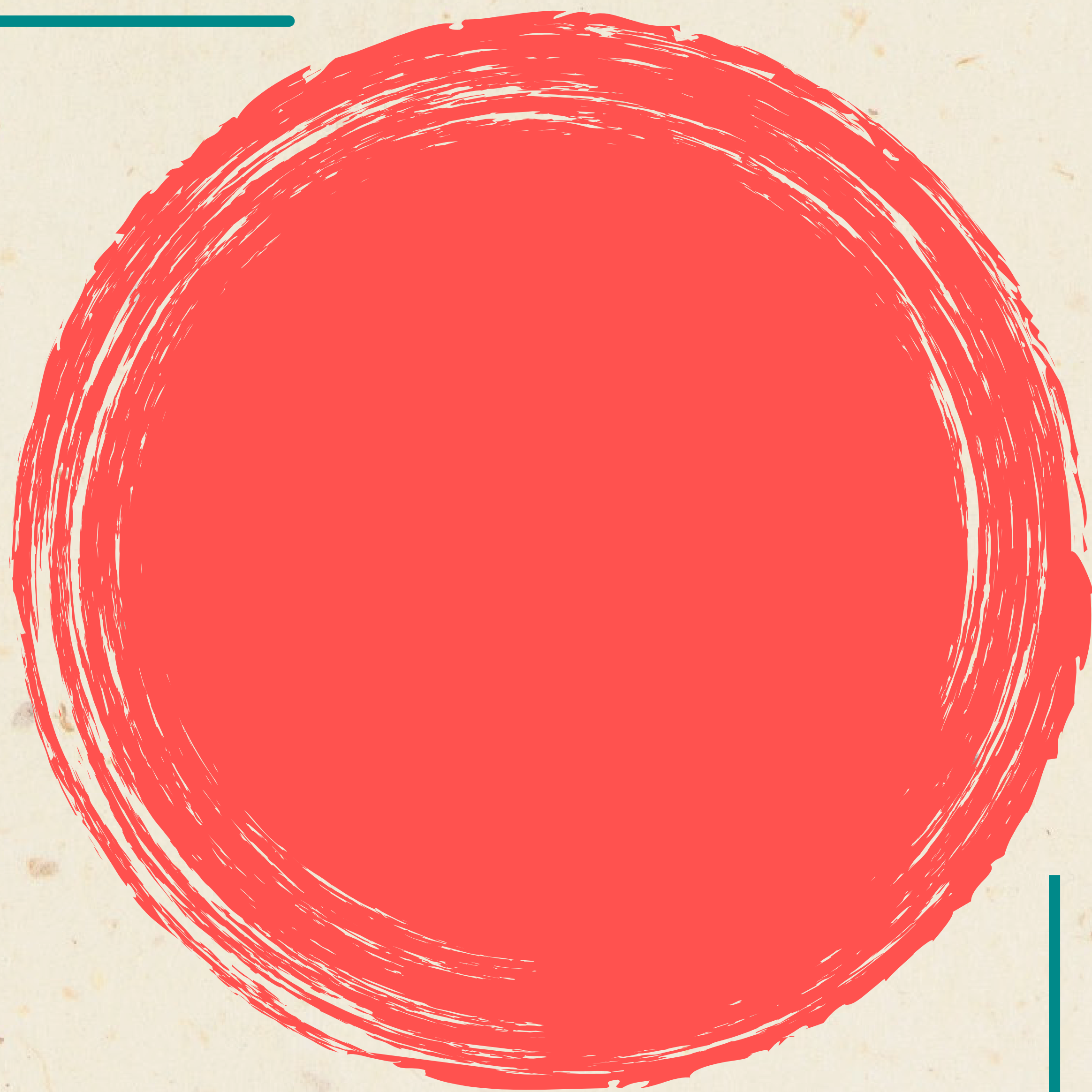


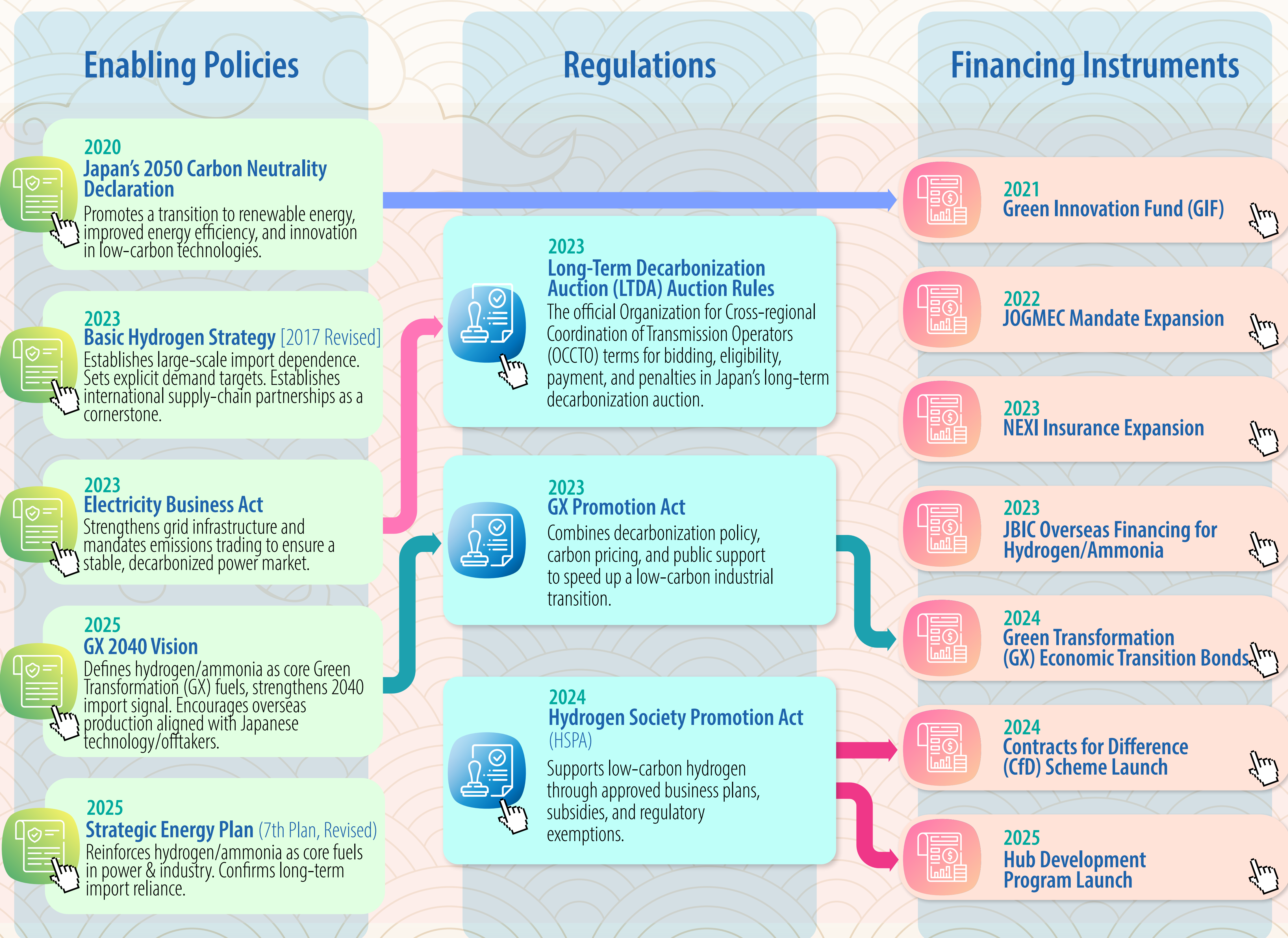


Japan's Hydrogen and Derivatives Framework



Hydrogen Policies, Regulations and Financing Instruments

Japan was the first country in the world to release a national hydrogen strategy, in 2017. Since then, the country made a long-term, quantified, and institutionally backed commitment to importing large volumes of low-carbon hydrogen and hydrogen derivatives through 2050. This demand