Mobilising private investment for adaptation to climate change

Executive Summary

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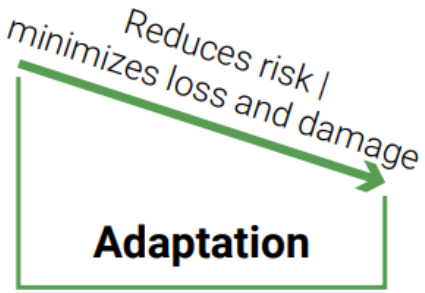
Current global commitments to reduce GHG emissions put us on to **dangerous climate risk levels** (2.4°C–2.6°C warming) by the end of the century.

Even if more ambitious action is adopted, **residual risks will occur**. Some socioecological systems are already experiencing adaptation limits.

About 40% of humankind are already living in **highly climate-vulnerable areas.**

UNEP (2023)

USD 215–387 billion/ year for adaptation in developing countries is required



Residual risk

Loss and damage

Avert loss and damage:

- Mitigation to reduce emissions

Minimize loss and damage:

- Adaptation
- Disater risk reduction

Address loss and damage:

- Transfer risk e.g. social protection insurance
- Retain risk e.g. contingency fund

Extreme or slow onset event:

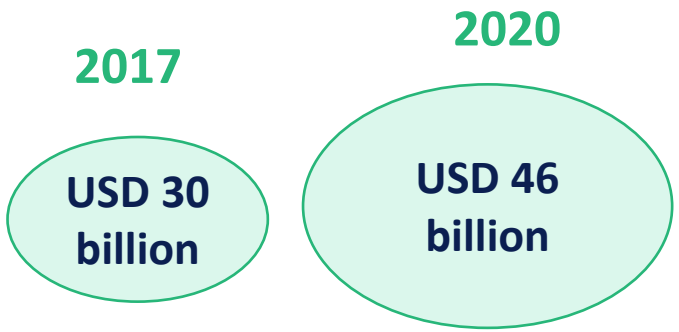
- Storm / Typhoon / Cyclone
- Extreme drought
- Rising sea levels
- Ocean acidification
- Glacial melt
- Heatwave
- Flood
- Wildfire

Address loss and damage:

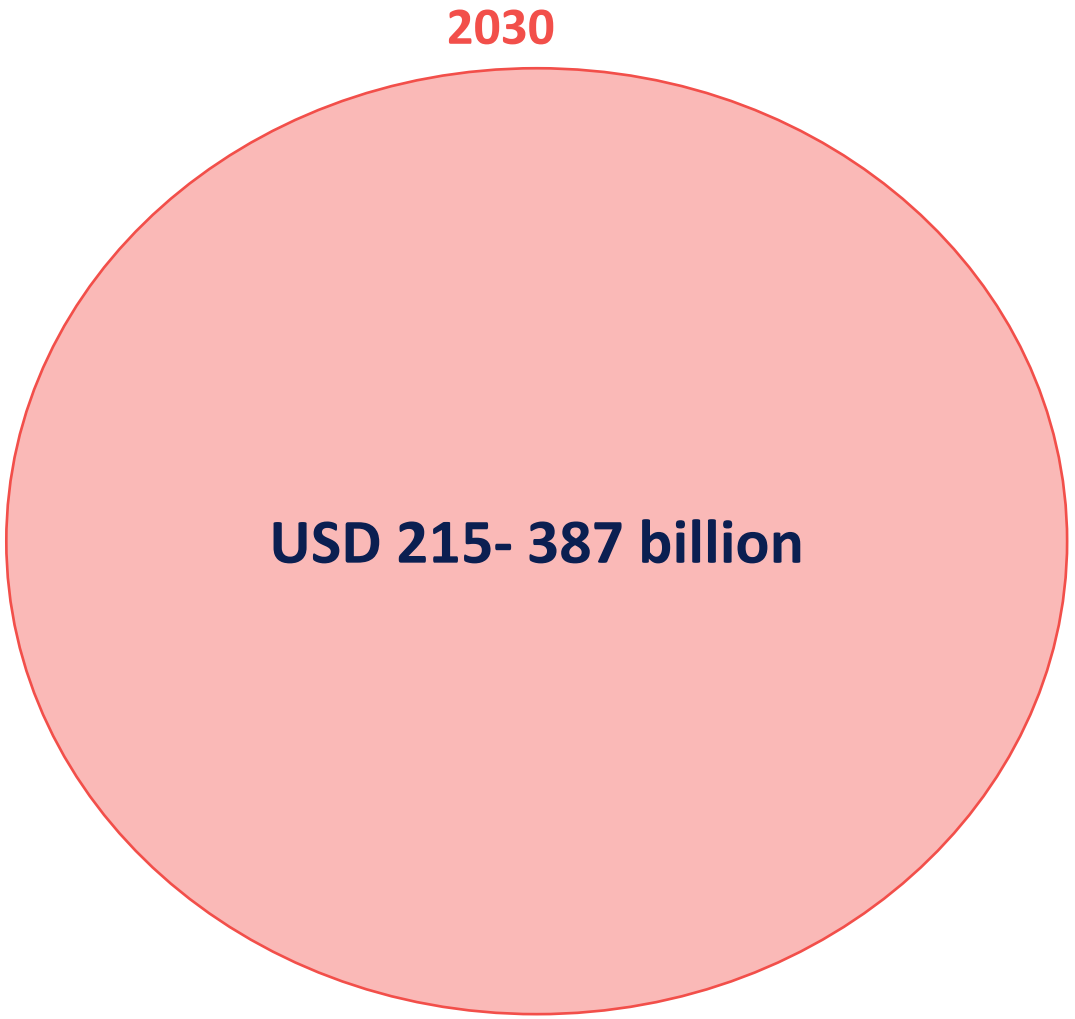
- Emergency response
- Rebuilding funds
- Relocation support
- Livelihood programmes
- Social protection

