



FINANCING GREEN HYDROGEN IN EMERGING MARKETS

– DFIs ROLE IN PUSHING GREEN HYDROGEN –

14 August 2024

IFC Overview

IFC: A MEMBER OF THE WORLD BANK GROUP

IFC is the largest global development institution focused on the private sector in emerging markets

The World Bank Group

IBRD	IDA	IFC	MIGA	ICSID
International Bank for Reconstruction and Development	International Development Association	International Finance Corporation	Multilateral Investment and Guarantee Agency	International Center for Settlement of Investment Disputes

In working to **end extreme poverty** and **boost shared prosperity**, IFC collaborates closely with other members of the World Bank Group

Loans to middle-income and credit-worthy low-income country governments	Interest-free loans and grants to governments of poorest Countries	Solutions in private sector development	Guarantees of private sector investments' non-commercial risks	Conciliation and arbitration of investment disputes
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Leading the Way in Private Sector Development

- IFC advances economic development and improves the lives of people by encouraging the growth of the private sector in developing countries
- We achieve this by creating new markets, mobilizing other investors, and sharing expertise. In doing so, we create jobs and raise living standards, especially for the poor and vulnerable. Our work supports the World Bank Group's twin goals of ending extreme poverty and boosting shared prosperity
- We help countries develop their private sectors in a variety of ways:
 - ✓ **Investing in companies** through loans, equity investments, debt securities and guarantees
 - ✓ **Mobilizing capital** from other lenders and investors through loan participations, parallel loans and other means
 - ✓ **Advising businesses and governments** to encourage private investment and improve the investment climate

Quick Facts

- Founded in 1956
- Over 60-year history in emerging markets
- Triple-A credit rating
- Owned by 186 member countries
- Present in more than 100 countries
- \$32.8 billion in investment commitments in FY22
- 100+ offices in 95+ countries worldwide
- ~4,200 staff (57% are based outside Washington D.C.)

Our Mission

Advance economic development by encouraging the growth of private enterprise in developing countries.

Our Core Values

Impact | Integrity | Respect
Teamwork | Innovation

WHAT WE DO: 4 AREAS OF EXPERTISE + 8 PRODUCTS AND SERVICES

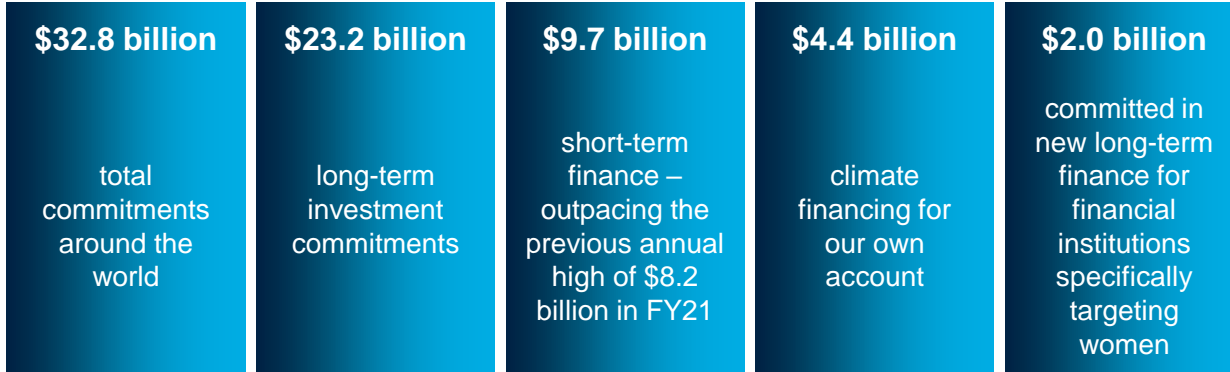
IFC's offerings are mutually reinforcing and can be tailored to a client's specific needs