signal is articulated through Cabinet-approved strategies and statutory planning documents, coordinated by the Ministry of Economy, Trade and Industry (METI). These are key enabling policies, regulations and financing instruments implemented by Japan to support the low-carbon hydrogen industry:



How Regulatory and Financing Instruments Stack

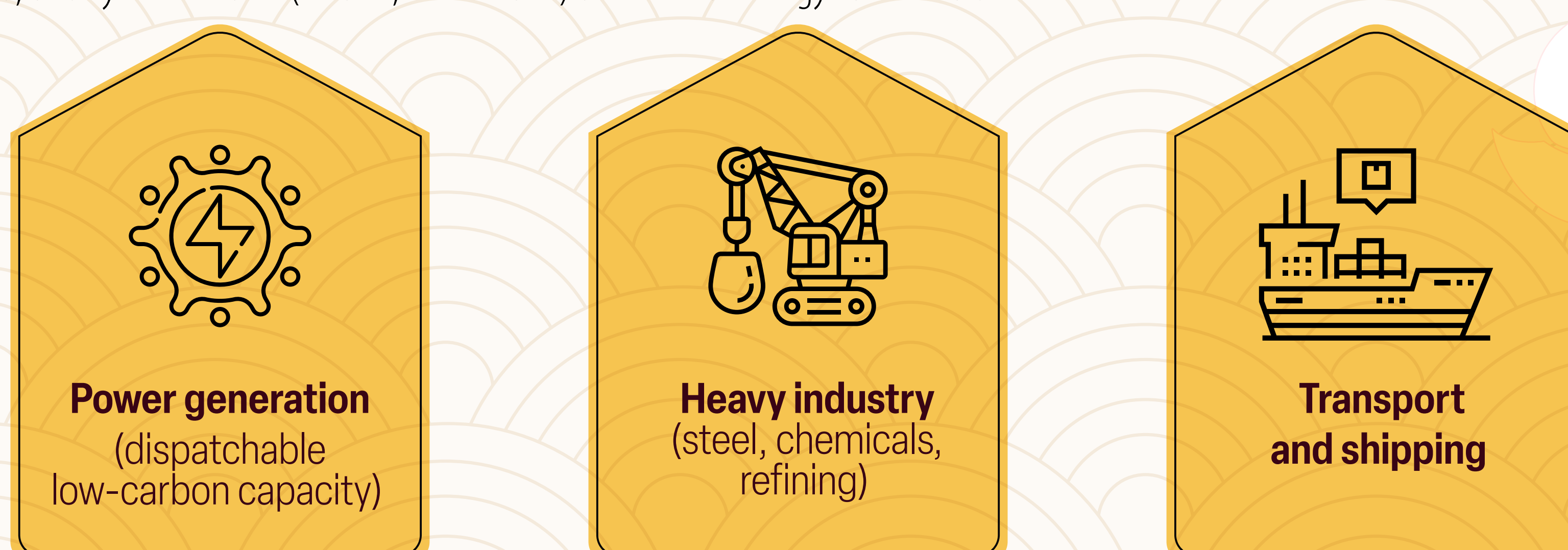
How each instrument mitigates a specific risk across the hydrogen value chain:

