

FINANCIAL INSTITUTION TRAINING MANUAL FOR DOMESTIC BIODIGESTER TECHNOLOGY

Picture courtesy of HomeBiogas

Module 2: Financial instruments and mechanisms

Co-financed By



Ministry of Foreign Affairs of the
Netherlands



Co-ordinated By



Netherlands Enterprise Agency

In Partnership With



Lead Implementer - Kenya



Access to finance - Kenya



Learning outcomes

- ✓ An understanding of the different financing options available for the biodigester sector
- ✓ Insights on carbon Markets and financing for biodigester sector players
- ✓ An understanding of the potential revenue generation from bio slurry

Module overview



Financial Products for Biogas Sector



Overview of available Financing Mechanisms



Overview of Key risks



Investment Opportunities and Returns

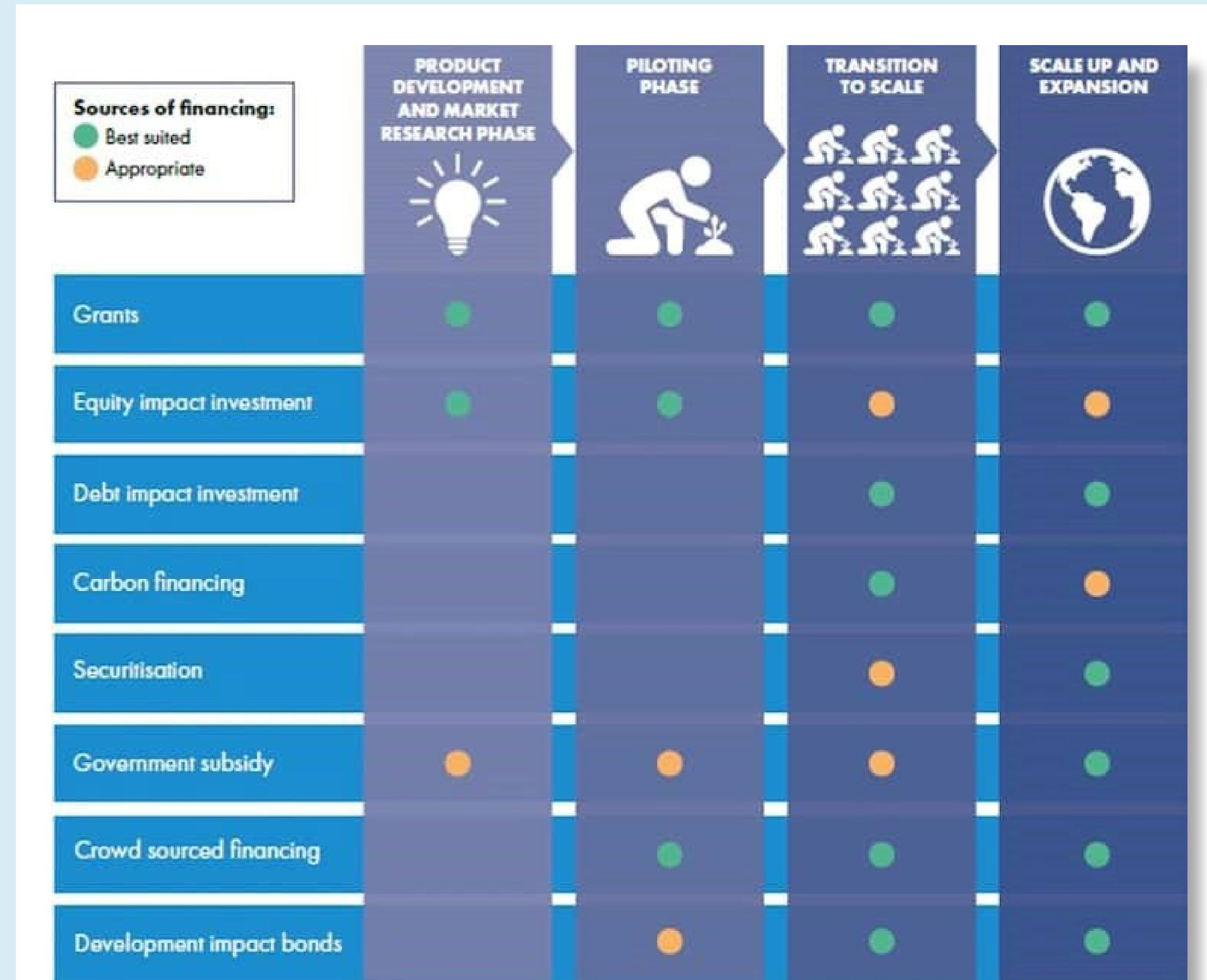


Project Planning and Financing


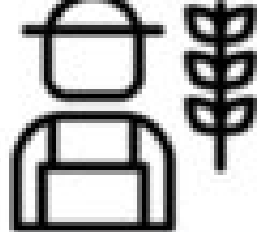
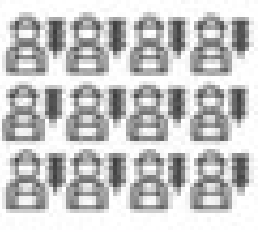



