

Developing robust and reliable cold chains in Bangladesh and India, the issues and potential for growth

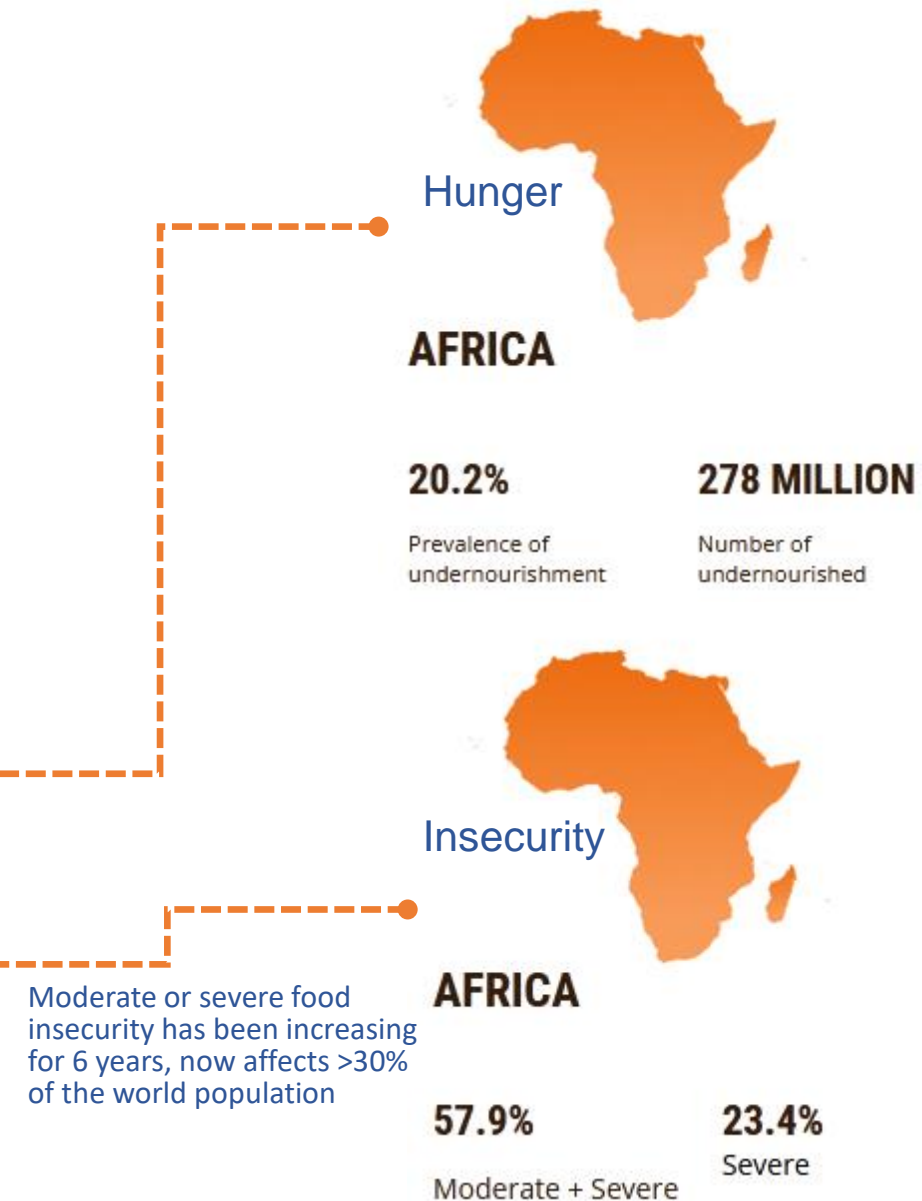
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Relevance of cooling

- Food cold chains in lower income countries are developing rapidly
- Lack of access to cooling for farmers affects their:
 - Income (high levels of food loss)
 - Health (including food safety)
 - Hunger
 - Food security/insecurity (global and national). Moderate or severe food insecurity has been increasing for 6 years, now affects >30% of the world population (Africa more)
 - Cooling and access to cold chains can help mitigate these issues

