



## **Global Environment Facility**

### **United Nations Development Programme**

***Executing Agency:***

Ministry of Science and Technology (MoST)

***Project Partners:***

Ministry of Construction (MoC)

Ministry of Natural Resources and Environment (MONRE)

Ministry of Industry and Trade (MoIT)

Ministry of Planning and Investment (MPI)

Viet Nam Association for Building Materials (VABM)

## **UNDP/GEF Project: Promotion of Non-Fired Brick (NFB) Production and Utilization in Viet Nam Project (PIMS 4546)**

### **Terminal Evaluation Report**

(Timeframe: 6 January – 30 May 2020)

Mission Team:

**Rogelio Z. Aldover**

International Consultant

**Vu Thi Thu Ha**

National Consultant

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The Team wishes everyone success in all their endeavors.

**Rogelio Z. Aldover**

International Consultant

**Vu Thi Thu Ha**

National Consultant

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## Acronyms and Abbreviations

AWP	Annual Work Plan
AAC	autoclaved aerated concrete
BAU	business-as-usual
CBB	concrete brick block
COMA	Construction and Mechanical Corporation
DoC	Department of Construction
DoIT	Department of Industry and Trade
DoST	Department of Science and Technology
EOP	End of Project
ECC	Energy Conservation Centre
FCB	Fried clay brick
GEF	Global Environmental Facility
GoV	Government of Viet Nam
GIF	Green Investment Facility
kton	Kiloton or 1,000 tons
MTR	Mid-Term Review
MoC	Ministry of Construction
MoE	Ministry of Economy
MoIT	Ministry of Industry and Trade
MoNRE	Ministry of Natural Resources and Environment
MPI	Ministry of Planning and Investment
MoST	Ministry of Science and Technology
M&E	Monitoring and evaluation
NAFOSTED	National Foundation for Science and Technology Development
NPD	National Project Director
NFB	Non-Fired Brick
NFBM	Non-fired building materials
ProDoc	Project Document
PMU	Project Management Unit
PSC	Project Steering Committee
SME	Small and Medium Enterprises
SBU	Standard brick unit
STAMEQ	The Directorate for Standards, Metrology and Quality of Viet Nam
TE	Terminal Evaluation
TCVN	<i>Tiêu chuẩn Việt Nam</i> , or the national standards of Vietnam issued by the Vietnam Standard and Quality Institute
UNDP	United Nations Development Programme
VBKs	vertical shaft brick kilns
VABM	Viet Nam Association for Building Materials
VFCEA	Viet Nam Federation of Civil Engineering Associations

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VNMEC	Viet Nam Machinery Erection Corporation
VAA	Viet Nam Architects’ Association
VIBCA	Viet Nam Building Ceramic Association
VIBM	Viet Nam Institute for Building Materials

## Executive Summary

This Terminal Evaluation (TE) Report documents the TE process following the United Nations Development Programme (UNDP) Guidelines for Conducting Terminal Evaluation for GEF-funded projects. The project being evaluated is the **Promotion of Non-Fired Brick (NFB) Production and Utilization in Viet Nam Project** (PIMS 4546) or the Viet Nam NFB Project, funded by the Global Environment Facility (GEF) and implemented through the United Nations Development Programme (UNDP). The Executing Agency, representing the Government of Viet Nam (GoV), is the Ministry of Science and Technology (MoST) in cooperation with project partners consisting of Ministry of Construction (MoC), Ministry of Natural Resources and Environment (MoNRE), Ministry of Industry and Trade (MoIT), Ministry of Planning and Investment (MPI) and Viet Nam Association for Building Materials (VABM).

The NFB Project had its Mid-Term Review (MTR) started in 2017 and is now having its Terminal Evaluation (TE) as required by the UNDP and GEF Policy to assess the efficiency and effectiveness of a project in achieving its intended results.

The TE Mission was conducted with field visits to the selected project sites in Hanoi and Ho Chi Minh, Viet Nam during the period of January 5 – 11, 2020. The TE Team conducted interviews with the government counterparts, private entrepreneurs and stakeholders.

### Project Summary

The full description of the NFB Project detailing the project’s activities, expected outputs, results/outcomes, resources and institutional/management arrangement is included in the GEF-approved Project Document (ProDoc) of the NFB Project. The ProDoc which also contains the original Project Results Framework, also called the Project Logical Framework (Log Frame), was approved and signed on November 4, 2014. The project implementation started in January 2015. The Log Frame prepared in February 2014 was updated with revisions based on the recommendations of the Mid-Term Review (MTR) which was completed in June 2018.

**Table 1: Project Summary Table**

Project Title:	<b>Promotion of Non-Fired Brick (NFB) Production and Utilization in Viet Nam</b>		
GEF Project ID:	4801	UNDP Project ID (PIMS #)	4546
UNDP Project ID:	00087517		
Country:	Viet Nam		
Region:	Asia Pacific		
Focal Area:	Climate Change		
FA Objectives, (OP/SP):	CCM1-2.1: Appropriate policy, legal and regulatory frameworks adopted and enforced		

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	CCM1- 2.2: Sustainable financing and delivery mechanisms established and operational	
Executing Agency:	Ministry of Science and Technology	
Other Partners involved:	Ministry of Construction, Ministry of Natural Resources and Environment Ministry of Industry and Trade, Ministry of Planning and Investment, Viet Nam Association for Building Materials	
ProDoc Signature date	November 4, 2014	
(Operational) Closing Date:	Official: November 4, 2019 Actual (PMU Office): May 29, 2020	
<b>Project Financing</b>	<b><i>at endorsement (US\$)</i></b>	<b><i>at completion (US\$)</i></b>
GEF financing:	2,800,000	2,800,000
GEF agency/UNDP:	550,000	550,000
Government:	8,420,000	12,356,000
Private Sector:	27,310,000	76,099,949
Total co-financing:	36,080,000	89,005,949
Total Project Cost:	38,880,000	91,805,949

**Brief Project Description**

The project was designed to reduce the annual growth rate of greenhouse gas (GHG) emissions by displacement of fossil fuel use and the usage of topsoil for brick making through the increased production, sale and utilization of NFB’s in Viet Nam.

This objective would be achieved by removing barriers to increased production and utilization of NFB’s through 4 project components:

- **Component 1: Policy support** - Strengthening existing policies, guidelines, standards and codes for NFB production and usage and building the capacity of responsible government personnel to enforce a strengthened regulatory framework;
- **Component 2: Technical Capacity Building** - Building the knowledge and capacity of stakeholders involved in NFB production and use on the application of NFB production technology and the use of NFB products;
- **Component 3: Sustainable financing** - Improving access of SMEs and other potential NFB investors to affordable capital financing for NFB projects; and
- **Component 4: NFB technology application, investment and replication** - Technical assistance in demonstrating the development of NFB production lines and the use of NFB products in new building and construction projects.

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The NFB Project is expected to generate GHG emission reductions through the displacement of fired clay brick kilns. From the Project Results Framework or Log Frame, the direct GHG emission reduction (DER) target is 88 kilo tons (ktons) of CO<sub>2</sub> while direct post-project emission reduction (DPPER) is 1,270 ktons of CO<sub>2</sub> that is cumulative for a 10-year period (2020-2030) after the end of the Project. This is an estimation of DPPERs from NFB plants that received technical assistance from Project Output 4.9 during Years 4 and 5 to be implemented after the end of the project (EOP). The project is expected to generate cumulative direct energy savings<sup>1</sup> from displaced coal fuel through the NFB demonstration and replication plants and replacements of fired-clay bricks. The actual realization of the estimated GHG reduction benefits will therefore depend largely on the sustainability of the project results and how the market will be able to absorb the NFB’s actually produced and applied in the construction of buildings versus the business-as-usual scenario involving the continued production and use of fired clay bricks.

### **Project Implementation**

The Project was implemented over a 5-year period and is expected to generate GHG emission reductions through the displacement of fired clay brick kilns and promoting non-fired building materials (NFBMs) in general.

The Project’s official ending date was November 4, 2019. After the official closing date, the project continued to operate and complete few pending activities, project communication and documentation and closure of the PMU. The Project did not see the need to request for an official extension as most of the project outputs had been realized by the official EOP date while also completing the commitments in the 2019 Annual Work Plan (AWP) in terms of financial delivery and project reports. As planned, the six (6) months wrapping up period was decided upon to take care of the usual operational, asset turn over and financial closure procedures. The Project continued the completion of remaining activities and outputs, including:

- a) completion of the 3 replication projects (in addition to the 18 completed as of EOP in terms of implementation and technical support) which started operation in early 2019
- b) completion of the development of a national level integrated product-market strategy for non-fired bricks in Viet Nam in February/March 2020
- c) completion of the assessment of results and impacts of NFB demonstration, replication projects and financial assistance in March 2020
- d) Conduct of the project closing workshop.

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<sup>1</sup> The value is calculated based on difference between energy saving resulting from the total NFB’s outputs produced by the NFB demo and replication plants assisted by the Project and the corresponding energy saving of the same number of FCBs outputs displaced.

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In view of these, the Project was not able to complete all its activities within the planned timeframe, before the official EOP of November 4, 2019. There was a delay in project implementation as also reported in the PIR 2019 which was submitted during August/ September 2019, barely few months before the official EOP. The TE Team considers this a minor shortcoming since, even while there was no project extension requested, the Project results that were targeted in the Project Document were not affected, even exceeding target levels in majority of expected Outputs at EOP.

**Evaluation Rating Table** provides a summary of ratings of the terminal evaluation of the NFB Project.

**Table 2: Terminal Evaluation Ratings\***

<b>Evaluation Ratings:</b>			
<b>1. Monitoring and Evaluation</b>	<b>Rating</b>	<b>2. IA&amp; EA Execution</b>	<b>Rating</b>
M&E design at entry	S	Quality of UNDP Implementation – Implementing Agency (IA)	S
M&E Plan Implementation	S	Quality of Execution - Executing Agency (EA) – MoST	S
Overall quality of M&E	S	Overall quality of Implementation / Execution	S
<b>3. Assessment of Outcomes</b>	<b>Rating</b>	<b>4. Sustainability</b>	<b>Rating</b>
Relevance	R	Financial resources:	L
Effectiveness	HS	Socio-economic:	L
Efficiency	S	Institutional framework and governance:	L
Overall Project Outcome Rating	S	Environmental:	L
		Overall likelihood of sustainability:	L

**Summary of conclusions, recommendations and lessons**

**Conclusions:**

- *The very strong and highly productive collaboration among UNDP, GoV, Non-Governmental Organisations and the Private Sector in NFB development in Viet Nam, in support of the GoV’s Program 567, proved to be very successful and sustainable. These yielded very significant long term socio-economic, energy and environmental benefits consistent with and exceeding most targets in the Project Results Framework which was reconstituted after the MTR.*
- *The Project officially ended in November 4, 2019 and has been in an operational and financial project closing and completion process since December 2019. The project is following a National Implementation Modality (NIM) scheme. An official extension request was not deemed necessary. There was a delay though in the project implementation as the Project continued to complete few remaining activities after*

the EOP, but without affecting the Project results. This is considered a minor shortcoming in the definition of the overall performance in the rating scale.

- *The Project has produced all the planned outputs (with many indicators exceeding targets) towards the desired outcomes and has been satisfactorily implemented and executed.* The Project has gathered a wealth of experiences, knowledge and skills and lessons learned. The various outcomes that have been successfully achieved in terms of policy/legal frameworks, technology requirements, financial support and market development are well entrenched and mainstreamed in the Viet Nam’s government machinery, i.e. in the national and local planning, implementation and management functionalities that make the NFB Program technically, socio-economically and environmentally sustainable.
- *NFBM production and utilization could be considered still as a newly emerging industry in Viet Nam when the Project is being implemented though the GoV interest in developing them started in early 2000s.* Considering the vast untapped potential, it came at an opportune time that the government boosted NFBM development contributing significantly to the construction sector. GoV has strategically assumed the program driver role, by supporting the barrier removal intervention with the necessary support of GEF and UNDP.
- *The NFBM industry has linkages with several sectors and involves varied stakeholders. The partnership strategy designed by the Project helped to effectively coordinate across this complex landscape and serve as a catalyst for change and to address the barriers and gaps identified in the Program 567<sup>2</sup> as the NFP Project’s main baseline program.* The role of MoST and MoC acting in tandem was a key to the success of the Project. Having reached this stage and momentum of development, the GoV is now faced with firming up the replication and sustainability plan and ensuring where the different components of the NFB Program will be seated and sustained in the coming years based on the Project experience.
- *Most of the barriers that were identified in project design have been addressed and removed.* The Project focused on addressing critical barriers through enhancing NFB product quality, increasing consumer awareness, improved marketing and enhancing practices and technical solutions in NFB application in building construction. The results of the barrier removal were the main achievement of the Project. To remove the barriers, the Project supported establishment of effective institutional coordination mechanisms and setting up synergistic strategies in the policy formulation and technology application aspects. However, these efforts need to be

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<sup>2</sup> The GoV approved, via Decision No. 567/QD-CP dated April 28, 2010, the “Non-fired building Materials Development Program to 2020” (also called “Program 567”) that serves as the main baseline plan in Viet Nam for the NFB Project.

sustained even after the Project has ended since the market dynamics continue to be a challenge for sustainable NFB production, marketing and application due to high demand for competing good quality and low-cost building materials (i.e. FCB’s and other energy-intensive building material alternatives). The growing need for capacity building, showcasing of best practices and information dissemination in the application of NFB’s in building construction is deemed crucial. Attention has been given by the Project regarding quality issues in construction reported by NFB users such as installation defects and cracking phenomenon, which if not addressed systematically could hamper further market share expansion from the 28.5% achieved at EOP (13% at the start of the Project). In addressing the barriers related to quality in NFB production and use, MoC conducted survey and research in 2018 which recommended measures and an action plan needed to address the remaining issues, to be integrated by MoC and other related agencies in the programs under implementation. Since Project 567 is ending in 2020, the long-term development strategy for building materials, including NFB’s, up to 2030 and with a vision till 2050, was supported by the Project and submitted to GoV for consideration.

- *The efficient and effective government support and fund/resources mobilization are important factors that contributed to the success of the Project.* The strong partnership between GoV and the Stakeholders proved to be essential for attaining the Project achievements and for the realization of the economic, environmental and sustainable development potential for NFB’s, that exceeded most of the targeted Output levels.
- *The active and committed participation of the private sector is evident by the co-financing and investment mobilized through the project. This was achieved through crucial interventions, policies and directions by the GoV and facilitated by the Project.* The very encouraging response by the private sector and banking institutions reflects the confidence and commitment by the project partners to the NFB Project and the overall NFB market development. These achievements were catalyzed by the Project through providing assistance to the GoV’s Program 567. With UNDP and GEF assistance, a number of policies, regulations and incentives were passed improving on the previous ones and along with the demonstrations and replications have finally convinced and motivated private enterprises to participate. The Project contributed significantly in capacity building of a wide range of stakeholders all over the country which bolstered the cooperation and commitment at the local and provincial levels. It provided support to SMEs in accessing financial sources and provided technical assistance to government agencies and enterprises in NFB production and NFB application in construction. These project initiatives eventually encouraged and enabled the building material producers to be decisive towards the accelerated shift from FCB’s to NFB’s.

- *The vibrant response of the provincial and city governments to the Project reveals their trust and commitment to the potential contribution of NFB’s to sustainable development and their strengthened role in the local construction industry.* This could also be an area where sustainability of project results and outcomes should be taken care of in the post-project long-term program. In this connection, a post-project sustainability plan should be worked out by GoV, particularly by MoST and MoC together with the other participants and stakeholders of the NFB Program based on the outputs and outcomes of the Project and the recommendations of the study on the integrated market/demand strategy for NFB’s. At the same time a new action plan needs to be formulated and adopted to replace the Program 567 that is ending in 2020, in support of the momentum created by the Project for NFBs to capture the desired market share levels. The Project has created an enabling environment for this new potential Action Plan through the capacity built, the clarity gained on the specific roles and responsibilities of the key stakeholders and through various policies and regulations brought in with the support of the Project.
- *The technical assistance for feasibility studies, the support for demonstrations and replications and the training courses provided by the Project have facilitated the market development process.* These Project initiatives have resulted in very significant investments in improved production technology and capacity in a number of NFB production lines. The improvements were affected in areas such as the curing process, optimization of raw material mixing process, waste recycling and other forms of re-engineering and optimization of the production schemes. The technical assistance and investment mobilization through the Project were fully appreciated by the participating enterprises. There is still room for improvement drawing from the experiences in the demonstration and replication projects, for example the need to improve the capacity utilization of NFB production lines which is uneven and low and remains a challenge. The lessons learnt through the Project could help future NFB investments, with many enterprises showing interest in investing in NFBs.
- Based on the review of the implementation and impact assessment of the Project demonstrations and replications, the Project has effectively addressed the main barriers hindering the wider application of NFBs and market development and the NFB market is expected to grow in the coming years (2030-2050). The major barriers address by the Project include: (i) hesitancy of building owners and developers to use NFBs which they tend to attribute to “unsatisfactory quality” of the NFBs sold in the market that they suspect lead to cracking, water seepage, excessive shrinkage or expansion of the bricks, etc.; and (ii) Lack of awareness by workers of appropriate construction techniques using NFBs. The Project has worked successfully on product quality improvement and has successfully laid the ground for continuous improvements in both the NFB production and in NFB application projects. The post-

project sustainability plan will have to continue addressing the inadequate knowledge and skills in using NFBs in building construction, which if not addressed properly will result in continuing the negative perceptions associated with NFBs and also decrease the overall quality and security of constructions.

- *The Project has prepared the grounds for the transition period as the PMU has consolidated all the project outputs and assets that are to be transferred to the GoV for contributing to continuing with NFB development in Viet Nam.* These will provide guidance and substantial information in developing the above-mentioned post-project sustainability plan of GoV.

## **Recommendations**

- Develop a post-project sustainability plan based on the Project Outputs and Outcomes and recommendations of the market strategy study, impact assessment of the demonstration/replication plants and the feasibility studies. This will help to sustain the momentum developed under the Project and contribute towards continued and progressive implementation of the NFB Program of the GoV.
- Review and determine measures needed for sustainable implementation and enforcement of the new policies, regulations and standards developed with support from the Project.
- Immediate measures need to be undertaken as the next steps for scaling up, as listed below:
  - Continue to complete, update and enforce the regulations, standards and guidelines, etc. to ensure quality of bricks produced as well as to ensure workers have sufficient skill and knowledge in using NFBs. Especially, based on careful study of existing TCVNs<sup>3</sup>, develop means to address quality issues related to the use of NFBs in construction, such as cracking, water seepage, etc.
  - Support new investors and SMEs investing in NFB production lines to get conformity certification for their products in addition to meeting technical requirements, as early in the process as possible as it is more time-consuming and costlier to enhance their performance later in the process.

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<sup>3</sup> National standards or *Tiêu chuẩn Việt Nam* (TCVN), or the national standards of Vietnam issued by the Vietnam Standard and Quality Institute.

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- Disseminate at the provincial level, technical handbook/technical guidelines<sup>4</sup> developed by the Project for both NFB production and use, combining lessons learned and good practices gathered during the project implementation, including measures to address barriers and challenges.
- Continue to research on, as well as disseminate the lessons learned during the Project, more specific technical solutions and quality enhancement in production and application of NFBs, in order to encourage more use of NFBs at the local and provincial levels. This can be achieved through a research and development program, as well as training program and awareness campaign.
- Continue improvements to the training modules developed through the Project and institutionalize the training courses at the local and provincial levels to deepen knowledge and experience of the stakeholders on various aspects of NFB.

### **Lessons learned**

The main lessons learned from the implementation of the Project include the following:

- The key to success was the strong commitment, active involvement and partnership of the main Ministries involved in this kind of development process: MoST and MoC through their involvement with the technology development and transformation as well as commercialization and market development. GoV has always emphasized the need for program sustainability. It had taken the driver seat in executing Program 567 with the main ministries directly involved and having clear direction and understanding of the roles they have to play. But at the same time, it has enabled broader coherence and coordination by ensuring that the support programs of other Ministries, the private sector and the local government units continue to be coherent and integrated with the orientation of the NFB market development programme and that stakeholders take ownership and actively participate through their areas of activity and responsibility.
- Enterprises who were able to produce good quality NFBs, also had clear instructions on the proper use of NFBs, and had good after-sale service, and these ensured better sales.
- Based on one pilot project, the application of solar energy in the curing of concrete brick block (CBB), helped the enterprises not only in improving CBB quality but also

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<sup>4</sup> Project has already published 5 training materials with 3,000 copies to be delivered to 63 provincial branches of DoC and has prepared a handbook on NFBM usage to be delivered to users.

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saving costs by (1) reducing time needed for curing, (2) reducing costs for renting area used for conventional curing under natural condition; and (3) saving energy.

- Energy saving and waste reuse and recycling are significant opportunities for all NFB producers, especially for autoclaved aerated concrete (AAC) production. Enterprises who were able to apply this approach through the Project supported demonstrations and replications, achieved significant cost savings and production efficiency.
- Appreciation of the benefits of NFB and the hands-on technical skills and knowledge of the workers on NFB application have proven to be very important in securing the quality of the constructions and in raising awareness and building capacity of the customers.

## 1 Introduction

This Terminal Evaluation (TE) Report documents the TE process following the UNDP Guidelines for Conducting Terminal Evaluation for GEF-funded projects<sup>5</sup>. The project being evaluated is the **Promotion of Non-Fired Brick (NFB) Production and Utilization in Viet Nam Project** (PIMS 4546) or the Viet Nam **NFB Project**, funded by the Global Environment Facility (GEF) and implemented through the United Nations Development Programme (UNDP). The Executing Agency is the Ministry of Science and Technology (MoST), in cooperation with project partners: Ministry of Construction (MoC), Ministry of Natural Resources and Environment (MoNRE), Ministry of Industry and Trade (MoIT), and Ministry of Planning and Investment (MPI) and Viet Nam Association of Building Materials (VABM).

The TE Mission was conducted with field visits to selected project sites in Hanoi and Ho Chi Minh during the period January 6 – 10, 2020.

### 1.1 PURPOSE OF THE EVALUATION

This Terminal Evaluation is in compliance with the UNDP and GEF M&E policies and procedures for all full and medium-sized UNDP-supported, GEF-financed projects which are required to undergo a terminal evaluation upon completion of implementation. The objectives of the evaluation are to assess the achievement of project results, and to draw lessons that can both improve the sustainability of benefits from this project, and aid in the overall enhancement of UNDP programming.

### 1.2 Scope, Methodology and Performance Rating

The evaluation included a mixed methodology of document review, interviews, and observations from project site visits, and information verification.

The scope of the TE includes the following:

- Evaluation of the project achievements against the Project Results Framework or Logical Framework, also referred to as the Log Frame, which had been updated based on the Midterm Review (MTR) during October 2017 - June 2018.

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<sup>5</sup> <http://web.undp.org/evaluation/documents/guidance/GEF/UNDP-GEF-TE-Guide.pdf>. Guidance for Conducting Terminal Evaluations for UNDP-Supported, GEF-Financed Project or the UNDP-GEF TE Guide. Evaluation Office, 2012. United Nations Development Programme. Evaluation Inception Report. Page 8.

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- Assessment of the progress of achieving the expected outcomes through the outputs of the project
- Assessment of:
  - physical work progress
  - operational status of project activities
  - replication potential
  - sustainability
  - post-project arrangements
- Assessment of the linkages of the actual results of the project and UNDP Country Programme (strategy/outcomes/outputs) and United Nations Development Assistance Framework/One Strategic Plan (UNDAF/OSP)
- Identification of issues, constraints and lessons learnt
- Recommendations on strategies to move the project forward and recommendations for follow-up effort by the Government of Viet Nam through the Ministry of Science and Technology, the Ministry of Construction and other key partners.

As an important part of the TE, the evaluation process used the criteria of relevance, effectiveness, efficiency, sustainability, and impact, as defined and explained in the UNDP Guidance for Conducting Terminal Evaluations of UNDP-supported, GEF-financed Projects.

### **1.3 Structure of the Terminal Evaluation Report**

The TE Report followed the suggested outline in the Terms of Reference (TOR), including the following:

- Executive Summary
- Introduction
- Project Description and development context
- Findings of the Evaluation
  - Assessment of the actual project approach vis-à-vis project design/formulation
  - Assessment of project implementation in terms of management, partnership, M&E, financing and execution by the implementing agency (UNDP) and executing agency (MoST) in cooperation with the partners
  - Assessment of project results in terms of relevance, effectiveness, efficiency, ownership, mainstreaming, sustainability, and impact
- Conclusions, Recommendations and Lessons Learnt.

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The annexes include **Annex A** that presents the TOR as reference for the conduct of the Terminal Evaluation. In assessing and rating the outputs and outcomes, the evaluation referred to the Project Results Framework or also referred to as Logical Framework (Log Frame), that includes success indicators and targets as shown in **Annex B**. The Log Frame had some revisions as recommended in the Mid-Term Review (MTR) in September 2017 and as reviewed and modified by the Project Steering Committee considering the needs of the Project and directions of the GoV. The overall TE Mission schedule, persons interviewed, and sites visited are shown in the Mission Schedule or itinerary as shown in **Annex C**.

The List of Persons met/interviewed is shown in **Annex D**. Minutes of meetings with the stakeholders are summarized in **Annex E**. List of reports and documents provided by UNDP and the project management team is presented in **Annex F**. A matrix of questions covering each of these criteria was used as guidance and is included as **Annex G**.

**Annex H** (Target and Actual Achievement of ProDoc Log Frame Outcomes and Ratings), **Annex I** (Project Financial Performance under the GEF & UNDP Funded Components, as of December 31, 2019, including anticipated expenses up to EOP and Co-Financing as of January 31, 2020) and **Annex J** (Summary of the Demonstration and Replication NFB Plants and their GHG and Energy Savings Contributions and the Training Evaluation) are also included in the sequence as mentioned in the body of the report.

Other ancillary annexes include **Annex K** (Evaluation Consultant Agreement Form), **Annex L** (Report Clearance Form), **Annex M** (TE Audit Trail) are also included while **Annex N** (Terminal GEF Tracking Tool) is submitted in separate file.

## **2 Project description and development context**

### **2.1 Project Background, Start, Duration and Implementation History**

The objective of the Project is to reduce the annual growth rate of GHG emissions by displacing the use of fossil fuels and the usage of good quality soil for brick making through the increased production, sale and utilization of non-fired bricks (NFBs) in Viet Nam.

This objective will be achieved by removing barriers to increased production and utilization of NFBs through 4 components:

- **Component 1: Policy Support** – Strengthening existing policies, guidelines, standards and codes for NFB production and usage and building the capacity of responsible government personnel to enforce a strengthened regulatory framework;

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- **Component 2: Technical Capacity Building** – Building the knowledge and capacity of stakeholders engaged in NFB production and use on NFB technology application and the use of NFB products;
- **Component 3: Sustainable Financing** – Improving access of SMEs and other potential NFB investors to affordable capital financing for NFB projects; and
- **Component 4: NFB Technology Application, Investment and Replication** – Technical assistance in demonstrating the development of NFB production lines and the use of NFB products in new building and construction projects.

The NFB Project is expected to generate GHG emission reductions through the displacement of fired clay brick kilns. From the Project Results Framework or Log Frame, the direct GHG reduction target is 88 ktons of CO<sub>2</sub> while indirect emission reduction is 1,358 ktons of CO<sub>2</sub> that is cumulative for a 10-year period (2020-2030) after the end of the Project. The project is expected to generate cumulative direct energy savings from displaced coal fuel through the NFB demonstration and replication plants.

The key information of the Project is summarized below:

Project Title:	<b>Promotion of Non-Fired Brick (NFB) Production and Utilization in Viet Nam</b>		
GEF Project ID:	4801	UNDP Project ID (PIMS #)	4546
UNDP Project ID:	00087517		
Country:	Viet Nam		
Region:	Asia Pacific		
Focal Area:	Climate Change		
FA Objectives, (OP/SP):	CCM1-2.1: Appropriate policy, legal and regulatory frameworks adopted and enforced CCM1- 2.2: Sustainable financing and delivery mechanisms established and operational		
Executing Agency:	Ministry of Science and Technology		
Other Partners involved:	Ministry of Construction, Ministry of Natural Resources and Environment Ministry of Industry and Trade, Ministry of Planning and Investment, Viet Nam Association for Building Materials		
ProDoc Signature date	November 4, 2014		
(Operational) Closing Date:	Official: November 4, 2019 Actual (PMU Office): May 29, 2020		
<b>Project Financing</b>	<b><i>at endorsement (US\$)</i></b>		<b><i>at completion (US\$)</i></b>
GEF financing:	2,800,000		2,800,000
GEF agency/UNDP:	550,000		550,000
Government:	8,420,000		12,356,000

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Private Sector:	27,310,000	76,099,949
Total co-financing:	36,080,000	89,005,949
Total Project Cost:	38,880,000	91,805,949

As explained in the ProDoc, the following paragraphs describe the brick industry situation in Viet Nam and how the Government of Viet Nam (GoV) decided to focus on the market transformation of the brick industry to more energy efficient and environmentally friendly non-fired bricks (NFBs). The country’s GDP growth since 2008 has been around 6%. A consequence of this healthy economic growth is the rapid urbanization of Viet Nam, where the brick manufacturing, a key sub-sector of the construction material industry, has also risen dramatically. The overall demand for building bricks has increased by 6% annually from 2005 until 2011 and is expected grow at a similar pace for the next 10 years. More than 87% of the building bricks used in Viet Nam, however, are fired clay bricks (FCBs). The annual production of 20 billion standard brick units or SBUs of fired-clay bricks during the 2008-2010 period consumed more than 2.2 million tonnes of coal equivalent (tce) annually, corresponding to an annual emission of 6 million tonnes of CO<sub>2</sub>. According to the Viet Nam Association for Building Materials (VABM), more than 40 billion SBUs will be required by 2020.

While the rapid growth of the brick making industry has contributed to poverty reduction in Viet Nam, there are more than 10,000 traditional brick kilns still in operation where the majority of brick producers are in the business for immediate economic gain and using inexpensive traditional production methods. The continual growth in the number of FCB kilns, however, result in adverse environmental and social impacts such as:

- Inefficient consumption of coal and wood energy due to limitations of traditional kiln design to use waste heat to pre-heat new bricks
- Higher levels of local air pollution and harmful emissions
- Generation of more waste causing serious pollution to local areas
- The reduction of 3,000 ha of arable land annually from the mining of agricultural topsoil as material for brick making, and
- Poor working conditions notably during operations at traditional kilns during the monsoon season.

FCB production involves two key processes: (i) forming of clay bricks; and, (ii) the firing and sintering of clay bricks in a kiln. The sintering process requires thermal energy inputs such as coal, furnace oil or other fossil fuels. The production of NFBs, in contrast, does require intensive thermal energy. Bonding of the basic materials of NFB is facilitated through

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hydration, the chemical reaction between anhydrous mixture of fly ash, lime or cement, gypsum, stone dust and other kind of building material waste, with water.

The net result of a shift to NFB production is a substantial saving of thermal energy required for FCB production, less the electricity from the national grid to power NFB machinery and equipment and less the energy required for cement production. For Viet Nam, a shift to NFB production will translate into substantial energy savings in the order of 30 to 70% that will reduce and eventually eliminate the use of coal in conventional brick production. NFB production will also make use of various waste by-products from industrial activities such as coal fly ash from thermal power plants that are continuing to grow in stockpiles and causing environmental problems in the areas where they are being stored and disposed.

Thus, the GoV wants to promote the use of “non-fired bricks” (NFBs) as a green building material in an effort to:

- Reduce pressures on agricultural land to be mined for clay as material for brick making and to improve food security for Viet Nam;
- Utilize fly ash as a raw material for NFBs to reduce growing stockpiles of fly ash from coal power production;
- Reduce fossil fuel consumption and GHG emissions generated from brick manufacturing activities; and
- Modernize the brick industry in line with other modern and rapidly developing countries some of whom have market share of NFBs close to 90%.

The GoV has long recognized the need to transform the building materials market in Viet Nam towards NFB technology. As a follow-up to earlier initiatives, the GoV approved, via Decision No. 567/QD-CP dated April 28, 2010, the “Non-building Materials Development Programme to 2020” (hereinafter called “Program 567”) that serves as the main baseline plan in Viet Nam in the area of energy efficient building materials, including NFB making. The national targets set by this programme are:

- The share of non-fired building materials (NFBMs) to replace FCBs will increase to 20-25% by 2015 and 30-40% by 2020;
- Utilization of 15 to 20 million tonnes of industrial waste (ash from coal-fired power plants and slag from blast furnaces) to produce NFBMs; this will translate into savings of 1,000 hectares of agricultural land per year and hundreds of ha required for storage of industrial waste; and

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- All traditional FCB making plants will be gradually replaced by NFB production facilities.

Demand for NFBs comes mainly from Viet Nam’s largest urban areas, namely Hanoi, Danang and Ho Chi Minh City. This demand has spawned a number of concrete brick block (CBB) plants that produced 2.7 billion standard brick units (SBUs) in 2011. These CBB plants are mainly comprised of more than 50 medium to large enterprises. Most CBBs are produced mechanically using automated vibration-pressing technology mainly to produce solid and hollow bricks with the standard brick unit (SBU) dimensions of 220mm x 105mm x 60 mm (of which hollow bricks comprise more than 75% of the demand). The resulting NFB quality, however, is very low to the extent that building developers only have the confidence to use NFBs in low-rise buildings, pavement and wall fence applications.

### *Situation of the Brick Industry during the Project Design and Approval Stage (2012-2014):*

While there were 70 NFB production facilities in Viet Nam during this period that had a capacity of over 4.3 billion SBUs annually, NFBs had not evolved into a mainstream construction product as they only accounted for 13% of all brick sales, all this despite CBB prices being roughly 80 to 85% below that of FCBs. According to VABM, total brick production in 2011 was equivalent to 24.0 billion SBUs, of which 20.9 billion SBUs were fired clay bricks, 3.1 billion SBUs were non-fired bricks. In 2012, CBBs were the most common NFBs with over 2.7 billion SBUs produced with AAC bricks being the next most common NFB product with 0.2 billion SBUs.

