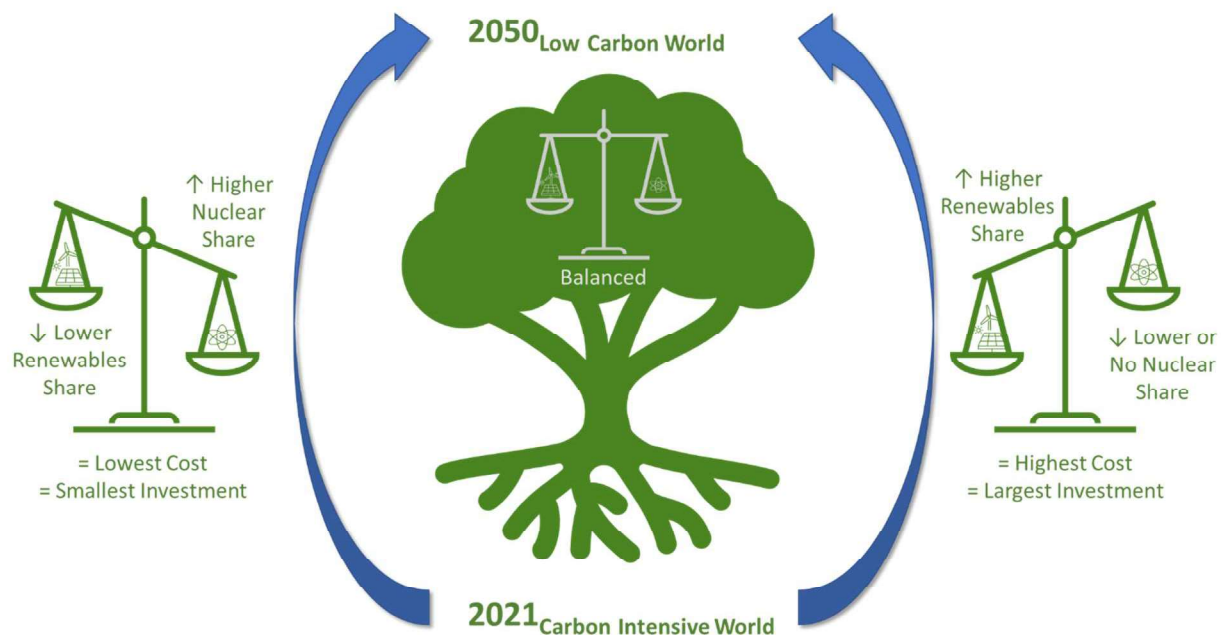
<sup>2</sup> Source: [3]- p. 16

<sup>3</sup> Source: [4].

will the world generate up to 95 PWh of electricity per year by 2050 relying on only clean and affordable generation sources?

IBNI is a conceptual new multilateral international financing institution (IFI) that will be solely focused on financing and supporting nuclear projects within IBNI member countries ranging from developing countries to the world's most advanced economies - in each case, in nations that will have chosen nuclear as part of their low-carbon energy generation mix and their strategy to decarbonize their energy sectors to achieve net zero by 2050. The core mission of IBNI will be to significantly expand global nuclear generation capacities in order to facilitate the *twin* goals of: a) achieving 2050 global net zero; and, b) promote sustainable global development. The Bank will be capitalized and governed using a model very similar to those of the major multilateral International Financing Institutions (IFI's) which have been in existence and have been successfully fulfilling their missions for many decades (such as the World Bank Group, the European Bank for Reconstruction and Development, the Asian Development Bank, etc.)

As the nations of the world are now seeking to develop and implement their own national strategies and policies to address *how* to achieve Net Zero by 2050 in a sustainable manner, three low carbon alternative strategies emerge: a) whether to pursue high renewables share (in most cases, high variable renewables); b) whether to pursue a high nuclear share with less dependency on renewables (and particularly high levels of variable generation); or, c) whether to pursue a balance of nuclear and renewables.



