

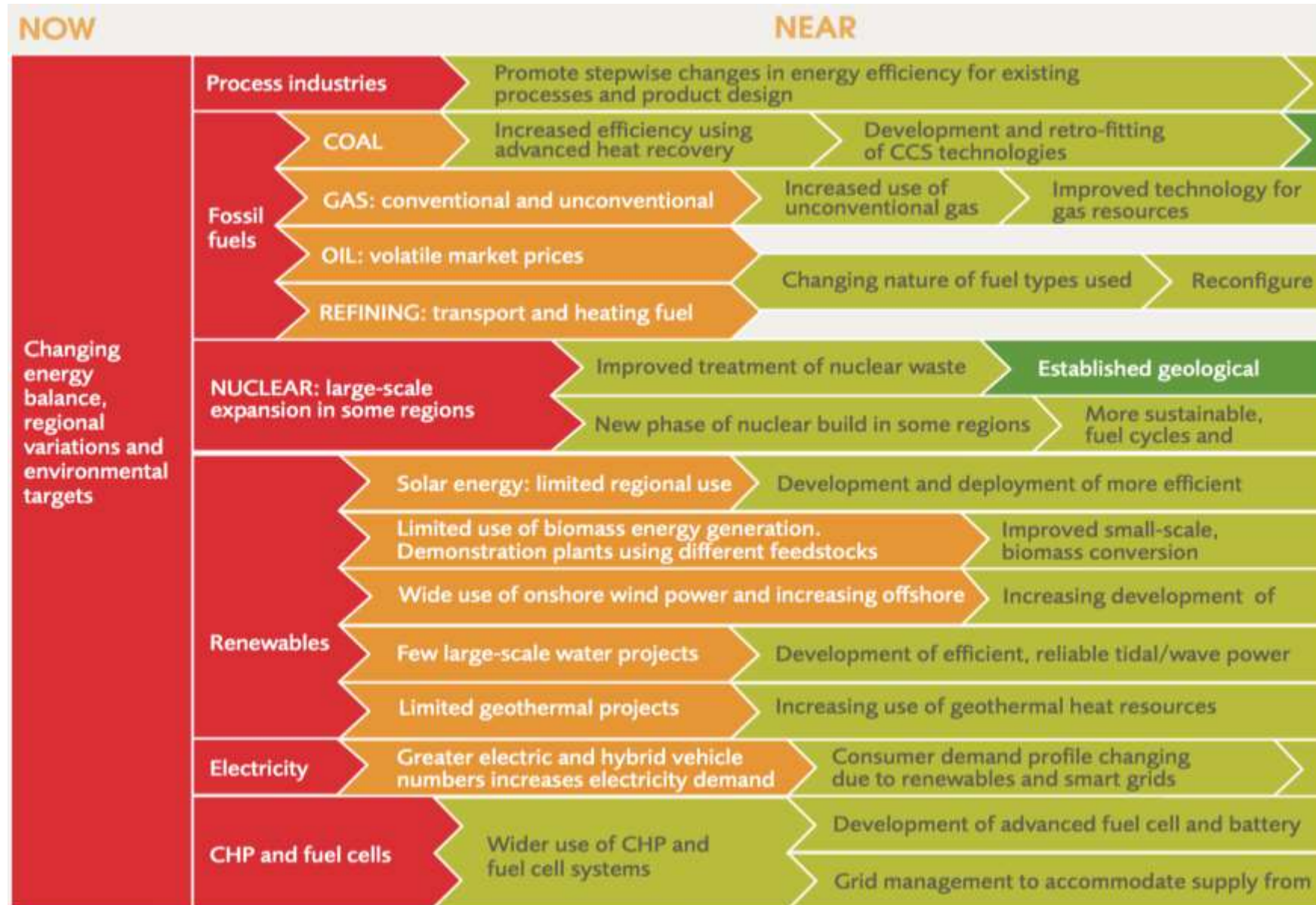
Investing in the planet: Green banks and other financial tools to scale up mitigation technologies

- **Dr Rob Gross**, Imperial College London
- **Dr Rachael Hall**, IChemE Energy Centre
- **Mr Mark Apsey**, Ameresco and IChemE
- **Dr Charles Donovan**, Imperial College London
- **Mr Gavin Templeton**, UK Green Investment Bank
- **Mr Douglass Sims**, Natural Resources Defense Council's Center for Market Innovation

Dr Rachael Hall

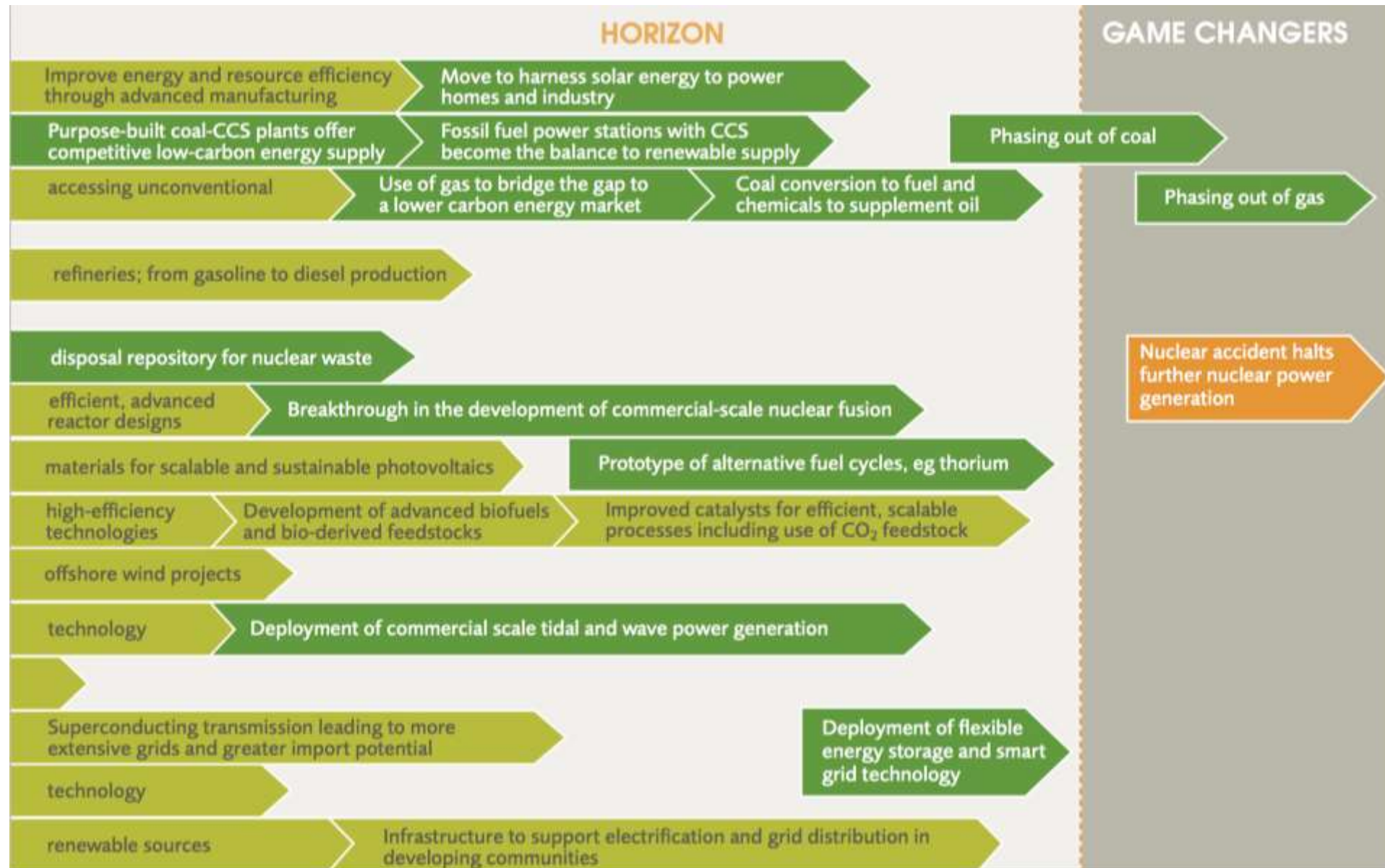
IChemE Energy Vista

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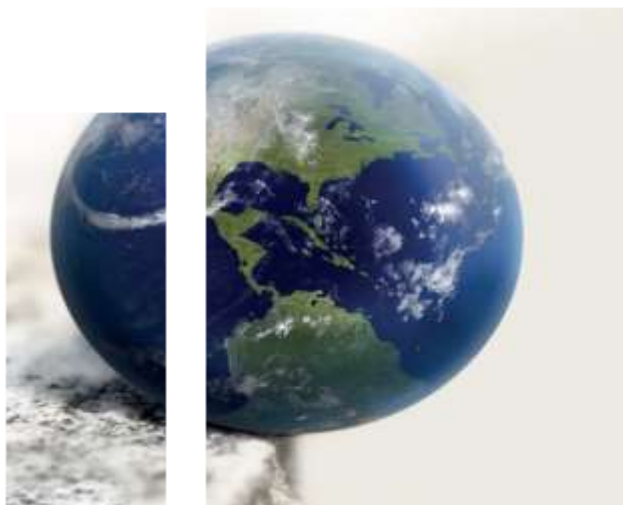
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Towards a Low Carbon Future