Our Areas of Expertise	Our Products and Services			
MAS (Manufacturing, Agribusiness and Services)	Loans	Equity	Syndications	Advisory
<ul style="list-style-type: none"> • Manufacturing • Agribusiness and Forestry • Tourism, Retail and Property • Health & Education 	<ul style="list-style-type: none"> • Senior loans (corporate finance; project finance); subordinated loans; on-lending through intermediary institutions • Fixed / floating rates • IFC has provided financing in 74 local currencies • Long maturity: typically, 7-12 years with appropriate grace periods 	<ul style="list-style-type: none"> • Provide both developmental support and long-term growth capital • Direct equity investments; through Private Equity funds, profit- participating loans, convertible loans, and preferred shares • Typically, 5% to 20% of total equity 	<ul style="list-style-type: none"> • Capital mobilization to amplify positive development impacts • 60+ years of experience • 500+ investment partners • 1500+ projects committed • \$97 billion mobilized in debt financing 	<ul style="list-style-type: none"> • Advisory services to companies and governments to help establish the necessary conditions to attract the most private capital
INR (Infrastructure and Natural Resources)	Blended Finance	Trade and Supply Chain Finance	Treasury Client Solutions	AMC
<ul style="list-style-type: none"> • Cities • Energy • Mining • Water • Environmental and Municipal Infrastructure • Sustainable Infrastructure Advisory • Transportation • Telecoms, Media and Technology 	<ul style="list-style-type: none"> • Use relatively small amounts of concessional donor funds to mitigate specific investment risks and help rebalance risk-reward profiles of investments that are unable to proceed on strictly commercial terms • Can be structured as debt, equity, risk-sharing, or guarantee products with different rates, tenor, security, or rank 	<ul style="list-style-type: none"> • Global Trade Finance Program (GTFP) guarantees trade-related payment obligations of approved financial institutions • Extend and complement the capacity of banks to deliver trade finance by providing risk mitigation on a per-transaction basis for 218 banks across 71 countries 	<ul style="list-style-type: none"> • Derivative; structured finance; local currency products and solutions • Enable clients to hedge foreign exchange, interest rate, and commodity price exposure • Local-currency finance; partial credit guarantee; portfolio risk-sharing facilities; securitizations 	<ul style="list-style-type: none"> • IFC AMC (Asset Management Company) mobilizes and manages capital for businesses in developing countries and frontier markets
FIG (Financial Institutions Group)				
<ul style="list-style-type: none"> • Banking • Insurance • Fintech • Capital Markets • Trade & Supply Chain Finance • Financial Inclusion (SMEs, Microfinance) 				
CDF (Disruptive Technologies and Funds)				
<ul style="list-style-type: none"> • Disruptive Technologies • Venture Capital • Private Equity Funds 				

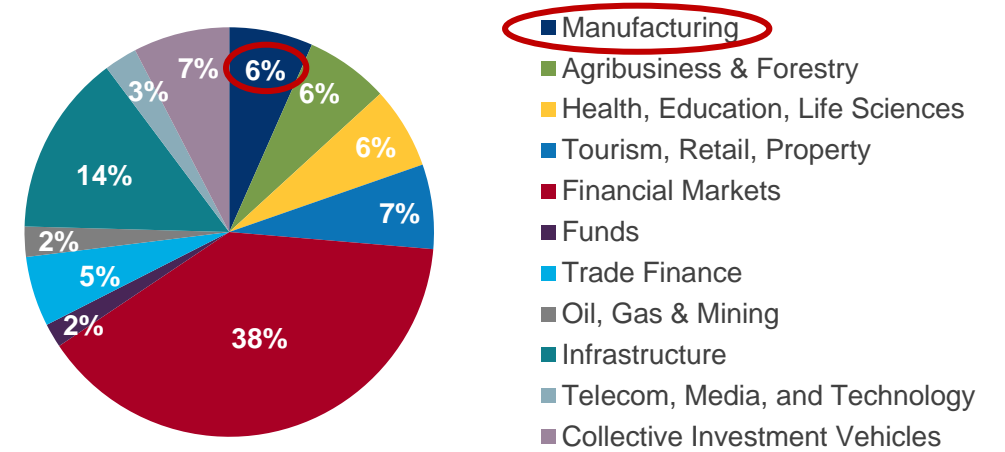
IFC INVESTED OVER \$200 BILLION IN EMERGING MARKETS OVER 10 YEARS