Some of the features of the industry during this period were:

- No NFB production lines were in operation using modern technology
- A number of plans/policies were adopted to encourage NFB developments:
  - Program on development of non-fired building materials (NFBM) by 2020 or the so called “Program 567” approved by Decision No. 567/2010/QD-TTg dated April 28, 2010;
  - Directive No. 10/CT-TTg (dated April 16, 2012) on promotion of use of non-fired building materials (NFBM) and limitation of FCB production and use;
  - Circular No. 09/2012/TT-BXD (dated November 28, 2012) regulating the use of NFBMs in civil and industrial construction works.
  - Decision No. 1469/QD-TTg of the Prime Minister dated August 22, 2014, approving master planning of building materials in Viet Nam by 2020, with orientation to 2030; with the roadmap for retirement of traditional clamp kilns.

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- Lack of standards and policies for NFB’s that could encourage and attract local enterprises to invest in NFB production lines
- Insufficient NFB standards made it difficult to control the quality of NFBs produced and the quality of buildings where NFBs were used
- No standard/norm had been adopted for energy efficiency and GHG emission reduction for production of construction materials as well as NFBs
- Limited capacity of the government officers on NFBs in general, and especially on quality control of NFB production and use
- There were no training courses held to enhance capacity of government officers and other stakeholders in NFB development, management or use
- Lack of local technical knowledge on how to manufacture equipment for NFB production lines that can compete with those internationally produced (in terms of quality and price)
- Lack of consumer confidence and knowledge in using NFBs
- Limited NFB knowledge amongst engineers, designers and building developers
- Little or no knowledge amongst construction workers on NFB building techniques and best practices in using NFBs in construction
- Low awareness on the advantages and environmental benefits of NFBs within the construction and building sector in Viet Nam
- A number of financial institutions such as Vietinbank, VEPP, NOFOSTED, Green Investment Facility (GIF) had an interest in supporting SMEs for NFB investment, however, there was no dedicated financing for NFB production
- Many potential NFB investors during this period were SMEs who had difficulty in accessing loans,
- Lack of knowledge and ability of potential SME investors to apply for concessional financing of NFB projects.

### *Situation of the Brick Industry during the Project Inception (First Half 2015):*

- By 2015 there existed:
  - more than 1,000 CBB production lines (with yearly production capacity of 5.6 billion SBUs)
  - 12 AAC companies (with yearly production capacity of about 1.3 million SBUs); and
  - 17 foam brick companies (with yearly production capacity of 0.12 billion SBUs).
- Most of the CBB technologies imported from China were of low quality
- NFB entrepreneurs lacked knowledge on the production of quality NFB’s, and lack of knowledge in designing, constructing, operating and maintaining an NFB plant
- Very few examples of well-managed and profitable NFB production facilities existed

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- Lack of local technical knowledge on planning, designing, constructing, operating and maintaining an NFB plant
- Lack of consumers’ confidence in the quality of NFB’s limited development of the NFB market in Viet Nam.

A primary reason for the low market share of NFB’s during this period was the lack of confidence in NFB products by the primary consumers of NFB’s, local architects, engineers and building developers. This had contributed to reduced demand for NFB’s, deterioration of existing NFB production lines, and a general lack of knowledge on NFB product quality and usage. Notwithstanding that the price for some NFB’s such as CBBs were lower than FCB’s, the quality of NFB’s in the Vietnamese brick market continued to be poor, exacerbating the lack of consumer confidence in NFB products. Furthermore, consumers were unaware of the economic gains from the use of quality NFB’s that may result in the reduced use of mortar, improved quality construction, and lighter buildings. On the supply side, prospective NFB entrepreneurs lacked knowledge of the production of quality NFB’s, and were unable to provide quality assurances and safeguards while regulators did not have the necessary codes, standards and enforcement resources to ensure the quality of production and the proper use of NFB’s in various construction projects.

### *Actual Implementation Timeline (June 2015 – November 2019)*

The Project was expected to start after the Project Document (ProDoc) was finally signed on November 4, 2014. However, it became operational later when the Project Manager was hired in January 2015, few project staff in PMU were hired and when the implementation plan was affirmed in the Inception Workshop in June 2015. The first Project Implementation Report (PIR) was submitted in June 2016 covering the implementation period from November 2014 to June 2016, corresponding to the Year 1 and 2 of the project as the first and second operational years. This is why the proposed operational closing date was set as November 4, 2019 so as to complete the 5-year duration of the project. The Project Timeline is shown below:

<b>Dates</b>	<b>Key Project Events</b>
June 1, 2012	PIF Approval
March 11, 2014	GEF CEO Endorsement
September 19, 2014 October 27, 2014 November 4, 2014	ProDoc Signatures: Prime Minister MoST as Executing Agency UNDP as GEF Implementing Agency

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January 2015	Project Manager hired
April 24, 2015	First Meeting of the Project Steering Committee
June 2015	Inception Workshop
January 13, 2016	Second Meeting of the Project Steering Committee
June 2016	Year 1 & 2 PIR (finalized October 2016)
January 17, 2017	Third Meeting of the Project Steering Committee
June 2017	Year 3 PIR
October 2017 – June 2018	Mid-Term Review
January 18, 2018	Fourth Meeting of the Project Steering Committee
June 2018	Year 4 PIR
January 22, 2019	Fifth Meeting of the Project Steering Committee
June 2019	Year 5 PIR (finalized August/September 2019)
November 4, 2019	Official Closing Date (no extension requested)
January 6 -10, 2020	Terminal Evaluation Mission
May 30, 2020	PMU Closing (Operational) Date

The Inception Workshop which presumably marked the operational start of the project and hiring of key personnel, was conducted only on May 29, 2015 or six (6) months after the expected start of the Project effective the signing date on November 4, 2014. This was the stated reason for the possible extension by six months to complete remaining activities and outputs. However, the Project did not request for an official extension since most, if not all, of the project outputs had been realized within the official EOP date.

After the above-mentioned official closing date, the Project continued to complete remaining tasks and close the PMU office. This was considered as an internal procedure of a project being executed under the Nationally Implemented Modality (NIM) scheme.

As such, during the six (6) months wrapping-up period the Project did the usual operational, asset turnover and financial closure procedures as well as winding up of the PMU operations and the completion of the remaining activities and outputs, including:

- a) Completion of 3 replication projects which started operation in early 2019 (in addition to the 18 completed as of EOP) in terms of technical support and implementation
- b) completion of the development of a national level integrated product-market strategy for Non-fired bricks in Viet Nam in February/March 2020
- c) Completion of the assessment of results and impact of NFB demonstrations, replications and finance assistance in March 2020
- d) Conduct of the project closing workshop.

## **2.2 Problems that the Project Sought to Address**

As explained in detail in the ProDoc, the low market share of NFB products in Viet Nam can be attributed to a number of barriers as summarized below:

- a. Market barriers: Despite its presence in the Vietnamese market for more than 30 years, NFBs only have a 13% share of the Vietnamese brick market which can be attributed to lack of reliability of locally-produced NFBs, high cost of AACs which is a NFB with a high potential in Viet Nam, resistance to change of some FCB kiln owners.
- b. Policy barriers: The construction sector and building material consumers have been slow to adopt NFB technologies and applications which can be mainly attributed to a policy and legal framework that is not fully supportive to the shifting to NFB technology.
- c. Institutional barriers: The capacity of local government agencies and provincial and municipal people’s committees to promote NFB production and usage is weak due to lack of the resources, capacity and knowledge required to implement a local NFB development program and to systematically disseminate information on NFBs to create demand and increase supply.
- d. Knowledge and awareness barriers: Awareness of the advantages and environmental benefits of NFBs within the construction and building sector in Viet Nam is low among the various actors in the NFB industry in their areas of responsibility and specific knowledge and skill needs.
- e. Technical barriers: Low quality of existing sub-standard imported NFB production facilities, lack of development of an NFB industry and low quality of input raw materials resulting in low quality NFBs
- f. Financial barriers: Reluctance by local banks and financing institutions to finance NFB investments; increased bank due diligence on new borrowers resulting from higher ratios of bad loans; potential investors lacking experience with NFB technology and having a high risk profile as borrowers for NFB plants; many potential investors being SMEs owning FCB plants using traditional kilns or vertical shaft brick kilns (VSBKs) who may not have access to sufficient collateral for loans for NFB investments; and lack of knowledge and ability of potential SME investors to apply to concessionary financing sources such as VEPF.

## **2.3 Immediate and Development Objectives of the Project**

The NFB Project is under the GEF-5 Climate Change Strategic Objective 2: Promote market transformation for energy efficiency in industry and the building sector. The Project will

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contribute to the reduction of GHG emissions through the transformation of the building brick market towards the increased application of non-fired bricks (NFBs) in building construction. This will be achieved through the promotion and facilitation of local manufacturing of bricks using NFB technology and utilization of NFBs in building construction. Moreover, the application of NFB technology will also contribute to the improvement of energy efficiency in Viet Nam’s brick making industry, with the co-benefit of reducing GHG emissions from that sector. It will also lead to (albeit indirectly) the reduction in the energy consumption of, and GHG emissions from, the building construction sector on account of new buildings that will be constructed (and possibly existing buildings that will be retrofitted) with NFBs.

The main program of the GoV that is designed to work towards the transformation of brick making into a modern energy efficient industry in Viet Nam is the “Master Plan of Construction Material Development up to 2020”. To boost NFB production, GoV approved the “Non-Fired Brick Development Programme” (NFBPD) on 28 April 2010 with national targets set by the Prime Minister’s Decision No. 567/2010/QĐ-TTg or also known as “Program 567”.

As defined in the Project Results Framework, the NFB Project is in line with the following:

- Primary applicable GEF Key Environment and Sustainable Development Key Result: 2. *Catalyzing environmental finance*
- Applicable GEF Strategic Objective and Program: *GEF-5 CCM Strategic Program SP2: Promote market transformation for energy efficiency in industry and the building sector*
- Applicable GEF Expected Outcomes: *Appropriate policy, legal and regulatory frameworks adopted and enforced, sustainable financing and delivery mechanisms established and operational, and GHG emissions avoided*
- Applicable GEF Outcome Indicators: *Energy efficiency policy and regulation in place, investment mobilized, and energy savings achieved.*

### **2.4 Business-as-usual and Alternative Scenarios**

As described in the ProDoc, despite the aforementioned activities of the participating Ministries (as indicated in section 2.1), the outcome of the Government’s policies, standards and directives has not resulted in catalyzing NFB investments in Viet Nam needed to meet the targets of Program 567. The net impact of these policies is the presence of just 70 NFB production facilities throughout Viet Nam with 3.1 billion SBUs manufactured in 2011, comprising only 13% of the brick market (with a target of 25% in 2015 from Program 567).

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In a business-as-usual (BAU) scenario, the MoC and MoST would not have been able to develop the necessary standards required to catalyze NFB market development in a timely manner to meet the targets of Program 567. In addition, the general lack of capacity at the local government level and lack of standardization in the NFB market would have resulted in only a marginal increase in NFB market share in the brick market at less than 1% annually.

An alternative scenario with GEF support envisions assistance being provided to the Government in implementing Program 567. The needed project interventions would include the re-setting and enforcing of standards for NFB quality, design and implementation of a FCB replacement program, designing and implementing policies to encourage domestic production of NFB equipment to reduce the cost of NFB products and make them more competitive vis-à-vis FCBs, and training provincial and local government personnel on the enforcement of standards and codes for NFBs. The impact of this assistance would be an updated regulatory framework, wider technology demonstration and replication plan, increased capability and improved financial support system that would be conducive to accelerating domestic NFB manufacturing and usage to meet the Government NFB committed targets.

### **2.5 Main stakeholders**

The GoV has continued to be the main stakeholder in the effort to increase NFB production and usage in Viet Nam, through the relevant ministries and agencies. This was manifested in a series of government pronouncements, mandates and incentives during 2001, 2004 and 2008, to bolster the NFB industry. However, these were not effective enough to meet the targets.

In 2010, GoV made a strong move by issuing Program 567 on the NFB Development Program, and Directive No. 10/CT-TTg which set incentives and 10-year target of 30-40% market share for NFBs by 2020. With this mandate, five ministries became more actively involved in this NFB acceleration program with their responsibilities as given below:

- MoST: planning and implementing investment plans for production R&D, technological transfer, and issuing technical standards in coordination with MoC and STAMEQ.
- MoC: issuing policies and mechanisms for the promotion of NFBs and the related regulations on their usage; overseeing local governments in developing and implementing a roadmap for FCB retirement; planning on increasing production to meet increased market demand for lime and NFBs; coordinating with non-government entities on

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information aspects and with various provincial-level departments and building materials associations on promotional aspects.

- MoF: developing guidelines on tax policy in coordination with MoC and implementing relevant tax incentive policies.
- MoNRE: adopting and enforcing policies, laws and regulations on the environmental standards on brick production and the use of agricultural land for FCB production.
- MoIT: promoting local NFB equipment manufacturing projects that can qualify for financial incentives.
- Provincial and Municipal People’s Committees: setting up a roadmap and action plan for the reduction of FCB production and local implementation of the Program 567 (in coordination with MoC) and providing support on inspection and monitoring.

After two to three years of implementation of the policies and directives issued in 2010, NFB investments and NFB production and utilization still fell short of expectations and would have continued to be so if no intervention were made. Gaps and barriers were identified and the NFB Project was developed to address them. A stakeholder analysis was carried out, as the ProDoc has explained in detail, so that the NFB industry could have an integrated approach with more clarity about the roles of the stakeholders:

- Public sector stakeholders at the central level who sets policies to promote and regulate the growth of NFB production and usage;
- Public sector stakeholders at the provincial levels who implement central policies and would be tasked to work with the private sector to ensure robust growth in the production and usage of NFBs in their respective jurisdictions;
- Private sector stakeholders who will own, finance, design, construct, operate and maintain NFB plants;
- Private sector stakeholders who will provide the necessary, specialized services to NFB plant owners and government agencies to ensure the sustainable supply of NFBs. These services would include engineering, equipment manufacturing and installations, plant operations, and the training and certification of personnel; and
- Civil society organizations (such as VABM, and industrial associations, farmer associations, and industrial promotion associations) that would help raise the profile of NFB production and usage and its environmental and social benefits through advocacy, awareness raising and training.

The complete list of stakeholders of the NFB Project as listed in the ProDoc is summarized below:

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Stakeholder	Role in the NFB Project Intervention
<b>Government Stakeholders</b>	
Ministry of Science and Technology (MoST)	<ul style="list-style-type: none"> <li>• Project implementing partner accountable to the Government of Viet Nam and UNDP</li> <li>• Developing and implementing the R&amp;D Investment Plan on NFB production technologies and equipment</li> <li>• Providing guidance on NFB technology transfer and in cooperation with the Ministry of Construction to issue NFB technical standards</li> <li>• Accrediting the NFB quality evaluation agencies</li> </ul>
Ministry of Construction (MoC)	<ul style="list-style-type: none"> <li>• Developing policies, technical standards and regulations on NFB production and usage promotion</li> <li>• Ensuring strong coordination with all stakeholders to maximize their synergies to meet the objectives of the National NFB Development Program.</li> </ul>
Ministry of Finance (MoF)	<ul style="list-style-type: none"> <li>• Developing and issuing regulations on tax incentives and financial incentives for NFB development</li> <li>• Instructing, guiding, supervising and implementing these regulations.</li> </ul>
Ministry of Natural Resource and Environment (MoNRE)	<ul style="list-style-type: none"> <li>• Regulating land use for sourcing clay for FCB production</li> <li>• Instructing provinces and cities in developing their provincial land use planning to include land use planning for brick production</li> <li>• Developing and issuing policies and mechanisms, to discourage the use of agricultural land for fired clay brick production</li> <li>• Monitoring GHG emission reductions due to the growth of NFB production in Viet Nam.</li> </ul>
Ministry of Industry and Trade (MoIT)	<ul style="list-style-type: none"> <li>• Including entry of locally manufactured NFB equipment and the NFB manufacturing production lines into the List of Key Mechanical Products and the List of Key Mechanical Product Investment Projects for the industry to access financial incentives and preferences provided by GoV</li> </ul>
Local Government Agencies (DoC, DoST, DoIT, ECCs and STAMEQs under DoST)	<ul style="list-style-type: none"> <li>• Creating local incentive policies and land use planning that support the replacement of FCBs with NFBs at the provincial level according to the project implementation plans.</li> <li>• Capacity building of human resources of local agencies to enable them in M&amp;E and NFB quality control/inspection.</li> </ul>
<b>Industrial Associations</b>	

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<b>Stakeholder</b>	<b>Role in the NFB Project Intervention</b>
(VABM, VIBCA, CERATEC, VFCEA, VAA)	<ul style="list-style-type: none"> <li>• Providing in-kind contributions as co-financing through their networks and staff in the dissemination of NFB information and raising awareness of different stakeholders on NFB benefits</li> </ul>
Brick industry associations (i.e. Hai Duong VSBK associations)	<ul style="list-style-type: none"> <li>• Awareness raising and information dissemination activities of the Project.</li> </ul>
<b>Private Sector Entities</b>	
Viet Nam Building Glass and Ceramic Corporation (VIGLACERA);	<ul style="list-style-type: none"> <li>• Hosting an AAC demonstration project</li> </ul>
Viet Nam Machinery Erection Corporation (LILAMA) Construction and Mechanical Corporation (COMA)	<ul style="list-style-type: none"> <li>• Supplying components and parts of the NFB production line and acting as potential partner for international NFB equipment suppliers.</li> </ul>
NFB equipment suppliers: (DmC in Hai Duong Province, Thanh Phuc manufacturing company in Haiphong Province, Trung Hau company in Ho Chi Minh City; and Other suppliers	<ul style="list-style-type: none"> <li>• Manufacturing and supplying equipment and consulting for NFB project investment, technology transfer to NFB investors</li> <li>• Acting as NFB service providers of engineering and consultancy services.</li> </ul>
<b>Financial Entities</b>	
Viet Nam Trade and Industrial Bank (VietinBank)	<ul style="list-style-type: none"> <li>• Providing commercial loans for NFB technology application investments.</li> </ul>
Viet Nam Environment Protection Fund (VEPF) managed by MoNRE	<ul style="list-style-type: none"> <li>• Providing financial support through soft loans, loan guarantees, funding grants for NFB production projects.</li> </ul>
National Foundation for Science and Technology Development (NAFOSTED) under MoST	<ul style="list-style-type: none"> <li>• Promoting research efforts in enterprises, with focus on core technologies development that contribute to national economic growth and competitiveness, promotion of research efforts in enterprises.</li> <li>• Providing loan guarantees for SME brick producers who are unable to access loans from financial institutions for NFB investments.</li> </ul>
<b>Civil Society Organizations</b>	
Viet Nam Architects' Association (VAA)	<ul style="list-style-type: none"> <li>• Providing workshops on promoting NFB products</li> <li>• Enhancing R&amp;D on modern and traditional architecture of Viet Nam and training architects and developing talent in architecture.</li> </ul>
Viet Nam Association for Building Materials (VABM)	<ul style="list-style-type: none"> <li>• Promoting NFBs and provide expert advice to the building and construction industry on NFB usage</li> </ul>
Viet Nam Farmer's Association (VFA)	<ul style="list-style-type: none"> <li>• Helping in the shift from FCB kilns towards NFB technologies for the benefit of its farmer membership</li> </ul>

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<b>Stakeholder</b>	<b>Role in the NFB Project Intervention</b>
Viet Nam Federation of Civil Engineering Associations (VFCEA)	<ul style="list-style-type: none"> <li>• Promoting NFB products</li> </ul>
Viet Nam Building Ceramic Association (VIBCA)	<ul style="list-style-type: none"> <li>• Promoting NFB products</li> <li>• Networking with entrepreneurs working on building ceramic industry, linking with R&amp;D institutes, consultancies, and consulting engineers.</li> </ul>
Viet Nam Women’s Union (VWU)	<ul style="list-style-type: none"> <li>• Promoting NFB products</li> <li>• Mobilizing women to implement the policy of the Party and the law of the State; propagandize gender equality; supports women to enhance their capacity, knowledge, and their mental well-being,</li> <li>• Developing gender equality and fairness in the workplace.</li> </ul>
Youth Union of Viet Nam (VYU)	<ul style="list-style-type: none"> <li>• Promoting NFB product</li> <li>• Providing more opportunities for youth to find employment in this sector.</li> </ul>
<b>Academic Organizations</b>	
IBST, HUST, National University of Civil Engineering (NUCE) and HCMC University of Civil Engineering	<ul style="list-style-type: none"> <li>• Providing technical training and technology transfer.</li> </ul>
Viet Nam Institute for Building Materials (VIBM)	<ul style="list-style-type: none"> <li>• Providing consultancy services for demonstration projects, replication projects</li> <li>• Supporting training courses and NFB technology transfers.</li> </ul>

## **2.6 Expected Results**

The Project Results Framework of the NFB Project (as shown in **Annex B** as updated in post-MTR with report dated June 2018) presents the details of expected project outcomes, outputs and their respective end-of-project (EOP) targets, or otherwise stated, that are summarized in the following:

- Objective: Reduce the annual growth rate of GHG emissions by displacement of fossil fuel use and the usage of good quality soil for brick making through the increased production, sale and utilization of NFBs in Viet Nam

*Targets:*

- Cumulative direct CO<sub>2</sub> emission reductions resulting from the NFB plant investments and technical assistance = **0.088** million tons of CO<sub>2</sub>

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- Cumulative direct post-project CO<sub>2</sub> emission reductions = **1.270** million tons of CO<sub>2</sub>
  - Cumulative direct energy saving (TOE) from displacement of coal through the demonstration NFB plants (3 CBB plants and one AAC plant and 21 replication projects during project time) = **30,782** toe
- Outcome 1: Approval and enforcement of an improved legal framework to encourage NFB production and use, and enhanced government capacity and knowledge to regulate NFB development and usage

### *Outputs:*

- 1.1: Strengthened legal framework to promote NFB production and utilization
- 1.2: Strategies to implement FCB kiln replacement programme
- 1.3: Recommended policies and standards to encourage domestic production of NFB equipment and technology
- 1.4: NFB product standards and building codes
- 1.5: Energy efficiency and emission standards for NFB production
- 1.6: Trained government personnel for promotion and improved regulation of the growth of NFB production and utilization

### *Targets:*

- Number of policies, regulations and standards approved and enforced to encourage the increase in the production and usage of NFB and decrease the use of FCBs:
  - **13** additional policies approved and enforced to encourage NFB development (Investment, production and use) and decrease FCB usage by EOP
  - **2** standards/policies approved to promote local manufacturers of NFB equipment and technology by Year 4
  - **3** standards/ regulations approved by Year 3 to govern quality of NFBs
- Number of standards/norms on energy efficiency (EE) and emissions reduction in NFB production developed and recommended for approved = **2** by EOP;
- Enhanced government capacity to improve NFB regulation, control and mandate NFBs production and markets
  - **940** government officers at national and provincial level trained on various aspects of NFBs (types, characteristics, requirement for control and promotion of NFB manufacturing, production technology, usage, etc.)

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- Outcome 2: Increased availability of technically skilled and qualified local service providers for NFB plants, and enhanced stakeholder knowledge on NFB usage.

### *Outputs:*

- 2.1: Established strategic partnerships for NFB technology transfer
- 2.2: Completed technical courses on planning NFB investments
- 2.3: Entrepreneurs with firm plans to expand local manufacture of NFB-making equipment and associated components
- 2.4: Completed training courses on the design, construction, production operation and maintenance of NFB plants
- 2.5: Completed seminars on the use of NFB as a construction material
- 2.6: Technical assistance to VABM to promote NFB usage and facilitate NFB investments

### *Targets:*

- Number of local firms that can manufacture NFB plant equipment based on set standards developed under this project = **1** by Year 4
  - Number of building developers and owners used NFBs as building construction materials = **300**
  - Enhanced technical skills and stakeholder knowledge/ information on NFB associated issues
    - **21** training courses with total of 1500 people from 50 provinces trained on various NFBs’ aspects. Of these:
      - **940** governmental and local officers
      - **121** designers and constructors
      - **399** NFB investors
      - **40** people from other related areas
    - **2** training courses for 60 people from vocational colleges of construction
    - **1** NFB website developed, maintained and updated regularly
- *Outcome 3:* Improved availability and sustained access to financial support for NFB technology applications

### *Outputs:*

- 3.1: Completed study on the viable financing sources for scale-up of NFB investments
- 3.2: Completed workshops for financing institutions on NFB investments
- 3.3: Established Business Links on NFB Manufacturing
- 3.4: Action Plan for Financing NFB SMEs

3.5: Operational financing scheme for NFB projects

*Target:*

- Loan volume provided by financial institutions (including commercial banks) for NFB investments (USD m) = At least **US\$24** million by Year 3
- Number of SMEs and NFB entrepreneurs with confirmed financing = **30** NFB SMEs get loans from financial institutions (10 from VEPF and 20 from VietinBank)

- *Outcome 4:* Boosted confidence in NFB technology application resulting in an increased market share of NFBs

*Outputs:*

- 4.1: Bankable Feasibility Analyses of Selected Demonstration NFB (CBB) Sites
- 4.2: Financing for Demonstration NFB Projects
- 4.3: Completed preparations for implementing NFB projects
- 4.4: Installed and operational NFB demonstration plants
- 4.5: Trained personnel to optimize NFB production
- 4.6: Monitoring and evaluation reports on the operational and financial performances of the demonstration NFB projects
- 4.7: AAC plants with improved production efficiencies
- 4.8: Completed demonstration on the use of NFB products
- 4.9: Plans for replication NFB plants

*Targets:*

- Number of NFB demonstration plants in operation
  - **3** CBB demonstration plants operating at 90% designed capacity, with cumulative annual production of 65 million SBUs;
  - **1** AAC demonstration plant operating at 90% designed capacity
- Number of NFB plants received technical assistance on optimization of raw materials, product quality control procedures, staff training and technology transfer, feasibility studies planned and operated
  - **21** NFB plants received direct support in development of feasibility studies, optimization of inputs materials, production management, quality control, etc. and operated;
  - **50** NFB plants with approved investment plan
- % of market share of NFBs in the local brick market is **25 %**.

### 3 Findings

#### 3.1 Project Design / Formulation

##### 3.1.1 Analysis of LFA/Results Framework (Project Logic /Strategy; Indicators)

*List of Project Indicators*

The Project Results Framework or also called as the Log Frame was updated after the Mid-Term Review (MTR) based on the MTR recommendations as validated and finalized by the PSC. The lesser number of post-MTR list of indicators compared to the original ProDoc is shown below:

Outcomes	Changes in the Project Log Frame List of Indicators	
	Original ProDoc	Post-MTR
<p><i>Outcome 1:</i> Approval and enforcement of an improved legal framework to encourage NFB production and use, and enhanced government capacity and knowledge to regulate NFB development and usage</p>	<ul style="list-style-type: none"> <li>• Number of approved and enforced policies to encourage the increase in the production and usage of NFBs and decrease the use of FCBs by EOP</li> <li>• Number of officially approved and enforced regulatory framework mandating the replacement of fired clay brick kilns by Year 2</li> <li>• Number of policies and standards developed for the local manufacture of NFB equipment and technology that are approved and enforced by Year 4</li> <li>• Number of developed regulations, building standards and codes</li> </ul>	<ul style="list-style-type: none"> <li>• Number of policies, regulations and standards approved and enforced to encourage the increase in the production and usage of NFB and decrease the use of FCBs</li> <li>• Number of standards/norms on energy efficiency (EE) and emissions reduction in NFB production developed and recommended for approved</li> <li>• Enhanced government capacity to improve NFB regulation, control and mandate NFBs production and markets</li> </ul>

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Outcomes	Changes in the Project Log Frame List of Indicators	
	Original ProDoc	Post-MTR
	<p>governing the use of NFBs in the construction sector that are approved and enforced by Year 3</p> <ul style="list-style-type: none"> <li>• Number of developed standards on energy efficiency and emissions reduction in NFB production that are approved and enforced by Year 3</li> <li>• Number of trained government officers in NFB quality control standards and regulations and new building codes mandating the use of NFBs by EOP</li> <li>• Number of NFB plants that are compliant to new NFB quality control regulations and standards by EOP</li> <li>• Number of building projects that are using new building codes that define and mandate the use of NFBs by EOP</li> </ul>	
<p><i>Outcome 2:</i> Increased availability of technically skilled and qualified local service providers for NFB plants, and enhanced stakeholder knowledge on NFB usage.</p>	<ul style="list-style-type: none"> <li>• Number of new NFB plants that were designed and constructed by local engineering firms based on new NFB technical guidelines by EOP</li> <li>• Number of local firms that can manufacture NFB plant equipment based on set</li> </ul>	<ul style="list-style-type: none"> <li>• Number of local firms that can manufacture NFB plant equipment based on set standards developed under this project</li> <li>• Number of building developers and owners used NFBs as building construction material</li> </ul>

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Outcomes	Changes in the Project Log Frame List of Indicators	
	Original ProDoc	Post-MTR
	<p>standards developed under this project by Year 2</p> <ul style="list-style-type: none"> <li>• Number of building developers and owners that use of NFBs as building construction material by EOP</li> <li>• Number of visitors to NFB website and facilitation center at VABM by EOP</li> </ul>	<ul style="list-style-type: none"> <li>• Enhanced technical skills and stakeholder knowledge/information on NFB associated issues</li> </ul>
<p><i>Outcome 3:</i> Improved availability and sustained access to financial support for NFB technology applications</p>	<ul style="list-style-type: none"> <li>• Number of financing institutions providing financial products for NFB investments by Year 3</li> <li>• Number of SMEs and NFB entrepreneurs with confirmed financing through Project financial schemes by EOP</li> </ul>	<ul style="list-style-type: none"> <li>• Loan volume provided by financial institutions (including commercial banks) for NFB investments (USD m)</li> <li>• Number of SMEs and NFB entrepreneurs with confirmed financing</li> </ul>
<p><i>Outcome 4:</i> Boosted confidence in NFB technology application resulting in an increased market share of NFBs</p>	<ul style="list-style-type: none"> <li>• Number of operational NFB demonstration plants in operation with a 90% capacity factor by Year 3</li> <li>• Number of AAC facilities with production at a 90% capacity factor by Year 3</li> <li>• Cumulative annual production of NFBs from 3 NFB demonstration plants in Vietnam by EOP (SBUs)</li> <li>• MJ/standard brick unit (energy intensity) of CBB manufacture from demonstration NFB plants by EOP</li> </ul>	<ul style="list-style-type: none"> <li>• Number of NFB demonstration plants in operation</li> <li>• Number of NFB plants received technical assistance on optimization of raw materials, product quality control procedures, staff training and technology transfer, feasibility studies planned and operated</li> <li>• % of market share of NFBs in the local brick market</li> </ul>

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Outcomes	Changes in the Project Log Frame List of Indicators	
	Original ProDoc	Post-MTR
	<ul style="list-style-type: none"> <li>• MJ/standard brick unit (energy intensity) of AAC bricks by EOP</li> <li>• Number of NFB plants with feasibility studies completed with assistance of VABM-associated consultants by EOP</li> <li>• Number of NFB plants that are planned by EOP</li> <li>• % of market share of NFBs in the local brick market by EOP</li> </ul>	

*Listing of Project Outputs*

The listing of Project Outputs was modified from the ProDoc original version to the new rearranged post-MTR version (but maintaining the same listing with minor rewording in some outputs) which is the reference list for this TE.