Source: IBNI-IO SAG.

Today's existing nuclear generation technologies offer proven, affordable, versatile, dispatchable and safe low-carbon generation solutions which are compatible with both existing electricity grids and are also compatible with and complimentary to reasonably high levels of variable renewable energy (VRE)



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technologies in the future. In comparison to fossil fuels technologies, nuclear also offers security of supply. Under appropriate frame works, existing and proven nuclear technologies can be rapidly deployed on a global scale in order to meet *any* foreseeable 2050 electricity demand scenario.

The IBNI initiative is fully supportive of the maximum possible development of renewables along with utility-scale energy storage, intelligent and distributed grid systems, and interim CCUS solutions, to the extent and subject to the limitations to which each of these technologies may be scaled-up and deployed in a timely, economically viable and environmentally sustainable manner. However, the challenge of achieving 2050 net zero in the energy generation sector is both immediate and real. In order for there to be even a 50% chance of achieving maximum global temperature increase of 1.5°C, the remaining “carbon budget” between now and 2050 must be limited to approximately 500 gigatonnes (Gt) of CO<sub>2</sub>-equivalent (GHG) emissions<sup>4</sup>. In order to achieve this target, with no overshoot, the world simply cannot wait years or decades for idealized technological breakthroughs in generation, energy storage (grid-scale, long-term), grid and CCUS technologies to materialize and to be proven to be commercially viable. The time to act is now.

At this point in time, nuclear generation technology, along with hydroelectric, biomass and geothermal are the only proven low-carbon technologies, which can provide safe and affordable 24-hour *non-intermittent* dispatchable electricity. Furthermore, nuclear, biomass and geothermal technologies are the only low carbon technologies that are capable of efficiently and economically generating heat energy for residential, commercial and industrial applications. However, it should be noted that currently available and emerging nuclear technologies (such as Very High Temperature Reactors (VHTRs), Gas Cooled Fast Reactors (GCFRs) sand Sodium Cooled Fast Reactors (SCFRs)) offer significantly more versatility and efficiencies with respect to heat energy available and meeting the requirements of certain industrial processes, which require high temperature heat inputs that are currently being provided by fossil fuel based processes.

Nuclear generation is highly versatile and in addition to electricity production, can efficiently serve as the primary energy source to supply vast amounts of hydrogen, electrofuels, heat, cooling and desalinated water in most markets on an affordable and sustainable basis. Unlike hydroelectric, biomass and geothermal technologies, all of which all have limited capabilities to be further economically developed and scaled-up on a global basis (in most countries), nuclear is proven to be a technology that is scalable in almost any geography proximate to major energy demand centers. Nuclear power is also amongst the world’s most *energy intensive* technologies, which translates into the least consumption of land and materials per unit of energy output.

Nuclear energy also provides the advantage of security of energy supply in many countries that are currently dependent upon imported fossil fuels, until such point in time when those countries can make a full transition away from fossil fuels.

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<sup>4</sup> Source: [5] – Chapter 2, Pg. 96. Note: 2018 reference of 580 Gt CO<sub>2</sub>-equivalent budget for a “medium chance” (probability) of achieving 1.5°C warming has been reduced to account for approximately 80 Gt CO<sub>2</sub>-equivalent emissions in 2019 and 2020.



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In addition to today's existing and proven nuclear technologies (Generation III and III+ reactors), there are currently many other new emerging Generation IV nuclear reactor technologies, including advanced reactors and small modular reactor (SMR) designs, which may offer further improvements and enhancements relative to today's already proven nuclear generation technologies in terms of enhanced applicability, scalability, modularity, safety, versatility, affordability and potential reduction of radioactive waste. To the extent that these emerging nuclear technologies become commercially viable over the next years or decades, they may very well further improve the already strong case for nuclear power as a preferred technology in many markets, but we must not wait for these new technologies to become commercially proven and scaled-up.