	Risk or Decision Point	Instrument That Addresses It	Explanation
	Power-asset CAPEX risk	LTDA	Provides long-term revenue certainty, reducing investment risk for capital-intensive power and hydrogen assets.
	Hydrogen fuel price gap	HSPA CfDs	Bridges the cost gap between clean hydrogen and market fuel prices, enabling early commercial adoption.
	Infrastructure coordination	HSPA hub program / MLIT	Aligns hydrogen production, transport, storage, and demand within coordinated regional hubs.
	Carbon cost pressure on users	GX-ETS	Puts a price on carbon, improving the relative competitiveness of low-carbon hydrogen solutions.
	Political and commercial risk	JBIC / NEXI / JOGMEC	Mitigate sovereign, regulatory, and commercial risks through financing, guarantees, and insurance.

Notes: LTDA: Long-Term Decarbonization Auction, HSPA CfDs: Hydrogen Supply Promotion Act - Contracts for Difference, HSPA: Hydrogen Supply Promotion Act, MLIT: Ministry of Land, Infrastructure, Transport and Tourism, GX-ETS: Green Transformation Emissions Trading Scheme.

Japan's Core Hydrogen Policies

As part the country's legally declared pathway to achieve carbon neutrality by 2050, the Government of Japan has positioned hydrogen, ammonia, and synthetic fuels (e-fuels, e-methane) as essential energy carriers for:



Explicit Volume and Cost Targets

Japan defines explicit demand and delivered-cost trajectories for hydrogen and ammonia demand (largely for power and shipping):

Target Year	Low-carbon Hydrogen Demand	Low-carbon Ammonia Demand	Hydrogen Cost Target (CIF)	Governing Policy
2030	~3million tons/y	~3 million tons	~30 yen/Nm ³	Basic Hydrogen Strategy (2023)
2040	~12 million tons/y	Not specified	Intermediate Target	GX2040 Vision
2050	~20 million tons/y	~30 million tons	≤20 yen/Nm ³	Strategic Energy Plan

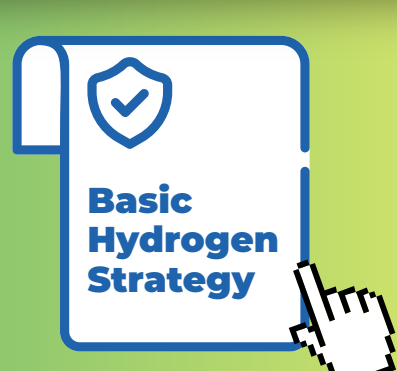
Note: CIF: Cost, Insurance, and Freight,

These targets directly underpin Japan's planning for power generation capacity, industrial fuel switching, port infrastructure, and public finance allocation.

Core Concepts from Key Policies and Regulations

Japan's hydrogen support architecture is rules-based and selective, but explicitly open to imported hydrogen and derivatives that comply with statutory eligibility, carbon-intensity, and safety requirements.

POLICY



Basic Hydrogen Strategy

Anchors CfD-style-price-gap support later implemented via Hydrogen Society Promotion Act (2024)

Establishes hydrogen/ammonia industrial clusters (i.e. regional clusters)

Japan's hydrogen eligibility framework is technology neutral ("color agnostic"), allowing multiple hydrogen production pathways, provided projects meet the specified lifecycle emissions thresholds.

Low-carbon hydrogen
≤3.4kg CO₂e per kg-H₂

Low-carbon ammonia
≤0.84 kg CO₂e per kg-NH₃

Formally expands scope to include ammonia as both fuel and carrier (new in 2023).

Positions Japanese firms to reach 15GW global electrolyzer deployment by ~2030.

