Net Zero Financing Roadmaps

Key Messages

November 2021

UN CLIMATE CHANGE CONFERENCE UK2020

Private financial actors have key roles supporting the $30 trillion in net-zero investment required this decade

$32 trillion of investment in decarbonization is needed this decade to put the world on a path to net zero, aligned with an IEA transition scenario

- Direct capital expenditure for decarbonization needs to triple in 2021-2025 compared to 2016-2020, and will need to average $4.5 trillion per year after 2026 to reach $125 trillion in total investment by 2050

Private actors could provide up to 70% of this financing globally, offering huge opportunities for investors – reliant on public policy and support

- Private investors play a key role through direct net zero investment and by supporting and enabling others' decarbonization investments, particularly corporations
- This level of private investment is based on improvements in financial market development and increases in market maturity in emerging markets, and contingent on public implementation of required policy action to achieve net zero by 2050 and a focus on blended finance tools that better enable private investment
- There is expected to be significant regional variation in private investment ranging from 50% in Africa to 90% in North America, reflecting differences in financial market maturity, political conditions and the broader enabling environment for business and investment
- Corporates are the largest direct investors into decarbonization projects or assets (~40%, $960 billion annually 2021-2025), followed by commercial FIs (~20%, $460 billion annually 2021-2025), and households and individuals at about ~10% ($300 billion annually 2021-2025)
- Financial intermediaries, including commercial FIs, institutional investors, infrastructure funds and private equity/venture capital, play a critical role in both direct investment ($120 billion annually from 2021 to 2025) and through providing finance that facilitates others to invest ($960 billion annually from 2021 to 2025)

Public support through policy, regulation, market building and public investment is critical to realizing the full potential of private capital

- Investors face a range of financial barriers and non-financial barriers that limit investment, from constrained returns to political risk and regulatory constraints
- By adjusting approaches to blended finance, USD 110 billion of public blended finance could enable USD 300 billion of private finance annually from 2021 to 2030

The economics of low-carbon investments are rapidly improving

- By 2030, 70%-80% of decarbonization technology investments could offer better value than conventional, emissions-intensive alternatives *

A broad range of investors can seize opportunities across an array of decarbonization investments matched to their risk-return profiles

- There is a wide range of investment opportunities with different risk and return profiles for different investor appetites, across four archetypes: *Early technology bets* (5-10%), *Maturing technologies in emerging regions* (50-60%), *Market creation opportunities* (15-30%), and *Established investment opportunities* (~15%)
- Each archetype would benefit from a set of enabling policies and actions to fully unleash investment potential – for example, *Market creation opportunities* would benefit from enabling actions to build new markets via establishing frameworks and providing incentives, and promoting access for new entrants

*70%-80% of technologies are estimated to have higher Net Present Value than high-carbon alternatives, based on regionally-adjusted projected technology improvements and incorporating the IEA's Net Zero Scenario carbon price and a global uniform weighted average cost of capital of 4%

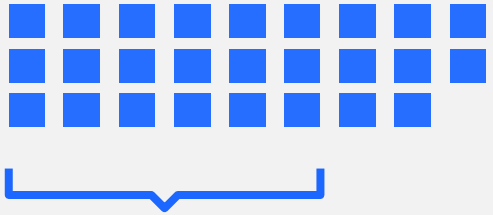
Private finance could provide over two-thirds of the $2.6 trillion in investment needed every year to 2025 to put the world on a path to net zero by 2050