UNEP (2023)

Adaptation finance needs to increase by 10-18 times



Total tracked adaptation finance
(*CPI, 2021*)



Estimated annual adaptation costs in developing countries
(*UNEP, 2022*)

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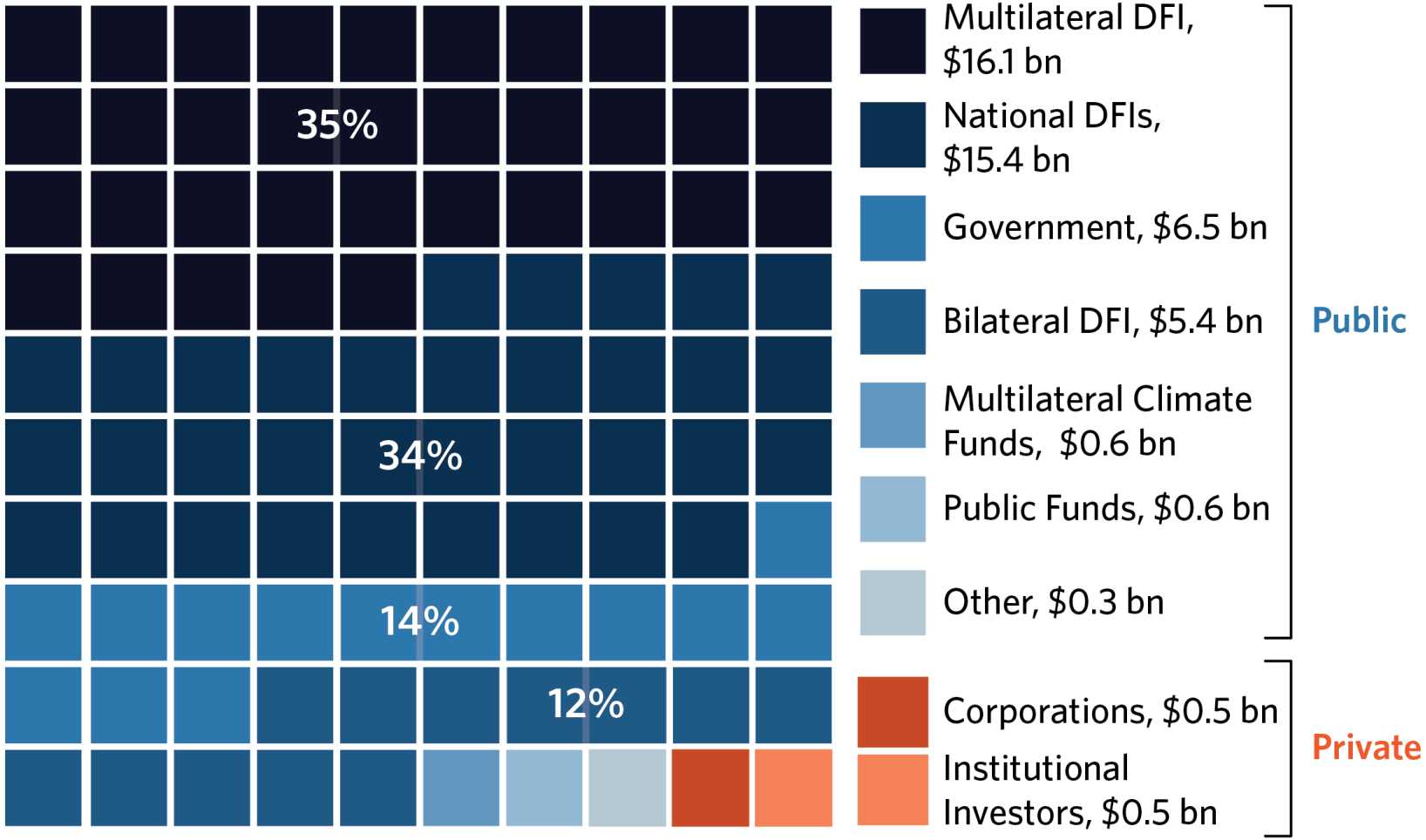
Why the private sector matters for adaptation?

- Adaptation needs to be delivered by the private sector: The public sector alone is not sufficient.
- Cannot rely on the market to deliver the adaptation solutions developing countries need now.
  - There are market barriers to adaptation solutions
  - There is urgency in making the adaptation solutions available
- Therefore, private sector investment needs to be kick-started. We cannot wait for the market to autonomously respond to the current and future risks (and opportunities) presented by climate change

Volume of private climate finance to adaptation is underestimated (but certainly insufficient)



2% of global adaptation finance was sourced to the private sector for 2019/20.

