Transforming Rice Value Chains in the Mekong Delta (TRVC)

Final Project Design “Business Plan”

Revised March 15, 2023

Content Sections

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Project Overview

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Project Background & Objectives

Transforming Rice Value Chains for Climate Resilient and Sustainable Development in the Mekong Delta (TRVC) is a Department of Foreign Affairs and Trade (DFAT) Australia-funded project that will use a results-based financing mechanism to incentivize private enterprises in the Rice Value Chain (RVC) to invest in scaling sustainable rice production among smallholder farmers (SHF) and marketing domestically and internationally in the most rice intensive production provinces, specifically **An Giang, Kien Giang, and Dong Thap,** in the Mekong River Delta (MRD).

OBJECTIVES

1

IMPROVE CLIMATE RESILIENCE

Increase SHF profits and yields through the adoption of methods/tools that strive SHF towards a path of sustainable, low-carbon rice production

2

OPTIMIZE RICE VALUE CHAIN LINKAGES

Enhance efficiencies and facilitate rice quality assurance, traceability, and certification of good agriculture practices/low-carbon rice production

3

DEVELOP CARBON MARKETS

Support the development of an enabling framework for scaling low carbon technologies across the Mekong Delta, including a carbon accreditation mechanism

The project aims to build on the successes of the AgResults Vietnam Emission Reduction Challenge Project (AVERP), which piloted the results-based prize incentive model in the Thai Binh province to attract a diverse pool of private sector actors to implement improved rice farming practices. This mechanism worked well as a model to incentivize scaling of climate-smart/low carbon rice technologies, especially in comparison with standard push-mechanism approaches generally adopted by government programs and other development projects.

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Project Purpose

Why focus on Rice Production for GHG Reduction in Vietnam?

Rice production in Vietnam accounts for about 30% of the country's total agricultural production value, and the Mekong Delta is home to over half of total rice production and over 90% of its rice exports. In addition, rice production contributes to about 48% of agricultural emissions with over 70% of emissions deriving from methane and nitrous oxide. These two are more potent than carbon dioxide but are short-lived, therefore reducing them will have a faster and more powerful impact in reducing global warming. If left unaddressed, these emissions will continue to rise dramatically due to the increase in demand for food from growing populations.

Why focus on GHG Reductions Now?

Vietnam has committed to GHG reductions in agriculture, particularly rice, to help meet its Nationally Determined Contributions (NDCs) commitments to the UN's Framework Convention on Climate Change (UNFCCC) to cut methane emissions by 30% by 2030 and to achieve net-zero carbon emissions by 2050. The Government of Vietnam (GOV) has detailed these commitments in its *Strategy for Sustainable Agriculture and Rural Development for 2021-2030* and its *Vision to 2050* that prioritizes resilient, green, low-carbon agricultural transformation. Additionally, GOV issued Resolution 120/NQ-CP on sustainably developing the Mekong River Delta (MRD) in adaptation to climate change, which sets up goals for 2050 and a vision to 2100.

Why a Prize Competition?

Pay-for-Results (PfR) prize competitions have benefits over traditional grants, such as:

- ✓ Enables companies to overcome market barriers in innovative ways that best fit their business models
- ✓ Encourages greater adoption and scaling than a "picking winners" grant approach
- ✓ Shifts risk from donors to the private sector with respect to desired results
- ✓ Focuses on sustainable market creation

Prize competitions focus on addressing specific challenges and are not by themselves a comprehensive solution; they may still require more traditional "push" project activities to provide certain upfront capacity building.

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Building on Results and Learning from the AgResults Vietnam Emissions Reduction Project (AVERP)

Project Description

AgResults designed and implemented the Vietnam GHG Emissions Reduction Challenge Project (2017-2021), which used a Pay-for-Results (PfR) prize competition to incentivize private sector competitors to drive uptake of improved rice technology packages and practices among smallholder rice farmers in Thai Binh Province.

By using results-based incentives, the project aimed to spark the development, testing, and promotion of innovative solutions that would reduce GHG emissions and increase rice yields — in turn raising incomes and improving SHF livelihoods.

RESULTS

- ✓ Through four cropping seasons of Phase 2, four competitors worked with 47,762 smallholder farmers (37,596 unique individuals) in 507 villages.
- ✓ Although the GHG reductions were models, the model piloted an effective model to scale technologies to SHF using private sector incentives in Vietnam.
- ✓ Additional results include the following:

Prize Competition Structure

Phase 1: Companies tested products, tools, and agronomic practices for rice farming to demonstrate how specific production practices and products can lower GHG emissions and increase yields.

Total Prizes: $175,000

Phase 2: Companies were rewarded for their ability to drive uptake by SHF of agronomic practices and products that reduce GHG emissions and increase yields.

Total Prizes: $2,850,000

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Building on Results and Learning from the AgResults Vietnam Emissions Reduction Project (AVERP) Continued

Below are key considerations from AgResults that TRVC should incorporate into the design of a new model to incentivize reduced GHG emissions in rice:

How to Scale

The AgResults prize competition model worked well as a method to encourage uptake and scale. However, the multiple prize metrics (GHG reductions, yield increases, # of farmers) were at odds with each other and created perverse incentives to manipulate farmer counts.

- TRVC should employ a similar **Pay-for-Results Mechanism,** as the model was well-appreciated by participating companies as it allowed them more flexibility in how they approached the solution.
- TRVC should focus on GHG reductions as the primary indicator as this would still encourage companies to scale up improved practices that will increase profits for SHF.

How to Simplify Verification

AgResults verification was costly and complicated with high uncertainty of GHG emissions reductions.

- Verification should focus on monitoring the most critical GHG factors – like water management – while making reasonable assumptions/ setting up light-touch means to quantify other practices.
- Remote sensing should be a central component of any verification scheme at scale.
- Verification should be scalable without requiring extensive data requirements from companies nor on-the-ground observations by certifiers/ verifiers.

How to Make Sustainable

AgResults competitors appreciated the awards, but not all of them continued scaling up at the conclusion.

- TRVC should focus on addressing both monetary and non-monetary incentives for participation, such as certifications and improved brand awareness/ perception.
- TRVC should strive to create a replicable means for rice companies to be able to internationally certify their GHG reductions rice farming practices to contribute towards NDCs, Scope 3 emissions, or carbon markets.
- TRVC should develop a concrete GESI plan that increases participation of women and other disadvantaged groups in the different aspects of rice farming.

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The Market Failure in Rice Production Systems in the MRD

The current system of rice farming in the Mekong River Delta is unsustainable. Farmers in the MRD have made progress in improving yields, but it has come at the expense of long-term viability of the region. ***Farmers use unsustainable, extractive, resource-intensive methods of farming rice across the region***. Without addressing systemic challenges in a way that benefit both farmers and the private sector, Vietnam will have difficulty in meeting its GHG reduction targets in rice production and will face longer-term environmental degradation that will negatively impact the economic viability of rice-growing in the future.

KEY ACTORS

Farmers are focused on increasing or maintaining profits as a primary motivation for rice farming. Many farmers have received some training on more sustainable practices but do not have economic incentive to implement these approaches. Farmers are aware that high input use (pesticides, fertilizers, water), during up to three crop seasons per year, degrades the long-term viability of the land, but they require guidance to change.

Rice companies engage many farmers through contracted cooperatives and/ or farmer groups. The companies tend to provide at least some of the rice inputs, while also promoting adoption of improved practices to produce higher-quality rice (SRP, organic, MRL compliant, etc.) and pay farmers premiums for them.

The Government of Vietnam has developed simple yet effective methodologies for improving sustainable rice production, including “One Must Five Reductions”, but have largely focused on direct-to-farmer extension and not private sector engagement models. The lack of private sector integration into outreach strategies has limited uptake to date.

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The Solution

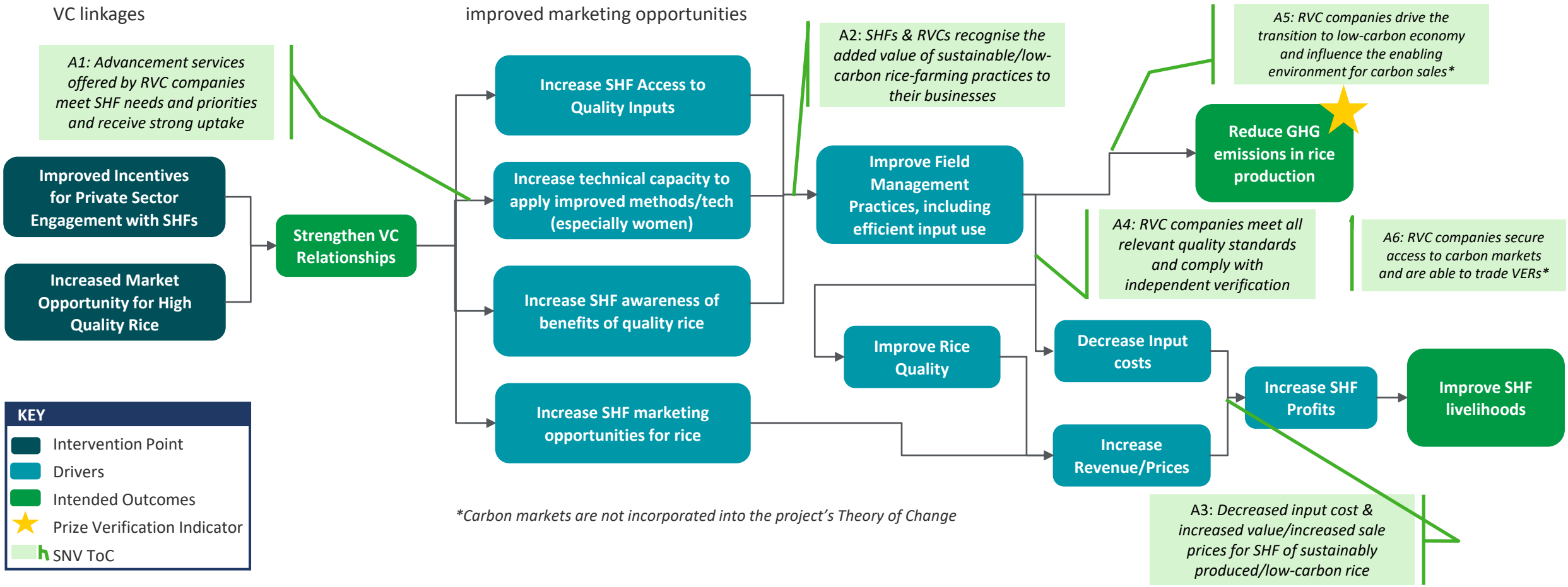
To address this market failure, we propose an ***incentive-based prize challenge or competition*** that focuses on incentivizing the private sector to engage more closely with farmers in the MRD to adopt sustainable, and eventually more profitable, farming practices.