POLICY



Strategic Energy Plan

Legal basis under Basic Act on Energy Policy (revised every ~3 years).

Extends planning horizon explicitly to 2040 (beyond prior Strategic Energy Plan (SEP) focus).

Names hydrogen, ammonia, e-methane as "next-generation fuels"

Explicitly links hydrogen demand growth to GX-driven electricity demand (data centers, semiconductors, etc.).

Assigns hydrogen/ammonia a role in decarbonizing thermal power (30–40% of power mix in 2040).

Endorses ammonia co-firing in coal ~20% by 2030; up to 50% longer term.

Frames hydrogen as essential for energy security (Ukraine shock, LNG price volatility).

First nation-level strategy to emphasize commercial deployment, which sets the stage for future implementation tools.

POLICY



GX 2040 Vision

Set ambitious economy wide reduction targets, aiming for a 60% cut by 2035 and 73% by 2040 from 2013 levels.

Safeguard energy security while advancing the transition to a low-carbon economy.

Stimulate green industrial growth and employment, leveraging private investment in clean technologies:

- Attract private investment toward clean technologies.

Adopted together with the SEP as part of a coordinated policy package to align climate targets, energy policy, and industrial transformation.

Anchors hydrogen and ammonia within Japan's industrial competitiveness and growth strategy through 2040.

POLICY



Hydrogen Society Promotion Act

The Hydrogen Society Promotion Act (HSPA) is the central regulatory gateway to creating subsidies, and regulatory special agreements that enable hydrogen financing. Unlike earlier strategies or GX-wide legislation, the Act:

1. Establishes a sector-specific legal basis for hydrogen commercialization;
2. Operationalizes the policy shift from R&D into early commercial deployment through financing

3. Legal basis for offtake-side support: The Act enables price-gap support mechanisms (e.g. contracts-for-difference-style support) that compensate users for the cost difference between hydrogen and incumbent fossil fuels. This reduces the risk for utilities, steelmakers, and industrial users to sign long-term offtake agreements.

The HPSA Legally designates hard-to-abate sectors (power generation, industry, transport) as priority hydrogen users. Hydrogen is recognized in law as both:

- an energy source, and
- an industrial feedstock.

Statutory Demand Creation

The Hydrogen Society Promotion Act legally designates power, industry, and transport as priority hydrogen-using sectors and recognizes hydrogen as both an energy source and an industrial feedstock. This creates a statutory basis for demand-side support mechanisms that enable long-term offtake and lower the cost of hydrogen adoption for end users.

Use-Side Incentives (Demand-Side Support)

The Act authorizes government intervention to bridge the cost gap between hydrogen and fossil alternatives, enabling contracts-for-difference-style support for utilities and industrial users. This reduces adoption risk and creates predictable, policy-backed hydrogen demand before full cost parity is reached.

Supply-Side Incentives (Production Support)

By establishing a hydrogen-specific legal framework, the Act enables operating subsidies and revenue-stabilizing support for producers, shifting policy from R&D into early commercial deployment. This legal certainty allows hydrogen projects to attract private investment and reach financial close.

Infrastructure Roll-Out

The Act enables public support and regulatory coordination for hydrogen hubs, pipelines, terminals, and storage by recognizing hydrogen infrastructure as system-critical assets. This facilitates coordinated build-out and avoids first-mover risk for private developers.

System Integration & Utilities

The Act positions utilities and system operators as central actors in hydrogen deployment, enabling integration with the power grid, storage, and balancing assets. This ensures hydrogen is deployed as part of a planned energy system, not as isolated projects.



Japan's first hydrogen-specific law

The Act establishes legally binding carbon-intensity thresholds (certification and subsidy eligibility):

Fuel Type	System Boundary	Carbon Intensity Limit
Hydrogen	Well-to-Production Gate	≤ 3.4 kg CO ₂ e / kg H ₂
Ammonia	Well-to-Production Gate	≤ 0.87 kg CO ₂ e / kg NH ₃
E-fuel	Full lifecycle	≤ 39.9 g CO ₂ e / MJ
E-methane	Full lifecycle	≤ 49.3 g CO ₂ e / MJ

Existing Project Pipeline

- Typically, ≥ 1,000 tons/year of supply from FY2030 onward
- Evaluated by METI during business-plan approval

Target sectors

- Power, steel, chemicals, transport, shipping, cement, refining, and potentially aviation and heavy-duty road transport.*

*Defined by METI sectoral guidance

Long-term commitment

- ~20–25 years of supply (15-year support + continuation)
- Required for CfD eligibility

Joint supplier–user business plans

- Mandatory under HSPA
- Reviewed by METI, executed by JOGMEC

REGULATION



GX Promotion Act

The GX Promotion Act establishes Japan's overarching GX financing architecture, creating the legal foundation that links public spending, carbon pricing, and private capital mobilization. It enables multi-year, system-wide financing mechanisms that support large-scale industrial and energy transitions, including hydrogen.