FY22 is a year of record results for IFC with total commitments around the world achieving \$32.8 billion

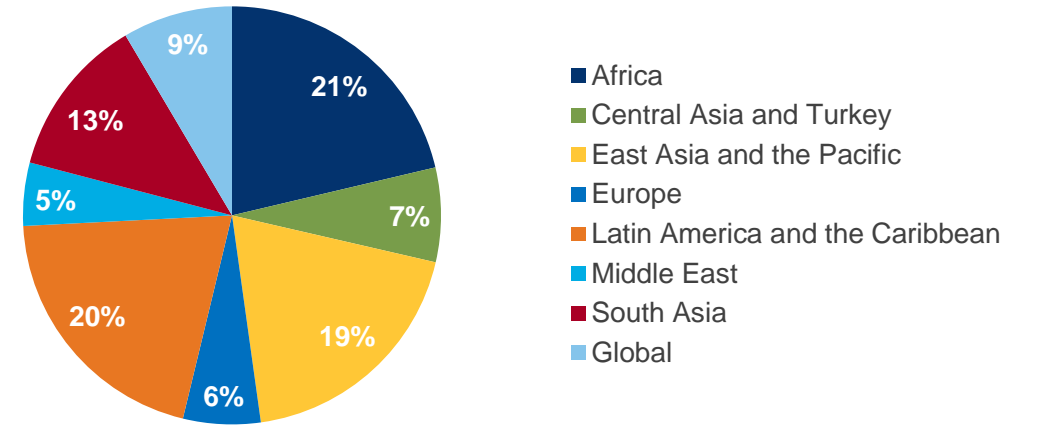
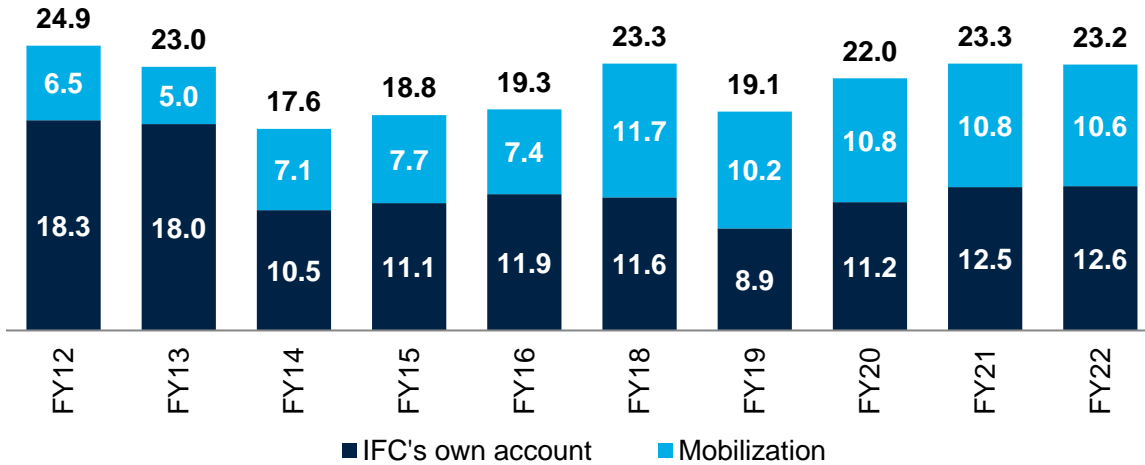
FY22 Financial Highlights¹