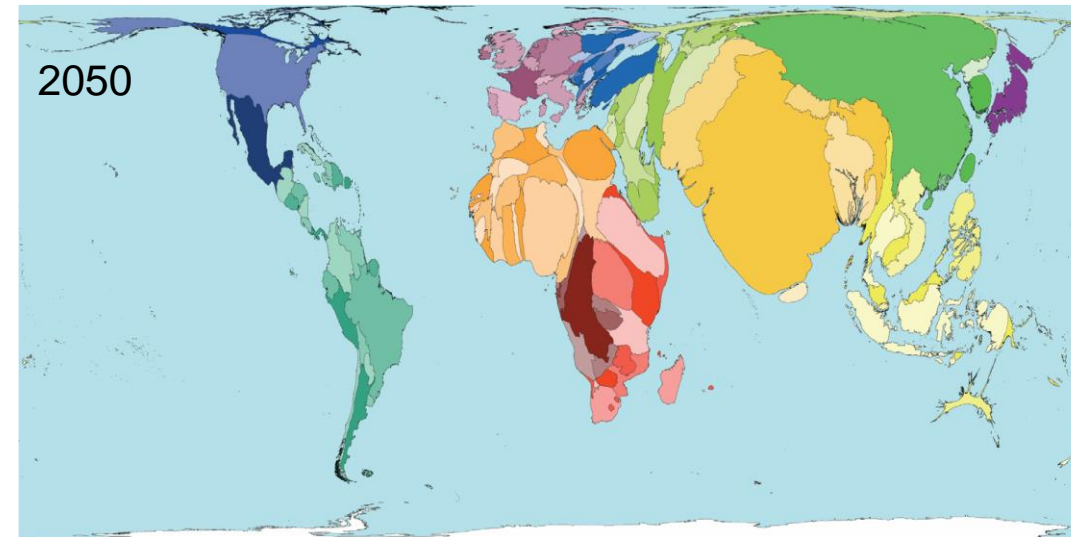
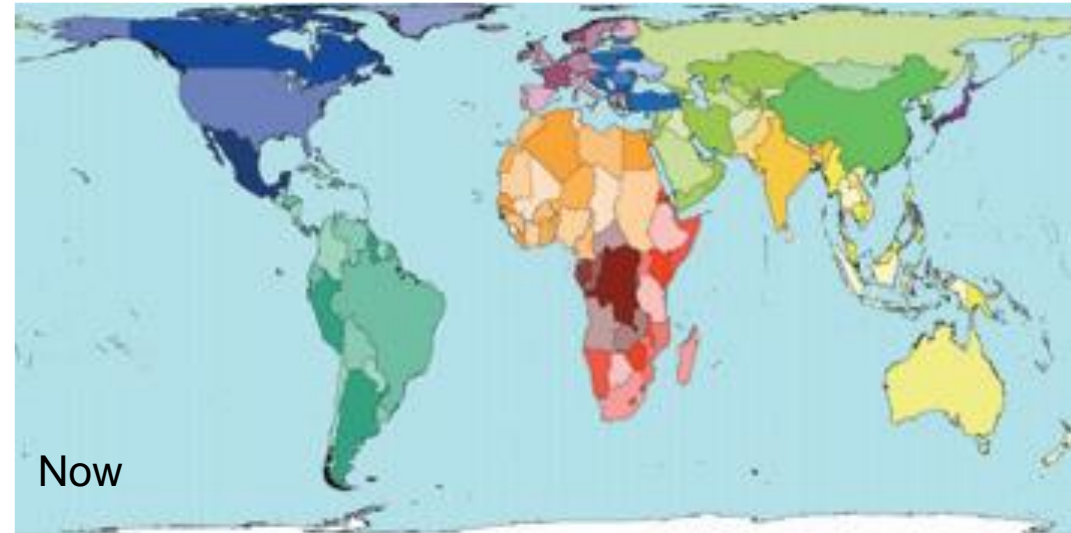