1 Project-developed incentives, including monetary prizes and secondary benefits, compel PS companies to create stronger VC linkages

2 Through these linkages, companies work more closely with SHF to improve efficient input use and farming practices and offer improved marketing opportunities

3 Through these market relationships SHF gain higher prices and reduce input costs

4 The improved farming practices and prices lead to reduced GHG emissions and improved SHF livelihoods



*Carbon markets are not incorporated into the project's Theory of Change

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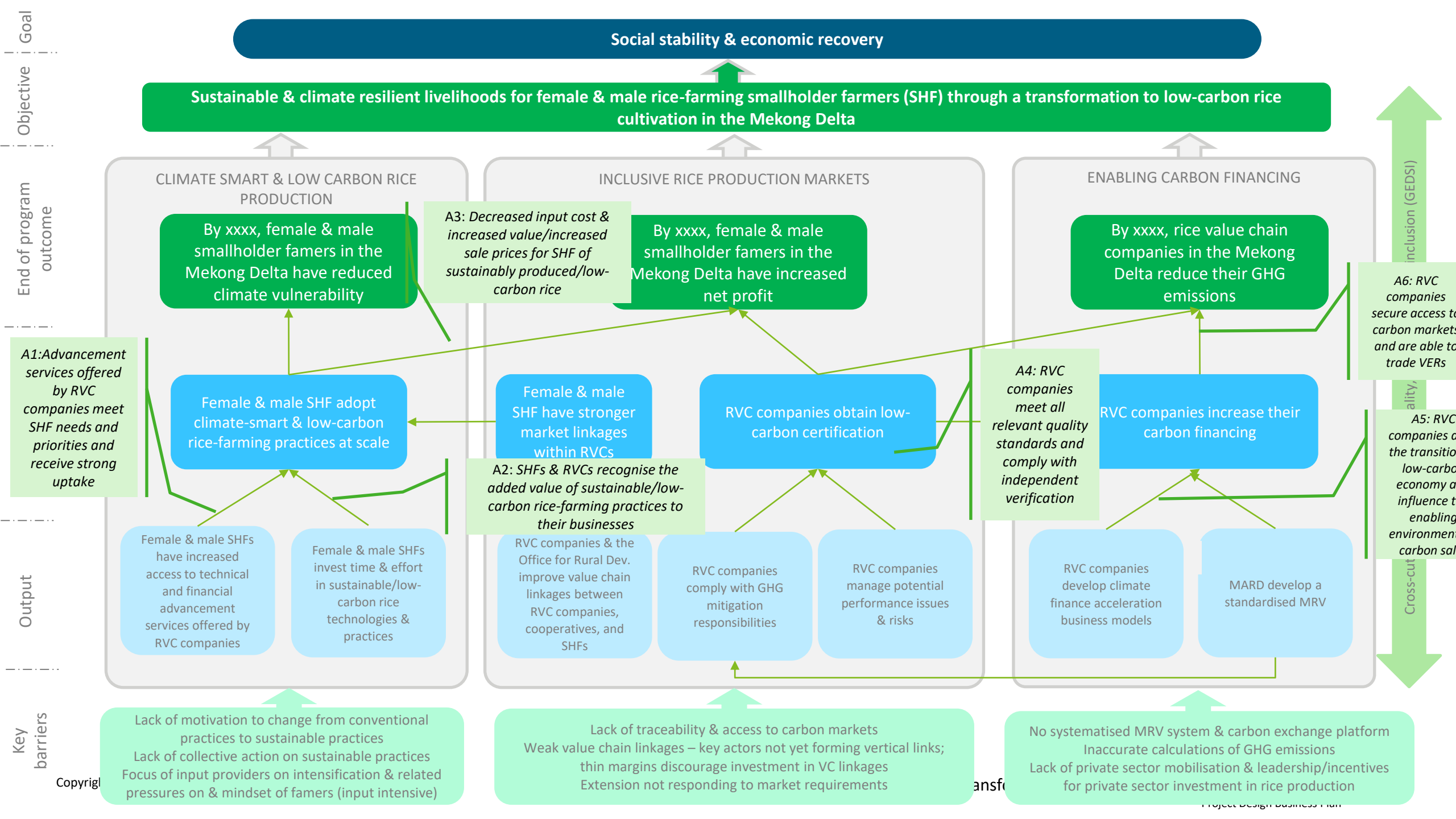
Goal
Objective
End of program outcome
Output
Key barriers
Social stability & economic recovery
Sustainable & climate resilient livelihoods for female & male rice-farming smallholder farmers (SHF) through a transformation to low-carbon rice cultivation in the Mekong Delta
CLIMATE SMART & LOW CARBON RICE PRODUCTION
INCLUSIVE RICE PRODUCTION MARKETS
ENABLING CARBON FINANCING
By xxxx, female & male smallholder famers in the Mekong Delta have reduced climate vulnerability
A3: Decreased input cost & increased value/increased sale prices for SHF of sustainably produced/low-carbon rice
By xxxx, female & male smallholder famers in the Mekong Delta have increased net profit
By xxxx, rice value chain companies in the Mekong Delta reduce their GHG emissions
A1:Advancement services offered by RVC companies meet SHF needs and priorities and receive strong uptake
Female & male SHF adopt climate-smart & low-carbon rice-farming practices at scale
Female & male SHF have stronger market linkages within RVCs
RVC companies obtain low-carbon certification
A4: RVC companies meet all relevant quality standards and comply with independent verification
RVC companies increase their carbon financing
A2: SHFs & RVCs recognise the added value of sustainable/low-carbon rice-farming practices to their businesses
Female & male SHFs have increased access to technical and financial advancement services offered by RVC companies
Female & male SHFs invest time & effort in sustainable/low-carbon rice technologies & practices
RVC companies & the Office for Rural Dev. improve value chain linkages between RVC companies, cooperatives, and SHFs
RVC companies comply with GHG mitigation responsibilities
RVC companies manage potential performance issues & risks
RVC companies develop climate finance acceleration business models
MARD develop a standardised MRV
Lack of motivation to change from conventional practices to sustainable practices
Lack of collective action on sustainable practices
Focus of input providers on intensification & related pressures on & mindset of famers (input intensive)
Lack of traceability & access to carbon markets
Weak value chain linkages – key actors not yet forming vertical links; thin margins discourage investment in VC linkages
Extension not responding to market requirements
No systematised MRV system & carbon exchange platform
Inaccurate calculations of GHG emissions
Lack of private sector mobilisation & leadership/incentives for private sector investment in rice production
inclusion (GEDSI)
A6: RVC companies secure access to carbon markets and are able to trade VERs
A5: RVC companies a the transitio low-carbo economy a influence t enabling environment carbon sal
Cross-cut

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Assumptions for the Theory of Change

The Theory of Change for the TRVC Project is underpinned by a number of key assumptions.

Assumptions for the Theory of Change

1

Increasing the rice quality that SHFs sell will increase overall profits for enterprises

- Improving rice quality means adopting sustainable farming practices that decrease input usage and utilize more efficient farming techniques. These result in reduce costs relating to inputs, labor, etc. The higher rice qualities (organic, bio-rice, SRP certified, etc.) will also fetch higher prices when SHFs sell their rice to competitors. The combination of higher prices and lower costs should increase profit margins.
- The prize is designed to help competitors offset the costs of pushing adoption of new farming practices relating to farmer training, field monitoring and verification, and paddy purchases.

Risk: Reduced prices/demand for high quality rice or other economic/climate shocks could decrease SHF profits, reducing adoption of farming techniques/input packages, and lowering productivity.

2

Domestic and international demand for premium rice is increasing

- Premium rice types such as SRP certified, bio-rice, or organic rice are typically cost more to produce due to field monitoring/audit requirements, training, and infrastructure changes to accommodate quality standards. These higher costs however are accompanied by a premium in sales price due to the improved quality. Consumers are willing to pay more for this rice due to the increased transparency in production, improved safety and health outcomes, and its positive environmental impacts.
- As consumers become more aware of the benefits of premium rice, including the increasing need to shift to more sustainable practices, their demand for these products will increase and will be willing to pay more for them.

Risk: The growth in demand for higher quality rice is not as prevalent as anticipated which could lead to underachieving revenue growth and decreased motivation for transitioning to sustainable rice

3

Decreased measurements of inputs are due to increased efficiencies of methods/technologies as opposed to being a result of lower application due to lower production/yield goals

- Many of the more sustainable rice practices (SRP, 1M5R, 3R3G, etc.) involve some level of input reduction to improve efficiency and quality of rice production while decreasing costs.
- Even though input usage decreases, quantity of rice production should not decrease as the approach is typically accompanied by other inputs and/or techniques to ensure improvement of quality and financial benefits of the rice production, such as using higher quality seeds or other efficiency improving methods.

Risk: Competitors decrease their input usage to decrease their GHG emissions reductions to achieve a favorable result for the purpose of the Activity, which is focused on GHG emissions reductions.

4

Farmers, not only competitors, will see the increased benefits of producing premium rice and will sufficiently adopt the sustainable practices throughout the Activity and beyond.

- Many of the farmers that will participate in the Activity will be doing so as part of a contracted cooperative/farmer group that typically uses some or all the inputs provided by the buying enterprise as well as adopt many of the production techniques required. Even though the input mix and farming techniques will yield premium sales prices for the competitors, the approach will also result in farmers selling their rice paddies at a premium.

Risk: There is the possibility that farmers will not see the benefits of altering their production practices to more sustainable ones to produce premium rice. While there are premiums, the premiums amounts may not be enough to properly incentivize them to change their ways.

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Project Context: The RVC in the Mekong River Delta

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Rice Value Chain Overview

Value Chain Actor Roles

Domestic Wholesalers/ Retailers

Sell rice for domestic consumption; typically wholesalers, traditional retailers (small stores), or modern retailers (supermarkets)

Input and Service Providers

Provide inputs (seeds, fertilizer, pesticides, etc.) and services (drying, land preparation) for rice producers

Exporters

Export rice to other markets such as the U.S., EU, Middle East, Europe; typically large enterprises

Producers (Farmers)

Produce rice on mostly fragmented, small fields. in the Mekong

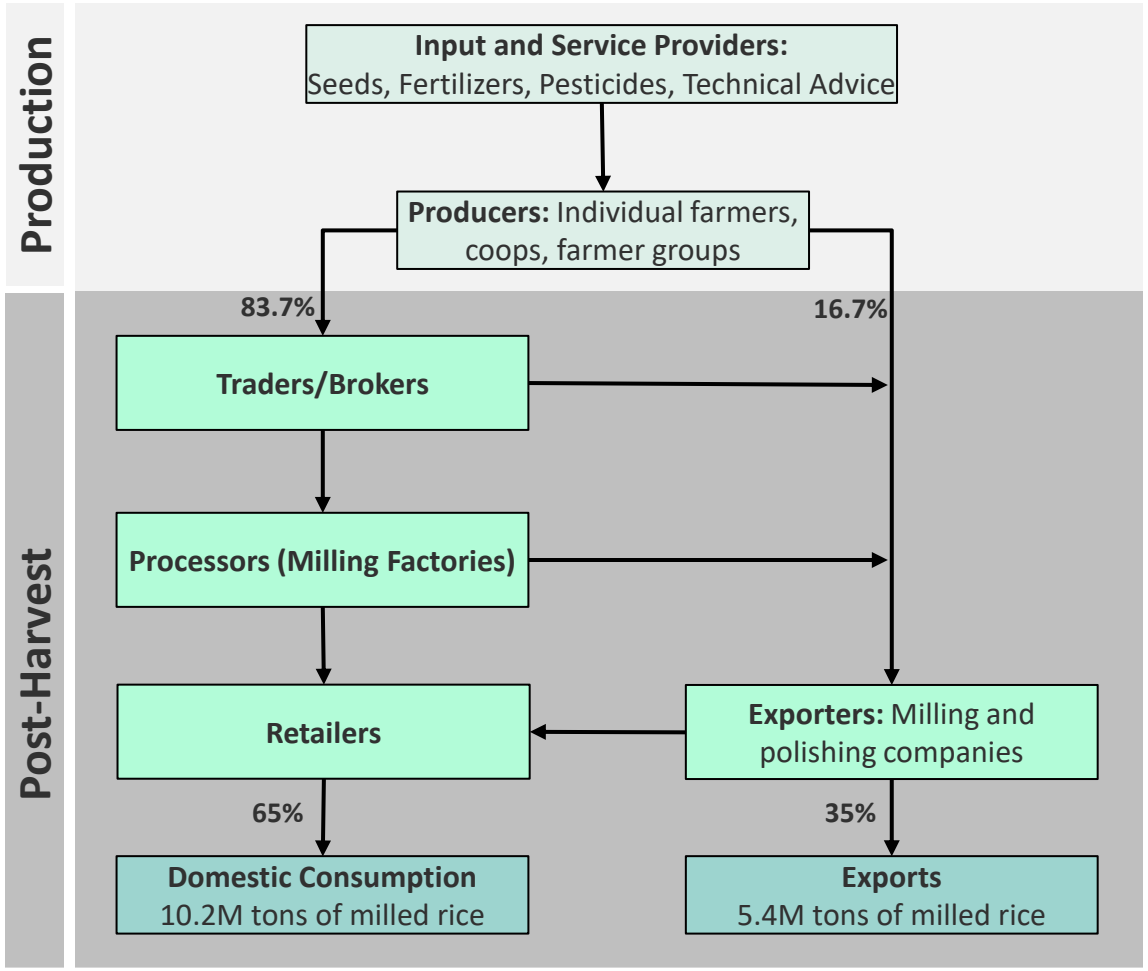
Processors (Milling Factories)

Involved in a combination of **de-husking, de-branning, or polishing**

Traders/Brokers

Operate independently and are not bound to specific farmers or buyers; about 8% represent a specific rice mill. Typically small, multi-enterprise businesses without a physical warehouse or shop

Value Chain Map of An Giang, Dong Thap, and Kien Giang



Rice Production in Target Provinces

Information (2021)	An Giang	Kien Giang	Dong Thap
Planted Paddy Area (Thousands of Hectares) (Spring/Autumn/Winter)	624.9 (230.4 / 390 / 4.5)	715.7 (284.4 / 372.9 / 58.4)	504.4 (196.1 / 308.3 / ?)
Yield of Paddy (Tons/ Hectares) (Spring/Autumn/Winter)	7.31 (8.48 / 6.65 / 5.03)	7.29 (8.40 / 6.16 / 5.02)	7.30 (8.07/ 6.81 / ?)