CPI (2021)

Initial research on why and how to mobilize new private investment in adaptation

The Untapped Opportunity for Private Investment in Adaptation

Sample of adaptation solutions in India

Strengthening the Market for Adaptation Solutions

Barriers to private adaptation investment

Opportunities to mobilize and support private adaptation investment

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The untapped opportunity for private investment in adaptation

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Adaptation can take many forms and adaptation ‘solutions’ are not well defined

*Adaptation is “**Adjustment[s] in natural or human systems in response to actual or expected climate stimuli or their effects, which moderates harm or exploits beneficial opportunities**”*

A financial activity can be classified as adaptation if it helps adjust ***“to actual or expected climate and its effects”***

(IPCC, 2014)

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Private investment in adaptation can benefit the company alone and/or to the wider public

Investments a company makes in adaptation 'solutions' that protect the company's own operations and business model

'Adapted activities'

e.g. A water company purchasing an early warning system to reduce the risk of flooding in their facilities

Investments a company makes to offer adaptation 'solutions' to a public or private sector consumer

'Adaptation enabling activities'

e.g. A company invests in developing and marketing a new business offer of installing early warning systems for other companies/ governments.

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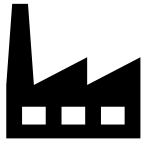
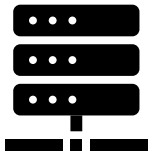
Focus of this research: Enterprises in the real economy that provide adaptation solutions

Enterprise in the real economy



Manufacture an

Construct an



Provide a service for an

Provide a resource for an

Adaptation 'solution'

Which build the resilience of other companies and/or wider society

= *'Adaptation enabling activities'*

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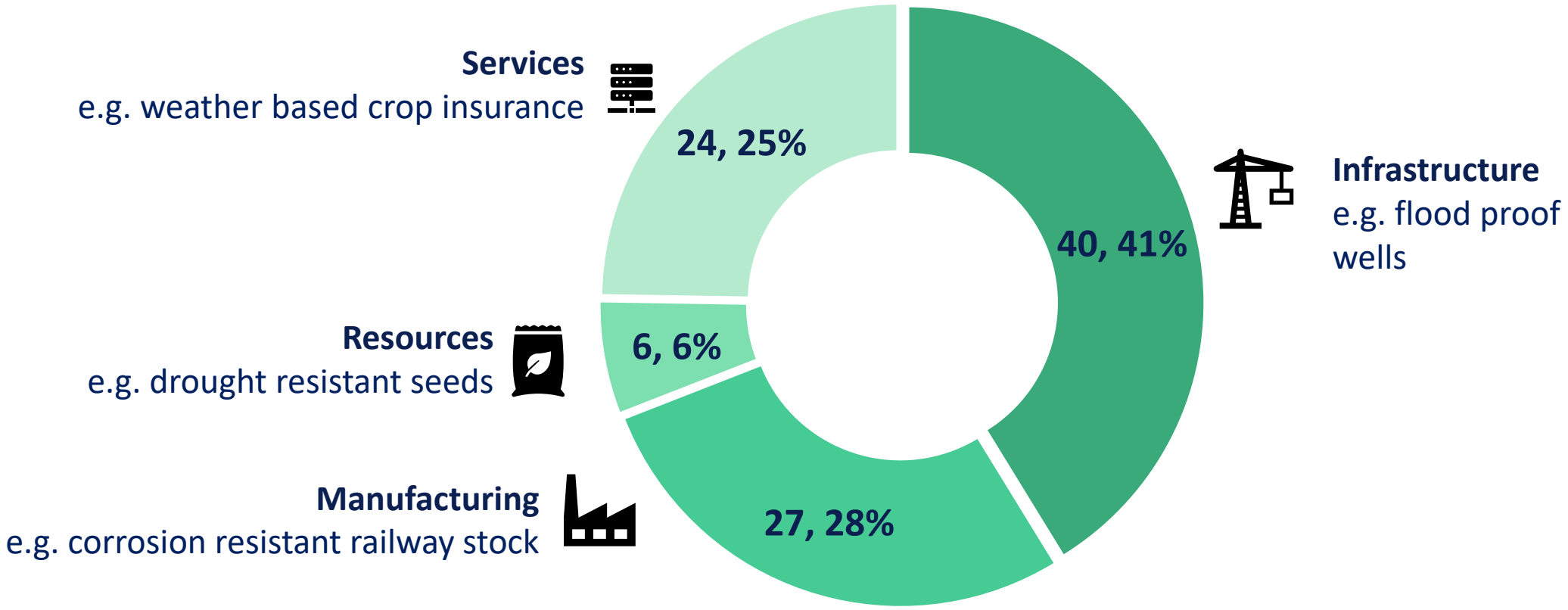
We used a sample of 77 adaptation solutions in India viable for private investment