Recent annual investment [1]
2016-2020

$900 billion

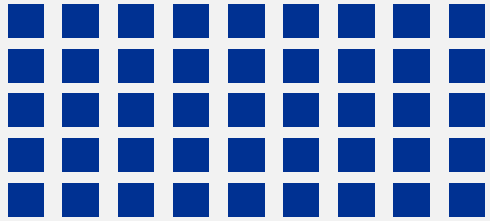
Annual investment needed
now
2021-2025

$2,600 billion



Average annual investment
beyond 2025
2026-2050

$4,500 billion



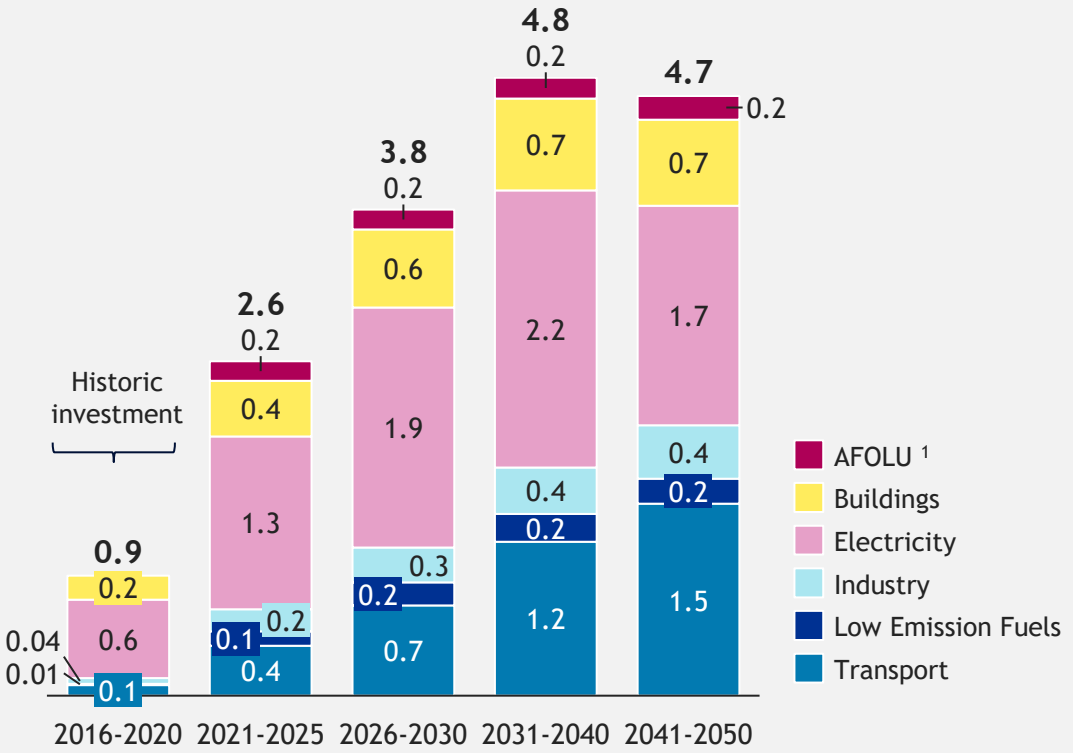
The private sector could provide 70% of this investment globally, ranging from 50% to 95% across regions with different levels of market maturity [2]

However, increased and well-targeted public support will be needed to support increased private ambition, including policy and regulations targeting net zero, market building, direct investment and blended finance [3]