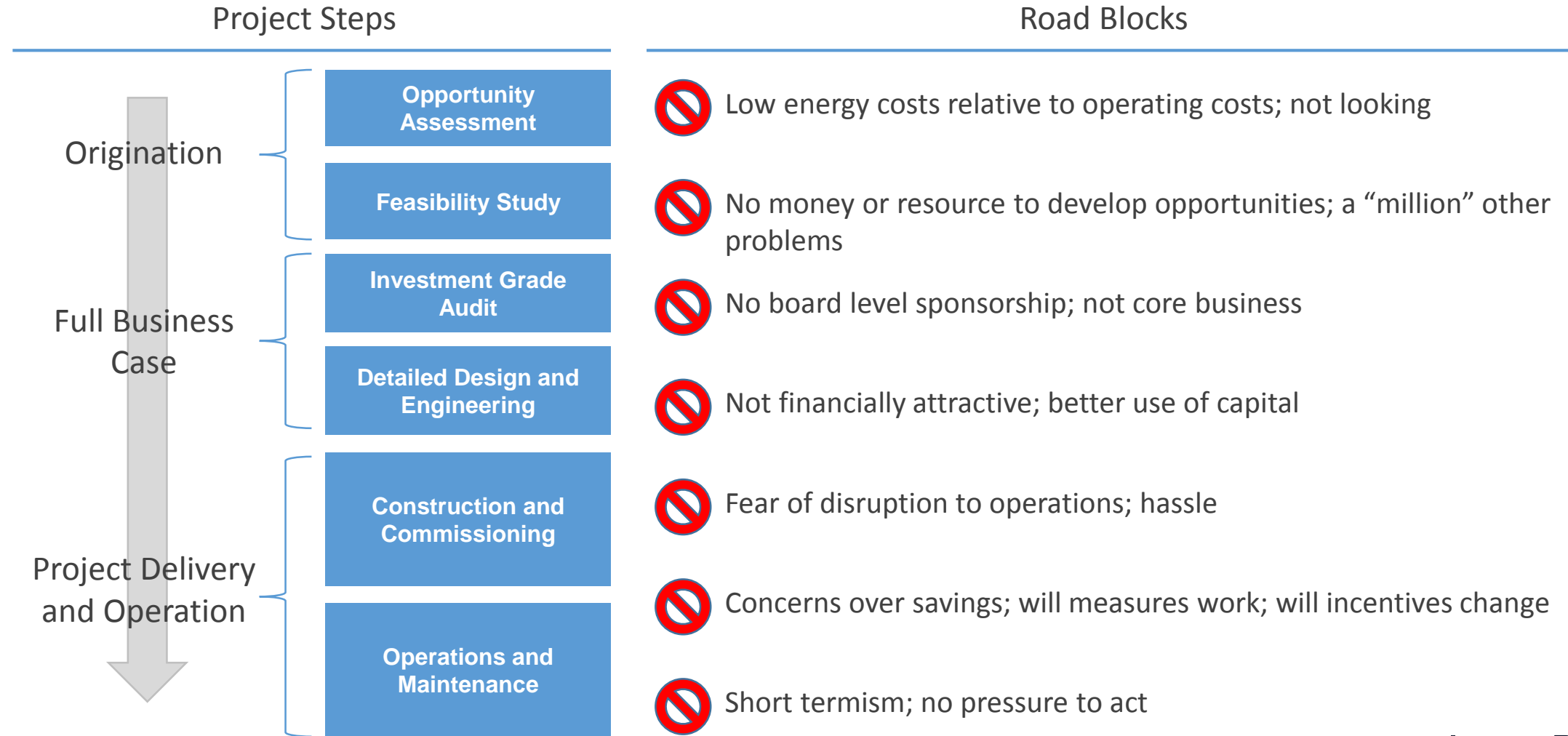
Overview of Promising Mitigation Technologies



Dr Rachael Hall

The Project Delivery Process

Why can't we deliver more energy efficiency and renewable energy projects faster across all types of organisation?



Ideas to Unblock and Accelerate Deployment

How can we help to accelerate the development and implementation of energy efficiency and renewable energy solutions?

Encourage (“The Carrot”)

Incentives

Renewable Power Payment

Renewable Heat Payment

Energy Saving Payment

Tax relief for energy efficiency equipment (both capital and operating)

Taxes

Climate change tax on power

Climate change tax on fuel

Enforce (“The Stick”)

Mandatory Reporting of Emissions (Scope 1, 2, 3)

Mandatory Identification of Opportunities

Learn from Health & Safety Legislation

As Low As Reasonably Practicable (ALARP)
Direct prosecutions of individuals for failure to comply
Unlimited corporate fines



Levels need to be material \$/kWh



Punitive measures need to be significant

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Ideas to Unblock and Accelerate Deployment

What about direct intervention by governments to drive change?

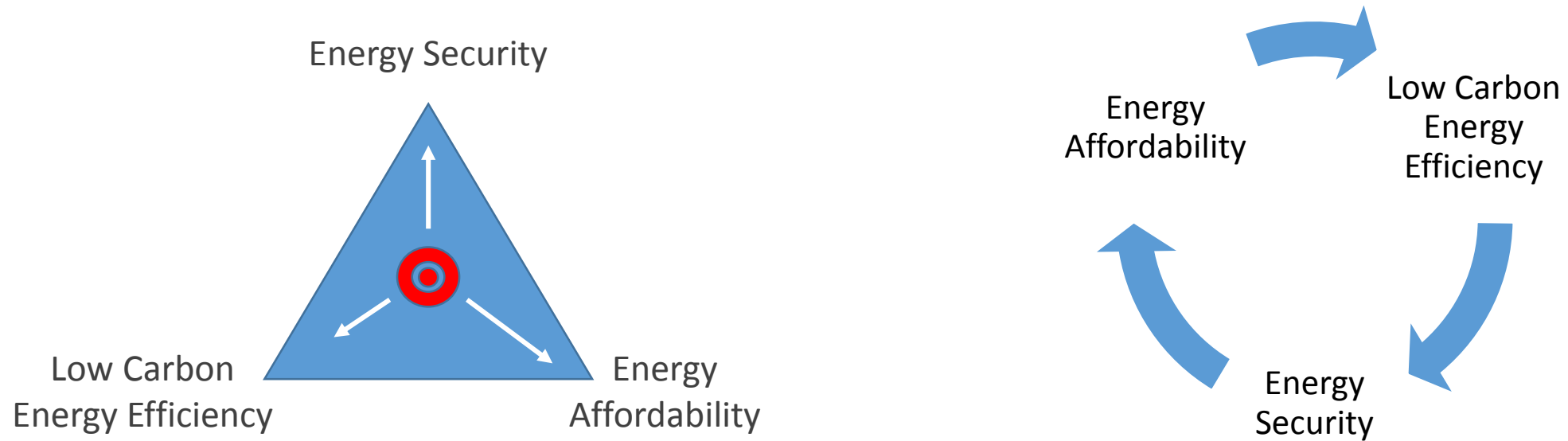
Direct Government Intervention

Project Development Assistance	<ul style="list-style-type: none">• Early stage support via a loan or grant• Cover origination phase costs• Get projects ready to contract, ready to invest	Investment Funds	<ul style="list-style-type: none">• Allocated government money to invest in projects• For example, UK Green Investment Bank• Double bottom line of carbon and profit, on market supply of money, draws in 3rd party investors
New Technology Support	<ul style="list-style-type: none">• Support to accelerate development• Realise benefits of new technology sooner• e.g. storage, fuel cells, electric vehicles	Green Bonds	<ul style="list-style-type: none">• Provide tax breaks for issuers to fund green projects• Cheap source of finance, successful in the US• Can delay/distort markets as other investors wait
Guarantees	<ul style="list-style-type: none">• Provide credit guarantees to organisations• Attract third party investors• Projects get delivered that otherwise fail	Infrastructure Projects	<ul style="list-style-type: none">• Build the infrastructure for a low carbon future• e.g. Smart power grids, renewable generation, vehicle charging, low carbon transport systems, hydrogen gas grids, CCS
Education and Communication	<ul style="list-style-type: none">• Raise awareness of energy efficiency benefits• Up to 80% energy costs wasted• Promote funding models e.g. Energy Performance Contracts	Whatever Works!	<ul style="list-style-type: none">• Political structures vary from country to country• Success should be measured in magnitude and speed of emissions reduction

Look Up and Out to the Future

"You cannot escape the responsibility of tomorrow by evading it today", Abraham Lincoln

Long Term Strategy to 2050 and beyond

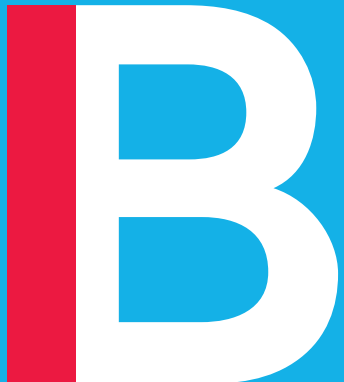


We need clearer long term energy strategies that give confidence to investors and organisations to implement projects