Outcomes	Changes in the Project Log Frame List of Outputs	
	Original ProDoc	Post-MTR
<i>Outcome 1:</i> Approval and enforcement of an improved legal framework to encourage NFB production and use, and enhanced government capacity and knowledge to regulate NFB development and usage	<p>1.1: Strengthened legal framework to promote NFB production and utilization</p> <p>1.2: Strategies to implement FCB kiln replacement programme</p> <p>1.3: Recommended policies and standards to encourage</p>	<p>1.1: Mechanisms, policies supplemented, completed and implemented to promote the production and utilization of NFBs</p> <p>1.2: Strategies to implement FCB kiln replacements</p> <p>1.3: Recommended policies and standards on domestic production of NFB equipment and technology</p>

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Outcomes	Changes in the Project Log Frame List of Outputs	
	Original ProDoc	Post-MTR
	<p>domestic production of NFB equipment and technology</p> <p>1.4: NFB product standards and building codes</p> <p>1.5: Energy efficiency and emission standards for NFB production</p> <p>1.6: Trained government personnel for promotion and improved regulation of the growth of NFB production and utilization</p>	<p>1.4: NFB product standards and building codes</p> <p>1.5: Comparison of energy consumption and GHG emissions between concrete brick production and fired brick production in Viet Nam</p> <p>1.6: (<i>Transferred to Outcome 2</i>)</p>
<p><i>Outcome 2: Increased availability of technically skilled and qualified local service providers for NFB plants, and enhanced stakeholder knowledge on NFB usage.</i></p>	<p>2.1: Established strategic partnerships for NFB technology transfer</p> <p>2.2: Completed technical courses on planning NFB investments</p> <p>2.3: Entrepreneurs with firm plans to expand local manufacture of NFB-making equipment and associated components</p> <p>2.4: Completed training courses on the design, construction, production</p>	<p>1.6: Trained government personnel for promotion and improved regulation of the growth of NFB production and utilization.</p> <p>2.1: Established strategic partnerships for NFB technology transfer.</p> <p>2.2: Completed technical courses on planning NFB investments.</p> <p>2.3: Entrepreneurs with firm plans to expand local manufacture of NFB-making equipment and associated components (Combined with Output 1.3)</p> <p>2.4: Completed training courses on the design, construction, production</p>

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Outcomes	Changes in the Project Log Frame List of Outputs	
	Original ProDoc	Post-MTR
	<p>operation and maintenance of NFB plants</p> <p>2.5: Completed seminars on the use of NFB as a construction material</p> <p>2.6: Technical assistance to VABM to promote NFB usage and facilitate NFB investments</p>	<p>operation and maintenance of NFB plants.</p> <p>2.5: <i>(Combine with Output 4.10)</i></p> <p>3.2: Completed workshops for financing institutions on NFB investments.</p> <p>3.3: Established business links on NFB manufacturing.</p>
<p><i>Outcome 3:</i> Improved availability and sustained access to financial support for NFB technology applications</p>	<p>3.1: Completed study on the viable financing sources for scale-up of NFB investments</p> <p>3.2: Completed workshops for financing institutions on NFB investments <i>(Transferred to Outcome 2)</i></p> <p>3.3: Established Business Links on NFB Manufacturing <i>(Transferred to Outcome 2)</i></p> <p>3.4: Action Plan for Financing NFB SMEs</p> <p>3.5: Operational financing scheme for NFB projects</p>	<p>3.1: Completed study on the viable financing sources for scale-up of NFB investments</p> <p>3.4: Action Plan for Financing NFB SMEs</p> <p>3.5: Operational financing scheme for NFB projects</p>
<p><i>Outcome 4:</i> Boosted confidence in NFB technology application resulting in an increased market share of NFBs</p>	<p>4.1: Bankable Feasibility Analyses of Selected Demonstration NFB (CBB) Sites</p> <p>4.2: Financing for Demonstration NFB Projects</p>	<p>4.1: Bankable Feasibility Analyses of Selected Demonstration NFB (CBB) Sites</p> <p>4.2: Financing for Demonstration NFB Projects</p>

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Outcomes	Changes in the Project Log Frame List of Outputs	
	Original ProDoc	Post-MTR
	4.3: Completed preparations for implementing NFB projects	4.3: Completed preparations for implementing NFB projects
	4.4: Installed and operational NFB demonstration plants	4.4: Installed and operational NFB demonstration plants
	4.5: Trained personnel to optimize NFB production	4.5: Trained personnel to optimize NFB production
	4.6: Monitoring and evaluation reports on the operational and financial performances of the demonstration NFB projects	4.6: Monitoring and evaluation reports on the operational and financial performances of the demonstration NFB projects
	4.7: AAC plants with improved production efficiencies	4.7: AAC plants with improved production efficiencies
	4.8: Completed demonstration on the use of NFB products	4.8: Completed demonstration on the use of NFB products
	4.9: Plans for replication NFB plants	4.9: Plans for replication NFB plants
		4.10: Drafted and implemented communication and awareness raising plan (addition during the project Inception phase).

The changes and realignment of the Outputs after the MTR have improved the Log frame logic and helped in better defining the consistency and interrelationship of the Outputs towards achieving the desired Outcomes, thus enhancing the overall implementation strategy.

### 3.1.2 Assumptions and Risks

#### *Design Stage*

The main assumptions for the NFB Project as it was designed /approved in 2014 and the prevailing related situation are the following:

- *Continued growth of Viet Nam’s economy that includes the continued growth of its real estate sector.* The current growth of real estate sector has slowed down over the past 2 years but is expected to pick up as demands for increased and improved housing in urban areas increases
- *Continued willingness amongst Viet Nam’s brick making SMEs and entrepreneurs to transform the industry to NFB technologies.* To sustain their willingness to change, the Project will need to augment the GoV’s policies and set up the required support systems that will allow the brick industry to confidently invest and sustain production of NFBs at low costs to maximize return on investment
- *Availability of sufficient capital for scale-up of NFB investments to meet the target for 2020.* The estimated capital required for this scale of NFB investment until 2020 is in the order of USD 220 million. The Project will facilitate the availability of capital for scaling up investments.

Risks identified at the outset prior to the implementation of the Project include the following:

- Delays in the endorsement and enforcement of new regulations that might dampen interest of local brick producers and building investors towards NFBs and delay the implementation of investment projects;
- The financial incentives and loans from existing funds might not be available in the early stages of the Project, delaying progress in NFB demonstration projects as well as the applicability and sustainability of the model financial schemes
- NFB plants do not provide rates of return to satisfy investors
- Owners of FCB kilns do not convert to NFB technologies.

The measures proposed to mitigate the identified risks during the project development are as follows:

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- 1) Engaging and working with the appropriate government authority from the commencement of the Project to ensure their support and commitment to Project on formulating standards and expediting regulations;
- 2) Ensuring high-level representation from concerned authorities (in this case MoST, MoC, MoF).
- 3) Close coordination and consultation with relevant stakeholders in each of the proposed activities and involving them at a very early stage (PPG phase)
- 4) Inclusion of the financial capacity in the criteria for selecting pilot sites to ensure that the hosting companies/investors are financially capable;
- 5) Deploying financial expertise early in the Project to obtain financing as early as possible.
- 6) Providing technical assistance to obtain approval for the financing of, and to design and operate the NFB plants. Most importantly, the Project will provide this assistance towards ensuring the production rates of NFB plants are optimized, maximizing the rate of return for investors, thus demonstrating the viability of NFB plants as good investments
- 7) Target certain clusters of FCB kilns and provide them with demonstrations of NFB investments and technical and financial assistance to implement an NFB project.

### *Implementation*

All risks during the Project implementation have been recognized, managed and monitored on a quarterly basis. With good management of identified risks, almost all activities of the Project are carried out as scheduled.

The primary risk that was experienced by the Project during implementation which was also one among the identified risks during the design stage is: *risk that the consumer has low confidence in and inadequate knowledge on NFB*. This risk has been mitigated and managed to some extent, but it is affirmed during this assessment that the risk continues to exist and the mitigation measures should continue, especially that the Project is closing.

Since the consumer side-related risk remains and is definitely market-demand driven, the GoV, through the MoST and the MoC, need to continue addressing said risk after the NFB Project and the Program 567 have ended in 2020.

In line with this and based on the 5-year experience, the Project has proposed follow-up actions including the following to continue risk mitigation which could be considered by the GoV in developing the post-project sustainability plan:

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- Develop a strategy for further market development of NFB based on the 28.5 % market share level reached in 2019
- Advocate and support the implementation of MoC Circular No. 13 regulating the use of non-fired brick products through training courses and workshops
- Continue cooperation arrangement between the MoST and MoC through their local Department operation centers in the provinces to conduct workshop to sustain efforts in raising awareness on the use of NFBMs.
- Provide technical assistance to NFB producing companies to get Non-Fired Brick product quality certificate.
- Produce communication materials for dissemination including video and leaflets on the benefits and superiority of non-fired brick products, etc. based on the experience of the Project in the demonstration and replication plants.

### **3.1.3 LESSONS FROM OTHER RELEVANT PROJECTS**

During the project preparation stage, there were a lot of activities going on in Viet Nam. As early as 2008, the GoV had issued the “Master Plan on development of building materials up to 2020” that recognized the country’s need to scale-up non-fired building materials (NFBMs) production and use and to scale down fired-clay brick (FCB) production. As a follow-up, the GoV promulgated Program 567 which was further strengthened by Directive No. 10/CT-TTg in 2012 on Promotion of NFB Production and Utilization.

There were many challenges, problems and concerns that hampered the implementation of the NFB Development Program that led to the need for a project intervention that will address them. In the project design, a situation analysis was drawn from the experiences, needs and lessons learned from the above-mentioned earlier program initiatives. The main concerns were reaffirmed regarding the high energy consumption in producing FCBs and need to preserve soil for productive uses in agriculture. As such, Program 567 served as the main baseline program of the country for the NFB project. The design focused on the development and promotion of modern and semi-modern technologies producing the following types of NFBMs: (i) concrete block bricks (CBB) made of cement, fly ash, ash, ore tailing, other industrial wastes; and (ii) lightweight concrete bricks or autoclaved aerated concrete (AAC) bricks made of sand, fly ash, cement, aluminum, and ore tailings; (iii) foam concrete and non-autoclaved aerated concrete. In summary, the lessons learned from the NFB project design exercise pointed to the following directions:

- Firm up a target for NFB production and market share that will increase to 20-25% by 2015 (using 2010 as baseline, which was still falling short during the project design in 2014 by about 15%) and to 30-40% by 2020.
- Replace gradually all traditional energy-intensive fired clay brick production facilities by NFB production facilities
- Define an implementing arrangement for coordinating and executing the program activities among the agencies and units concerned to achieve the set objectives within the scope of the Program 567. The Ministry of Construction (MoC) was identified to act as the lead agency initially. However, the production side of the NFB supply chain needed a lot of support and hence the role of the Ministry of Science and Technology (MoST) became significant. Thus, a partnership of the two

ministries, MoC and MoST, was considered strategic and effective. The decision was to have MoST to be the Executing Agency with very active support of MoC as main project partner.

#### **3.1.4 Planned stakeholder participation**

The PMU has been very successful in coordinating and mobilizing the active participation of stakeholders from central to local levels such as: Ministry of Science and Technology (MoST), Ministry of Construction (MoC), Ministry of Finance (MoF), Ministry of Natural Resources and Environment (MoNRE), Viet Nam Association for Building Materials (VABM), Viet Nam Institute for Building Materials (VIBM), Viet Nam Institute for Building Science and Technology (IBST), Research and Application for Tropical Building Materials Institute, Departments of Construction of 63 provinces and cities, National University of Civil Engineering, Ha Noi University of Science and Technology, Research Center for Technology and Industrial Equipment of Ho Chi Minh City University of Technology, financial/banking institutions, 6 NFB technology equipment suppliers and technology service/transfer suppliers, and especially the active participation of 26 NFB manufacturers in the demonstration and replication program.

During the period of 2015-2019, the PMU worked closely with the above stakeholders and mobilized their resources and expertise to carry out activities towards the agreed goals beneficial for both parties.

Based on reports, the TE Team recognizes the very active participation of the various stakeholders listed above with particular mention of the participation of the brick kiln manufacturers in hosting and shouldering the cost of the demonstration projects. The GoV through the MoST and has been very effective in mobilizing support and participation in the activities and receiving inputs from the stakeholders.

#### **3.1.5 Demonstration and Replication approach**

Replication of NFB technology to encourage further market development of NFBs supported by the GoV’s Program 567 is a very important and successful achievement of the NFB Project. Based on the ProDoc, suitable mechanisms were to be set up to support interested NFB investors including SMEs. The capacity of the NFB investors were strengthened by the Project through providing NFB technical information, listing of approved suppliers of NFB equipment, listing of approved NFB service providers (for planning, designing, engineering, constructing, operating and maintaining NFB

production plants), obtaining access to various financing sources, and providing guidance for the completion of all necessary applications for regulatory permits.

The project supported the conduct of feasibility studies and preparation of the report for financing application requirements with VEPF during the preparatory stage. The four demonstration plants served as models and learning opportunities for the replication stage. The NFB Project technical assistance included: equipment selection, design of material mix ratios for quality improvement, standardization, improving product competitiveness, energy efficiency, human resources development, product promotion, marketing studies and development of working linkages with the provincial/city governments for the replication phase. The list of brick production plants supported by the NFB Project to replicate NFB technology application is presented in **Annex J**.

As of January 31, 2020, all the 22 replication plants that were supported were all operational. Total potential production capacity for the 22 replication plants is estimated at 926.5 million SBUs. The 22 operational replication projects resulted in an energy saving of 56,788.91 toe which corresponds to 295,575.35 tons of CO<sub>2</sub> in GHG emission reduction. Cumulatively, the 4 demonstration and 22 replication plants have contributed 73,031.82 tons of oil equivalent (toe) of energy savings and 380,116 tons CO<sub>2</sub> in equivalent GHG emission reduction exceeding the original target in the ProDoc.

### **3.1.6 UNDP comparative advantage**

UNDP’s role as an Implementing Agency in a GEF-funded project for the GoV was quite strategic and important. UNDP’s experience in integrated policy development, human resources capacity development, institutional and organizational strengthening as well as non-governmental, private sector and community participation was of great highly advantage for the NFB project.

The brick industry covers several sectors both public and private with overarching development objectives and involves multiple programs that need to be synchronized and synergized in achieving the Project goal and objectives. UNDP has the long-term commitment in developing these sectors and in following the United Nations Development Assistance Framework (UNDAF) and Country Programme Document (CPD) that UNDP administers for Viet Nam. With its productive and long-term relationship with governments, UNDP, particularly in Viet Nam, has been assisting GoV in promoting, designing and implementing projects consistent with the GEF Mandate and national sustainable development plans. Through this Project UNDP has supported Viet Nam in

reducing energy consumption and GHG emissions by creating appropriate infrastructure and business atmosphere for improved production and use of NFB’s.

In the final analysis, the satisfactory results in terms of development objectives of the NFB Project have linked directly and contributed very significantly to the achievement of the Outcome 2 in Viet Nam’s UNDP Country Programme (on low-carbon, resilient and environmentally sustainable development with respect to the GHG emission reduction and energy saving achieved as indicated in the Section 3.1.5.).

### **3.1.7 Linkages between the NFB Project and other interventions within the sector**

The NFB Project worked hand in hand with several building materials projects or interventions where the Project plays a very important integrative and barrier removal role. Starting from the project development stage, the establishment of linkages and coordinative relationships among the relevant agencies led by MoST and MoC with similar project objectives and initiatives is crucial for ensuring success in program implementation under the government umbrella. During the NFB Project development in 2014-2015, there were projects and programs that were ongoing with similar objectives and development strategies that needed to be synchronized and coordinated towards the common goal of improving the productivity and efficiency of brick kilns in Viet Nam through NFB technologies. From then on, when the project started to be implemented in 2015, the NFB Project continued building upon the established linkages within the building construction sector. The ongoing interventions and working relationships at the time of the NFB Project implementation (starting from the project development stage) include the following:

- a. Ongoing research and development and training in agencies, academic organizations and institutes on building materials: IBST, HUST, National University of Civil Engineering (NUCE) and HCMC University of Civil Engineering, Viet Nam Institute for Building Materials (VIBM)
- b. Government programs and regulations on the development and awareness building on policy, regulations and standards development, energy efficiency, production and utilization of NFBs by MoST and MoC at the national and local provincial/city levels
- c. Brick making projects being implemented by the private companies and enterprises
- d. On-going activities in standards development for the brick industry by MoC and MoST
- e. Research and demonstration work in various institutes and industry associations which are also the local resource centers and consultants of the project;

- f. Ongoing initiatives in other similar UNDP-GEF-supported projects in other countries, such as in Bangladesh.

### **3.1.8 Management arrangements**

MoST carries all main responsibilities for the NFB Project as the Project Executing Agency under a National Implementation Modality (NIM) scheme, with UNDP as the GEF Implementing Agency. In this context, MoST assumes the role as UNDP’s Implementing Partner on behalf of the Government of Viet Nam. UNDP provides the overall management and guidance from its Country Office in Hanoi and the Bureau for Regional Hub (BRH) in Bangkok and is responsible for monitoring and evaluation of the project according to GEF and UNDP requirements. MoST designated the Director General of the Department of Science and Technology for Economic – Technical Branches (Department of S&T Branches) as the *National Project Director (NPD)* for the project. The NPD is responsible for overall guidance for project management, including adherence to the Annual Work Plan (AWP) and achievement of planned results as outlined in the ProDoc, and for the use of UNDP funds through effective management and well-established project review and oversight mechanisms. The NPD also ensures coordination with various ministries and agencies as it provides guidance to the project team to coordinate with UNDP, reviews reports and looks after administrative arrangements as required by the Government of Viet Nam and UNDP.

The Project Steering Committee (PSC) oversees the Project Management Unit (PMU) which is responsible to MoST, the PSC and UNDP for implementing the NFB Project, planning activities and budgets, recruiting specialists, conducting training workshops and other activities to ensure the Project is executed as per approved work plans. The PMU takes care of financial management and overall operation of the Project and reporting of quarterly and annual GEF’s funding use in accordance with UNDP regulations. The PMU is composed of the National Project Director (NPD), Project Manager (PM), National Senior Technical Advisor (NSTA), Building Materials Expert (BME), Project Assistant/Interpreter and Project Accountant. The PSC provides the necessary direction that allows the Project to function and achieve its policy and technical objectives, and to approve the annual Project plans and M&E reports.

UNDP also has a role of project assurance through the assigned UNDP Programme Officer for the project and assisted by the part-time Technical Adviser. The PMU and the NPD implement mechanisms to ensure ongoing stakeholder participation and effectiveness by conducting regular stakeholder meetings, implementing strong project management practices, and having close involvement with UNDP Viet Nam.

Further, the “Harmonized Programme and Project Management Guidelines” (HPPMG) between the Government of Viet Nam and the United Nations in Viet Nam provides detailed implementation guidance in the Project’s day-to-day implementation and operations.

### **3.1.9 Partnership arrangements (with relevant stakeholders involved in the country/region)**

The PMU coordinates and mobilizes the active participation of stakeholders from central to local levels such as Ministry of Construction (MoC), Ministry of Finance (MoF), Ministry of Natural Resources and Environment (MoNRE), Viet Nam Association for Building Materials (VABM), Viet Nam Institute for Building Materials (VIBM), Viet Nam Institute for Building Science and Technology (IBST), Research and Application for Tropical Building Materials Institute, Departments of Construction of 63 provinces and cities, National University of Civil Engineering, Ha Noi University of Science and Technology, Research Center for Technology and Industrial Equipment of Ho Chi Minh City University of Technology, financial/banking institutions, 6 NFB technology equipment suppliers and technology service/transfer suppliers, and especially the active participation of 26 NFB manufacturers in the demonstration and replication program.

### **3.1.10 Feedback from M&E activities used for adaptive management**

From the results of the TE Team’s interviews with PMU, the Annual Project Report (APR), Project Implementation Review (PIR), Quarterly Reports, the Mid-Term Review (MTR) and other monitoring systems are very relevant and effective M&E tools for tracking performance within a risk-based approach. The reference benchmarks are according to the project strategy capsulized in the Project Results Framework. Guided by the periodic assessment in agreed targets and indicators of success, the project implementation has been effective in adapting to changing situations, policy environment and institutional priorities while still keeping the end goal and objectives in mind. The project monitoring and evaluation (M&E) followed the established UNDP and GEF procedures and the M&E Plan as embodied in the approved ProDoc and confirmed in the Project Inception Workshop in June 2015.

The project progress for the year is reviewed by the PSC from which achievements/results and progress with implementation serve as the basis for preparation and approval of the next year’s AWP as part of the adaptive management process.

A major M&E activity that provided significant adaptive management interventions was the Mid-Term Review (MTR) which was done in October 2017 - June 2018. The MTR recommendations formed the basis of the adaptive management that needs to be done to accelerate the progress of achieving the expected results. The MTR recommended modification of the Project Log Frame, in terms of changes in indicators and outputs under each Outcome. There were recommendations also on improving operations and budget management in line with UNDP/GEF guidelines.

The NFB Project Management continued an adaptive management approach in implementing the plans to enhance efficiency and effectiveness in producing the desired outputs (and exceeding targets) towards the expected project outcomes. The changes and realignment of the Outputs after the MTR have improved the log frame logic and helped in better defining the consistency and interrelationship of the Outputs towards achieving the desired Outcomes, thus enhancing the overall implementation strategy.

### **3.1.11 Project Finance**

In summary, the project budget and expenses as of January 31, 2020 is summarized in Table 3 below in terms of the GEF Funds and co-financed resources. This includes the expenses up to the official end of project (EOP) at November 4, 2020 and updated in January 31, 2020 to add the additional committed expenditures as the Project wraps up to final completion.

**Table 3: Summary of Project Finance in GEF and Co-financing as of January 31, 2020**

	<b>Budget at Endorsement (Million US\$)</b>	<b>Expenses at Completion (Million US\$)</b>	<b>% spent /realized as of EOP</b>
GEF Financing	<b>2,800,000</b>	<b>2,758,287</b>	99%
<i>Remaining GEF fund</i>		<b>41,713</b>	
Co-financing	36,080,000	89,005,949	247%
Total	38,880,000	91,805,949	236%

*GEF Trust Funds*

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The Summary of GEF Funds Project Annual Budget versus Expenditures as of January 31, 2020 per Component/Activity is shown in **Table 4** in the following page.

As of January 31, 2020, the Project funds supported by GEF is 99% spent with remaining fund balance of USD **41,713** as provided by the PMU. Further details can be found in **Annex I, Table I.1**.

### *Project Co-Financing*

The extent of co-financing realized by the project is valued at USD 89,005,949 as compared to the indicative values during the project approval at USD 36,080,000. The details of the actual co-financing realized are shown below (**Table 5**).

The Project was very successful in mobilizing counterpart funds in the form of co-financing up to 247 % of initially planned funding level. This manifests the strong support and adherence to the NFB objectives, particularly by the private enterprises in the NFB demonstration and replication plants and the banking institutions for the market-based loans thus manifesting a very promising reaffirmation of their belief in the long-term benefits of the NFB program. The VIETINBANK contributed USD 20,700,000 by their initiatives and commitment to the NFB Project and related market development in response to the GoV encouragements. The high level of co-financing was made possible by the leveraged investments in the form of equities and loans by the 21 NFB replication companies reaching up to USD 29,239,526 in addition to the investments in the NFB enterprises demonstrations totaling up to USD 26,110,423. The GoV contributed USD 12,356,000 including the USD 8,000,000 sourced from the VEPF for the NFB demo projects. Further details can be found in **Annex I, Table I.2**.

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**Table 4: Summary of GEF Funds Project Annual Budget versus Expenditures as of January 31, 2020 per Component/Activity (in US \$)**

Project Strategy	Total Budgeted Amounts for all Years (Revised) [A]	Total Expenses Year 1 -3 2015-2017 [B]	Budgeted (US\$) (Revised)			Actual Expenses (US\$) as of January 31, 2020 (including anticipated)			Total Actual Expenses [B]+[C]	Percent of Actual Expenses/ Total Budgeted (%) [B+C]/[A]
			Year 4 2018	Year 5 2019	Total Year 4&5	Year 4 2018	Year 5 2019	Total Year 4&5 [C]		
<b>Outcome 1: Approval and enforcement of an improved legal framework to encourage NFB production and use, and enhanced government capacity and knowledge to regulate NFB development and usage</b>										
<b>Sub Total Outcome 1</b>	568,550	321,588	180,568	144,027	324,595	164,366	148,516	312,882	634,470	112%
<b>Outcome 2: Increased availability of technically skilled and qualified local service providers for NFB plants, and enhanced stakeholder knowledge on NFB usage</b>										
<b>Sub Total Outcome 2</b>	562,820	611,418	128,810	13,244	142,054	130,840	20,075	150,915	762,333	135%
<b>Outcome 3: Improved availability and sustained access to financial support for NFB technology applications</b>										
<b>Sub Total Outcome 3</b>	267,950	125,790	183,000	125,398	308,398	74,745	75,872	150,617	276,407	103%
<b>Outcome 4: Boosted confidence in NFB technology application resulting in an increased market share of NFBs</b>										
<b>Sub Total Outcome 4</b>	1,267,780	401,148	345,982	339,311	685,293	347,657	259,577	607,234	1,008,382	79%
<b>Project management (incl. M&amp;E)</b>	132,900	54,342	21,965	43,576	65,541	13,307	9,046	22,353	76,695	58%
<b>TOTALS</b>	<b>2,800,000</b>	<b>1,514,286</b>	<b>860,325</b>	<b>665,556</b>	<b>1,525,881</b>	<b>730,915</b>	<b>513,086</b>	<b>1,244,001</b>	<b>2,758,287</b>	<b>99%</b>
<b>EOP Remaining Funds</b>									<b>41,713</b>	

**Table 5: Results of Co-Financing Resource Mobilization from Project Partners, in US\$**

Co-financing (type/source)	UNDP own financing (mill. US\$)		Government (mill. US\$)		Partner Agency/Companies (mill. US\$)		Total (mill. US\$)	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
	Loans/Concessions			4,000,000	8,000,000	21,200,000	20,700,000	25,200,000
In-kind support	550,000	550,000	4,220,000	4,356,000	110,000	50,000	4,880,000	4,956,000
Other (Self invested)					6,000,000	55,349,949*	6,000,000	55,349,949
<b>Totals</b>	<b>550,000</b>	<b>550,000</b>	<b>8,220,000</b>	<b>12,356,000</b>	<b>27,310,000</b>	<b>76,099,949</b>	<b>36,080,000</b>	<b>89,005,949</b>

\* To avoid double counting, this amount does not include the USD 8,000,000 VEPF soft loan used for the NFB Demo plants which are already included in the GoV co-financing.

### 3.1.12 Monitoring and evaluation

*Design at entry and inception (\*)*

The TE Team finds the NFB Project monitoring and evaluation (M&E) systems and reporting procedures adequate and practical to meet the needs of the Project in tracking its progress and implementation experience of the project following the M&E standards set for all GEF-funded, UNDP-implemented projects. It was also designed to guide the transition of the NFB project into a mainstreamed program by the GoV after the Project ends. **Rating: (S) Satisfactory**

*M&E During MTR and assessment of progress resulting from Post-MTR recommendations*

As part of the overall M&E system, the Mid-Term Review (MTR) was conducted for the Project to gauge the implementation progress in terms of achieving the expected results. The MTR recommended modifications in the Project Results Framework or the Project Log Frame in terms of removing some indicators and clarifying the targets which was approved by the Project Steering Committee (PSC) with further modifications. The final version of the Log Frame is now the reference and basis for this TE. The MTR also recommended some changes in terms of necessary improvement in certain areas to follow up or reinforce initial benefits from the project. These are summarized in the table below showing also the Action Taken by the Project and the status as of EOP vis-à-vis the MTR recommendations.

Post-MTR recommendations	Action taken by the NFB Project and Status as of EOP
Standards have been developed for the manufacturing of non-fired bricks; these are now also needed for the use of non-fired bricks in construction. The project has initiated work on this, which needs to continue.	The project, within its budget and capacity, continued to provide support to GoV in drafting 3 national standards (TCVN), on AAC wall panels. Initially, three (3) TCVN were approved in 2017 by MoST and the 3 AAC TCVN were approved by MoC and MoST in 2019.  TCVN on concrete bricks (e.g. requirement for building design, NFB mortar requirements, building techniques and procedures, requirement for as-built acceptance, etc.) to overcome NFB associated issues/problems that affect the quality of the construction works have been updated. Building techniques and procedures and requirement for as-built acceptance of the CBB application have been prepared and 3 training modules developed and

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Post-MTR recommendations	Action taken by the NFB Project and Status as of EOP
	used by the project for training activities. The project will transfer the training modules (05) to the relevant governmental agencies for future training activities or for development of TCvNs that can be officially applied national wide.
Compliance with regulations for the use of non-fired bricks is a challenge. The project should develop a strategy to increase compliance with requirements for the use of non-fired bricks, to maximize their impact.	The Project, by implementation of NFB demonstration and replication projects, trainings and communication activities nationwide has helped relevant stakeholders to understand important aspects (e.g. NFB conformity certificates, quality of products produced, technical guidance, building design, construction technique and procedures, etc.) that should be followed to be competitive in the NFB markets.
Training has been successful, however, a much larger group of stakeholders in the construction sector also needs training in the use of non-fired bricks now that the market is rapidly developing. This will require different ways of delivering training, requiring less project resources	<p>In addition to the training materials developed by the Project in the first half of the project life, the project has developed, after the MTR, additional training materials and video on construction procedure and technique using CBB and AAC bricks, to help trainees understand more about the construction techniques.</p> <p>Overall, 26 training courses for 1,890 trainees from 63 provinces/cities in the country have been conducted, using 5 NFB modules developed by the Project. Among the above turn out, 270 trainees (designers, inspectors, engineers of contractors, etc.) are from construction sector (149 out of 270 trainees have been trained after the MTR).</p> <p>The training courses have actively contributed to implementation of Program 567. Staying within the project budget with some co-financing inputs, the number of trainees would have been more if more resources were available. After training participants from the 63 provinces and cities, it is expected that the training will be continued by the GoV in the future. The Project plans to hand over all the training materials developed by the Project and the documentations of the training implementation, results and evaluation to MoST and MoC who shall disseminate the NFB Training Program to competent agencies, vocational training colleges and university to continue the work.</p> <p>The participants to the training courses sent by the companies were mostly non-professional laborers and masons whose employment terms are temporary. To address this, the Project prepared two lectures and video for training technical staff from the building contractors who will have the responsibility of training their workers using these training tools. The local</p>

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Post-MTR recommendations	Action taken by the NFB Project and Status as of EOP
	<p>Department of Construction in the provinces will raise resources to conduct training of the workers. These project outputs were used in the training courses conducted in Ho Chi Minh city and Thai Binh province and received good feedbacks.</p> <p>In order to maximize impact using the Project’s limited budget, the strategy was to focus the trainings on contractors’ engineers so that they will play a role of trainers to the workers of construction companies that will use NFB.</p> <p>In addition, a communication strategy has been developed and implemented by the Project to promote NFB production and use in Viet Nam.</p>
<p>Sustainable financing for the manufacturing for non-fired bricks has been realized, and it is advisable to reduce the remaining available budget to free up budget for the development of the demand side of the market.</p>	<p>Most of the financing support were channeled to the production side, including:</p> <ul style="list-style-type: none"> <li>- Technical assistance in preparation of guidelines for loan application, loan guarantee application submitted to financial institutions</li> <li>- Support enterprises to assessing financial sources for investment in NFB production, via preparation of feasibility studies for the investment and other necessary documents for loan and loan guarantee application</li> <li>- Organizing workshops for investors and financial institutions</li> <li>- Organizing national and international workshops on science and technology for NFBM development in Viet Nam which mainly links to NFB production development.</li> </ul> <p>Project supported market demand side development through:</p> <ul style="list-style-type: none"> <li>- An additional financial-related activity that has been done including a study/survey on NFB market share in Viet Nam, for the period 2016-2020. This is an important project indicator added during the MTR and carried out afterwards.</li> </ul>
<p>A strategy is needed to ensure quality of non-fired bricks and to make sure market parties can recognize bricks that meet quality standards, for example</p>	<p>The Project has also focused on NFB product quality assurance with the following outputs:</p> <ul style="list-style-type: none"> <li>- 6 TCVN on quality and use of NFBs</li> <li>- 3 replication projects have received technical assistance on quality certification to be compliant with the Regulation No. 10 by MoC that</li> </ul>

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Post-MTR recommendations	Action taken by the NFB Project and Status as of EOP
<p>working more with certification of NFBs.</p>	<p>all NFB products are required to get “Quality Conformity Certificate” issued by the designated organization.</p> <ul style="list-style-type: none"> <li>- 22 replication projects implemented by Project including activities ensuring quality such as: setting up product quality control procedures, factory staff training courses, etc.</li> <li>- Related communication and public awareness activities about NFB products and application</li> </ul>
<p>A comprehensive strategy is needed for the development of the demand side of the market, including communications strategy, government policies, QA/QC strategy for NFBs, etc. The integrated market development strategy is the top priority for the remainder of the project.</p>	<p>The Project has provided technical assistance to GoV in the development of “Integrated Product Market Strategy for NFB in Viet Nam”, which aimed to</p> <ul style="list-style-type: none"> <li>- increase investment in NFB production (CBB, AAC, and Autoclaved Lightweight Concrete Panel (ALC Panel) and use to 35% -40% by 2025 and 40% -45% by 2030;</li> <li>- Increase NFB market by completion of policy framework to promote NFB production, limit FCB production, set up green building policies and regulations, etc.</li> <li>- Provide training to both NFB producers and end-users/masons;</li> <li>- Prepare communication strategy and awareness campaigns;</li> </ul> <p>The completed market study covered both supply and demand aspects including recommendations on balanced measures to ensure product quality and building construction quality to develop the market for NFBs in its 2030 and 2050 scenarios, in response to the MTR recommendation.</p> <p>Presently, main NFB users are those who use governmental budgets or those investors having their building higher than 9-floor, for whom it is obligatory to use NFB in their construction works, as required by Circular 13/2017/TT-BXD regulating use of NFBMs in construction works. NFBs are not yet attractive for use by private users. One of the reasons for limited consumption of NFBs is due to the tradition of using FCBs for a long time and thus brick users have preference for FCBs and tend to resist shifting to NFBs for lack of appreciation of the benefits of NFBs. The completed market study therefore serves as basis for the GoV to develop a sustainability plan for the period after the NFB Project and Program 567 have been completed in 2020. The findings and recommendations of the study addressed the problems that hinder NFB use that include the perceived “unsatisfactory quality of the NFBs by which users attribute to it for incidences of cracking, water seepage, excessive shrinkage or</p>

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Post-MTR recommendations	Action taken by the NFB Project and Status as of EOP
	<p>expansion of the bricks, etc. The study indicates that the root cause of these problems may be the inconsistent quality of NFBs produced and circulated in the market by producers who are not following standards, masons who are not trained in the proper application of NFBs, lack of technical manual/guidelines for both NFB production and use (which the Project has already addressed). Not all NFB manufacturers have conformity certificate for their products or strictly follow NFB production procedures and only few have developed basic standards for their projects. The national standards (TCVN) for regulating the quality of CBB have been issued in response to the MTR recommendation.</p>
<p>Annual strategy reviews for the project, including a full revision of the project’s strategic results framework, are recommended, and report to the Steering Committee for instructions.</p>	<p>The project results framework (Log Frame) has been revised after MTR and approved by UNDP as well as the Project Steering Committee. This current TE uses the updated Log Frame as basis of the evaluation at EOP.</p>
<p>With the project over half of its lifetime, it is important to start preparing an “exit strategy” for the project, which includes a plan to end activities before the end of the project.</p>	<p>No “written exit strategy” has been developed and presented by the Project during the TE Mission in January 2020. Instead, an assessment report on results and impacts of NFB demonstration and replication projects and a market strategy development study have been completed in February/March 2020 which provide lessons learnt and experiences to the GoV for future development of the NFB market in Viet Nam. During the implementation process, the PMU worked closely with project partners like MoC and NFB enterprises who have immediately taken over the project results (i.e. inputs to the policy formulation or technical support to NFB investor and producers) for their operation. The PMU has started to prepare its project terminal report which will document and include a list of documents to be transferred to competent agencies so that the project results, knowledge and experience will continue to be used by competent agencies for NFB market development in Viet Nam. As the NFB Project and the Program 567 are completed in 2020, based on the ensuing recommendations, the GoV, through the MoST and MoC, could develop the post-project sustainability arrangements. The long-term strategy in NFBM market development for the future could be through a road map to achieve the long-term goals and post-project impacts on GHG mission reduction and energy savings in a sustainable manner. This should also provide a time frame for implementing a relevant action plan, responsibility matrix for the stakeholders and indicators of success to monitor progress.</p>

*During implementation (\*)*

The implementation of the M&E Plan based on the updated Project Log Frame has been found sufficient and effective underlying the risk-based monitoring approach. The above foregoing analysis outlines the action taken after the MTR and the year-to-year monitoring done thereafter by the Project. The M&E of UNDP/GEF projects include the Project Implementation Review (PIR), Annual Project Report (APR) and other reporting systems on the physical accomplishments and financial performance. Starting with the Project Inception Report in 2015, over the five years of implementation, the Project has consistently and regularly submitted PIRs, APRs and Quarterly progress reports; held Project Steering Committee Meetings and conducted the mid-term and terminal evaluations as planned.