Segment	
Infrastructure	All-weather road technology; Motor graders for blading of gravel roads; Floating dry docks; Raised/new embankments; Port dredging; Sustainable breakwaters; Raising docks; River Information Services; Geosynthesis on railway slopes; Corrosion resistant railway stock; Wind fences on railway track; Pervious concrete; Sediment monitoring for hydropower; Air Cooled Condensers for thermal power; Stainless steel electricity distribution infra; Aerial bundled conductors; Underground cabling; Geosynthesis for coastal erosion; Drainage for oil and gas facilities; Preventative maintenance of oil/gas pipeline; low-power wireless telecommunications network; Backup power at cell towers; Underground telecommunications cables; Reflective surfaces; Green rooftops; Green buildings;
Agriculture	Rapid soil testing devices; Soil testing labs; Urea Deep Placement technique; Green Seeker; Micro irrigation; Reinforced HDPE geomembrane lining for farm pond; Laser land leveler; Climate resilient crops; Systematic Rice Intensification; Hydroponics; Automated data collection and sensors; Cold storage; Drones for precision farming
Water and sanitation	Desalination plants; Rainwater harvesting for infiltration; Solar RO water purification; Managed Aquifer Recharge System; Sustainable water purification; Smart Water Meters; Water recycling and reuse; Solar water pump; Rainwater harvesting for storage; Sand dams; Flood proof wells; Perforated dams; Silt management; Flood resilient latrines; Resizing urban storm water drains
Disaster Management	Household weather insurance; Weather based crop insurance; Social protection from extreme weather for low-income groups; Cyclone shelters; Slope stabilization; Artificial reef construction; Groynes; Individual flood protection barriers; Closure dams; Dykes; Island raising; Seawalls
Nature-based solutions	Urban forests; Mangrove restoration; Forest conservation; Beach nourishment; Seagrass beds restoration; Biosales; Sand dune stabilization;
Climate services	Aerial LIDAR remote sensing; Weather forecasting; Meteorological equipment; Real-time flood monitoring

The adaptation investment opportunities fall across multiple categories



Many cover multiple categories, for example, for permeable pavements there is both a manufacturing (of the technology) and infrastructure (construction of the pavements) opportunity.

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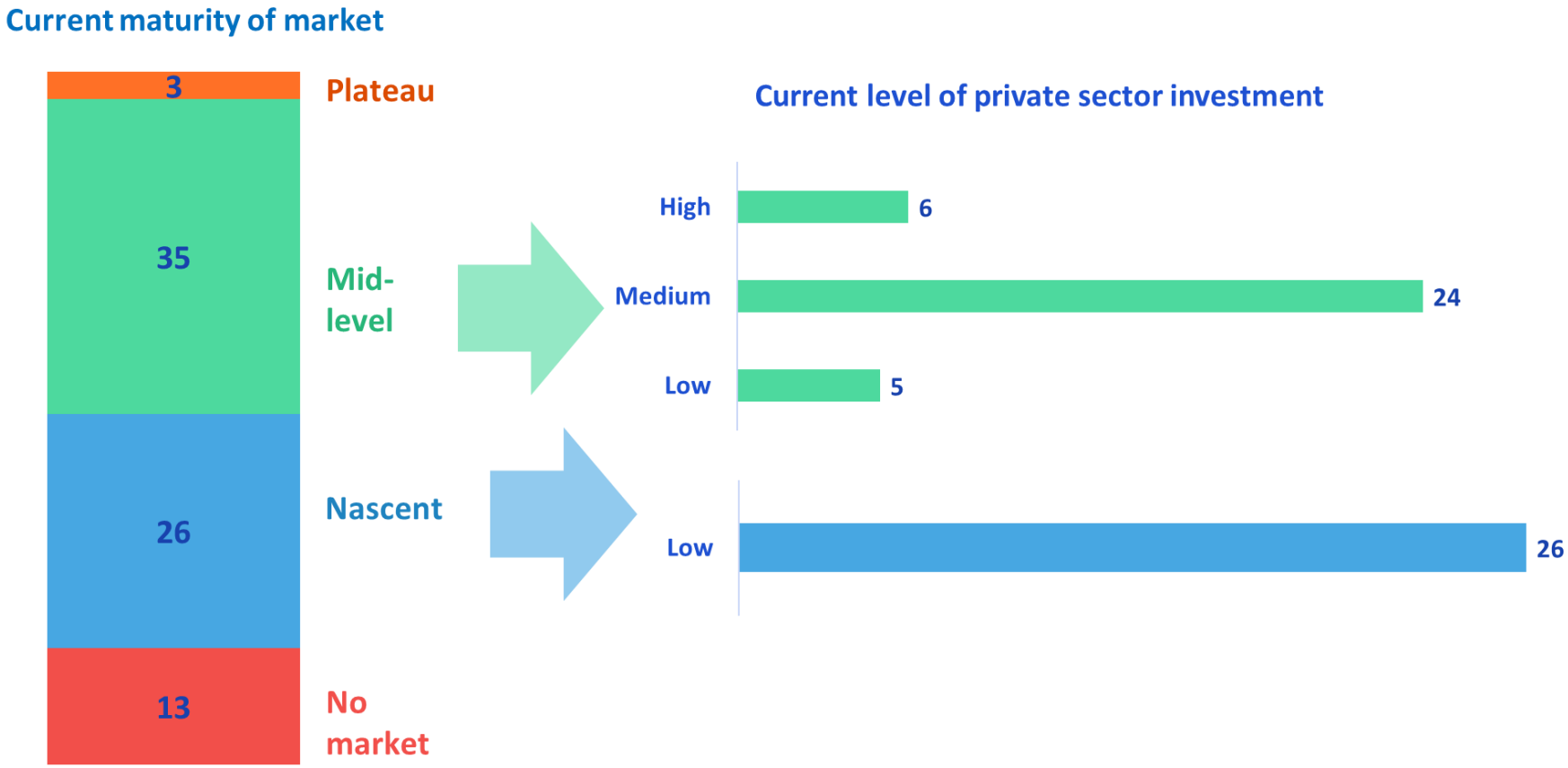
~80% of markets for the solutions have potential for increased private sector investment



Number of sample adaptation products and services with markets of different levels of maturity

