Completion Report

Improving rural livelihoods in the North Central region in Vietnam through innovative development of supply chains for energy-efficient cook stoves and wood from sustainable sources

Vietnam

Grantee: Preferred by Nature (NEPCon)
Local Partners: SEPON, Cam Lo and SPARK
Other Partner: None

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1. EXECUTIVE SUMMARY

The project ***'Improving rural livelihoods in the North Central region in Vietnam through innovative development of supply chains for energy-efficient cook stoves and wood from sustainable sources'*** was designed to support sustainable livelihoods of 6,000 poor and low-income rural households in the Quang Tri province of Vietnam. On top of that, the project aimed to improve access to affordable and clean energy efficient solutions for 2,000 households as well as supporting a sustainable forest resource base while mitigating carbon emissions. Following the baseline studies, it was found that cook stoves would not be successful on the countryside as firewood is mostly free – it would be difficult to distribute pellets to farmers and expect payment for them.

As a consequence, the project focused on developing industry scale incinerators fuelled by wood pellets as well as supporting a sustainable forest resource base while mitigating carbon emissions. The latter was done through training of farmers which improved their livelihoods due to more income being generated from better plantation management.

The current forest management practices and wood supply chain in the province of Quang Tri offers opportunities for increased sustainable livelihoods as well as releasing bottlenecks that affect the incomes of farmers as well as private sector industries and their employees involved in the wood processing industry. Despite tangible economic and environmental benefits of implementing sustainable forest management certifications such as the Forest Stewardship Council™ (FSC™), a lack of technical knowledge, business network and financing services are main barriers that are preventing the majority of farmers from switching to sustainable forest management practices.

This project developed the supply chain of certified wood and wood pellets from sustainable forests and scaled up certified sustainable forest management areas, thereby enhancing the sustainable livelihoods for plantation growers. By doing so, it will help the local companies to get sufficient supply of certified wood to produce higher added value lumbers and wooden products for export, as well as sufficient supply of by-products and residues – the inputs needed for wood pellet production.

This project was done in collaboration with Cam Lo Wood Pellet Company. The company will continue to support and encourage the 6,000 farming households to apply sustainable forest certification practices while training local farmers in sustainable forest management practices and forest replantation techniques. These efforts are done to further strengthen a sustainable base for a certified wood pellet production in the province. In addition, the project will enable industrial users to apply cleaner energy solutions to reduce a significant amount of fossil fuel such as coal, leading to lowered CO2 emissions. The development of certified wood and wood pellets turns wood processing waste into renewable and energy efficient fuel for local households and industry users.

Due to some initial delay, and longer periods of training required, the project was extended from end of 2019 until April 2021. This additional time was used to develop incinerators of industry level and extend the training of farmers to increase the impact of the project.

The main adjustments to the project goals and activities were:

1) Baseline studies showed that the costs related to cook stoves would not be accepted by farmers, thus this activity was focused on developing and promoting incinerators using wood pellets at industrial scale.

2) Although providing loans can be beneficial in supporting farmers in establishing longer rotations, Cam Lo decided to pay premium prices for certified wood instead, while ensuring a market for bigger dimension timber to promote longer rotation cycles. This was done to avoid risks such as farmers not paying their debt back and incurring too high interest rates.
3) COVID-19 caused delay in training and hindered outreach to companies for capacity building. As a consequence, Cam Lo took the lead in improved wood processing.
4) Awareness raising was focused on a YouTube production rather than more traditional establishment of demonstration sites and information material. Training of trainers was seen as less efficient, and more farmers were trained in plantation areas for a hands-on approach.

In terms of positive impact on climate mitigation, this was observed through more sustainable land use on the plantation areas. The initial greenhouse gas (GHG) emission reduction was expected to be 16,000 t per year in direct impact but was revised to 33,000 t at project end as the initial carbon sequestration was estimated conservatively. As for indirect reduction per year, it was estimated to be 2,5 mio t but revised to 14,445 t at project end. This was due to the shifting expectation that other industries would have started using pellets as fuel to replace coal. However, the project achieved an estimated 1,000 t production of pellets per month – and it is likely to reach a maximum capacity of 1,500 t per month in the foreseeable future.

The lessons learned are that timber processors like Cam Lo can play an important role in sustainable plantation management. Processors with a long-term development strategy as well as good production and market capacity are most promising. It was also discovered that institutional capacity is crucial to be successful. Groups of farmers or collective enterprises should be built and strengthened to support individual households practising appropriate silviculture technique.

Improving planting material quality at the nurseries needs to be the first step of any sustainable plantation promotion project. There are advanced farmers and useful demonstrations as well as models of plantation available in the communities. These existing farmers can be mobilised for effective communication with lesser time and lower resources cost. Thus, practical training in plantations is the most efficient way of training.

The sustainability of the project is anchored through the continued interest of Cam Lo to support a reliable supply chain and commit to fair prices and relations to the local communities. The project will be able to scale up after project end through cooperation with the USAID sustainable forest management project.

2. ACHIEVEMENT OF RESULTS

2.1 Achievement of outcomes and outputs

Expected outcomes and outputs	Indicator(s):	Achievement of outcomes and outputs:
Outcome 1:		
1.1 Assessment on best options for improved forest management in Quang Tri province	Study on improved forest management completed	*Yes: Study submitted at end of M1 as planned.* The study allowed the project to decide upon the best strategy for implementation.
1.2 Assess feasible forest replantation areas for sustainable forest management certification schemes	Replantation areas identified	*Yes: Report submitted at end of M1 as planned.* The best areas to work with farmers (communes) were identified.
1.3 Conduct meetings/visits with farmers on sustainable forest management practices	6,000 ha has been prepared for certification	*Yes: Planned for M2, delayed until M3.* More than 2,100 farmers received information. This corresponds to approx. 6,300 ha of plantation being targeted.
1.4 Establish seedling nurseries	In total, two to three nurseries established, and five to seven female farmers are employed at each nursery	*Yes: Planned for M3 but continued until project end.* Two nurseries established, more than two mio cuttings produced and female workers employed as planned.
1.5 Capacity building on sustainable forest management and certification	500 leaders of farmer groups (20% female) are trained on sustainable forest management techniques and 6,000 households are guided on FSC forest management techniques	*Yes: Planned for M3 but continued until project end.* The initial plan was to train 500 leaders of groups, but to be more efficient 2,700 farmers have been trained directly instead. In addition, 525 members of farmer groups, and support to about 1,000 farmers being certified has been provided. Also, awareness material was distributed which reached at minimum 1,775 farmers, of which more than 20% were female. Thus, the target to reach 6,000 households was met.
1.6 Sustainable forest management (increase rotation cycle and financial support)	6,000 ha of forest area has been targeted for sustainable forest management certification and loan agreements	*Partially*: Evidence related to activity 1.5 and purchase of certified wood confirms that more than 2,700 farmers were trained. The average farm size

	have been elaborated (2,000 ha replanted)	is close to 3 ha, thus, minimum 6,000 ha of plantation have been targeted for sustainable management. Replanting is harder to assess because certification does not request permanent tree cover anymore. It is, thus, likely to be less than 2,000 ha.
1.7 Build capacity for sale of FSC certified wood products	Capacity for sale of certified products is increased (outreach to 25 companies and minimum 10 business models developed)	*Partially: Planned for M4, postponed until project end.* Due to COVID-19, it was difficult to convene as planned and subsequently develop the targeted business model. Nonetheless, the project did succeed to host one workshop on 27 March 2021 where 18 stakeholders participated to discuss certification and long rotation cycle Acacia management.
Outcome 2:		
2.1 Conduct baseline study on the current energy use practices and needs for cooking and heating/boiling at household and industry level…	Baseline study about cook stoves conducted	*Yes: Study submitted at end of M1 as planned.* The study allowed the project to decide upon the best strategy for implementation.
2.2 Conduct initial market study on available cook stoves for energy efficiency solutions using wood pellets at households and industrial user level…	Study about cook stoves completed	*Yes: Study submitted at end of M2 as planned.* The update of cook stoves at farm level is not promising, however, industry scale use of pellets has good potential.
2.3 Promote interested cook stove producers to engage in the supply chain ***Revised to*:** Promote interested industrial wood pellets users to engage in the supply chain	BPs for two cook stove producers and three wood pellet producers elaborated. Three to five models of affordable cook stoves identified and available for HH and industrial users ***Revised indicator:*** Contact possible wood pellet users to assess interest and potential	*Yes: Planned for M4, completed by end of project.* The project partner SPARK has developed business models and facilitated outreach to possible clients interested in wood pellets. Preferred by Nature has contacted a Danish energy provider for possible import.