In the 2018 PIR, in Year 4 of project implementation, the Project was reported to be on track and was expected to achieve all of its objectives and EOP targets in time for the expected project closure in November 2019. Performance indicators therein were rated Satisfactory for both the Development Objectives and Implementation Progress. However, in the Year 5 PIR 2019 and the last year of the Project, the PMU reported that the Project implementation might need to be extended to tentatively April 30, 2020 due to delay in the actual start of operations on May 2015 corresponding to around 6 months and more time was needed for completion of remaining activities. These include particularly: i) Completion of 3 replication projects; ii) Development of a national level integrated product-market strategy for NFBs in Viet Nam; iii) Assessment of results and impact of NFB demonstration, replication projects and finance assistance and operational and financial closure of the project.

However, the Project did not request for extension and decided to complete the remaining activities and outputs as planned in the 2019 AWP for the last year of the Project.

The detection of challenges and its resolution helped the Project to achieve all the expected project results and outcomes. This has been due to the effective adaptive management led by the GoV and UNDP, consistent with the NIM scheme.

The TE Team finds satisfactory compliance in the monitoring and evaluation needed during implementation and in the diligence and prudence needed for the management of resources allocated for the project. The TE Team considered the delay as a minor

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shortcoming in terms of timely completion of some expected outputs at the official EOP. Nevertheless, the project implementation was kept on track in completing all the committed Outputs with minor delay but without affecting the overall project results.

Likewise, the monitoring of the co-financing inputs expected from key partners has been fully established and therefore, has significantly contributed as an effective tool for tracking the commitment and participation of project partners and stakeholders. This has contributed a lot in meeting the expected outputs for the demonstration and replication projects which are also the main outputs of the Project.

Nevertheless, the PMU has managed to keep track of all the other outputs of the Project based on the reconstituted Project Results Framework with its approved indicators per Outcome. The Project did not find it necessary to request extension of the project duration since it was able to manage the situation that was anticipated in the PIR 2019 assessments. *Rating: (S) Satisfactory*

### *Overall assessment (\*)*

Thus, regarding the overall assessment of the M&E, the Project had satisfactorily met the required M&E for the entire project duration with minor shortcomings on timeliness of completion of related studies and assessments in the NFB market demand side. As part of the overall M&E process, the findings and recommendations of the studies would have been significant inputs to the development of an “exit strategy” or post-project sustainability plan which is normally done before a UNDP/GEF project ends.

Overall, through the effectiveness and efficiency of the M&E system in place and the diligence of the Project in submitting M&E reports, the project was able to exercise its adaptive management to complete all Outputs as targeted in the reconstituted Project Results Framework with many outputs exceeding the targeted levels. Hence, the TE Team considers this achievement in M&E system as Satisfactory. *Rating: (S) Satisfactory*

### **3.1.13 UNDP and Implementing Partner Implementation/Execution (\*) Coordination and Operational Issues**

#### *UNDP as the Implementing Agency (\*)*

Being the GEF Implementing Agency and drawing from UNDP’s overall comparative advantage of overseeing these kinds of developmental projects, UNDP Viet Nam has

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performed its oversight function over the NFB Project effectively and efficiently within the set quality and timeliness standards of UNDP and GEF. It has closely coordinated with the GoV through the MoST, which is the Executing/Implementing Agency, in coordination with MoC and the rest of the Project Team. It has effectively overseen and executed the Project in the context of NFBM within a multi-sectoral and multi-disciplinary industry that is evolving rapidly.

UNDP provided overall oversight and guidance from its UNDP Viet Nam Country Office in Hanoi and the Bureau of Regional Hub (BRH) in Bangkok. It has been responsible for monitoring and evaluation of the Project as per normal GEF and UNDP requirements. It has diligently kept track of project progress through periodic assessments through the APR, PIR, Quarterly Reports and coordination meetings under a risk-based approach. UNDP Viet Nam has been very responsive in managing concerns if any problem arises. It also uses the risk-based methodology and system through an integrated planning and management platform provided by the ATLAS ERP system so that timeliness of the project are ensured and regularly tracked. At the operational level, the Standard Letter of Agreement between the GoV and UNDP for the Provision of Support Services has proved to be very helpful in accessing support services from UNDP for human resources, procurement, financing and other related services. *Rating: S (Satisfactory)*

### *MoST as the Implementing and Executing Partner*

As Implementing and Executing Partner of the NFB Project and also accountable to GoV, MoST has effectively and efficiently carried out its tasks, including: (a) the overall implementation of the Project; (b) mobilization of all resources including needed co-financing for the project implementation; (c) proper coordination among all related ministries, agencies, provinces and stakeholders involved in the project implementation; (d) managing the day-to-day operations of the Project implementation as per approved work plans and with outputs, outcomes and targets as provided in ProDoc. The National Project Director designated by MoST has been very active, resourceful and has served as an effective leader in providing the overall project direction through the Project Steering Committee (PSC) in the project management and technology development aspect of the Project and with close working relationship with the MoC. The MoST/MoC collaboration has been key to the successful implementation of the Project, with the NFB production technology and the policies and schemes related to its application in building construction. Market share increased from 13% up to 28.5% in the period from 2014 to 2019. Under the responsibility of the Project Management Unit (PMU) as guided by Project Director and Project Steering Committee and UNDP Viet Nam, the

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implementation and execution functions have been very effectively performed thus ensuring the Project’s success with a host of highly motivated and committed cooperating agencies and institutions as well as consultants.

The Project has been country-owned and –driven with very strong commitment and support from the private sector across all the project components and activities with far-reaching impacts at the local and provincial levels. This will not be possible without the strong advocacy and determination of the GoV, through MoST, in collaboration with MoC. The last year of the Project was very critical in achieving the targets on time since at the time of the PIR preparation the overall project delivery was less than 80% and the 2019 AWP delivery rate was less than 40% with a few months to implement the project up to the November 2019 EOP. As of January 31, 2020, the overall project expenditures rose to 99%, with only around USD 41,000 remaining. In terms of the project outputs, the Project has exceeded the targeted Outcome levels in line with its development objectives. *Rating: (S) Satisfactory*

*Overall project Implementation/execution (\*) Rating: (S) Satisfactory*

## 3.2 Project Results

### 3.2.1 Overall results in attainment of objectives (\*)

It should be noted that the Rating Scheme adopted by this TE is a three-step process. Firstly, in **Section 3.2.2** below the project accomplishments are reckoned at the Output Indicator level. The performance is gauged by comparing the level of accomplishment that is actually achieved, as reported by PMU, compared to the target level (as indicated in the Project Results Framework) at EOP. Regarding the quantity aspect, an indicator in which the actual accomplishment exceeds the targeted level by at least 20 %, the rating given is Highly Satisfactory (HS); if it is just at par, Satisfactory (S) and if it more than 20 % off target, Moderately Satisfactory (MS); and so on as a gauge of efforts in producing the outputs. The shortcomings are also noted to characterize the performance as may be relevant.

Then, secondly, the performance is further evaluated at the level of Outputs and assessed how these Outputs contribute to the attainment of the Project Outcomes. **Section 3.2.3** and **Table 6** illustrate how the performance is analyzed further by taking into account the evaluation criteria consisting of Relevance, Efficiency and Effectiveness as required in the TE TOR. The definition of rating and rating scale are explained in **Annex H1**.

Thirdly, these findings are summarized in a descriptive form at the Outcome Level and tabulated as seen in **Section 3.2.4**, including the major performance areas that include:

- Monitoring and Evaluation (**Section 3.1.12**)
- UNDP and Implementing Agency/Executing Agency Execution (**Section 3.1.13**)
- Assessment of Outcomes (**Section 3.2.3**)
- Sustainability (**Section 3.2.6**)

The development objective of the NFB Project is to reduce the annual growth rate of GHG emissions by displacement of fossil fuel use and the usage of good quality soil for brick making through the increased production, sale and utilization of NFB’s in Viet Nam.

Objective Indicators	EOP Target	EOP Achieved	Rating
Reduction in GHG and coal energy use**			
<ul style="list-style-type: none"> <li>• Cumulative direct CO<sub>2</sub> emission reductions<sup>6</sup> resulting from the NFB plant</li> </ul>	<b>0.088</b>	0.380116	HS

<sup>6</sup> The value is calculated based on difference between CO<sub>2</sub> emission reduction resulting from the total NFBs outputs produced by 4 demo plants and 18 operational replication plants as compared to the CO<sub>2</sub> emission reduction of the same number of FCBs

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Objective Indicators	EOP Target	EOP Achieved	Rating
investments and technical assistance, million tons CO <sub>2</sub>			
<ul style="list-style-type: none"> <li>Cumulative direct post-project CO<sub>2</sub> emission reductions<sup>7</sup>, million tons CO<sub>2</sub></li> </ul>	<b>1.270</b>	1.513	HS
<ul style="list-style-type: none"> <li>Cumulative direct energy saving<sup>8</sup> from displacement of coal through the demonstration NFB plants during project time, toe</li> </ul>	<b>30,782*</b>	73,031*	HS
<i>Overall DO Rating</i>			<b>HS</b>

\*\*Potential GHG and Energy Savings Contributions (Calculations based on Production Capacity This means that these figures are not normalized to consider typical annual capacity utilization of the plants and assuming all NFB produced are sold and used).

**Reference:** *Results of Investigation, Survey, Efficiency Assessment and Impact of Demonstration and Replication Programs on Non-fired Brick Production Projects.* Contract 2709/2019-HDTV-TDS. February 2020.

The Project very successfully achieved its development objective in terms of direct and direct post-project CO<sub>2</sub> reduction with actual results exceeding by around 40 % of set target total. The results have contributed to the achievement of Outcome 2 targets on low carbon development of the CPD (2017-2021). The TE noted that the environmental and energy benefits are in terms of potential GHG and energy savings contributions from calculations based on production capacity. This means that these figures may have to be verified if they are normalized to consider typical annual capacity utilization of the plants. The calculation assumed all NFB produced are sold and used. The reference cited did not elaborate on this further in the calculation methodology.

While the NFB Project has the main objective of reducing the annual growth rate of GHG emissions by displacement of fossil fuel use, it is also concerned about the reduction of the usage of good quality soil for brick making in Viet Nam. The TE took it that the attainment of this secondary objective was implicit in the production of NFBs which avoids the use of clay and soil-based raw materials.

Nevertheless, the TE also noted a very significant achievement of the GoV as facilitated by the Project regarding the NFB market share at 28.5% exceeding remarkably (rated HS

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outputs (The higher values of results as compared to previous estimates included the NFBs produced by 18 replication projects).

<sup>7</sup> The direct post-project CO<sub>2</sub> is calculated based on the cumulative NFB SBUs produced by 4 demo plants and 18 replication plants for 10 year’s period during 2020-2030

<sup>8</sup> The value is calculated based on difference between energy saving resulting from the total NFBs outputs produced by 4 demo plants and the 18 operational replication projects in and the energy saving of the same number of FCBs outputs

in the detailed assessment of outputs below) the corresponding EOP target of 25%, from the baseline of 13% in 2014.

The TE Team has noted that the quantitative outcome indicators in CO<sub>2</sub> reduction and energy savings were highly exceeded and have to be rated HS at the Objective level, and likewise, the market share in the Outcome level. However, in determining the overall rating, the TE considered also the detailed assessment at the Output level which was altogether rated as Highly Satisfactory (HS). Based on these observations, the TE rated the overall achievement of Project in terms of attainment of developmental objective as Highly Satisfactory.

**3.2.2 Elaboration of the Major Project Accomplishments vs. Targets Per Indicator under each Project Outcome (\*)**

- *Outcome 1: Approval and enforcement of an improved legal framework to encourage NFB production and use, and enhanced government capacity and knowledge to regulate NFB development and usage*

Indicators	Related Outputs*	EOP Performance		Rating (*)
		Target	Achieved	
<ul style="list-style-type: none"> <li>• Number of policies, regulations and standards approved and enforced to encourage the increase in the production and usage of NFB and decrease the use of FCBs:</li> </ul>				
<ul style="list-style-type: none"> <li>○ additional policies approved and enforced to encourage NFB development (Investment, production and use) and decrease FCB usage by EOP</li> </ul>	Output 1.1,1.2	13	16	HS
<ul style="list-style-type: none"> <li>○ standards/policies approved to promote local manufacturers of NFB equipment and technology by Year 4</li> </ul>	Output 1.3	2	2	S
<ul style="list-style-type: none"> <li>○ standards/ regulations approved by Year 3 to govern quality of NFBs</li> </ul>	Output 1.4	3	6 <sup>9</sup>	HS
<ul style="list-style-type: none"> <li>• Number of standards/norms on energy efficiency (EE) and emissions</li> </ul>	Output 1.5	2	2	S

<sup>9</sup> Three (3) in 2017 and additional 3 TCvNs on AAC panel in 2018 and 2019 have been prepared and approved by MoC and MoST

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Indicators	Related Outputs*	EOP Performance		Rating (*)
		Target	Achieved	
reduction in NFB production developed and recommended for approved by Year 3				
<ul style="list-style-type: none"> <li>Enhanced government capacity to improve NFB regulation, control and mandate NFBs production and markets (revised post-MTR)</li> </ul>	Output 1.1, 1.2	By EOP, 940 government officers at national and provincial level trained	1,000	HS
Overall Rating Outcome 1				<b>S</b>

\* Output 1.6: Trained government personnel ... was transferred to Outcome 2 after MTR.

The Project, in collaboration with and leaderships of the MoST and MoC, has very actively and effectively supported to improve the legal basis, framework and institutional mechanisms to promote NFB production and utilization.

The Project has developed and enforced new policies upon existing policies that GoV had initiated earlier over a decade ago. GoV has been pursuing the technology shift to NFBs because of the recognized socio-economic and environmental benefits of NFBs. As a manifestation of the GoV's definitive direction towards extensive NFB market development, the GoV laid down the basic legal framework and ensured an integrated government response through Program 567 in 2010, and Directive No. 10/CT-TTg to back it up with incentives and to set specific 10-year targets by 2020 at 30-40% market share by NFBs while replacing FCBs.

In 2015, the Project was launched to address the barriers that still hindered further market development and to further strengthen policies and incentives that could further encourage local NFB production, utilization and market development to support Program 567.

At the National level, there were five (5) regulations issued supported by the Project that directly support NFB market development (with highlights on the innovations introduced to spur development):

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- (i) Decree No. 24a/2016/ND-CP (5 April 2016) on the management of building materials supplementing existing policies on investment promotion, land lease, land use fees, and technology transfer for the production of NFBMs. (This decree reinforces the earlier pertinent provisions of the Law on Investment in 2014 and the Law on Technology Transfer in 2006 to favor NFB market development).
- (ii) Circular No. 13/TT-BXD (8 December 2017) regulating the use of NFBMs for construction works, superseding Circular No. 09 issued in 2012. (This Circular requires construction works with allocated State Budgets to use NFBs up to 30% or more of the total requirement.)
- (iii) Decree No. 121/2013/ND-CP on administrative sanctions related to construction operations, specifically on the section on utilization of NFBMs. The revised contents were included in the Decree No. 139/2017/ND-CP of the Government on 27 November 2017.
- (iv) Decision No. 1264/QD-BXD publishing the cost norms for construction work estimation related to NFBMs (1 February 2018).
- (v) Circular No. 01/2018/TT-BKHDT (30 March 2018) removing incentives for imported NFB equipment for production lines of less than 20 million SBUs/year.

These issuances clearly manifest GoV’s strong resolve to encourage NFB market development. The GoV also developed measures to reduce the production and use of FCBs which required retirement of all types of manual FCB kilns and this resulted in 58 provinces preparing road maps, 25 provinces issuing directives to support the strategy and 11 provinces formalizing their master plans and support policies. These information, policies and plans were introduced in the training workshops supported by the Project and co-financed by the local governments in all the 63 provinces and cities.

At the local level, there are eleven (11) documents issued by the People’s Committees of provinces and cities on the planning of building materials, plans for development of NFBMs, roadmap and incentive policies when eliminating manual brick kilns. These further strengthened earlier policies brought about by Decision No. 567 of the Prime Minister.

Altogether, the project supported the issuance of sixteen (16) major regulations directly related to NFBs.

To back up these policies with standards of performance and products, several standards and regulations were issued with support from the Project on promoting local

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manufacturers of NFB equipment and technology, on quality of NFBs and on energy efficiency and emissions reduction in NFB production.

Building upon the earlier government NFB directions, all these policies and regulations issued with the support of the Project enabled the development of the market of NFBs. The NFB value chain cuts across several sectors and government institutions. The policies and regulations were developed based on dialogue and consultations with relevant stakeholders through the effective leadership of MoST and MoC, in collaboration with other government agencies and private sector. These consultations helped to get necessary clarification of institutional roles and functions of various agencies involved in the market development of NFB’s.

Regarding standards and norms, the following were developed and adopted with Project support:

- 1 standard on NFB mould developed with support by the Project (a standard of NFB mould was approved and announced by Thanh Phuc Company)
- 3 national standards (TCVN) on NFB (Concrete bricks) adopted by MoST in 2017
- 3 standards on AAC panel approved by MoC and MoST by 2019.
- 2 norms on energy consumption and GHG emission for NFB recommended.

The issuances were adopted and enforced by the relevant government agencies and disseminated through the implementation of training and capacity building program of the Project as discussed in Outcome 2, among other activities.

- *Outcome 2: Increased availability of technically skilled and qualified local service providers for NFB plants, and enhanced stakeholder knowledge on NFB usage*

Indicators	Related Outputs	EOP Performance		Rating (*)
		Target	Achieved	
• Number of local firms that can manufacture NFB plant equipment based on set standards developed under this project by Year 4	Output 2.3	1	1	S
• Number of building developers and owners used NFBs as building construction materials	Output 2.2	300	2,115 <sup>10</sup>	HS

<sup>10</sup> This figure was a result of the survey done by the local governments in terms of number of buildings. PMU explained that the number of buildings correspond to the number of building developers and owners (which is the indicator in the Log Frame).

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Indicators	Related Outputs	EOP Performance		Rating (*)
		Target	Achieved	
• Enhanced technical skills and stakeholder knowledge/ information on NFB associated issues				
▪ Training courses on various NFBs’ aspects, covering:	Output 2.4	21	26 <sup>11</sup>	HS
○No. of provinces/cities		50	63	
○No. of people trained		1,500	1,890	
- governmental and local officers		940	1,000	
- designers and constructors		121	270	
- NFB investors		399	492	
- people from other related areas		40	128	
○Training courses for 60 people from vocational colleges of construction	Output 2.5	2	3	N.A. <sup>12</sup>
▪ NFB website developed, maintained and updated regularly*	Output 2.6	1	1 (250,000 visitors)	N.A.*
Overall Rating Outcome 2				HS

\* Per the MTR, this indicator has been replaced with the new indicator “Enhanced technical skills and stakeholder knowledge” as listed above.

Regarding the Project’s accomplishment on local firms that can manufacture NFB plant equipment based on set standards developed under this project, Thanh Phuc Manufacturing Company was the company selected for this purpose. It is the company which produces NFB production equipment, using self-developed mold standards. Resulting from this initiative, many NFB production enterprises in Viet Nam buy molds from Thanh Phuc which cost less than those imported. The company plans to cooperate with a Japanese company in improving further their manufacturing of NFB production lines.

<sup>11</sup> This includes the 3 training courses for engineers of contractors on NFB building techniques, construction procedures

<sup>12</sup> No training is provided to the vocational construction colleges since these colleges no longer provide training to construction workers. Instead, the project conducted 2 training workshops for 10 construction workers and 10 supervisors as part of activities to develop training documents and demonstrate the use of NFBs in construction work.

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In addressing the felt needs of the NFB industry, the Project successfully planned and implemented various training and capacity building activities for NFB Project stakeholders and partners including national and local officials and policy makers, production investors, construction contractors, design consulting agencies, and financial institutions. Based on the training needs assessments conducted with the Project support, it developed 5 sets of training manuals, including the following:

- Module 1: Introduction (Basic knowledge) of NFBs, policy and standards
- Module 2: Design and construction of buildings using NFBs
- Module 3: Production technology of Autoclaved aerated concrete (AAC)
- Module 4: Production technology of concrete block brick (CBB)
- Module 5: Investment planning and capital loan applications for NFB projects.

The Project conducted 26 training courses on various NFB aspects for a total of 1,890 participants from 63 provinces and cities. Out of these, 3 training courses were conducted for engineers of contractors on NFB building techniques and construction procedures. For that matter, the PMU informed that the Project also coordinated with vocational colleges of construction and found that these schools could not enroll their students in the planned training courses as intended in the Indicator: “Training courses for 60 people from vocational colleges of construction”. Therefore, the Project modified its training program to train said engineers of contractors (instead of participants from the vocational colleges). As part of their responsibility, the engineers can help the contractors in training their workers. Since most workers are not permanently employed, the modification made the program more effective in the above-mentioned indicator for vocational colleges. For this particular indicator, of the 3 training courses for contractors’ engineers, the Project conducted 1 training course to cater to a contractor as a demonstration of the training approach. The details of the Training Evaluation can be seen in **Annex J.3**.

The Project has published 3,000 copies of training materials for the Department of Construction of 63 provinces and other stakeholders.

In brief, there are training, and capacity building needs identified related to issuance of technical guidelines, regulations on NFB production, NFB application/construction, procedures for acceptance of construction works using NFBs. For these, there is a need for continuing the training in the future, especially for those who work at NFB production facilities and in construction sector.

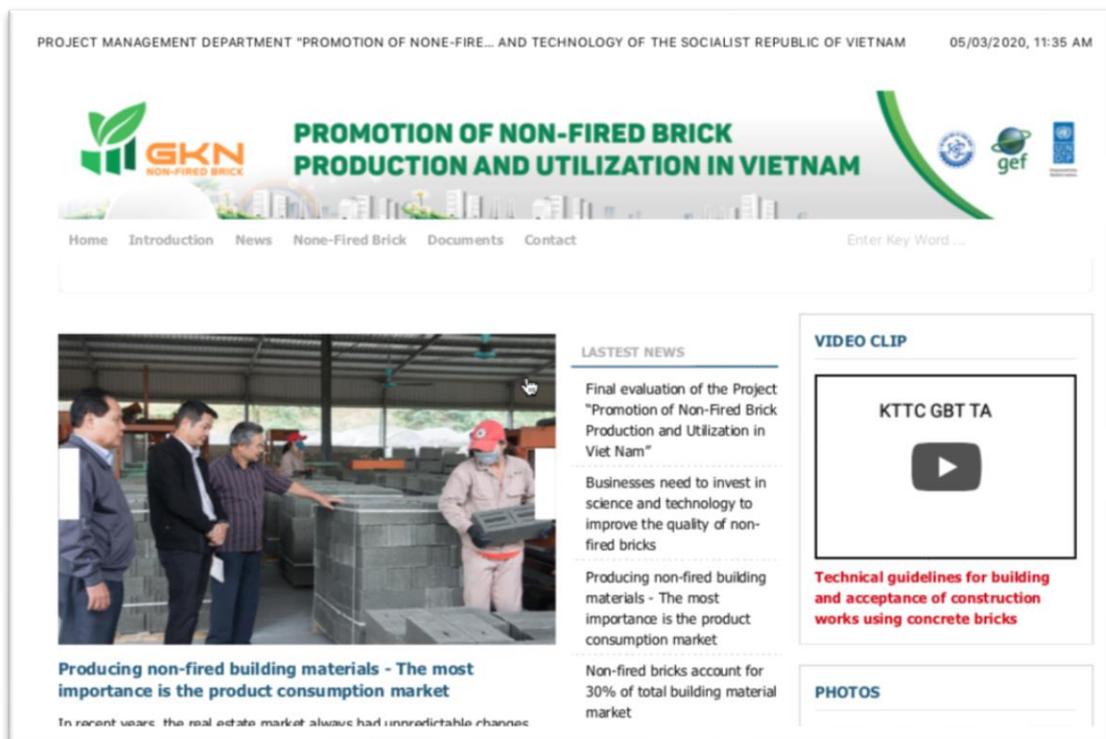
Along with the expected Outcome, the Project contributed largely in enhancing knowledge, awareness and skills in various aspects of the NFB industry: for making

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development policies at the national and local levels, for managing and operating NFB production lines, for applying NFBs in construction works and other related functions and service providers. It also developed a curriculum for construction universities and technical high schools and colleges.

Through the Viet Nam Association for Building Materials (VABM), the Project has also supported an Awards Program for 51 enterprises who have excelled in their NFB production and utilization projects. Their good practices received citations and honoring during the Building Materials Forum 2019.

The Project also developed and operated a website page <http://en.duangachkhongnung.vn/> hosted by VABM (Viet Nam Association for Building Materials) with the screenshot as shown below. The web page has registered visitors totaling 250,000. It has also produced hundreds of news, articles and posted them in mass media.



Overall, by providing training to large number of NFB stakeholders nation-wide on various NFB aspects, the Project has contributed significantly to strengthening capacity of relevant governmental agencies in management and development of NFB sector; to

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enhancing capabilities for enterprises in NFB production and to improving technical skill for the construction sector in application of NFBs in practice. The Project has played active role in supporting the GoV in the promotion of NFB development, especially in realization of Program 567. Though the training program has been evaluated as highly satisfactory by the participants and while the Project exceeds the quantitative targets in output indicators, however, the TE Team noted that the training program could be assessed further as to the right sizing of the number of participants per training course so as to make it more effective.

- *Outcome 3: Improved availability and sustained access to financial support for NFB technology applications*

Indicators	Related Outputs	EOP Performance		Rating
		Target	Achieved	
• Loan volume provided by financial institutions (including commercial banks) for NFB investments by Year 3, USD million	Output 3.1, 3.2	At least <b>U\$24</b> million	US\$27.26 million	HS
• Number of SMEs and NFB entrepreneurs with confirmed financing get loans from financial institutions	Output 3.3, 3.4, 3.5	<b>30</b> NFB SMEs (10 from VEPP and 20 from VietinBank)	40 NFB (12 from VEPP; 28 from Vietinbank)	HS
Overall Rating Outcome 3				HS

The Project has completed studies on viable financing schemes and funding sources for NFB project investments. It has identified and connected financial institutions with potential enterprises investing in NFB production and utilization. It conducted workshops and training courses for these 2 groups composed of financial institutions and enterprises to help them improve their understanding about effective NFB technology and production projects.

On the part of the banks, they have become capable of evaluating proposed projects if they are eligible for lending. These financial institutions include a.) VietinBank which committed 22 million USD (in loans equivalent to nearly 500 billion VND); b.) VEPP committed 3 million USD (nearly 70 billion VND) and, c.) NAFOSTED guaranteed 1 million USD, etc.

In addition, the Project has provided technical assistance for 26 demonstration and replication projects so that they have all necessary financial application documents for loans from the banks. As a result, owners of the 26 demonstration and replication plants

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raised their own capital or borrowed from banks or other funding sources to invest nearly USD 40 million (VND 900 billion). With the financial and economic feasibility of NFB projects established, the Project has been very successful in linking and mobilizing businesses to foster very good relationship with financial institutions. This has created a very good investment climate for NFBs and for expanding the NFB market share as desired by the GoV.

- *Outcome 4: Boosted confidence in NFB technology application resulting in an increased market share of NFBs*

Indicators	Related Outputs	EOP Performance		Rating
		Target	Achieved	
<ul style="list-style-type: none"> <li>• Number of NFB demonstration plants in operation using modern technology</li> </ul>				
<ul style="list-style-type: none"> <li>○ CBB demonstration plants</li> </ul>	Output 4.2, 4.3, 4.4, 4.5, 4.6	<b>3</b> operating at 90% designed capacity, with cumulative annual production of 65 million SBUs	3 operating at 70% of design capacity, with cumulative annual production of 87.5 million SBUs	S
<ul style="list-style-type: none"> <li>○ AAC demonstration plant</li> </ul>	Output 4.2, 4.3, 4.4, 4.5, 4.6, 4.7	<b>1</b> operating at 90% designed capacity	1 (operating capacity of the AAC factory reached to almost 100% after the project TA. However, the operating capacity in practice is less, i.e. about 74% and the production output ranges 71.0 – 103.5 million SBUs depending on demand)	S
<ul style="list-style-type: none"> <li>• Number of NFB plants received technical assistance on optimization of raw materials, product quality control procedures, staff training and technology transfer,</li> </ul>				

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Indicators	Related Outputs	EOP Performance		Rating
		Target	Achieved	
feasibility studies planned and operated				
<ul style="list-style-type: none"> <li>○ NFB plants received direct support in development of feasibility studies, optimization of inputs materials, production management, quality control, etc. and operated</li> </ul>	Output 4.1, 4.8	21	22	S
<ul style="list-style-type: none"> <li>○ NFB plants with approved investment plan</li> </ul>	Output 4.9	50	53	S
<ul style="list-style-type: none"> <li>• % of market share of NFBs in the local brick market</li> </ul>	Output 4.9	25 %	28.5%	HS
Overall Rating Outcome 1				S

Observations from the field visits show that demonstration and replication projects were successfully implemented. The demonstration/replication projects (for instance, Viglacera, Dai Dung Green Material JSC, Thanh Phuc Company, etc.) could be considered as good showcases for GoV to continue replication in the coming years. The good practices include optimization of the input raw materials in order to produce quality products; application of measures for energy savings; reuse of the factory’s waste to save resources, or utilization of renewable energy for NFB curing and as a result enhancing quality of the product. Results of the demonstration and replication projects show that the measures do not only help enterprises to enhance quality of the products but also to reduce production costs, protect environment and reduce GHG emission at the same time. Details about demonstration projects are summarized in **Annex J.2**.

Application of a comprehensive approach in implementation of the demonstration /replication projects has proved to be an efficient and effective way to promote NFB market development, i.e. providing technical assistance along with providing trainings to key technical staff and organizing dissemination workshop to those working in NFB sector, especially NFB producers/manufacturers, to discuss about the project results as well as exchanging experience and lessons learnt from implementation of each demonstration project.

### **3.2.3 Summary of Assessment Ratings based on the Project Outputs Leading to Achievement of Project Outcomes**

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The NFB Project achievements were evaluated based on the updated project Log Frame resulting from the recommendations of the MTR in 2018 and approved by the PSC. As observed by the TE Team, a summary of findings is presented in **Table 6** below. Details are given in **Annex I** which shows the analysis of the targeted and the actual achievement with reference to the updated project Log Frame Outcomes and Outputs. In summary, the following presents the corresponding Ratings using the key evaluation criteria required in the TE TOR on relevance, efficiency and effectiveness.

**Table 6: Summary of Assessment Ratings on Actual Achievement (as of January 31, 2020) vs. Expected Project Objectives, Outcomes and Outputs in terms of Key Evaluation Criteria**

Objective/ Outcomes	EOP Target [ <i>Actual Achievement EOP Dec 2019</i> ] in Expected Project Outcome/Outputs as Updated Post-MTR)	Assessment Ratings Per Criteria (See Annex H1 for Rating Scale Definitions)			Overall
		Relevance	Efficiency	Effectiveness	
<b>Objective:</b> Reduce the annual growth rate of GHG emissions by displacement of fossil fuel use and the usage of good quality soil for brick making	• Cumulative direct CO <sub>2</sub> emission reductions resulting from the NFB plant investments and technical assistance of 0.088 million tons of CO <sub>2</sub> [ <b>0.380</b> ]	R	HS	HS	HS
	• Cumulative direct post-project CO <sub>2</sub> emission reductions of 1.270 million tons of CO <sub>2</sub> [ <b>1.513</b> ]	R	HS	HS <sup>13</sup>	HS
	• Cumulative direct energy saving of 30,782 toe from displacement of coal through the demonstration NFB plants [ <b>73,031</b> ]	R	HS	HS <sup>14</sup>	HS
<b>Outcome 1:</b> Approval and enforcement of an improved legal framework to encourage	1.1: Strengthened legal framework to promote NFB production and utilization [ <b>Achieved</b> ]	R	HS	HS	HS
	1.2: Strategies to implement FCB kiln replacement program [ <b>Achieved</b> ]	R	S	HS	S
		R	S	HS	S

<sup>13</sup> The realization of this figure is dependent on the actual NFBs used and not only on those quantities produced or capacity to produce. Based on the current market situation, there is an imbalance, supply is in excess relative to the market demand.

<sup>14</sup> Similarly, since the value is calculated based on difference between energy saving resulting from the total NFBs outputs produced by 4 demo projects + 22 replication projects in and the energy saving of the same number of FCBs outputs, This is yet to be realized. The effectiveness rating can conservatively be Satisfactory and the monitoring and sustainability plan may have to be put in place for the market absorption of the NFBs produced. Studies show that the market demand for 2030 – 2050 is projected to further increase market share.