Challenges and Opportunities Facing Rice Value Chain Actors

	Input and Service Providers	Producers (Farmers)	Traders/Brokers	Processors (Milling Factories)	Domestic Wholesalers/ Retailers	Exporters
Challenges	• Limited extension agents and drying services per commune • Machinery manufacturer supply is limited due to inadequate technical and financial capacity.	• 75% farmers sell discounted "wet paddy" due to limited access to dryers • Still improving traceability component to track/verify "premium" products reduces farmer incentives • Many farmers don't use AWD optimally due to inadequately accurate water-level measuring • Tough to fully comply with and verify all quality standards (SRP, MRL, etc.)	• Have vested interest to disrupt/ discourage stronger direct SHF-processor linkages • Provide complicated and inconsistent information which does not help farmers sell their products at the right market price • Rice quality from traders is not homogenous because they buy rice from many different fields	• Direct supply contracts with farmer organizations, especially for high-quality rice, mostly benefit the millers/exporters • Focus on Maximum Residue Limits (MRL) makes it difficult for SHF to meet quality standards; inadequate premiums may disincentivize SHF to adopt seed/ fertilizer/ water-saving farming strategies	• Modern retailers sell pre-packaged and labeled rice at higher prices than traditional retailers, and their share of the domestic market is low	• Export markets, particularly lower income countries, have high demand for Vietnam's low rice quality and prices. This disincentivizes farmers from producing/selling premium rice to exporters • High costs for switching SHF to organic/ high-quality production. • Companies are heavily guided by consumer demand as opposed to just sustainability goals. Some companies (Olam) do not currently see sufficient demand that justifies scaling • Value of high-quality export rice is < in domestic markets
Opportunities	• Farmers have shown a willingness to adopt new inputs provided by firms • Farmers have a high participation rate for technical training sessions provided by enterprises (via co-ops and farmer groups) on new sustainable practices/inputs • Vietnam-developed varieties gaining traction on the global stage – Vietnam variety was selected as best global rice in 2021	• Sustainable farming methods and informed management of inputs can significantly reduce emissions and increase profits • Companies are eager to engage SHF to produce high-quality rice and SHF are aware of their financial/ environmental benefits • Companies and DARDs are purposefully promoting the LFM to expand sustainable practices to more farmers • Many farmers already collect some level of farming data	• Online rice brokers link suppliers with rice purchasers on a variety of rice types (jasmine, etc.) **Not sure if online trading is as commonplace** • 71% of traders sell through "rice intermediaries" who link to factories this adds costs and reduces direct links	• Mill rice recovery rate is low (62.5%) vs. modern milling systems (70%). This is partially due to inadequate drying facilities at farms, requiring rice to be milled twice – first as wet paddy on farm then at govt mills.	• Studies show domestic consumers care for food safety, organic agricultural products, and eco-labeled aquaculture products and may be willing to pay a 9% to 29% premium on certified sustainably produced rice • Domestic demand for high-quality rice (with more transparency and traceability) may be higher than export demand	• Many companies are making expansion of high-quality rice a priority whether it is due to growing demand or goals and public image of sustainability • Growing demand (and high prices) for organic/ low-carbon rice • Existing capacity to export means firms in MRD can take advantage of buyer demand for sustainable rice • New EU CBAM tax will require more stringent sustainable practices and traceability

Assessing Rice Company – SHF Engagement Models in the MRD

Rice companies in the MRD are at various stages of complexity with respect to their engagement with SHF. Below provides an overview of different rice value chains across the spectrum of quality and contracting models. TRVC should aim to incentivize companies to shift them towards the target value chains below.

Standard Quality Rice

Companies buy rice from farmers, cooperatives, or traders without contract farming which leaves SHF vulnerable to market volatility and pressures. Quality standards are low, and rice is primarily sold to low-end Asian markets and domestic markets. This rice value chain is dominated by farmgate traders who offer farmers little value beyond promise of immediate income.

For TRVC – there is value in targeting these SHF to scale up to low-carbon rice farming since there is greater room for improvement/potential for GHG reductions.

Examples: Most traders and millers work with standard quality rice

TRVC Target Value Chains

Low-Pesticide Rice

Companies contract with farmers to purchase rice with pesticide application standards to meet maximum residue limits (MRL) for higher-quality domestic or export markets like China and Philippines. Inputs may or may not be provided at a partial subsidy or on credit. Some premiums for farmers.

For TRVC – would need to improve AWD and other protocols – may not be economically sustainable.

Examples: Agrimex, Hoang Minh Nhat

High Quality/SRP/Bio Rice

Companies contract with SHF or coops and dictate input amounts, farming practices and timing, and harvesting and storage practices, with stricter MRL requirements. Companies verify quality standards throughout the growing season through site visits, especially at harvest. Rice is sold at a premium in local or export markets like EU, US, Japan. High premiums for farmers.

For TRVC – may need to add AWD to qualify. Integrated rice/ shrimp systems need further research on GHG reduction potential.

Examples: Trung An, Thuan Minh

Organic Rice

Companies contract with and provide significant training to farmers on input amounts, farming practices, storage, and purchases. Rice is certified by third-party verification bodies that include on-farm visits. Most organic rice is exported and is generally of the highest value. High premiums for SHF.

For TRVC – may need to add AWD to qualify, but AWD adds challenge due to strict inputs requirements.

Examples: Co May, Hong Tan

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Large Field Models (LFMs) Have High Upside for Quality Production, but Limited Uptake to Date

Some areas of the MRD have seen farmers organize (either themselves or through private sector encouragement) into large, commonly managed production areas to 1) help promote adoption of improved technologies and standardized practices and 2) improve stability in the output markets for farmers. Despite a decade of push by the GOV, only about 10% of rice production areas in the MRD is farmed using one of the below models:

	Model 1 (Shareholders)	Model 2 (Contract Farming)	Model 3 (Leases and Sales)
Description	• Farmers contribute land, labor, machinery, money, etc. which is priced and counted as shares. Annual profit is also divided based on shares • Production is decided in shareholder meetings • Farmers have flexibility in how they want to participate (on-farming vs off-farming vs other jobs)	• Farmers sign contracts with coops or enterprises with an agreed upon quantity and price for rice • Farmers receive inputs, improve their technical capacity, and maintain control over production • All advance investment contracts are paid at the end of the season once the farmers sell their outputs	• Farmers or the government sell or lease their land to enterprises or cooperatives and do not participate in the production. The government can also gather the land from farmers, build the required infrastructure, then sell/lease the land to enterprises • Enterprises determine production activities
Application	• Duc Hue Cooperative in Dong Thap uses this model. Their minimum area to participate is 1.00 ha, which is larger than the average landholding in the province	• Loc Troi Group operates a contract farming system in the Mekong. They provide inputs, access to finance, and technical support to contracted rice farmers, particularly those producing SRP verified rice	• Duc Hoe Cooperative and Phu Cuong commune in Dong Thap both sign contracts with farmers to use their land
Challenges	• This model is relatively new, so there is hesitancy to partake • Shareholder meeting decision-making can be lengthy • Farmers all share all risk	• Contracts are often breached due to market price volatility • Lack of legal oversight to ensure fair process between farmers and enterprises	• Requires a large amount of investment all at once • It take as long time for enterprises to finalize the process when directly working with farmers

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Several High-Quality Rice-Growing Techniques Have Been Promoted through Recent MRD Programs

1M5R (1 Must, 5 Reductions)

This approach requires using certified seeds and reducing seed quantity, fertilizer use, water use, pesticide use, and post-harvest losses. This approach is a more recent update to the 3G3R approach promoted by the Government of Vietnam.

- Major barriers: Not fitting with farmer's cropping pattern, too difficult to apply, and weather conditions
- Natural fertilizers can reduce 40-50% of GHG emissions

Previous Projects:

- VNSAT (2017): 1M5R applied in the Red River Delta led to a 10% yield increase in winter-spring and 2% increase in summer-autumn; net income increase of 7% and 17%, respectively; and GHG emissions reductions by 26.6%-29.67%, respectively
- ACP (2013): 15MR applied in the Mekong Delta led to a reduction in seed use (29-50%), inorganic fertilizer use (22-50%), water use (30-50%), and pesticide use (20-33%). This led to a 29-67% profit increase, production cost decrease of VND4M/ha, and a 5.2-7.9% increase in rice yields

Alternate Wetting & Drying (AWD)

This is an irrigation method of watering rice paddy fields by allowing fields to intermittently drain before re-applying irrigation water to the non-flooded fields (1-10 days later) as opposed to constantly flooding the fields.

- AWD requires high initial investment costs and that fields are level so that flooding reaches all rice plants
- Continuous measurement is required to get the correct quantity and timing of paddy field flooding
- While AWD can lower methane emissions, it could potentially increase nitrous oxide emissions
- Significant emissions reductions occur when comparing AWD surface drying vs. 8 cm below to continuous flooding. Difficult to MRV water levels
- Low incentives for continuing AWD unless profits rise

Previous Studies:

- IRR Study: Consistent AWD application can reduce GHG emissions by 30-70% without affecting yields
- JIRCAS Study: AWD farmers in An Giang were able to maintain yields while reducing inputs (including water) leading to a17% increase in N_2O emissions but also decreases in LC-GHG (41%), soil CH_4 (47%), and non-soil GHG (burning straw and other management (9%)

Sustainable Rice Production (SRP)

SRP provides a framework for instilling climate-smart rice production practices relating to farm management, pre-planting, water use, nutrient management, integrated pest management, harvest and post-harvest, health and safety, and labor rights.

- Farmers can acquire SRP certification if abiding by the 41 SRP requirements, which can yield rice premiums and a reduction in input costs.
- Farmers have limited direct access to large-scale SRP markets, so they rely on large rice enterprises

SRP Verification Process

1. Self-assessment to identify and address any gaps
2. An on-site audit to ensure SRP compliance
3. Receipt of SRP verification valid for 1 year

Case Study: Loc Troi piloted the SRP model to 150 farmers in 2016 and expanded its application since then. Farmers cultivating SRP rice reduced costs by $60/ha while Loc Troi enjoyed a $6/ha sales price premium for SRP-certified rice

Other practices that have potential to contribute to reduced GHG emissions:

- **Internet of Things (IoT):** This method uses technology to improve the rice production process. This can involve the use of water sensors (smart irrigation systems) that can help farmers better determine optimal water usage and frequency. Irrigation can be further automated through wireless links and an internet infrastructure. Feasible for larger competitors v. SHFs.
- **Rice Straw Management:** This method requires properly disposing of rice straws/residues instead of farmers leaving them on the field (methane release) or burning them (methane, nitrous oxide, soot release). Rice straws can be sold or used in a more sustainable manner such as a fertilizer, animal fodder, biofuel, or bioplastics. Rice straw can also be mechanically collected with balers to ensure a quick turnaround for getting the field ready for the next cropping season. Reduced straw is a new component of a proposed GVN "1M6R" strategy.