2.4 Organise workshops/ events for awareness raising on benefits of improved wood pellets ***Revised to:*** Sole focus on incinerators and excluding cook stoves	A total of five workshops conducted ***Revised indicator:*** A total of three workshops conducted	*No: Planned for M4, delayed because of COVID-19.* The workshops have not been implemented as planned. However, the benefits have been promoted as far as possible through informal communication with interested parties. No costs are reported for this activity.
2.5 Develop energy efficiency solutions for interested companies who want to use wood pellets	At least four to 10 local industry users apply improved ovens used certified wood pellets	*No.* Incinerators have been tested and show that pellets are more cost efficient than coal, a 10% saving in fuel costs have been achieved. This provides the basis to build a good business case and demonstrate to potential industry clients that incinerators and pellets can be a good alternative to coal. However, as promotion towards industry clients has been restricted due to COVID-19, no local industry users have applied improved ovens using certified wood pellets thus far.
Outcome 3:		
3.1 Assessment of current wood processing practices	Wood processing assessment completed	*Yes: Planned and finalised at end of M2.* That farmers can improve their plantation management considerably and that a mechanism to buy damaged wood at a fair price is needed.
3.2 Adapt and implement improved wood processing practices	Wood processing practices are improved in the private sector (training of five companies). They have knowledge about certified production, 4% reduction in by-product, 6,700t of residues available for pellet production	*Partially: Planned for M4 but continued until project end.* Due to COVID-19, training of five companies as planned has not been done, knowledge about certified production has only been made available indirectly, and 6,700t of residues available has not been accounted for. However, residues are used and purchased from sawmills to produce pellets, but the amount is not known. Yet, wood processing has been improved because Cam Lo Factory changed and upgraded many equipment items to increase production capacity,

		wood usage rate and improve worker safety. The factory has installed a 1,000 square meter roof to be able to operate during the rainy season. A wood chopper can consume 3t of material per hour. With this equipment, the factory can increase its wood capacity faster to make use of timber during typhoons. Thus, improved wood processing has been addressed, but not through the training planned.
3.3 Implement improved wood harvesting practices	***Initial indicator:*** Wood harvested is mechanised in at least 40% of the certified forest plantation areas that are ready for harvesting - Farmers get 10% of higher income thanks to improved wood harvesting technologies - Commercial value of wood products processed for export market increased by 15% ***Revised indicator:*** 20 trainings towards +300 farmers and service providers to increase safe and efficient harvest of trees	*Yes: Planned for M4 but continued until project end.* The project organised a class on work safety for 219 factory's employees, and 100 members of 10 harvesting groups. The project also purchased and delivered personal protective facilities to groups of plantation owners, harvesting teams and factory workers.
Outcome 4:		
4.1 Develop demonstration sites and conduct study tours for local authorities ***Revised to:*** Raise awareness on sustainable forest management and project outcomes	**Initial indicator:** Increased interest from district, commune and province authorities related to forest planning and management through study tours, including development of demonstration sites. ***Revised indicator:*** Produce five training videos on YouTube to promote sustainable Acacia plantations	*Partially: Planned for M4 but delayed until project end.* Only one of five videos was produced and uploaded to YouTube where it received considerable attention. Additional work done: To gain support from the government and other relevant organisations, the project implemented a kick-off workshop with the participation of district leaders, related departments and representatives of forest owners and thereby, partly fulfilled the

		initial indicator. Local TV and newspapers made a broadcast and wrote about the project.
4.2 Local campaign and workshops targeting farmers **Revised to:** Activity 4.2 was merged with Activity 4.1 as part of the November 2000 amendment	***Initial indicator:*** Adoption of improved forest management techniques by farmers in the province, with 10,000 ha of area either achieving or working towards sustainable forest management certification. ***Revised indicator:*** Promote YouTube productions from 4.1	*Partially:* Planned for M4 and by project completion more than 3,500 farmers have seen the YouTube video.
Outcome 5:		
5.1 Establish key project indicators, and develop and implement a Monitoring & Evaluation system	Monitoring and implementation system in place	*Yes: Submitted at end of M1 as planned.* Tools were developed and used for project implementation.
5.2 Develop and implement a stakeholder consultation and dissemination plan	A gender training for project staff has been implemented	*Yes: Submitted at end of M1 as planned.* Consultation and dissemination plan developed as guidance. Gender training conducted.

2.2 Deviations from the planned outputs and activities

The project was initially planned to end ultimo October 2019. However, all activities could not be completed during the initial 30-month project duration. This led to the project being extended to 31 December 2020. Following that, social restrictions brought on by COVID-19 hindered people from being together which led to a further delay as most activities planned to be continued during the extension period could not be carried out. Therefore, a second extension was agreed upon until the end of April 2021 to complete the project as far as possible. Notably, trainings could be continued successfully under this second extension before the situation worsen once more. In addition, extensions allowed activity ***1.4 Establish nurseries*** and ***1.5 Capacity building on sustainable forest management and certification*** to be continued despite having already reached their original goals in late 2019.

As a consequence, outreach became difficult and Cam Lo took initiative to improve wood processing and capacity building on the compound of Cam Lo factory. Trainings of farmers and other activities were implemented directly from the factory. Yet, because of the atypical nature of Cam Lo factory (being part of SEPON group, which is committed to local development of communities and fair trade), it is not a concern that the project activities have been more focused around Cam Lo than initially planned. Ultimately, Cam Lo shares information to farmers, suppliers and other

partners which allows the project benefits to reach far and wide within the province. For example, Cam Lo channelled more investment to increase the production capacity of pellets made from chip wood that had been damaged during typhoons. This helps farmers to reduce the risk of planting long rotation cycle Acacia as they can now sell damaged wood at a fair price to Cam Lo. Previously, it would have been very difficult to make reasonable income from damaged plantation wood.

Two events in particular led to deviations to the original project design:

1. Cook stoves were found to have no potential of market penetration during the initial studies. The project focused instead on wood pellets at industrial level alone.
2. Some workshops and training were reduced in number or cancelled due to COVID-19 as reported below.

Specific project deviations are listed below:

1.5 Capacity building on sustainable forest management and certification. The concept of training 500 farmers to forward information to other farmers appeared to be weak. For more efficiency, the training was expanded to include 2,700 farmers, who received information and direct trainings in the plantations. In addition, 525 members of farmer groups and support to 1,000 farmers being certified have been provided. Awareness material was also distributed which reached, at a minimum, 1,775 farmers – with 20% of them being females.

1.6 Sustainable forest management (increase rotation cycle and financial support). At project start, it was foreseen that loans should be provided to support farmers in establishing longer rotation cycles. This would help compensate farmers while waiting for harvest to generate better income. For several reasons, loans were not provided: 1) There is a risk of many farmers not paying their debt back, 2) interest is high, and 3) the administrative effort is considerable to manage loans.