Role of refrigeration

- IIR estimate that 778 million tons of food preserved by refrigeration in the world
- Theoretically, 1,661 million tons should have benefited from refrigeration
- 13 % of the food produced in the world lost because of a lack of refrigeration (estimated >475 million tons)
- The 475 million tons could be saved using refrigeration
- This could feed 950 million inhabitants per year
- 4% of global GHG emissions caused by cold chains and lost food
- In sub-Saharan Africa, about 37% of ALL food is lost between production and consumption
- The lack of pre-cooling is estimated to account for nearly 50% of these losses
- According to WHO, almost 1 in 10 people contract foodborne diseases every year
 - Leads to 420,000 deaths, including 125,000 children <5 years, African and SE Asia highest burden

The challenge

- By 2050, global food demand is set to grow by 59-98%, driven by: population increase, migration to cities, change in diet, and climate change
- At same time, global warming is impacting food production and water (drought and flooding)
- There is a need to:
 - Provide long term sustainable, realistic and practical solutions to cold chain issues
 - Make systems as integrated, efficient, and smart as possible
 - Support LICs to develop food chains
 - Improved knowledge transfer
 - Prove the benefits of technologies and processes
 - Improve skills and training
 - Reduce reliance on fossil fuels, integrate renewable energy
 - Move to low GWP refrigerants



2050: estimated earth's human population will be 9.07 billion. 62% of the people in Africa, Southern Asia and Eastern Asia – numerically same as if all the world's current population lived just in these regions. In addition another 3 billion spread across the rest of world. *World mapper* (www.worldmapper.org)

Examples in Bangladesh and India

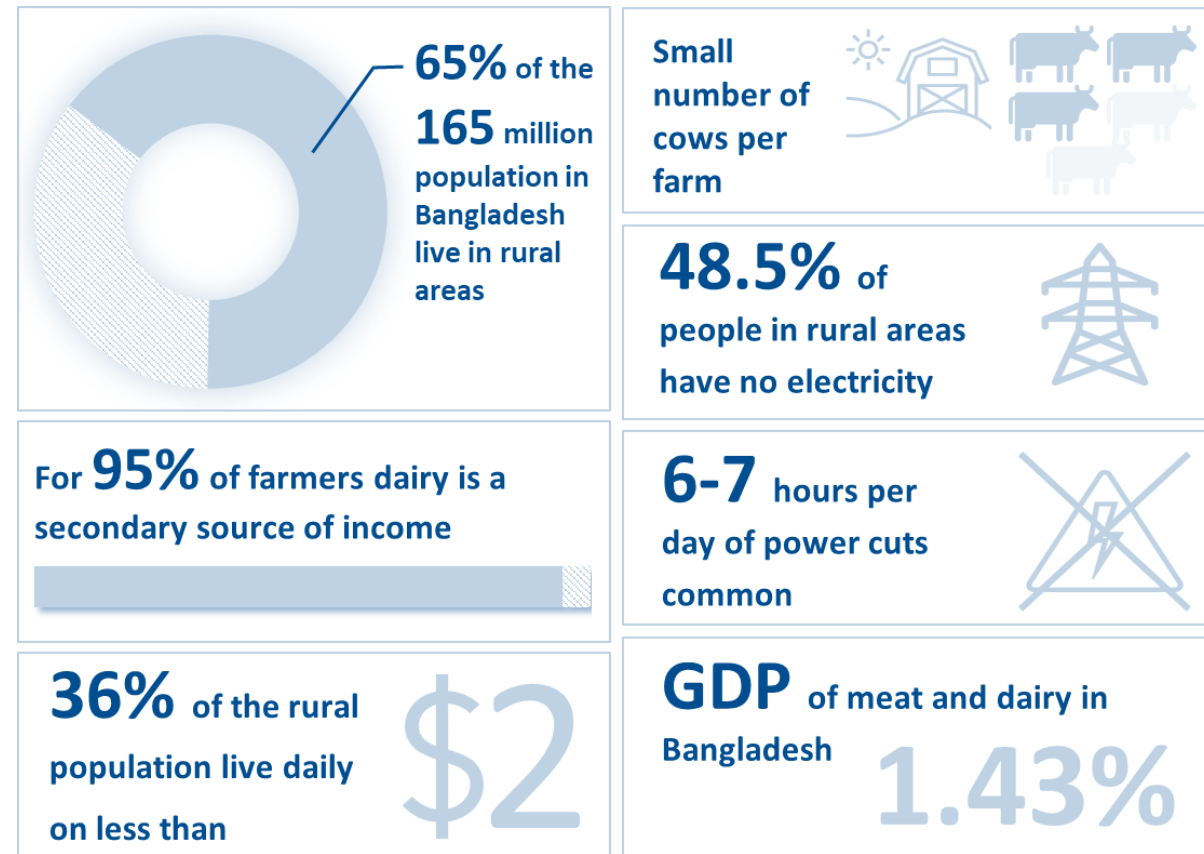
- Bangladesh – milk and dairy cold chains
- India – developing cold chains using the inland waterways
- Developing advice to enable cold chains to be applied
 - Technologies
 - Business models
 - Behavioural issues
 - Training
 - Support and policy interventions