\$63 Billion Active Portfolio² Breakdown as of FY22



Long-Term Investment Commitments by Year (\$ billion)



1. Including both loan-type and equity-type products

2. Portfolio exposure is defined as the sum of the (i) committed exposure for IFC's debt investments, (ii) fair market value of IFC's equity investments, and (iii) total undisbursed equity commitments

IFC'S Project Development (Upstream) Approach

UPSTREAM SUPPORTS THE PRIVATE SECTOR TO CREATE MARKETS

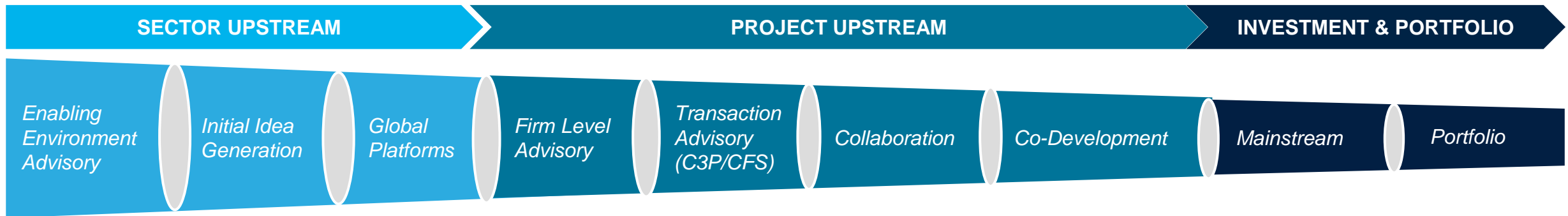
From Upstream to Investment

IFC is focused on increasing pipeline of bankable private-sector projects by

- ✓ Providing **advisory services and other capacity** support to clients (governments / private sector) to develop, enable and seek investment for transformative projects
- ✓ Working closely across the **World Bank Group to help develop policies, regulations, and frameworks** for private sector investments and to provide necessary political risk mitigants and financial products to address gaps in commercial and financial structures
- ✓ Investing in and helping develop projects at an early stage through a variety of means, with a focus on **high impact projects where IFC can add significant value**

...in markets with challenging operating environments

- ✓ **Incomplete/ ineffective regulatory environment**
- ✓ **High risk** perception
- ✓ **Complexity to achieve bankability** for large scale transformative projects
- ✓ **Limited availability of early-stage risk capital** and other project development resources



Sector-Wide Initiatives

- Sector-level initiatives to improve investment environment
- Develop linkages between client projects and the objectives of governments
- Work on sector-level interventions aimed at unlocking client projects

Global Delivery Platforms

- IFC is developing new products aimed at improving delivery to clients
- A large part of this work involves working with our global clients in piloting or refining these products