While IBNI will initially focus on immediately supporting its members in deploying existing and proven nuclear technologies today, it is envisaged that IBNI will also play a role in supporting, both directly and indirectly, an acceleration in the deployment of new generation advanced reactor and SMR technologies. The Bank will directly promote the advancement of new generation nuclear reactor technologies directly by supporting 'first of a kind' demonstration projects and programs as well as providing necessary support for qualified development stage innovative nuclear companies, programs and projects from 'pre-conception through adulthood'. Perhaps more importantly, the Bank will also indirectly support new generation nuclear technology by developing global nuclear financial markets with a strong nexus to Environmental, Social and Governance (ESG) reporting requirements, promoting global demand for new low carbon nuclear technologies, as well as the investment in innovation and the advancement of global nuclear production and supply chains.

Under any 2050 net zero pathway scenario, *"2050 net zero needs nuclear - and nuclear needs IBNI"*. Why does nuclear need IBNI? Amongst the primary factors that have impeded the nuclear power generation industry's ability to scale up and compete globally over the previous three decades have been the related issues of lack of access to cost-effective nuclear-accommodative financing sources, together with the lack of affordability and competitiveness of nuclear (resulting from numerous factors, including cost-overruns and delays, liberalized and unbundled energy markets, lack of nuclear supportive regulatory regimes and other factors), in many markets, relative to other generation alternatives. IBNI will aim to facilitate and promote comprehensive solutions which address multifaceted financing, market, regulatory and the affordability/cost competitiveness issues that have recently plagued the nuclear industries in many countries. IBNI is the 'missing link', and it serves as the 'game changer' in nuclear finance, by offering a comprehensive solution to all challenges and impediments currently facing the nuclear sector.





*Photo Credit: Matthew Lancaster (Unsplash.com)*

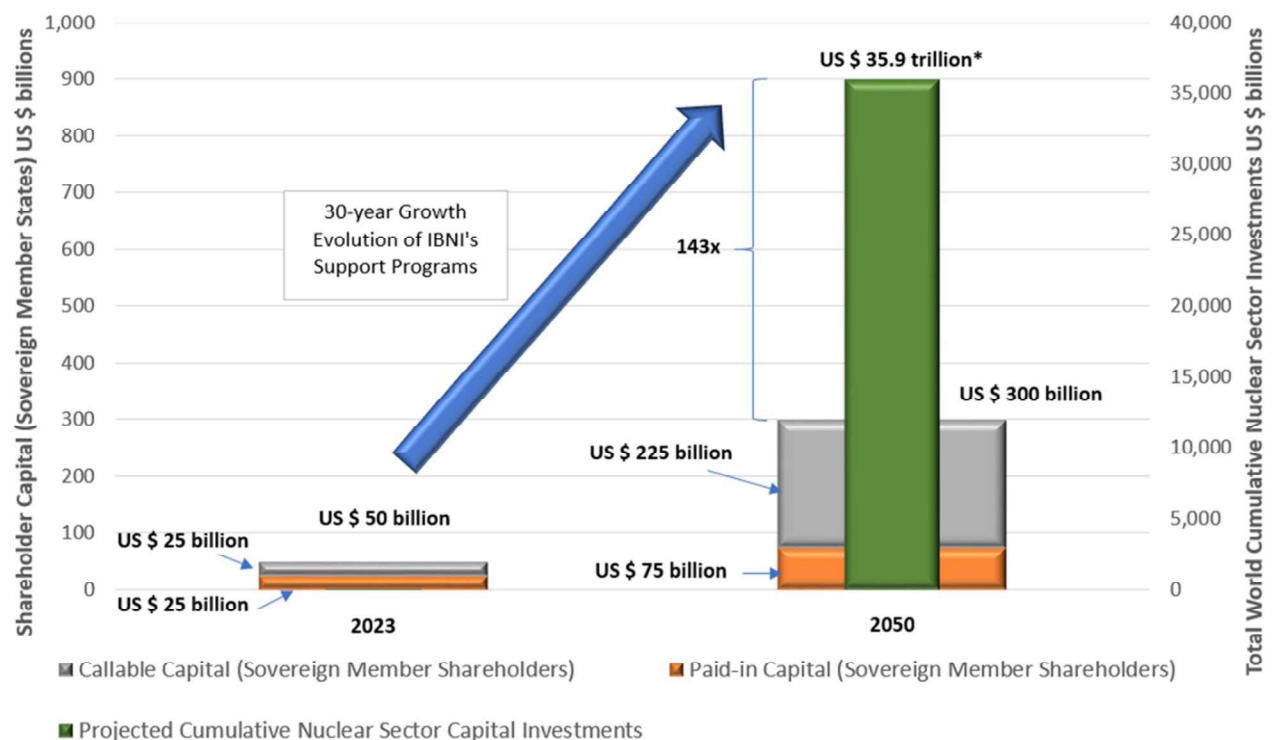
IBNI will support all types of qualifying nuclear new-build, reactor life extension and re-start, fuel cycle and decommissioning projects, on an open and transparent technology-neutral basis. As a condition for providing financing and other support for nuclear projects, the Bank will impose and enforce a rigorous set of standards and criteria upon project participants within terms of financing or support. In addition to ensuring that the highest possible thresholds and standards are met by participants in terms of nuclear safety, security and safeguards; commercial viability; regulatory frame works; and competitive procurement. IBNI's standards and criteria will also enable each IBNI-supported project to report well against the emerging ESG metrics.