Current meat and dairy production in Bangladesh

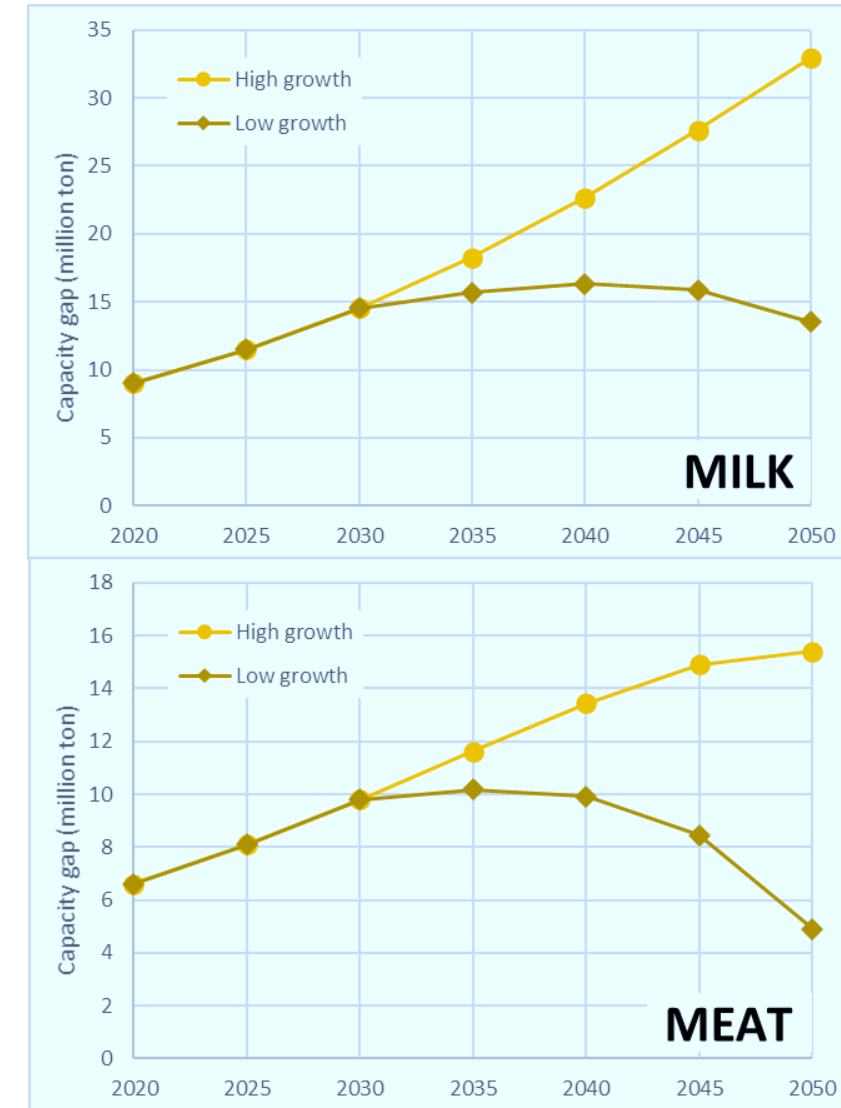


- Most farms very small
- Meat and milk chains are dominated by the informal sector
- Meat slaughtered in wet markets with no chilling
- Milk sold directly after collection with no chilling