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Objective/ Outcomes	EOP Target [ <i>Actual Achievement EOP Dec 2019</i> ] in Expected Project Outcome/Outputs as Updated Post-MTR)	Assessment Ratings Per Criteria (See Annex H1 for Rating Scale Definitions)			Overall
		Relevance	Efficiency	Effectiveness	
NFB production and use, and enhanced government capacity and knowledge to regulate NFB development and usage	1.3: Recommended policies and standards to encourage domestic production of NFB equipment and technology [ <i>Achieved</i> ]	R	S	HS	S
	1.4: NFB product standards and building codes [ <i>Achieved</i> ]	R	S	S	S
	1.5: Energy efficiency and emission standards for NFB production [ <i>Achieved</i> ]	R	S	HS <sup>15</sup>	S
	1.6: Trained government personnel for promotion and improved regulation of the growth of NFB production and utilization [ <i>Achieved</i> ]				
<i>Outcome 1 Summary of Ratings</i>		R	S	S	S
<b>Outcome 2:</b> Increased availability of technically skilled and qualified local service providers for NFB plants, and enhanced stakeholder knowledge on NFB usage	2.1: Established strategic partnerships for NFB technology transfer [ <i>Achieved</i> ]	R	S	S	S
	2.2: Completed technical courses on planning NFB investments [ <i>Achieved</i> ]	R	HS	HS	HS
	2.3: Entrepreneurs with firm plans to expand local manufacture of NFB-making equipment and associated components [ <i>Achieved</i> ]	R	S	S	S
	2.4: Completed training courses on the design, construction, production operation and maintenance of NFB plants [ <i>Achieved</i> ]	R	S	S	S
	2.5: Completed seminars on the use of NFB as a construction material [ <i>Achieved</i> ]	R	HS	HS	HS
	2.6: Technical assistance to VABM to promote NFB usage and facilitate NFB investments [ <i>Achieved</i> ]	R	S	S	S

<sup>15</sup> The effectiveness of the training may have yet to be proven in terms of evaluation of the training program with regards to how the learnings are applied by the target participants. The TE noted also that the number of the participants per training course as an indicator of the effectiveness of the training needs to be looked into. In the absence of these info, rating may have to be conservative to be S. Suggested that this be looked into in the post-project Sustainability Plan.

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Objective/ Outcomes	EOP Target [ <i>Actual Achievement EOP Dec 2019</i> ] in Expected Project Outcome/Outputs as Updated Post-MTR)	Assessment Ratings Per Criteria (See Annex H1 for Rating Scale Definitions)			Overall
		Relevance	Efficiency	Effectiveness	
	3.2: Completed workshops for financing institutions on NFB investments [ <i>Achieved</i> ]	R	HS	HS	HS
	3.3: Established business links on NFB manufacturing [ <i>Achieved</i> ]	R	HS	HS	HS
	<i>Outcome 2 Summary of Ratings</i>	<i>R</i>	<i>S</i>	<i>S</i>	<i>S</i>
<b>Outcome 3:</b> Improved availability and sustained access to financial support for NFB technology applications	3.1: Completed study on the viable financing sources for scale-up of NFB investments [ <i>Achieved</i> ]	R	S	HS	S
	3.4: Action Plan for Financing NFB SMEs [ <i>Achieved</i> ]	R	S	HS	S
	3.5: Operational financing scheme for NFB projects [ <i>Achieved</i> ]	R	HS	HS	HS
	<i>Outcome 3 Summary of Ratings</i>	<i>R</i>	<i>S</i>	<i>HS</i>	<i>S</i>
Outcome 4: Boosted confidence in NFB technology application resulting in an increased market share of NFB’s	4.1: Bankable Feasibility Analyses of Selected Demonstration NFB (CBB) Sites [ <i>Achieved</i> ]	R	S	S	S
	4.2: Financing for Demonstration NFB Projects [ <i>Achieved</i> ]	R	HS	HS	HS
	4.3: Completed preparations for implementing NFB projects [ <i>Achieved</i> ]	R	S	S	S
	4.4: Installed and operational NFB demonstration plants [ <i>Achieved</i> ]	R	HS	HS	HS
	4.5: Trained personnel to optimize NFB production [ <i>Achieved</i> ]	R	S	HS	S
	4.6: Monitoring and evaluation reports on the operational and financial performances of the demonstration NFB projects [ <i>Achieved</i> ]	R	S	S	S
	4.7: AAC plants with improved production efficiencies [ <i>Achieved</i> ]	R	S	S	S

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Objective/ Outcomes	EOP Target [ <i>Actual Achievement EOP Dec 2019</i> ] in Expected Project Outcome/Outputs as Updated Post-MTR)	Assessment Ratings Per Criteria (See Annex H1 for Rating Scale Definitions)			Overall
		Relevance	Efficiency	Effectiveness	
	4.8: Completed demonstration on the use of NFB products [ <i>Achieved</i> ]	R	HS	HS	HS
	4.9: Plans for replication NFB plants [ <i>Achieved</i> ]	R	S	HS	HS
	4.10: Drafted and implemented communication and awareness raising plan [ <i>Achieved</i> ]	R	S	S	S
	<i>Outcome 4 Summary of Ratings</i>	<i>R</i>	<i>S</i>	<i>HS</i>	<i>S</i>
	<b>Per Criteria Rating</b>	<b>R</b>	<b>S</b>	<b>HS</b>	<b>S</b>
	<b>No. of Outputs = 27</b>	<b>OVERALL PROJECT RATING</b>			<b>S</b>

### 3.2.4 Summary of the Project Outcome Achievements per Assessment Criteria

Based on the above assessment, the overall project achievements are rated as:

- Relevant** – The Project achievements are well suited to the national and local development priorities and organizational policies, including the adjustments and adaptive management done over time. They are also significantly in line with the GEF Operational Programs or the strategic priorities under which the Project was funded. The Project is definitely country-driven and highly strategic. It was cognizant of the national and local realities that led to the appropriate directions and courses of action in achieving the Outcomes. The necessary institutional structure and policy framework have contributed a lot in facilitating production of energy-efficient and resource-efficient NFBMs. The Project has a wealth of very relevant lessons and intervention experiences with strong participation of the public and private sector as the NFB Program is sustained in the replication stage to achieve the long-term goals. In the final analysis, the overall results in terms of development objectives of the NFB Project have been remarkably relevant, linked directly and contributed very significantly to the achievement of the Outcome 2 in Viet Nam’s UNDP Country Programme and United Nations Development Assistance Framework/One Strategic Plan (UNDAF/OSP).
- Highly Satisfactory in terms of Effectiveness** – The Project has achieved all the expected 27 Outputs with 17 Outputs getting Highly Satisfactory (HS) results. The performance measurement indicators and targets used in the project monitoring system were modified to suit the needs and realities of the NFB industry as part of an effective

adaptive management. The partnership between the and MoC has been effective in mainstreaming the NFB program along with a balanced approach in the retirement of FCB kilns. The outputs were properly aligned and modified with the corresponding adjustments in the nature and number of Indicators in direct relationship with the desired project outcomes. As a result, the outputs including additional Output 4.10 (Awareness and Communication Program) were all accomplished within the five-year project duration. The Project has been very successful in facilitating the NFB program requirements of government agencies, particularly at the local provincial levels, to mainstream NFB into their corresponding policy and regulatory frameworks according to the national mandates. The high level of co-financing and investment realized is a manifestation of the Project’s effectiveness in the partnership strategy as well as the fact that the NFB alternative has been found acceptable and beneficial not only to the users but also to the country in general. The comparative advantage of UNDP in its multi-sectoral and multi-disciplinary approach in its developmental projects, with NFB cutting across many sectors, has definitely contributed a lot in effectively achieving all the targets. Exceeding the CO<sub>2</sub> emission reduction and energy saving targets is a sign of the Project’s overall effectiveness in achieving its goal and objectives and contributed significantly to GoV’s NFB market share target at 28.5%, as verified through a market survey conducted with assistance of the Project.

- **Satisfactory (S) in terms of Efficiency** – The Project was implemented efficiently in line with international and national norms and standards with least-cost and competitive values in the building materials market. It has achieved all the Project Outputs towards achieving the Outcomes with only minor shortcomings in the delivery of results according to prescribed timeframe and scope where the Project operated within the GEF-budgeted resources. Of the 27 Outputs, 9 Outputs were rated Highly Satisfactory (HS) which are basically exceeding the Log Frame output indicator targets. The GoV, through the efforts of the MoST and MoC and facilitated by the PMU, has been able to mobilize additional resources whether through cash and in-kind inputs, concessional loans, equity investments and accommodations within the ongoing related brick production and application projects by the highly motivated and dedicated project stakeholders, at the national and especially at the local provincial levels covering 63 provinces. In reviewing these in terms of financial inputs and project results, the TE Team noted that in implementing the many activities leading to the desired project outputs committed in the ProDoc Results Framework, the Project has managed to generate some financial savings which gave way to the conduct of other relevant additional outputs. As a result, the Project has very successfully mobilized and realized US\$ 89,005,949 in total value of co-financing inputs compared to what was targeted in the ProDoc at US\$ 36,080,000, a

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very remarkable 247% achievement indeed. This reflects the efficient and timely mobilization by GoV through the MoST/PMU and PSC in putting in place the financial mechanisms and necessary resources to top up and leverage the available GEF funds allocated for the purpose in achieving the NFB demonstrations and replications. This resulted the financial mobilization ratio (co-financing/GEF fund) from 12.8 at ProDoc design stage to the actually realized 31.8, compared to the normal 7 to 10. The updated project Log Frame and AWP as well as the established M&E systems and coordination mechanisms of UNDP have contributed to a great extent in keeping the performance and deliverables at par.

Minor shortcoming in the overall timeliness of delivery of outputs was experienced though in completing other significant outputs related to the remaining 3 replication plants, development of the integrated market demand strategy, impact assessment of demonstration and replication plants which were finally completed in March 2020 after the official EOP of November 4, 2019. These significant Outputs with their findings and recommendations are the necessary inputs to the formulation of the post-project sustainability plan that can be submitted to GoV as the Project is finished. Nevertheless, the overall project results were not affected. The GoV, through MoST and MoC may continue to develop it specially that the Program 567 is likewise completed in 2020.

**Overall Rating: S (Satisfactory)**

### Summary of Terminal Evaluation Ratings at the Outcome Level\*

<b>Evaluation Ratings:</b>			
<b>1. Monitoring and Evaluation</b>	<b>Rating</b>	<b>2. IA&amp; EA Execution</b>	<b>Rating</b>
M&E design at entry	S	Quality of UNDP Implementation – Implementing Agency (IA)	S
M&E Plan Implementation	S	Quality of Execution - Executing Agency (EA) – MoST	S
Overall quality of M&E	S	Overall quality of Implementation / Execution	S
<b>3. Assessment of Outcomes</b>	<b>Rating</b>	<b>4. Sustainability</b>	<b>Rating</b>
Relevance	R	Financial resources:	L
Effectiveness	HS	Socio-economic:	L
Efficiency	S	Institutional framework and governance:	L
Overall Project Outcome Rating	S	Environmental:	L
		Overall likelihood of sustainability:	L

### 3.2.5 Country ownership

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The NFB Project has been very successful because of the very evident country ownership and government-driven execution as manifested at the national and local levels with very efficient and effective support from various stakeholders and partners. The high level of achievement in mobilizing co-financing from the GoV and the private sector shows the genuine partnership that MoST and MoC, together with the other very active agencies and organizations sustained over the entire five years of project life which undoubtedly will continue to pursue the avowed goals in the years to come after this project has ended. This very positive situation has influenced very much the high level of efficiency and effectiveness of project implementation and the coordination mechanisms that have been established and strengthened through a series of GoV policy and regulatory issuances towards achieving common long-term socio-economic and environmental goals.

In review to illustrate country ownership, several government initiatives have been conducted to promote implementation of Program 567 including, for example, among others:

- MoC prepared and adopted Decision No. 1696/QD-TTg dated 23 Sep 2014 on using a number of industrial wastes such as ash, slag and gypsum of thermal power plants and chemical fertilizer plants to use as raw materials for building materials production. The initiative was a joint effort between MoC and MoST and technical assistance by the project.
- MoST supported Viglacera in 2017 to upgrade the plant’s production line in following areas: increased capacity from 100,000 SBUs to 200,000 SBUs/year, automation of the plant production line, technology improvement, procurement of parts of the production line (locally and/or imported from Germany). This was done in in cooperation with NFB project;
- MoST (via NFB project) in cooperation with MOIT (via Danish Green Investment Facility) to support MOIT in setting up criteria for selection of NFB projects.

Few landmark policies and programs were in place even before the NFB Project was developed, of which the following are very significant: (i) Master plan on development of building materials by 2020; (ii) Decision No. 567/2010/QD-TTg or also called Program 567; (iii) Directive No. 10/CT-TTg on promotion of NFB production and utilization; (iv) Circular No. 09/2012/TT-BXD creating NFB demand; (v) Decision No. 1449/QD-TTg for retirement of traditional brick kilns. Through these policies and regulations, as well as newer ones, it is quite evident that the GoV is committed and prepared in directly driving the Program 567. The NFB Project built upon these GoV initiatives

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which bolstered further the progress of the program. The TE Team observed that the GoV is well prepared to sustain the goals of the Program 567 after it is finished in 2020.

The support systems are functioning properly, e.g. monitoring and evaluation, which provide the tools for adaptive management and decision making to be executed with the national government and active implementation by the provinces/cities.

### **3.2.6 Mainstreaming**

The NFB project is an intervention to address the barriers that have been affecting the growth of the production and use of NFBs which the GoV has been encouraging in line with the objective of mainstreaming local quality NFBs in the country’s building sector. Based on the results of the project implementation NFBs has penetrated the market for NFB materials from 13% at the start of the project in 2015 to 28.5% after 5 years. The GoV, through the combined effort of MoST and MoC had started in this direction in 2010 when it mandated in Decision No. 567/QD-TTg the market development of NFBs. As reported, the mainstreaming happened not only in the key provinces and cities but to all of the 63 geographical area divisions (58 provinces and 5 cities/municipalities) of Viet Nam, exceeding the project target of 50 areas.

At the local level, 47 of 63 localities have developed and issued directives on increasing production and use of NFBs while limiting the production and use of FCBs at the same time. In terms of long-term planning, 57 of the 63 areas developed and issued roadmaps to gradually reduce and retire manual brick kilns, improved manual brick kilns, round kilns, vertical shaft brick kilns using fossil-fuel as well as related local plans.

More than 40 domestic equipment suppliers have been proactively improving their NFB production lines by using advanced, highly automated technology to supply to the domestic and international markets. Technical consulting units who have been trained during the implementation of the Project are now capable of transferring NFB production and utilization technology effectively.

To influence the growth of the market for NFBs , various training courses and workshops were conducted by the Project and its partners for the relevant target groups including architects, NFB producers, machinery manufacturers, NFB users, government officials, etc. as guided by the 4 demonstration and 22 replication projects, techno-economic feasibility studies, NFB market assessments and surveys and support policies, regulations and financing schemes. The 26 NFB plants supported by the Project have a combined NFB

Production capacity of 1,191 million SBUs per year which is already significant in mainstreaming the NFB program all over the country.

The MoC, as a Government agency mainly responsible for developing building materials, submitted the “Building materials development strategy to 2030 with a vision to 2050” to the Prime Minister for approval to increase the proportion of NFBMs to 40% of the total building materials market by 2030. This document is an important legal basis for the continued development of building materials including NFBMs.

### **3.2.7 Sustainability**

It is noteworthy that the successful and efficient physical and financial performance accomplished by the Project stems from the realization of the partnership strategy and co-financing arrangements designed for and achieved by the Project. In this connection, for instance, the Project’s Outcome 3 on establishing improved availability and sustained access to financial support for NFB technology applications has been satisfactorily accomplished, particularly in Output 3.4 for the action plan for financing NFB SMEs and highly satisfactory for Output 3.5 in coming up with operational financing schemes for NFB projects.

These will ultimately lead to sustainable NFB program in the coming years after the project is completed and therefore would be good to include the said action plans and financing schemes in the post-project sustainability plan in a concise, easily understood and implementable plan document. This post-project arrangement should include the stakeholder responsibility matrix, suggested timetable, indicators of success, five/ten-year targets (like an extension of the Project Log Frame that the partners have been accustomed to using and following). The GoV, through MoST and MoC, could use the outputs and recommendations of the Project, particularly from the market demand assessments and feasibility studies on NFB manufacturing plants. The Impact Assessment of the Demonstration and Replication NFB Plants as well as the policy and financial-related reports that the Project supported will also guide future programs and sustainable development of NFBs.

A study on the integrated strategy on NFB demand market was completed which pointed out many recommendations to address the remaining issues. A long-term development strategy for building materials, including NFBs, was already developed and submitted also to GoV. This in-depth study recommends a road map and action plan up to 2030 and describes the scenario in a vision that looks forward to the possibilities and potential in 2050.

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All these give more reasons to continuously implement the innovative financial schemes established through the Project in cooperation with the financial sector led by VIETINBANK with its accommodation for market-based loans totaling up to USD 20,700,000 and VEPF in its soft loans totaling USD 8,000,000. Therefore, sustainable development of the NFB market, which the Project has already catalyzed and built to a level of 28.5 % at EOP from 13 % in 2015, needs to be ensured by effectively planning ahead as inspired by the GoV’s highly successful Program 567 which is also completed in 2020.

**Summary of Ratings:**

- Financial resources (\*) – (L) Likely
- Socio-economic (\*) – (L) Likely
- Institutional framework and governance (\*) – (L) Likely
- Environmental (–) – (L) Likely
- Overall likelihood (–) (L) Likely

In general, the Sustainability Rating is (L) Likely as the overall likelihood assessment that the Project’s achievement can be sustained after the Project is completed operationally in May 2020 as GoV pursues the program’s long-term goals. The sustainability of the NFB development would be further consolidated if Government puts more priorities on (i) continuing implementation of measures to enhance NFBs’ quality via, for instance, strictly control and/or supervising NFB producers, especially SMEs, to ensure all NFBs when produced are certificated to the NFB conformity required by circular No 10/2017/TT-BXD of MoC and regulation QCVN 16:2017/BXD; (2) continuing trainings to the construction sector to ensure their appropriate application of NFBs in practice; (3) communication to wider public to help them understand about benefits of NFB application and from there increase NFB use.

The following findings indicate the Project contributions, it being a barrier-removal project intervention vis-à-vis the initial barriers that the Project ought to address at the outset:

Barriers affecting Sustainable NFB Development (2014)	Project Contribution in Addressing the Barriers (2019)
<p>a. Market barriers:</p> <ul style="list-style-type: none"> <li>• Lack consumer confidence and knowledge on using NFBs.</li> </ul>	<p>Development and adoption leading to the enforcement of policies, regulations and incentives and the related technical standards favoring</p>

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<b>Barriers affecting Sustainable NFB Development (2014)</b>	<b>Project Contribution in Addressing the Barriers (2019)</b>
<ul style="list-style-type: none"> <li>• Low reliability of locally produced NFBs</li> <li>• High cost of AACs which is a major type of NFBs</li> <li>• Low awareness and acceptance of NFBs by some FCB kiln owners.</li> </ul>	<p>sustainable NFB development that resulted to increased reliability of locally-produced NFBs, reduced cost of AACs which is a major type of NFBs, improved awareness and acceptance of NFBs by FCB kiln owners and new NFB users.</p> <p>By implementation of demonstration and replication projects, the project proved that market share will be increased for companies who pay attention on quality of the products (by getting certificate of product conformity), post-sale services (by providing product application guidance, training on technical application of NFBs, communication, etc.), and reduction of product costs by application of innovative technologies (i.e. energy efficiency, renewable energy, reuse and recycling of waste from NFB production and using recycled industrial waste in NFB production (ashes/scraps from industrial process, etc.).</p> <p>Percent market share of NFBs increased form 13% in 2015 to 28.5% in 2019.</p>
<p>b. Policy barriers:</p> <ul style="list-style-type: none"> <li>• Lack of standards and policies on NFB equipment to encourage and attract local enterprises to invest in NFB production lines.</li> </ul>	<p>By adoption of a series of policies and regulations associated with NFB development including loan incentives, GoV, with the Project support, has created a favorable environment for local NFB investors. More and more enterprises invest in NFB production in recent year, especially since start of the project implementation in 2016.</p> <p>Improvement in the policy framework over what have been issued in the past years since Program 567 as mandated since 2010. The construction sector and building material consumers have started to adopt in an increasing pace the NFB technologies and applications which can be mainly attributed to a policy and legal framework that is now fully enforced and supportive to the shifting to NFB technology and</p>

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Barriers affecting Sustainable NFB Development (2014)	Project Contribution in Addressing the Barriers (2019)
	moving away from the conventional FCB kilns and wasteful practices in energy and soil resources.
<p>c. Institutional barriers:</p> <ul style="list-style-type: none"> <li>• Limited capacity of the government officers in NFBs in general, quality control of NFB manufacturing, production and uses in particular.</li> <li>• No training courses have been held to enhance capacity of the government officers in NFB development and management</li> </ul>	<p>The government officers and the industry players at the national and local levels were trained on various NFB aspects focused areas to improve planning, implementation and monitoring of results. The policy and regulatory issuances included institutional reforms that defined the specific roles and responsibilities of the relevant institutions and stakeholders led by the MoST and MoC and the collaboration mechanisms between and amongst them. The capacity of local government agencies and provincial and municipal people’s committees in policy formulation and decision making was improved. The promotion and development of the NFB production, usage and market have been strengthened in terms of the resources, capacity and knowledge required to implement a local NFB development program and to systematically disseminate information on NFBs to create demand and provide supply.</p>
<p>d. Knowledge and awareness barriers:</p> <ul style="list-style-type: none"> <li>• Limited NFB knowledge amongst engineers, designers and building developers.</li> <li>• No training has been provided to stakeholders regarding NFB associated issues.</li> <li>• Low awareness on the advantages and environmental benefits of NFBs within the construction and building sector in Viet Nam.</li> </ul>	<p>Conduct of capacity development and training courses Increased awareness of the advantages and environmental benefits of NFB’s within the construction and building sector in Viet Nam among the various actors in the NFB industry in their areas of responsibility and specific knowledge and skills needs. The feasibility studies, demonstration, information dissemination and knowledge management activities by the Project largely enhanced the knowledge and awareness of all sectors involved regarding the technical, economic, environmental and market advantages of NFBs towards better appreciation and decision making in NFB investments and application.</p> <p>By providing training to wider stakeholders (including not only governmental officers, NFB producers but also NFB application/developers, designers, engineers,</p>

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Barriers affecting Sustainable NFB Development (2014)	Project Contribution in Addressing the Barriers (2019)
	<p>etc.) in addition to organizing workshops for NFB developers and investors to disseminate results of demonstration/ replication projects as well as communication tools conducted by mass media to the public, communities and individuals, the Project significantly supported GoV in enhancing NFB knowledge and awareness and encouraged application of NFBs in practices. These would be difficult to be realized without the Project interventions.</p>
<p>e. Technical barriers:</p> <ul style="list-style-type: none"> <li>• Insufficient NFB standards make it difficult to control quality of NFB produced, quality of buildings where NFBs are used.</li> <li>• Low quality of input raw materials resulting to low quality NFBs</li> <li>• No standards / norms have been adopted for EE and emission reduction for production of building materials as well as NFBs.</li> <li>• Lack of local technical knowledge on how to manufacture equipment for NFB production lines that can be competed with those internationally produced (Quality and price)</li> <li>• Little or no knowledge amongst construction workers on NFB building techniques and best practices on using NFB’s in construction</li> </ul>	<p>Development and facilitation in the issuances of appropriate and effective policies, standards and regulations to encourage the technology shift and market development from FCBs to NFBs. Removed incentives on importation of low technical quality of existing sub-standard imported NFB production facilities and provided support and technical assistance in the demonstration and replication projects in order to facilitate the accelerated shift in technologies in production and application of NFBs.</p> <p>With the project support, a number of regulations, standards and policies have been updated and adopted to promote NFB development and enhance quality of NFB produced. These include:</p> <ul style="list-style-type: none"> <li>• Decree No. 24a/2016/ND-CP dated 5 Apr 2016 on the management of building materials.</li> <li>• Circular No. 13/TT-BXD dated 8 Dec 2017 regulating the use of NFBMs for construction works, superseding Circular No. 09 issued in 2012.</li> <li>• Decree No. 121/2013/ND-CP on administrative sanctions related to construction operations (Specifically the section on utilization of NFBMs).</li> <li>• Decision No. 1264/QD-BXD in 2017 publishing the cost norms for construction work estimation related to NFBMs.</li> <li>• Circular No. 01/2018/TT-BKHDT dated 30 Mar 2018 to remove incentive for imported NFB</li> </ul>

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Barriers affecting Sustainable NFB Development (2014)	Project Contribution in Addressing the Barriers (2019)
	<p>equipment for production lines of less than 20 million SBUs/year.</p> <ul style="list-style-type: none"> <li>• 03 national standards (TCVN) on NFB (Concrete bricks) adopted by MoST in 2017</li> <li>• 03 standards on AAC panel approved by MoC and MoST by 2019.</li> <li>• 02 norms on energy consumption and GHG emission for NFB recommended</li> <li>• 01 basic standard on NFB mould developed and approved by Thanh Phuc Company, with support by the Project.</li> </ul> <p>In addition, by providing training to a huge number of people (1,890) from various sectors on various NFB aspects and providing technical assistance in implementation of a significant number of demonstration /replication projects within the project timeframe and limited budget, the project together with the GoV efforts well boosted development of the NFB sector in recent year.</p>
<p>f. Financial barriers:</p> <ul style="list-style-type: none"> <li>• No dedicated financing for NFB production.</li> <li>• Many potential NFB investors are SMEs who have difficulties in accessing to loans.</li> <li>• Lack of knowledge and ability of potential SME investors to apply for concessional financing for NFB projects.</li> <li>• Reluctance by local banks and financing institutions to finance NFB investments</li> <li>• increased bank due diligence on new borrowers resulting from higher ratios of bad loans;</li> <li>• Potential investors lack experience with NFB technology and currently</li> </ul>	<p>Established financial mechanisms, made funding resources available in banks, issued decrees on investment incentives and provided technical assistance to address the financial barriers that hamper NFB development. The GoV issued Decree No. 24/2016/ND-CP to provide many investment incentive policies for NFB production and support for technology transfer expenses for investment projects and State construction works to require the use of NFBs. The following indicate that the barriers have been removed because 12 NFB enterprises got concessional loans from VEPF of 167 billion VND and 28 NFB enterprises got loans from Vietinbank of 446.5 billion VND, hence, altogether for 40 enterprises accessed loans over the expected target level at 27.26 million USD because banks believed in the technical, economic and market feasibility of NFBs.</p>

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<b>Barriers affecting Sustainable NFB Development (2014)</b>	<b>Project Contribution in Addressing the Barriers (2019)</b>
have a high-risk profile as borrowers for NFB plants	

Based on the above, the NFB Project’s very significant achievements in barrier removal support the above sustainability assessment. With the developed NFB policy framework, the continuing improvement in the institutional arrangements, the technology enhancement and application and the financial and fiscal supports, the NFB Program is therefore highly sustainable in realizing the economic and environmental goals that the NFB Project was originally set to realize. Banks and financial institutions are ready to provide capital for investment in NFB production.

From the GoV side, MoST and MoC annually budgets necessary resources in science and technology R&D for the building materials industry including NFBMs. The GoV, through them and the other collaborating agencies can sustain to implement the program and keep up the remarkable direction and momentum created. These are in terms of policy making, implementation knowledge, program management, actual technology demonstrations and investments, replications, monitoring and decision making that the Project has put in place successfully.

Another very important intervention of the Project is the certification procedure and documentation regarding standard conformity and product conformity. Once a factory receives this certification it becomes a third-party acceptance that the products are strictly following controlled quality standards. It also attests that the necessary technical requirements are in place when the products are used in the building construction. The certification program can be sustained by GoV through the MoC. From the producer’s point of view, they gain a marketing foothold not only in the local but also in the export market. This paves the way in establishing competitive advantage for the patronizing enterprises. On the side of the users, the practice creates trust and attraction for customers looking for dependable NFB enterprises.

### **3.2.8 Impact**

The NFB Project’s overall impact is summarized in the following achievements that were reached after five years of implementation.

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- Strengthened policy development, legal framework, enforcement, institutional support and governance as a result of capacity building and awareness raising among policy makers, officials and staff at all levels and service providers. Of special note was the comprehensive coverage in 63 provinces and cities through successful implementation of training and capacity building programs
- Continued improvement in the system of NFB product standards, construction guidelines, and usage norms and applied R&D on NFBs
- Mobilized and enabled financial institutions to provide concessional and commercial loans that spurred the increased investments amounting to US\$ 27.26 million. The collaborative efforts of private enterprises and banks was enabled by the de-risking efforts through the Project that resulted in stable government policies, investment incentives and regulations to promote local NFB production and utilization, which helped to create increased confidence in the technical, economic and market feasibility of NFBs
- As a manifestation of the collective ownership and nationally-driven NFB market development program, the Project mobilized co-financing at US\$ 89,005,949 from the national agencies, local government units, private enterprises and other organizations (NGOs, institutions and universities) and leveraged them as contribution to the GoV’s Program 567, which is also being completed in 2020. All these need to be realized and monitored to sustain further development to attain the long-term goals.
- The project supported NFB plant investments and technical assistance to 4 demonstration projects and 22 replication projects resulted in cumulative 1.893 million tons CO<sub>2</sub> of direct and direct post-project (10 years) GHG emission reductions
- 73,031 toe energy saved from the displacement of coal and power used in the project supported NFB demonstration and replication projects
- Raised NFB market share to 28.5% from the 13% baseline in 2014
- Identified additional 53 new NFB production lines for which investment plans were approved.

The basic advantages of the NFBs over the traditional FCBs are the greatly reduced energy consumption and CO<sub>2</sub> emissions in producing equivalent SBUs of NFBs, as claimed by the project reports:

<b>Plant Type</b>	<b>Energy consumption rate (MJ/m<sup>3</sup> of SBU)</b>	<b>CO<sub>2</sub> emission rate (kg/m<sup>3</sup> of SBU)</b>
Fired brick plants	2,562.87	245.62

NFB plants	14.47	3.28
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Ref: PMU Final Report of the Project. March 2020. Output 1.5.

## 4 Conclusions, Recommendations & Lessons

### 4.1 Conclusions

- *The very strong and highly productive collaboration among UNDP, GoV, Non-Governmental Organisations and the Private Sector in NFB development in Viet Nam, in support of the GoV’s Program 567, proved to be very successful and sustainable. These yielded very significant long term socio-economic, energy and environmental benefits consistent with and exceeding most targets in the Project Results Framework which was reconstituted after the MTR.*
- *The Project officially ended in November 4, 2019 and has been in an operational and financial project closing and completion process since December 2019. The project is following a National Implementation Modality (NIM) scheme. An official extension request was not deemed necessary. There was a delay though in the project implementation as the Project continued to complete few remaining activities after the EOP, but without affecting the Project results. This is considered a minor shortcoming in the definition of the overall performance in the rating scale.*
- *The Project has produced all the planned outputs (with many indicators exceeding targets) towards the desired outcomes and has been satisfactorily implemented and executed. The Project has gathered a wealth of experiences, knowledge and skills and lessons learned. The various outcomes that have been successfully achieved in terms of policy/legal frameworks, technology requirements, financial support and market development are well entrenched and mainstreamed in the Viet Nam’s government machinery, i.e. in the national and local planning, implementation and management functionalities that make the NFB Program technically, socio-economically and environmentally sustainable.*
- *NFBM production and utilization could be considered still as a newly emerging industry in Viet Nam when the Project is being implemented though the GoV interest in developing them started in early 2000s. Considering the vast untapped potential, it came at an opportune time that the government boosted NFBM development contributing significantly to the construction sector. GoV has strategically assumed*

the program driver role, by supporting the barrier removal intervention with the necessary support of GEF and UNDP.

- *The NFBM industry has linkages with several sectors and involves varied stakeholders. The partnership strategy designed by the Project helped to effectively coordinate across this complex landscape and serve as a catalyst for change and to address the barriers and gaps identified in the Program 567<sup>16</sup> as the NFP Project’s main baseline program.* The role of MoST and MoC acting in tandem was a key to the success of the Project. Having reached this stage and momentum of development, the GoV is now faced with firming up the replication and sustainability plan and ensuring where the different components of the NFB Program will be seated and sustained in the coming years based on the Project experience.
- *Most of the barriers that were identified in project design have been addressed and removed.* The Project focused on addressing critical barriers through enhancing NFB product quality, increasing consumer awareness, improved marketing and enhancing practices and technical solutions in NFB application in building construction. The results of the barrier removal were the main achievement of the Project. To remove the barriers, the Project supported establishment of effective institutional coordination mechanisms and setting up synergistic strategies in the policy formulation and technology application aspects. However, these efforts need to be sustained even after the Project has ended since the market dynamics continue to be a challenge for sustainable NFB production, marketing and application due to high demand for competing good quality and low-cost building materials (i.e. FCB’s and other energy-intensive building material alternatives). The growing need for capacity building, showcasing of best practices and information dissemination in the application of NFBs in building construction is deemed crucial. Attention has been given by the Project regarding quality issues in construction reported by NFB users such as installation defects and cracking phenomenon, which if not addressed systematically could hamper further market share expansion from the 28.5% achieved at EOP (13% at the start of the Project). In addressing the barriers related to quality in NFB production and use, MoC conducted survey and research in 2018 which recommended measures and an action plan needed to address the remaining issues, to be integrated by MoC and other related agencies in the programs under implementation. Since Project 567 is ending in 2020, the long-term development

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<sup>16</sup> The GoV approved, via Decision No. 567/QD-CP dated April 28, 2010, the “Non-fired building Materials Development Program to 2020” (also called “Program 567”) that serves as the main baseline plan in Viet Nam for the NFB Project.

strategy for building materials, including NFBs, up to 2030 and with a vision till 2050, was supported by the Project and submitted to GoV for consideration.