Number of sample 'mid-level' and 'nascent' adaptation products and services with different current levels of private sector investment

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We did a deep dive assessment of 7 of the adaptation investment opportunities

Solution	Funding opportunity	Maturity	Estimated market potential (2026/27)	Revenue Model
Solar water treatment (1)	**Infrastructure:** Solar-powered utility-scale desalination and waste-water-treatment plants	**Mid-level**	**Medium**: $1.55 billion for solar-powered waste water treatment/ $0.5 billion for solar-powered desalination	Driven by long-term contracts
Green ports	**Infrastructure:** Installation of green technology (e.g. sewage and waste-water treatment) in port	**Nascent**	**Mediu**m: $0.27 billion (for range of green technologies)	Revenue sharing model
Rainwater harvesting	**Manufacture:** Manufacture (and installation) of rainwater harvesting systems	**Mid-level**	**Medium**: $0.8-1 billion	Based on market (supply/ demand)
Climate Services	**Services:** Services providers for range of climate and weather data, analytics and tools	**Mid-level**	**Medium** (across range of specific service/ products) (e.g. for weather forecasting alone, $0.16-0.17 billion)	Based on market (supply/ demand)
Solar-powered Hydroponics	**Infrastructure**: Establishment and operation of large-scale hydroponic farms	**Nascent**	**Small**: $15-20 million	Based on market (supply/ demand)
Solar water treatment (2)	**Manufacture**: Manufacture (and/or operation) of decentralized solar enabled desalination and waste-water treatment systems	**Nascent**	**Very small**: $2-4 million	Based on market (supply/ demand)
Solar powered cold storage	**Manufacture/ Services**: Manufacture of decentralized solar powered cold storage systems and/or cooling-as-a-service providers	**Nascent**	**Very small**: $4-5 million	Based on market (supply/ demand)

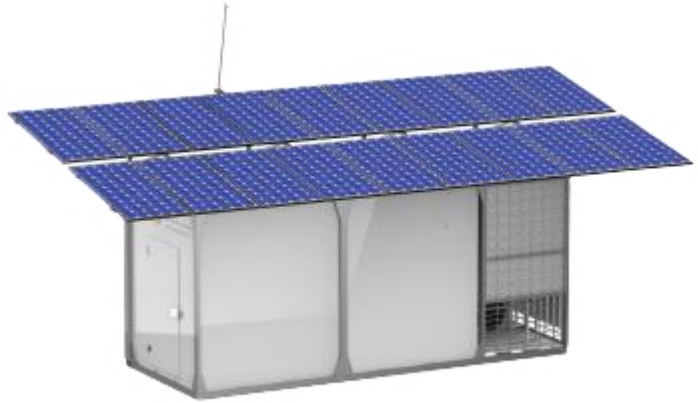
For example, **construction of solar utility-scale desalination and waste-water plants (WWTP)**

Adaptation Benefits: Manages impact of freshwater scarcity (with clean energy source required given it is an energy intensive process). 36% of districts currently over-exploiting groundwater.

Market size: Overall desalination/ WWTP market is mid-level mature market but expected to grow rapidly. If assuming 30% of overall market share is solar powered (currently at pilot stage), then USD 500m by 2026 for solar-powered desalination; USD 1.5 billion for solar-powered WWTP

Revenue potential: Commercial returns from long-term contracts with utilities/ municipalities/ industrial units (EPC/PPP mode). Ticket size USD 130 million for 60 MLD solar-powered desalination plant.

For example, **manufacture of decentralized solar cold storage systems**



Credit: Inficold

Adaptation Benefits: Allows farmers to manage erratic weather patterns and increase resilience of food supply. Off-grid systems with solar power and thermal (ice) battery storage manages energy needs of technology.

Market size: Cold storage in general is high-growth market in India, but use of solar panel is nascent stage (approx. 3000 units currently installed). If 33% of this market is solar-powered then value of market is USD 4.3 million in 2026.

Revenue potential: Manufacturers (of which 3 exist currently) target Farmer Producer Organisations, traders and collectives. One is offering technology as Cooling-as-a-Service. Average investments range from USD 0.7million – USD 7.5 million.