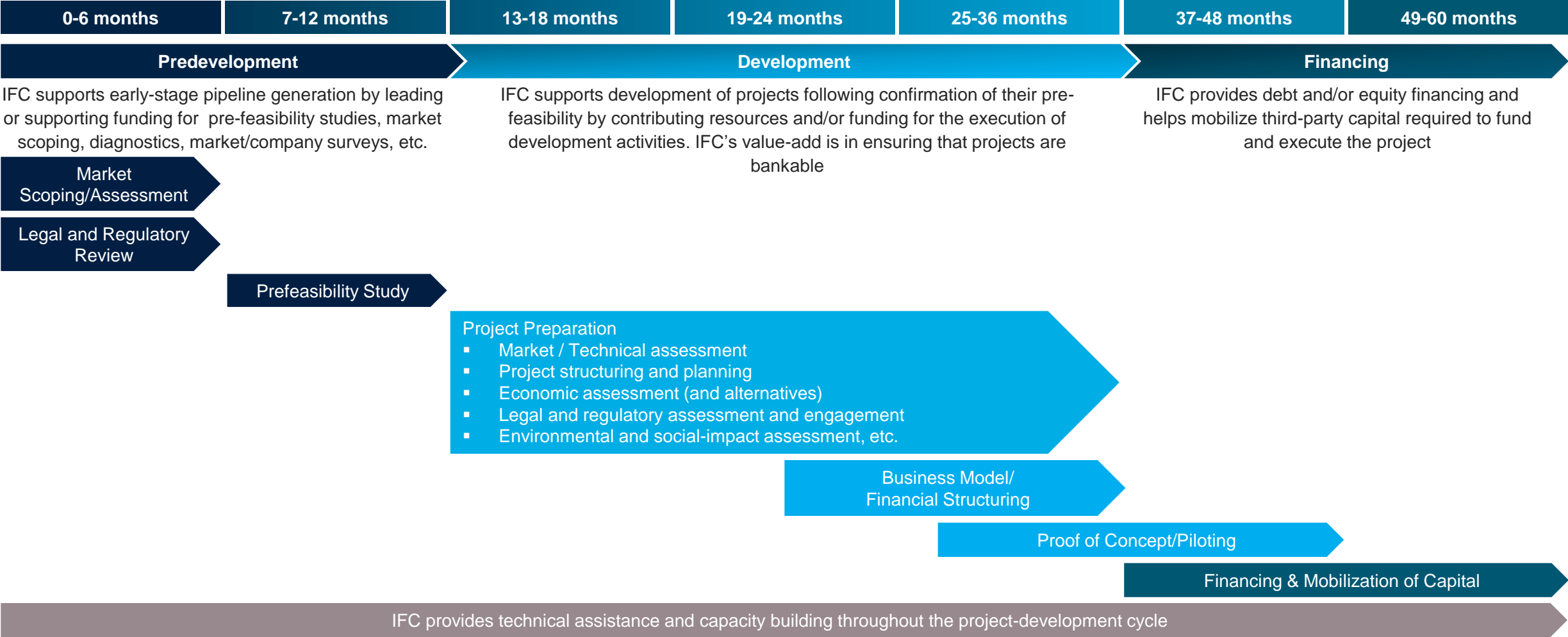
Early-Stage Project Development

- Early-stage project engagement
- Involves working with clients in conceptualizing and/or developing projects
- IFC could provide funding and advisory services for specific project-development activities

EARLY-STAGE PROJECT DEVELOPMENT

From conceptualizing an idea to nursing it into a bankable investment opportunity

WHAT EARLY-STAGE ACTIVITIES CAN WE FUND AND SUPPORT?



IFC & DFIs in Green Hydrogen

GREEN HYDROGEN - KEY OPPORTUNITIES AND CHALLENGES

Green Hydrogen represents an immense opportunity for emerging markets with high RE potential, but many questions remain

Opportunities and Challenges in Green Hydrogen Development and Deployment



Market Applications

- Use of **hydrogen for chemicals is well known** - large potential for displacement of grey hydrogen in ammonia, refineries or in steel
- **Potential for green hydrogen in other/new use cases** (transportation fuel, power, storage, heating, etc) yet to be determined
- Definition of export and import schemes and standards + **firm offtakes** are required to unlock additional opportunities



Cost Competitiveness

- **Green hydrogen** production costs are **currently 2-3 x more expensive than grey hydrogen**
- **Concessional / grant financing**, carbon pricing etc. can accelerate green hydrogen competitiveness
- Costs driven by electrolyzer, cost / capacity factor of renewables, proximity to demand and infrastructure



Scaling Up

- **Electrolyzers are well-known technology** but multiple technologies being explored for scalability in green hydrogen applications
- **Currently no clear winner for a scalable option** - current **manufacturing capacity** for electrolyzers production is only 8 GW
- **Challenge in scaling up renewables** to meet both green hydrogen and electrification demand – 5-10x today's investment levels