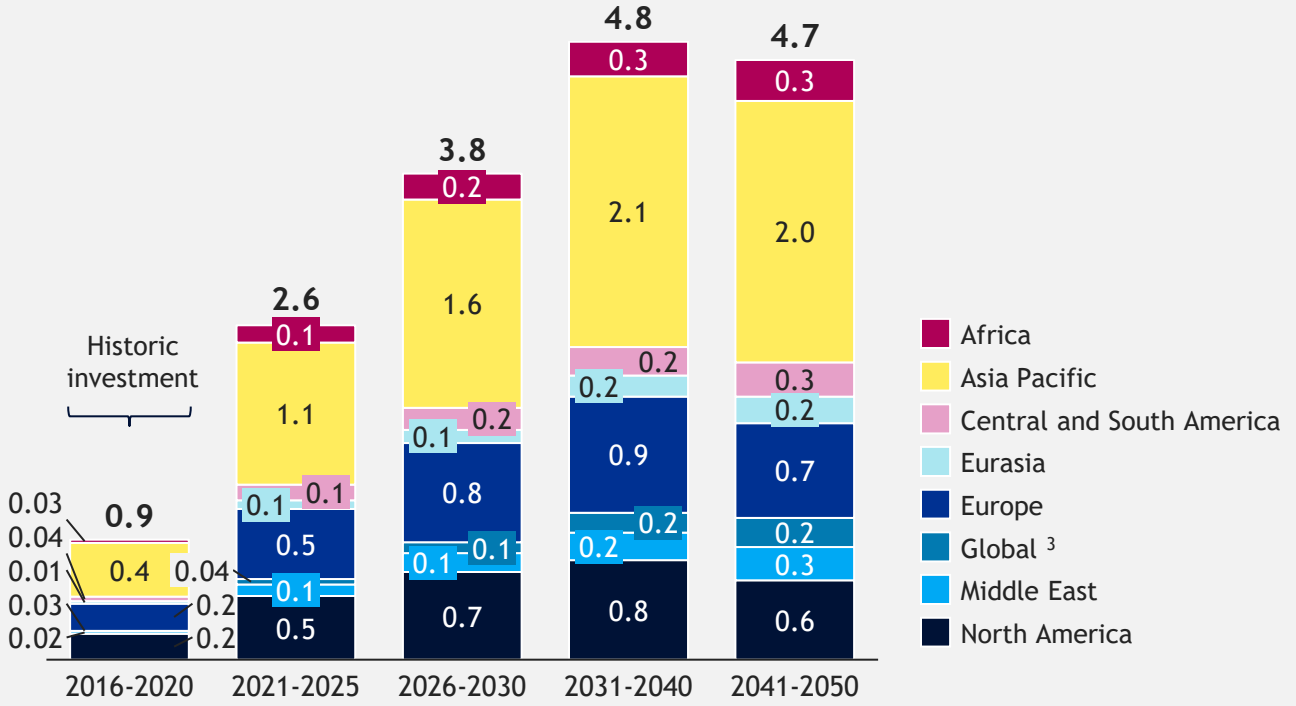
1. Recent annual investment is based on IEA analysis for consistency with IEA projections, and differs from other recent estimates (such as CPI's recent $630 billion estimate for 2019/2020) due to definitional and methodological differences.
2. This analysis takes into account project changes in technology costs projected improvements in financial market conditions and underlying enabling environments across different investment geographies.
3. The 70% assessment of private sector investment potential includes an assessment of scaled-up public support through blended finance to enable private investment into currently challenging markets and/or technologies. Without this additional public blended finance support, the private sector may only be able to support 65% of total investment opportunities.

Decarbonization investments need to triple in 2021-25 compared to 2016-20

Annual average investment requirement across sectors
2021-2050, in USD trillion



Annual average investment requirement across regions[2]
2021-2050, in USD trillion