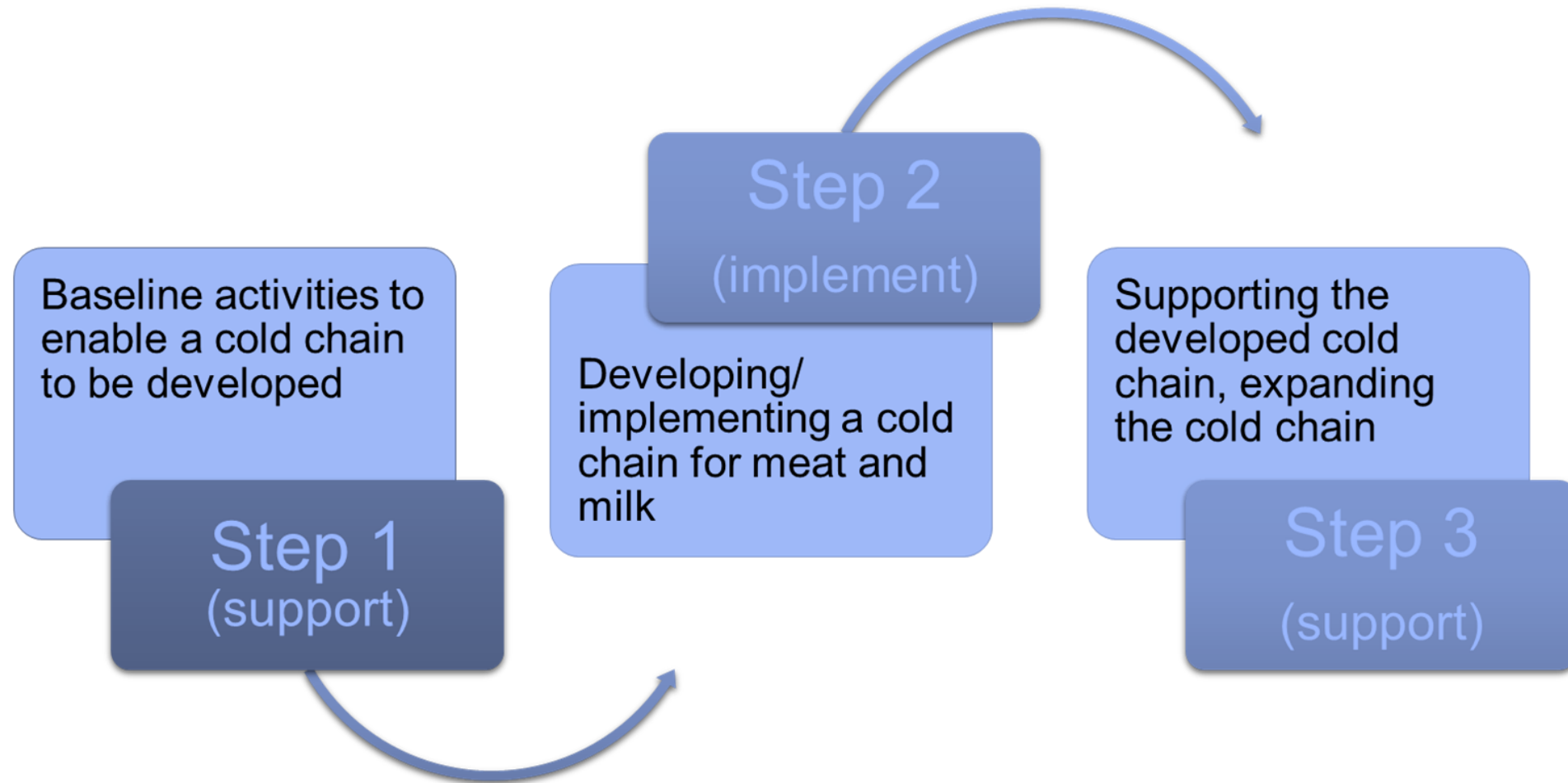


Issues to overcome

- Farmers have ambitions to expand their operations
 - Land is at a premium
 - Access to finance is restricted
 - Most farm are currently not large enough to justify a cold chain
- Many farms off grid
 - Renewable energy has considerable potential in Bangladesh
- Lack of understanding of hygiene and food safety
- Animal welfare is not prioritised
- Availability of finances and suitable business models
- Comprehension of value of chilled foods for many consumers
- However, there are significant projected changes in production of milk and meat over last decade
 - Significant gap in capacity even applying the lowest growth in the market scenarios
 - Represents a huge growth potential
- Capacity within the current formal chain unused