- *The efficient and effective government support and fund/resources mobilization are important factors that contributed to the success of the Project.* The strong partnership between GoV and the Stakeholders proved to be essential for attaining the Project achievements and for the realization of the economic, environmental and sustainable development potential for NFBs, that exceeded most of the targeted Output levels.
- *The active and committed participation of the private sector is evident by the co-financing and investment mobilized through the project. This was achieved through crucial interventions, policies and directions by the GoV and facilitated by the Project.* The very encouraging response by the private sector and banking institutions reflects the confidence and commitment by the project partners to the NFB Project and the overall NFB market development. These achievements were catalyzed by the Project through providing assistance to the GoV’s Program 567. With UNDP and GEF assistance, a number of policies, regulations and incentives were passed improving on the previous ones and along with the demonstrations and replications have finally convinced and motivated private enterprises to participate. The Project contributed significantly in capacity building of a wide range of stakeholders all over the country which bolstered the cooperation and commitment at the local and provincial levels. It provided support to SMEs in accessing financial sources and provided technical assistance to government agencies and enterprises in NFB production and NFB application in construction. These project initiatives eventually encouraged and enabled the building material producers to be decisive towards the accelerated shift from FCB’s to NFB’s.
- *The vibrant response of the provincial and city governments in all the activities of the Project shows their adherence to the development approach in view of the benefits of increased application of NFBs and their commitment to their strengthened role in the local construction industry.* This could also be an area where sustainability of project results and outcomes should be taken care of in the post-project long-term program. In this connection, a post-project sustainability plan should be worked out by GoV, particularly by MoST and MoC together with the needs of the other participants and stakeholders of the NFB Program based on the outputs and outcomes of the Project and the recommendations of the study on the integrated market/demand strategy for NFBs. At the same time, with the momentum created by the Project in the overall

market transformation towards the desired NFB market share levels and the updating of the specific roles and responsibilities of the key stakeholders with policies and regulations, a new action plan for the coming years need to be formulated and adopted as the Program 567 is completed in 2020. *The vibrant response of the provincial and city governments to the Project reveals their trust and commitment to the potential contribution of NFB’s to sustainable development and their strengthened role in the local construction industry.* This could also be an area where sustainability of project results and outcomes should be taken care of in the post-project long-term program. In this connection, a post-project sustainability plan should be worked out by GoV, particularly by MoST and MoC together with the other participants and stakeholders of the NFB Program based on the outputs and outcomes of the Project and the recommendations of the study on the integrated market/demand strategy for NFB’s. At the same time a new action plan needs to be formulated and adopted to replace the Program 567 that is ending in 2020, in support of the momentum created by the Project for NFBs to capture the desired market share levels. The Project has created an enabling environment for this new potential Action Plan through the capacity built, the clarity gained on the specific roles and responsibilities of the key stakeholders and through various policies and regulations brought in with the support of the Project.

- *The technical assistance for feasibility studies, the support for demonstrations and replications and the training courses provided by the Project have facilitated the market development process.* These Project initiatives have resulted in very significant investments in improved production technology and capacity in a number of NFB production lines. The improvements were affected in areas such as the curing process, optimization of raw material mixing process, waste recycling and other forms of re-engineering and optimization of the production schemes. The technical assistance and investment mobilization through the Project were fully appreciated by the participating enterprises. There is still room for improvement drawing from the experiences in the demonstration and replication projects, for example the need to improve the capacity utilization of NFB production lines which is uneven and low and remains a challenge. The lessons learnt though the Project could help future NFB investments, with many enterprises showing interest in investing in NFBs.
- Based on the review of the implementation and impact assessment of the Project demonstrations and replications, the Project has effectively addressed the main barriers hindering the wider application of NFBs and market development and the NFB market is expected to grow in the coming years (2030-2050). The major barriers

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address by the Project include: (i) hesitancy of building owners and developers to use NFBs which they tend to attribute to “unsatisfactory quality” of the NFBs sold in the market that they suspect lead to cracking, water seepage, excessive shrinkage or expansion of the bricks, etc.; and (ii) Lack of awareness by workers of appropriate construction techniques using NFBs. The Project has worked successfully on product quality improvement and has successfully laid the ground for continuous improvements in both the NFB production and in NFB application projects. The post-project sustainability plan will have to continue addressing the inadequate knowledge and skills in using NFBs in building construction, which if not addressed properly will result in continuing the negative perceptions associated with NFBs and also decrease the overall quality and security of constructions.

- *The Project has prepared the grounds for the transition period as the PMU has consolidated all the project outputs and assets that are to be transferred to the GoV for contributing to continuing with NFB development in Viet Nam.* These will provide guidance and substantial information in developing the above-mentioned post-project sustainability plan of GoV.

- Performance Ratings:

The Project was not able to complete all its activities within the planned timeframe, before the official EOP of November 4, 2019. Consequently, there was a delay in project implementation as also reported in the PIR 2019 which was submitted in August/September 2019, barely few months before the official EOP. The TE Team considers this a minor shortcoming since, even while there was no project extension requested, the Project results that were targeted in the Project Document were not affected, exceeding target levels in majority of expected Outputs at EOP.

<b>Evaluation Ratings:</b>			
<b>1. Monitoring and Evaluation</b>	<b>Rating</b>	<b>2. IA&amp; EA Execution</b>	<b>Rating</b>
M&E design at entry	S	Quality of UNDP Implementation – Implementing Agency (IA)	S
M&E Plan Implementation	S	Quality of Execution - Executing Agency (EA) – MoST	S
Overall quality of M&E	S	Overall quality of Implementation / Execution	S
<b>3. Assessment of Outcomes</b>	<b>Rating</b>	<b>4. Sustainability</b>	<b>Rating</b>
Relevance	R	Financial resources:	L
Effectiveness	HS	Socio-economic:	L
Efficiency	S	Institutional framework and governance:	L
Overall Project Outcome Rating	S	Environmental:	L
		Overall likelihood of sustainability:	L

## 4.2 Recommendations for Further Development by GoV

- Develop a post-project sustainability plan based on the Project Outputs and Outcomes and recommendations of the market strategy study, impact assessment of the demonstration/replication plants and the feasibility studies. This will help to sustain the momentum developed under the Project and contribute towards continued and progressive implementation of the NFB Program of the GoV.
- Review and determine measures needed for sustainable implementation and enforcement of the new policies, regulations and standards developed with support from the Project.
- Immediate measures need to be undertaken as the next steps for scaling up as listed below:
  - Continue to complete, update and enforce the regulations, standards and guidelines, etc. to ensure quality of bricks produced as well as to ensure workers have sufficient skill and knowledge in using NFBs. Especially, based on careful study of existing TCVNs<sup>17</sup>, develop means to address quality issues related to the use of NFBs in construction, such as cracking, water seepage, etc.
  - Support new investors and SMEs investing in NFB production lines to get conformity certification for their products in addition to meeting technical requirements, as early in the process as possible as it is more time-consuming and costlier to enhance their performance later in the process.
  - Disseminate at the provincial level, technical handbook/technical guidelines<sup>18</sup> developed by the Project for both NFB production and use, combining lessons learned and good practices gathered during the project implementation, including measures to address barriers and challenges.
  - Continue to research on, as well as disseminate the lessons learned during the Project, more specific technical solutions and quality enhancement in production and

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<sup>17</sup> National standards or *Tiêu chuẩn Việt Nam* (TCVN), or the national standards of Vietnam issued by the Vietnam Standard and Quality Institute.

<sup>18</sup> Project has already published 5 training materials with 3000 copies to be delivered to 63 provincial branches of DoC and has prepared a handbook on NFBM usage to be delivered to users.

application of NFBs, in order to encourage more use of NFB’s at the local and provincial levels. This can be achieved through a research and development program, as well as training program and awareness campaign.

- Continue improvements to the training modules developed through the Project and institutionalize the training courses at the local and provincial levels to deepen knowledge and experience of the stakeholders on various aspects of NFB.

### **4.3 Lessons learned**

The main lessons learned from the implementation of the Project include the following:

- The key to success was the strong commitment, active involvement and partnership of the main Ministries involved in this kind of development process: MoST and MoC through their involvement with the technology development and transformation as well as commercialization and market development. GoV has always emphasized the need for program sustainability. It had taken the driver seat in executing Program 567 with the main ministries directly involved and having clear direction and understanding of the roles they have to play. But at the same time, it has enabled broader coherence and coordination by ensuring that the support programs of other Ministries, the private sector and the local government units continue to be coherent and integrated with the orientation of the NFB market development programme and that stakeholders take ownership and actively participate through their areas of activity and responsibility.
- Enterprises who were able to produce good quality NFB’s, also had clear instructions on the proper use of NFBs, and had good after-sale service, and these ensured better sales.
- Application of solar energy system in the curing of concrete brick block (CBB), helped the enterprises not only in improving CBB quality but also saving costs by (1) reducing time needed for curing, (2) reducing costs for renting area used for conventional curing under natural condition; and (3) saving energy.
- Energy saving and waste reuse and recycling are significant opportunities for all NFB producers, especially for autoclaved aerated concrete (AAC) production. Enterprises who were able to apply this approach through the Project supported demonstrations and replications, achieved significant cost savings and production efficiency.

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- Appreciation of the benefits of NFB and the hands-on technical skills and knowledge of the workers on NFB application have proven to be very important in securing the quality of the constructions and in raising awareness and building capacity of the customer.

## Annex A: Terms of Reference for the Terminal Evaluation of the Viet Nam NFB Project

### I. INTRODUCTION

In accordance with UNDP and GEF M&E policies and procedures, all full and medium-sized UNDP support GEF financed projects are required to undergo a terminal evaluation upon completion of implementation. These terms of reference (TOR) sets out the expectations for a Terminal Evaluation (TE) of **the Promotion of Non-Fired Brick (NFB) Production and Utilization in Viet Nam Project** (PIMS #:4546).

The essentials of the project to be evaluated are as follows:

#### PROJECT SUMMARY TABLE

Project Title:	<b>Promotion of Non-Fired Brick (NFB) Production and Utilization in Viet Nam</b>			
GEF Project ID:	4801		<i>at endorsement (US\$)</i>	<i>at completion (US\$)</i>
UNDP Project ID:	87517	GEF financing:	696,448	
Country:	Viet Nam	IA/EA own:	110,000	
Region:	Asia Pacific	Government:	8,220,000	
Focal Area:	Climate Change	Private Sector:	6,000,000	
FA Objectives, (OP/SP):	CCM1-2.1: Appropriate policy, legal and regulatory frameworks adopted and enforced CCM1- 2.2: Sustainable financing and delivery mechanisms established and operational	Total co-financing:	36,080,000	
Executing Agency:	Ministry of Science and Technology	Total Project Cost:	38,880,000	
Other Partners involved:	Ministry of Construction, Ministry of Natural Resources and Environment	ProDoc Signature (date project began):		November 4, 2014
		(Operational) Closing Date:	Proposed: November 30, 2019	Actual: Tentatively April 30, 2020

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	Ministry of Industry and Trade Ministry of Planning and Investment Viet Nam Association for Building Materials			
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### II. OBJECTIVE AND SCOPE

The project was designed to reduce annual GHG emissions by limiting the use of fossil fuels and promoting the usage of good quality soil for brick making through the increased production, sale and utilization of non-fired bricks (NFBs) in Viet Nam. This objective was to be achieved by removing barriers to increased production and utilization of NFBs through 4 components:

- Component 1: Policy support for non-fired brick (NFB) technology development
- Component 2: Technical capacity building on NFB technology application and operation and use of NFB products
- Component 3: Sustainable financing support for NFB technology application
- Component 4: NFB technology application, investment and replication.

The Project was implemented over a 5-year period and is expected to generate GHG emission reductions through the displacement of coal-fired clay brick kilns. Direct GHG reduction estimates are 383 ktonnes CO<sub>2</sub>. Indirect emission reductions are 13,409 ktonnes CO<sub>2</sub> that is cumulative for a 10- year period after the end of the Project.

The TE will be conducted according to the guidance, rules and procedures established by UNDP and GEF as reflected in the UNDP Evaluation Guidance for GEF Financed Projects. The objectives of the evaluation are to assess the achievement of project results, and to draw lessons that can both improve the sustainability of benefits from this project, and aid in the overall enhancement of UNDP programming.

### III. EVALUATION APPROACH AND METHOD

An overall approach and method<sup>19</sup> for conducting project terminal evaluations of UNDP supported GEF financed projects has developed over time. The evaluator is expected to frame the evaluation effort using the criteria of **relevance, effectiveness, efficiency, sustainability, and impact**, as defined and explained in the UNDP Guidance for Conducting Terminal Evaluations of UNDP-

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<sup>19</sup> For additional information on methods, see the [Handbook on Planning, Monitoring and Evaluating for Development Results](#), Chapter 7, pg. 163

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supported, GEF-financed Projects. A set of questions covering each of these criteria have been drafted and are included with this TOR (*Annex C*) The evaluator is expected to amend, complete and submit this matrix as part of an evaluation inception report, and shall include it as an annex to the final report.

The evaluation must provide evidence-based information that is credible, reliable and useful. The TE team is expected to follow a collaborative and participatory approach<sup>20</sup> ensuring close engagement with the Project Team, government counterparts including Ministry of Science and Technology, Ministry of Industry and Trade, Ministry of Construction, Viet Nam Environmental Protection Fund (VEPF) the UNDP Country Office(s), UNDP-GEF Regional Technical Advisers, and other key stakeholders including Viet Nam Association of Building Material and demonstration site owners, etc. The evaluator is expected to conduct a field mission to Viet Nam including the project sites in Hanoi and Ho Chi Minh city. Interviews will be held with the following organizations and individuals at a minimum:

The evaluator will review all relevant sources of information, such as the project document, project reports – including Annual PIR, project budget revisions, midterm review, progress reports, GEF focal area tracking tools, project files, national strategic and legal documents, and any other materials that the evaluator considers useful for this evidence-based assessment. A list of documents that the project team will provide to the evaluator for review is included in [Annex B](#) of this Terms of Reference.

#### IV. EVALUATION CRITERIA & RATINGS

An assessment of project performance will be carried out, based against expectations set out in the Project Logical Framework/Results Framework (see [Annex A](#)), which provides performance and impact indicators for project implementation along with their corresponding means of verification. The evaluation will at a minimum cover the criteria of: **relevance, effectiveness, efficiency, sustainability and impact**. Ratings must be provided on the following performance criteria. The completed table must be included in the evaluation executive summary. The obligatory rating scales are included in [Annex D](#).

Evaluation Ratings:			
1. Monitoring and Evaluation	rating	2. IA& EA Execution	rating
M&E design at entry		Quality of UNDP Implementation – Implementing Agency (IA)	

<sup>20</sup> A useful tool for gauging progress to impact is the Review of Outcomes to Impacts (ROtI) method developed by the GEF Evaluation Office: [ROTI Handbook 2009](#)

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M&E Plan Implementation		Quality of Execution - Executing Agency (EA)	
Overall quality of M&E		Overall quality of Implementation / Execution	
<b>3. Assessment of Outcomes</b>	<b>rating</b>	<b>4. Sustainability</b>	<b>rating</b>
Relevance		Financial resources:	
Effectiveness		Socio-political:	
Efficiency		Institutional framework and governance:	
Overall Project Outcome Rating		Environmental :	
		Overall likelihood of sustainability:	

**V. PROJECT FINANCE / COFINANCE**

The Evaluation will assess the key financial aspects of the project, including the extent of co-financing planned and realized. Project cost and funding data will be required, including annual expenditures. Variances between planned and actual expenditures will need to be assessed and explained. Results from recent financial audits, as available, should be taken into consideration. The evaluator(s) will receive assistance from the Country Office (CO) and Project Team to obtain financial data in order to complete the co-financing table below, which will be included in the terminal evaluation report.

Co-financing (type/source)	UNDP own financing (mill. US\$)		Government (mill. US\$)		Partner Agency (mill. US\$)		Total (mill. US\$)	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
Grants								
Loans/Concessions								
• In-kind support								
• Other								
Totals								

**VI. MAINSTREAMING**

UNDP supported GEF financed projects are key components in UNDP country programming, as well as regional and global programs. The evaluation will assess the extent to which the project was successfully mainstreamed with other UNDP priorities, including poverty alleviation, improved governance, the prevention and recovery from natural disasters, and gender.

**VII. IMPACT**

The evaluators will assess the extent to which the project is achieving impacts or progressing towards the achievement of impacts. Key findings that should be brought out in the evaluations include whether the project has demonstrated: a) verifiable improvements in energy savings, b)

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verifiable reductions in in greenhouse gas emissions, and/or c) demonstrated progress towards these impact achievements.<sup>21</sup>

### VIII. CONCLUSIONS, RECOMMENDATIONS & LESSONS

The evaluation report must include a chapter providing a set of **conclusions, recommendations and lessons**. Conclusions should build on findings and be based in evidence. Recommendations should be prioritized, specific, relevant, and targeted, with suggested implementers of the recommendations. Lessons should have wider applicability to other initiatives across the region, the area of intervention, and for the future.

### IX. IMPLEMENTATION ARRANGEMENTS

The principal responsibility for managing this evaluation resides with the UNDP CO in Viet Nam. The UNDP CO will contract the evaluators and ensure the timely provision of per diems and travel arrangements within the country for the evaluation team. The Project Team will be responsible for liaising with the Evaluators team to set up stakeholder interviews, arrange field visits, coordinate with the Government etc.

### X. EVALUATION TIMEFRAME, DUTY STATION AND EXPECTED PLACES OF TRAVEL

**Duration and Timing:** Estimated 25 working days for an international consultant and 20 working days for one national consultation during October 2019 – January 2020.

The tentative schedule is according to the following plan:

Activity	Timing (international consultant)	Timing (national consultant)	Completion Date
<b>Reviewing documents and Preparation</b>	7 working days	7 working days	3 November 2019
<b>Evaluation Mission</b>	5 working days (tentatively 18 - 22 November)	5 working days	22 November 2019
<b>Draft Evaluation Report</b>	9 working days	6 working days	13 December 2019
<b>Final Report</b>	4 working days	2 Working days	15 January 2020

**Duty station:** Home-based and Hanoi with in-country travel as required. The international consultant is expected to have 5 working day mission to Hanoi, Viet Nam. In case of in-country travel (if required), local travel cost shall be covered by the project based on UNDP policy or UN-EU cost- norm.

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<sup>21</sup> A useful tool for gauging progress to impact is the Review of Outcomes to Impacts (ROtI) method developed by the GEF Evaluation Office: [ROtI Handbook 2009](#)

## XI. EVALUATION DELIVERABLES

The evaluation team is expected to deliver the following:

Deliverable	Content	Timing	Responsibilities
<b>TR Inception Report</b>	TR team clarifies timing, objectives and methods of Terminal Review	No later than 2 weeks before the TE mission (3, November 2019).	TE Team submits to the UNDP CO project team
<b>Presentation</b>	Initial Findings	End of TE mission (22 November 2019)	TE Team presents to the project team and the UNDP CO
<b>Draft Final Report</b>	Full report, (using guidelines on content outline in Annex B) with annexes	Within 2 weeks of the evaluation mission	Sent to UNDP CO, reviewed by CO, project team, RTA, Project Coordinating Unit, GEF OFP
<b>Final Report*</b>	Revised report	Within 1 week of receiving UNDP comments on draft	Sent to CO for uploading to UNDP ERC.

\*When submitting the final evaluation report, the evaluator is required also to provide an 'audit trail', detailing how all received comments have (and have not) been addressed in the final evaluation report. See Annex I for an audit trail template.

## XII. TEAM COMPOSITION

The evaluation team will be composed of 1 international team lead and 1 national consultant. The consultants shall have prior experience in evaluating similar projects. Experience with GEF financed projects is an advantage. The team lead will be responsible for finalizing the report. The evaluators selected should not have participated in the project preparation and/or implementation and should not have conflict of interest with project related activities.

The Team members must present the following qualifications:

### For International Consultant (Team Leader)

- Master’s degree in project management, energy efficiency, environmental sciences or relevant fields.
- At least ten (10) years of international experience in the areas of project development, project implementation, and project evaluation for donor-funded development projects in developing countries.
- Recent experience in leading results-based management evaluation management evaluation for international donor supported projects in climate change mitigation, energy efficiency
- Experience working with the GEF or GEF-evaluations; Project evaluation/review experiences within United Nations system will be an asset;

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- Work experience in climate change mitigation, energy efficiency projects in developing countries in Asia is an advantage;
- Good interpersonal and analytical skills and ability to work under diverse/varied cultural environments;
- Demonstrated command over writing professional reports in English.

Specifically, the international expert (team leader) will perform the following tasks:

- Lead and manage the evaluation mission; Guide the national expert in collecting data and information and preparation of relevant sections in the report
- Design the detailed evaluation scope and methodology (including the methods for data collection and analysis);
- Conduct an analysis of the outcome, outputs and partnership strategy (as per the scope of the evaluation described above);
- Draft related parts of the evaluation report; and
- Finalize the entire evaluation report.

### **For National Consultant (Team member)**

- Graduate degree in degree in project management, energy efficiency, environmental sciences or relevant fields
- At least five (5) years of experience in the areas of project development, project implementation, and project evaluation for donor-funded development projects in Viet Nam;
- Familiarity and past experience with evaluation of international donor supported projects, especially energy efficiency, climate change mitigation projects;
- Work experience in climate change mitigation for donor-supported projects is an advantage
- Experience with evaluation of GEF supported projects is an asset
- Good interpersonal and analytical skills and ability to work under diverse/varied cultural environments;
- Excellent English skills with evidence through practical experience.

Specifically, the national expert will perform the following tasks:

- Documentation of evaluation and data gathering and consultation meetings;
- Contributing to the development of evaluation plan and methodology;
- Conducting specific elements of the evaluation determined by the International Lead Consultant;

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- Contributing to presentation of the evaluation findings and recommendations at the evaluation wrap-up meeting;
- Contributing to the drafting and finalization of the TR reports, notes of the meetings and other related documents prepared by the international consultant.
- Performing translation for the international consultants during meetings with various stakeholders and necessary documents discussed during the international consultant’s mission.

### **XIII. EVALUATOR ETHICS**

Evaluation consultants will be held to the highest ethical standards and are required to sign a Code of Conduct (Annex E) upon acceptance of the assignment. UNDP evaluations are conducted in accordance with the principles outlined in the [UNEG 'Ethical Guidelines for Evaluations'](#).

### **XIV. PAYMENT MODALITIES AND SPECIFICATIONS**

%	Milestone
60%	Following submission and approval of the 1ST draft terminal evaluation report
40%	Following submission and approval (UNDP-CO and UNDP RTA) of the final terminal evaluation report and all the products under the contract.

### **XV. APPLICATION PROCESS**

UNDP applies a fair and transparent selection process that will take into account the competencies/skills of the applicants as well as their financial proposals. Qualified women and members of social minorities are encouraged to apply. Qualified women and members of social minorities are encouraged to apply.

## Annex B: NFB Project Log frame (Post-MTR 2018)

Strategy	Indicators [in relation to Outcomes/Pertinent ProDoc Output]	Baseline	Target	Sources of Verification	Risks and Assumptions
<b>Project Objective:</b> Reduce the annual growth rate of GHG emissions by displacement of fossil fuel use and the usage of good quality soil for brick making through the increased production, sale and utilization of non-fired bricks (NFBs) in Viet Nam	<ul style="list-style-type: none"> <li>Cumulative direct project and post-project CO2 emission reductions resulting from the NFB plant investments and technical assistance by EOP, Mtons CO2.</li> </ul>	<ul style="list-style-type: none"> <li>No NFB production lines in operation using modern technology</li> <li>No emission reduction through replacement of CFBs through modern NFBs</li> </ul>	<ul style="list-style-type: none"> <li>0.088<sup>22</sup> (direct project) + 1.270<sup>23</sup> (direct post-project) Mt CO2 emission reduction</li> </ul>	Project final report as well as annual surveys of energy consumption & reductions for each NFB project	
	<ul style="list-style-type: none"> <li>Cumulative direct energy saving (TOE) from displacement of coal through the demonstration NFB plants (3 CBB plants and one AAC plant and 21 replication project during project time) by EOP</li> </ul>	<ul style="list-style-type: none"> <li>No NFB production lines in operation using modern technology</li> <li>No energy savings through replacement of CFBs through modern NFBs</li> </ul>	<ul style="list-style-type: none"> <li>30,782 TOE / year energy savings</li> <li>At least 25 (4 demo + 21 replication) production lines in operation using modern technology</li> </ul>	Project final report as well as annual surveys of energy consumption & reductions for each NFB project	Willingness of current brick SMEs and entrepreneurs to transform the industry to NFB technologies is ensured.
<b>Outcome 1:</b> Approval and enforcement of an improved legal framework to encourage NFB production and use, and enhanced government capacity and knowledge to	<ul style="list-style-type: none"> <li>Number of policies, regulations and standards approved and enforced to encourage the increase in the production and usage of NFB and decrease the use of FCBs [Outputs 1.1, 1.2, 1.3, 1.4]</li> </ul>	<ul style="list-style-type: none"> <li>A number of plans/policies have been adopted to encourage NFB developments: (i) Master plan on development of building materials by 2020; (ii) Decision No. 567/2010/QD-TTg; (iii) Directive No. 10/CT-TTg (2012) on promotion of</li> </ul>	<ul style="list-style-type: none"> <li>13 additional policies approved and enforced to encourage NFB development (Investment, production and use) and decrease FCB usage by EOP</li> <li>2 standards/policies approved to promote</li> </ul>	<ul style="list-style-type: none"> <li>Official documentation on approved NFB policies, standards and quality regulations</li> <li>Project annual reports</li> </ul>	Continued government support for strengthening current NFB legal framework as well as regulations, standards and codes

<sup>22</sup> This is the direct emission reduction during the course of the 5-year Project

<sup>23</sup> This is the direct post-project emission reduction from NFB plants that received technical assistance from Project Output 4.9 during Years 4 and 5 to be implemented after EOP

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Strategy	Indicators [in relation to Outcomes/Pertinent ProDoc Output]	Baseline	Target	Sources of Verification	Risks and Assumptions
regulate NFB development and usage		<p>NFB production and utilization: (iv) circular 09/2012/TT-BXD creating NFB demand; (v) decision No. 1449/QD-TTg for retirement of traditional claps kilns.</p> <ul style="list-style-type: none"> <li>Lack of standards and policies on NFB equipment to encourage and attract local enterprises to invest in NFB production lines</li> <li>Insufficient NFB standards make it difficult to control quality of NFB produced, quality of buildings where NFBs are used;</li> </ul>	<p>local manufacturers of NFB equipment and technology by year 4</p> <ul style="list-style-type: none"> <li>3 standards/ regulations approved by year 3 to govern quality of NFBs</li> </ul>		
	<ul style="list-style-type: none"> <li>Number of standards/norms on energy efficiency (EE) and emissions reduction in NFB production developed and recommended for approval [Output 1.5]</li> </ul>	<ul style="list-style-type: none"> <li>No standards/norms have been adopted for EE and emission reduction for production of construction materials as well as NFBs</li> </ul>	<ul style="list-style-type: none"> <li>2 standards/norms on energy efficiency and emission reduction in NFBs production approved by year 3</li> </ul>	<ul style="list-style-type: none"> <li>Official document approved on the EE and emission standards for NFB production</li> </ul>	
	<ul style="list-style-type: none"> <li>Enhanced government capacity to improve NFB regulation, control and mandate NFBs production and markets [Output 1.6, transferred to Outcome 2]</li> </ul>	<ul style="list-style-type: none"> <li>Limited capacity of the government officers in NFBs in general, quality control of NFB manufacturing, production and uses in particular;</li> <li>No training courses have been held to enhance capacity of the</li> </ul>	<ul style="list-style-type: none"> <li>By EOP, 940 government officers at national and provincial level trained on various aspects of NFBs (types, characteristics, requirement for control and promotion of NFB manufacturing,</li> </ul>	<ul style="list-style-type: none"> <li>Training reports/ workshops proceedings</li> </ul>	

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Strategy	Indicators [in relation to Outcomes/Pertinent ProDoc Output]	Baseline	Target	Sources of Verification	Risks and Assumptions
		government officers in NFB development and management	production technology, usage, etc.)		
<b>Outcome 2: Increased availability of technically skilled and qualified local service providers for NFB plants, and enhanced stakeholder knowledge on NFB usage.</b>	<ul style="list-style-type: none"> <li>Number of local firms that can manufacture NFB plant equipment based on set standards developed under this project [Output 2.1]</li> </ul>	Lack of local technical knowledge on how to manufacture equipment for NFB production lines that can be competed with those internationally produced (quality and price)	<ul style="list-style-type: none"> <li>1 local firm able to manufacture NFB plants’ equipment based on set of standards developed under this project by year 4.</li> </ul>	<ul style="list-style-type: none"> <li>Study on NFB equipment standardization</li> <li>Technical report by the project</li> </ul>	
	<ul style="list-style-type: none"> <li>Number of building developers and owners used NFBs as building construction materials [Output 2.1]</li> </ul>	<ul style="list-style-type: none"> <li>Lack of consumer confidence and knowledge on using NFBs;</li> </ul>	<ul style="list-style-type: none"> <li>300 building developers and owners correctly use NFBs as building construction material by EOP</li> </ul>	<ul style="list-style-type: none"> <li>Documents of market research</li> <li>Report from Department of construction from provinces</li> </ul>	
	<ul style="list-style-type: none"> <li>Enhanced technical skills and stakeholder knowledge/ information on NFB associated issues [Output 2.3, 2.4, 2.5, 2.6]</li> </ul>	<ul style="list-style-type: none"> <li>No training has been provided to stakeholders regarding NFB associated issues;</li> <li>Limited NFB knowledge amongst engineers, designers and building developers;</li> <li>Little or no knowledge amongst construction workers on NFB building techniques and best practices on using NFBs in construction;</li> <li>Low awareness on the advantages and environmental benefits of</li> </ul>	<ul style="list-style-type: none"> <li>By EOP, 21 training courses with total of 1500 people from 50 provinces trained on various NFBs’ aspects. Of these:                             <ul style="list-style-type: none"> <li>940 governmental and local officers</li> <li>121 designers and constructors</li> <li>399 NFB investors</li> <li>40 people from other related areas</li> </ul> </li> <li>2 training courses for 60 people from vocational colleges of construction</li> <li>A NFB website developed, maintained and updated regularly</li> </ul>	<ul style="list-style-type: none"> <li>Training materials on various aspects of NFB</li> <li>Training reports;</li> <li>Documentation on NFB website</li> </ul>	

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Strategy	Indicators [in relation to Outcomes/Pertinent ProDoc Output]	Baseline	Target	Sources of Verification	Risks and Assumptions
		NFBs within the construction and building sector in Viet Nam			
<b>Outcome 3: Improved availability and sustained access to financial support for NFB technology applications</b>	<ul style="list-style-type: none"> <li>Loan volume provided by financial institutions (including commercial banks) for NFB investments (USD m) [Output 3.1, 3.2]</li> </ul>	<ul style="list-style-type: none"> <li>A number of financial institutions such as Vietinbank, VEPF, NOFOSTED, Green Investment Facility (GIF) have interest in supporting SMEs for NFB investment, however:</li> <li>No dedicated financing for NFB production</li> </ul>	<ul style="list-style-type: none"> <li>At least U\$24 million provided by financial institutions for NFB production investment by year 3</li> </ul>	<ul style="list-style-type: none"> <li>Workshop report organized for financial institutions;</li> <li>Report by the financial institutions (VEPF and Vietinbank, etc.) on their lending to NFB producers</li> </ul>	Sufficient capital replenishments are available for NFB scale-up (estimated to be around USD 221 million to Year 2020)
	<ul style="list-style-type: none"> <li>Number of SMEs and NFB entrepreneurs with confirmed financing [Output 3.3, 3.4, 3.5]</li> </ul>	<ul style="list-style-type: none"> <li>Many potential NFB investors are SMEs who have difficulties in accessing to loans,</li> <li>Lack of knowledge and ability of potential SME investors to apply for concessionary financing of NFB projects</li> </ul>	<ul style="list-style-type: none"> <li>30 NFB SMEs get loans from financial institutions by EOP (10 NFB projects get loan from VEPF and 20 projects get loans from VietinBank)</li> </ul>	<ul style="list-style-type: none"> <li>Financing agreements between new NFB entrepreneurs and financing sources that are a part of NFB financing scheme</li> </ul>	Willingness of SMEs and entrepreneurs to shift towards NFB technology from FCB kilns is ensured
<b>Outcome 4: Boosted confidence in NFB technology application resulting in an increased market share of NFB’s</b>	<ul style="list-style-type: none"> <li>Number of NFB demonstration plants in operation [Output 4.1, 4.2, 4.3, 4.4, 4.5]</li> </ul>	As of 2015 there exist <ul style="list-style-type: none"> <li>(i) more than 1,000 CBB production lines (with yearly production of 6 million SBUs);</li> <li>(ii) 12 AAC companies (with yearly production of about 1.3 million SBUs); and</li> </ul>	<ul style="list-style-type: none"> <li>3 CBB demonstration plants operating at 90% designed capacity by EOP, with cumulative annual production of 65 million SBUs by EOP;</li> <li>1 AAC demonstration plant operating at 90% designed capacity by EOP;</li> </ul>	<ul style="list-style-type: none"> <li>Bankable feasibility studies;</li> <li>Financial agreement;</li> <li>Technical assistance reports</li> <li>Monitoring and evaluation reports for each</li> </ul>	Support of SMEs and entrepreneurs to ensure excellent demonstration of NFB technologies