Organic Rice is a Rapidly-Emerging Production Area in Response to Global Demand

Organic rice is a relative newcomer to the MRD, emerging in 2015 and expanding to over 2,000 ha by 2021. Organic agriculture is a holistic farming system that prohibits the use of chemical pesticides, antibiotics, and chemical fertilizers with the goal to enhance soils, increase biodiversity, and improve long-term sustainability of production.

There are two certified organic rice systems currently operating in the MRD:

1) ***Organic rice production in intensive farming areas***
2) ***Organic shrimp-rice farming systems***

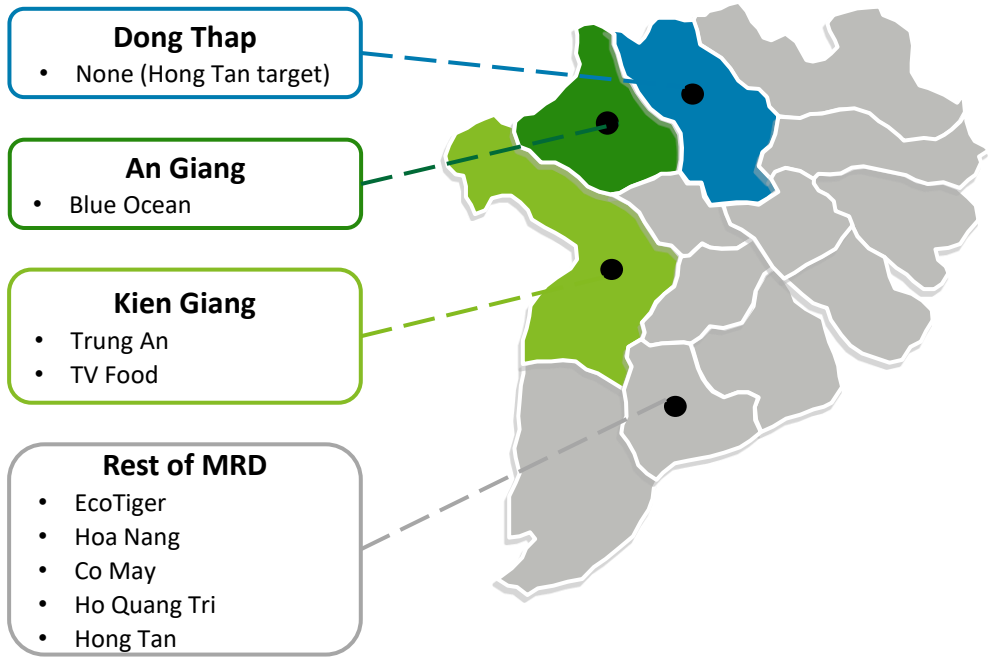
These rice production systems generally have ***increased production costs*** and ***reduced yields***, while generating ***significantly higher prices and profit*** for farmers (as shown in the table):

Category	Production Costs	Yields	Selling Price	Profit
Standard Organic	>18-40%	<7-33%	>700-800%	>10-100%
Rice-Shrimp Organic	<14%	<5-17%	>25%	>14-39%

Expanding organic farming is a priority of the GVN.
An overview of ***challenges*** and ***opportunities*** in organic rice farming expansion is below:

Challenges	Opportunities
• Costly to switch to organic production • Farmers do not understand benefits • Weak market linkages make transition risky for farmer	• Politically supportive environment • High global demand and prices • Emerging base of companies and coops producing certified organic rice

Companies Producing Organic Rice by TRVC Target Province



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Prior Emissions Reduction Projects - Case Studies

In addition to AgResults, several projects, outlined below, have demonstrated the economic viability of promoting GHG-reducing farming practices among SHF.

Market Oriented Smallholder Value Chain (MSVC) Project

Olam International, GIZ, MARD (2018-2022)
Objective: Improve livelihoods of +35,000 SHFs in Vietnam, Thailand, and Indonesia; scale up the promotion of sustainable rice by complying SRP standards; form lasting business relationships between local farmers & millers

- Olam helped train farmers on applying SRP standards to their farming practices such as AWD and input use reduction
- Olam provided farmer incentives and created market linkages between cooperatives and millers to buy paddy directly from the farmers in the Mekong

RESULTS

- ✓ 10,000 farmers in the Mekong had incomes increased by 17%
- ✓ Farmers in the program's trial plots reduced water usage by up to 40% and N-P-K fertilizer usage by up to 15%
- ✓ The rice quality of up to 150,000 tons of paddy improved to international standards which could open up Vietnam rice to new markets in the U.S. and EU
- ✓ Most SHFs recorded +50% increase in scores verified by SRP

Closing Rice Yield Gaps (CORIGAP) in Asia Project

IRRI, SDC, CGIAR, ACIAR, WBG
Objective: Improve food security, promote gender equity, and alleviate poverty through optimizing productivity and sustainability of irrigated rice production systems

- Assessed needs and constraints among farmers and other stakeholders along the value chain and develop schemes to monitor and evaluate improved rice systems of the IRRC technologies
- Developed novel mechanisms for outreach and scaling out, including farmer participatory videos, business model development, and strengthened market integration of farmers

RESULTS

- ✓ Project reached +700k farmers across 6 countries; adopted best practices increased rice yield 11-20%, profit 15-25%.
- ✓ In Vietnam, yields were higher than control fields by 0.5 to 1.0 t/ha, pesticide use reduced by 50%, and net income increased 7-9% in Winter-Spring and 7-18% in Summer-Autumn.

Vietnam Sustainable Agriculture Transformation (VnSAT) Project

IRRI, WBG
Objective: Develop rice and coffee production in the Mekong Delta and the Central Highlands through improving practices, investing in processing infrastructure, and connecting with agri-businesses

- Provided +800,000 SHFs technical training on improved rice cultivation techniques including 1M5R practices
- Established and consolidated farmers' organizations, including cooperatives and cooperative groups
- Supported construction of nurseries and water-saving irrigation models while completing disbursement of all allocated credit capital worth US$105 million. Measured using static chambers.

RESULTS

- ✓ Reduced greenhouse gas emission: 1,582,299 tons of CO2 equivalent from the targeted 1,000,000 tons (158%)
- ✓ Increased net profit per hectare: 31.6% from the targeted 20% for rice
- ✓ Areas with sustainable farming practices: 184,643 hectares from the targeted 150,000 hectares for rice (123%)

Project Design

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Prize Competition Objectives & Process

Prize Competition's Key Objectives:

1. **GHG Emissions Reduction:** Reduce GHG emissions by 200,000 tons of CO2e by encouraging sustainable farming practices that reduce chemical fertilizer, pesticide, and water consumption.

2. **Improve SHF Livelihoods:** Reach 350,000 smallholder farmers (cumulative over six growing seasons) throughout the MKD region and attain smallholder farmer profit margins of 30% or more.

Prize Mechanism to Achieve Objectives:

Seasonal prizes will be awarded to each competitor who successfully reduces at least 100 MT of CO2e emissions for each crop season (2 crop seasons per calendar year). There will also be a grand prize will be awarded at the end of the competition in 2027 for the top five competitors with the most cumulative CO2e emissions reductions and help rice farmers achieve project income targets.

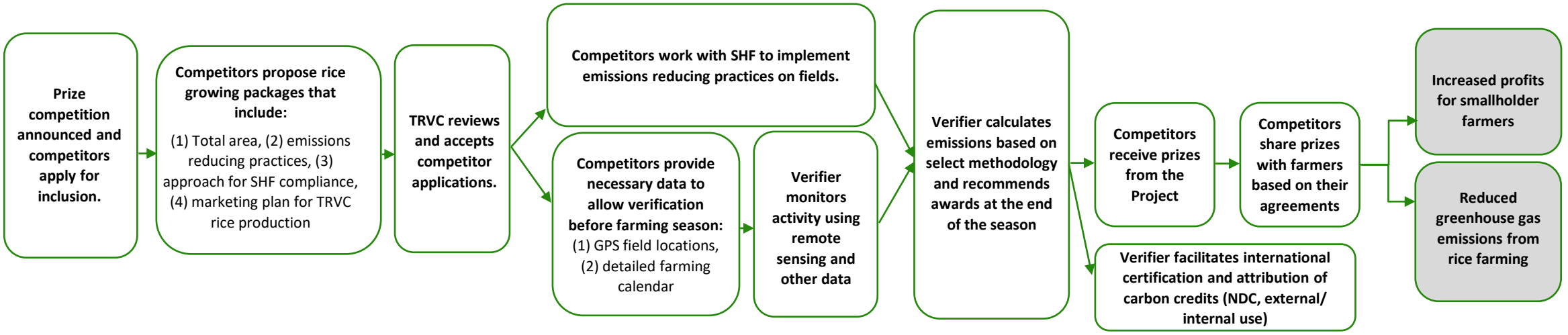
Seasonal Prizes (2x per year) =

Per-unit prizes OR Proportional prizes if the seasonal pool cap is reached *(see next slide for details)*

Grand Prize =

Placement	Prize (AUD)
1st	300,000
2nd	250,000
3rd	200,000
4th	100,000
5th	50,000

Transforming Rice Value Chain Project Overview



Prize Structure Details

Prize competitions tend to benefit larger companies with more resources and existing presence. To encourage participation by companies of different sizes and sophistication, the following prize structures are recommended:

Seasonal Prizes

These prizes are designed to encourage companies of all sizes to participate and reduce as many GHG emissions as possible. There will however be seasonal prize pool caps *(see next slide)* for each crop season. The payment structure of the seasonal prizes depends on whether the seasonal prize pool cap is reached using the per-unit method for each crop season.

- **Per-unit Approach:** TRVC will first attempt to pay the seasonal prizes out based on a per-unit schedule of prizes *(see next slide)*; for every metric ton of GHG emissions reduced, the competitor will receive an AUD prize amount. If the calculated total payout of seasonal prizes to all competitors **exceeds the seasonal prize pool cap**, then TRVC will use the proportional approach…..

- **Proportional Approach:** In this approach, competitors will be paid proportionally based on how much GHG emissions they reduced that crop season out of the total emissions reductions among all competitors. The proportional prize payments are awarded from the seasonal prize pool cap amount.

End-of-Competition Grand Prizes

These prizes are designed to encourage greater scaling by larger companies that may otherwise have less incentive from a per-unit prize structure.

The grand prize amounts are designed to generate excitement and bring awareness to the winners – more enticing to larger firms than a monetary prize.

Prizes will be awarded to companies with greatest cumulative total GHG emissions reductions at the end of the six crop seasons:

1st Place	**AUD 300,000**
2nd Place	AUD 250,000
3rd Place	AUD 200,000
4th Place	AUD 100,000
5th Place	AUD 50,000
Totals	*AUD 900,000*

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Seasonal Prize Payment Structure Details

The seasonal prize allocations depend on whether the initial per-unit prize approach exceeds the seasonal prize pool cap (**Table 1**). This is a measure of cost control as the project would like to encourage as much farming land participation as possible but need to be cognizant of total potential prize spending.

Table 1	Y1, Crop 1	Y1, Crop 2	Y2, Crop 1	Y2, Crop 2	Y3, Crop 1	Y3, Crop 2	Total
Seasonal Prize Pool Caps (AUD)	100,000	175,000	275,000	275,000	275,000	275,000	**1,375,000**
"Ideal" Seasonal Prize Pool Caps (AUD)	200,000	350,000	550,000	550,000	550,000	550,000	**2,750,000**

Note: These prizes have been designed to be scalable in the event that more funds can be allocated to the seasonal prize pools. We expect most seasons to exceed the pool caps given pre-competition surveys of high expected participation, but the limited prize pools as currently budgeted may discourage greater scale.