Responsible authority: METI

Function: The Act authorizes the Government of Japan to deploy upfront public spending to accelerate GX-aligned investments, particularly in early commercial stages where private capital alone is insufficient. This spending is designed to de-risk investment and catalyze significantly larger volumes of private finance.

Role in imports: The Act enables GX financing mechanisms to support overseas supply chains, including imports critical to Japan's decarbonization strategy. This allows public finance tools to be applied to international hydrogen and clean energy value chains where they support domestic GX objectives.

REGULATION



LTDA Auction Rules

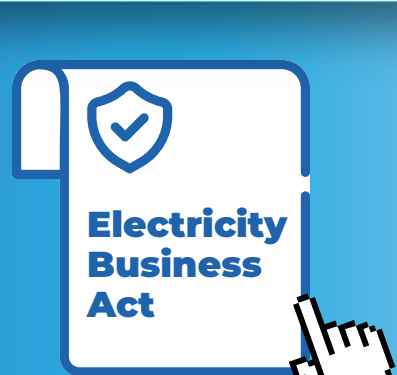
Designed to make capital-intensive low-carbon power projects financeable by guaranteeing stable revenue for availability

Addresses long-term fixed cost recovery (CAPEX and fixed O&M) for eligible power assets; does not provide fuel price support.

Awards winning projects a 20-year capacity payment (typically ¥/kW-year) intended to recover CAPEX and fixed O&M only, with strict availability obligations and a mechanism that largely refunds excess energy market revenues.

Technology-neutral, with tailored treatment for emerging options such as hydrogen and ammonia fired generation.

REGULATION



Electricity Business Act (EBA)

Japan's core law governing electricity generation, transmission, grid access, and system planning.

Not hydrogen-specific, but recent reforms explicitly accommodate low-carbon thermal substitutes, including hydrogen- and ammonia-fired power generation, by supporting grid access, capacity adequacy, and long-term transmission investment.

Provides the regulatory pathway for power-sector hydrogen demand, allowing hydrogen and ammonia projects to participate in capacity mechanisms such as the Long-Term Decarbonization Auction and integrate into Japan's decarbonized power system.

REGULATION



High-Pressure Gas Safety Act

Projects approved under HSPA may access:

- Special approval procedures under the safety laws

- Deemed approvals / streamlined permitting for ports, roads, and hub infrastructure

Primary Regulatory Role

The High-Pressure Gas Safety Act governs the safe design, construction, operation, storage, and transport of hydrogen and hydrogen derivatives handled at high pressure. It is the central safety and operational law applied across production facilities, pipelines, storage tanks, ports, and terminals in Japan.

Facility Approval & Operating Standards

The Act sets mandatory technical standards for hydrogen facilities, including pressure management, materials, inspection protocols, and operational controls. Compliance under this Act is required for hydrogen infrastructure to be built, operated, and insured in Japan.

Permitting & Project Execution

Projects aligned with national hydrogen priorities can access streamlined approval pathways under the Act, enabling faster permitting for hydrogen-related facilities such as hubs, import terminals, and storage sites. This reduces procedural delays while maintaining safety oversight.

System-Level Infrastructure Coordination

By applying uniform safety rules across facilities and transport infrastructure, the Act enables hydrogen to be developed as an integrated system—from port entry and storage to distribution and use—rather than as isolated assets.

Implications for Hydrogen Imports into Japan

For international hydrogen supply chains serving the Japanese market, compliance with the High-Pressure Gas Safety Act provides regulatory clarity at the point of landing, storage, handling, and downstream distribution. This improves execution certainty for Japan-bound hydrogen projects and supports long-term import planning.

Policy-Anchored Financing Instruments

Japan deploys demand-side subsidies, sovereign-backed finance, guarantees, and insurance to make hydrogen and ammonia projects bankable — with most instruments administered by METI-backed public finance institutions.