Strengthening the Market for Adaptation Solutions

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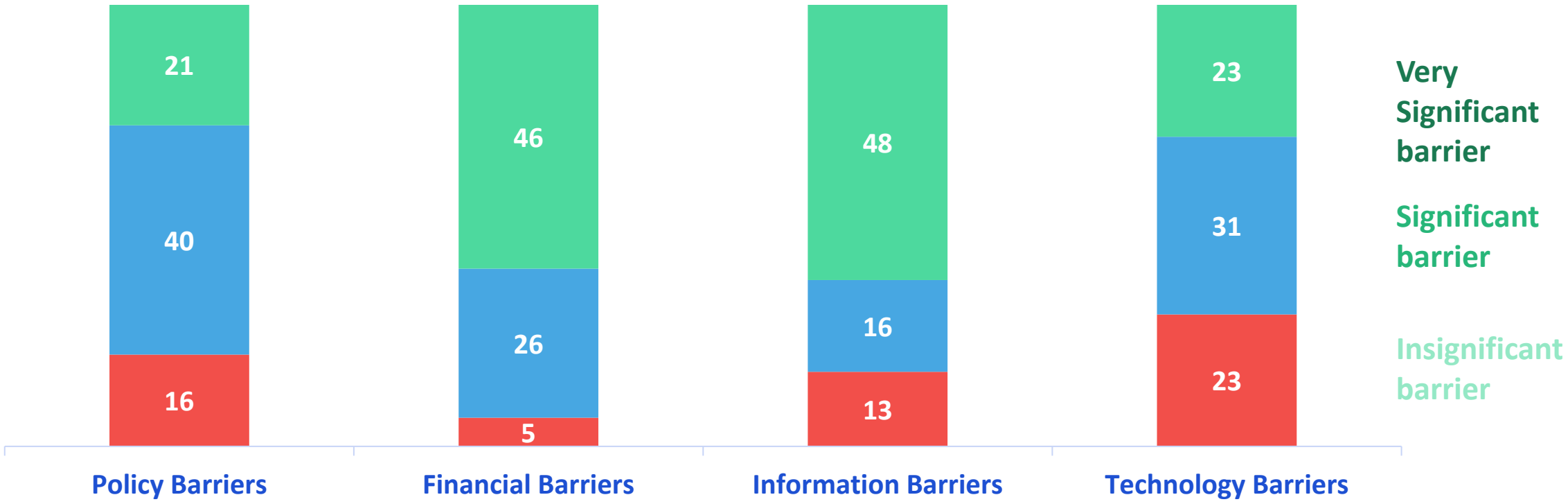
There are significant barriers to mobilising (domestic) private investment in adaptation

Policy /regulatory barriers	Financial barriers	Information barriers	Technology barriers
Fundamental for those solutions dependent on public procurement. But wider regulatory system also influences adaptation solutions sold to private clients (e.g. quality standards, consumer incentives, land rights etc)	Access to capital for both providers and consumers of adaptation solutions is common constraint. Finance sector has limited understanding of market potential of adaptation solutions.	Potential providers and consumers (and investors) of adaptation solutions often suffer from incomplete or asymmetric information on the scale and nature of climate risks and benefits of adaptation solutions.	Some adaptation solutions involve technology that is currently at a nascent stage or unproven in the local context.

~60% of the 77 adaptation solutions in India face high financial and information barriers



Number of sample adaptation products and services with barriers rated at different levels, based on market consultations and analysis

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For example, **manufacturing and installation of Rainwater Harvesting Systems (RHS)**

Adaptation Benefits: A RHS collects and stores rainwater for agriculture, domestic or other uses, helping to protect against water scarcity during drought, manage stormwater and prevent flooding and soil erosion.

Enablers: Government has been promoting RHS under Smart Cities and Green Buildings initiative. Unit costs are relatively low, manufactured domestically.

Barriers: Very fragmented market: Small, turnkey providers who produce and install RTS for their locality. Limited demand from residential segment (and upfront costs mostly prohibitive) and few incentives offered. Limited enforcement of rules for RHS when they exist for cities/ industry.

There are useful lessons from mobilizing private investment in mitigation solutions

In particular: Ambitious policy targets, institutional focus and coordination and getting the economics right

But, there are crucial differences between many mitigation and adaptation solutions:

- **Smaller market size**
- **Smaller ticket size**
- **Higher investment risks**

Therefore, a new approach targeted to specificially mobilizing private investment in adaptation is required

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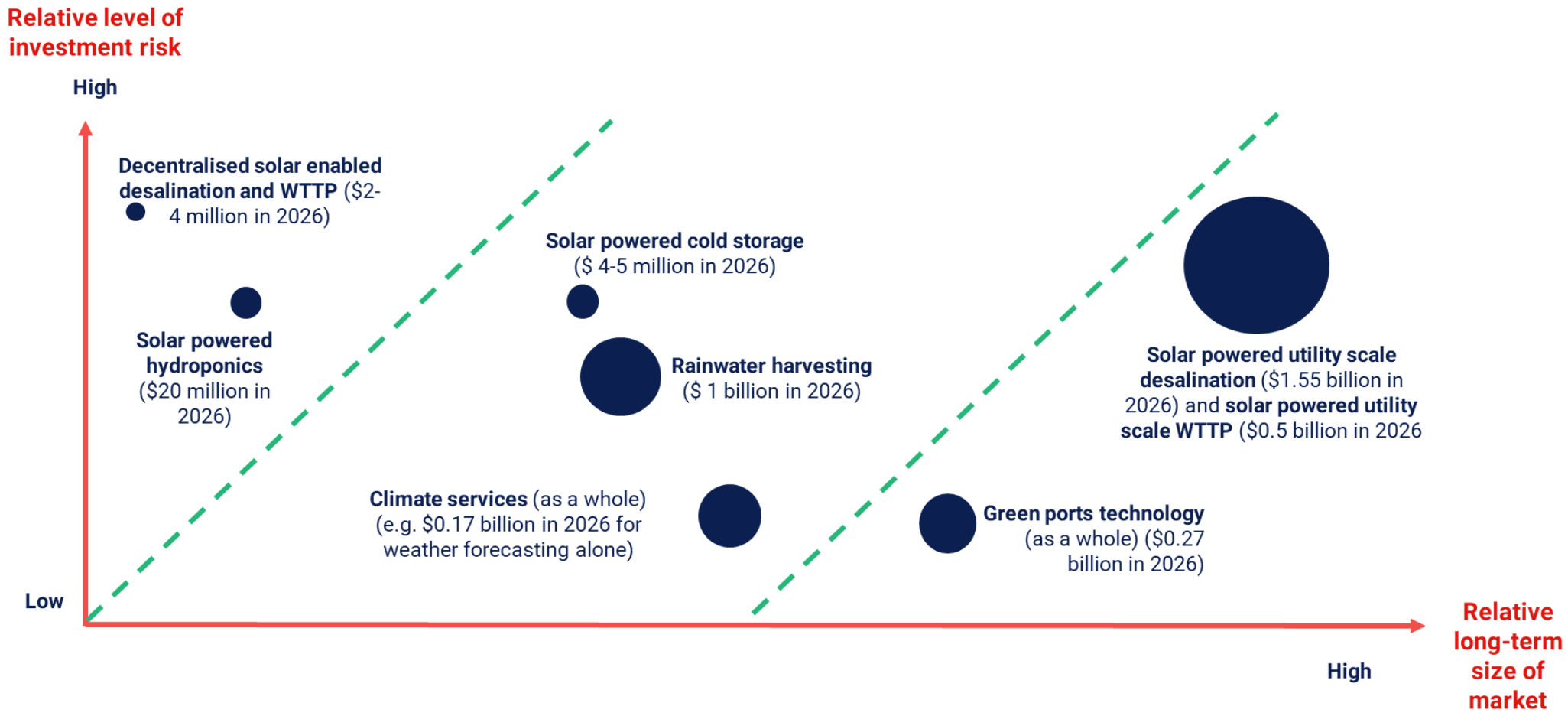
There are three categories of adaptation markets