Financial products for biodigester sector

- ✓ Grants and credits from institutes for economic aid
- ✓ Means from the national budget of the developing country (public support)
- ✓ Credits from national (developing) banks
- ✓ Funding from international carbon trading schemes
- ✓ Resources of the project initiator
- ✓ Fees/contributions from the user



Overview of available financing mechanisms

Impact monetisation mechanism	Product development 	Piloting phase 	Transitions to scale 	Scale up and expansion 
Grants	●	●	●	●
Equity impact investment	●	●	●	●
Debt impact investment			●	●
Carbon financing			●	●
Crowd-sourced financing		●	●	
Securitisation			●	●
Development impact bonds		●	●	●
Government subsidy programmes	●	●	●	●

Key

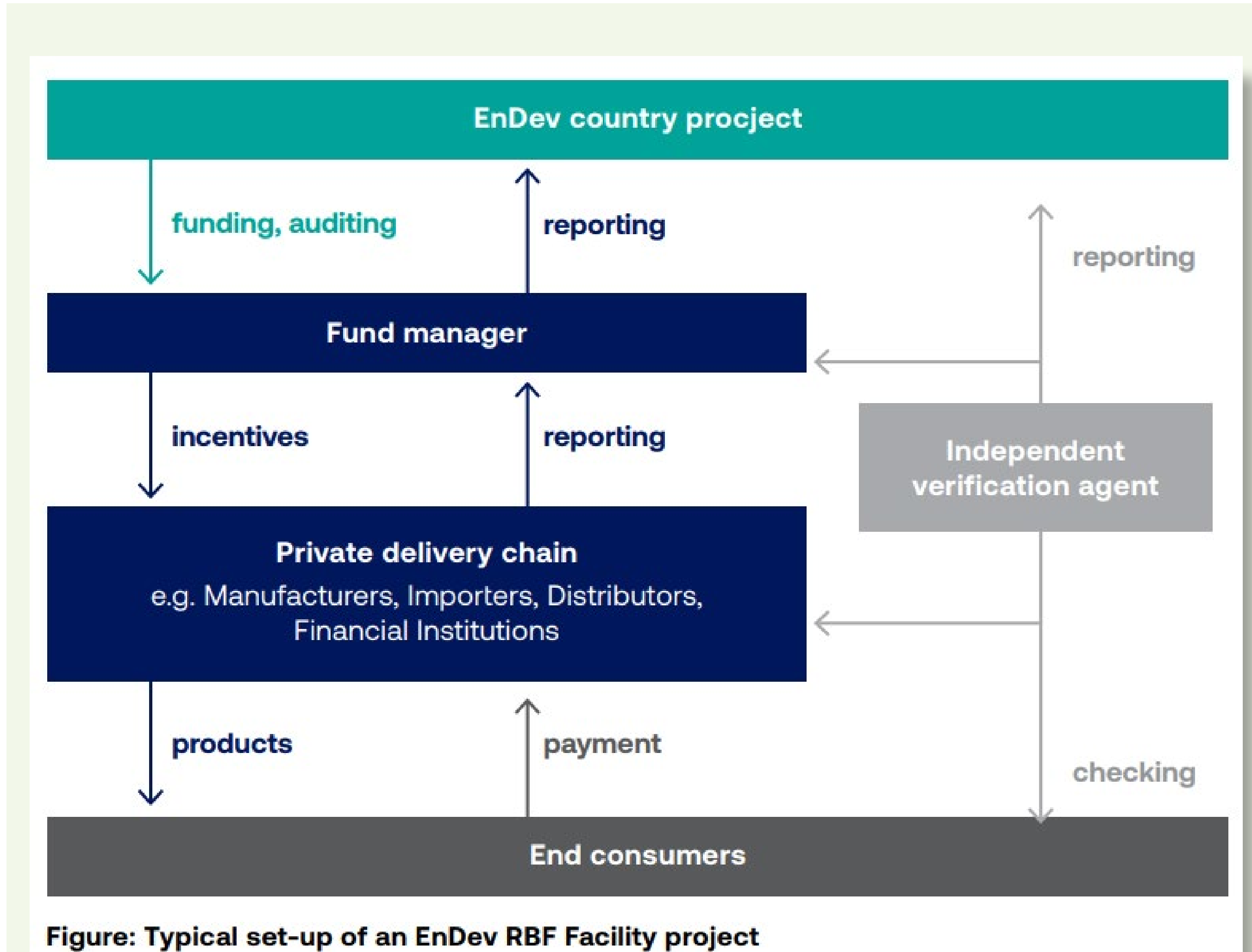
- Mechanism is targeted towards supporting this stage of growth
- Mechanism is partially targeted towards supporting this stage of growth

