BARRIERS TO NUCLEAR FOR DEVELOPMENT

The WBG will focus on common barriers facing developing countries

Countries not prepared

Countries without existing Nuclear Energy Programs will need to **develop the institutions** necessary for the safe, secure use of nuclear energy. IAEA estimates the total cost to set up these institutions is as much as 2.5 billion over 10 years per country

Countries with existing Nuclear Energy Programs may need to **adapt existing infrastructure and institutions** to prepare for advanced reactors, including small modular reactors (SMRs)

For all countries, development of a **national strategy** is critical to inform decision-making and align stakeholders around common objectives

Projects not prepared

Before a nuclear project can be financed, it requires many expensive, lengthy **preparation studies**. For example, studies must be conducted on feasibility, siting, environmental impacts, engineering, safety, and licensing (among others), which cost tens of millions USD for each plant

Nuclear requires complex, multi-decadal **project management**. Many projects suffer from inadequate planning, regulatory delays, and supply chain risks

Today, the nuclear industry is addressing bottlenecks in the **supply chain** and **human resources** which may otherwise hamper future deployment

Projects not financed

For conventional nuclear power plants the **upfront capital cost** (USD 8 to 20+ billion) and the risks during a **long construction period** are finance challenges

Small modular reactors may lower upfront cost (USD 1 to 5+ billion) and construction risk, but they are still in development

Low-cost, long-term capital is essential. Unlike other kinds of energy projects, nuclear energy has not been “project financed” by the private sector. Developers may need to raise capital on their own balance sheets (e.g., domestic debt markets, bonds), but many will require support to do so

Benefits not delivered

Different routes to a nuclear power program produce different development benefits

Countries need to build and maintain **domestic know-how** to benefit from local job creation (e.g., construction, engineering, legal)

Countries wishing to benefit from spillover effects, like the development of adjacent industries (e.g., medical isotopes, advanced manufacturing), may benefit from a **holistic national strategy**