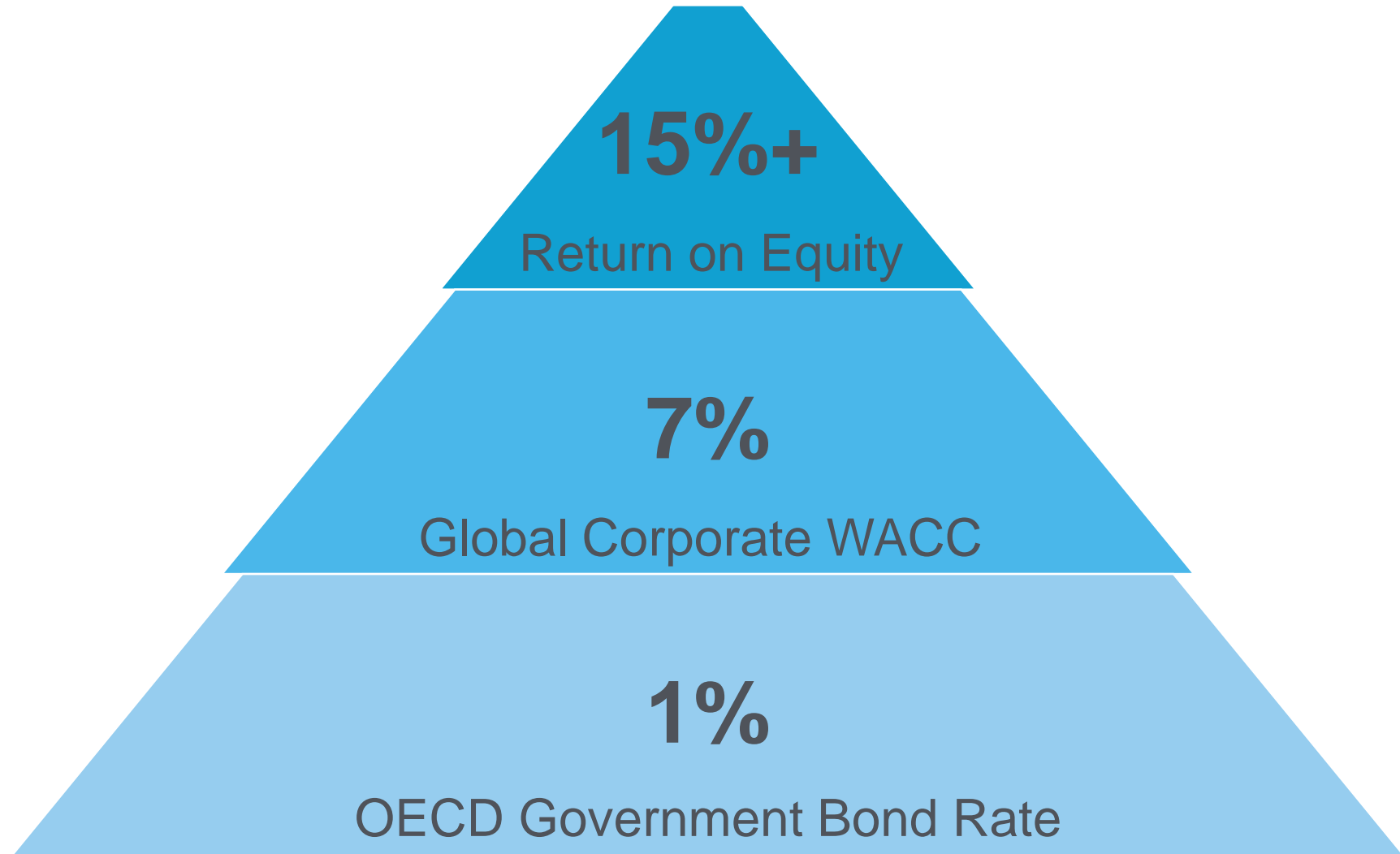
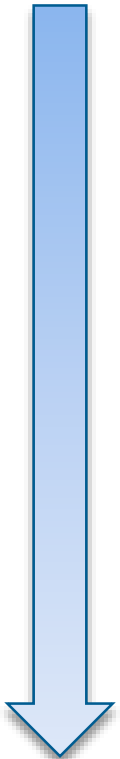
How Can Innovative Finance Help?

Dr Charles W Donovan
Director, Centre For Climate Finance and Investment

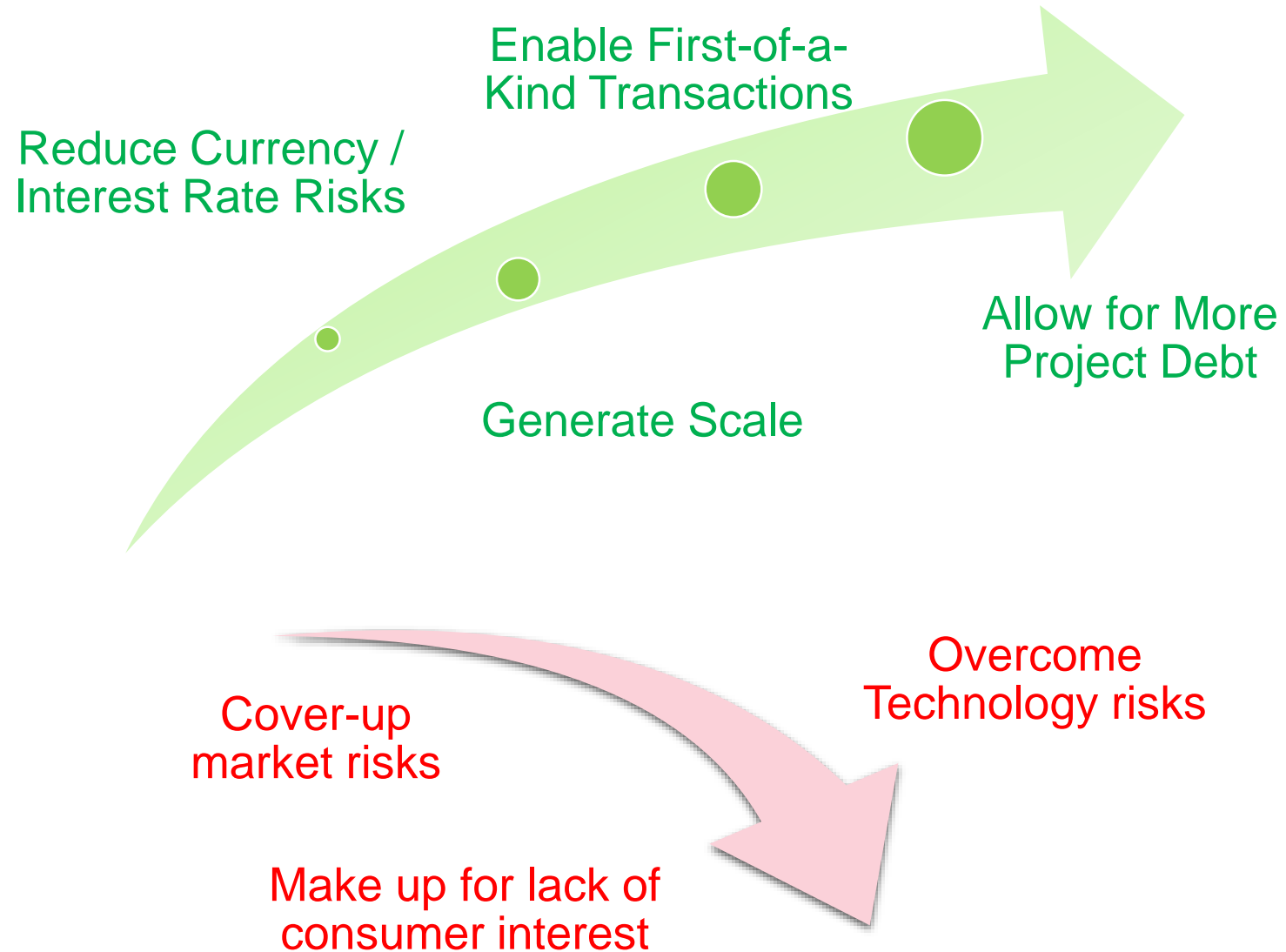
Web imperial.ac.uk/business-school/climate-investing
Email climatefinance@imperial.ac.uk

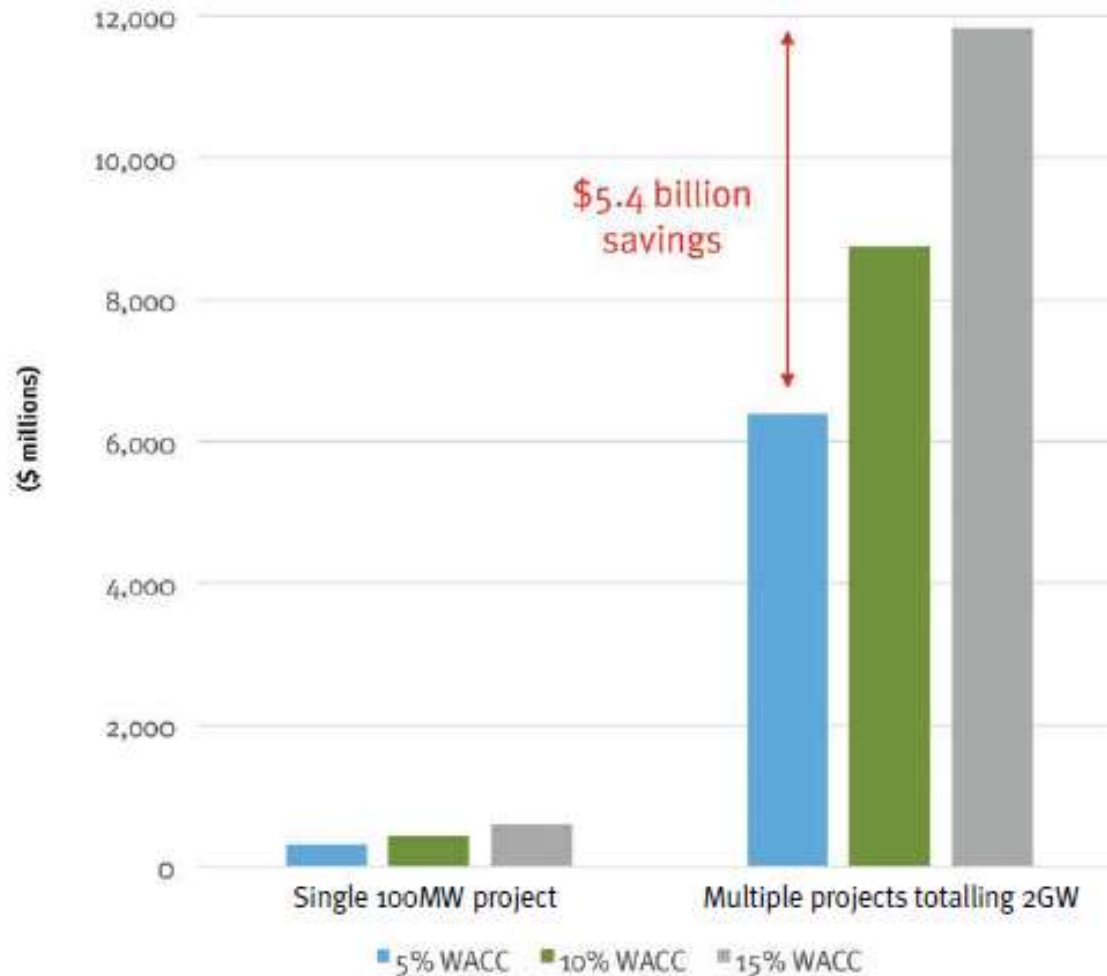


RISK



What Can Innovative Finance **Do** – And **Not Do**?