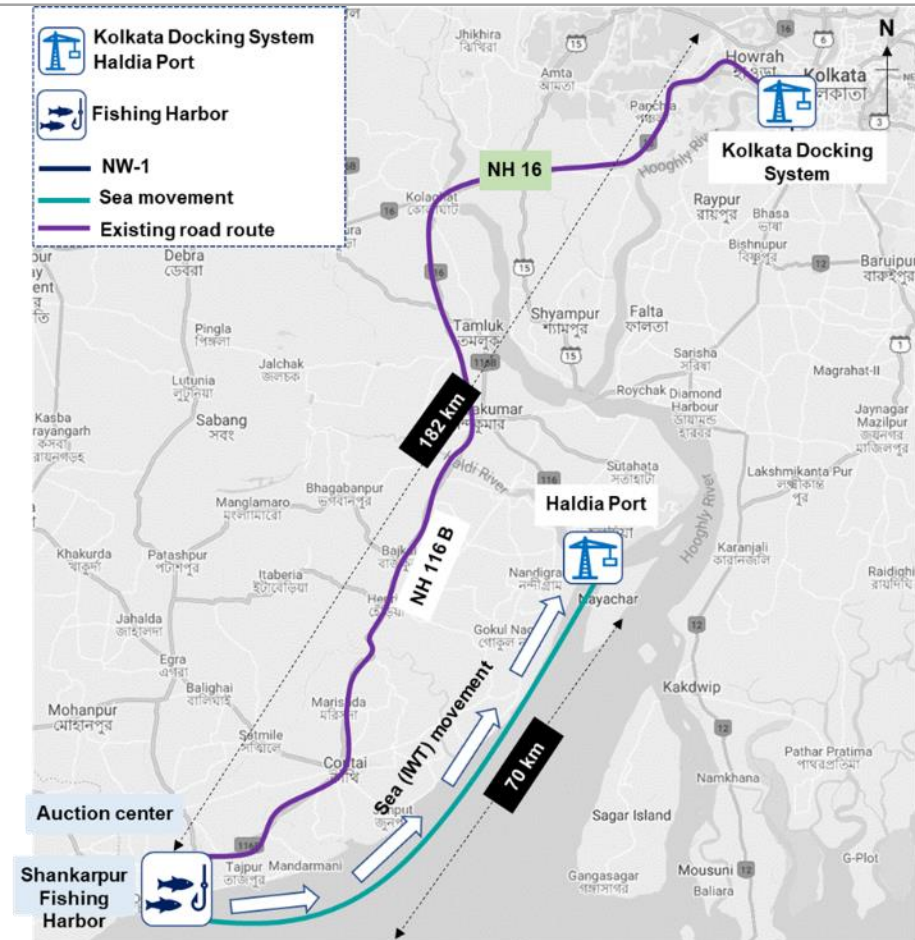


Implementation of recommendations



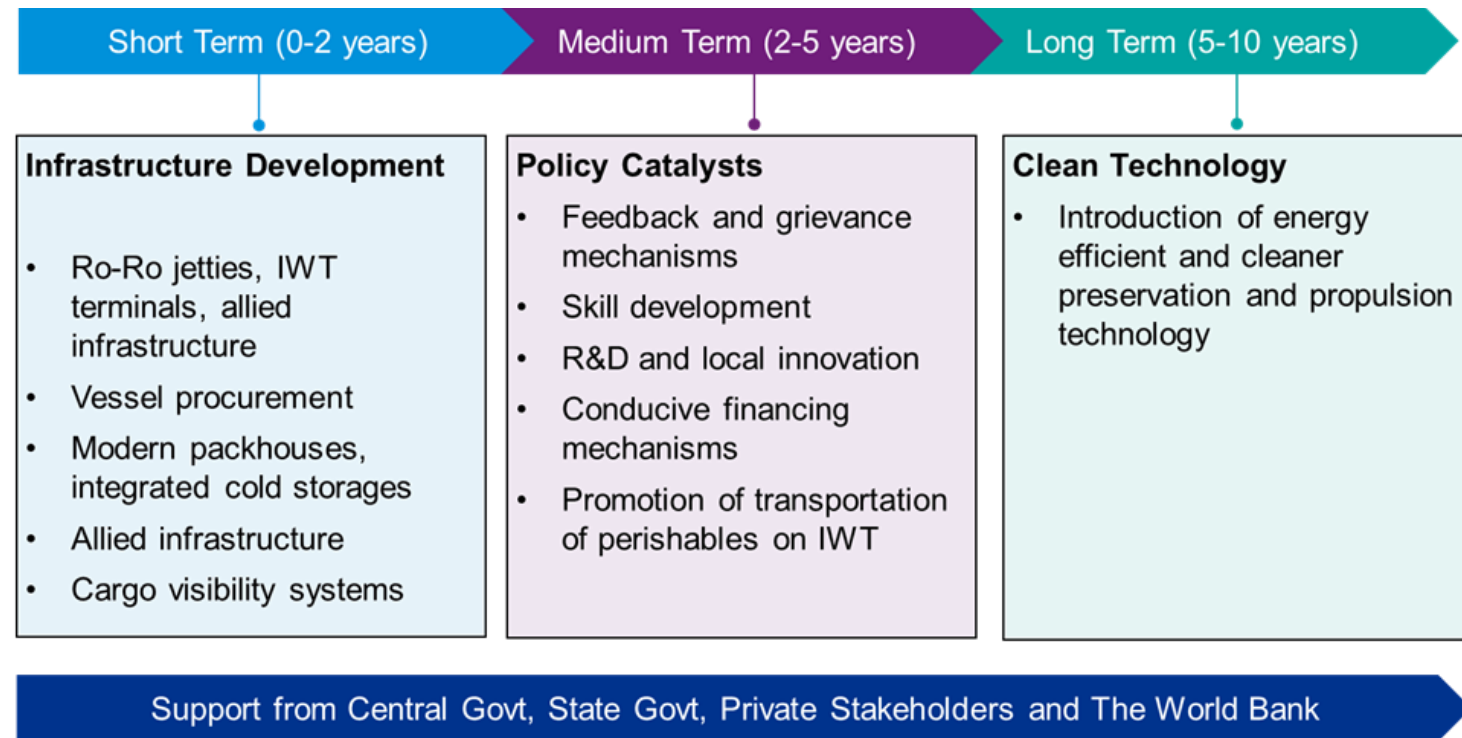
India - Kolkata

- Huge use of trucks to move food into the city
- Most is unrefrigerated
- Significant delays on bridges
 - **Carbon emission savings by using boats**
 - Partly lower distances travelled
 - Also more efficient options
 - Cost for transport reduced in some cases
 - Often quicker transport
 - Option to refrigerate the food to enhance quality and safety
 - Potential to use of reefers, Ro-Ro ferries (+refrigerated vehicles) lower GWP refrigerants, use of PCMs
- Depending on the options selected carbon savings of 12-86% achievable



India - Kolkata

- Results quite depended on fuels used in boats
- No clear fuel for the future yet (LNG, hydrogen, ammonia, bio diesel, full electric)
- Often need to develop the market
- Need for infrastructure and equipment
- Often the up/down stream equipment needs update (e.g. cold stores)
- Move to low GWP refrigerants (availability an issue)
- Need traceability and tracking systems
- Policy to develop docks and develop routes on waterways



Links to other projects

- ACES
- ENOUGH
- UK decarbonisation projects (net zero by 2050)
- Try to ensure that lower income countries benefit from technologies and strategies in developed countries
- Need to make sure that lower income countries leap frog to newer appropriate options



Thanks

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