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Strategy	Indicators [in relation to Outcomes/Pertinent ProDoc Output]	Baseline	Target	Sources of Verification	Risks and Assumptions
		(iii) 17 foamed brick companies (with yearly production of 0.12 billion SBUs). <ul style="list-style-type: none"> <li>• Most of CBB technologies imported from China are low quality;</li> <li>• NFB entrepreneurs lack knowledge on the production of qualified NFBs, lack of knowledge in designing, constructing, operating and maintaining an NFB plant;</li> <li>• Very few examples of well-managed and profitable NFB production facilities existed</li> </ul>		demonstration plant (demonstration production and energy consumption)	
	<ul style="list-style-type: none"> <li>• Number of NFB plants received technical assistance on optimization of raw materials, product quality control procedures, staff training and technology transfer, feasibility studies planned and operated [Output 4.6, 4.7]</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of local technical knowledge on planning, designing, constructing, operating and maintaining an NFB plant;</li> </ul>	With the project support, it's expected by EOP: <ul style="list-style-type: none"> <li>• 21 NFB plants received direct support in development of feasibility studies, optimization of inputs materials, production management, quality control, etc. and operated;</li> <li>• 50 NFB plants with approved investment plan</li> </ul>	<ul style="list-style-type: none"> <li>• Technical report of replication projects</li> <li>• Provincial reports on the NFB production</li> </ul>	Willingness of existing brick SMEs to embrace new NFB technologies is assured
	<ul style="list-style-type: none"> <li>• % of market share of NFBs in the local brick market [Output 4.8, 4.9]</li> </ul>	<ul style="list-style-type: none"> <li>• By the project start, there exist about 70 NFB production facilities, with annually designed capacity</li> </ul>	<ul style="list-style-type: none"> <li>• 25 % of the NFB market share in the local brick markets by EOP</li> </ul>	<ul style="list-style-type: none"> <li>• Market survey of brick market</li> </ul>	

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Strategy	Indicators <i>[in relation to Outcomes/Pertinent ProDoc Output]</i>	Baseline	Target	Sources of Verification	Risks and Assumptions
		<p>of over 4.3 billion SBUs, accounted for 13% of the brick market share in Vietnam</p> <ul style="list-style-type: none"> <li>Lack of consumers' confidence in the quality of NFBs limits development of the NFB market in Viet Nam</li> </ul>		<ul style="list-style-type: none"> <li>Ministry of Construction statistics</li> </ul>	

## Annex C: Program and Itinerary of the TE Mission

Time	Agency/Person to Meet	Topics	Note/Address
<b>Day 1: Monday 6/January</b>			
09:00 - 12:00	PMU and UNDP Program Officer	<ul style="list-style-type: none"> <li>- Overview of the project implementation, achievement of the project objectives and impacts;</li> <li>- Clarification questions</li> <li>- Discussion about the mission schedule and contents</li> <li>- Review of the project implementation/achievement by components and co-financing related issues, challenges/risks and pending issues</li> </ul>	MoST office, No. 113 Tran Duy Hung street, Hanoi
11:00 - 12:00	MoST- National Project Director (manager, technical advisor)  Mr. Nguyen Dinh Hau	<ul style="list-style-type: none"> <li>- Project implementation, achievement and challenges, from governmental points of views;</li> <li>- Coordination and cooperation in the project implementation;</li> <li>- Possibilities in future project replication and/or expansion</li> <li>- How to further develop non-fired building materials or further develop green building materials for green buildings</li> </ul>	MoST office, No. 113 Tran Duy Hung street, Hanoi
14:00 – 15:30	Ministry of Construction	<ul style="list-style-type: none"> <li>- Current legislations regarding NFB,</li> <li>- Project contribution in adoption of national policies/regulation regarding NFB,</li> <li>- and challenges in expansion of the NFB markets</li> <li>- Possibilities in future project replication and/or expansion</li> <li>- How to further develop non-fired building materials or further develop green building materials for green buildings</li> </ul>	37 Le Dai Hanh Str. Hai Ba Trung District, Hanoi
16:00 - 17:00	Viet Nam Environment Protect Fund	<ul style="list-style-type: none"> <li>- Discussion about co-financing related issues</li> </ul>	No. 85 Nguyen Chi Thanh Str. Hanoi
17:30 - 18:30	UNDP Head of Climate Change and Environment  Mr. Dao Xuan Lai	<ul style="list-style-type: none"> <li>- Discussion about the expected outcome of the mission and the TE</li> <li>- Coordination and cooperation in the project implementation;</li> <li>- Possibilities in future project replication and/or expansion</li> </ul>	UNDP Office, 304 Kim Ma
<b>Day 2: Tuesday 7/January</b>			

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Time	Agency/Person to Meet	Topics	Note/Address
09:00 - 10:30	Institute for Building material Viet Nam	<ul style="list-style-type: none"> <li>- Discussion about their Contribution in the project implementation</li> <li>- Potential/weakness in the future NFB development in VN.</li> <li>- Possibilities in future project replication and/or expansion</li> <li>- How to further develop non-fired building materials or further develop green building materials for green buildings</li> </ul>	No. 235 Nguyen Trai Str. Thanh Xuan District, Hanoi
10:45 – 12:00	Việt Nam Association for Building material	<ul style="list-style-type: none"> <li>- Discussion about their Contribution in the project implementation.</li> <li>- Potential/weakness in the future NFB development in VN</li> <li>- Possibilities in future project replication and/or expansion</li> <li>- How to further develop non-fired building materials or further develop green building materials for green buildings</li> </ul>	No. 235 Nguyen Trai Str. Thanh Xuan District, Hanoi
14:00 - 17:00	Capital house investment	<ul style="list-style-type: none"> <li>- Typical results of Company on Green building investment using non-fired bricks</li> <li>- Understanding NFB consumers, associated disadvantages and advantages, and potentials in the future NFB application, and lessons learnt</li> </ul>	No. 58 TO Huu Str., Me Tri Ward, Nam Tu Lie, District, Hanoi
<b>Day 3: Wednesday 8 January</b>			
9:00 - 12:00	AAC Viglacera Bac Ninh Company	<ul style="list-style-type: none"> <li>- Understanding NFB supply aspects, NFB market and future NFB development and associated challenges/risks and lessons learnt</li> <li>- Results of technical assistance from Project to Company</li> <li>- How to further develop non-fired building materials or further develop green building materials for green buildings</li> </ul>	Address: Yen Phong industrial Zone, Bac Ninh Province
15:00 - 17:00	NB Airport Departure for HCM		
<b>Day 4 Thursday, 9 January</b>			
9:00 - 12:00	Green material Company Ho Chi Minh city	<ul style="list-style-type: none"> <li>- Understanding NFB supply aspects, NFB market and future NFB development and associated challenges/risks and lessons learnt</li> <li>- Results of technical assistance from Project to Company</li> <li>- How to further develop non-fired building materials or further develop green building materials for green buildings</li> </ul>	Cu Chi district, Ho Chi Minh City

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<b>Time</b>	<b>Agency/Person to Meet</b>	<b>Topics</b>	<b>Note/Address</b>
14:00 - 16:00	DOC Ho Chi Minh City	<ul style="list-style-type: none"> <li>- To understand point of view of government authorities on NFB development and challenges</li> <li>- Status of production and utilization in Ho Chi Minh City</li> <li>- Activities implemented in cooperation with Project UNDP in Ho Chi Minh city.</li> </ul>	Ho Chi Minh City
18:00-20:00	TSN airport Departure for Ha Noi		
<b>Day 5 Friday 10 January</b>			
8:00 -12:00	Team to review the findings		MoST office, 113 Tran Duy Hung str., Hanoi
14:30 - 18:00	Briefing	-	

## Annex D: List of Persons Interviewed

Name	Position/Office	Contact Details
1. Vu Thi Thu Hang	Programme Officer, UNDP	<a href="mailto:vu.thi.thu.hang@undp.org">vu.thi.thu.hang@undp.org</a>
2. Nguyen Dinh Hau	National Project Director	
3. Do Giao Tien	Project Manager, PMU	<a href="mailto:dogiaotien@gmail.com">dogiaotien@gmail.com</a>
4. Nguyen Ba Vinh	Technical Advisor, PMU	<a href="mailto:vinhpecsme@gmail.com">vinhpecsme@gmail.com</a>
5. Le Minh Tuan	Communication Specialist, PMU	<a href="mailto:tuan4nfb@gmail.com">tuan4nfb@gmail.com</a>
6. Nguyen Hoang Tu	Project Accountant, PMU	<a href="mailto:tunguyenhoang1989@gmail.com">tunguyenhoang1989@gmail.com</a>
7. Nguyen Kim Chung	Project Assistant, MPU	<a href="mailto:n.kimchung@gmail.com">n.kimchung@gmail.com</a>
8. Pham Van Bac	Director General, Department of Construction Materials, MoC	
9. Nguyen Quang Hiep	Deputy Director General, Department of Construction Materials, MoC	
10. Le Van Ke	Expert, Department of Construction Materials, MoC	
11. Vu Hai Nam	Expert, Department of Construction Materials, MoC	
12. Pham Van Trieu	Deputy Director, Viet Nam Environment Protection Fund (VEPF)	
13. Pham Tuan Viet	Deputy Head, Department of Credit, VEPF	
14. Le Quang Linh	Officer, GEF Viet Nam Focal Point	
15. Le Duc Thinh	Director, Center of Strategic Study, Institute for Building Materials	
16. Le Viet Hung	Deputy Director, Concrete Center, Institute for Building Materials	
17. Tran Thanh Binh	Deputy Director, Consulting Center	
18. Phung Trong Quyen	Staff, International Cooperation Division, Institute for Building Materials	
19. Tong Van Nga	Chairman, VABM	
20. Thai Duy Sam	Vice Chairman, VABM	
21. Hoang Van Nhuong	Chief of staff, VABM	

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<b>Name</b>	<b>Position/Office</b>	<b>Contact Details</b>
22. Trinh Tung Bach	R&D Director, Genesis School, Capital Investment Company	
23. Nguyen Thi Hong Ly	Specialist, Genesis School	
24. Nguyen Lan Huong	Specialist, Genesis School	
25. Nguyen Hong Phong	Director, Viglacera	
26. Duong Van Tham	Viglacera	
27. Bui Danh Dai	Project ‘s technical expert (NFB production line)	
28. Nguyen Van An	Project technical expert (energy efficiency)	
29. Bach Dinh Thien	Director, Institute of Tropical Building Material Studies and Application	
30. Trinh Nhien	Director, Dai Dung Green Material JSC	
31. Tran Thanh Thang	Deputy Director, Dai Dung Green Material JSC	
32. Nguyen Thanh Binh	Deputy Head, Division of Construction Material, Ho Chi Minh City’s DOC	
33. Nguyen Thi Huyen Han	Expert, Division of Construction Material, Ho Chi Minh City’s DOC	

## Annex E: Meeting Notes and Summary of Field Visits

Date/ Stakeholders Met	Briefing Notes
<p><b>1. Meeting with UNDP and PMU (Jan. 6, 2020)</b></p>	<ul style="list-style-type: none"> <li>- The PD was signed in Sep 2014, implementation period from 11/2014 -11/2019</li> <li>- MoST is national implementation partner and MoC is co-implementing partner</li> </ul> <p>04 project outcomes achieved:</p> <p><b>Component 1: regulation</b></p> <ul style="list-style-type: none"> <li>- Completion of NFB policies and regulation, and awareness raising to promote development and use of NFB, from central to provincial level;</li> <li>- Working in close with MoC in the implementation of component 1;</li> <li>- Need more technical guidelines for use /applications of NFB;</li> <li>- Capacity building for governmental officers via training, WS;</li> </ul> <p><b>Component 2: Technical capacity strengthening for various target groups on NFB technology application - designing, production and use of NFB</b></p> <ul style="list-style-type: none"> <li>- Capacity building to various target groups via 26 training courses across the country (63 provinces) – with good results achieved (see training evaluation report);</li> </ul> <p><b>Component 3: Financial support for NFB application</b></p> <ul style="list-style-type: none"> <li>- Support financial institutions to understand more about NFB technology to facilitate evaluation of NFB investment proposals, via workshops;</li> <li>- About 28.8 mill USD were provided by financial institutions to 40 NFB enterprises as concessional and commercial loans for investment in NFB production;</li> <li>- Vietinbank- a commercial bank, had committed to provide US\$ 21 million for NFB application as co-financing;</li> <li>- At the project design stage, 36 mill USD have been committed by various stakeholder as co-financing, the amount now (end of the project) reaches to 89 mil USD.</li> </ul> <p><b>Component 4: NFB technology application, investment and replication</b></p> <ul style="list-style-type: none"> <li>- Financial support for NFB application: 04 demonstration plants and 21 replication plants (in total 25 NFB plants supported by the project)</li> <li>- Technical support includes: WS, training to NFB enterprises to understand NFB specifications; sending technical expert to work directly with enterprises to understand their need and technical shortages, based on which the project will provide support/advices to the enterprises for improvement, for instance, introduction of various NFB production technologies will help the investors to understand about then and able to select the appropriate technology for their investment; setting up NFB production procedure, registering NFB standardized units;</li> <li>- Project’s support covers all provinces (63) in the country. With the project contribution, the NFB production sharply increases in recent years but NFB consumption/uses is still a bit weak;</li> <li>- The project also conducts communication for NFB awareness raising by producing news, TV, video clips for various stakeholders;</li> <li>- In addition to involve stakeholders, as specified in the project design stage, in the project implementation and dissemination of the project results, a number of newly</li> </ul>

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Date/ Stakeholders Met	Briefing Notes
	<p>private companies/enterprises have participated in the investment of NFB production, with the modest support from the project;</p> <ul style="list-style-type: none"> <li>- The project contributes to implementation of national 567 program</li> </ul> <p>At the beginning of the project implementation, there are about 3 equipment suppliers but in the end of the project, there are more than 10 suppliers involving in the project. Two more institutions (include Tropical building material Institute, and University of Science and Technology in HCM City) join the project and actively involved in the technological transfer.</p> <p>According to the consultant team, TE of a project is to identify how does the project address the project barriers; how is the future NFB market look like? What will the GoV do in 5 year later/what is the GoC’s response? The project has implemented a lot of activities and get good outputs but at the outcome level more information should be presented. With the limited budget how the project triggers the NFB market? The team would like to learn more detail about the 4 demonstration projects, each is expected to demonstrate in an NFB aspect and which barrier each demonstration project helps to address which barriers identified during the project development.</p> <p>After implementation of the demos, we conduct WS and disseminated the results. The successes of the demonstration include</p> <ul style="list-style-type: none"> <li>- Technical NFB demos (only suppliers could do before)</li> <li>- 15 provinces, including Gov officers, participate in the dissemination WS.</li> <li>- Invest impacts (in 2015, Thai Nguyen Province had only 2 NFB manufactures, in 2018 more than 10 NFB producers are active in the area, as the results of the demonstration project);</li> <li>- Awareness raising to financing institutions such as VEPP on NFB investment so that they are able to appraise applications for loans.</li> </ul> <p>The PMU is preparing a project implementation report which includes recommendations and lessons learnt from the demonstration projects. We will send you key bullet points. The trend in VN is to use light construction materials or AAC bricks for construction; there are needs in the coming time is improve quality of the NFB, training to workers/users on construction Techniques; NFB standards developed.</p> <p>NFB production market share in 2019: 28,5%. At the beginning of the project design, the NFB market share is only 13%. GoV planned to reach 40% of NFB market share. Manufacturers only produce NFB based on orders and in such case, there are not much NFB in stock (not used).</p>
<p><b>2. Meeting with Department of Building materials, MoC (Jan. 6, 2020)</b></p>	<p>Legislation, policies, guidelines associated to construction materials include Program 457<sup>24</sup> adopted in 2010 on Development of Non-fire construction materials (NFBMs) sets objective to achieve 30-40% of the non-fire construction materials market share by 2020.</p> <p>Following program 567, the Government has adopted</p> <ul style="list-style-type: none"> <li>- Directive NO 10/CT-TTg dated November 28, 2012 promoting the use of Non fired building materials (NFCM) and limiting the production and use of FCB;</li> <li>- decision 1694/2014 adopted to regulate treatment of ashes;</li> </ul>

<sup>24</sup> The “Program 567” was approved by decision No. 567/2010/QD-TTg dated April 28, 2010.

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Date/ Stakeholders Met	Briefing Notes
	<ul style="list-style-type: none"> <li>- Decision 1469/QD-TTg dated August 22, 2014 of the Prime Minister approving master planning of Construction materials in Vietnam by 2020, with orientation to 2030;</li> <li>- decree 24a/2016 which was then replaced by decree 95/2019 orientating development of Non-fired building materials;</li> <li>- Circular 13/2017/TT-BXD stipulates use of 100% NFB for construction of building using governmental budget; and 80% of NFB in buildings higher than 9 floors;</li> <li>- circular 157/2011/TT-BXD adopting a list of materials used for production of NFBM and equipment for NFBM production lines that are exempted from imported taxes;</li> <li>- Circular 46/2012/BCT regulating non-use of yearly industrial promotion budgets for trainings deployment of models at FCB facilities;</li> <li>- Circular 01/2018/TT-BKHDT dated March 30, 2018 does not encourage importation of NFB production lines with capacity of less than 20 million units per year. Following the circular, those with capacity of less than 20 million NFB units (NFBUs) will be subjects of tax; those with capacity of more than 20million NFB Units will be exempted from tax.</li> </ul> <p>According to results of the recent survey, over the country, designed capacity of NFB production lines is 12.6 billion NFBUs; NFB production is 5 billion units; and about 70-80% of the NFB production are consumed by users.</p> <p>MoC is preparing national strategy for development of non-fired construction materials under which NFB is a section. According the strategy, the NFB market share will be 35-40% by 2025; 40 – 45% by 2030 and about 60-70% by 2050. Investment in production of NFBM with large dimensions, utilizing industrial wastes (ashes from thermal power plants or wastes from industries, etc.)</p> <p>Project, since starting, provided budget and support Government in preparation and approval of a number of NFB legal framework, organized workshops, training.</p> <p>Contribution from the project to development and approval of the policy, legal documents include:</p> <ul style="list-style-type: none"> <li>- Decree 24a/2016 on management of construction materials;</li> <li>- Circular 13/2017/TT-BXD stipulates use of 100% NFB for construction of building using governmental budget; and 80% of NFB in buildings higher than 9 floors;</li> <li>- Drafting national strategy for development of non-fired construction materials under which NFB is a section;</li> <li>- Review and prepare new standards for various types of NFBs; technical guidelines for construction and acceptance of a construction block using light NFB, cost norms for construction block using NFBM,</li> <li>- Organizing study of industrial wastes (ashes, fly ash, gypsum, steel scraps, crush stones as input materials for NFBs</li> </ul> <p>Concerning awareness and knowledge, the construction contractors are not fully aware of requirement for NFB uses, the NFB producers have insufficient experiences, NFB productions lines invested are not always good enough which affect to quality of NFB produced and construction works. In addition, prices of FCB is cheaper, which makes NFB less competitive compared to FCB.</p>

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	<p>The program of NFB production and use are being responding by professional associations, communication agencies, etc. the NFB production and use are step by step developed and applied in practice.</p> <p>Difficulties/challenges:</p> <ul style="list-style-type: none"> <li>- Long-time traditions and habits of using fired clay brick (FCB) by Consumer may take time for them to gradually change their habit from the use of FCB to the use of NFBs;</li> <li>- Compiling curriculum for vocational training is not sufficient yet;</li> <li>- Synchronized technical Guideline for NFB construction activities is not yet available;</li> <li>- Quality of the NFB produced is not stable. Often for SME investors who invest in small capacity-production lines due to limited budgets do not register NFB conformity. Quality of their bricks produced are not stable; for the big investors who invest in big-capacity NFB production line often register NFB conformity, quality of their NFB is good. Exiting of both unqualified and qualified NFB in the market could affect to the quality of buildings if unqualified NFB are used and this discourages consumers.</li> <li>- Investors in provinces could not access to benefit specified under governmental priority policies adopted for NFS production;</li> <li>- Not strictly limit FCB production or use. The price of FCB currently is lower than NFB which is due to following reasons: <ul style="list-style-type: none"> <li>o Soil/clay soil as input materials for FCB production are taken from area not planned for FCB production. The investors in such the cases do not have to pay soils as input materials for FCB production. If continue using soil as input materials for FCB production, soil sources will be exhausted;</li> <li>o FCB production pollutes the environment but the enterprises do not have pay for the pollution correction, I.e. costs for environmental protection have not been included in the products’ costs and this makes the FCB cheaper than NFB. <ul style="list-style-type: none"> <li>➔ Fair competition these types of brick should be considered, e.g. strictly monitoring environmental pollution at FCB manufacturers, strictly monitoring soil sources used for FCB production against a regulation, recently issued, associated to requirement of having raw material areas if invested on FCB production.</li> </ul> </li> <li>o Walls constructed by NFB have problems of shrinking and/or cracking. Possible reasons include <ul style="list-style-type: none"> <li>▪ Quality of the brick;</li> <li>▪ Construction technique;</li> </ul> </li> </ul> </li> </ul>
<p><b>3. Meeting with Vietnam Environmental Protection Fund (VEPF) (Jan. 6, 2020)</b></p>	<ul style="list-style-type: none"> <li>- VEPF has provided concessional loan for 12 NFB projects, with total amount of VND 167 billion (around US\$ 7.5 million) with interests from 2.6 – 5.4% yearly, for 5-6 years. The project that gets largest loan VND 50 billion is Tran Chau NFB Investor. Among those, 8 projects able to access VEPF by the support from NFB projects;</li> </ul>

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	<ul style="list-style-type: none"> <li>- Following the recently adopted decree 40/2019/ND-CP on Amendment a number of Decrees of Law on Environmental Protection, NFB is not in priority list by the GoV anymore and therefore not under consideration by VEPF for getting loan;</li> <li>- The VEPF is considering to include NFB in the draft decision 78 being submitted for approval, as priority for accessing VEPF loan under climate change theme. However, if it’s approved, it applies for only 13 Mekong Delta provinces.</li> </ul>
<p><b>4. Meeting with Institute for Building Materials (Jan. 7, 2020)</b></p>	<p>The institute has involved in the study of NFB Market Share and finds that the NFB market share is sharply increased due to policy development, Production of NFB continues to promote by the governmental priority policies. Market of NFB (production) is well developed. An example: Xuan Mai company has invested from 2-10 NFB production lines. It’s estimated that NFB demand will increase to 16-20 million NFBUs due to rapid urbanization;</p> <p>The Institute also involves in development of National Strategy for Building Materials Development Market in Vietnam by 2030 (with vision to 2050) under which Building Materials are divided into 12 groups and NFB is one of the groups.</p> <p>On the question of how the Inspecting system of building material in Vietnam operated, the Institute responds that the inspections/monitoring are still administrative, done by Department of Construction (at provincial level) and the results are reporting to Ministry of Construction (MoC); lack of resources, data are not fully accurate ...</p> <p>The survey of NFB market share has been done in 2019 with the project support, it’s expected that the survey will be reconducted in 2025 and 2030.</p> <p>Associated to building materials’ prices, while Non-fired Brick (NFB) reflects real price, the Fired Clay Brick (FCB) are cheaper, because the price does not include tax for soil exploitation, costs of environmental pollution causes be exhaust gases. Circular No. According to a Canadian expert who is the international Consultant involving in development of National Strategy for Development Market of building materials in Vietnam, promotion of green building could help promotion of demand for using NFB, Materials used for concrete brick include crushed stone (10%), fine fraction (sand or fly ash) accounted for 40%, cement (available). if quality of the stone is not good, it will affect to quality of the brick. In Vietnam stone are available and good quality, excepting for those exploited in the Southern part of Vietnam.</p> <p>Often, fine fraction for NFB making is sand or fly ash. Many enterprises omit the fine fraction and this leads to lower quality of bricks.</p> <p>Foam Concrete (be tong bot): high intensity, sound and heat isolation; made by cement and fly ash</p> <p>For NFB producers, there could exist following problems:</p> <ul style="list-style-type: none"> <li>- 1st group: Professional producers (accounted for larger percentage). They are often investors/constructors or traditional producers of building materials. For this group their NFB produced has good quality and is well sold in the market;</li> <li>- 2nd groups: (i) SMEs, and (ii) new investors who do not have enough experience produce NFB with not good enough quality;</li> <li>- 3rd group: Manual producers (family): produce low quality NFB and often used for construction of wall fence only.</li> </ul>

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Date/ Stakeholders Met	Briefing Notes
<p><b>5. Meeting with VABM (Jan. 7, 2020)</b></p>	<p>VABM has 150 members. The objective of VABM is to study and introduce new building materials to its members.</p> <p>VABM has worked with MoC to prepare NFB programme (called program 567) for the period 2010 – 2020. The program will be reviewed in the next year (2020). With the support from NFB project, the program 567 is well implemented. After the reviewing, the program will help NFB to better developed in the market.</p> <p>VABM during the last years actively works with UNDP NFB project, i.e. contribution to accomplishment of technical standards, awareness raising, conducting 07 workshops (out of total 26 workshops of the project) to introducing NFB technology to local enterprises, issue quarterly journal with NFB articles included, etc. the project impact on NFB sector is positive.</p> <p>In 2020, MoC will review implementation of 567 programme. It’s good and expected that new programs will be developed to continue accomplishment of program 567, and to include remaining issues that need to be addressed later. The remaining issues that make the NFB market are not fully addressed include</p> <ul style="list-style-type: none"> <li>○ Habit and traditional use of FCB for construction of the houses, especially those who live in rural areas;</li> <li>○ FCBs produced from hilly soils, in large quantity are competitive with NFBs;</li> <li>○ AAC is not yet developed in Vietnam (technology is not fully developed) but well sold in the market</li> <li>○ A number of facilities with small capacity produce NFB with not good quality, which affect to NFB market due to cracking and seepage problems.</li> <li>○ Data about NFBM is not sufficient and not fully correct. With the project support, NFB data are improved;</li> <li>○ Technical training on NFCM has not given adequate attention. Project has provided trainings and communication to strengthen knowledge/awareness on NFBM.</li> </ul> <p>It’s expected that UNDP continue providing support to have projects on production of green building materials, that are environmentally friendly and is able to cope with climate change.</p>
<p><b>6. Meeting with Capital House Group at International Kinder Garten School (Genesis School) (Jan. 7, 2020)</b></p>	<p>Capital Investment JSC - the Real Estate Company gets a Green building Certificate for its buildings meeting with criteria of Green buildings. The Company often use NFB for construction of its commercial buildings. With 07 projects using NFB, its experiences include:</p> <ul style="list-style-type: none"> <li>○ ECOHOM1 is the 1<sup>st</sup> high-rise building used 100% NFBs. The Building was constructed 5-6 years ago. After putting into operation, there appear many cracks in the outsider walls and this takes company’s time and costs for repairing and maintenance.</li> <li>○ With the lesson learnt from the 1<sup>st</sup> building, in the following buildings the Company reduce percentage of using non-fired building materials to 70%, i.e. in the outside walls, FCBs are used instead of NFB; and NFBs (AAC, ACOTEC panels) are used for internal walls. At these buildings, fewer crack problems are observed;</li> </ul>

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	<ul style="list-style-type: none"> <li>○ GENESIS School (3-floor building) is the second building using 100% NFBs. Since the building is newly constructed and low -floor building, fewer cracks are observed;</li> <li>○ An integrated solution (using both NFB and FCB), including strictly control construction process, is needed to ensure quality of the buildings (reducing fixing activities that are not easy to be done when the buildings are already put into operation) and avoid high maintenance costs, according to Capital Investment KSC.</li> </ul> <p>Effectiveness of using NFB</p> <table border="1"> <thead> <tr> <th></th> <th style="background-color: #f4a460;">Fired bricks</th> <th style="background-color: #d9ead3;">Concrete/AAC bricks</th> <th style="background-color: #d9ead3;">Wall panel</th> </tr> </thead> <tbody> <tr> <td><i>Progress (time)</i></td> <td style="background-color: #f4a460;">-</td> <td style="background-color: #d9ead3;">~ 30% faster</td> <td style="background-color: #d9ead3;">~ 40% faster</td> </tr> <tr> <td><i>Investment (cost)</i></td> <td style="background-color: #f4a460;">-</td> <td style="background-color: #d9ead3;">same</td> <td style="background-color: #d9ead3;">same</td> </tr> <tr> <td><i>Construction Quality</i></td> <td style="background-color: #f4a460;">Stable</td> <td style="background-color: #d9ead3;">crack</td> <td style="background-color: #d9ead3;">crack</td> </tr> <tr> <td><i>Site cleaning</i></td> <td style="background-color: #f4a460;">-</td> <td style="background-color: #d9ead3;">-</td> <td style="background-color: #d9ead3;">Much better (<i>no plaster, reducing dust on site</i>)</td> </tr> </tbody> </table> <p>Asking about cracking problems, whether they appear due to (i) quality of brick, (ii) quality of plasters; construction technique or etc.? - the company observes that cracking often appears 3-6months after the buildings constructed. The cracks are more in junction between the NFC and beams, but they could appear everywhere; the company, as the user, didn't know where the problems come from (as NFB user). The NFBs used for its building are from big and reliable NFB producers such as Viglacera, Thien Phu JSC., etc. and construction workers are provided by the respective NFB producers.</p> <p>Recommendation from Capital House</p> <ul style="list-style-type: none"> <li>○ Use non-fired building materials is a must for buildings and green building is inevitable trend;</li> <li>○ Incentive and special offers are needed for investors;</li> <li>○ A synchronized solution for NFBM is needed;</li> <li>○ Need more sample constructions, typical and publicly available works.</li> </ul>		Fired bricks	Concrete/AAC bricks	Wall panel	<i>Progress (time)</i>	-	~ 30% faster	~ 40% faster	<i>Investment (cost)</i>	-	same	same	<i>Construction Quality</i>	Stable	crack	crack	<i>Site cleaning</i>	-	-	Much better ( <i>no plaster, reducing dust on site</i> )
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<p><b>7. Meeting with Viglacera, Bac Ninh Province (Jan. 8, 2020)</b></p>	<p>The company was founded in 2010, with the capacity of 100,000 m<sup>3</sup>bricks/year. In 2017, with support from ministry of Science and Technology and with the support from the project, the company increase its capacity to 200,000m<sup>3</sup>/year (two production lines). The company has about 100 staff, located in an area of about 6ha. The Company's products include (i) AAC with different dimensions; and (ii) ALC Panels with dimension up to 3m. The NFBs produced by the company are characterized by light weight, sound and heat isolation; and with good quality.</p> <p>About 70% of the products produced are sold. Of these 5-10% are exported. The company still have difficulties in selling its product in the market because of lacking governmental quality standards for this type of bricks. The company has therefore developed basic NFB standard for controlling quality of its products. For export, the company produce NFB in accordance to the user's requirement.</p>																				

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	<p>The product price of 01m2 NFB itself is 5-10% more expensive than FCB but if comparing per finished wall (1m2 wall), costs of wall using NFB is cheaper than this using FCB's, due to less time required for construction, less mortar; Walls using NFB after finished are flatter than the walls using FCB.</p> <p>Asking about raw material sources, the company informs that</p> <ul style="list-style-type: none"> <li>○ AAC brick is produced by materials, such as sand, lime, cement, gypsum, aluminum powder, and water. Among the above, sand is the key component of AAC. All input materials are available in the market. However, the GoV has policy to limit extraction of sand and requires the company to get permit for sand exploitation and pay associated environmental tax.</li> <li>○ For producing Panels, the required input materials are the same as or producing AAC, with inclusion of steel, paint.</li> </ul> <p>Responding to cracking problems, the company give a number of possible reasons:</p> <ul style="list-style-type: none"> <li>○ The users do not use correct mortar for this type of bricks</li> <li>○ It requires to calculate building structure right at the beginning, in the design stage, if NFBs are used;</li> <li>○ Quality of NFBs is not good enough;</li> <li>○ NFB transportation, storage conditions (maintenance), construction procedures inappropriately applied?</li> </ul> <p>For Viglacera, quality of the NFBs have been improved since investment in the second production line (Germany) and with the project support (improved energy savings and improving input material mix (input material formula). The company provides (i) instructions of NFB use to users when buying products from the company; (ii) providing training to workers NFB construction techniques, and (ii) construction service to the users/contractors if required. The Company always work together with contractors, construction companies to guide construction techniques and support fixing problems, issue standard for its owned products;</p> <p>Technical support from the project to the company includes providing technical experts to work with the company in</p> <ul style="list-style-type: none"> <li>○ improving Mixing formula of input materials in order to improve quality and compressed intensity of the products and reduce product density. This includes increase recycling of by-products, waste from production lines to save materials used; An alternative option for sand which is fly ash was also recommended by the project consultant to the Company, in case sand is limited.</li> <li>○ conducting energy audit of equipment using coals and electricity in the plant and providing support to improve energy efficiency by reducing energy loss, as the results lead to reducing product costs.</li> </ul> <p>Recommendation from Viglacera to GoV:</p> <ul style="list-style-type: none"> <li>○ NFB are useful products. The Government needs to have policy/direction specific for each type of NFB; further support to development of AAC among other NFBs are expected;</li> <li>○ Issue sufficient standards: Presently AAC standards (TCVN) are not sufficient, e.g. economic and technical norms, construction instructions/procedures, training to workers, incentive/support policies, etc.</li> </ul>