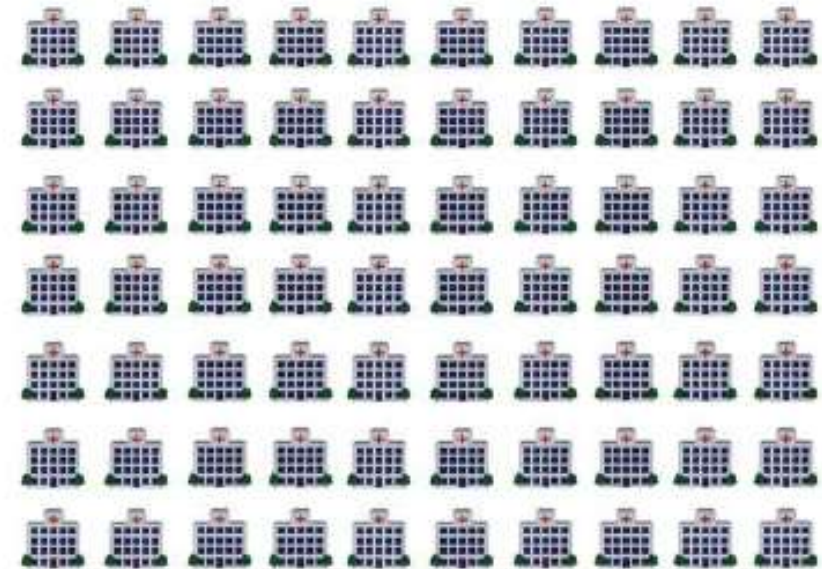




“If the cost of capital in India was akin to the USA, the lifetime saving on the cost of solar PV projects at scale to the Indian government would be:

\$5.4 billion

The equivalent of establishing 70 medical colleges and hospitals in India.



Source: Donovan and Corbishley (2016)
<https://www.imperial.ac.uk/grantham/publications/briefing-papers>

Real Test for Any Form of Innovative Finance:

Does it reduce the cost of capital for private sector investors?

- With regards to public finance, there's better “bang for the buck” from changes to market design (e.g. auctioning)
- \$100 billion in climate finance is insignificant compared to trillions of dollars of private sector investment decisions.
- Innovative public finance cannot be a substitute for national regulatory mechanisms needed to shift BAU infrastructure investments

Building the world's first green investment bank

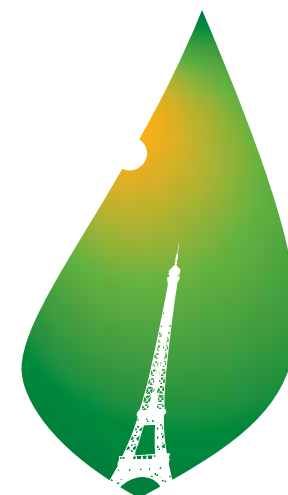
Gavin Templeton, Head of Sustainable Finance

2016

We were established to meet a public policy need

16

...and now Globally



PARIS2015
UN CLIMATE CHANGE CONFERENCE
COP21·CMP11

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Our business today

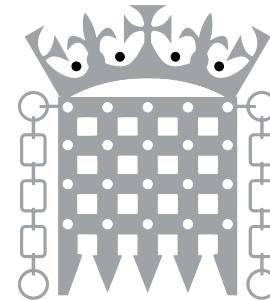
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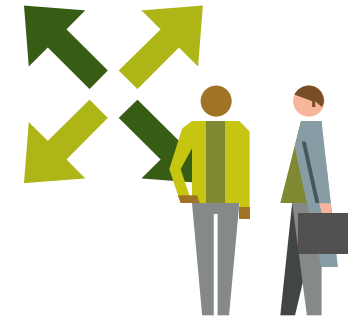
4 years old