Rather than facilitating loans, Cam Lo decided to pay premium prices for certified wood and be a reliable purchaser of timber, having dimensions of +7 years. A guaranteed premium price is a driver to support long term rotations and can thus, replace the incentive loans could have provided. Furthermore, the project raised the capacity and demonstrated how thinning of plantations less than 5 years old can create income before final harvest.

1.7 Build the capacity of sale of legal and certified wood products. COVID-19 restrictions made it difficult to convene, as planned, to develop the minimum 10 business models and outreach to 25 companies. Even so, the project managed to conduct one workshop where 18 stakeholders participated to discuss certification and long rotation cycle Acacia management. A report was elaborated as planned, but ten business models were not elaborated to follow up upon future cooperation. However, reassessment of chain of custody certificate has been achieved for Cam Lo.

2.3 Promote interested industrial wood pellets users to engage in the supply chain. This activity was changed to target industrial wood pellet users rather than cook stove producers. This is because the initial study showed that cook stoves will be very difficult to sell to farmers who already had access to plenty of firewood for the existing fireplaces.

2.4 Organise workshops/events for awareness raising on benefits of improved wood pellets. Implementation has been impossible due to COVID-19 restrictions. As an alternative, awareness raising was done through informal communication methods with interested parties that have been promoted as far as possible. No expenses have been reported for this activity.

2.5 Develop energy efficiency solutions for interested companies who want to use wood pellets. The goal of this activity was to get four to ten companies to use the incinerators. This was not achieved because the development of incinerators took longer than expected. It was found that incinerators were needed to be finalised to demonstrate the benefits clearly. Furthermore, COVID-19 hindered outreach to other companies.

3.2 Adapt and implement wood processing practices. Training of five companies was cancelled due to COVID-19. However, supportive activities were carried out to make up for the lack of trainings. Residues are used and purchased from sawmills to produce pellets. Meanwhile, Cam Lo Factory changed and upgraded many equipment items to increase production capacity, wood usage rate and improve worker safety. An example is the acquisition of a wood chopper which can consume 3t of wood per hour. With this equipment, the factory can increase their wood capacity at a faster rate to make use of timber during typhoons. Cam Lo factory also installed a 1,000 square meter roof to enable operation during the rainy season. Thus, improved wood processing has been addressed, although not through the training planned.

3.3 Implement improved wood harvesting practices. The project has supported Cam Lo Factory within work safety improvement. The project organised a class on work safety for 219 of the factory's employees, and 100 members of 10 harvesting groups. The change in the activity appears to have been the best possible adaption to meet the target and comply with COVID-19 restrictions at the same time. Many factory employees are farmers at the same time, thus the training of 219 factory employees was also an efficient way to reach farmers and build capacity in improved wood harvesting practices.

4.1 Raise awareness on sustainable forest management and project outcomes. The initial activity was to create demonstration sites, but as explained below, this was changed to promote sustainable plantation management through YouTube videos and other promotion materials. Only one long YouTube video was produced, rather than five shorter ones.

The remaining YouTube videos have not been completed as planned, mostly due to COVID-19. Another factor that was considered was that demonstration sites need at least five years to show results, while the project implementation time is only three years. In Quang Tri, there are demonstration sites that can be used for communication and training. With several previous projects promoting sustainable plantation, local leaders have obtained an overall understanding of sustainable forest management. Among them, some leaders even have expertise in forestry, with good knowledge about sustainable forest management.

4.2 Local campaign and workshops targeting farmers. This activity was combined with Activity 4.1 when the project was extended by end-2019. The target was to promote the YouTube productions made under Activity 4.1.

2.3 Achievement of NCF indicators

NCF core indicator	Results (quantitative)			Clarifications/Means of verification
Number of beneficiaries reached	Women		Approx. 9,500	Around 6,000 farmers reached (training records, YouTube visits, memberships). Households consist of plus three people. Thus, each farmer has impact on minimum three times more people leading to a total of 18,000 beneficiaries.
	Men		Approx. 9,500	
	Total		Approx. 18,000	
Number of people with increased resilience to climate change	Women		Approx. 1,650	Farmer groups to establish long term rotation cycles have been established with 600 members (evidence: group member lists). In addition, more than 2,700 farmers were trained in sustainable plantation management (evidence: training records).
	Men		Approx. 1,650	
	Total		Approx. 3,300	
Number of people with improved livelihoods	Women		N/A	The numbers could not be assessed due to COVID-19 and climate disaster in Quang Tri province during the project end period.
	Men		N/A	
	Total		N/A	
New decent jobs created	Full-time	Women	3	The nurseries supported and established have created new jobs mostly for women. The employments depend on the season, under favourable conditions about 10 women will be employed, under poor weather conditions it will be less. Interview of nursery owner and news article elaborated on this background: https://www.nordicclimatefacility.com/news/growing-a-
		Men	1	
		Total	4	
	Part-time	Women	N/A	
		Men	N/A	
		Total	N/A	
	Seasonal	Women	6	
		Men	2	

		Total	8	future-vietnams-budding-sustainable-forestry-sector
Number of Green Business Concept tested				Two concepts have been tested: 1) increase capacity of farmers to better manage plantations for increased income and sustainability and 2) Develop incinerators for small to medium size industry plants using pellets as renewable energy based on residuals.
Number of multi-stakeholder partnerships developed				One main partnership between Cam Lo and farmer groups to grow large dimension Acacia during long rotation cycles.
Amount of funds leveraged (possible secured future investment for scaling-up/replication)				Approximately four mio USD

3. CLIMATE CHANGE

The project has achieved its goals in regard to the area of plantations targeted and number of farmers trained. Thus, the positive impact on climate mitigation is achieved as expected by more sustainable land use on the plantation area (reduced erosion, better soil protection and protection of watershed areas). These actions are tangible climate change adaptations and will help reduce the negative impact of climate change in the years to come. Annex 6.1 and 6.2 shows the initial expected carbon emission reductions along with the updated estimates at project end. The initial GHG emission reduction was expected to be 16,000t per year in direct impact. The direct reduction is defined as a reduction due to the investments made by the project. Following the project completion, it was expected that the indirect impact would be 2,5 mio t. The indirect reduction is based on the expected additional investment from other sources. The table below shows the differences between the initial assessments and the one updated at project end.

Source of emission reduction	**Initial reduction (t GHG equivalents)**	**Revised estimate at project end (t)**	**Explanation for difference**
Direct reduction per year	16,000	33,000	The initial carbon sequestration was estimated conservatively

			(in the understanding it could be better).
Indirect reduction per year (after project end)	2,5 mio	14,445	The initial expectation was that other industries would have started using pellets as fuel to replace coal. This holds a huge potential for emission reductions. At project end, this is still a potential but, it is not planned or agreed for the time being. As a consequence, future investment may happen, but are not counted at present.

However, the project has achieved an estimated 1,000t production of pellets per month, and it is likely to reach a maximum capacity of 1,500t per month in the foreseeable future. This can be compared to the project target of 3,000t at project end.

Cook stoves have not reached the expected target of an annual reduction of 3,100t of GHG emissions per year because it was found that this activity could not be implemented. Initial study revealed that cook stoves will be very difficult to sell to farmers who already had access to plenty of firewood for the existing fireplaces.

4. DEVELOPMENT IMPACTS AND CROSS-CUTTING ISSUES

Health and safety improvement at Cam Lo factory

A gender equality and social inclusion (GESI) guideline was developed jointly by SPARK and Cam Lo team to be applied during the project implementation. The project encouraged all partners to conduct flexible and innovative GESI mainstreaming, taking into consideration the context and available resources to improve gender equality in plantation management. The Guidelines include topics and tools for both women and men to have equal opportunities for participating in the project activities. The project field staff and Cam Lo factory staff were instructed on the GESI guideline by SPARK during the project implementation. The project coordinator consultants also regularly assisted the project staff in following the GESI guideline.

