Financing demand – Diverse needs, varying bankability

Defossilising power. Renewables are a bright spot within the climate agenda, but more needs to be done.

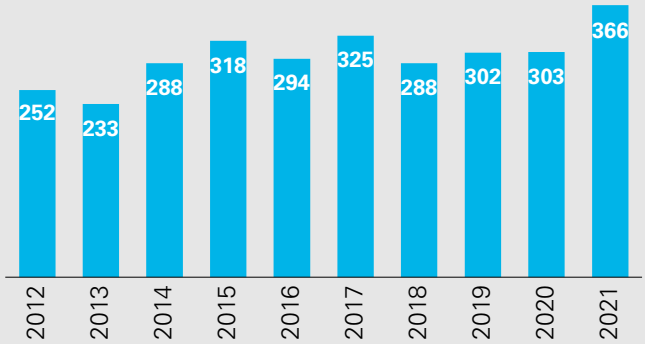
Power, Transport and Industry contribute to ~80 per cent of emissions. A peek into progress in these sectors reveals the heterogeneity (in terms of technology evolution, policy/institutional context, scale economies, emissions impact) and implications on financing attractiveness and investment riskiness. Tackling the diverse climate needs requires differentiated, contextually configured financing pathways.

Renewable power has emerged as the primary choice for energy capacity addition globally. Globally, renewable capacity grew from 1,347 GW in 2010 to 3,068 GW in 2021. Solar saw a meteoric rise, growing 34X from 25 GW to 854 GW during this period, while wind energy more than quadrupled from 196 GW to 823 GW. In 2021, the EU had 1,060 GW or 35 per cent of the global renewable capacity. China (1,020 GW) leads with over a third of global capacity, followed by the US, Brazil, Norway and India. These five countries account for 59 per cent of global renewable capacity.[3]

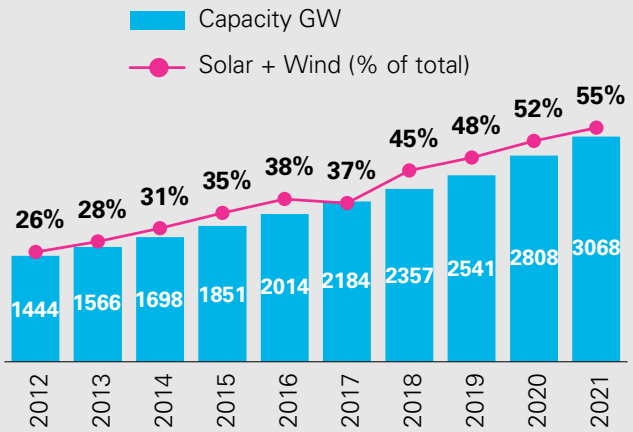
Renewables have become commercially viable and attract private financing at scale. Conducive and progressive policies, evolving technology, sharp reduction in costs, and scaled economies have come together to create enabling conditions for private financing flows which account for over two-thirds of all incremental investment in renewables globally. Renewable investments have remained robust in the post pandemic phase, with investments crossing USD366 billion in 2021 and an estimated USD226 billion in H1 2022, notwithstanding a rise in input costs and near term macro-economic headwinds. A rapid scale-up of the green bonds ecosystem, entry of corporates and institutional investors and global policy thrust to low carbon hydrogen could help scale investments from current levels. Refer Exhibit 4.

Exhibit 4: Global Renewable capacity additions and investment trends

Investment in renewables (USD billion)



Renewables capacity (GW) | Solar and wind (% of total)



Source: IRENA, IEA, KPMG analysis. Chart on Investments in Renewables does not include investments in large hydropower