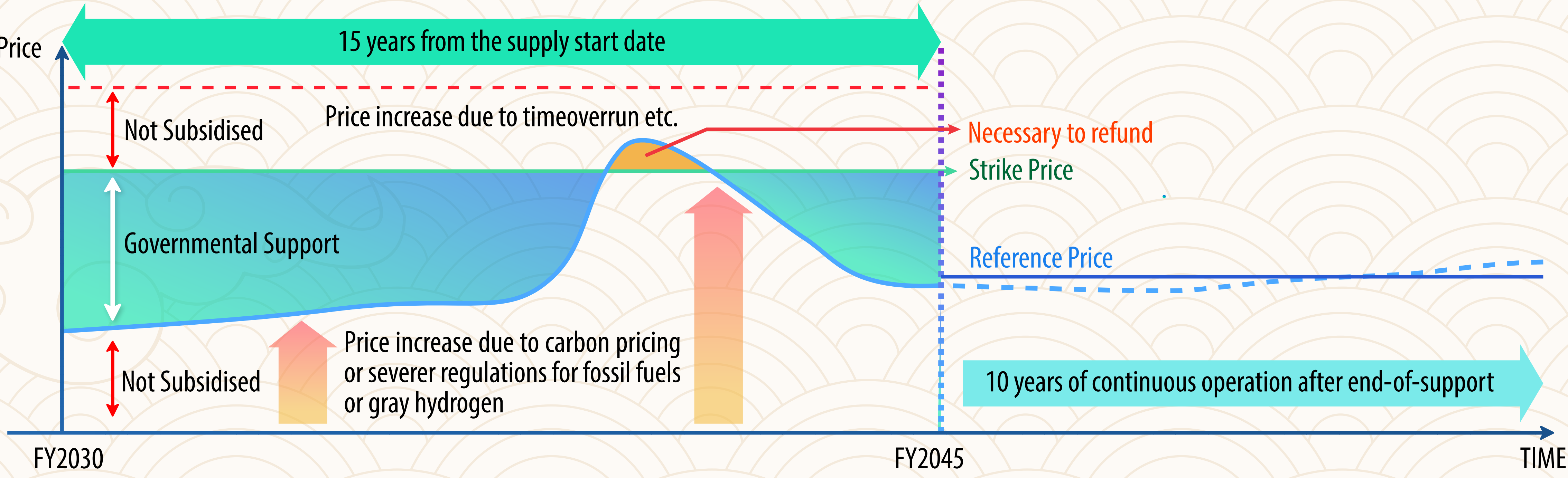
Japan's prefectural and municipal governments provide additional subsidies, particularly for hydrogen mobility and refuelling infrastructure. These measures mainly support domestic deployment and are not primary instruments for export-oriented hydrogen supply chains, which are governed at the national level.

Financing under the Hydrogen Promotion Act

Contracts for Difference (CfD) — launched 2024

- Implementing Body • JOGMEC
- Budget • ~JPY 3 trillion
- Subsidy Duration • 15 years (+ 10-year supply commitment = 25 years total)
- Minimum Supply Threshold • 1,000 tons/year from FY2030
- Eligibility • Projects producing or importing low-carbon hydrogen/derivatives into Japan

How a CfD works



CfD First Round Update



Geography & project types

Applications were submitted from diverse geographical regions, encompassing the entire hydrogen value chain.

- Early awards prioritized domestic projects, with imports explicitly expected in subsequent rounds.
- The first approved CfD projects (September 2025) were domestic Japanese projects, including:
 - a green hydrogen project for steel production (Toyota Tsusho—led consortium), and
 - a waste derived hydrogen project for ammonia production (Resonac), both linked to identified industrial offtakers.

In December 2025, Japan awarded its **first international hydrogen CfDs**, allocating approximately US\$6.8 bn to large scale U.S. based blue ammonia projects (Louisiana), led by JERA and Mitsui & Co.

- These projects leveraged a dual support structure: Japanese CfD payments combined with U.S. production incentives (e.g., 45Q tax credits), materially reducing delivered costs to Japan.

What do the early winners show?

- CfD design focuses on price gap, not production method.
- Carbon thresholds are more flexible than EU schemes, widening the eligible project pool.
- 15 year support horizon materially improves bankability for first of a kind projects.

What made these projects eligible?

- Joint supplier—offtaker business plans are decisive.
- Industrial use cases (steel, chemicals, ammonia) take priority.
- Japan accepts multiple production pathways (electrolysis, waste derived hydrogen, CCUS) if MRV is credible.
- Projects align with system logic, not standalone supply.

What happens next?

- CfD awards will be announced on a rolling basis through 2026.
- Import linked hydrogen and ammonia projects are expected to enter future cohorts.

For hydrogen- and ammonia-fired power projects, CfD support for fuel costs operates alongside the Long-Term Decarbonization Capacity Auction (LTDA), which provides capacity payments. Together, these mechanisms reduce both price risk and revenue volatility, improving bankability for dispatchable low-carbon generation.

Hub Development Program

Implementing Body

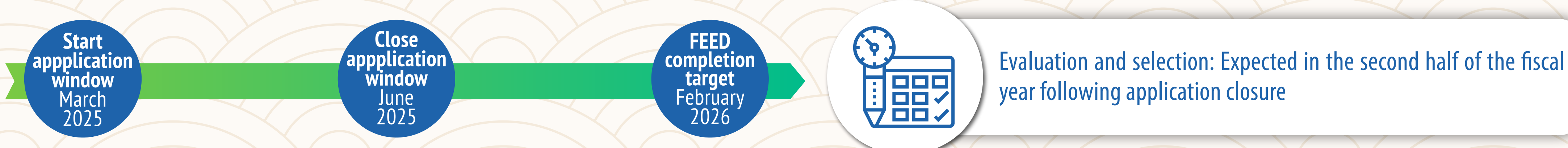
Japan Organization for Metals and Energy Security (JOGMEC) [primary implementation and subsidy administration]

Ministry of Land, Infrastructure, Transport and Tourism (MLIT) [responsible for port-related infrastructure components]

Designed to

- Enable cluster-based hydrogen hubs integrating production, import, storage, and demand.
- Stimulate demand creation by lowering infrastructure barriers for hydrogen users.
- Promote efficient, coordinated CAPEX deployment across hydrogen value chains.
- Support the creation of infrastructure that delivers widely shared benefits rather than asset-specific advantages.