£2.7bn
of capital
committed



100%
owned by UK
Government



Autonomous and
Independent

Our business today

19

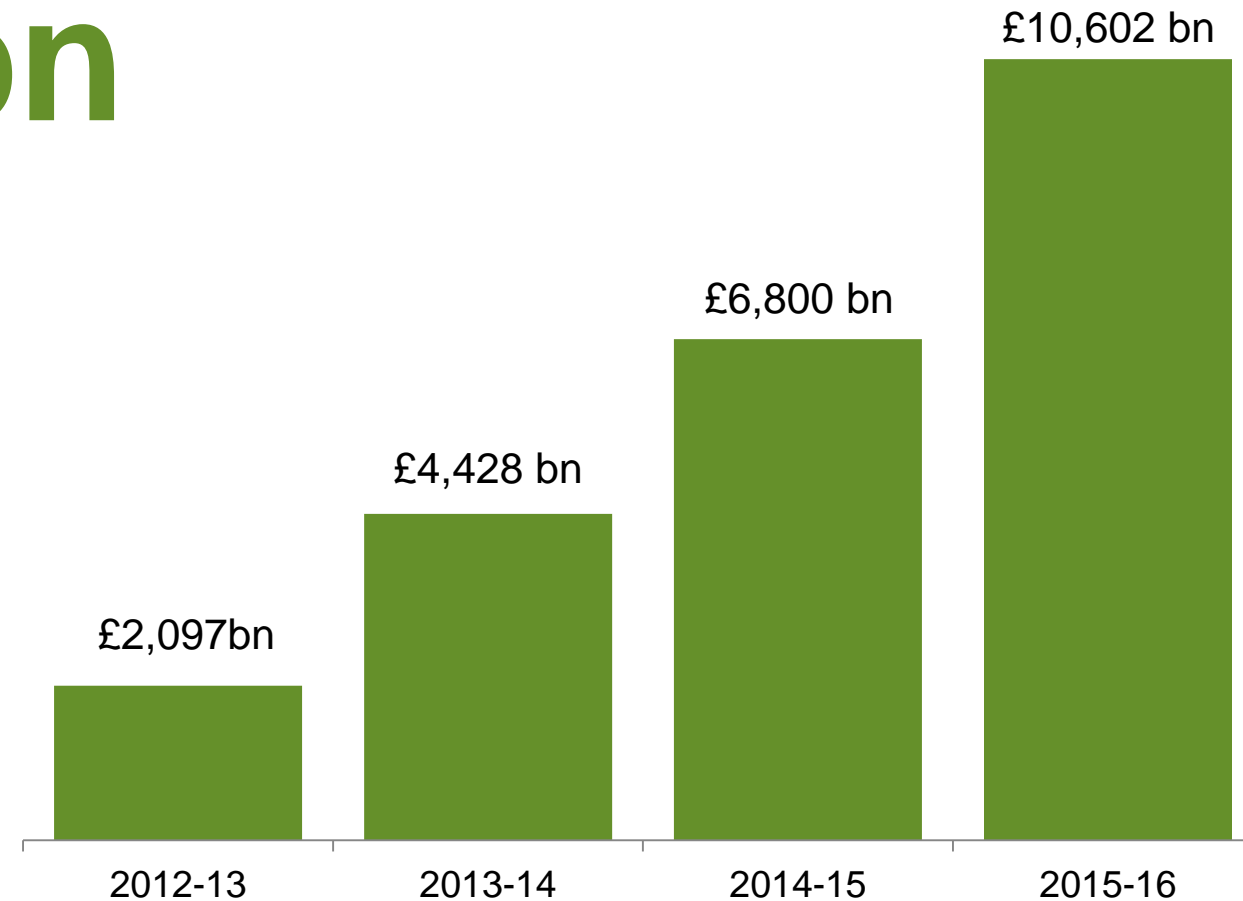
Our vision: green and profitable

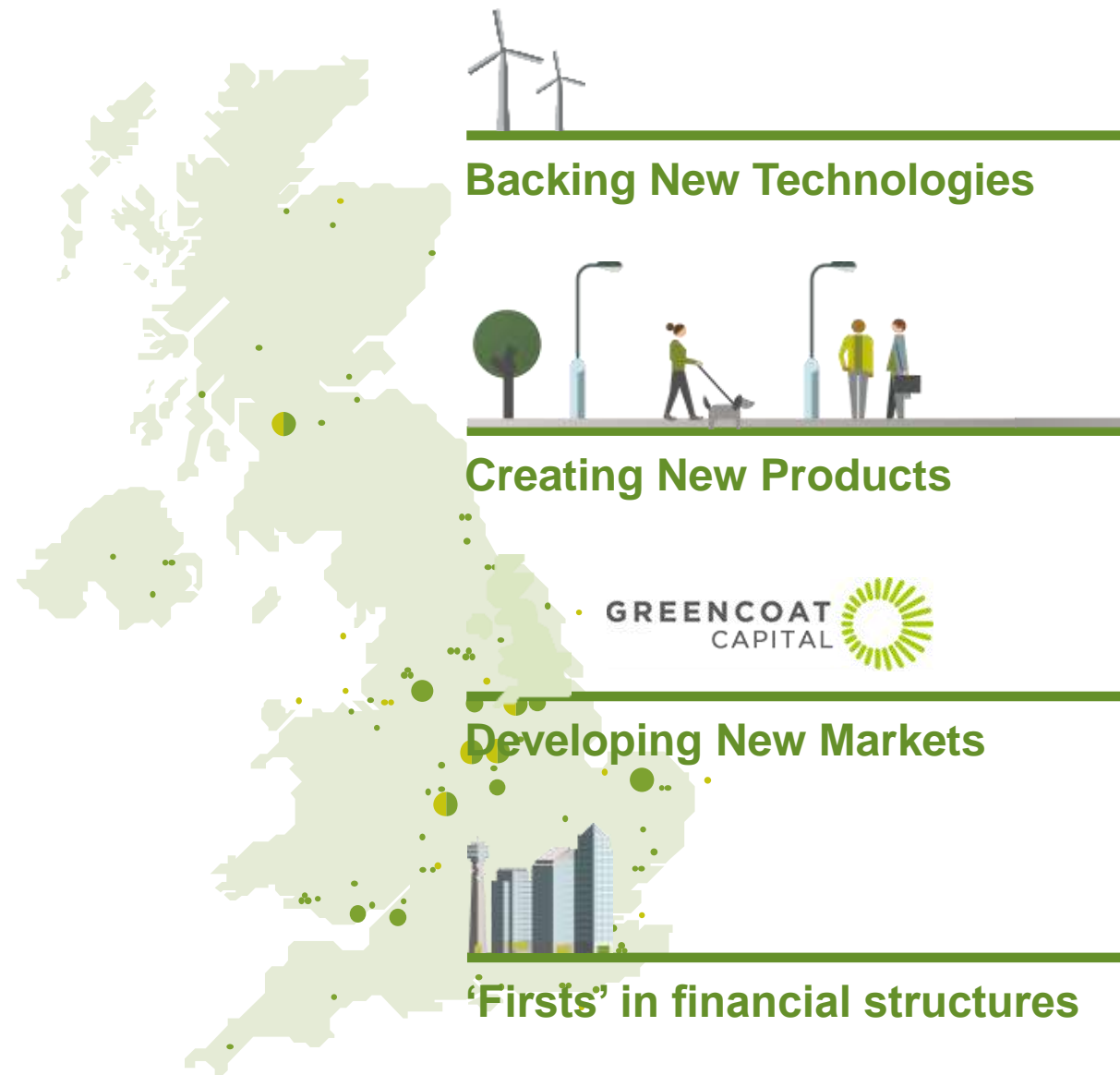


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Mobilised

£11bn







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GREEN & RESILIENCE BANKS:

HOW THE GREEN INVESTMENT BANK MODEL CAN PLAY A ROLE IN SCALING UP CLIMATE FINANCE IN EMERGING MARKETS

*COP22 Side Event: Investing in the Planet
Marrakech, Morocco
November 14, 2016
Presented by Doug Sims, NRDC*



coalition for
green capital



CLIMATE
FINANCE
ADVISORS



NRDC
NATURAL RESOURCES
DEFENSE COUNCIL



**INTRODUCTION: THE
CHALLENGE AND KEY
FINDINGS**



**THE ROLE OF
GREEN INVESTMENT
BANKS**



**CREATING AND
CAPITALIZING
A GIB**



**PRODUCTS AND
TOOLS FOR
UNDERSERVED
MARKETS**



**SCALING UP CLIMATE
FINANCE WITH THE
GIB MODEL**



Introduction: The Challenge and Key Findings

Download at
www.greenbanknetwork.org/portfolio/Green-and-Resilience-Banks

Green & Resilience Banks

HOW THE **GREEN INVESTMENT BANK MODEL**
CAN PLAY A ROLE IN SCALING UP CLIMATE FINANCE
IN EMERGING MARKETS

Natural Resources Defense Council
Coalition for Green Capital
Climate Finance Advisors



CLIMATE
FINANCE
ADVISORS

NOVEMBER 2016

Major shifts required to meet global climate goals

Investment from Fossil to Clean* Implementation of Paris climate pledges will require over US\$13.5 trillion in green investment; keeping below 2°C will require an additional US\$ 11 trillion	OECD to non-OECD More investment needed in emerging markets ,where energy demand is growing rapidly and financial markets are less mature	Greening Finance Addressing systemic barriers to LCR infrastructure within the financial system itself, including investors' considering climate in investment decisions	Centralized to Distributed Energy resources are increasingly distributed, where access to reasonably priced capital can be limited
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Public funding alone cannot enable this transformation

“Green finance” and “greening finance” are synergistic

Specialized green financing institutions should be scaled up, particularly in developing and emerging economies, where exposure to technologies and business models may be limited

The GIB model is attracting attention

“The key added value of green banks, for example, is their capacity to foster institutional innovations and partner with other financial and regulatory institutions to increase the diversity and depth of local financial markets in order to enhance the domestic supply of green finance.”

— *UN Inquiry: Design of a Sustainable Financial System report: The Financial System We Need*

“...GIBs are making a case that centralising expertise in a new independent institution dedicated to mobilising green private investment can be an effective approach to unlocking larger flows of private capital.”

— *OECD report: Green Investment Banks: Scaling up Private Investment in Low Carbon, Climate Resilient Infrastructure*

“In a number of G20 countries, national development finance institutions (as well as specialist green investment banks) have proved instrumental to improve management of environmental risks and crowd-in funding from the private sector.”

— *G20 Green Finance Synthesis Report*

Key Findings

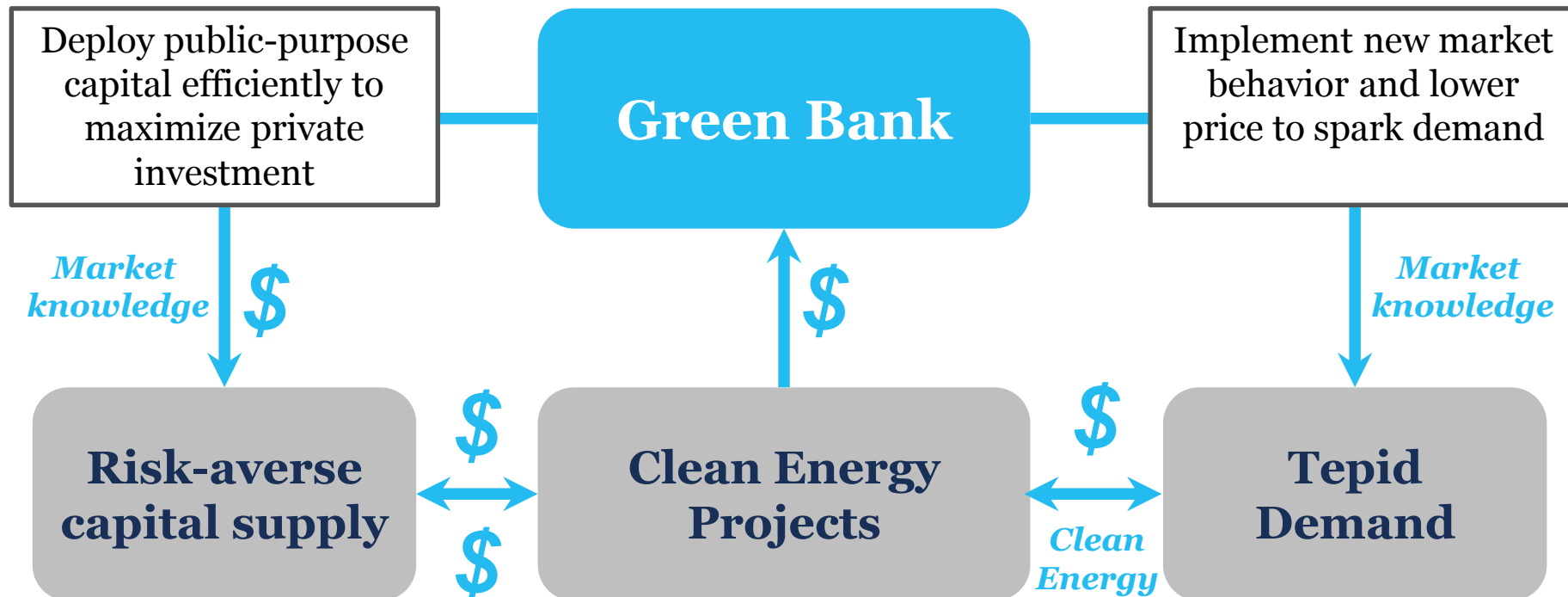
- GIBs can provide a national and local solution to close financing gaps in scaling up low carbon, climate-resilient (LCR) investments
- The GIB model can scale up climate finance in developing and emerging economies by
 - Helping countries achieve climate goals articulated within their NDCs;
 - Being a locus of financial innovation to meet local market needs; and
 - Being a critical partner for international sources of climate finance and Development Finance Institutions (DFIs)
- GIBs can be a conduit between the international and national level (upstream) and local project level (downstream)