Results-based Financing (RBF)

Funds are disbursed to a recipient only once a pre-agreed set of results are achieved.

This approach is based on 3 key principles:

- ✓ Payments are made only after the results are achieved
- ✓ Recipient may independently choose how to achieve these results
- ✓ Independent verification of results is the trigger for disbursement



Carbon Finance: Terms

Carbon Credit

A tradable certificate or permit representing the right to emit one tone of carbon dioxide or an equivalent amount of another greenhouse gas

Carbon Offset

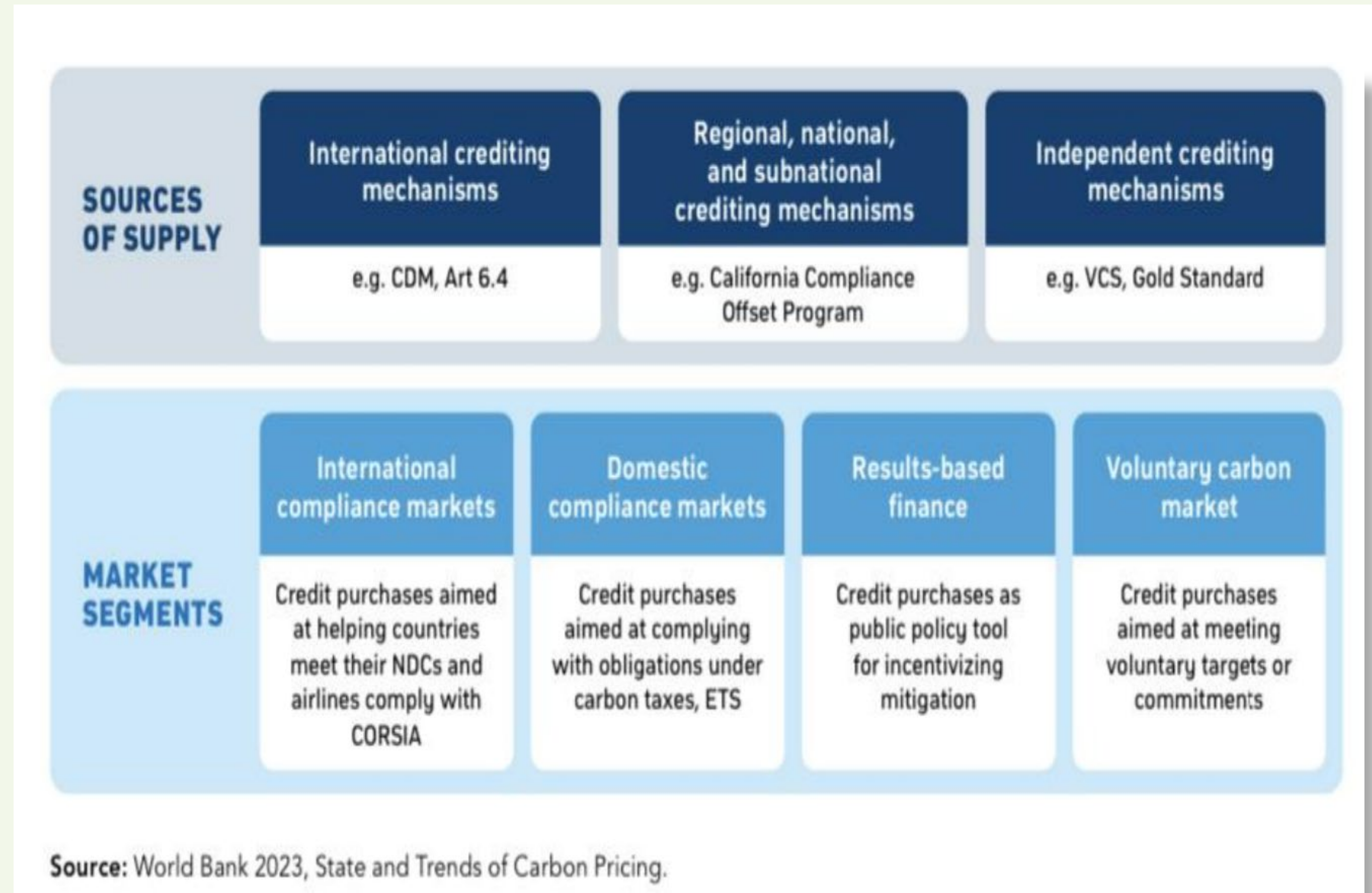
A reduction in emissions of carbon dioxide or other greenhouse gases made in to compensate for emissions made elsewhere