Amongst the Bank's primary aims will be to catalyze broad and diverse participation from the global financial markets both in the form of private sector investments in the Bank and in the form of investments alongside the Bank for supported nuclear projects which report well against ESG metrics. IBNI's leadership and participation as the 'anchor investor' or 'anchor lender' in the global nuclear finance space is expected to drive significant new sources of capital into an accelerating pipeline of nuclear projects over the next three decades. Similar to the proven models of the existing multilateral IFI's, IBNI will seek to achieve a "multiplier effect" whereby for each government dollar invested by IBNI member states, IBNI will catalyze a multiple quantum of private sector investments in qualified and supported nuclear projects globally.

It is envisaged that IBNI will be established in early 2023, with Member States (a coalition of no fewer than 50 sovereign governments) initially contributing shareholder capital of US \$ 50 billion (50% or US \$ 25 billion of which will be paid-in and 50% or US \$25 billion will represent callable capital). The capital requirement may

be periodically increased as IBNI’s programs grow over time. Applying similar models that have been utilized by other multilateral IFIs, it is projected that under high demand scenarios (in terms of demand for nuclear energy generation and for IBNI’s support programs) that over a 30-year period, IBNI may catalyze up to approximately US \$ 26 trillion<sup>5</sup> in total cumulative global nuclear sector investments. This “high-case” level of program activity would require Member States’ collective shareholder contributions to increase to approximately US \$ 300 billion (representing 25% or US \$ 75 billion paid-in capital and 75% or US \$ 225 billion callable capital) over a 15-year period. This would allow IBNI to directly provide support to qualified nuclear sector projects in the amount of over US \$ 1.1 trillion<sup>5</sup> over 30-years. The total ‘multiplier impact’ of sovereign governments’ capital investments in IBNI is therefore projected to approach 143x.

### Projected IBNI Multiplier Impact on Cumulative Global Nuclear Sector Investments over 30 Years



Source: IBNI-IO SAG.

IBNI’s membership (and shareholding) is foreseen to include a coalition of the International Atomic Energy Agency (“IAEA”) Member States who subscribe in supporting IBNI’s mission to significantly expand global nuclear power generation capacities as a key element of attaining 2050 global net zero. The Bank will empower each of its member countries, ranging from developing to advanced economies, to access cost-effective, non-discriminatory, and inclusive financing and support programs for the development or

<sup>5</sup> Inclusive of assumed average rate of inflation of 3.5% per annum.