Infrastructure/ Value Chain Development

- **Transporting and storing hydrogen can add up to 1-2x more costs** and may require massive infrastructure investment (pipelines, shipping, storage terminals, distribution & access points) – still to be seen what best carrier will be (liquid H2, ammonia, LOHCs, etc)
- Electrolysis is a **water intensive** process. ~9-15 kg of potable water (roughly 45 kg of seawater) is required for 1kg of hydrogen.
- Significant **project-on-project risks** given long, and emerging, value chain



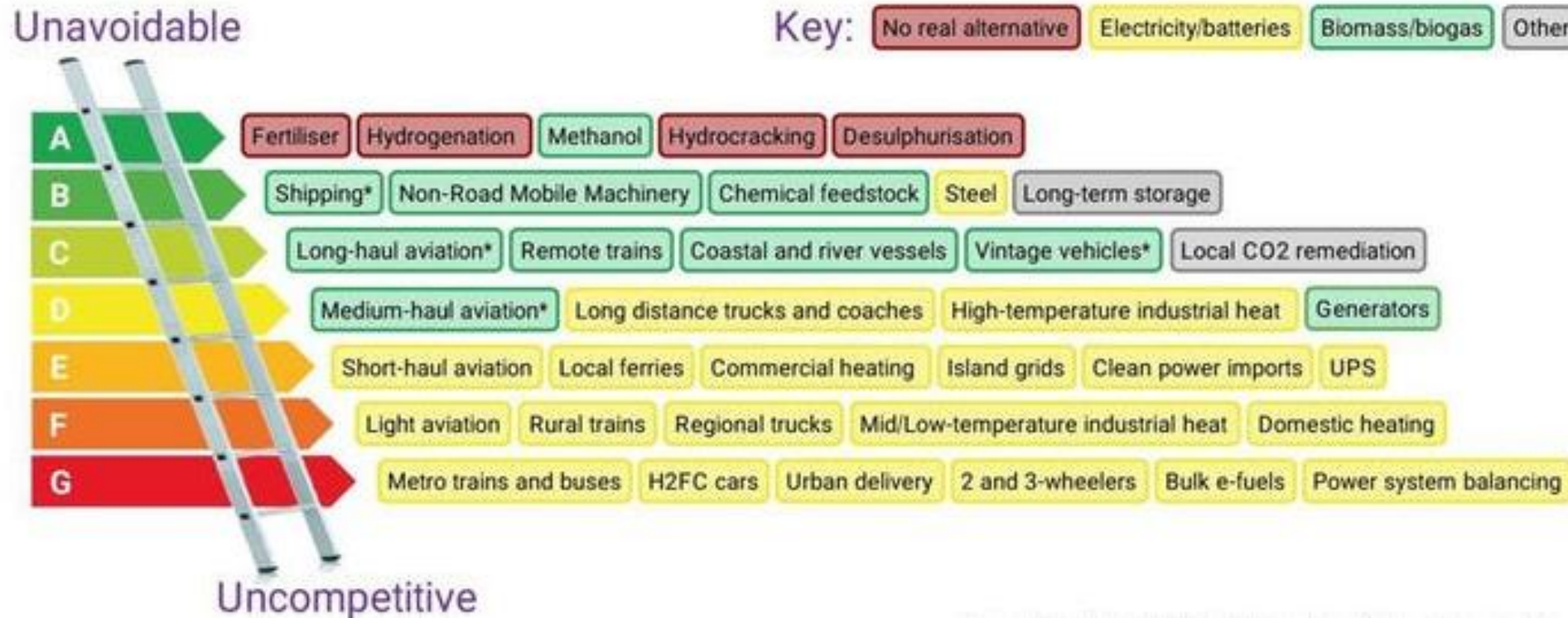
Regulation and Market Dependence

- In most emerging markets, hydrogen-specific **policies and regulations are nonexistent or not yet well defined**
- **Evolving (and different) standards** on what can be label as green hydrogen across different markets
- Need for cross-sectoral and global development and update of **safety guidelines and technical codes**