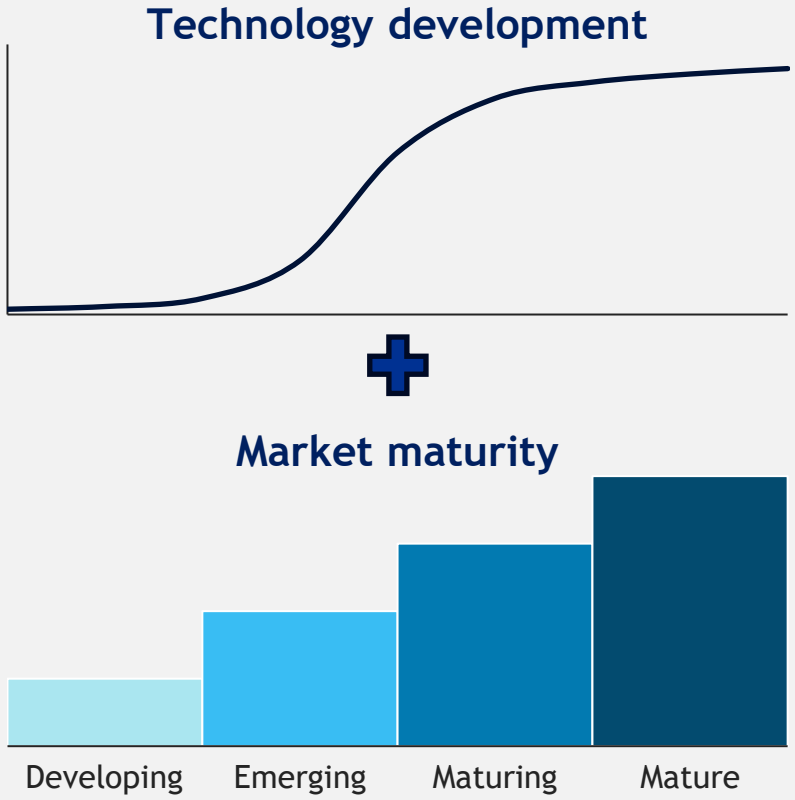


Huge increases are needed in energy generation and transport decarbonization investment, with big regional steps up needed in Asia Pacific, Europe and Africa

1. AFOLU investment refers to the additional spending needed over 2020 investment levels to reach climate sustainability
2. Final investments include additional breakdown for select countries / micro-regions: Brazil, China, EU, USA, India, Japan, Emerging Asia Pacific, and SIDS
3. Global includes mining for minerals used in Es, which is not mapped on a regional level

Source: International Energy Agency Net Zero by 2050 scenario (2021) (henceforth, "IEA NZE"), Vivid Economics

The Net Zero Financing Roadmaps identify direct capital provision by actor given expected changes in technology and market maturity



- Corporate actors
- Households and individuals
- Commercial financial institutions
- Institutional investors
- Infrastructure funds
- Private equity / Venture capital

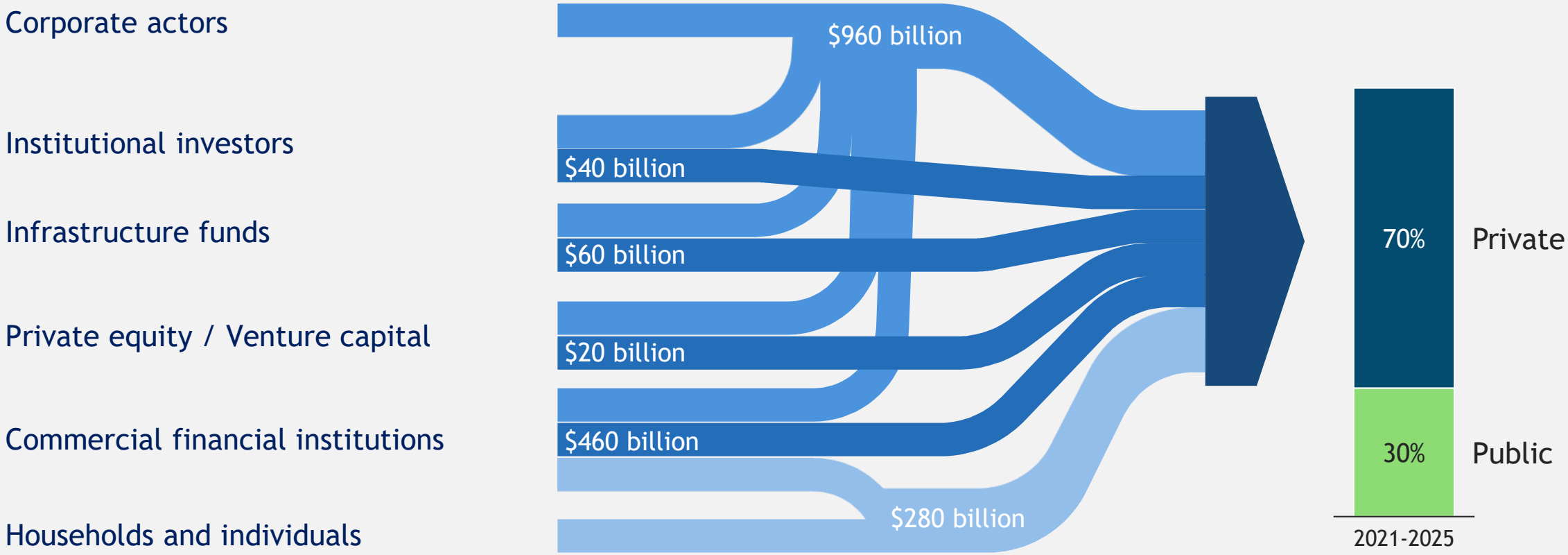
The net zero financing roadmaps identify actors that could provide the **direct capital investment** needed to achieve net zero, and also identify the investible universe for crucial secondary and intermediary investment actors