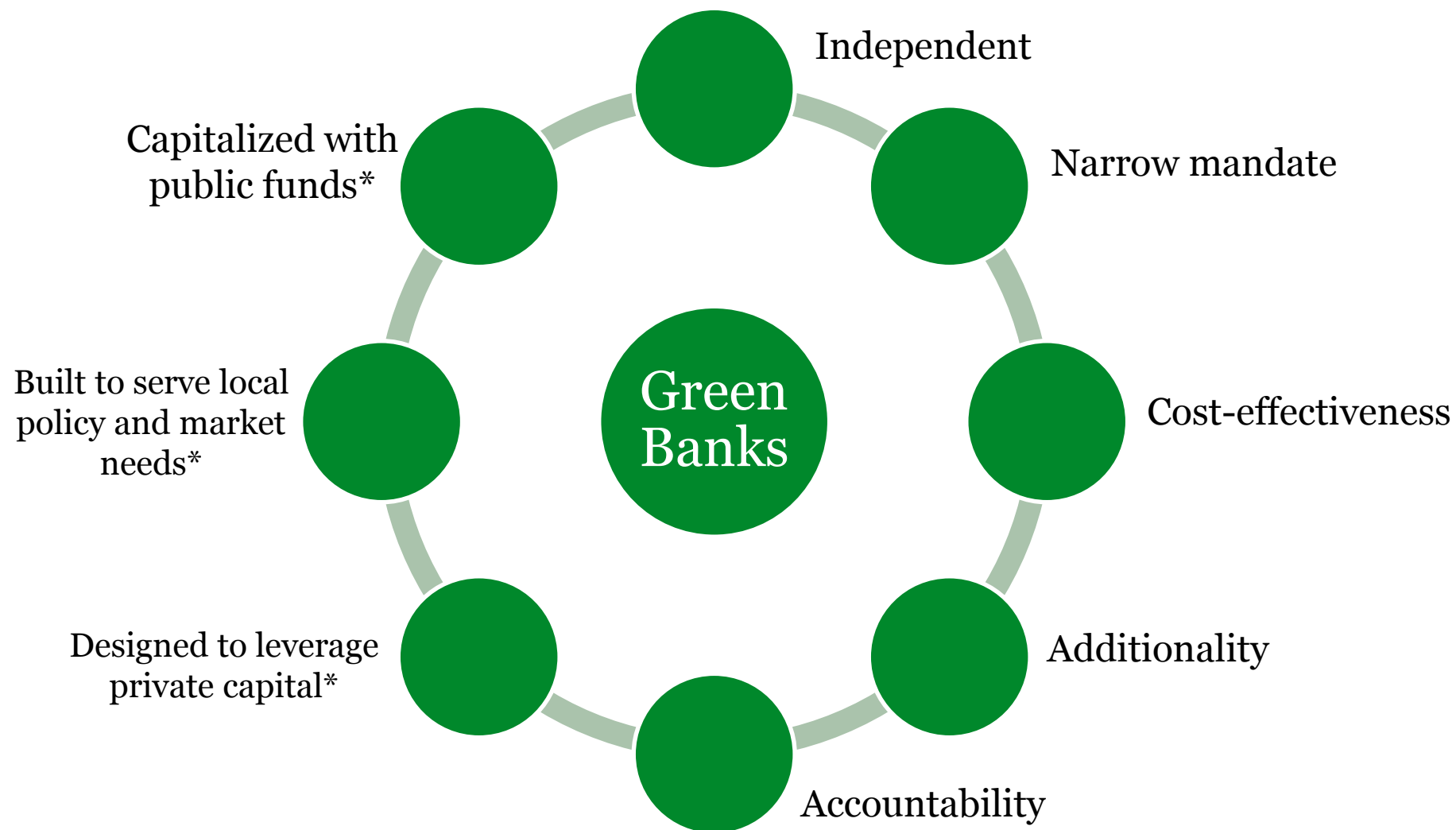
The Role of Green Investment Banks

The Green Investment Bank Model

A GIB is a public financing authority that uses limited public funds to work alongside private capital providers to accelerate growth of competitive clean energy markets



Defining characteristics of Green Investment Banks



Adapted from the OECD report, "Green Investment Banks: Scaling up Private Investment in Low-Carbon, Climate-Resilient Infrastructure", 2016. An asterisk indicates characteristics that have been added to the OECD's list.

Existing Green Investment Banks

- As of year-end 2015, the OECD reported that **13 GIBs¹ have been established** in local and national jurisdictions worldwide
- GIBs have been established by policy makers as **part of a broader set of solutions** to address market failures and barriers preventing LCR investment

¹GIBs or “GIB-like institutions”

GIB address common challenges



Utility and Large Commercial and Industrial Renewable Energy Projects

SME-sponsored projects:

Lack of ability to provide guarantees or equity, lack of track record, high cost of structuring financing

Innovative technologies:

Projects considered risky due to unfamiliarity with technology, lack of liquidity



Distributed Small and Medium Scale Renewable Energy Projects

Lack of interest from financial institutions due to small size

Inability to provide guarantees, equity, etc. due to the size of the sponsor

High cost of structuring financing

Unfamiliarity with technical and operational profile of the technologies

Difficulty perceiving the economic benefits

Lack of specific financial instruments



Energy Efficiency Projects

Difficulty perceiving the economic benefits

Perception that payback periods are too long

Lack of specific financial instruments

Incipient level of development of ESCOs

GIBs have locally specific missions

Australia: Clean Energy Finance Corporation

Accelerate the transformation of Australia into a more competitive economy in a world with less carbon, to catalyze greater investment in reducing emissions.

Malaysia: GreenTech Malaysia

Develop sustainable and widespread green technology markets and strengthen local green technology industry.

Japan: Green Finance Organization

Support the development of local communities to address the impacts of slow economic growth.

Connecticut, USA: Connecticut Green Bank

Prioritize reducing carbon emissions and reducing energy costs, as it contributes to the creation of local jobs by investing in clean energy.

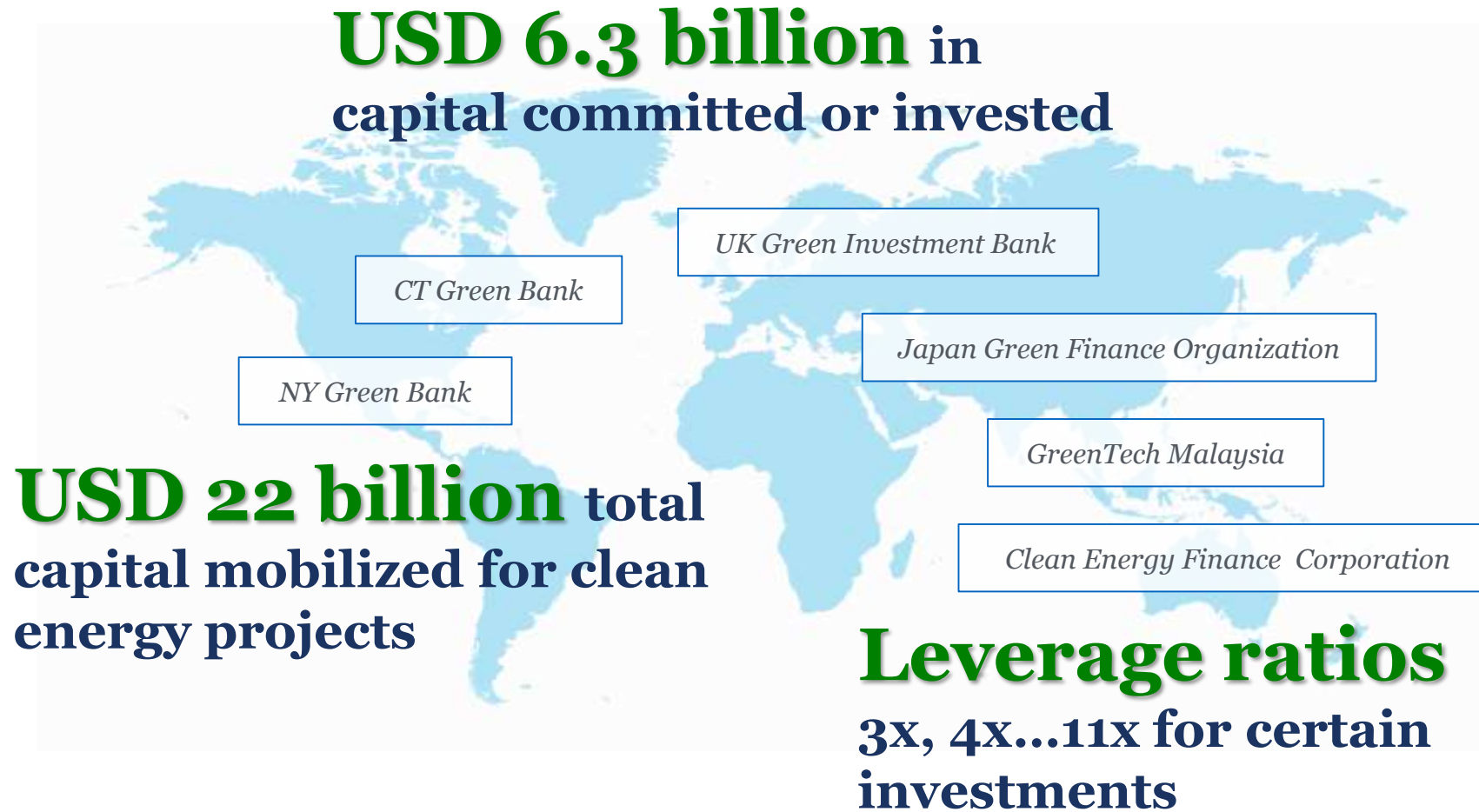
New York, USA: NY Green Bank

Transform and accelerate the deployment of clean energy in the state of New York through funding and collaboration with the private sector.