1. Per-unit Approach: TRVC will calculate the potential seasonal prize payouts using the per-unit payment schedule in **Table 2** (below) for each competitor's GHG reductions for the season. As any competitor hits the MT threshold for the next tier, the subsequent MT reductions will be paid out at the higher per-unit price until the seasonal total hits the tier after that. If the total calculated payout for all competitors is **below the corresponding cap** in **Table 1**, then TRVC will use this payment structure.

- *Illustrative Example: The total estimated prize for that season is below the cap. Competitor Y contributed to 3,000 MT of emissions reductions. Competitor Y's seasonal prize reward is therefore **AUD 9,500** (1,000 * 2.50 + 2,000 * 3.50).*

Table 2

GHG Emissions Reductions Tiers	Base per-unit prize
First 1,000 MT reduced (per season)	AUD $2.50 per mt each season
1,000 – 5,000 MT reduced (per season)	AUD $3.50 per mt each season
5,000+ MT reduced (per season)	AUD $4.50 per mt each season

2. Proportional Approach: If the total calculated payout using the Per-unit Approach is **higher than the seasonal prize pool cap**, then TRVC will award prizes proportionally based on how many emissions each competitor reduced compared to the total emissions reductions for that season. The proportional prize payments are awarded from that season's prize pool cap.

- *Illustrative Example: The total estimated prize exceeds the prize cap for that crop season. Total GHG emission reductions for all competitors is 80,000 MT where Competitor X contributed 10,000 MT of reductions. Competitor X's proportion of the seasonal prize pool is 12.5% (10,000/80,000) which means that their seasonal prize reward is therefore **AUD 20,625** (12.5% * 165,000).*

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Additional Incentives to Participation

Beyond the monetary awards, we anticipate companies will be motivated to join the competition for several reasons, including the following:

Additional Motivations to Participate in TRVC:

- Certification of GHG emissions reductions
- Opportunities for companies to improve branding to take advantage of marketing/ CSR
- Ability to create low-carbon rice brands
- Preparing companies to be ready for carbon neutral operations and/ or potential future carbon taxes
- Potential to receive capacity building and support pre-contest, including AWD/ GHG mitigation optimization training
- Facilitated opportunities for engaging with more coops/ SHFs
- Opportunities to address GEDSI within supply chains/ operations.

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Project Timeline, Milestones, and Project Management Activities

Timeline	Project Manager Key Activities During Project Implementation
Year 1	• Review Competitor applications and select competitors for project participation. • Enter into legal agreements, which include competition rules, with all participating competitors. • Provide high level of administrative support and assistance to competitors as they begin working with input providers. • Help coordinate between competitors and the verifier to ensure that ongoing verification activities are proceeding. • Report any implementation roadblocks or challenges to the Project Manager and work to mitigate those challenges.
Year 2	• Ongoing activities including competitor recruitment (Year 1 and 2 only), review of emissions reducing practices, dispute resolution, etc. • Monitor changes in the regulatory and political environment. • In Year 3, in addition to implementing the final year of the project, the Project Manager will lead the coordination of project's closeout.
Year 3	

Recommended Considerations for Competition Rules

Clear, objective, and transparent competition rules are requirements for a viable prize competition. Considering the desk research and field validation discussions with key stakeholders, we recommend the following considerations for the project's competition rules document:

Eligibility.	• Applicants must be for-profit companies legally registered to do business in Vietnam. • Firms must have existing demonstrated relationships with farmers and/ or farmers groups and/ or cooperatives in Kien Giang, An Giang, and/ or Dong Thap provinces. • Firms with multiple branches or that are majority owner of another company may apply only once. • Firms will be allowed to join the competition during the application period that will occur in September/ October of each project year.
Technology	• Firms must agree to use some combination of 1M5, SRP, AWD, Post-harvest Rice Management, and/ or Organic production practices. • Partner farmers must follow the proposed practices as closely as possible given weather events and other *forces majeure and* must keep detailed farmer diaries that TRVC can audit at any time. Any areas deemed to not be following the technologies may be removed from consideration for that growing season.
Area	• All project production areas must be physically located in Kien Giang, An Giang, or Dong Thap provinces. • Must register at least 100 ha per season to be eligible. • All submitted production areas must be at least 1 ha in size, or as otherwise required by the project Verifier. • **In the first competition crop season (i.e., Winter-Spring 2023-2024), the maximum area allowed for each competitor is recommended to be 1,000 ha to mitigate risk and test the verification methodology**. In subsequent years, there will be no limit to the area that each firm can include in the competition.
Prizes	• Firms must provide evidence of how partner farmers will financially benefit from project participation (i.e., increased profits, prize award sharing, carbon credit allocation to farmers). • Firms must pass a simple pass/fail by SNV for each of the following criteria: 1) formulate inclusive rice value chains with GEDSI considerations; 2) reduce input costs; and 3) ensure 30%+ profit margin for participating farmers. Firms must also reduce at least 100 MT CO2e per crop season to be eligible for seasonal prizes.
Verification	• Firms must agree to provide SNV and all information needed to calculate GHG emissions. This includes but is not limited to: GPS coordinates of fields (four corners); current farmer practices in production areas; proposed farming practices including specific input amounts, timing of events, and yield amounts.
Timing	• The competition will take place in the Winter/ Spring (~Nov – March) and Summer-Fall (~April – August) crop seasons. • Prize awards will be calculated at the conclusion of each competition year and paid upon validation of results by TRVC.
Other	• Firms must provide equal opportunity for women and disabled farmers to participate in the competition.

“Push” Elements in the Pull Design

Based on the current state and operating models of private sectors companies in the MRD, we recommend that the Project Manager engage in light-touch “push” support actions to increase the effectiveness and uptake speed of GHG emissions-reducing rice farming practices among SHFs:

	Improving general understanding of GHG-reducing farming practices	Facilitating stronger engagement and linkages between companies and SHFs
Considerations	Companies in the MRD have a varied level of understanding of GHG-reducing practices and lack clear methods to reduce GHG emissions while satisfying market/customers. SHFs have an even greater learning curve of how to reduce GHG emissions and how it can benefit them financially.	Many companies in the MRD are unsure of how or where to scale quality rice production which requires myriad considerations. SHFs may also be wary of embracing out-grower schemes and sustainable practices due to past experiences or general uncertainty.
TRVC Recommended Tasks	TRVC recommends SNV work with the DARDs to: • Conduct open training workshops to generally inform about sustainable practices with emphasis on AWD technology. For companies that require it, provide 1-on-1 expert reviews on the proposed packages and how best to scale • Coordinate the roles of Women’s Union and Organization of Disabled People to support GEDSI mainstreaming activities	TRVC recommends SNV work with the DARDs to: • Oversee contract negotiations to ensure transparency and trust to strengthen contract successes for all stakeholders. Primarily act as an observer and only intervene to settle disputes • Determine effective avenues of increasing participation of women/ disadvantaged groups in the competition, including in off-farm activities relating to business, trading, and translating • Work with SNV to co-review applications from companies and suggest suitable project areas to expand to with regards to AWD feasibility and capacity-building

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Considerations for the Project's Advisory Council (AC)

The AC will provide SNV with technical advice, progress reviews, and support to troubleshoot challenges during project implementation. Key considerations are provided below:

Tasks

The AC will provide the following services:

- Quarterly meetings (virtual + in-person) to assess project progress, including one mid-season evaluation and one post-season meeting focused on lessons learned
- Support to SNV's competitor selection process
- Review and validation of verification protocols and results
- Ad-hoc engagement to troubleshoot project challenges and recommend solutions
- Contest Rule adjustments following lesson learnt
- Promote TRVC's visibility and synergies nationally and internationally (scientific symposium, COP, CSA, Low carbon forum, etc.)

Members

The AC will be led by Deloitte as coordinator and prize design specialist, and will include three technical specialists across three domains:

- Understanding of rice value chains in the MRD
- Private sector experience in rice sector
- Measurement, verification, and reporting in GHG emissions reductions in rice (particularly experience in remote sensing)

In addition, **the AC will include a GOV counterpart** (from the Crop Production Department of MARD), as well as a **representative from DFAT Australia**.

Cost

Estimated annual costs for each (non-GVN/ donor/ Deloitte) individual AC member:

- Labor: 10 days, AUD 750/ day, AUD 7,500 per member per year
- Travel costs will vary depending on home location for each member. It is expected that the AC will assemble once per year in person.

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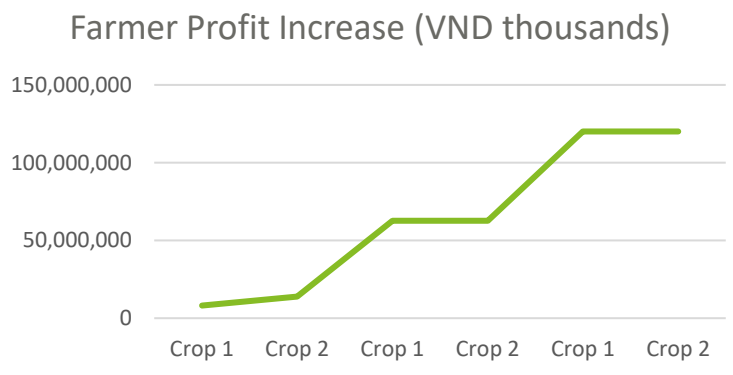
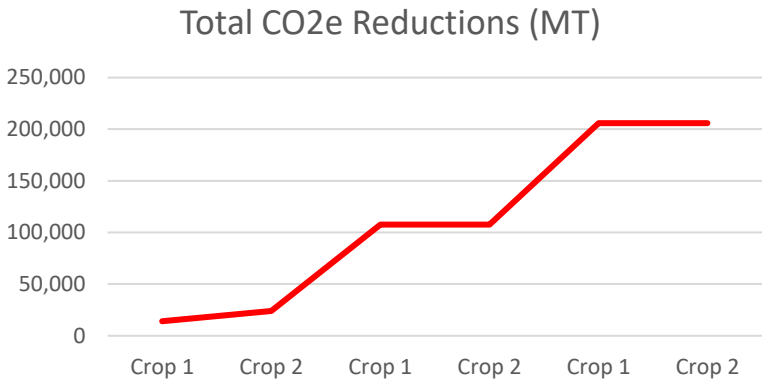
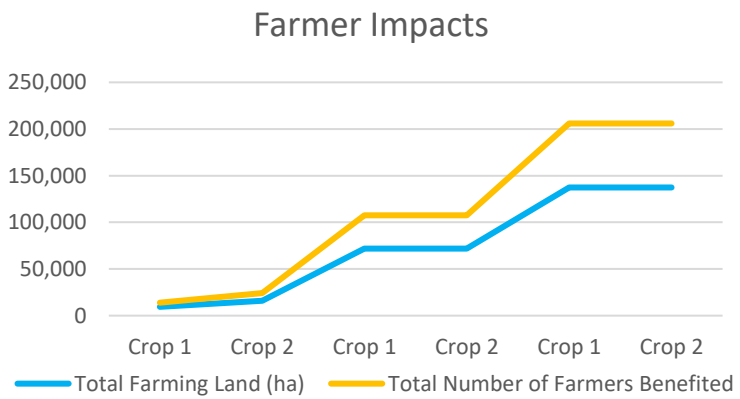
Estimating Project Impact

In order to estimate the expected productivity gains the pilot might expect to achieve on behalf of farmers, we have calculated expected impact based on prior project examples.

Estimated Productivity and Revenue Gains from the Project (See Annex for Detailed Calculations)







	Year 1 (2024)**	Year 2 (2025)	Year 3 (2026)	Totals
Total Competitors	20	20	20	20
Total Farmers	38,025	215,100	411,750	664,875
Total Hectares	25,350	143,400	274,500	443,250
Total Per-Unit Seasonal Prizes (AUD)	108,438	550,000	550,000	1,208,438
Total Grand Prizes (AUD)	-	-	900,000	900,000
Total Profit Increases (VND thousands)	22,181,250	125,475,000	240,187,500	387,843,750
GHG Reductions, mt (CO2e)	38,025	215,100	411,750	664,875

Projected/Max Prize Awards =

AUD 2.11 million

** as noted in the competition rules, there is a limit in the first season of 1,000 ha/ competitor, so Y1 amounts are reduced.