Actors across the financial system have key roles to play in driving both direct and secondary net zero investment

Financing actors

Annual decarbonization investments 2021-25

*Stylized representation of direct capital investment and supporting financial intermediation **

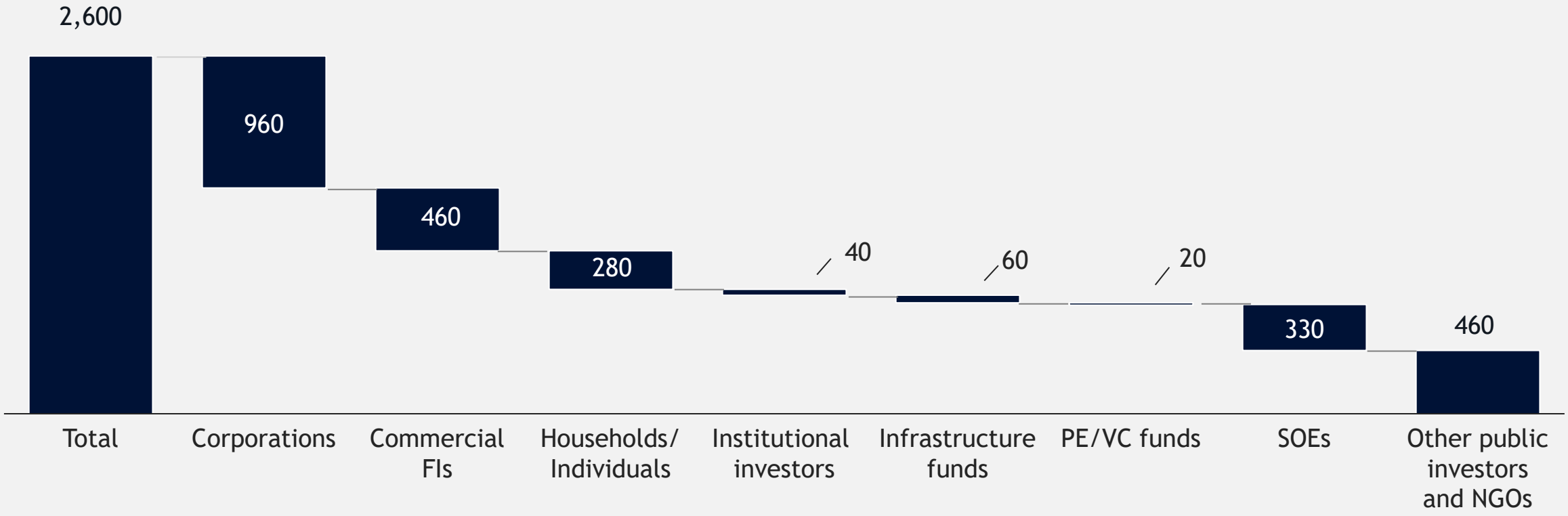


Institutional investors, infrastructure funds, PE/VC and commercial financial institutions have critical roles in supporting and enabling corporate and household action, in addition to their own direct investments

* In addition to these roles supporting direct corporate capital investment, financial system actors may also take roles investing in or supporting other financial actors and intermediaries.