According to the guidelines, the roles and voices of women and men in activities are equally respected. In many cases, women are given priority. The diverse communication approach also helps every individual to acquire better information than conventional training courses. In the planning process, time and place factors are always considered to create the best conditions for women to fully participate. The GESI guideline can be used or referenced by similar projects.

Although the work done was for a target group of 10-15 people, this is an encouraging first step to anchor GESI at Cam Lo and in future project context.

Environmental sustainability

The project succeeded in building a solid case of good cooperation between plantation owners and Cam Lo factory processing Acacia into wooden products and pellets. Through this partnership, it is demonstrated to authorities and the industry that an investment in a safe supply chain makes economic sense and promotes increased sustainability to prevent erosion and increase soil quality, as well as the income by farmers through longer rotation cycles. Nurseries providing high quality planting material is a key to achieving this. The example set helps support livelihoods and other social benefits as well.

5. ASSESSMENT OF THE RESULTS AND IMPACTS OF THE PROJECT

5.1 Relevance

Acacia plantations are a political priority at both central and province level. On top of that, the wood processing industry relies on access to Acacia wood in dimensions that allow furniture production, mostly for export. The FSC certification is often a requirement to enter the international markets. As tangible results have been achieved in forming farmer groups, the project is a living example for other areas and will remain important for years to come. This also supports local, national and province level policies which aim to increase the area of certified plantations.

Making use of wood pellets as a side product of wood processing is not easy when competing with large scale industries located at harbours for export of the pellets. However, by developing pellet incinerators for the small and medium size industry, the project shows that energy consumption and costs can be lowered. This also becomes an attractive solution in light of Vietnam's plans of implementing environmental taxes related to carbon emissions within the next few years. Already today, Vietnam imposes taxes on water consumption which are paid to forest owners for protecting watershed areas.

Good health and safety are competitive advantages when supplying furniture to international retailers such as IKEA. The IWAY standard requires wood processors to fulfil minimum requirements before the products can be imported by IKEA. Ensuring better income in rural areas is another main political goal in Vietnam. Meanwhile, the main motivation for farmers is higher income. The project has been vital in demonstrating how better management of plantations can both result in environmental benefits as well as social improvements.

5.2 Effectiveness

Cook stoves were given up due to difficulties in both creating a market and logistic supply of pellets to households to replace firewood and gas for cooking. For pellets to be used at industrial scale, it was necessary to build demonstration incinerators first to make the case and prove the benefits in practice. Unfortunately, it was not possible to buy incinerators suited for this purpose because they were not available for purchase. Thus, time was needed to develop the incinerators before promotion made sense. At the time this was possible, COVID-19 paused this activity. However, since Cam Lo has full ownership for this initiative, it will be continued after project end.

The measures outlined in the project confirms that more than 2,700 farmers received training in sustainable plantation management, indicating indirect impact has been made. As the average farm size is close to 3 ha, a minimum of 6,000 ha of plantation was targeted for sustainable management. Also, the number of planting material produced indicates that the impacts expected have been achieved.

To improve the project's effectiveness, awareness raising was done through the promotion of the YouTube video. Aside that, the project emphasised more on directly training a larger number of farmers rather than depending on certain farmer groups to pass on the information gained.

5.3 Efficiency

Several activities have been implemented timely prior to COVID-19 putting a halt to certain activities, which led to the project being delayed. Through cooperation with trainers working at local level for local salaries, the project has been cost-efficient. Furthermore, Cam Lo has invested in machinery and construction to support the project and continues to be committed to the project. Through the local ownership to project activities and cooperation with authorities and NGOs, it is hard to imagine how the activities could have been implemented more efficiently, with the restrictions imposed by the pandemic. By demonstrating a win-win situation between industry and farmers, it becomes a very important achievement for continued efforts from other sides to improve Acacia plantation management in Vietnam.

The two extensions of the project allowed to deal with unforeseen delays and findings which made the revision of project activities necessary.

5.4 Impact

Social impacts have been recorded through the demonstration to farmers that forming groups helps them in improving plantation management and gaining more income by applying better plantation management techniques. Health and safety along with gender equality have been addressed as well. Social benefits have also been achieved through the provision of jobs for disabled women in nurseries as well as the improved practices in plantation management and prioritising health and safety at the factory level.

Environmental impacts can be seen through the practices of longer rotation cycles and better management of plantations. These collectively reduce erosion, pesticide use and carbon emissions while improving soil health and ensuring the availability of clean water.

Economic impacts could be recorded at the farmer as well as the industry level. Through this project, wood production industry would be able to reliably source large amounts of Acacia while farmers as well as farm managers would benefit through increased returns generated from well managed plantations.

5.5 Sustainability

Since the project builds on increased income by both farmers, wood processors and/or industries using pellets as fuel, the remaining challenge is how to overcome the time difference with investments needed years before income is earned, as environmental benefits at demonstration sites needs at least five years to show results, while the project implementation period is only for three years. A clear strategy is implemented to allow thinning and the use of high-quality planting material to close the gap between making the investment and achieving the increased income. The driver behind this is to facilitate trust and good cooperation between farmers and industries. Once this has been established, FSC certification may be seen as one more benefit to document sustainability and to expand into the international markets.

The project has made its intend and concept available through a kick-off meeting for important stakeholders. The provincial Forest Protect Department has also agreed to work closely with the project in terms of farmer trainings. Aside that, the project is a strong basis for the USAID project Sustainable Forest Management which is being implemented from 2020-2025. Most importantly, the cooperation between Cam Lo and farmers will be used as lesson learned in this new project. Such industry and plantation owner relations will be key to both increase profitability and sustainability of plantation management.

5.6 Coherence

The project was initiated based on more than 10 years of support to farmers by GIZ and WWF in the Quang Tri province to achieve FSC certification through more sustainable plantation management. Close cooperation with WWF and authorities during project implementation was prioritised and will be continued in the new project context within the activities of the new USAID project mentioned.

It is also important to mention the cooperation with province authorities and the synergy between the political priorities and sustainable plantation management. Vietnam has policies on both national and province levels to increase the wood production based on improved Acacia plantation management. On top of that, certified wood is a priority for these authorities as wood production, especially furniture export, is an important source of income.

6. INNOVATION

In terms of innovation, the project aimed to create links between wood processors and plantation owners while using the residuals from sawmills to produce wooden pellets. The latter is done to replace coal in incinerators developed for the specific small to medium industrial scale found in Quang Tri.

Wood processors depend on Acacia that has grown for more than five years to allow the production of wooden parts for furniture. However, plantation owners are reluctant to grow Acacia for the sufficient time because they will have to wait for financial return. If a relation is built between the wood processor and plantation owner, both can gain from having safe supplies of Acacia at sufficient size and quality and generate better income from growing Acacia for 5+ years. Previously, processors were purchasing as much Acacia as possible, at the cheapest price available. Meanwhile, plantation owners settled for low income from small trees as they are easier to sell and could bring them remuneration at a faster rate. At the same time, saw dust and waste wood from processing 5+ year Acacia can be upcycled to be used for pellets – generating additional income that can be used to support extended growing periods.

7. POTENTIAL FOR SCALING AND FOLLOW-UP INVESTMENTS

The project demonstrates benefits when farmers invest in their plantations to achieve better income and environmental benefits. At the same time, commitment from wood processors needs to be mobilised. As a member of the SEPON group, Cam Lo has invested in making this model to enable farmer groups to improve plantation management and possibly achieve FSC certification, a long-term intervention, which will continue after the project completion. Furthermore, The Sustainable Forest Management USAID project works in six additional provinces of Vietnam to demonstrate and facilitate project results for additional farmers and plantation areas. Scaling up is, thus, happening with support from both foreign aid and through priority of local and centralised authorities in Vietnam. The investment from USAID is approximate 4 mio USD until 2025 in the scope of better plantation management. Local provinces and the MARD follow the project closely and support the project through administrative and political contributions.