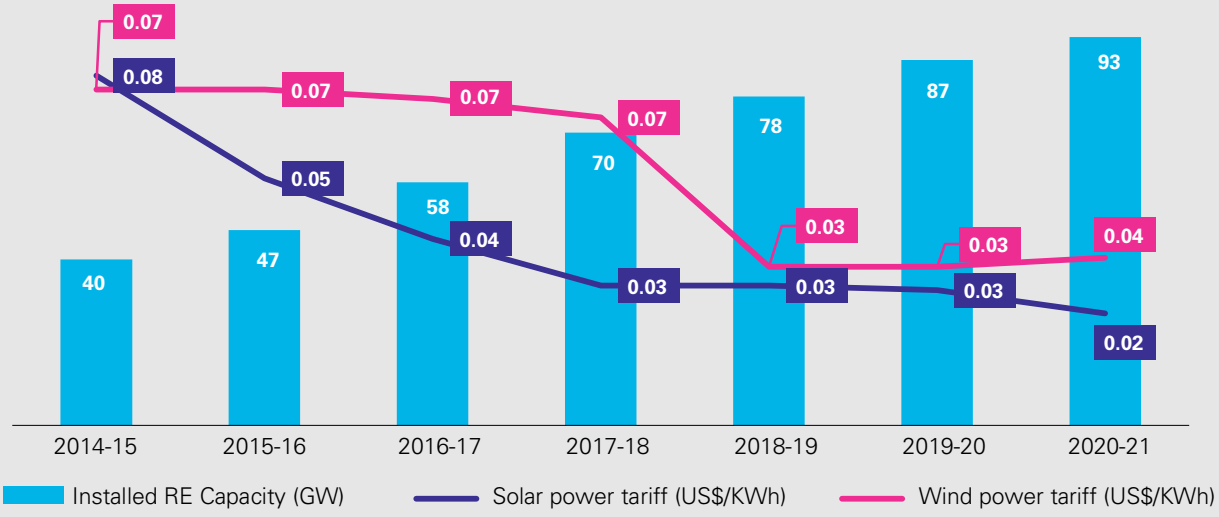
[3] Renewable Energy Statistics/ International Renewable Energy Agency (IRENA), 2015 and 2022/ October 2022

Despite these positives, regional concentration, and rising inputs costs remain concerns, as investment needs to triple from current levels. Even as EU, the US and China witness robust investments, EMDEs barring exception have lagged, and remain constrained by higher financing costs, weaker credit profile and market/regulatory risks. India's experience in ramping up grid-scale renewable capacity in the last few years is instructive. Conducive policies, institutional support and a maturing financing ecosystem have helped crowd-in private financing. Refer Exhibit 5. IEA notes supply chain constraints, higher commodity prices and tighter financing conditions of late have increased renewables costs for the first time in a decade, even though the cost of renewable power remains competitive.

Renewables score high on both bankability and impact dimensions, and remain a critical priority area to channel higher climate financing flows. EMDEs have an opportunity to leapfrog to renewables but will need to up the ante on conducive policies, institutional strengthening and financial sector reforms to crowd-in private financing.

Exhibit 5: Conducive policy, maturing financial ecosystem, widening investor base underpin India's renewables journey

Falling tariffs aid India's solar, wind capacity additions



Source: BNEF, PIB, UNFCC, CEEW, Secondary research, KPMG analysis

India's non-fossil power generation capacity doubled between FY15 and FY21, crossing 152 GW in 2021. Solar capacity grew 18-fold during this period. Solar (49 GW), large hydro (47 GW), wind (40 GW) accounted for 86 per cent of capacity, with nuclear, small hydro and bio-energy accounting for the rest. While doing so, India achieved 40 per cent share of non-fossil power generation capacity, ahead of 2030 timeline committed at the United Nations Climate Change Conference 2015 (COP-21).

This ramp-up has been driven by favourable sectoral policies, institutional support and measures to deepen the financing ecosystem. Conducive policies, capital subsidies, tax holidays, duty exemptions, institutional stewardship through

the federal agency, Solar Energy Corporation of India (to pool demand, hold auctions, provide counterparty comfort) and falling costs have all played a key role in securing private financing at scale.

Deployment of financing instruments across equity and debt structures by a diversified investor base, including developers, PE firms, global pension funds, banks, non-banking finance companies have aided the scale-up. Today, global sovereign funds, PE firms, MNCs hold equity in India's renewable sector. Foreign direct investment (FDI) flows crossed **~USD7.3 billion**[4] during FY15 and FY21. Over USD11 billion[5] raised through foreign currency denominated green bonds since FY14 have become a preferred mode for refinancing debt. Institutional investors, including global and sovereign wealth funds have also made investments in the sector.