Application and Evaluation Timeline



Financing through GX Promotion Act

GX Emissions Trading Scheme (GX ETS)

- GX ETS transition • Japan's GX ETS transitions from a voluntary phase to a mandatory emissions trading system from FY2026.
- Sector coverage • Covers energy-intensive sectors such as power, steel, and chemicals.
- Compliance requirements • Covered companies must measure and report emissions and hold emission allowances equal to their emissions; allowance trading is permitted.
- Economic impact • Increases the cost of fossil-based alternatives over time, creating an additional demand-side economic driver for hydrogen and ammonia and complementing CfD and LTDA mechanisms, while avoiding an immediate shock to industry.

Under the GX Promotion Act, Japan is issuing up to ¥20 trillion in GX Transition Bonds to catalyze over ¥150 trillion in public—private GX investment.

- The GX Acceleration Agency (GXA) coordinates GX related finance, including debt guarantees and co investment, and works alongside METI, JOGMEC, JIBC, and NEXI.
- While not hydrogen specific, GX funding supports hydrogen, ammonia, steel, chemicals, power, and associated infrastructure where projects align with Japan's GX priorities.

Public Financial Institutions and Project-Level De-Risking Instruments

While Japan’s legislative and regulatory framework establishes long term demand, price signals, and market structure for hydrogen, project level bankability is achieved through a complementary set of public financial institutions and balance sheet instruments that de risk individual investments and crowd in private capital.



JOGMEC is the primary implementing body for both the CfD and Hub Development programs direct project-level support. It can participate in overseas hydrogen and ammonia projects through subsidies, equity investments, and debt guarantees:

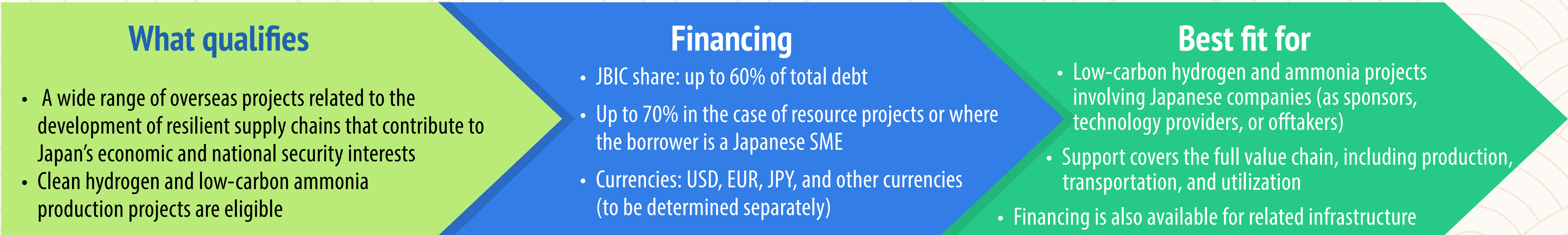
- Equity participation: Up to 50% of project equity to be borne by Japanese companies
- Debt guarantees: Up to 50% of debt obligations to be borne by Japanese companies
- Scope:
 - Overseas projects contributing to Japan’s imports strategy
 - Disburses funds after METI approval



JBIC provides loans (including long-tenor project finance) and equity investments for low-carbon energy projects, with a dedicated facility for hydrogen, ammonia, and related sectors.

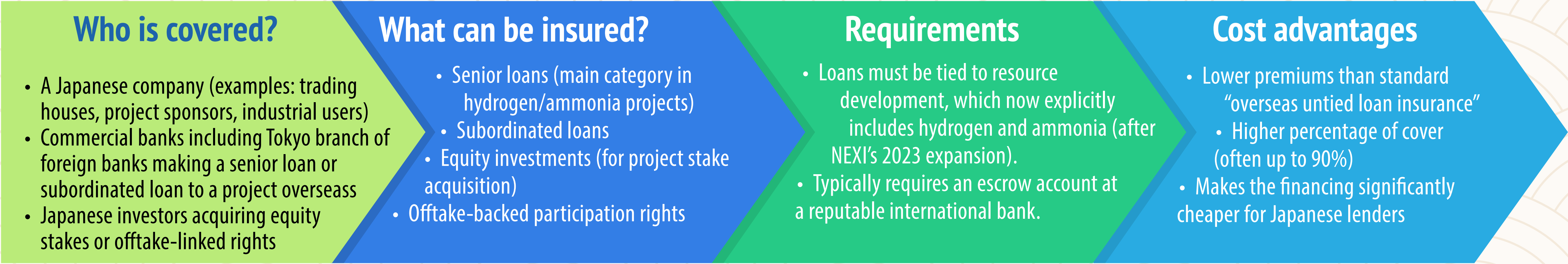
- Supervising ministry: MOF, policy alignment with METI
- Instruments:
 - Export Loans, Import Loans, Overseas Investment Loans, Untied Loans, and Equity Investments
- Scope: The full hydrogen and ammonia value chain (from upstream to downstream), with Japanese offtake or Japanese sponsors