1. ***Ready for (relatively) large sums of investment:*** In adaptation solutions with a large market potential, investment risk is low, and provides for relatively large individual ticket size for investments. E.g. Green Ports, utility-scale desalination and WWTP
2. ***Ready for limited sums of investment:*** For adaptation solutions with a medium market-size potential, individual ticket size and some investment risks. E.g. Rainwater harvesting, climate services
3. ***Requires pro-market support:*** For adaptation solutions with a small market potential, individual ticket size and a significant level of investment risk. E.g. hydroponics, decentralised cold storage

The approach needs to differentiate for size, maturity and risk level of the market



The figure maps the seven adaptation investment opportunities in India against three dimensions: the relative estimated market size in 2026 (indicated by size of bubble); long-term market size (up to 2050); and level of investment risks

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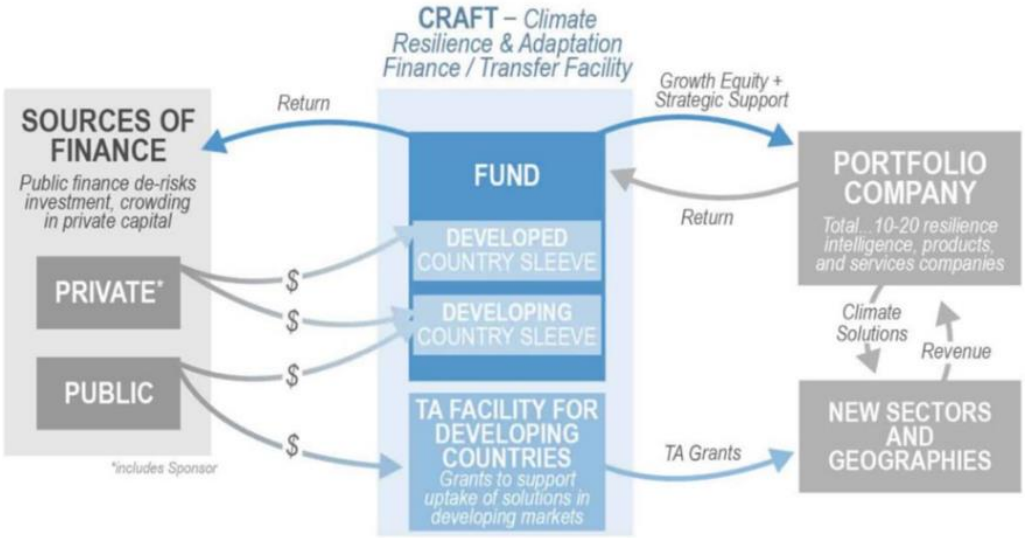
The readiness of the adaptation market for investment should define the support provided

Readiness of market	Support required to de-risk private investment
Adaptation solutions ready for (relatively) large sums of investment	New/ expanded fund with dedicated focus on adaptation solutions, could include a platform approach with co-ownership of some of the assets
Adaptation solutions ready for limited sums of investment	New/ expanded fund that combines different financing mechanisms to provide risk-appropriate capital, such as blended private equity with concessional commercial layers
Adaptation solutions requiring market enabling support	Grants for pilots/ scaling and policy reform to address regulatory and other barriers to private investment

There are funds experimenting with mobilizing private adaptation finance

Fund	Description
Climate Resilience and Adaptation Finance and Technology Transfer Facility ('CRAFT)	First global growth equity fund on adaptation developed by global sustainable private equity firm, the Lightsmith Group
Climate Investment Funds (CIF) on climate resilience	Uses Private Sector Set Asides to allocate concessional financing ($25m in 2019) on a competitive basis to climate resilience projects. It provides risk-appropriate capital to drive private investment in challenging markets.
UK Big Nature Impact Fund	A public-private, blended finance vehicle in the start-up phase, with GBP 30 million to capitalize the fund and de-risk private investments in UK projects capable of generating revenue from ecosystem services, such as tree planting, woodland creation and peatland restoration
Water Equity	The first asset manager focused exclusively on the global water and climate crisis. It invests in both small/ mid size infrastructure projects (PPPs or investment platforms) and growth companies in the water value chain.
Green Climate Fund (GCF) Private Sector Facility	Funds and mobilizes private sector actors, including institutional investors, to de-risk the delivery of private capital, but has so far struggled to find revenue generating adaptation projects to support