70% of financing could come from the private sector, with corporations being the largest direct investors

Annual decarbonization investments by direct capital investment actor, 2021-25, USD Billion



SOURCE: Vivid Economics based on IEA and additional modelling

Increasing private low-carbon investment will be supported by improving project economics

In some cases, private actors could already capture benefits from low-carbon technologies by adjusting investment approaches

- Many low-carbon technologies already offer greater long-term returns, if investors can accommodate higher upfront costs and/or longer return periods (subject to regulatory requirements and fiduciary duties)

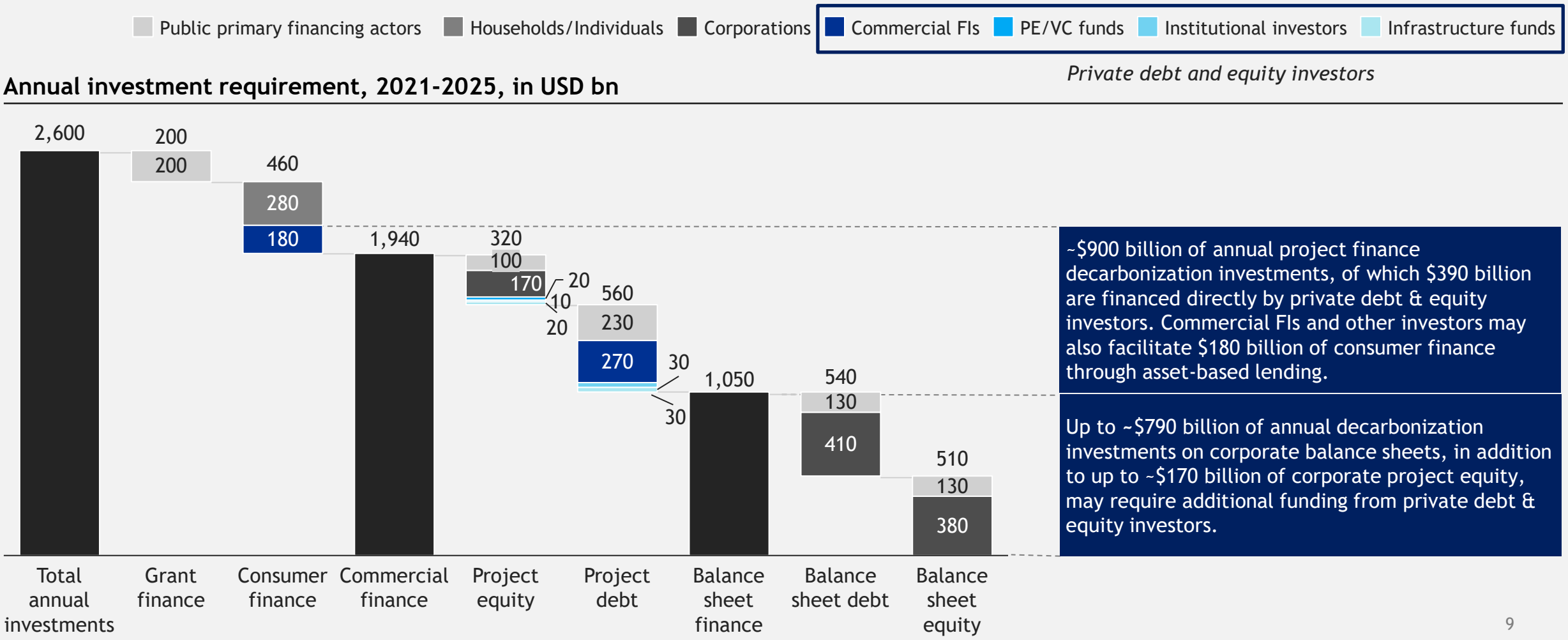
By 2030 up to four-fifths of decarbonization technology investments could be better value than conventional, emissions-intensive alternatives

- Technology maturity modelling for the Net Zero Financing Roadmaps suggests that 70%-80% of technologies could have higher Net Present Value than high-carbon alternatives, based on regionally-adjusted projected technology improvements and incorporating the IEA's Net Zero Scenario regional carbon prices *
- For example, solar PV technologies are already or almost cost-competitive today, while passenger car electric vehicles may be cost-competitive in around five years due to improved equipment efficiency and economies of scale

* The analysis applies regionally-adjusted projected technology improvements and incorporates the IEA's Net Zero Scenario carbon price and a global uniform weighted average cost of capital of 4%. Carbon price in USD (2019) per ton of CO2: Advanced economies: USD 75 - 250 (2025-50); selected emerging market and developing economies USD 45 – 200 (2025-50); other emerging market and developing economies USD 3 – 55 (2025-50).