UK Green Investment Bank

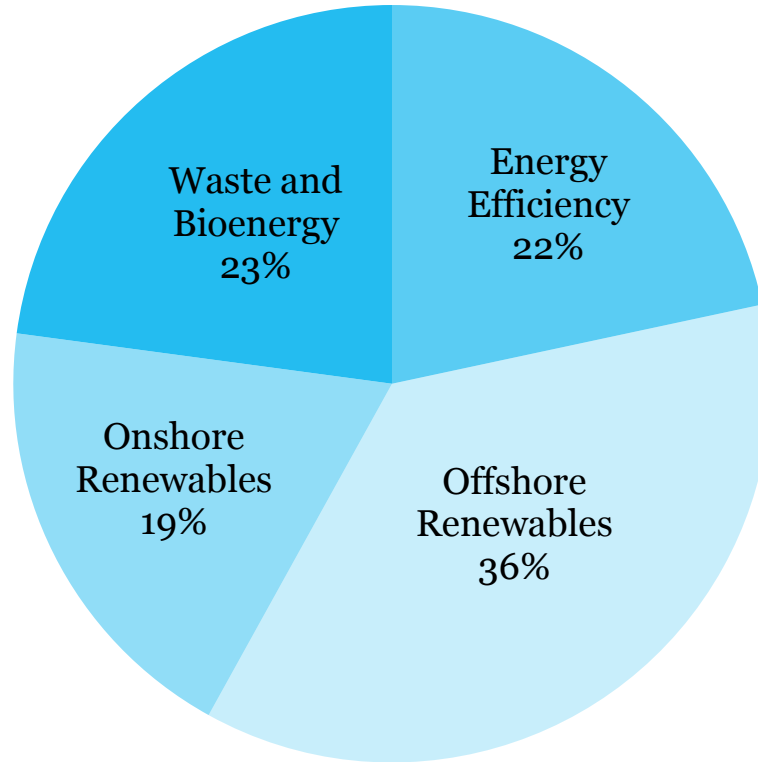
Accelerate the UK's transition to a greener, stronger economy. Focus on being “green and profitable”.

=====
GIBs are already having an impact...



Source: NRDC and CGC calculation

...by scaling diverse technologies



Percent of total GBN members' capital investments and commitments by sector

**Preliminary estimate by NRDC and CGC based on available data*

Energy Efficiency

- Commercial retrofits
- Energy management systems
- LED street lighting
- Low emissions vehicles
- Residential retrofits

Onshore Renewables

- Geothermal
- Onshore wind
- Small hydro
- Solar PV and thermal
- Storage
- Wind

Offshore Renewables

- Offshore wind
- Wave energy

Waste and Bioenergy

- Anaerobic biogas
- Biomass
- CHP
- Landfill gas
- Waste to energy



Creating and Capitalizing a Green Investment Bank

Structure and Capitalization of existing GIBs

Institution	Established	Structure/Oversight	Capitalization
Australia CEFC	2012	Independent Board that reports to Parliament through its responsible Ministers. New entity.	Government funds
Connecticut Green Bank	2011	CT Green Bank is a quasi-public corporation established as part of the Connecticut Legislature. Repurposed entity.	RGGI (cap & trade funds) Utility bill surcharge Federal competitive and non-competitive grants Private sources.
GFO Japan	2013	GFO is a public entity in Japan that uses public dollars to make investments. New entity.	Capitalized by revenue of a carbon tax on fossil fuel consumption (Tax for Climate Change Mitigation)
GreenTech Malaysia	2010	GTM is under the purview of the Ministry of Energy, Green Technology and Water and a Board of Directors. New division.	Government funds
NY Green Bank	2014	Public Service Commission oversight New division of state energy office	RGGI (cap & trade funds) NYSERDA funds (ratepayer funds)
UK GIB	2012	GIB is wholly owned by the UK Government. New entity. In the process of privatization.	UK Government

Approaches to GIB Creation

Legislative

- The Australian Clean Energy Finance Corporation (CEFC) was created by legislative action through the CEFC Act of 2012 passed by Australian parliament.

Regulatory and Administrative

- New York chose to create their Green Bank through combination of administrative action and regulatory ruling.

Re-purposing and Consolidation

- The Connecticut Green Bank was formed by fully repurposing an existing quasi-public entity, the Connecticut Clean Energy Fund (CCEF).

Approaches to GIB capitalization

Domestic Sources

- Budget Funds
- Cap & Trade / Carbon Tax Revenue
- Utility Surcharge
- National Development Banks/Funds

International Sources

- International donor assistance (bilateral and private philanthropy)
- Institutional investors, pension funds, other private investors and capital markets (green bonds)
- Climate finance funds

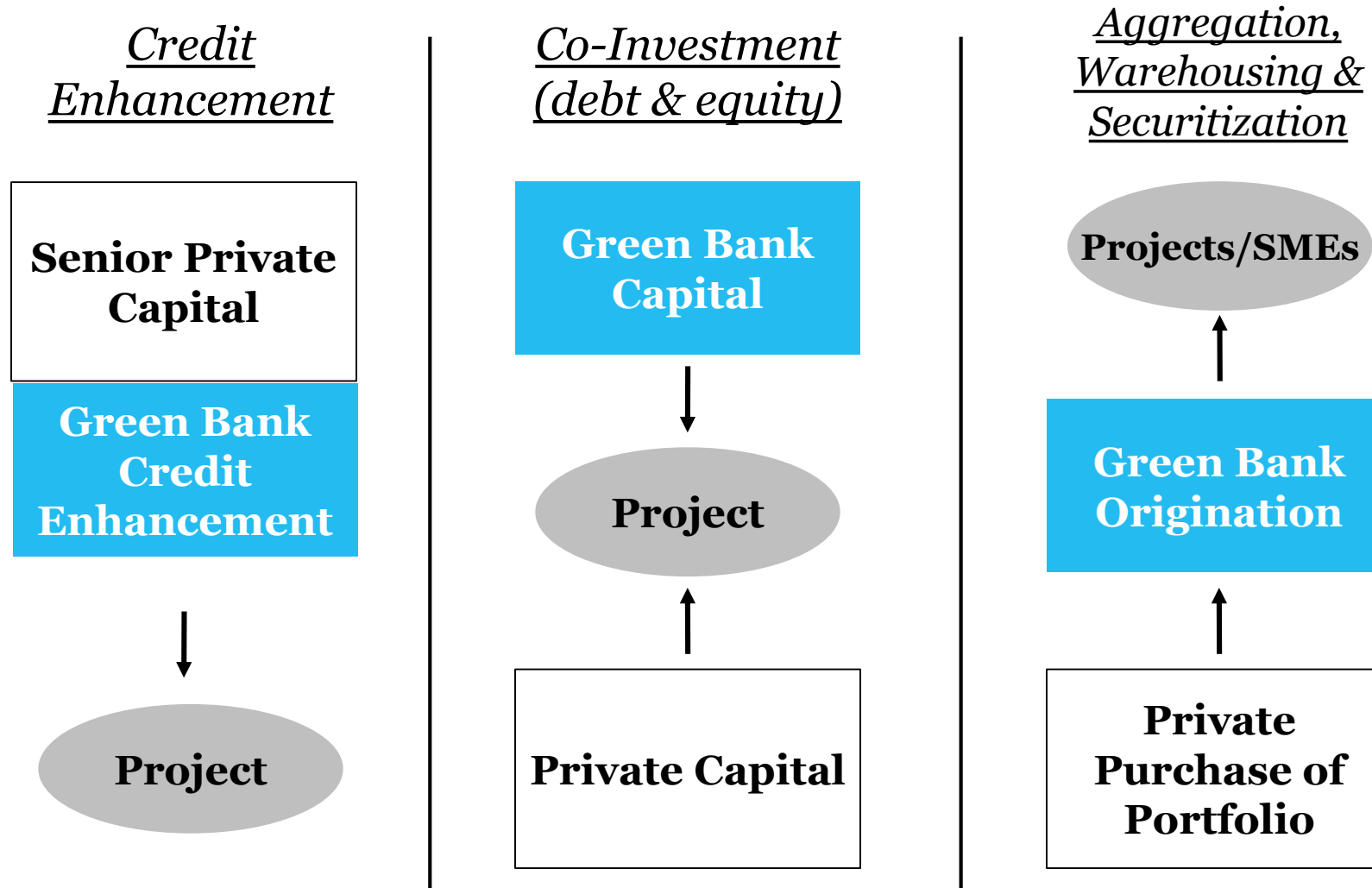
Focus on GIB Capitalization with Climate Finance

- There are almost 100 climate funds including the Green Climate Fund (CCF), the Global Environment Facility (GEF), and the Climate Investment Funds (CIFs)
- Capital is concessional and mission-aligned with GIBs
- Each Fund has the ability to support national level GIBs
- Each Fund can on-lend and provide guarantees and other risk-sharing mechanisms
- Using Fund capital to capitalize GIBs can support enabling environment, capacity building and deployment investments tailored to local needs



*Products and Tools for
Underserved Markets*

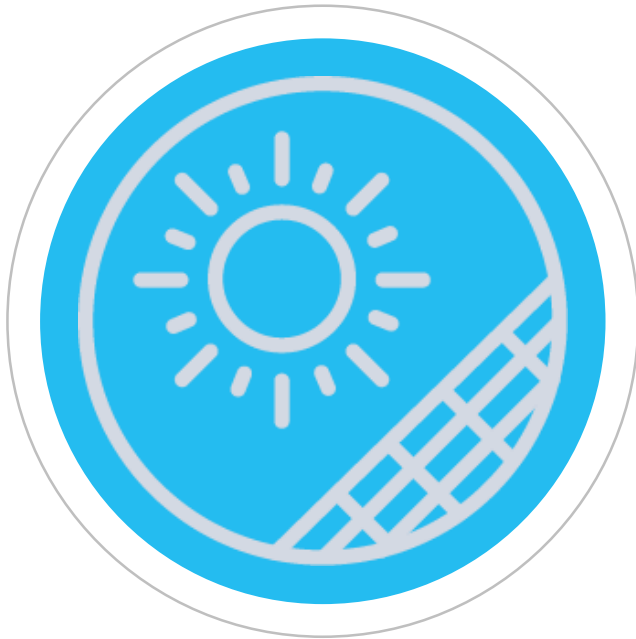
Typology of GIB Strategies



Green Bonds and Green Banks

- Green Bonds have same credit characteristics as any other bond.
Green feature is a plus factor
- A bond issued by a Green Bank (or any other issuing entity) can be a “Green Bond” if it **meets the market’s issuance requirements**
- Green bonds present an opportunity to access domestic and international capital markets who want **sustainable assets**
- GIBs can use green bonds to **refinance development costs** of LCR projects after the construction phase or **sell portfolios**
- GIBs can play a role in **building the green bond markets**, such as by credit enhancing aggregation facilities or aggregating their own loans
- GIBs can **purchase green bonds** to create liquidity