M&As in India's renewable sector have intensified in recent years, accounting for close to 40 per cent of the investment in the renewable space in FY22. Big M&A deals included Adani Green Energy Limited's acquisition of SB Energy, Reliance New Energy Solar acquisition of REC Solar Holdings, Shell's acquisition of Sprng Energy, JSW's acquisition of Mytrah energy, Waaree's buyout of Indosolar.

The Government of India's updated Nationally Determined Commitment includes 50 per cent cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030. This will call for adding between 400 GW and 500 GW of renewable energy capacity and an incremental investment of over USD200 billion by 2030. However, concerted actions will be needed on three fronts to turn the vision into a reality:

i. mitigating sectoral risks around counterparty creditworthiness, grid stability, and securing supply chain components including panels, equipment and batteries,

ii. deepening the financial ecosystem to tap and channel domestic and foreign capital, and

iii. operationalise low carbon hydrogen policy focused on industrial decarbonisation as a demand-side trigger

Electrifying transport. Electric vehicles (EVs) have witnessed a private financing surge, although public transport remains under-funded and largely reliant on public outlays and multi-lateral financing

Led by China and Europe with 85 per cent market share, EVs have powered ahead, quadrupling their passenger car market share to 10 per cent and tripling cars-on-road to 16.5 million during 2018-21. China dominated the EV market with over 3.3 million vehicles sold in 2021, followed by Europe (at 2.3 million) and the US (at 630,000). In 2021, EV sales accounted for 15 per cent and 17 per cent share of all cars sold in China and Europe, respectively. It is estimated that by 2030, EVs will account for close to a third of all vehicle sales. EV adoption in rest of the world has been relatively slow. Nevertheless, vehicle makers are expected to invest over USD515 billion till 2030 to create capacities for EVs.[6] Refer Exhibit 6.

[4] India has achieved its NDC target with total non-fossil based installed energy capacity of 157.32 GW which is 40.1% of the total installed electricity capacity/ Press Release – Ministry of New and Renewable Energy, December 2021/ October 2022

[5] Financing India's Energy Transition Through International Bond Markets/ CEEW, August 2021/ October 2022

[6] Global Electric Vehicles Outlook/ International Energy Agency, May 2022/ October 2022

Exhibit 6: China's electric vehicles ecosystem – factors driving the investment surge

China alone accounts for 95 per cent of new registrations of electric two- and three-wheeler vehicles, and 90 per cent of new electric bus and truck registrations globally. Electric two- and three-wheeler vehicles now account for half of China's sales.

China directed specific incentives and subsidies covering both purchase and lifecycle costs. These include government subsidies, discounts on mandatory traffic liability insurance, tax incentives and exemptions on vehicle registration fees, at the time of vehicle purchase. Post purchase incentives include exemptions from tolls (in specific roads), zero/lower parking charges and vehicle inspection fees, and discounts, subsidies for charging infrastructure. China extended its New Electric Vehicle (NEV) subsidy scheme to the end of 2022 from its previous expiry date of 2020 with a reduction in the base subsidy of 10 per cent, 20 per cent and 30 per cent each year between 2020 and 2022. The differentiated subsidy seeks to get local manufacturers move up the value chain. *In recent years, China's battery range of its EVs has gone up by 50 per cent, and EV sales have risen, despite the reduction in subsidies.*

China holds formidable advantages in battery manufacturing and supply chains. China produces 75 per cent of all lithium-ion batteries, has 70 per cent of cathode production capacity and 85 per cent of anode production capacity. It owns over 50 per cent of lithium, graphite and cobalt processing capacities. *A higher share of smaller electric cars relative to other markets, and competitive costs has narrowed price differential with conventional cars to 10 per cent compared with 45 to 50 per cent in other markets.*

China has the largest EV charging infrastructure network in the world, with over 1.1 million public charging points. As part of its electrification ambitions, China is working to expand its EV charging infrastructure services to cater to 20 million EVs. Special emphasis has been given to building a well-connected and distributed EV charging network, particularly in rural areas and along transport corridors. At present though, over 70 per cent of public charging points are in Guangdong and Shanghai.