Carbon Footprint

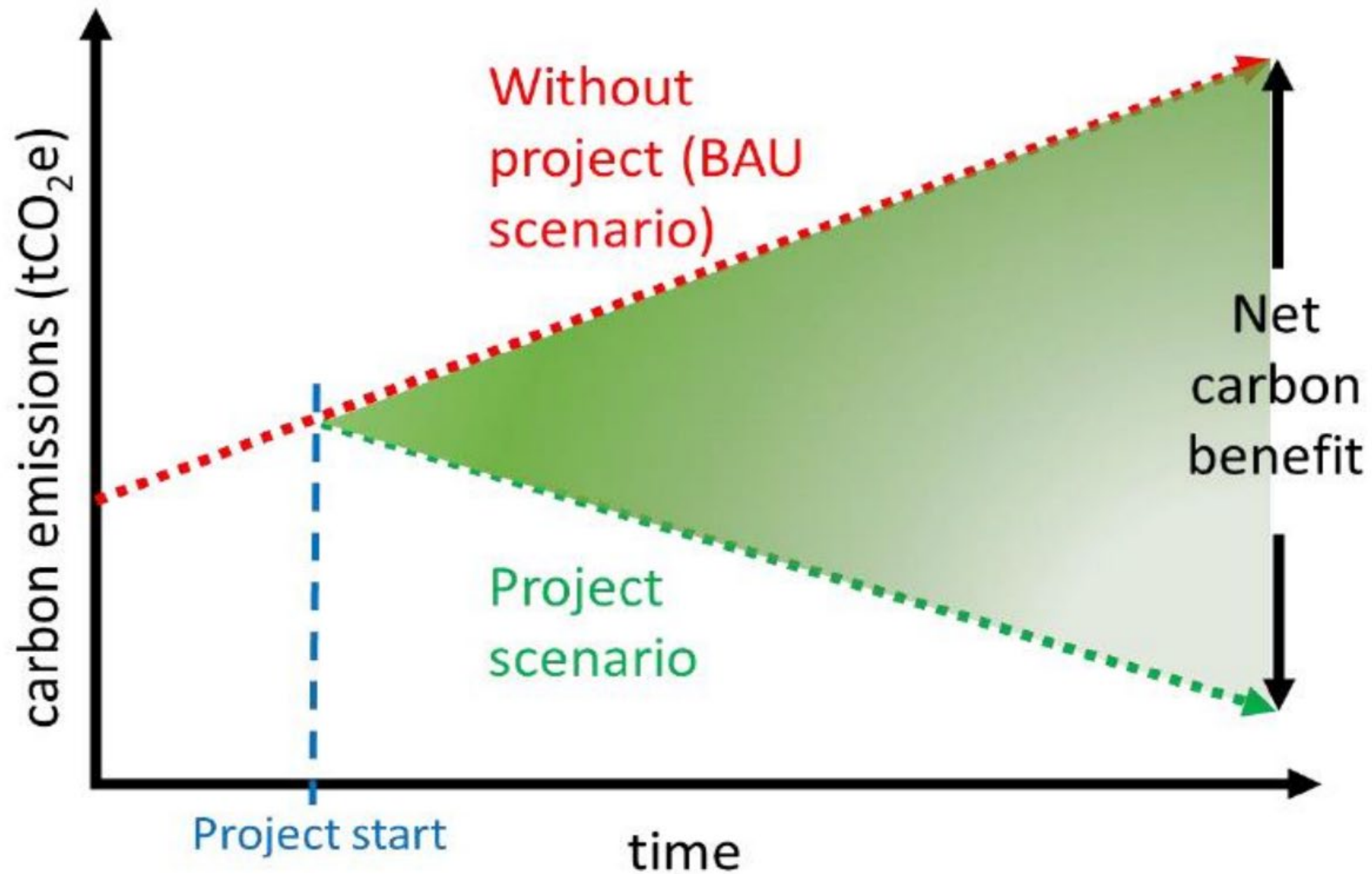
The total amount of greenhouse gases, including carbon dioxide and methane, that are emitted directly or indirectly by human activities, expressed in equivalent tons of carbon dioxide