8. RISKS

The following risks were identified at project start. Comments are made to present and future mitigation.

Initial risk	Comment	Mitigation done and future
Low market penetration of stoves due to lack of interest from users	Risk materialised and the project had to be redesigned in regard to cook stove activities.	This risk turned out to be impossible to mitigate because farmers have access to basically free firewood, and hence no interest in buying pellet burning stoves. Also, the distribution of

		pellets in the project area created a challenge because it would be costly to transport pellets consistently over a large area in combination with high price sensitivity.
Low market penetration of pellets due to lack of interest from private sector	Investment and replacement of burners remains a challenge	A demonstration was elaborated at two factories to prove the business case related to the advantages of pellet incinerators. Continued promotion especially to industry under construction and those who must renew coal burners is also needed after project end.
Farmers will have reduced income for three years when shifting from five to eight-year rotations. This cost will be reduced by training in FSC certification and provide access to interim financing. In addition, the project will identify short term crops that can be intercropped with newly planted trees for more income.	FSC certification is not in itself a driver for long rotation cycles. A premium price for certified Acacia cannot be assumed per se. Thus, better plantation management is the necessary starting point. Certification may add additional income.	Thinning and use of high-quality planting material is initiated and continues to be promoted towards farmers. Establishing farmer groups and anchoring in partnership with Cam Lo to ensure profitable sale of long rotation cycle Acacia. Fair prices also for Acacia wood damaged during typhoons.
Subsidy for certified timber must be available to encourage and facilitate FSC certification.		Industry partnership with farmer groups provides wood processors with a reliable resource base of certified wood, and at the same time gives farmers the necessary conditions to become certified. If these benefits are well communicated, they may serve as encouragement for FSC certification facilitation.
Lack of interest in certification		Plantation management must be addressed before the option to be certified can be considered.
COVID-19 travel restrictions	Training of farmers and companies has been close to impossible for the last part of the project due to COVID-19 restrictions.	Some trainings and activities have been moved to the compound of Cam Lo Factory.

9. MONITORING AND EVALUATION

An evaluation was made at the project end by consultants Thanh Pham Nguyen and Thai Thi Huyen Nga from SPARK. Both of them are entirely independent and have been involved with previous project work. Due to the limited resources available for evaluation, this seemed to be the best way to proceed especially since COVID-19 restricted travels and interactions with stakeholders. This is because taking in an evaluator without previous knowledge to the project would have required considerable time for them to understand the background and work done by the project.

The project had five main activities broken down into 19 sub activities.

Twelve activities were fully completed, some with revised indicators: ***1.1 Assessment on best options for improved forest management in Quang Tri province***; ***1.2 Assess feasible forest replantation areas for sustainable forest management certification schemes***; ***1.3 Conduct meetings/visits with farmers on sustainable forest management practices***; ***1.4 Establish seedling nurseries***; ***1.5 Capacity building on sustainable forest management and certification***; ***2.1 Conduct baseline study on the current energy use practices and needs for cooking and heating/boiling at household and industry level***; ***2.2 Conduct initial market study on available cook stoves for energy efficiency solutions using wood pellets at households and industrial user level***; ***2.3 Promote interested industrial wood pellets users to engage in the supply chain***; ***3.1 Assessment of current wood processing practices***; ***3.3 Implement improved wood harvesting practices***; ***5.1 Establish key project indicators, and develop and implement a Monitoring & Evaluation system***; and ***5.2 Develop and implement a stakeholder consultation and dissemination plan***.

Five activities were completed partially – mostly due to COVID-19 restrictions regarding organising meetings: ***1.6 Sustainable forest management (increase rotation cycle and financial support)***; ***1.7 Build capacity for sale of FSC certified wood products***; ***3.2 Adapt and implement improved wood processing practices***; ***4.1 Raise awareness on sustainable forest management and project outcomes***; and ***4.2 Raise awareness on sustainable forest management and project outcomes***.

The activities ***2.4 Organise workshops/events for awareness raising on benefits of improved wood pellets*** and ***2.5 Develop energy efficiency solutions for interested companies who want to use wood pellets*** were not completed due to COVID-19 restrictions.

The main finding of their evaluation report (can be forwarded upon request) is:

- *With the information collected and verified, it can be concluded that the project has achieved most of its expected results. Although the COVID-19 pandemic has delayed many activities, the project has found practical solutions to achieve its objectives. However, the area of sustainable plantation needs more time to achieve the expected number. It is because the owners have to wait for the new rotation to start new plans.*

To sum up, it is evident that the project stakeholders have been positive. This is supported by their active participation in the project: Forest Protection department in

Quang Tri, where WWF and Forest Certification Association make up the most important parties.

10. LESSONS LEARNT

- Despite the advantages of cook stoves compared to open fire cooking, the project found that farmers would not have been willing to pay for cook stoves. Low-cost cook stoves were developed for them but were still too expensive. In addition, plenty of free firewood is available and this hinders the distribution of pellets that the farmers would need to pay for.
- Timber processors can participate and play an important role in sustainable plantation promotion projects. The processors with a long-term development strategy, good production and market capacity, having participated in the sustainable wood value chains are potential partners for sustainable plantation projects.
- Institutional capacity is crucial for promoting sustainable forest management among the small household plantations. Groups of farmers or collective enterprises should be built and strengthened to support individual households practising appropriate silviculture technique.
- The quality of cuttings that are being popularly used is a major obstacle to sustainable plantation management. Improving planting material (seedlings/cuttings/tissue transplanting) quality at the nurseries should be the first step of any sustainable plantation promotion project.
- There are advanced farmers and useful demonstrations as well as models of plantation available in the communities. These local advantages should be identified and mobilised for effective communication with less time expensed and low resources cost.
- Practise is important in silviculture training events. In addition, providing tools such as pruning scissors will encourage participants to apply and practise technical guidance immediately.
- Maintaining regular contact is essential to build trust between project field staff with the groups and individual plantation owners, strengthening the partnership and commitments among the stakeholders in project implementation.
- Coal used for heat burning in the factories can be replaced by wood pellets without incurring additional fuel costs or most likely even reduce costs for fuel. Along with export, the industrial users are a promising domestic market for wood pellet producers in Vietnam.
- As the project was planned with many different aspects of plantation management, it should have been realigned to focus solely on wood pellets and the sustainable management of the plantation alone.

11. OUTREACH

To support capacity building, the project designed and produced three types of communication materials on sustainable plantation management, which cover both benefits and techniques information. The project produced 2,200 large size posters, 2,500 letter size leaflet-style handouts and 2,500 copies of pocket-sized brochures that were printed and delivered. These three types of documents have different designs to meet the diverse needs of the people. Large sized documents can be hung

or placed inside people's houses, community houses or public places. Leaflets are distributed during in-consultation meetings to support the communication. The assessment results show that forest owners prefer to use large poster materials because they are convenient to see every day and contain easy-to-understand illustrations. In contrary, leaflets do not receive much attention because of their small size and are easily lost and forgotten.

The project also produced a 10-minute video clip presenting the major technical and economic issues of long rotation plantation to be broadcasted on YouTube. By the end of April 2021, the video clip garnered over 3,500 views. According to the evaluation discussions, those who have seen the clip shared that it is helpful and easy to understand because it directly addresses people's concerns.