Key Assumptions

# of Competitors (Y1-Y3)	20
# of Farmers per Implementer	> 150
Organic Rice Profit Incr (VND/ha)	5,000
Hi-Quality Rice Profit Incr (VND/ha)	1,500

CO2e Reductions (tons/ha/crop)	1.5
Avg Start Size of Small Comp. (ha)	100
Avg Start Size of Med Comp. (ha)	500
Avg Start Size of Large Comp. (ha)	1,000

Competition Year	Farmer Growth Rate	Hectare Growth Rate
1	-	0 – 100%
2	465%	50 – 500%
3	91%	25 – 100%

***TRVC will require competitors to apply with the anticipation of working with a minimum of 100 hectares. Threshold selected to ensure that established or capable new businesses are joining. TRVC will also finalize and put in place a cap on prize awards per crop season during the finalization of contest rules to avoid dominance by one player or a cost overrun.**

Implementation Risks and Mitigation Strategies

Below are identified key risks to the successful implementation of the proposed prize competition.

1

Challenge: There are at least three other projects that will be implemented around the same time as TRVC that also focus on GHG emissions reductions: 1) TCAF by MARD and World Bank; 2) Sustainable RVC by SunRice Group and ACIAR; and 3) CarbonFarm/Fund Group. The other projects may target the same competitors, region, stakeholders, etc. that TRVC might. If so, some competitors may not participate in TRVC due to participation in other projects/competitions.

Mitigation Strategy: Engage early with the other ongoing/future projects to determine how TRVC can differentiate itself to potential competitors. Coordinate with the other projects to generally avoid duplication of effort, targeting the exact same competitors/regions, and consider points of collaboration.

2

Challenge: Reducing GHG emissions requires a degree of technical understanding of the drivers of emissions. Most companies operating in the rice value chain in the MRD are not familiar with the specific drivers of emissions, particularly the interrelated dynamics of input amounts and timing with water management.

Mitigation Strategy: Before starting Phase 1 of the competition, provide technical capacity training for the competitors to help them understand the drivers of GHG and are equipped to train farmers on best practices.

3

Challenge: The competition design is focused on companies as the drivers of uptake of emissions-reducing strategies. These strategies can generally be profit-increasing for farmers but do often result in lower yields. Some farmers may be hesitant to adopt these strategies if they are not aware of the potential overall economic benefit.

Mitigation Strategy: At the competitor recruitment stage, require competitors to describe how their methodologies to reduce emissions will also maintain (or increase) farmer profits – through a combination of higher farmgate prices and lower input costs, as well as prize-sharing and/ or carbon credit profit sharing as relevant.

4

Challenge: Prize competitions that emphasize scale, particularly when there are winner-take-all or proportional prizes, can often benefit larger companies with pre-established supply chain networks – in this case sourcing relationships with farmers and farmer groups.

Mitigation Strategy: Design a minimum prize award scheme so that even smaller companies operating on less than 1,000 hectares can benefit monetarily from the prize, while still encouraging scale through shared prize pools.

5

Challenge: The GVN has its own sustainable rice production strategies and plans, particularly the 1 Million Hectares Initiative, and may result in a lack of support for TRVC if not properly involved.

Mitigation Strategy: Engage GVN at the national level (MARD) as well as local levels (DARD) in all three provinces. Propose that TRVC outcomes contribute to 1 Million Hectares.

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Competing Donor-Funded Projects to Consider

It is important to consider the entire ecosystem of existing competitors and projects during the design phase. Below illustrates ongoing projects that could pose potential risk to the TRVC project. The project manager is encouraged to coordinate closely with these projects to leverage their investments – and minimize the chance of overlap.

	THE WORLD BANK	SunRice	DFAT	
Active Project	Transformative Carbon Asset Facility (TCAF)	Sustainable Rice Value Chains	Scaling Carbon Markets Access for Sustainable Rice Producers in Vietnam	Vietnam MRV - CarbonFarm
Organization(s)	**MARD – World Bank**	**SunRice Group - ACIAR**	**DFAT - IRRI**	**CarbonFarm – Rikolto – IRRI - DFAT**
Project Overview	Accelerate Vietnam's low carbon rice sector transformation from 2021-2030 by providing $100M results-based carbon/climate finance support (RBCF) to be paid against actual mitigation generation.	Establish a rice value chain with high yield, sustainability, traceability and quality assurance for short-grain rice throughout the Mekong Delta, benefiting rice farmers and meeting the requirements of SunRice's export markets.	Simplify and de-risk carbon markets access for rice producers in Vietnam, by developing a framework to reduce methane emissions and provide a cost-effective, practical pathway for Vietnamese farmers to generate new income streams.	Train and support Vietnamese rice producers in more sustainable rice farming and pilot an innovative Measuring, Reporting and Verification (MRV) method using artificial intelligence and satellites to quantify methane emission reductions.

Potential Risk

Overall Risk: Since these projects will be ongoing at the same time as TRVC, there is a good chance that they will be targeting the same competitors, provinces, stakeholders, etc. This risk may lead to a more limited pool of potential competitors as they may not want to participate in more than one engagement at a time. Our results of GHG emissions reductions and profit increases may also be influenced by the efforts of these other projects as well.

More information on project objectives, approach, and design of these initiatives is in the Annex

1 Million Hectares Initiative

In 2022, the Vietnamese Ministry of Agriculture and Rural Development (MARD) was tasked with developing a project to produce high-quality rice on 1 million hectares in the MRD.

Target Outcomes

1. **Use high-quality, certified rice varieties**
   Meet the increasing requirements of domestic and international consumers (particularly growing awareness of climate and environmental impacts as well as food safety and nutritional considerations).
2. **Adopt sustainable farming practices**
   Reduce GHG emissions and reduce inputs. The goal will be to save resources and reduce emissions and pollution.
3. **Improve value chain linkages**
   Reduce production costs and increase farmer incomes. Farming households will be encouraged to work within cooperatives that will be linked more closely with business that can provide quality inputs and higher prices for quality outputs.
4. **Increase investment into infrastructure**
   Include mechanization, irrigation, and digital solutions for traceability, disease prevention, and water management.
5. **Create a sustainable model**
   Achieve the above, resulting in increased trust by farmers, circular economy, and improved branding of Vietnam's rice.

MARD is already developing a pilot project to improve quality rice production for export and has begun engaging leading rice companies to push forward the initiative.

Recommendation for TRVC

This program is an opportunity for TRVC to gain GVN buy-in.

- TRVC can pledge its production areas to count under 1M Hectares, as our model aligns with all of the outcomes listed to the left
- This will also help companies be more comfortable joining TRVC, as many have also been approached by the GVN to contribute to 1M Hectares
- TRVC can help set the stage for the internationally-recognized certification methodology we use to become the standard for Vietnam rice production – eventually allowing the GVN to account for GHG emissions reductions across the entire 1M Hectares and contribute to its NDCs

Verification Design

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Measurement, Reporting and Verification (MRV) Systems in Agriculture

MRV Overview

MRV systems in agriculture are critical in determining the sustainability of different farming practices and their impact on the environment. They are also essential for developing certified carbon markets because they enable measurement, quantification, and verification of carbon emissions over time, allowing countries to obtain and sell carbon credits for their reduced emissions.

Key activities related to MRV systems in agriculture include collection of field-level data relevant to a project's progress and results to-date, translation of field data into a standardized format, and review of data collected to ensure it is complete, consistent, reliable and transparent.

Up until recently, MRV platforms and systems in agriculture were viewed as costly, complex, and unreliable, largely due to the lack of automated data collection and verification processes. However, recent digital advances in the climate technology sector have produced a variety of tools, including remote sensing and sophisticated greenhouse gas accounting software/models, that have helped mitigate some of the key challenges inhibiting widespread MRV adoption and credibility in agriculture.

Challenges to Scale

- **Cost:** MRV systems require upfront investment in data modeling, technology, software, equipment, skilled labor.
- **Complexity:** MRV systems, even sophisticated ones, often employ a combination of manual and automated data gathering procedures. The use of manual data collection is often inefficient, prone to error, and unfeasible to scale across large geographies. Further, these such MRV systems usually require an added layer of comprehensive testing to validate the results which also contributes to higher costs.
- **Reliability:** MRV systems' lack of automation/digitization lowers the credibility and consistency of the data. On the other hand, highly technical models employ several calculation assumptions and are often viewed as black boxes due to their lack of transparency.

Progress to Date

- **New data sources and detailed data driven models** have been increasing the reliability, efficiency and scalability of MRV systems while reducing costs, by streamlining the gathering field data which was previously a manual process.
- **Improved measurement technology, such as remote sensing,** support the scaling of MRV systems as they enable high-volume sampling at a lower cost.

What TRVC is looking for:

- ✓ Fairness and transparency
- ✓ Little to no field-based observations
- ✓ Scalable and cost-effective solution
- ✓ Clear baselines
- ✓ Internationally accredited to issue carbon credits

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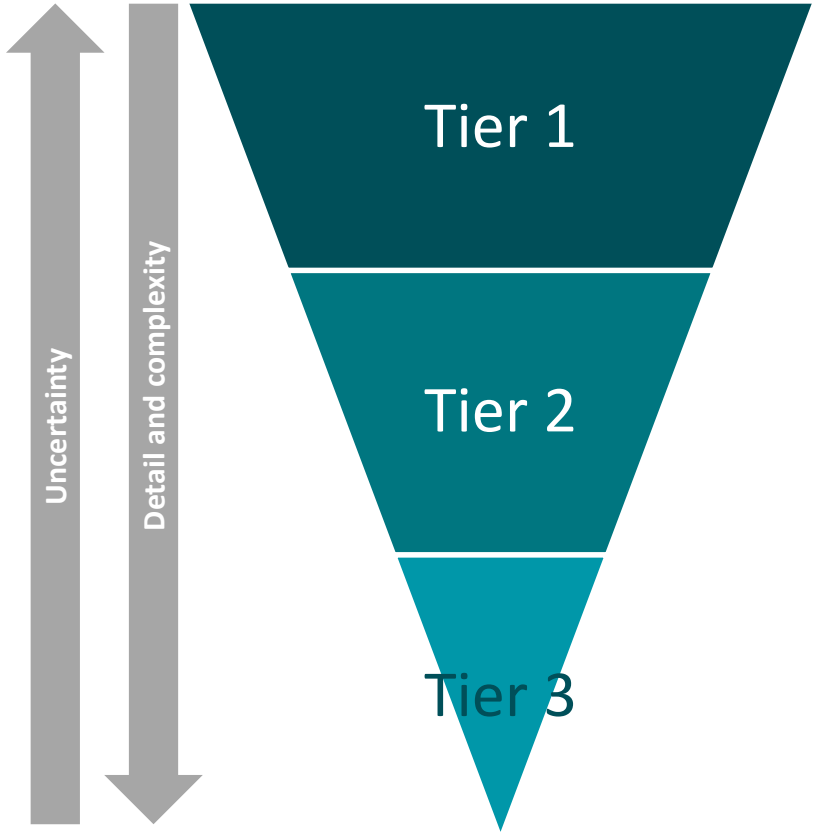
Calculating Emissions

The Intergovernmental Panel on Climate Change has set forth methodologies for calculating emissions along three "Tiers" that generally increase in complexity but that offer higher precision in estimating GHG emissions. **For this work we recommend a Tier 3 methodology**.