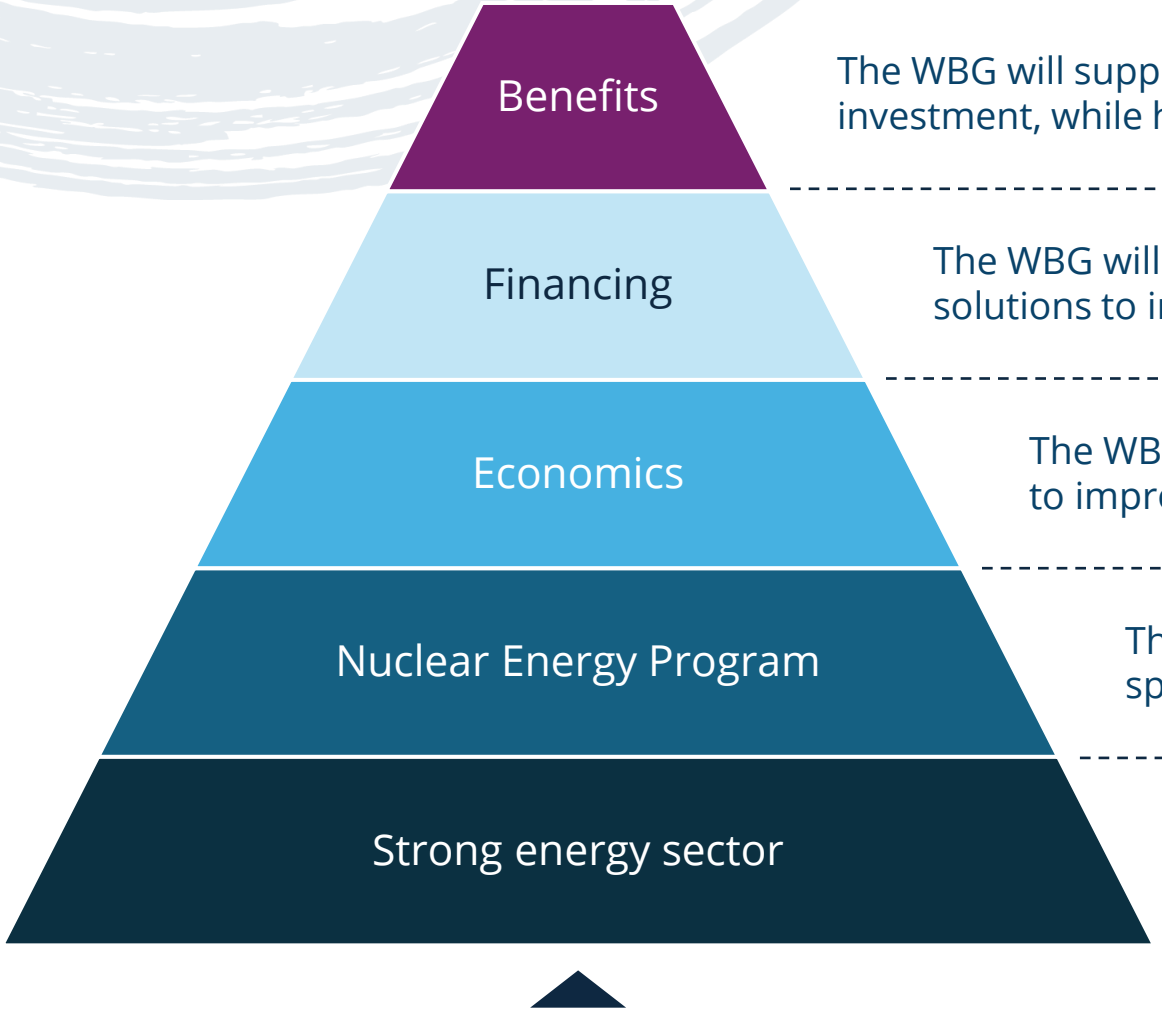
BENEFITS OF NUCLEAR

Nuclear energy can support development and climate goals

- ✓ **ENERGY SECURITY**: nuclear energy provides large amounts of firm, reliable energy at a stable price for decades
- ✓ **JOBS**: nuclear power programs can generate jobs at all skill levels and spur local, high-tech industry and research
- ✓ **DECARBONIZATION**: nuclear energy can provide electricity and heat as part of a country's strategy to reduce carbon emissions
- ✓ **ECONOMY-WIDE APPLICATIONS**: a nuclear industry produces isotopes used in diagnostic imaging, cancer treatments, agriculture, industry, and scientific research

BENEFITS ARE BUILT ON A WELL-RUN SECTOR AND A NUCLEAR ENERGY PROGRAM

The WBG will support countries to achieve a high standard for responsible nuclear energy



The WBG will support public and private clients that are candidates for near-term investment, while helping expand the number of candidates over time

The WBG will support clients with project preparation and develop co-financing solutions to improve the affordability of financing and expand the pool of capital