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expansion of their civilian nuclear power programs and industries, as an integral part of that country's commitments to 2050 net zero and sustainable development targets.

The financing instruments and support offered by IBNI will be uniquely tailored to address the specific requirements and known challenges and risks inherent with the financing of nuclear projects, the specific needs of the public or private project sponsor and shall also accommodate the specific economic circumstances and development objectives within the relevant IBNI member country hosting the nuclear project. IBNI's programs are envisaged to also complement existing nuclear development programs such as the IAEA's Integrated Nuclear Infrastructure Review (INIR) milestone framework. The Bank's uniform standards and criteria will align and comply with all IAEA nuclear safety, security and safeguards guidelines and relevant international nuclear treaties and conventions.

Another key focus of the Bank will be with respect to decreasing the cost (increasing the affordability) of nuclear energy options for all of its member countries. It will be essential to the mission of IBNI for the "clean premiums" of nuclear energy (and all low carbon generation) to be eliminated relative to the cost of fossil fuel generation. The steady decrease in and minimization of the cost of nuclear generation will be critical for the success of IBNI's mission and its *twin goals* of achieving 2050 global net zero and promoting robust and sustainable global economic development, prosperity and poverty eradication.

Not only will the energy generation sector need to fully decarbonize by 2050, but it will need to decarbonize in the *least cost manner* possible so as to avoid inhibiting sustained global economic growth. IBNI will play a catalytic role in driving down the costs of nuclear generation technologies, and this - coupled with continued decreasing costs of complementary renewables, storage and innovative grid technologies will achieve an elimination of all "clean premiums" relative to fossil fuel generation well in advance of 2050, inclusive of grid costs related to high levels of intermittent renewables. IBNI will drive nuclear generation cost reductions primarily through building significant global demand for nuclear technologies; reduction of capital and financing costs; promotion of international best practices with respect to projects risk allocations, contractual structures, regulatory frameworks and open and transparent procurement and competition; as well as the fostering of global private sector investments in nuclear innovation, production and supply chains.

This Initial Report and Action Plan (IRAP) is a report that builds the specific rationale describing why IBNI is urgently needed without delay, how it will be established, governed and capitalized and how it will operate. The IRAP also sets forth an actionable and concrete plan which identifies the specific steps and recommended time frames for achieving each step. Furthermore, the IRAP provides near-term (2030), mid-term (2040) and long-term (2050) targets and goals that IBNI as a results-based organization should be evaluated against. These targets are not intended to represent a "moonshot" – instead, they are realistic and achievable sets of milestones.

The IBNI initiative is being led by the International Bank for Nuclear Infrastructure – Implementation Organization (IBNI-IO) Strategic Advisory Group (IBNI-IO SAG). The IBNI-IO SAG has produced this IRAP. The IBNI-IO SAG is comprised of a group of multi-disciplinary experts from banking, economics, regulatory, legal,





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intergovernmental organization and nuclear industry backgrounds, who have come together to lead the IBNI initiative in its early stages. The composition of the IBNI-IO SAG is set forth herein.

It is currently envisaged that the IBNI-IO will be established by early 2022 as a not-for-profit entity with its main mission to assemble and advise a strong multi-dimensional coalition of governments, philanthropies, non-governmental organizations (NGOs), climate and clean energy policy and research institutions, and industry and financial markets organizations with respect to the optimal and timely establishment and formation of IBNI. Accordingly, it is envisaged that that IBNI will be established, by way of an international treaty by early 2023.

Members of the IBNI-IO SAG are extremely grateful for your organization's strong interest, support for and contributions to the IBNI initiative and the collaborative efforts toward achieving 2050 global net zero. We are happy to offer presentations on the IBNI initiative to your organizations and we are appreciative of all additional feedback.

**The International Bank for Nuclear Infrastructure – Implementation Organization  
Strategic Advisor Group**