Technical issues are specific and interpreted by the local growers themselves in the clip. Participants of the evaluation discussion groups also commented that there should be more similar clips introducing new species and new clones for plantation to enhance their knowledge on making better choices within plantation management. The video can be viewed here:
https://www.youtube.com/watch?v=aj8v9xBKxU8&t=353s

12. FINANCIAL SUMMARY

Table 1. Project financing per partner

	Financing, EUR					
Expenditures, EUR	**NCF**	**NEPCon**	**SPARK**	**Cam Lo**	**Revenues from the project**	**Total**
NEPCon	162,038	21,849	-	-	-	**183,887**
SPARK	62,123	-	2,356	-	-	**64,479**
Cam Lo	163,653	-	-	580,873	-	**744,526**
[…]						
Total	387,814	21,849	2,356	580,873	-	**992,892**

13. CONCLUSIONS AND RECOMMENDATIONS

The NCF project has been implemented in Quang Tri province for a period of 40 months, from the beginning of 2018 until April 2021. The main conclusions and recommendations are:

- The project had the right goals, but some of the original objectives and activities were not well defined at the project start. However, subsequent adjustments have made the project more relevant and feasible. By the end of the implementation phase, several major activities have either been completely or partially implemented, while key objectives have been achieved.

- Cam Lo Wood Pellet Factory was the right partner for this project implementation. The partner has implemented the project with a strong sense of ownership and responsibility.

- The project has generated initial impacts, changing the awareness and practise of plantation owners towards sustainable large timber management. Farmers now know and buy high-quality planting materials, and know how to practise advanced silviculture techniques such as pruning and thinning with proper tools. Many household groups have planned and implemented sustainable plantation with long rotation to produce large Acacia timber.

- The institutional capacity of small plantation owners in Quang Tri has been improved. Groups and cooperatives have been formed to support large timber production with long rotation. Although the number of groups and members is small compared to the total number of nearly 25,000 plantation owners in the province, the first groups created a fundamental condition to build up a larger association of plantation owners.

- The project has generated many important lessons learnt for stakeholders. Small plantation owners have learned important silviculture practises for producing high-quality timber, increasing their income and reducing negative impacts on the environment. Timber processors, especially the Cam Lo factory, have learned how to cooperate with small plantation owners to build sustainable material areas for long-term business plans. The local government in Quang Tri has learned how to mobilise forest rangers to implement policy on large timber plantation promotion.

- The project has found access to the domestic market for Cam Lo Wood Pellet, besides the conventional export. It is the industrial plants that are using or planning to use fossil fuel for heating. Cam Lo factory has achieved sufficient experience and technical knowledge to design and install wood pellet incinerator systems in accordance with technical requirements for every production line. This initial success is significant for the goal of using wood pellet as a sustainable alternative to fossil materials, contributing to reduced pollution and increasing income for the plantation owners.

Annex 1: Project completion fact sheet

Project Name:	Improving rural livelihoods in the North Central region in Vietnam through innovative development of supply chains for energy-efficient cook stoves and wood from sustainable sources		
Project no.	NCF-C6-0013		
Country:	Vietnam	**Financing:**	
		EUR	**%**
Nordic Partner:	NEPCon (Preferred by Nature)	21,849	2.2
Local Partner:	Cam Lo, SEPON	580,873	58.9
Other Partner:	SPARK	2,356	0.2
	NCF grant disbursed	387,814	39.1
	Total		**100.00**
Classification:	Mitigation		
Project cycle:	Project start date: 01 January 2018 Original closing date: 28 October 2019 Actual closing date: 30 April 2021		
Short project description:	The project was designed to support sustainable livelihoods of 6,000 poor and low-income rural households in the Quang Tri province of Vietnam. On top of that, the project aimed to improve access to affordable and clean energy efficiency solutions for 2,000 households. Following the baseline studies, it was found that cook stoves would not be successful on the countryside as firewood is mostly free – it would be difficult to distribute pellets to farmers and expect payment for them. Thus, the project was refocused solely on developing industry scale incinerators fuelled by wood pellets as well as supporting a sustainable forest resource base while mitigating carbon emissions. The latter was done through training of farmers which improved their livelihoods due to more income being generated from better plantation management. The current forest management practice and wood supply chain in the province of Quang Tri offers opportunities for increased sustainable livelihoods as well as releasing bottlenecks that affect the incomes of farmers as well as private sector industries and their employees involved in wood processing industry. Despite tangible economic and environmental benefits of implementing sustainable forest management certifications such as FSC, a lack of technical knowledge, business network and financing services are main barriers that are preventing the majority of farmers from switching to sustainable forest management practices. This project developed the supply chain of certified wood and wood pellets from sustainable forests and scaled up certified sustainable forest management areas thereby enhancing the sustainable livelihoods for plantation growers. By doing so, it will help the local companies to get sufficient supply of certified wood to produce higher added value lumbers and wooden products for export, as well as sufficient supply of by-products and residues – the inputs needed for wood pellet production. This project was done in collaboration with Cam Lo Wood Pellet Company. The company will continue to support and encourage the 6,000 farming households to apply sustainable forest certification practices while training local farmers in sustainable forest management practices and forest replantation techniques. These		

	efforts are done to further strengthen a sustainable base for a certified wood pellet production in the province. In addition, the project will enable industrial users to apply cleaner energy solutions to reduce a significant amount of fossil fuel such as coal, leading to reduced CO2 emissions. The development of certified wood and wood pellets turns wood processing waste into renewable and energy efficient fuel for local households and industry users. Due to some initial delay, and longer periods of training required, the project was extended from end of 2019 until April 2021. This additional time was used to develop incinerators of industry level and extend the training of farmers to increase the impact of the project.		
Completed as planned	**Expected Outcomes and Outputs**	**Achieved**	**End-of-project status**
	Outcome 1:		
	1.1 Assessment on best options for improved forest management in Quang Tri province	M1	Completed as planned
	1.2 Assess feasible forest replantation areas for sustainable forest management certification schemes	M1	Completed as planned
	1.3 Conduct meetings/visits with farmers on sustainable forest management practices	M3	Completed as planned
	1.4 Establish seedling nurseries	M5b	Completed
	1.5 Capacity building on sustainable forest management and certification	M5b	Completed, target likely to have been met
	1.6 Sustainable forest management (increase rotation cycle and financial support)	M5b	Partially completed in line with FSC new certifications rules, replanted area likely not fulfilled
	1.7 Build capacity for sale of FSC certified wood products	M5b	Partially completed capacity building, 10 business models not developed due to COVID-19
	Outcome 2:		
	2.1 Conduct baseline study on the current energy use practices and needs for cooking and heating/boiling at household and industry level…	M1	Completed as planned
	2.2 Conduct initial market study on available cook stoves for energy efficiency solutions using wood pellets at households and industrial user level…	M2	Completed as planned, cook stoves rejected from project scope
	2.3 Promote interested cook stove producers to engage in the supply chain - ***Revised to:*** *Promote interested industrial wood pellets users to engage in the supply chain*	M5b	Completed with revised content
	2.4 Organise workshops/ events for awareness raising on benefits of improved wood pellets *(**revised**: now excluding cook stoves)*	-	This was impossible to complete given the COVID-19 situation, but the

			benefits were communicated through informal communications.
	2.5 Develop energy efficiency solutions for interested companies who want to use wood pellets	M5b	Not completed as promotion towards industry has been restricted due to COVID-19.
	Outcome 3:		
	3.1 Assessment of current wood processing practices	M2	Completed as planned
	3.2 Adapt and implement improved wood processing practices	M5b	Partially completed with scope changed towards Cam Lo improvements, training of five companies was not conducted due to COVID-19
	3.3 Implement improved wood harvesting practices	M5b	Scope changed slightly, completed mostly as planned
	Outcome 4:		
	4.1 Develop demonstration sites and conduct study tours for local authorities ***Suggested adjusted activity:*** Raise awareness on sustainable forest management and project outcomes	M5b	Partially completed. Kick off workshop replaced study tour, demonstration sites replaced by YouTube video promotion. Goal fulfilled.
	4.2 Local campaign and workshops targeting farmers *[**revised** to be merged with activity 4.1 as part of November 2000 amendment]*	M5b	Partially completed. Merged with 4.1. one of five planned YouTube videos finalised.
	Outcome 5:		
	5.1 Establish key project indicators, and develop and implement a Monitoring & Evaluation system	M1	Completed as planned
	5.2 Develop and implement a stakeholder consultation and dissemination plan	M1	Completed as planned
Climate change outcomes and impacts:	Positive impact on climate mitigation has been achieved through more sustainable land use on the plantation areas. The initial GHG emission reduction was expected to be 16,000t per year in direct impact but was revised to 33,000t at project end as the initial carbon sequestration was estimated conservatively. As for indirect reduction per year, it was estimated to be 2,5 mio t but revised to 14,445t at project end. This was due to the shifting expectation that other industries would have started using pellets as fuel to replace coal.		