Source; Global Electric Vehicles Outlook 2022. International Energy Agency.

The investment surge into EVs has been catalysed by two factors. First, a *strong policy push* through announcements to eliminate internal combustion engine (ICE)-based cars and/or employ stringent pollution norms or CO_2 reduction target which in effect ban ICE cars by requiring zero emissions. Close to 50 countries have announced such Zero Emission Vehicle (ZEV) policies. **Second,** a range of *subsidies and incentives* has been introduced by governments to promote development of EV manufacturing ecosystems and supply chains. Governments provided over USD43 billion between 2013 and 2020 in incentives, including financial (subsidies, tax credits, tax exemption) and non-financial (preferred parking, road access, etc.).[7] While some countries, including China, Korea and the UK are steadily reducing vehicle direct subsidies as price gap between electric and conventional cars reduces, others (including India, Japan and the EU) are opting for higher subsidies. In 2021, government expenditure on electric car subsidies globally doubled. Adoption has also been helped by product launches with over 450 models introduced till 2021.

On the other hand, public transport, with high upfront capital costs and subsidised services, does not lend itself easily to private financing. While electrification of private vehicles has acquired significant momentum (led by Europe and China), investments to decarbonise public transport, both rail and buses, lag globally. For instance, investment in public transport infrastructure in cities globally lags substantially, especially given that the top 100 cities alone need an estimated USD208 billion annually through 2030, as estimated by C40 cities and International Transport Workers' Federation (ITF). Estimates by C40 and ITF suggest that less than 20 per cent of the global bus fleet is electrified. IEA had estimated a requirement of USD770 billion in rail investments through 2050. As against this, CPI 2021 estimates that less than ~USD13.4 billion was spent on low-carbon rail and public transport with financing largely from public sources and multilateral development banks (MDBs).

Indian Railways, one of the largest railway networks in the world, has reiterated its commitment to a Net Zero by 2030 and has completed electrification of close to **81.51 per cent**[8] of its broad-gauge network. Initiatives on the anvil include dedicated freight corridors, and sourcing of renewable energy to meet requirement of up to 30GW by 2030[9].

[7] Global Electric Vehicles Outlook/ International Energy Agency, May 2022/ October 2022
[8] Press Release. Rail Electrification gets a super boost/ Ministry of Railways Government of India, October 2022/ October 2022
[9] Press Release. Indian Railways has adopted an integrated approach for a Green Environment/ Ministry of Railways Government of India, October 2022/ October 2022

Electric city buses have been slow to catch up outside of China, but this may be changing. China accounts for over 98 per cent[10] of electrified bus fleet globally with over 420,000[11] e-buses in operation. China's rapid expansion has been fueled by public subsidies with Shenzhen reportedly receiving aid of ~USD70,000 per EV annually and had a 100 per cent electrified bus fleet of over 16,000 vehicles.[12] However, other regions are catching up. Europe could have nearly a third of its bus fleet converted to zero emission by 2030. India is likely to become a big market for e-buses too, with several large city bus utilities like Bengaluru, Delhi and Mumbai committing to sharp increases in their e-bus fleets.

In January 2022, Convergence Energy Services Limited (CESL), an India-based public sector undertaking, launched a tender worth approx. USD680 million (INR5,500 crore) to purchase 5,450 single decker and 130 double decker electric buses. Under this programme, Kolkata is expected to get 2,000, followed by Delhi and Bengaluru at 1,500 each.

From a financing standpoint, the transport sector therefore, presents a mixed bag. While regulation and subsidies have aided sizable private financing flows into EVs, public transport investments both in rail and buses continue to lag.