GREEN HYDROGEN – MARKET APPLICATIONS

There is still debate on which use cases hydrogen will be most competitive in but existing uses (ammonia, refining, etc.) are clearest use cases – Category A and B

Hydrogen Ladder – One View¹

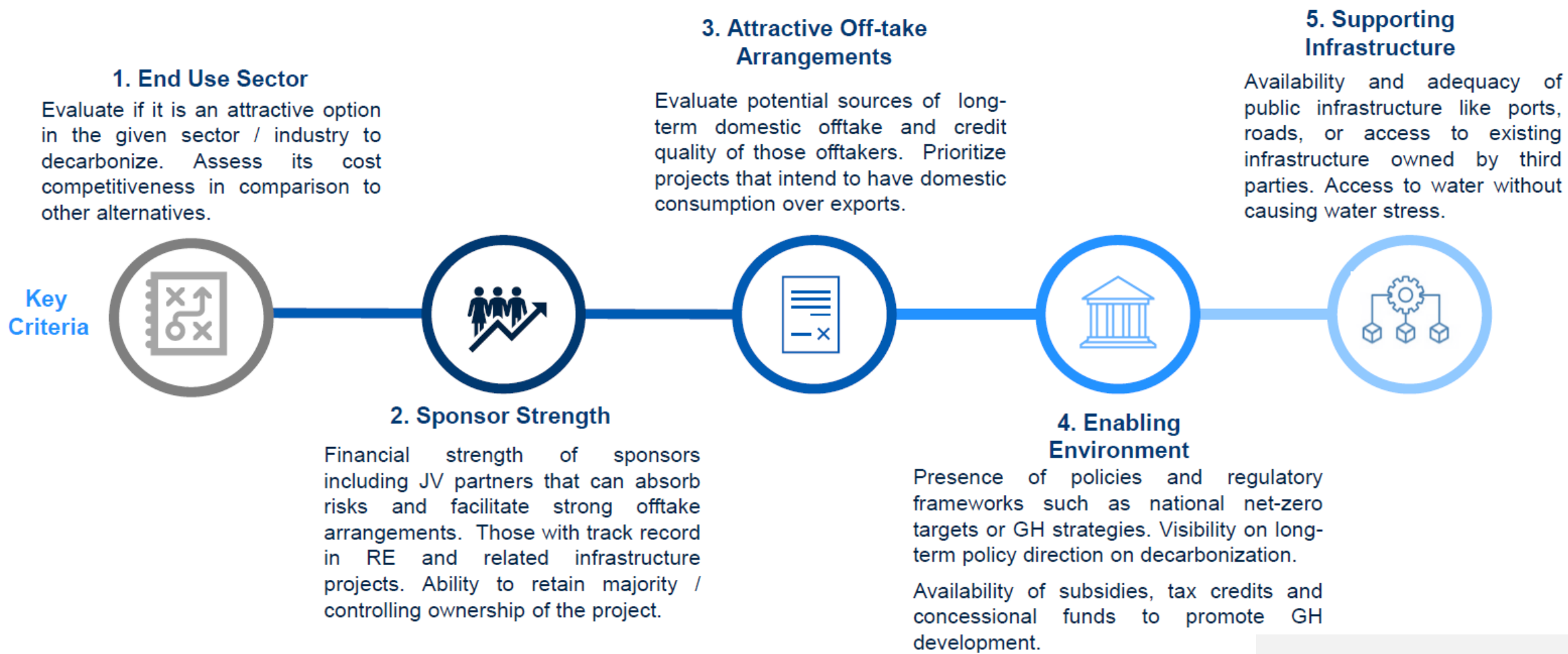


¹Source: Michael Liebrich / Liebrich Associates, Clean Hydrogen Ladder, Version 4.01, 2021