Tier 1: Simple methods to assess emissions that use default values

Requirements: Emissions are calculated by multiplying rice growing areas with universal emission factors

Limitations: does not take into account changes across a growing season; input quantities or timing; local soil characteristics; not well defined by IPCC for rice

Tier 2: Similar to Tier 1 but uses country-specific emissions factors

Requirements: Emissions are calculated by multiplying rice growing areas with country-specific factors

Limitations: Better than Tier 1, but in Vietnam does not take into account localized changes across a growing season; input quantities or timing; local soil characteristics

Tier 3: More complex, site-specific inputs are used as emissions factors to calculate or model emissions

Requirements: Site-specific observations (remote sensing and/ or local observations + soil data + weather data), modeled using various tools/ biogeochemical models like DNDC

Limitations: More costly to implement with tradeoffs between cost and uncertainty

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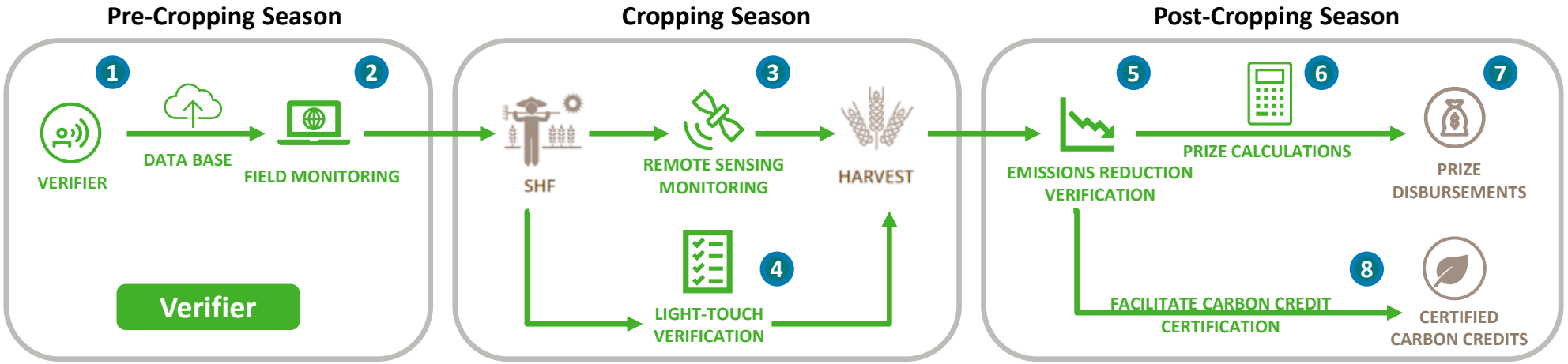
Verification Approach

The verification approach will depend on the success of the offeror, but in general the broad scope of work will include the following tasks:



Step	Verification Activity
1	Verifier obtains required data from Competitors prior to the start of each competition year. This data includes but is not limited to field locations (GPS), management practices (i.e., IM5R, AWD, etc.) and input details (i.e., amounts of organic matter, seed variety, fertilizer, etc.) as required by the Verifier.
2	Verifier aggregates data and uses geolocation to identify each competitor's fields and uses historical remote sensing data (if possible) to create baseline GHG scenarios
3	SHFs implement technology and the Verifier monitors the fields throughout each cropping season, using remote sensing, to verify water management and soil moisture.
4	Verifier uses appropriate, light-touch, methodology to conduct field-level spot-checks (e.g., surveys, farmer diaries) to increase certainty of adherence to proposed practices.
5	At the end of each cropping season, Verifier tabulates GHG reductions based on provided growing practices and measured water levels, as well as GIS data on weather and soils, to calculate GHG emissions using a pre-approved modeling process. The emissions outputs from the model are then compared to the emissions estimated by the baseline scenario and the reductions are calculated accordingly.
6	Verifier calculates prizes based on GHG emissions reductions.
7	Prizes awarded to competitors.
8	Verifier facilitates certification of GHG reductions by partnering with an international certification body (e.g., Verra, Gold Standard), allowing for the credits to be used for NDCs, external sale, or internal Scope3. ***The goal will be for this step to begin in Competition Year 2, and to enable competitors to continue to generate credits post-project.***

Approach to Setting Baselines for CO2e Reduction Estimates

Emissions reduction and avoidance MRVs must compare emissions reductions against a hypothetical baseline of what would have occurred if the solution were not being implemented.

The Verifier will be required to set a realistic baseline, which may include a **combination of historical remote sensing data as well as competitor-provided "historical practices" data** on any given project area.

Baselines must take into account the significant changes in farming practices (adoption of 1M5R, and to a lesser extent organic/ AWD practices) that are already occurring in some areas of the MRD.

Preferred baseline approach is to derive baselines for each project area (field) as opposed to an average modeled practice. However, this field-level data should go back as far as possible to "smooth" the data and account for year-over-year farmer practice shifts and experimentation.

Significant on-farm emissions data for the use of various rice-growing practices has been collected across the MRD by IRRI, Can Tho University, IAE, and other entities. **The Verifier would be expected to identify, collect, and ingest any available data to help update models and set baselines.**

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Potential GHG Emissions Modeling/ Measurement Tools and Methodologies

Various tools/ methodologies exist on the market to help measure/ model GHG emissions reductions.

Methods/Tools	Description/Strength	Weakness	Benefits
Cool Farm Tool	Tool to assess a farm's GHG/carbon emissions based on its harvest and marketable weight, acreage planted, fertilizer use, pesticide use, energy use , and transportation factors. Calculations based on IPCC guidelines (Tier 1-Tier 2)	• Built to apply at the farm level • Can be difficult to build a verification system	• Capture household level (emission assessment will be conducted on a per-field basis) • Use as a form of data storage over time (however, difficult to perform data validation)
DayCent	Model that simulates carbon and nitrogen fluxes between the atmosphere, soil, and vegetation in relation to farming practices, climatic conditions, and other items	• Difficult to popularize due to the high requirements and detailed farming data • For accurate simulation model, it is necessary to take actual measurements	• Access accurate emissions results through combined soil and environmental factors • Leverage reliable forecast results calibrated to simulate actual emission
DNDC Model	Biogeochemical models developed to incorporate experimental data; basic physical, biological, and chemical laws/processes in soil; and environmental factors affecting GHG emissions	• Same as the DayCent Model	• Same as the DayCent Model
Ex-Ante Carbon Balance Tool Ex-ACT	A land-use accounting system that calculates changes in total carbon emissions/ accumulations and GHG emissions per unit of land use which can be customized beyond default Tier 1 parameters	• Emissions scenario compared to will be forecasted 20 years from the start of project implementation; changes in 20 years will be unpredictable	• Use in WB VNSAT to calculate emissions • Populate in Excel with built-in calculation formulas
SECTOR	GHG calculator from IRRI for rice cropland based on the IPCC Tier 2 approach Available in Excel/web-based version; requires inputs from the user on cropping area, yield, and management practices	• Not self-explanatory and offers limited technical assistance	• Develop national GHG inventories • Evaluate project emissions
Software ALU	Inventory compiler software through the process of estimating gas emissions and removals related to agricultural activities	• Newly applied in national GHG inventories calculation	• Forecast GHG emissions by sector • Build standard reports on GHG inventories

We recommend that the verifier propose an appropriate methodology for calculating emissions, either one of the above-listed tools or an equivalent proprietary or open-source tool or methodology.

International Certification of Carbon Credits

In addition to performing MRV services, the Verifier must be able to lead and provide oversight during the certification of emissions reductions. Below are some potential uses for certified carbon credits; however, it is unclear which of the options below competitors can pursue based on the current environment. These **options are not mutually exclusive**, and TRVC could facilitate multiple options.

Potential uses for carbon credits generated by TRVC:

1 Vietnam's Nationally Determined Contributions (NDCs)

Competitors can elect to have their emissions reductions count towards Vietnam's NDCs. In 2022, Vietnam increased their conditional and unconditional NDCs emissions reduction targets to 15.8% and 43.5%, respectively, by 2030.

2 Carbon Markets

Competitors can sell their certified carbon credits through trading markets or B2B transactions. Although Vietnam has not established an official carbon market, it has been implementing carbon credit trade agreements on a trial basis. Competitors can also sell their carbon credits to buyers with the help of the Verifier and their connections.

3 Scope 3 Emissions Reductions

Institutional or larger competitors can decide to apply their carbon credits towards their Scope 3 emissions, indirect emissions that occur in a company's value chain, to improve their emissions footprint and become more sustainable.

Verra and Gold Standard are the two primary, and internationally recognized, certification bodies for emissions in rice; the Verifier should work with one of them to achieve certification of carbon credits.

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Annexes

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Annex 1

Summary of Literature Review for Verification Design

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Project: Transforming Rice Value Chains Towards Sustainable Development in MRD, Vietnam

Citation	Authors: Institute for Agricultural Environment, Dr. Mai Van Trinh
Overview	Carbon market presentation explaining SNV's project proposal for MRV Project including main research objectives and proposed solutions, legal basis and methods for implementation, methodology, data, and implementation methods, MRV system proposal, and research results. "Overview, review, and access the situation of MRV system currently applied for Rice and Analysis and clarify the effects of Article 6 of the Paris Agreement on the development of carbon markets in Vietnam and propose policy incentives and mechanisms"
Relevance	Research/Design • Reviews and evaluates status of MRV tool development for rice and proposed policies to support commercialization of carbon • Developed plan to deploy solutions in rice cultivation which included selection of calculation method, deployment to participating units and individuals, signed contracts and commitments (Slide 19) • Recommended recording, collecting info from fields, producers, communes, provinces, MARD • Verification of activities with correct registered technology (Slide 19) Implementation • Shift from voluntary climate change response to nationally defined NDC implementation • Analysis clarifies effects of Article 6 of the Paris Agreement on the implementation of the carbon market in Vietnam; find gaps in the current policy system for building carbon markets and the sale of carbon certificate • Explains legal basis and methods of implementation for a national GHG inventory and construction of MRV system (Slide 4) • Outlines MRV implementation project activities (Implementation level, advantages, and limitations of projects) (Slide 10) • Includes an annex of measurement tools (stats on some GHG inventory methods and tools applied in emissions assessment in agricultural sector in Vietnam, strengths, and weaknesses of each tool) (Slide 11) • Include gaps in the construction of the current MRV system (National level, provincial level (representing 3 consulting provinces: An Giang, Kien Giang and Dong Thapp provinces) (Slides 14-15) Lessons Learned • No existing regulations on MRV and national MRV system framework as required by Paris Agreement on climate change • Framework for measuring and calculating emissions of each measure has not been completed at regional, subregional, or local level – project has not been fully implemented • No specific guidelines, carbon exchange, financial mechanisms, or regulatory regulations • Transfer results of the project to complete relevant management and technical guidance desks such as guiding cultivation process, guiding MRV system, registering to participate in carbon offset and exchange mechanism to support localities and partners of project to participate in carbon market in rice production

AgResults Vietnam GHG Emissions Reduction Challenge Project – Final Report

Citation	Authors: AgResults (Deloitte)
Overview	Final Report of AgResults GHG Emissions Reductions Challenge Project which encouraged innovative solutions to reduce GHG emissions in rice production / improve SHF livelihoods. The report includes an overview of the project design, implementation, results, and key lessons learned.
Relevance	Design • Broken down into two phases: 1. GHG reducing technology and agronomic practice adoption 2. Scaling improved practice adoption among SHF • Rewarded competitors based on performance at the end of each crop cycle, two annual cycles • Awarded grand prizes at end of each phase for competitors that achieved top aggregate results across each phase Implementation • Competitor outreach demonstrated positive impacts such as mitigated GHG emissions, increased yields, reduced input costs, increased per-unit SHF incomes, and improved land and water management that benefited rice growers and their communities Lessons Learned • Demonstrated PfR prize competition is a strong tool to engage private sector and reach development goals • Proved verification can be difficult but developed insights to use to improve future projects

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Activity Data on Crop Management Define Uncertainty of CH4 and N2O Emission Estimates from Rice: A case Study of Vietnam