Decarbonising industry. Affordable low carbon hydrogen at scale by turn of the decade the next frontier

Low carbon hydrogen is emerging as a compelling choice to tackle the twin imperatives of energy security and carbon abatement. At COP26, over 32 countries came together to accelerate development of low carbon hydrogen and to ensure that affordable, renewable, low carbon hydrogen is globally available by 2030. This has been followed up with policy pronouncements by several countries. Targets to deploy hydrogen technologies are increasing in ambition, particularly to produce low-emission hydrogen. National targets for electrolysis capacities by 2030 have more than doubled from 74 GW globally in 2021 to reach 145-190 GW in 2022. The European Commission's REPowerEU plan targets production of 10 million tonnes (Mt) of renewable hydrogen within member states and to import 10 Mt of renewable hydrogen by 2030. This translates to 65-80 GW of electrolysis capacity in the EU alone, and a similar capacity is envisaged outside EU to fulfil import targets. In the US, the Infrastructure and Jobs Act and the Inflation Reduction Act has significant provisions to support increased investment in hydrogen projects. The IRA contains provisions to implement a clean hydrogen production tax credit of up to USD3 per kilogram, which is expected to give a massive fillip. Capacity creation to translate this intent is visible. Announced electrolyser manufacturing capacities could add to 94 GW by 2030 while the overall electrolyser deployment pipeline, which, if realised, could lead to 134-240 GW capacity by 2030.

Industrial decarbonisation is a logical starting point to incubate low carbon hydrogen at scale. Prioritising early-stage low carbon hydrogen initiatives at the hard-to-abate industrial sectors, including oil & gas, steel, cement and chemicals, account for an estimated fifth of all CO2 emissions globally (and higher in industrial/ manufacturing economies); it can possibly help tackle bankability and emission impact objectives. Existing global hydrogen demand (not counting potentially new applications) was 94 million tonnes (MT) in 2021[13]. The top four countries had a 60 per cent share; China had a 30 per cent market share, followed by the US with 13 per cent, and Europe and India with 8 per cent share each.[14] However, at this point, there is a price competitiveness challenge; depending on location, type of renewable alternative, price differential between conventional/ unabated, low-emission hydrogen can be anywhere upwards of USD3 – 8 per kg. With economies of scale, the expectation is that cost parity may be achieved by the turn of this decade.

[10] Electric Bus, main fleets and projects around the world/ Sustainable – Bus.com/ October 2022
[11] E-Bus Market is Speeding Up/ IAA Transportation/ October 2022
[12] E-Bus Market is Speeding Up/ IAA Transportation/ October 2022
[13] Global Hydrogen Review – 2022/ International Energy Agency (IEA), 2022/ October 2022
[14] Global Hydrogen Review – 2021/ International Energy Agency (IEA), 2021/ October 2022

Nevertheless, financing low carbon hydrogen programmes at scale can be tricky. Strong policy commitment, offtake certainty, clarity on viability gap treatment and grasp of value chain linkages will all be crucial. A rollout of low carbon hydrogen programme calls for dealing with multiple moving parts concurrently, and taking a comprehensive value chain perspective, one that considers an array of factors, including technology risks, demand aggregation and clustering, storage and transportation infrastructure planning, and linkages with renewable capacities. Programmes will also need to have mechanisms to deal with price differentials and viability gaps to incentivise and secure offtake commitments, which will be a key pre-requisite for bankability. Overall, proactive policy, clustered capacity creation with offtake commitments in decarbonising sectors, R&D incentivisation and innovative structuring will be central to drive scale and commercial viability. Refer Exhibit 7 for policy measures announced by select countries.

Exhibit 7: Policy measures to mitigate low carbon hydrogen project risks

Country	Grants	Tax incentives	Loan guarantees	Contract for differences
Australia	✓			
Canada	✓	✓		
Chile	✓			
EU	✓			✓
Germany	✓	✓		✓
UK	✓			✓
US	✓	✓	✓	

Source: Global Hydrogen Review 2022. IEA.