For example, **Climate Resilience and Adaptation Finance and Technology Transfer Facility ('CRAFT)**

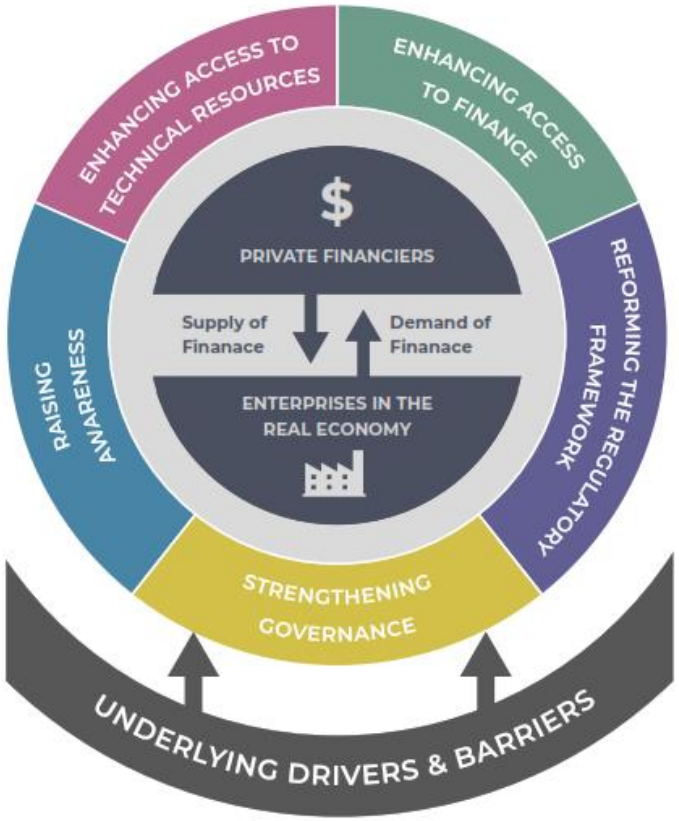


Who: The Lightsmith Group have brought together investors, including PNC Insurance Group, The Rockefeller Foundation, Kinneret Group, and Caprock Impact Partners, as well as the GCF, European Investment Bank, Asian Infrastructure Investment Bank, KfW, Nordic Development Fund and the Government of Luxembourg

Scope: Six initial technology areas: Water efficiency and smart water management, resilient food systems, agricultural analytics, geospatial intelligence, supply chain analytics, and catastrophe risk modeling and risk transfer. These represent an estimated total addressable market of over USD 170 billion today.

Design: Two thirds of the fund is to be invested in developing countries, and is a blended private equity fund, with a concessional equity layer ($250m) and a commercial equity layer ($250m) – and complementary technical assistance facility

There is experience of technical assistance to build markets for adaptation



Source: Foyelle (2019).

OPM led programme in South Asia (2014-19) identified **five 'enablers' for mobilizing private investment in adaptation**, which can address the underlying drivers and barriers to both the supply and demand for private financing:

1. Raising awareness of the business opportunities in adaptation
2. Enhancing access to finance
3. Reforming the regulatory framework
4. Enhancing access to technical resources
5. Strengthening governance mechanisms

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For example, **technical assistance to Farmer Producer Companies in India**

Who: OPM worked with the Department of Agriculture in Maharashtra, India to support Farmer Producing Companies (FPC) to access finance to invest in climate resilient agricultural practices.

Problem: Capacity and information barriers both with the FPCs and the institutional financial lenders, particularly in terms of FPCs ability to develop bankable projects and a lack of trust of FPCs by bank managers. Both sides also lacked awareness on the commercial opportunities from climate resilient crops and other practices

Approach: Developed a FPC rating tool with specific focus on climate resilience that was used by institutional lenders and World Bank. Worked with FPCs and lenders to bridge the trust gap, develop business planning skills and strengthen awareness on benefits of climate resilient crops

Conclusion

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There are four priority areas to pursue for mobilizing private investment in adaptation

1. ***Progress on defining adaptation within green taxonomies*****-** to help companies understand and value adaptation, and to help track level of investment in adaptation.
2. ***Raise awareness amongst investors of the commercial opportunities in adaptation*** – More detailed market assessment is required, to identify specific market- and firm-level opportunities
3. ***Market enabling activities to encourage and de-risk nascent adaptation markets*** – Including seed funding, de-risking facilities and policy and regulatory reform
4. ***New dedicated adaptation investment fund*** – experimenting with blended finance, fund of funds, private equity depending on the readiness of the market.

Thank you

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Background

This is an Executive Summary of the **OPM Working Paper: Mobilising Private Investment for Adaptation to Climate Change**

This Working Paper is based on research and analysis carried out under the FCDO-funded **Green Growth Equity Fund (GGEF) Technical Cooperation Facility** that OPM led between 2020–23 in partnership with PwC India and others.

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The views expressed in this paper do not necessarily reflect that of the UK Government and its policies

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