Malaysia: Increase Commercial Bank Lending



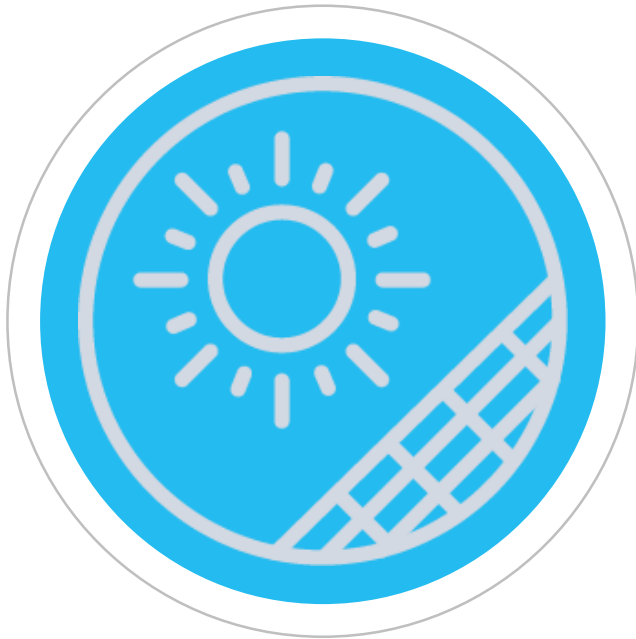
Goals: Promote green investments by providing easier [access to financing](#) and at a lower financing costs.

Investment Type: The scheme provides a [60% government guarantee](#) on financing provided by financial institutions as well as a [2% rebate on interest/profit rate](#) charged by the FI.

Result: As of June 2016, [248 projects](#) have been supported so far through the scheme, with 80% being renewable energy projects such as solar and biomass.

New Investors: The GTFS has [attracted 27 risk-averse banks and financial institutions](#) to invest in green infrastructure projects.

Japan: Increase Distributed RE Development



Goal: Facilitate loan financing for green infrastructure developers in Japan by decreasing debt to equity ratios, and to support the implementation of new business models.

Investment Type: The Green Fund makes equity investments. Investments are made directly in projects as well as indirectly through sub-funds. Equity amount must be less than 50% of total equity, and Green Fund will stay in a project for 10 years maximum.

Results: Since FY2013, the Green Fund has made a commitment to invest a total of USD 78 million into projects totaling USD 664 million for a leverage ratio of over 8:1. Projects GFO invested are expected to offset an estimated 664,000 tons CO₂e every year.

New Investors: Undisclosed private financial institutions (including local), private companies, civil funds, and co-ops.

United Kingdom: Draw in Pension Funds



Goals: Attract capital into the UK's offshore wind sector from new, long-term investors seeking solid, risk-adjusted returns by investing in operational assets. Create liquidity/exit to permit re-investment by sponsors.

Investment Type: unlisted project equity. The Fund is managed by an FCA registered subsidiary of GIB – UK Green Investment Bank Financial Services Limited.

Result: As of February 2016, the fund had five investments in UK OSW farms.

New Institutional Investors: As of October 2015, the Fund had total committed capital of £818MM from UK based pension funds, such as Strathclyde Pension Fund, as well as international institutional investors, including one of the world's largest sovereign wealth funds and Sweden's AMF Pensionsförsäkring AB, a leading European life and pension company.

Australia: Develop Green Asset-Backed Securities



Goal: Support the development of the green asset-backed security (ABS) market in refinancing innovative solar and storage products by purchasing AUS\$20 million in certified green bonds issued by FlexiGroup Limited.

Investment Type: Investment in listed green bond (ABS).

Results: Expands the types of financial instruments available, combining an innovative financing approach with a focus on rooftop solar and storage. First use of certification from the Climate Bonds Initiative on a securitization in Australia. Observed 5 bps pricing benefit in green tranche.



*Scaling Up Climate Finance With the
GIB Model*

Barriers to investment in emerging and developing economies

- Unfamiliarity of private capital suppliers with clean technologies
- Difficulty of assessing credit risk
- Lack of proven business models
- Lack of liquidity for investment exits
- High perceived implementation, political, and currency risk
- Difficulties with aggregation
- Inability to insure against certain climate-related risks
- Energy access/energy infrastructure
- Overall investment climate and policy framework

GIB model can scale up climate finance in emerging markets



GIBs as a Locus of Financial Innovation

Currency Hedging Risk Mitigation Facility for Local Currency-Denominated LCR Investment

- KfW Development Bank (Germany) to provide €30million through to hedging specialist TCX to reduce exchange rate risk in emerging-market investment deals

Energy Savings Insurance

- Inter-American Development Bank (IaDB), CTF, Danish Energy Agency implementing pilot US\$25 million fund in Mexico with local partners of investment in 190 energy efficiency projects that provide a savings performance guarantee

GIBs as a Locus of Financial Innovation (Cont'd)

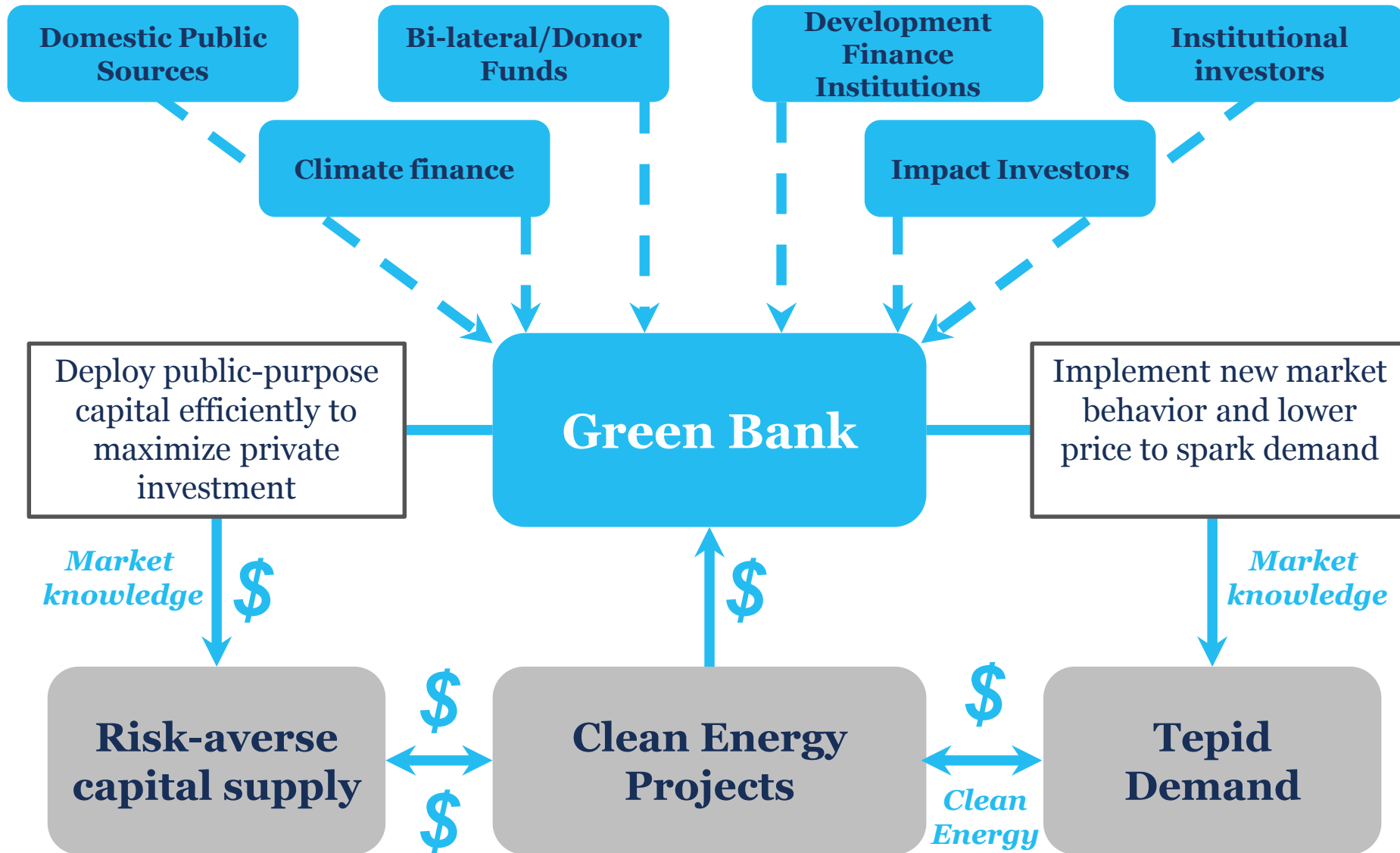
Bottom-of-the Pyramid (BoP) Solar Energy Access Investments

- The Green Climate Fund (GCF) is providing \$25M in equity & grants for the Acumen Fund to create the KawiSafi Ventures Fund to invest in access to off-grid solar power in East Africa for low income consumers

Global Renewable Independent Power Supplier (GRIPS)

- GRIPS provides a market-based approach to substitute clean energy for diesel generators. It is of particular interest in emerging economies & developing countries where grid power may be unavailable, limited, or unreliable

GIBs can blend and/or coordinate sources of capital



For more information contact:
Doug Sims (dsims@nrdc.org)

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www.greenbanknetwork.org
for more info and follow us
@GreenBankNtwrk

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