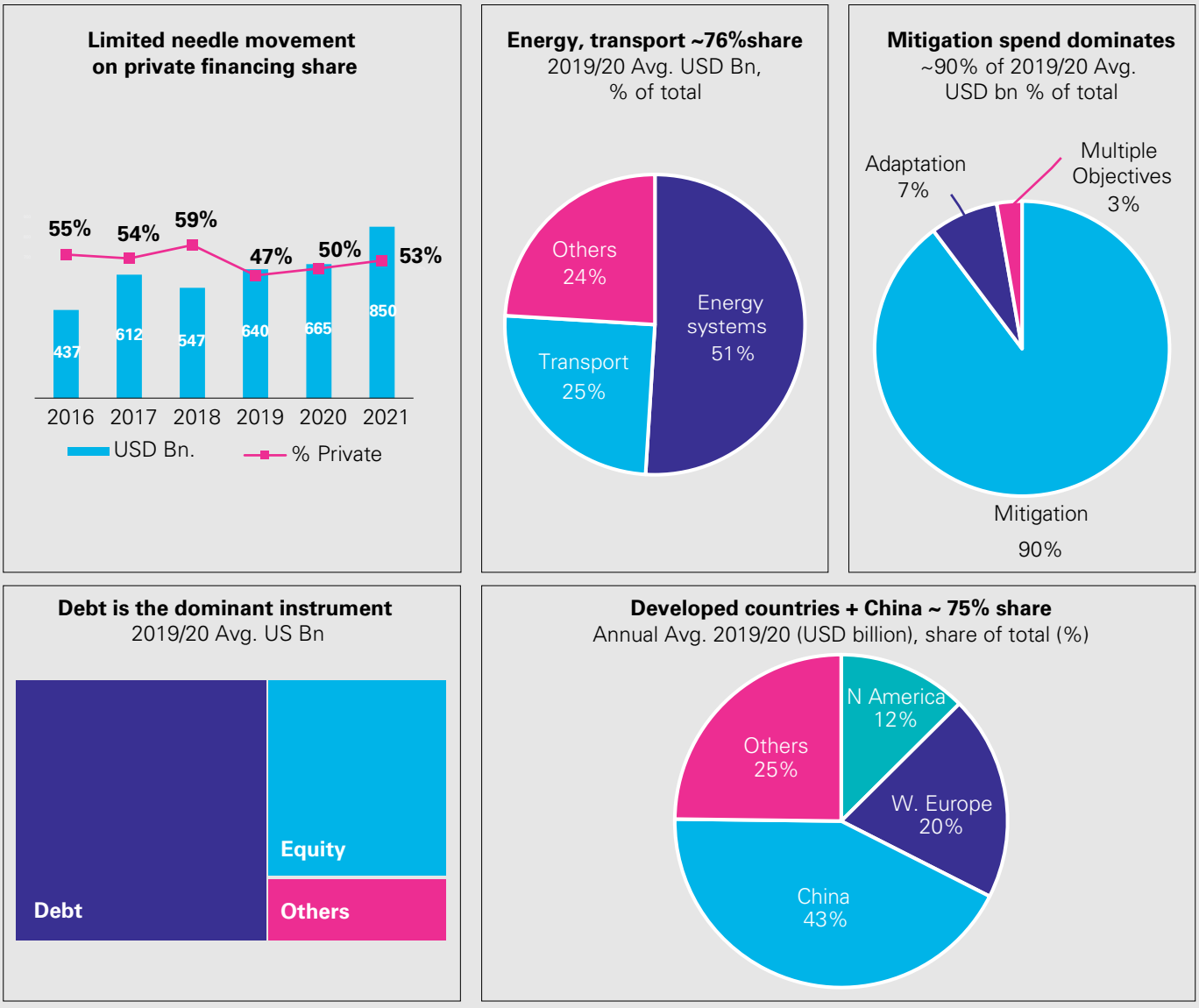
Signaling initiatives from the private sector are taking shape.

1. Japan's largest electricity generator, JERA, invited a competitive tender for supply of low-emission ammonia for Japan's largest coal-fired power plant from 2027,
2. Four automakers in the First Movers Coalition have pledged to source 10 per cent of steel from low-emission sources by 2030,
3. 18 companies have signed non-binding agreements to buy 1.5 Mt of steel produced with low emission hydrogen from 2025,
4. Maersk ordered 12 methanol-powered vessels, signed partnerships for 0.7 Mt of low-emission methanol procurement in 2025.

Supply of finance - Clouds remain, silver linings visible

Climate finance supply flows are concentrated in select sectors, limited to very few geographies and are over-reliant on limited sources and instruments.

Exhibit 8: Facets of climate finance supply



Source: CPI 2021, CBI 2022, Secondary research, KPMG analysis