SOURCE: Vivid Economics based on McKinsey Decarbonisation Pathway (DPO) and IEA NZE

There is a $580 billion annual direct financing opportunity for private investors, and a further $960 billion of balance sheet investment that they can facilitate for corporates



Numbers in the chart may not sum to totals due to rounding

The Roadmaps analysis distils the specific opportunities that a broad range of private financial actors can harness

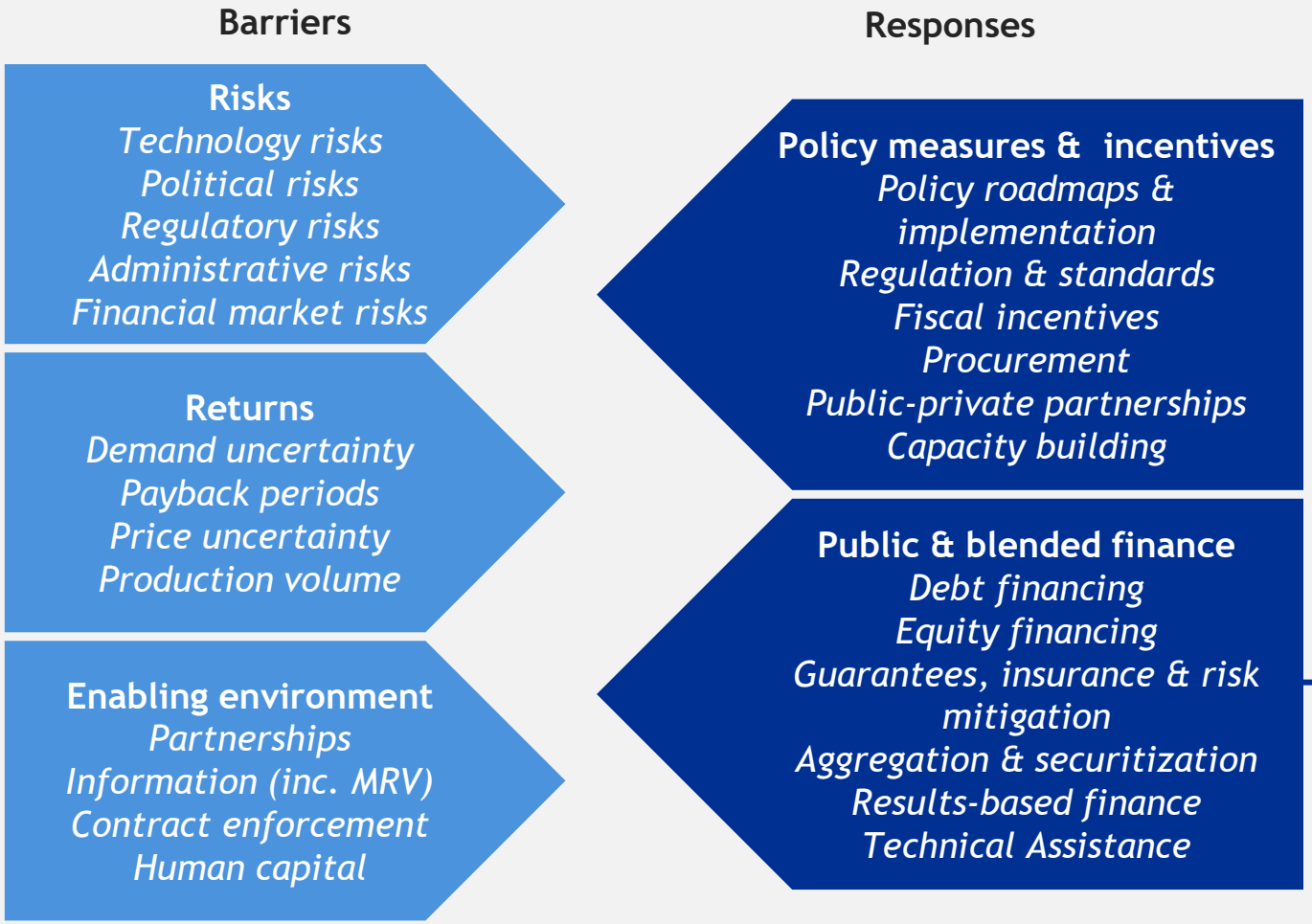
Corporate actors	• Could deliver $960 billion of global net zero investment, through retained capital and leveraging debt and capital markets • To 2025 they could invest $450 billion annually in electricity system investments alone, and an additional half a trillion dollars in other net-zero investment
Commercial FIs	• Important in transport decarbonization and buildings decarbonization investment, through both $460 billion in direct investment, including $180 billion in consumer finance, and supporting a share of the $400 billion needed in annual balance sheet debt to 2025 • Particularly important in supporting investment in less developed markets in Africa and LAC
PE and VC	• Majority of investment likely to be in corporate debt and equity, a share of up to $960 billion per year • A focus on electricity and industry developing and deploying decarbonization technologies in more mature markets, including higher-risk and higher-return pre-commercial plays • A relatively smaller $20 billion also possible annually in project-level investment
Infrastructure funds	• Could drive a substantial portion of the $960 billion in annual balance sheet corporate debt and equity to 2025, while also directly investing in projects to support a further $60 billion in investment per year between 2021 and 2025 • Will be more important in supporting investments in less mature markets
Institutional investors	• Key for driving decarbonization for corporates – with an investible universe of $960 billion in debt and equity due to their large balance sheets and long-term investment horizons • With diverse investment profiles, they could contribute substantially to direct capital expenditure via project finance of $40 billion annually between 2021 and 2025