The Sources of Demand and Supply for Carbon Credits

- ✓ Carbon markets are trading systems in which carbon credits are sold and bought.
- ✓ One tradable carbon credit equals one ton of carbon dioxide or the equivalent amount of a different greenhouse gas reduced, sequestered or avoided.



Measurement of CO₂t Equivalent



Key risks associated with biogas projects



Investment Opportunities and Returns

- ✓ A sound economic evaluation of any project is a fundamental requirement of pre-feasibility and feasibility study.
- ✓ These are total investment cost, total income, energy cost, the cost of maintenance, profitability, payback period, net profit value, internal rate of return, annuity, and cost annuity
- ✓ Most biogas systems for Kenyan household go for KShs 75,000 to 100,000
payback period of the biogas plants show 1.17, 1.08 and 1.01 years for 8 m, 12 m³ and 16 m³ biogas plants, respectively
- ✓ The positive net present values of 4500\$, 7000\$ and 9500\$ have been demonstrated for 8 m³, 12 m³ and 16 m³ plants, respectively

Approximate installation costs for various sizes of domestic systems

Item	Quantity per given sizes					Cost/Unit
	4 m ³ (1-2 cows)	6m ³ (2-3 cows)	8 m ³ (3-4 cows)	10 m ³ (4-5 cows)	12 m ³ (5-8 cows)	
Cement 50kg bags	14	18	22	27	30	800
Sand in ton	3	5	6	7	8	2000
Gravel in ton	1	2	3	4	4	2000
Quarry stones (6*9)	180	200	250	300	420	50
Fired bricks pcs	150	200	300	400	400	10
Round bars 3/8" (R8)	3	5	6	6	8	750
Round bars 1/4" (R6)	2	4	5	5	6	300
PVC pipe 6 inches	1	1	1	1	1	2500
PVC elbow 6 inches 45°	1	1	1	1	1	600

Approximate installation costs for various sizes of domestic systems

Nails 3 inches in Kgs	1	1	2	2	2	350
4 inches in Kgs	1	1	2	2	2	350
Binding wire in Kgs	1	3	4	4	5	200
Wooden bar in m	3	4	6	6	6	200
Plywood	2	3	3	4	4	550
Water proof additive	3	4	5	7	10	200
1" Galvanized pipe	1	1	1	1	1	1200
Approx. Total Cost	45,000	58,000	66,000	70,000	78,000	
Technical fee (Ksh)	28,000	30,000	35,000	40,000	45,000	
Total Cost (Ksh.)	70,000	88,000	90,000	100,000	123,000	

Bioslurry as a commercial and revenue stream



Is an excellent soil conditioner and enhances the soil's capacity to retain water.

Boost both nutrient efficiency and organic matter content in the soil reducing dependency on chemical inputs.