Financing Conditions – Japan Strategic Investment Facility –



NEXI provides insurance against political and commercial risks for Japanese companies investing abroad in hydrogen and ammonia supply chains:

- Coverage typically up to 90% for loan and up to 100% for investment
- Covers resource development, long-term supply contracts, and equity investments
- Particularly relevant for projects in politically complex or emerging-market environments



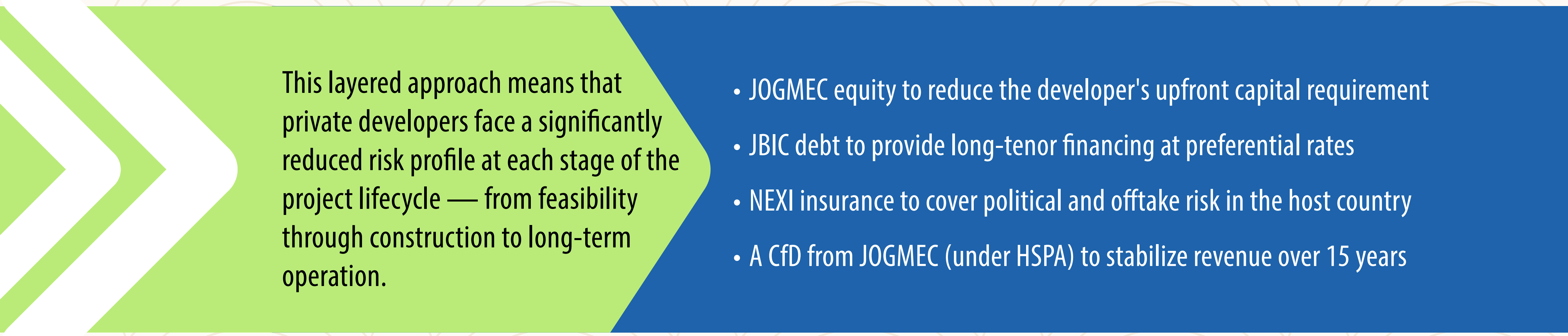
Projects are typically industry-led, not government-owned.

The Green Innovation Fund Projects is designed to support large scale technology and system demonstrations, rather than early-stage R&D or purely commercial deployment. For hydrogen, this includes:

- Power generation (hydrogen and ammonia firing)
 - Shipping and maritime applications
 - Hydrogen and ammonia carriers
 - Cracking / conversion technologies
 - Integrated supply-chain demonstrations
- Size: ~¥2 trillion by NEDO
Applicants may include:
- Japanese companies
 - Consortia (often required for large system demos)
 - Infrastructure developers, OEMs, energy companies, shipping companies
 - Joint ventures with international partners (Japanese entity must lead or co-lead)
- NEDO grants for technology demonstration at the pre-commercial stage

How the Instruments Work Together

The project-level tools are designed to be layered, not used in isolation. A typical project structure might combine:



H4D Recommendations

Japan's hydrogen market is open, selective, and structured. Entry is not generic: projects must align with specific policy gateways depending on whether they supply power, industrial hydrogen/ammonia, or system-level infrastructure. Successful projects combine offtaker commitments, statutory eligibility, and stacked public-finance instruments rather than relying on cost competitiveness alone.

For project developers and exporters

- Identify credible Japanese offtakers early (utilities, steelmakers, chemical companies, trading houses) at concept or pre-FEED stage.
- Structure proposals as joint supplier–user plans, not standalone supply offers.
- Design projects to meet or exceed HSPA carbon-intensity thresholds, with robust MRV.
- Assess whether the project can align with hub-based infrastructure.
- Engage Japanese public finance institutions before final investment decisions, not after.

For Emerging Markets and Developing Countries Policymakers

- **Provide long-term export and policy certainty**
Stable export permits, port access, FX convertibility, and repatriation rules over multi-decade horizons are critical inputs to Japanese risk assessments.
- **Enable Japanese participation across the value chain**
Create conditions for Japanese equity, EPC, offtake, and financing participation. Most Japanese public finance requires a clear and durable Japanese nexus.
- **Promote clustering and aggregation, not single-buyer exports**
Support hub- or cluster-based export development aligned with ports, industrial zones, and shared infrastructure to mirror Japan's demand model.

What to Watch Next (2025–2027)

- GX-ETS will move into mandatory compliance, strengthening demand-side pressure on fossil fuel use.
- First largescale HSPA CfD awards will set benchmarks for cost, scale, and acceptable risk structures.
- Hub development support is expected to concentrate on a limited number of priority locations.
- Carbon accounting, MRV, and verification requirements are likely to continue raising the bar for eligibility.

The H4D Partnership team appreciates the support provided by all Japanese institutions that contributed to the preparation of this document.