Realizing increased investment on this scale requires increased ambition and targeted policy action

The analysis identifies different types of investment and different enabling actions across four archetypes of decarbonization investment, each of which face different barriers to scaling up investment

	Annual investment USD billion, 2021-25	Opportunity roadmap examples	Key enabling actions
Early technology bets with high but highly uncertain potential returns, requiring enabling policy frameworks	200	Alternative protein in APAC Green hydrogen globally Green steel in China Green chemicals in China	Reducing technology risk by publicly funding RD&D and commercialization Incentivizing demand Investing in supporting infrastructure and establishing taxonomies
Maturing technologies in emerging regions with large market potential but accompanying market risk	1,600	Solar PV in Africa Electricity networks in Central and South America Off grid power in Africa	Managing market risks through public support and blended finance Improving market information & assessments
Market creation opportunities to ensure market development and adequate investment incentives	400	Biomethane globally Buildings retrofits and efficiency in Eurasia Buildings retrofits and efficiency in in Middle East Forestry, peatland and mangrove restoration in Central and South America	Building new markets by establishing frameworks and providing incentives Promoting market access for new entrants
Established investment opportunities with attractive investment profiles to be unlocked through addressing non-financial barriers	400	Wind energy in North America Wind energy in Europe Solar PV in Middle East EV chargers in Europe EV chargers in North America Electricity storage globally	Policy and regulatory action and reform to support technologies and associated markets Addressing non-financial barriers to investment and technology uptake, inc. network effects, grid integration, etc

Key unlocks for achieving this scale of private investment are targeted policy measures and increased and more ambitious blended finance



Blended finance currently makes up a small share of public finance support to low-carbon investments

By increasing the use of blended finance and the impact and leverage of blended finance approaches, USD 110 billion in scaled-up blended finance could support USD 300 billion in private investment annually between 2021 and 2030

This report was produced by the UNFCCC Race to Zero campaign with support and analysis from Vivid Economics

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For more information see **gfanzero.com/netzerofinancing** or contact **nzfr@videconomics.com**

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