

## Business models for reducing greenhouse gas emissions from food loss and waste

### Crates to transport tomatoes in Nigeria could reduce food loss and emissions by 36%

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#### Value proposition

Losses occur in transportation because tomatoes are placed in large woven baskets, and then stacked on top of one another for the journey to Lagos. Plastic crates can be stacked on top of one another without damaging the tomatoes at the bottom of stacks. Crates would also improve ventilation during transport. Losses can be reduced from 41% to 5% through use of crates. Furthermore, baskets are used on a one-time basis and must be replaced after each journey, and the crates are reusable.

#### Challenge

Nigeria is the second largest producer of tomatoes in Africa and are important for the rural economy. Tomatoes are also a critical source of vitamins. Despite being a large producer, up to 86% tomatoes are not consumed due to losses throughout the value chain: during production, harvest, local collection centers, cross-country transportation, and at retail markets. Approximately 41% of tomatoes are lost during transportation, as tomatoes are primarily produced in northern Nigeria and consumed in southern Nigeria, some 1,000 kilometers away.

#### Financial and GHG analysis for 25 kg crates (US\$ 1 = NGN 364)

Costs	Financial returns	Reduced losses	Climate change mitigation potential
<b>Upfront cost:</b> US\$ 8.25 <b>Return trip lost revenue for transporter:</b> US\$ 4.17	<b>3 year NPV:</b> US\$ 6.70 <b>3 year IRR:</b> 33%	<b>Per crate:</b> 756 kg over 3 years <b>Country potential:</b> 648,000 t/year	<b>GHGs per ton of tomato produced:</b> 0.14 tCO <sub>2</sub> e <b>GHGs reduced with country-wide implementation:</b> -0.09 MtCO <sub>2</sub> e <b>Marginal abatement cost:</b> - US\$ 63 per tCO <sub>2</sub> e

#### Barriers to adoption

- Crates have been distributed primarily through donor organizations, meaning that there are few businesses using crates commercially, and the business model needs to be further tested and refined. Profitability estimates of this analysis are highly uncertain and based on a number of assumptions with high variability
- Crates would be passing through numerous actors in the supply chain, making it difficult to ensure that the crate owner is able to retrieve the crate
- Purchase of crates – although more profitable than baskets in the long run – represents an upfront investment in a market with many cash-poor businesses and poor access to finance
- Crate manufacturers will only take orders of 10,000 or more, while single traders only need 700 crates in one truck load
- Traders must return to northern Nigeria with empty crates, decreasing the amount of sellable goods they can carry on the return trip

#### Solutions

- Transition from donor-supported model to commercial business model
- Support the growth of businesses that center their business model around crates (i.e. crate leasing companies)
- Introduce local legislation around handling and quality standards in Lagos markets

#### Relevant actors

Farmer organizations, traders, crate manufacturers, local government, and existing crate promotion programs

#### More information

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Duncan Gromko ([Duncan.gromko@unique-landuse.de](mailto:Duncan.gromko@unique-landuse.de)) from UNIQUE forestry and land use conducted the research in partnership with CCAFS. CCAFS is carried out with support from the CGIAR Trust Fund and through bilateral funding agreements. For details please visit: <https://ccaafs.cgiar.org/donors>.