Citation	Klaus Butterbach-Bahl, David Kraus, Ralf Kiese, Van Trinh Mai, Tanh Nguyen, Björn Ole Sander, Reiner Wassmann, Christian Werner
Overview	Globally, rice systems are a major source of atmospheric CH4 and for major rice-producing countries, such as Vietnam, CH4 as well as N2O emissions from agricultural land used for rice production may represent about one-fourth of total national anthropogenic GHG emissions. However, national-scale estimates of GHG emissions from rice systems are uncertain about its magnitude, spatial distribution, seasonality.
Relevance	Design • Used biogeochemical model LandscapeDNDC to calculate emissions of CH4 and N2O from rice systems (Tier 3 IPCC approach) • Identified hotspot regions of emissions and assessed contribution of N2O to total non-CO2 GHG balance of rice systems Lessons Learned • CH4 and N2O fluxes from rice systems in Vietnam are highly seasonal • Highest emissions were stimulated for double and triple rice cropping systems in MDR • Uncertainty in field management information were major drivers of uncertainty of national CH4 and N2O emission inventory • Tier 3 approaches for estimating national-scale GHG emissions from rice systems are ready to be applied nationally (allows users to identify regions w elevated emissions, accounting for CH4 and N2O) • Study also showed better info on land management is required to narrow uncertainties

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Methane Emission Factors from Vietnamese Rice Production: Pooling Data of 36 Field Sites for Meta-Analysis

Citation	Thi Bach Thuong Vo, Reiner Wassmann, Van Trinh Mai, Duong Quynh Vu, Thi Phuong Loan Bui, Thi Hang Vu, Quang Hieu Dinh, Bui Tan Yen, Folkard Asch, Bjoern Ole Sander
Overview	This study presents a meta-analysis of CH4 database emission factors (EFs) from 36 field sites across the rice growing areas of Vietnam and covering 73 cropping seasons. The EFs were developed from field measurements using the closed chamber technique. The analysis for calculating baseline EFs in North, Central and South Vietnam in line with the IPCC Tier 2 methodology was specified for the three cropping seasons being early-(E), mid-(M) and late-year (L) seasons. Calculated average CH4 EFs are given in kg ha−1 d −1 and reflect the distinct seasons in North, Central, and South Vietnam.
Relevance	Design • As of now, Vietnam's GHG inventories have been based on IPCC Tier 2 guidelines using EFs derived from capacity development program • Simplified EFs are given for entire year w/o seasonal differentiation and applied to most recent NC and Biennial Updated Report • Results from this study broaden database on EFs in width/depth by recording emissions at different sites (min. of 10) within given region and by distinguishing among seasons Lessons Learned • Database presented in this study does not include mitigation management but the quantification of emissions reduction will inherently rely on solid info of emissions baseline management • Baseline emissions data can assist in planning process by narrowing emission 'hotspots' • In North Vietnam, database points toward prioritizing late-year season as opposed to uniform mitigation campaign covering both seasons • Institute for Agriculture Environment (IAE) will develop recommendations on future use of EFs tailored at national GHG inventories and mitigation assessments • IAE is involved in development of NDCs – future versions will have to define specifics of programs including MRV

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Mapping of Rice Varieties and Sowing Data Using X-Band Spaceborne Synthetic Aperture Radar (SAR) Data

Citation	Hoa Phan, Thuy Le Toan, Alexandre Bouvet, Lam Dao Nguyen, Tien Pham Duy, Mehrez Zribi
Overview	The aim of this study was to develop methods using SAR data to retrieve the sowing date, in addition to the rice grown area, and distinction between long and short cycle varieties. This study makes use of X-band SAR data from COSMO-SkyMed covering the Chau Thanh and Thoai Son districts in An Giang province, Viet Nam, characterized by a complex cropping pattern. SAR data has been analyzed as a function of rice parameters, and the temporal and polarization behaviors of the radar backscatter of different rice varieties have been interpreted physically. New backscatter indicators for the detection of rice paddy area, the estimation of the sowing date, and the mapping of the short cycle and long cycle rice varieties have been developed and assessed
Relevance	Design/Research • Assessed use of SAR images for rice mapping, extended to retrieval of sowing date (relevant to field mgmt.) and short / long rice varieties, which is important to market assessment • Experiment was conducted in An Giang Province, Vietnam, where individual farmers have different planting schedules, growing practices and water management methods, which poses a challenge for using Earth observation data Implementation • SAR systems present an alternative for rice crop monitoring with 2 major advantages: their all-weather capability + specific physical interaction between the radar waves and the rice canopy over inundated or moist soil surface Lessons Learned • Good accuracy has been found with 92% in rice grown area, 96% on rice long or short cycle, and a root mean square error of 4.3 days in sowing date

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Methane Emissions from Rice Cultivation in Different Agro-Ecological Zones of the MRD: Seasonal Patterns and Emission Factors for Baseline Water Management

Citation	Thi Bach Thuong Vo, Reiner Wassmann, Agnes Tirol-Padre, Van Phuong Cao, Ben MacDonald, Maria Victoria O. Espaldon & Bjoern Ole Sander
Overview	Research provided scientific evidence for improved rice straw management. Rice cultivation with in-field burning of rice straw is the worst option with the lowest energy efficiency and highest air pollution emission. This article compares energy efficiency and environmental footprint of rice production using four different rice straw management scenarios, namely, straw retained, straw burned, partial straw removal, and complete straw removal. Paddy yield, grain quality, and energy balance were assessed for two seasons while GHG emissions were measured weekly starting from land preparation through to the cropping and fallow period. Despite the added energy requirements in straw collection and transport, the use of collected rice straw for mushroom production can increase the net energy obtained from rice production systems by 10–15% compared to burning straw in the field. Partial and complete removal of rice straw reduces GHGE by 30% and 40% compared to complete straw retention, respectively.
Relevance	Design/Research • National GHG inventories do not provide data for specific regions at subnational scale, so there is no direct quote on the specific GHG contribution of the MRD • Study objectives were to (1) assess spatial and seasonal variability of CH4 emissions under conventional rice cultivation over a wide range of rice environments in MRD and (2) determine zone-specific emission factors on CH4 emissions as a basis for future upscaling Lessons Learned • Understanding methane emission measurements and mapping can help TRVC focus on GHG reductions and encourage companies to scale improved technologies to reduce GHG in high impact areas

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ResearchGate

An Assessment of Irrigated Rice Production Energy Efficiency & Environmental Footprint with In-Field and Off-Field Rice Straw Management Practices

Citation	Nguyen-Van-Hung, Bjoern Ole Sander, JamesQuilty, Carlito Balingbing, Angeli Grace Castalone, Ryan Romasanta, Ma Carmelita R. Alberto, Joseph M. Sandro, Craig Jamieson, Martin Gummert
Overview	This study comprises a set of methane emission measurements in rice fields located in the four agroecological zones of the MRD, namely the zones w (i) alluvial soils, (ii) salinity intrusion, (iii) deep flood, and (iv) acid sulfate soils. These zones have very distinct bio-physical conditions and cropping cycles that will affect methane emissions in various forms. The study includes comprehensive mapping of these zones as well as an overview of rice statistics (activity data) at provincial level for each cropping season. Emission data were obtained using closed chamber method.
Relevance	Design/Research • Gathering rice straw for energy production is a possible solution to bring financial benefit to farmers and reduce environmental footprint of rice farming and prevent negative impacts of in-field burning • Two consecutive rice crops were produced in an experimental field between June 2015 and May 2016 to quantify the energy balance and environmental footprint of four contrasting rice straw management scenarios

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An Investment Plan for Low-Emission Rice Production in the Mekong River Delta Region in Support of Vietnam's Nationally Determined Contribution to the Paris Agreement

Citation	Tran Van The, Mai Van Trinh, Nguyen Thi Dieu Trinh, Le Hoang Anh, Meryl Breton Richards, Leo Sebastian, Eva Wollenberg, Vu Duong Quynh, Bjoern Ole Sander
Overview	This study employs a literature review, a study of promising GHG mitigation options, and an analysis of cost and benefits of AWD to develop an investment plan for AWD in the Mekong River Delta. In our field survey, we found AWD contributed to increasing farmers' net incomes primarily by decreasing production costs. The study proposes an investment plan with four outputs and 15 investment activities with a goal of practicing AWD on 900,000 hectares in the Mekong River Delta and mitigating 10.97 M.t CO2e. A co-benefit is additional net income for farmers of 8,540 billion VND (USD 371.36 million) per year compared to conventional rice cultivation."
Relevance	Research/Design • Reviewed literature on GHG emissions from rice production and studied promising GHG mitigation options for the NDC • Analyzed the cost and benefits of AWD to inform investment needs • Developed investment plans for AWD as a low emission development (LED) practice for rice production in the MRD region • Collected data through rapid rural appraisal (RRA), standardized questionnaires and individual interviews. A SWOT, bottleneck analysis, CBA, and marginal abatement cost (MAC) analysis to process data and report AWD in rice production in the MRD region Lessons Learned • AWD is one of the most important technical solutions to achieve the country's NDC to climate change mitigation, and should be supported via GHG-reduction policies • Study proposed investment for AWD in MRD with 4 outputs and 15 investment activities for AWD to be practiced on 900,000 arable hectares in the MRD region • Financial resources are potentially available from national targeted programs of rural development, public investment, rice restructuring, climate change response and green growth, and the policy of production linkages and large field models.

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Review of IRRI Studies in View of Informing Vietnam's NDC Revision: GHG Mitigation Potential in Vietnam's Rice Sector Through Out Scaling of Water-Saving Techniques

Citation	IRRI
Overview	IRRI is working with Vietnam's research institutes to develop AWD suitability maps for Vietnam. This report analyzes three AWD scaling scenarios based on NDC implementation plans proposed by the Ministry of Natural Resources and Environment (MoNRE) and the Ministry of Agriculture and Rural Development (MARD).
Relevance	Research/Design • Report outlines AWD implementation scenarios, GHG reduction potential for AWD scaling, in-depth AWD suitability mapping and analysis, and recommendations of IRRI. • Estimation of GHG emissions of the three scenarios above was conducted using the SECTOR tool, following the IPCC Tier 2 approach for rice with newly updated scaling factors • Estimation used different methane emission factors (kg CH4/ha/d) per cropping season in RRD and MRD (Table 3) • Seasonal crop duration (days) and yield by region published by GSO (2017) were used as input parameters for GHG calculations Lessons Learned • To date these maps are the best reference to support AWD implementation plans • The process can be applied to other provinces of Vietnam, as well as in other countries, to put the NDC commitments into action at the regional and local level • At meso- and macro levels, the AWD suitability analysis method together with GHG measurements can be applied to assess the potential for regional and national GHG mitigation in the rice sector • Next steps/recommendations for using suitability maps page

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Spearheading Vietnam's Green Agriculture Transformation: Moving to Low-Carbon Rice

WORLD BANK GROUP

Citation	"This work is a product of World Bank"
Overview	This report focuses on promoting low-carbon rice production systems in Vietnam and rice reduction pathways. There are many sources of GHG emissions within the agricultural sector in Vietnam, including along VCs and within the whole agri-food context. However, because rice production is so important to the country and to emission reductions in agriculture, this report focuses on known actions that can be rapidly upscaled, along with other complementary actions to reduce GHG emissions from rice production systems.
Relevance	Research/Design • Reviewed literature on GHG emissions from rice production and studied promising GHG mitigation options for the NDC • Analyzed the cost and benefits of AWD to inform investment needs • Developed investment plans for AWD as a low emission development (LED) practice for rice production in the MRD region • Collected data through rapid rural appraisal (RRA), standardized questionnaires and individual interviews. A SWOT, bottleneck analysis, CBA, and marginal abatement cost (MAC) analysis to process data and report AWD in rice production in the MRD region Lessons Learned • AWD is one of the most important technical solutions to achieve the country's NDC to climate change mitigation, and should be supported via GHG-reduction policies • Study proposed investment for AWD in MRD with 4 outputs and 15 investment activities for AWD to be practiced on 900,000 arable hectares in the MRD region • Financial resources are potentially available from national targeted programs of rural development, public investment, rice restructuring, climate change response and green growth, and the policy of production linkages and large field models.

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