Facilitate the slow release of nutrients in response to the dynamic needs of plants;

Boost the efficiency of water use to render crops more resilient and drought-resistant;

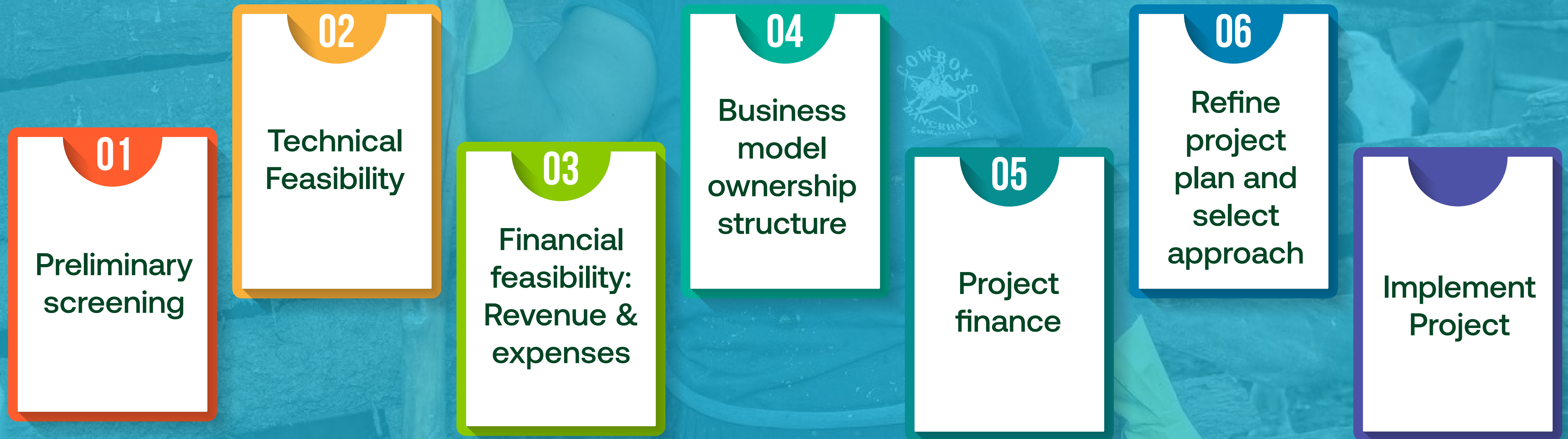


Reduce the impact of farming and safeguard ecosystems by minimizing leaching.

Improve the efficiency of resource use by incorporating natural raw materials.



Project Planning and Financing



Business Model Ownership Structures

Types of Business Model Ownership Structures

Model	Ownership Structure
Farmer owned and operated	A farmer typically owns and operates a digester on site and uses manure from the farm, at a minimum, as feedstock. In some cases, the farmer may accept manure or other organics from off site, generally for a tipping fee.
Third party owned and operated	A site owner may receive a rental fee or a share of the project's net income, but the third party owns, operates, and invests in the digester. The third party may be a venture capitalist or an investment group specializing in green energy projects. The third party may also manage the feedstock.
Third party operated	A third party, who does not own the digester, operates the digester, manages feedstock, and manages other aspects of energy and effluent sale. The digester and feedstock can be owned by a single entity or many.
Hub and spoke	<p>This business model can take two general forms: centralized digester or centralized processing, either of which could be owned by the structures mentioned above, or a municipality. It could also be part of a cooperative, which relies on a voluntary partnership of individuals that jointly own and democratically control the project.</p> <p>Centralized Digester –Feedstocks from multiple locations are collected and transported to a centralized anaerobic digester. It can be advantageous for communities to build one digester and distribute the biogas and digestate generated.</p> <p>Centralized Processing - Digesters at multiple locations send the biogas and/or digestate to a centralized processing facility. Biogas and digestate processing equipment can be expensive and a centralized processing facility provides a cost-sharing opportunity, lowering the financial burden for each entity.</p>

Recap and Practical Exercises



Discuss how financial institutions can structure their credit policies to support the biodigester sector.



Group discussions on the various support mechanisms that can be offered to the farmers to ensure they derive maximum utility from the biodigesters



Presentations on the various tailormade products for financing biodigesters by the Fis.