*Most likely via ammonia or e-fuel rather than H2 gas or liquid

WHAT DFIs LOOK FOR IN A GREEN HYDROGEN PROJECT

IFC's deal screening criteria – understanding GH project competitiveness



KEY FACTORS CRITICAL TO A GREEN HYDROGEN PROJECT'S COMPETITIVENESS

Project Cost Competitiveness



Cheap & Plentiful Renewable Energy Sources

- ❑ Locations with low-cost renewables and decreasing electricity prices
- ❑ **Projects with applying a combination of solar/wind or geothermal/solar energy**



Low-Cost Electrolyzers

- ❑ Low-cost electrolyzers (costs declining with investments and scale - **overall investment costs for PEM electrolyzers have reduced by 35% between 2014 and 2019 and are expected to start flattening out as early as 2030.**)
- ❑ High plant utilization factors (above 75% utilization rate for the electrolyzers)



High Capacity Factors

- ❑ **All other factors being equal, a 50% increase in capacity factor provides an almost equal reduction in the cost of hydrogen production.**
- ❑ High capacity factors (steady availability of energy to the electrolyzer throughout daily operations) will be a direct outcome of the energy sources selected

Project Context



Strong and Credible Partners

- ❑ Strong & credible sponsor(s) willing to take market risks and commit to long-term offtake.
- ❑ Technology providers with a robust track record



Market and Stakeholder Support

- ❑ Projects with mitigants that help bridge the competitiveness gap, and hence increase the probability of a successful outcome
- ❑ Countries with national hydrogen plans, policies and regulatory frameworks which facilitate green hydrogen deployment and its grid integration, carbon pricing



Prioritize Projects with Few to None Technology Competitors

- ❑ Projects targeted at applications with limited technology alternatives and stranded asset risks

IFC'S EXPERIENCE ACROSS THE HYDROGEN VALUE CHAIN

IFC has experience across the value chain in emerging markets globally working with key industry players



Renewable energy

- Financed over **20 GW** of renewables in emerging markets – one of largest financiers
- Often plays **market creator** role (Scaling Solar, offshore wind)
- Work with **premier clients**, e.g.:



Green Hydrogen

- IFC works closely with World Bank on multiple **market-enabling activities**, including:
 - **Market studies** (e.g. South Asia, H2 Fuel Cell – Transportation, Green H2 in Developing Countries)
 - **Country-level policy engagements**
- IFC partnering with **GH2 developers** at early stage (co-financing studies, development work)

Chemicals

- IFC has decades of experience in financing projects with **hydrogen derivatives** (ammonia, methanol, etc) in emerging markets
- Current portfolio includes 68 projects* in chemicals and fertilizer space. **Key clients:**



Africa



Egypt



South America/Africa



Pakistan



Nigeria



Egypt

Downstream Uses

- Significant experience in sectors with **downstream applications for hydrogen**, including refining, transport, mining, steel
- Strong ties to **clients across end-user industries**, such as:



Transport



Metals & Mining



Gas & Refineries



Steel, cement, glass

DFIs NEED TO WORK TOGETHER TO LEVERAGE OFFERINGS INTO ONE PACKAGE

DFIs can support at different stages which includes, early-stage project development expertise and co-funding, grants, technical advisory and financing to support the full lifecycle of the project.

Financial investors



Strategic investors



Concessional Funding



**In-kind contribution
(e.g. IP)**

**Cash, equity,
offtake, etc.**

**Cash, Technical
Assistance to SPV**



Grants
Contributions will strengthen the commercial viability of the project and can also cover cost of technology transfer and other technical assistance requirements.



Lending and/or Technical Assistance to Government agencies and/or State-Owned Enterprises to support the Project

THANK YOU



*Creating Markets,
Creating Opportunities*

Christoph Kausch

*Southern Africa Lead:
Manufacturing & Services
Upstream & Advisory*

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