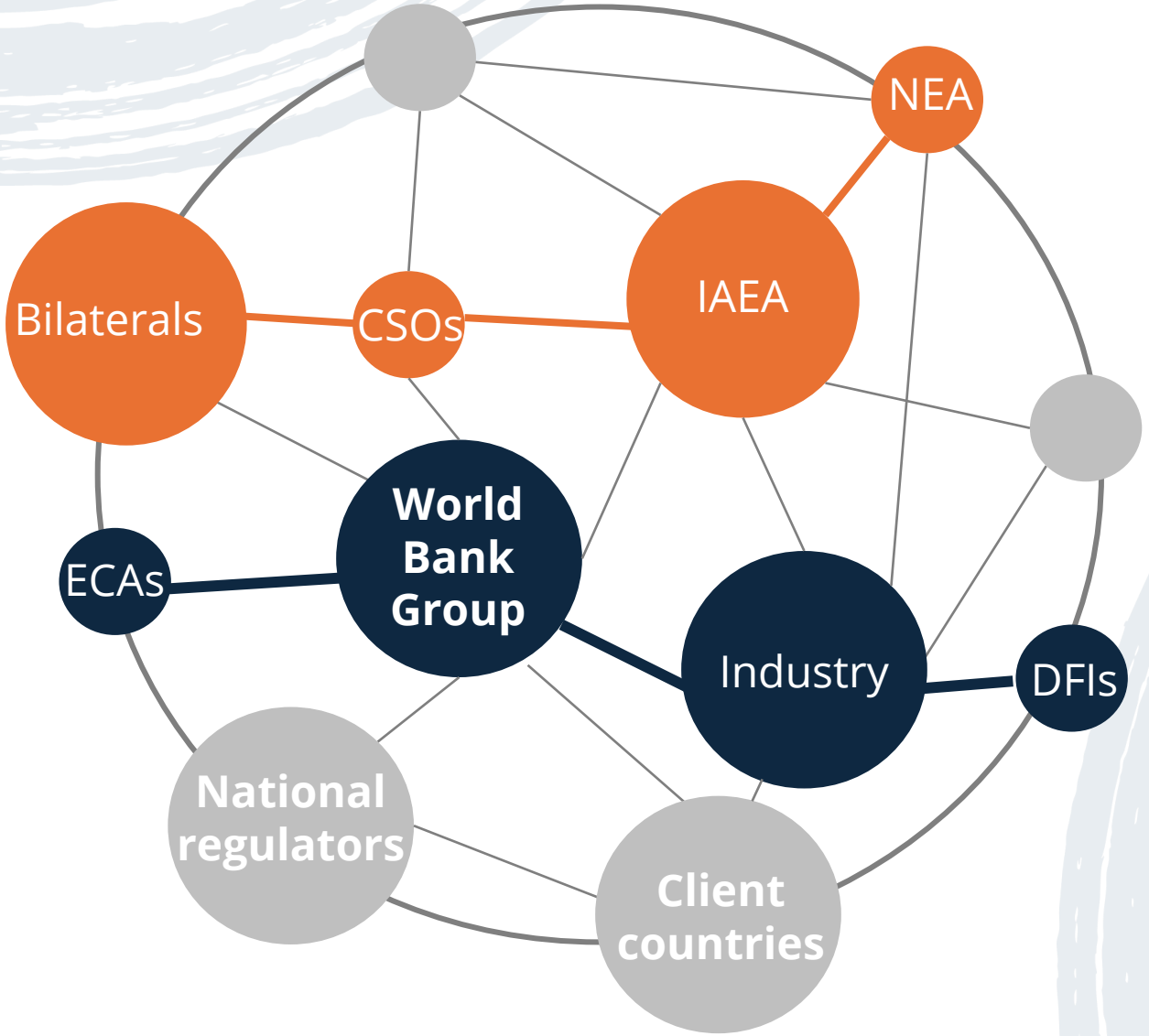
The WBG will advise clients on best practices the nuclear industry is following to improve nuclear power plant economics and reduce delivery risks

The WBG will support clients with advice and financing to strengthen the specialized institutions and infrastructure of a Nuclear Energy Program

The WBG will continue to support client countries with advice and financing to strengthen their energy sectors

LEVERAGE EXPERTISE OF EXPERIENCED STAKEHOLDERS

The WBG is learning from others to create more value for clients and stakeholders



Strengthening connections among Knowledge and Finance

Nuclear is a highly regulated industry with multiple layers of international conventions and protocols (e.g., exports, licensing, export credit agency financing) which will require the WBG to collaborate closely with stakeholders

The WBG could play a role in advancing harmonization (e.g., licensing) to expand markets

ENGAGE WBG CLIENTS

Initial WBG support prioritizes near- and medium-term project opportunities

Countries with long-term operation opportunities	**Middle-income countries that have hosted IAEA Integrated Nuclear Infrastructure Review missions**	**Countries with the infrastructure and institutions required for a Nuclear Energy Program**	**Countries with nuclear fuel resources**
Finance long-term operations	**Develop new Nuclear Energy Programs**	**Enhance existing Nuclear Energy Programs**	**Develop nuclear fuel resources**
Investment to support aging plants, including **power uprates, plant modernization, safety enhancements**, instrumentation upgrades, or spent fuel storage	Technical assistance (TA) for nuclear **policies and institutions**, including to prepare for investments in **advanced reactors** (e.g., SMRs); Development Policy Financing to support implementation	TA and investment for enhancing existing Nuclear Programs and preparing for new **fleet deployment**	Investment and TA to enable development of uranium (or thorium) resources, including **mining, milling, and conversion**
Illustrative examples:			
Armenia Brazil Bulgaria India Romania***** South Africa	Ghana Indonesia Jordan Kazakhstan Kenya Morocco Philippines Poland Sri Lanka Uzbekistan Viet Nam	Argentina Bangladesh Brazil Bulgaria Egypt India Mexico Pakistan Romania South Africa Türkiye Ukraine	Botswana Brazil Kazakhstan India Mongolia Namibia Niger Romania South Africa Tanzania Ukraine Uzbekistan
Private investment across the nuclear value chain			

*In June 2025, MIGA received an application from Nuclearelectrica's lenders for potential support to the financing of the Cernavoda Reactor 1 refurbishment