	However, the project has achieved an estimated 1,000t production of pellets per month, and it is likely to reach a maximum capacity of 1,500t per month in the foreseeable future. This can be compared to the project target of 3,000t at project end. Cook stoves have not reached the expected target of an annual reduction of 3,100t of GHG emissions per year because it was found that this activity could not be implemented. Initial study revealed that cook stoves will be very difficult to sell to farmers who already had access to plenty of firewood for the existing fireplaces.
Development outcomes and impacts:	Livelihoods are improved through longer rotation cycles. However, due to COVID-19, it was not possible to estimate the increase in income (or expectations for this based on better plantation management). Aside that, significant development impacts were recorded in the scope of health and safety improvements at the Cam Lo Factory. A gender equality and social inclusion (GESI) guideline was developed jointly by SPARK and Cam Lo team, which encouraged equal participation of both genders while providing the necessary tools and support for women to fully participate. In terms of environmental sustainability, the project succeeded in building a solid case of good cooperation between plantation owners and Cam Lo factory processing Acacia into wooden products and pellets. Through this partnership, it is demonstrated to authorities and the industry that an investment in a safe supply chain makes economic sense and promotes increased sustainability to prevent erosion and increase soil quality, as well as the income of farmers through longer rotation cycles. Nurseries providing high quality planting material is a key to achieving this. The example set helps support livelihoods along with several other social benefits.

	NCF core indicator	Results (quantitative)			Clarifications/ Means of verification
NCF core indicators	Number of beneficiaries reached	Women	Approx. 9,500		Around 6,000 farmers reached (training records, YouTube visits, memberships). Households consist of plus three people. Thus, each farmer has impact on minimum three times more people leading to a total of 18,000 beneficiaries.
		Men	Approx. 9,500		
		Total	Approx. 18,000		
	Number of people with increased resilience to climate change	Women	Approx. 1,650		Farmer groups established long term rotation cycles with 600 members (evidence: group member lists). In addition, more than 2,700 farmers were trained in sustainable plantation management (evidence: training records).
		Men	Approx. 1,650		
		Total	Approx. 3,300		
	Number of people with improved livelihoods	Women	N/A		The numbers could not be assessed due to COVID-19 and climate disaster in Quang Tri province during the project end period.
		Men	N/A		
		Total	N/A		
	New decent jobs created	Full-time	Women	3	The nurseries supported and established have created new jobs mostly for women. The employments depend on the season, under favourable conditions about 10 women will be employed, under poor weather conditions less. Interview of nursery owner and news article elaborated on this background: https://www.nordicclimatefacility.com/news/growing-a-future-vietnams-budding-sustainable-forestry-sector
			Men	1	
			Total	4	
		Part-time	Women	N/A	
			Men	N/A	
			Total	N/A	
		Seasonal	Women	6	
			Men	2	
			Total	8	

	Number of Green Business Concept tested				Two concepts have been tested: 1) increase capacity of farmers to better manage plantations for increased income and sustainability and 2) Develop incinerators for small to medium size industry plants using pellets as renewable energy based on residuals.
	Number of multi-stakeholder partnerships developed				One main partnership between Cam Lo and farmer groups to grow larger dimension Acacia during long rotation cycles.
	Amount of funds leveraged (possible secured future investment for scaling-up/replication)				Approximately 4 mio USD.

Annex 2: Results Framework

The initial Logical Framework developed at the beginning of the project to ensure the logic of activities related to the planned outputs and objectives. However, the deliverables have been adjusted during some amendments to the agreement or as part of milestone reports. The table below summarises the deliverables and the actual outputs and achievements. The Logical Framework was not updated during the project.

Milestone deliverable	**Outputs and achievements**
1.1 Assessment on best options for improved forest management in Quang Tri province	The report describing gaps in sustainable plantation management. It describes future challenges and most important elements for the sustainable management of the plantations such as: - Riparian zone protection - Soil protection - Harvesting - Waste management - Biodiversity protection
1.2 Assess feasible forest replantation areas for sustainable forest management certification schemes	Assessment on the plantation of Quang Tri province completed. The collected data from 32 communes confirmed that 6,290 ha can be replanted during the next 18 months. Sustainable plantation practices are expected to be applied on a total of 6,000 ha. It was later found that replantation was not increased due to project activities, but the identified areas helped to target the most promising areas to support sustainable plantation management.
1.3 Conduct meetings/visits with farmers on sustainable forest management practices	More than 2,100 farmers received information. This corresponds to approx. 6,300 ha of plantation being targeted.
1.4 Nurseries upgrading/ standardisation (previously “Establish seedling nurseries”)	The cooperation with the nursery continues to provide cuttings of high quality. The nursery produced 1,5 mio cuttings of high quality in 2020 and experienced high demand from farmers. The final achievement was that one more nursery was established, and more than 540,000 cuttings were produced, in total more than 2 mio cuttings in 2020 and the first months of 2021.
1.5 Capacity building on sustainable forest management and certification	The initial plan was to train 500 ToTs. This was changed to a new target to train 2,300 farmers. Through an impressive effort during the last 16 months of the project, the total number of farmers trained was about 2,700 farmers and related target groups.
1.6 Sustainable forest management (increase rotation cycle and financial support)	This activity was planned from project start to project end. Work has been done for farmers to maintain certification and help new farmers organise in groups and possibly become certified. The purchase of certified wood was only 713t in the reporting period. This was due to a heavy storm and COVID-19 restrictions. However, the amount purchased is reaching previous production level in the last months of the project period.

	A total of 2,700 farmers have been organised in 48 groups and planted 1,235 ha long rotation Acacia. Farmers who have become certified own an area of 1,100 ha. The total area certified through support from the project is 6,000 ha. Replanting is harder to access because certification does not request permanent tree cover anymore – thus, it is likely to be less than 2,000 ha.
1.7 Build capacity for sale of legal and certified wood products (previously "Build capacity for sale of FSC certified wood products")	Due to COVID-19 restrictions, it was difficult to convene as planned and subsequently develop the targeted business models. Nonetheless, the project did succeed in hosting one workshop, participated by 18 stakeholders to discuss certification and long rotation cycle Acacia management. A report was elaborated as planned, but ten business models were not elaborated to follow up upon future cooperation. However, reassessment of chain of custody certificate has been achieved for Cam Lo.
2.1 Baseline study about cook stoves conducted (Conduct baseline study on the current energy use practices and needs for cooking and heating/boiling at household and industry level)	The baseline study about cook stoves was conducted from 12 to 25 June 2018. In total, 53 households in Cam Lo, Dong Ha, Trieu Phong and Hai Lang district were interviewed.
2.2 Conduct initial market study on available cook stoves for energy efficiency solutions using wood pellets at households and industrial user levels as part of the inception phase (2.2 Conduct initial market study on available cook stoves for energy efficiency solutions using wood pellets at households and industrial user level)	SPARK has written a report to assess the potential of different cook stoves available on the market. The update of cook stoves at farm level is not promising, however, industry scale use of pellets has good potential.
2.3 Promote interested industrial wood pellet users to engage in the supply chain (initially "Promote interested cook stove producers to engage in the supply chain")	The project partner SPARK has developed business models and facilitated outreach to possible clients interested in wood pellets. Preferred by Nature has contacted a Danish energy provider for possible import.
2.4 Organise workshops/events for awareness raising on benefits of improved wood pellets (previously also including cook stoves)	Implementation has been impossible due to COVID-19. However, the benefits have been promoted as far as possible, through informal communication with interested parties. No expenses have been reported for this activity.
2.5 Develop energy efficiency solutions for interested companies who want to use wood pellets	The incinerator at Cam Lo factory has been considerably improved and has increased its efficiency which leads to more efficient pellet production. Importantly, two more incinerators have been built at the SEPON Cassava factory (and one more is operational purchased from a service provider). These incinerators have been tested and show that pellets are more cost efficient than coal, a 10% saving in fuel costs has been achieved. However, as promotion towards industry clients has

	been restricted due to COVID-19, no local industry users have applied improved ovens using certified wood pellets thus far.
3.1 Assessment of current wood processing practices	Preferred by Nature conducted a study to get information about wood processing. The overall conclusion was that farmers can improve their plantation management considerably and that a mechanism to buy damaged wood at a fair price is needed.
3.2 Adapt and implement improved wood processing practices	A roof and woodchopper have been installed at Cam Lo factory (funded by Cam Lo), together with improvements in health and safety machinery and equipment. Due to COVID-19 restrictions, training of five companies as planned has not been completed.
3.3. Implement improved wood harvesting practices	The project organised a class on work safety for 219 of the factory's employees, and 100 members of 10 harvesting groups. The project also purchased and delivered personal protective facilities to groups of plantation owners, harvesting teams and factory workers.
4.1 Raise awareness on sustainable forest management and project outcomes	To gain support from the government and other relevant organisations, the project implemented a kick-off workshop with the participation of leaders of districts, related departments and representatives of forest owners. Local TV and newspapers made a broadcast and wrote about the project. As mentioned under activity 1.5, a long YouTube video was produced which has received considerable attention.
4.2 Local campaign and workshops targeting farmers *[**revised** to be merged with activity 4.1 as part of November 2000 amendment]*	By project completion, the YouTube video recorded more than 3,500 views from farmers.
5.1 Effective Monitoring and Evaluation procedures that establish key project indicators, and monitor project progress, efficiency, and overall development impacts including on gender issues	A number of project management tools were developed during the first months of the project: 1) Activity overview 2) Procedures manual 3) Partnership agreement 4) ToR for project experts 5) Budget monitoring excel 6) Project management task list
5.2 A consultation plan and dissemination system to reach all stakeholders completed	All key stakeholders of the project were identified and were involved with the project. They are farmer groups, Forest Protection Department, Forest Certificate Association, Farmer's Association, World Wildlife Fund, More Tree project, and Scansia Pacific company. The stakeholders were provided with relevant project's documents and information. A consultation and dissemination plan was developed. The project management committee consisted of senior staffs of SEPON, Preferred by Nature and SPARK. Project's consultation group has the participation of all stakeholders. Regular and periodical meetings is the main consultation and dissemination methods. Information was also made available in a newsletter and reports.

Annex 3: Pictures

Photo 1. Good quality Acacia planting material

Photo 2. +5-year Acacia harvest for furniture production

Photo 3. FSC-certified Acacia from the Cam Lo factory

Photo 4. Chopper for wood chipping purposes

Photo 5. Equipment purchased by project for safter timber handling

Photo 6. FSC certified wood trunks for wood production

Photo 7. Wood processing activities at the Cam Lo factory

Photo 8. Workers conducting pellet production

Photo 9. Cooking at the farmers' place - no cook stoves are used

Photo 10. Tests: Feeding big pellet to mud cook stove

Photo 11. Industrial scale cook incinerator at rubber factory

Photo 12. Discussion meeting with farmers on 31 October 2018

Photo 13. Interviews were conducted with farmers about Acacia plantations

Photo 14. Farmers were consulted on better plantation management

Photo 15. Information materials were prepared for training purposes

Photo 16. Example of the type of leaflets prepared by the project team

Photo 17. Through this project, two nurseries delivered high quality planting material

Photo 18. The nurseries have created new jobs, mostly for women

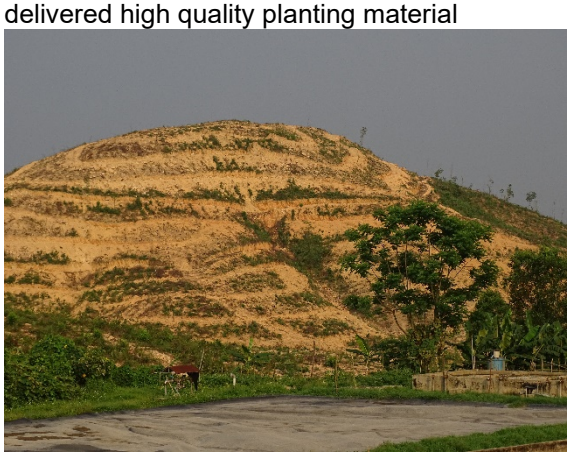

Photo 19. Poor plantation management is observed frequently

Photo 20. Mr Chien case story

Annex 4: Other supplementary deliverables/documentation/links

n/a

Annex 5: Impact story

Local farmer adopts sustainable plantation management techniques for better profitability

Mr Chien's household has a 3 ha plantation in the Ben Quan commune, Vinh Linh district. Similar to every other farmer within the area, he grows Acacia hybrid on his land and harvests it every five years. On average, 3 ha of Mr Chien's plantation brings in an annual income of about 50 million VND. Following his participation in the project's training, Mr Chien wants to plant a large timber plantation because he finds it more profitable. However, according to the technical guidance, there are some things he had never done before, including pruning and thinning. With the scissors provided through the project, Mr Chien tried his hand at pruning on 1 ha, followed by 2 ha. After undergoing this thinning, Mr Chien was satisfied with his plantation.

In a year, he prunes three times and through this, he has picked up a few tips of the trade. These include learning that a three-month-old plantation is best for first pruning. During the rainy season, these trees should be left to grow, untouched. The beginning of the next dry season is the best time for the second pruning. He found that too much pruning is not good because it will make trees soft and vulnerable to wind. According to Mr Chien, "*the technique is not difficult, but it is only by practise one can know how to do it properly across every single plantation site. And to do this efficiently, you need appropriate tools. Thanks to the scissors provided!*"

Huong Hoa Casava Starch Factory replaces coal with wood pellet

After two months of test running, in August 2020, Huong Hoa Casava Starch Factory is now using wood pellets for their heating system. Currently, the factory has three wood pellet incinerators, of which two are supplied by Cam Lo factory using hot air furnace technology that can run automatically, help reduce workload and improve heat control. The factory saves 10% of fuel cost, equal to 78 million VND per month, by using wood pellets. Wood pellets are environmentally friendly compared to coal because the smoke produced is without sulphur and other harmful particles. Burning wood pellets with heat blowing technology (indirect combustion) gives the advantage of ensuring a complete burn, leaving small amounts of ash which can be used for fertiliser. Today, the factory purchases 300 tons of wood pellets every month from the Cam Lo factory.