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	<ul style="list-style-type: none"> <li>○ Apply Tax should for FCBs (using soil as input materials, environmental pollution)</li> <li>○ The Government should provide massively training over the country on construction technique to workers and contractors and acceptance approaches of the construction works, using NFB, accompanied by associated manuals to reduce as much as possible problem associated to application of NFB</li> </ul> <p>Presently there are more than 30 AAC producers in Vietnam, only 3 AAC enterprises (including Viglacera) are able to develop, continue its business.</p>
<p><b>8. Meeting with Dai Dung Green Material JSC, Ho Chi Minh City (Jan 9, 2020)</b></p>	<ul style="list-style-type: none"> <li>- The factory was founded in 2018, 3 production lines of CBB; design capacity of 100 million NFBUs/production line; actual capacity of 85 million NFBUs/production line. Presently only 01 production line is under operation.</li> <li>- Before deciding to invest in NFB, the investor has visited domestic and oversea NFB factories and find that most of the domestic factories conduct NFB curing by natural method (under the sunshine, take long-time and quality of the NFB not the same for all units), while oversea, modern NFB plants do this only for 24hours to get minimum brick strength. While in oversea, steam is used for curing NFB, in Vietnam wood/coal for this process which lead to high cost, and therefore the investor tries to find better solution for this process.</li> <li>- Mr. Thiem/project has proposed solar energy technology for curing project and was accepted by the factory</li> <li>- The solar energy system helps a lot the curing process and has big advantages, i.e.               <ul style="list-style-type: none"> <li>○ Safe energy (require 9.6 tons of FO diesel per day if FO diesel is used; and 16.7 tons of coal per day if coal is used)</li> <li>○ Save time (normally, curing process, using coal, takes 28 days but by this method it requires only 14 days;</li> <li>○ Better quality of the NFB cured by this method as heat and steam from solar energy and hot water could reach to every brick in a curing compartment when by natural curing, only those of outside layer are able to get sufficient heat/steam during the during the curing process;</li> <li>○ Investment in a solar energy curing system is VND 2.4 billion/production line → 3 production lines are 3*2.4= VND 7.2 billion. The company will recover investment costs in solar systems for NFB curing in about 4-5 years;</li> <li>○ NFB produced with lower prices, environmentally friendly.</li> </ul> </li> <li>- Lessons learnt from Dai Dung Green Material JSC: If any company wants to invest in the curing system by solar energy, it’s the best to make plan of investment since design process.</li> <li>- Presently the company can sell 90% of the products produced (for 01 production line)</li> <li>- The Company faces following problems               <ul style="list-style-type: none"> <li>○ NFB market develops but quality of the bricks is not the same for every NFB producer. The market is mix of qualified and non-qualified NFBs and this makes difficult to the good NFB producers.</li> <li>○ Cracking problems regarding NFB occurred more if compared to FCB. This is partly due to not sufficient moisturizing the brick before constructed and</li> </ul> </li> </ul>

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	<p>brick walls after constructed (1 hour after wall is formed); To reduce the problem, Dai Dung Green materials JSC provides introductions of FB use for buyers or sending technical people to on-side training for big customers. By this the cracking problems are reduced. However, this is a tiring process. In many cases, the trainings have been provided or the introduction of NFB use have been given but the workers do not follow.</p> <ul style="list-style-type: none"> <li>○ To promote NFB use in the market, there needs involvement of the GoV and other stakeholders to raise awareness and provide further trainings to various target groups, for instance: providing training to Leader engineers of the contractors, internal building procedures, appraise construction capacity of the contractor &amp; construction documents, etc. Certificates of building techniques provide to workers are recommended to ensure quality of construction activities, using NFB.</li> <li>○ In the Southern part of VN, people often use CBB with small sizes, this size is not good for NFB as it’s easy to crack in small sizes. The small NFB sized requires bigger foundation for the construction works, because the NFB has less porosity and therefor need heavier bigger, compared to large NFB larger sizes. Larger NFB bigger sizes are lighter, less cracks when applied in practices → low costs <ul style="list-style-type: none"> <li>→ it’s recommended that the GoV to help changing consumers’ habits or issuing official regulation/standard with NFB size requirement), adopting technical design instruction for buildings using NFB so that NFB technical construction requirements are included in the building’s design from the beginning;</li> </ul> </li> </ul>
<p><b>9. Meeting with Division of Construction Material, HCM DOC (Jan 9, 2020)</b></p>	<p>Since implementation of national program 567 of the Prime Minister on Non-fired Construction Material to 2020, circular No 9/2012-TT-BXD which is then replaced by circular 13/2017/TT-BXD regulating use of NFB in governmental buildings and in building with 9-floor up, Ho Chi Minh City pro-has actively deployed implementation Non-Fired construction material (NFCM) by 2020; People Committee of HCM City adopted a number of decisions, plans such as</p> <ul style="list-style-type: none"> <li>- Decision No. 2491/QD-UBND dated May 21, 2011 of HCM CPC approving the City’s Planning for Development of Construction Materials by 2020. The Decision encourages enterprises to produce NFB to server for the City’s demand. Also following the decision, all FCB kilns, including Hofman Kilns have been eliminated.</li> <li>- Directive No 04/2013/CT-UBND dated January 28, 2013 on promoting uses of NFCMs in construction works in the City, to address issues preventing development of NFCM, and issues associated to production, sale and use.</li> <li>- Decision No. 50/2015/QD-UBND dated October 30, 2015 of HCM CPC encouraging investment and Demand in the City, including investment in NFCM production, by provision of loans with zero interests.</li> <li>- Adoption of Plan No. 4945/KH-SXD-VLXD dated April 26, 2019 on improving quality of Growth, competitiveness of the city’s Economy, in order to implement NFCM, to reduce environmental pollution, energy savings, following decision No. 567/QD-TTg</li> </ul>

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	<p>and Circular 13/2017/TT-BXD dated December 08, 2017 of MoC regulating use of NFB in construction works (previously is Circular No. 09/2012/TT-MoC);</p> <ul style="list-style-type: none"> <li>- Help 10 NFB enterprises in the city to publicize prices of NFB</li> <li>- DOC in 2019 conducted monitoring and inspecting 351 construction works compulsory to use NFB and identified 06 of the inspected did not compliance requirement of NFB use. If calculated from 2013 to date, 39 construction works did not comply with the regulation on NFB using. The violated enterprises have to pay fine of about VND 30- 40 billion. However, comparing the fine the enterprises have to pay due to non-compliance to NFB regulation, there seems no problem to the violated enterprises, because the money the have to use for fix cracking problem (due to NFB used) seems bigger the amount they pay for their violation.</li> <li>- By implementation of various solutions in the City, 48 projects have been appraised and approved; 53 projects, subjects to compulsory use of NFB, have been awarded construction permits; Accumulate since 2013 to date, there are in the City 1,420 projects compulsory to use NFB. Of these 583 projects have completed its construction; the number of enterprises invested in NFB production increases from 4 in 2013 to 25 enterprises in 2019.</li> <li>- Cooperation activities with NFB Project:             <ul style="list-style-type: none"> <li>o 2016: organize an NFB training course in the City to all District Peoples’ Committees, technical staff, managers of NFB enterprises, those who are planning to invest in NFB production.</li> <li>o 2017: organize a training course to 27 City staff in design and construction techniques for NFB; Communication and awareness raising on NFB. Etc.</li> <li>o 2019: Discussion with the project on solutions to promote development of NFB in the City; organizing a training course on construction and acceptance method of construction works using NFB.</li> </ul> </li> </ul> <p>With the above cooperation, use of NFB are increasingly in the city</p>

## Annex F: List of Documents Reviewed

(And other references as available in Dropbox created for the TE purpose)

	Particulars
Project Document	Final Version signed Nov 14, 2014
Inception Workshop Report	Conducted January 2015
Mid-term review (MTR) report of project	Conducted Oct 2017
Project Fact sheets	Various topics
Annual Work Plans (AWP)	2015, 2016, 2017, 2018, 2019
Project progress report (PPR)	2015, 2016, 2017, 2018, 2019
Annual Project Report/ Project Implementation Review (APR/PIR) till 2019	2015, 2016, 2017, 2018, 2019
Minutes of Project Technical Committee/Project Steering Committee meetings	PSC #3 (Jan 17, 2017); PSC #4 (Jan 18, 2018); PSC # 5(Jan 22, 2019)
Quarterly Reports	2015, 2016, 2017, 2018, 2019
Back to office reports of UNDP staff and PMU	
Study reports/Conference proceedings/government guidelines, etc.	Several instances
Project communication documents	
Project Training materials	
Report of implementing training courses of modules 1, 3, 4, 5 in Hanoi and Binh Duong	Sep 2016
Report of implementing training courses of modules 1,4, 5 in Ho Chi Minh City	Oct 2016
Report of implementing training courses of modules 1, 2,4 in Can Tho	May 2017
Report of implementing training courses of modules 1, 2,4 in Da Nang	June 2017
Report of implementing training courses of modules 1, 2,4 in Nha Trang	Sep 2017
Assessment of Result, efficiency and the impact of training program (report 3) – summary report	Oct 2019
Synthesis report – Results of implementing tasks	2019
Evaluation of the results and the impacts of the Demonstration and replication programs and financial assistance of NFB production	February 2020
Final report of the project	March 2020
Report of Market survey for NFB	
Baseline reports, consultancy inputs for implementation, post commissioning measurement studies, etc.	PIF preparation and LFA
GEF Monitoring & Evaluation Policy	TOR
GEF Focal Area tracking tools at baseline, midterm, and terminal points of the project	At endorsement and MTR
Knowledge products	Various packages
UNDP Development Assistance Framework (UNDAF)	With TOR online

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	<b>Particulars</b>
UNDP Country Programme Document (CPD)	With TOR online
UNDP Country Programme Action Plan (CPAP)	With TOR online
GEF focal area strategic program objectives	With TOR online
Other publications prepared under the Project	Various packages
Other publications prepared by partners outside project	Online
Several reference materials and data sheets	Provided by PMU

## Annex G: Evaluation Question Matrix – NFB Project TE

Evaluative Criteria	Questions	Indicators	Sources <sup>25</sup>	Methodology
<b>1. Relevance:</b> <i>How does the project relate to the main objectives of the GEF focal area, and to the environment and development priorities at the local, regional and national levels?</i>				
Is the project relevant to National priorities and commitment under international conventions?	Is the project country-driven? Did the (political, energy, social, institutional) context change during project implementation and how did the project adapt to this?	Participation of the stakeholders and beneficiaries	PIR, Field reports and UNDP CO Viet Nam assessments	Document analysis and interviews
	Does the project adequately take into account the national realities, both in terms of institutional and policy framework in its design and its implementation?	Government programs and laws and regulations passed	Copies of policy pronouncements	Document analysis and interviews
	How effective is the project in terms of supporting and facilitating needs of the building sector through efficient production of resource-efficient bricks?	Participation of the stakeholders and beneficiaries Relevant impacts on efficiency improvement	PIR, Field reports and UNDP CO Viet Nam assessments Energy audits reports on the selected brick kilns	Document analysis and interviews Field visits and inspections

<sup>25</sup> Various sources, but not limited to project document, project reports, national policies & strategies, key project partners & stakeholders, needs assessment studies, data collected throughout monitoring and evaluation, data reported in project annual & quarterly reports etc.

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	<p>What was the level of stakeholder participation in project design and ownership in project implementation?</p> <p>Whether gender issues had been taken into account in project design and implementation and in what way has the project contributed to greater consideration of gender aspects, (i.e. project team composition, gender-related aspects of pollution impacts, stakeholder outreach to women’s groups, etc.). If so, indicate how</p>	Satisfaction of the stakeholders and beneficiaries	PIR, Field reports and UNDP CO Viet Nam assessments	Document analysis and interviews
Is the project internally coherent in its design?	<p>Are there logical linkages between expected results of the project (log frame) and the project design (in terms of project components, choice of partners, structure, delivery mechanism, scope, budget, use of resources etc.)?</p> <p>Is the project Log Frame at <b>Annex A</b> as updated in the MTR in 2018, officially adopted and uploaded in GEF M&amp;E and used effectively in the PIRs 2018 and 2019?</p>	Number/degree of changes in the log frame and targets	MTR report UNDP CO Viet Nam assessments PMU Reports	Document analysis and interviews
	Even after one extension, does the project achieve its expected outcomes	Performance improvement and deliveries as a result of extensions	PIR PMU report UNDP CO Viet Nam assessments	Document analysis and interviews
	How did the project make satisfactory accomplishment in achieving project outputs (both in quantity and quality) vis-à-vis the targets and related delivery of inputs and activities?	Achievement of targets Explanation on non-achievement	PIR PMU report UNDP CO Viet Nam assessments	Document analysis and interviews

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Does the project provide relevant lessons and experiences for other similar projects in the future?	Has the experience of the project provided relevant lessons for other future projects targeted at similar objectives?	lessons learned reported	PIR PMU report UNDP CO Viet Nam Lessons learned reports	Document analysis and interviews
<b>2. Effectiveness: The extent to which an objective has been achieved or how likely it is to be achieved?</b>				
Does the project been effective in achieving the expected outcomes and objectives?	Whether the performance measurement indicators and targets used in the project monitoring system are accomplished and able to achieve desired project outcomes within the project duration at EOP? To what extent the project has been successful in influencing government agencies to mainstream NFB into policy and regulatory framework? If present, what have been the main reasons for delay/changes in implementation? Have these affected project execution, costs and effectiveness?	Achievement of targets under each outcomes – to be rated	Project Framework (logframe) in the GEF-Approved project document and subsequent revisions approved by UNDP/GEF PIR	Document analysis and interviews Completion of data and analysis in the Annex C: Evaluation of achievements based on the logframe targets or any revision thereof
Project implementation and management	Where there any operational and political / institutional problems and constraints that influenced the effective implementation of the project, and how did the project tried to overcome these problems? Was adaptive management applied adequately? Were any cost- or time saving measures put in place in attempting to bring the project as far as possible in achieving its results within its secured budget and time?	Number of identified problems/constraints		
Stakeholder participation, cooperation and partnerships	What was the achieved degree and effectiveness of collaboration and interactions between the	Level of participation of project partners in project		

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	various project partners and stakeholders during implementation of the project?	implementation arrangements		
Country ownership and divineness	How well did the project stimulate country ownership of project outputs and outcomes?	Perception of ownership by national and local agencies		
Financial planning and management	To what extent co-financing has materialized as expected at project approval?			
Monitoring and evaluation implementation	Was the M&E system operational and facilitated timely tracking of results and progress towards projects objectives throughout the project implementation period? Were the results used to improve project performance and to adapt to changing	Level of implementation of M&E system (execution of activities) • Changes in project implementation as result of MTE or other supervision visits		
How is risk and risk mitigation being managed?	How well are risks, assumptions and impact drivers being managed?	Risks identified and managed	PIR PMU reports	Document analysis and interviews
	What was the quality of risk mitigation strategies developed? Were these sufficient?	Quality assessment	PIR PMU reports	Document analysis and interviews
	Are there clear strategies for risk mitigation related with long-term sustainability of the project?	Risk mitigation done	PIR PMU reports	Document analysis and interviews
Consideration of recommendations and reporting of information	Did the project consider Midterm Review recommendations conducted on time and reflected in the subsequent project activities?	Compliance with agreed MTR recommendations Fuel saving achieved	PIR PMU reports Field reports	Document analysis and interviews

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	Reporting of the petroleum fuels and the power reduction in each of the model units from implementing NFB options and the corresponding carbon emission reductions.		UNDP CO Viet Nam assessments	
What lessons can be drawn regarding effectiveness for other similar projects in the future?	What lessons have been learned from the project regarding achievement of outcomes?	Lessons learned reported	PIR PMU reports Field reports UNDP CO assessments	Document analysis and interviews
	What changes could have been made (if any) to the project design in order to improve the achievement of the project’s expected results?	Nature of changes in indicators and targets	PIR PMU Reports UNDP CO assessments	Document analysis and interviews
<b>3. Efficiency:</b> <i>Was the project implemented efficiently, in-line with international and national norms and standards and delivered results with the least costly resources possible?</i>				
Was project support provided in an efficient way?	How does the project management systems, including progress reporting, administrative and financial systems and monitoring and evaluation system were operating as effective management tools, aid in effective implementation and provide sufficient basis for evaluating performance and decision making?	Problems identified and addressed	PIR PMU Reports UNDP CO assessments	Document analysis and interviews
	How effective was the adaptive management practiced under the project and lessons learnt?	Adaptive management actions reported and results	PIR PMU Reports UNDP CO assessments	Document analysis and interviews
	Did the project logical framework and work plans and any changes made to them used as management tools during implementation?	Satisfaction by the PMU and co-operating agencies in using the Log Frame as management tool	PIR PMU Reports UNDP CO assessments	Document analysis and interviews

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	Utilization of resources (including human and financial) towards producing the outputs and adjustments made to the project strategies and scope.	Resource inventory and utilization indices Extent of adjustments done and results	PIR PMU Reports UNDP CO assessments Field reports	Document analysis and interviews
	Details of co-funding provided (Ministry of Science and Technology, Government of Viet Nam and Financing Units) and its impact on the activities (Refer to Table in section 6. Project Finance / Co-Finance).	Ratio of co-financing actually realized vs. committed values	PIR PMU Reports UNDP CO assessments	Document analysis and interviews
	How does the APR/PIR process helped in monitoring and evaluating the project implementation and achievement of results?	Satisfaction of the PMU and UNNP CO in using it as management M&E tool	Assessment reports of PIRs	Document analysis and interviews
How efficient are partnership arrangements for the project?	Appropriateness of the institutional arrangement and whether there was adequate commitment to the project?	Level of partnership developed vs. committed level	PIR PMU Reports UNDP CO assessments	Document analysis and interviews
	Was there an effective collaboration between institutions responsible for implementing the project?	Level of collaboration achieved	PIR PMU Reports UNDP CO assessments	Document analysis and interviews
	Is technical assistance and support received from project partners and stakeholders appropriate, adequate and timely specifically for project PMU?	Level of satisfaction by PMU	PMU Reports UNDP CO assessments	Document analysis and interviews
<b>4. Sustainability: To what extent are there financial, institutional, social-economic, and/or environmental risks to sustaining long-term project results?</b>				
Will the project be sustainable on its conclusion and stimulate replications and its potential?	How effective is the project in terms of strengthening the capacity of building sector professionals	Satisfaction level of professionals accessing project results	PMU Reports UNDP CO assessments	Document analysis and interviews

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	Was an exit strategy prepared and implemented by the project? What is the “Expected situation at the end of the Project”	Coy of Exit Strategy	Exit strategy report UNDP Assessment	Document analysis and interviews
	Appropriateness of the institutional arrangement and whether there was adequate commitment to the project. Is the level of ownership by the main national and regional stakeholders sufficient to allow for the project results to be sustained?	Level of commitment through results realized	PMU Reports UNDP CO assessments	Document analysis and interviews
<b>5. Impact:</b> Are there indications that the project has contributed to, or enabled progress towards maximizing environmental benefits?				
What was the project impact under different components?	To what extent has the project contributed to the following? <ul style="list-style-type: none"> <li>• Direct project and post-project CO2 emission reductions resulting from the NFB plant investments and technical assistance</li> <li>• Direct energy saving (TOE) from displacement of coal through the demonstration NFB plants (3 CBB plants and one AAC plant and 21 replication project during project time)</li> <li>• Institutional Arrangements Strengthened</li> </ul>	0.088 <sup>26</sup> (direct project) + 1.270 <sup>27</sup> (direct post-project) Mt CO <sub>2</sub> emission reduction  30,782 TOE / year energy savings  Annual targets for 2018 and 2019  Institutional Arrangements Strengthened	<b>Annex F:</b> Evaluation of achievements based on the logframe targets or any revision thereof	Document analysis and interviews

<sup>26</sup> This is the direct emission reduction during the course of the 5-year Project

<sup>27</sup> This is the direct post-project emission reduction from NFB plants that received technical assistance from Project Output 4.9 during Years 4 and 5 to be implemented after EOP

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	<ul style="list-style-type: none"> <li>• Effective Information Dissemination Program Developed</li> <li>• Stakeholders capacity enhanced</li> </ul>	Information programs developed		
What are the indirect benefits that can be attributed to the project?	Were there spinoffs created by the project, if any, as a result of the various workshops held nationwide, toolkits, case studies developed?	Spin-offs created	PMU Reports UNDP CO assessments	Document analysis and interviews
Impacts due to information dissemination under the project	To what extent did the dissemination activities facilitate the progress towards project impacts?	Level of dissemination of results achieved	PIR PMU Reports UNDP CO Viet Nam assessments	Document analysis and interviews

## Annex H: Target and Actual Achievement in Updated Project Log Frame Outcomes, their Ratings and Rating Scale Used

Strategy (objective/ outcome)	Indicators	Target Level at End of Project (EOP)	Pre-MTR (2015-17) Accomplishments	Target/ Actual	2018	2019	Rating
<b>Project Objective:</b> Reduce the annual growth rate of GHG emissions by displacement of fossil fuel use and the usage of good quality soil for brick making through the increased production, sale and utilization of non-fired bricks (NFB’s) in Viet Nam	<ul style="list-style-type: none"> <li>Cumulative direct project and post-project CO<sub>2</sub> emission reductions resulting from the NFB plant investments and technical assistance by EOP, Mtons CO<sub>2</sub>.</li> </ul>	<ul style="list-style-type: none"> <li>0.088[1] (direct project) + 1.270[2] (direct post-project) Mt CO<sub>2</sub> emission reduction</li> </ul>	<ul style="list-style-type: none"> <li>0.007251 Mt CO<sub>2</sub> emission reduction</li> </ul>	Target	<ul style="list-style-type: none"> <li>0.029</li> </ul>	<ul style="list-style-type: none"> <li>0.088 (direct project) + 1.270 CO<sub>2</sub> reduction]</li> </ul>	HS
				Actual	<ul style="list-style-type: none"> <li>0.060712 Mt CO<sub>2</sub> emission reduction</li> </ul>	<ul style="list-style-type: none"> <li>0.380116 Mt CO<sub>2</sub>, direct emission reduction<sup>28</sup></li> <li>1.513 Mt CO<sub>2</sub>, direct Post project emission reduction<sup>29</sup></li> <hr/> <li>1.893 Mt CO<sub>2</sub> Total</li> </ul>	
		<ul style="list-style-type: none"> <li>Cumulative direct energy saving (toe) from displacement of coal through the demonstration NFB plants (3 CBB plants and one</li> </ul>	<ul style="list-style-type: none"> <li>30,782 TOE energy savings</li> </ul>	<ul style="list-style-type: none"> <li>4,817.4 toe energy savings</li> </ul>	Target	<ul style="list-style-type: none"> <li>10,261</li> </ul>	<ul style="list-style-type: none"> <li>30,782</li> </ul>
	<ul style="list-style-type: none"> <li>At least 25 (4 demo + 21 replication) production lines in</li> </ul>	7		Target	20	25	

<sup>28</sup> The value is calculated based on difference between CO<sub>2</sub> emission reduction resulting from the total NFB’s outputs produced by 4 demo projects + 22 replication projects as compared to the CO<sub>2</sub> emission reduction of the same number of FCBs outputs (Higher results as compared to previous are caused by counting in the NFB’s produced by 22 replication projects). Details can be seen in **Annex J**.

<sup>29</sup> The direct post project CO<sub>2</sub> is calculated based on the cumulative NFB SBUs produced by 4 demo projects and 22 replication projects for 10 years period during 2020-2030

<sup>30</sup> The value is calculated based on difference between energy saving resulting from the total NFB’s outputs produced by 4 demo projects + 22 replication projects in and the energy saving of the same number of FCBs outputs. Details can be seen in **Annex J**.

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Strategy (objective/ outcome)	Indicators	Target Level at End of Project (EOP)	Pre-MTR (2015-17) Accomplishments	Target/ Actual	2018	2019	Rating
	AAC plant and 21 replication project during project time) by EOP	operation using modern technology		Actual	19	26	
Outcome 1: Approval and enforcement of an improved legal framework to encourage NFB production and use, and enhanced government capacity and knowledge to regulate NFB development and usage	<ul style="list-style-type: none"> <li>Number of policies, regulations and standards approved and enforced to encourage the increase in the production and usage of NFB and decrease the use of FCB’s</li> </ul>	10 plans/policies	4 policies approved	Target	10 polices, regulations /standards	15 policies	HS
		Per the MTR, the target was revised to <ul style="list-style-type: none"> <li>13 additional policies approved and enforced to encourage NFB development (Investment, production and use) and decrease FCB usage by EOP</li> </ul>		Actual	15 policies	16 policies <i>(Please see below the list of policies developed/ issued by GoV)</i>	
		<ul style="list-style-type: none"> <li>2 standards/ policies approved to promote local manufacturers of NFB equipment and technology by year 4</li> </ul>	0	Target	02	02	S
				Actual	01	02	
		<ul style="list-style-type: none"> <li>3 standards/ regulations approved by year 3 to govern quality of NFB’s</li> </ul>	03 standard (TCVN) on NFB (concrete bricks) approved for governance of NFB quality	Target	-	3 (TCVN on NFB panel products)	HS
				Actual	-	6 (TCVN on NFB panel products) approved by MoC and MoST	

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Strategy (objective/ outcome)	Indicators	Target Level at End of Project (EOP)	Pre-MTR (2015-17) Accomplishments	Target/ Actual	2018	2019	Rating
	<ul style="list-style-type: none"> <li>Number of developed regulations, building standards and codes governing the use of NFB’s in the construction sector approved and enforced by Year 3</li> </ul>	3	1	The indicator was removed as recommended by MTR			
	<ul style="list-style-type: none"> <li>Number of standards/norms on energy efficiency (EE) and emissions reduction in NFB production developed and recommended for approval</li> </ul>	<ul style="list-style-type: none"> <li>2 standards/ norms on energy efficiency and emission reduction in NFB’s production adopted by Year 3</li> </ul>	0	Target	2	2	S
Actual				0	2		
	<ul style="list-style-type: none"> <li>Enhanced government capacity to</li> </ul>	100 (original PD)  Per the MTR, the target was revised to	186 government staff trained on various aspects of NFB	The indicator was moved to component 2	the indicator was moved to component 2	By EOP, 940 government officers at national and provincial level trained	HS

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Strategy (objective/ outcome)	Indicators	Target Level at End of Project (EOP)	Pre-MTR (2015-17) Accomplishments	Target/ Actual	2018	2019	Rating
	improve NFB regulation, control and mandate NFB’s production and markets	<ul style="list-style-type: none"> <li>By EOP, 940 government officers at national and provincial level trained on various aspects of NFB’s (types, characteristics, requirement for control and promotion of NFB manufacturing, production technology, usage, etc.)</li> </ul>		Actual		1,000	
	<ul style="list-style-type: none"> <li>Number of NFB plants that are compliant to new NFB quality control regulations and standards by EOP (This indicator will no longer be tracked, in line with the MTR)</li> </ul>	6	4	The indicator was removed as recommended by MTR			
	<ul style="list-style-type: none"> <li>Number of building projects that are using new building codes that define and mandate the use of NFB’s by EOP</li> </ul>	6	0	The indicator was removed as recommended by MTR			

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Strategy (objective/ outcome)	Indicators	Target Level at End of Project (EOP)	Pre-MTR (2015-17) Accomplishments	Target/ Actual	2018	2019	Rating
Outcome 2: Increased availability of technically skilled and qualified local service providers for NFB plants, and enhanced stakeholder knowledge on NFB usage.	<ul style="list-style-type: none"> <li>Number of new NFB plants that were designed and constructed by local engineering firms based on new NFB technical guidelines by EOP</li> </ul>	6	2	The indicator was removed as recommended by MTR			
	<ul style="list-style-type: none"> <li>Number of local firms that can manufacture NFB plant equipment based on set standards developed under this project</li> </ul>	<ul style="list-style-type: none"> <li>1 local firm able to manufacture NFB plants’ equipment based on set of standards developed under this project by Year 4.</li> </ul>	0	Target	0	1	S
				Actual	0	1 (Thanh Phuc Company - NFB Mold standard)	
	<ul style="list-style-type: none"> <li>Number of building developers and owners used NFB’s as building construction materials</li> </ul>	<ul style="list-style-type: none"> <li>300 building developers and owners correctly use NFB’s as building construction material by EOP</li> </ul>	70 buildings using NFB	Target	100		HS
				Actual	1536 buildings using NFB	2,115 (NFB Buildings -MoC data) <sup>31</sup>	
	<ul style="list-style-type: none"> <li>Enhanced technical skills and stakeholder</li> </ul>	Revised training targets (PMU):					
21 training courses						26	HS

<sup>31</sup> This figure was a result of the survey done by the local governments in terms of number of buildings. PMU explained that the number of buildings correspond to the number of building developers and owners (which is the indicator in the Log Frame).

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Strategy (objective/ outcome)	Indicators	Target Level at End of Project (EOP)	Pre-MTR (2015-17) Accomplishments	Target/ Actual	2018	2019	Rating
	knowledge/ information on NFB associated issues	50 provinces				63	
		<b>1,500</b> people, composed of:				<b>1,890</b>	
		940 gov and local officers				1,000	
		121 designers and constructors				270	
		399 NFB investors				492	
		40 people from other related areas				128	
		2 training courses for 60 people from vocational colleges of construction	0 (new indicator)	Target		2 training courses	
		Actual		0	2 training workshops to 10 construction workers and 10 supervisors <sup>32</sup>		
		A NFB website developed, maintained and updated regularly	30,000 visitors, 149 news, 19 articles produced	Target	80,000 visitors, 34 articles, 290 news	300,000 visitors; produced 15 articles and 150 news	N.A. <sup>33</sup>
				Actual	130.000 visitors; and with 149 news, 19 articles produce	250,000 visitors; produced __ articles and __ news A website page is available at <a href="http://en.duangachkhongnung.vn/">http://en.duangachkhongnung.vn/</a> hosted by VABM	

<sup>32</sup> No training is provided to the vocational construction colleges since these colleges no longer provide training to construction workers. Instead, the Project conducted 2 training workshops for 10 construction workers and 10 supervisors as part of activities to develop training documents and demonstrate the use of NFB's in construction work.

<sup>33</sup> Per the MTR, this indicator has been replaced with the new indicator “Enhanced technical skills and stakeholder knowledge” as listed above.

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Strategy (objective/ outcome)	Indicators	Target Level at End of Project (EOP)	Pre-MTR (2015-17) Accomplishments	Target/ Actual	2018	2019	Rating
						(Viet Nam Association for Building Materials)	
Outcome 3: Improved availability and sustained access to financial support for NFB technology applications	<ul style="list-style-type: none"> <li>Number of financing institutions providing financial products for NFB investments by Year 3;</li> </ul>	06 financing institutions providing loans to NFB investor	1 financing institutions providing loans to NFB investor	[The indicator was replaced by the below indicator since MTR]			
	<ul style="list-style-type: none"> <li>Loan volume provided by financial institutions (including commercial banks) for NFB investments (US\$)</li> </ul> <p>(This new indicator was set at MTR to replace the above one)</p>	<ul style="list-style-type: none"> <li>At least US\$24 million provided by financial institutions for NFB production investment by year 3</li> </ul>	US\$ 19.3 million	Target	+ VEPF - about US\$4.7 million for (09) projects + VietinBank medium-long term loan of US\$ 2,8 million for 9 projects	3 NFB investors accessed VEPF loan of about US\$ 1 million;  US\$ 25.2 Million of loan accumulative	HS
				Actual	US\$ 24.3 million	2 investors accessed VEPF;  US\$ 28.7 mil. for 40 SMEs by VEPF and Vietinbank	
<ul style="list-style-type: none"> <li>Number of SMEs and NFB entrepreneurs</li> </ul>	10 NFB SMEs (before MTR)	03 NFB SMEs get loans from financial institutions	Target		30 NFB SMEs get loans from financial institutions by EOP (10 NFB projects from VEPF and 20 projects from VietinBank)	HS	

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Strategy (objective/ outcome)	Indicators	Target Level at End of Project (EOP)	Pre-MTR (2015-17) Accomplishments	Target/ Actual	2018	2019	Rating
	with confirmed financing			Actual	30 NFB SMEs get loans from financial institutions	40 NFB enterprises (12 from VEPF; 28 from Vietinbank)	
Outcome 4: Boosted confidence in NFB technology application resulting in an increased market share of NFB's	<ul style="list-style-type: none"> <li>Number of NFB demonstration plants in operation</li> </ul>	<ul style="list-style-type: none"> <li>3 CBB demonstration plants operating at 90% designed capacity by EOP, with cumulative annual production of 65 million SBUs by EOP;</li> </ul>	03 demonstration projects implemented	Target	3 technical construction procedures; 20 staff/worker trained, 3 video produced	Demo completed with 1 technical construction procedure, 20 staff and workers trained and 1 video clip completed	S
				Actual	3 CBB demonstration projects implemented	3 CBB demonstration projects operating at 70% of design capacity, with cumulative annual production of 87.5 million SBUs <sup>34</sup>	
		<ul style="list-style-type: none"> <li>1 AAC demonstration plant operating at 90% designed capacity by EOP;</li> </ul>	0	Target	1AAC demonstration plant (Viglacera)	1AAC demonstration plant (Viglacera) received completed technology and management measures to improve production efficiency and energy efficiency	S

<sup>34</sup> The operational capacity is lower, due to the greater increase of NFB production compared to the smaller increase in the NFB demand

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Strategy (objective/ outcome)	Indicators	Target Level at End of Project (EOP)	Pre-MTR (2015-17) Accomplishments	Target/ Actual	2018	2019	Rating
				Actual	Viglacera got technical support from the project to improve production and energy efficiency	1 AAC demonstration plant operating at 74% design capacity and production output which ranges 71.0 – 103.5 million SBUs depending on demand <sup>35</sup>	
	<ul style="list-style-type: none"> <li>Number of NFB plants received technical assistance on optimization of raw materials,</li> </ul>	With the project support, it's expected by EOP:	4 replication projects received technical assistance and technical guideline	Target	18 replication project received technical assistance from the project	22 replication projects received technical assistance from the project	HS
		<ul style="list-style-type: none"> <li>21 NFB plants (replication projects)</li> </ul>					

<sup>35</sup> The plant has increased the designed production capacity from 100,000m<sup>3</sup> to 200,000m<sup>3</sup> since November 2018, with technical support by the project in improved EE, production efficiency and optimal mix of inputs materials.

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Strategy (objective/ outcome)	Indicators	Target Level at End of Project (EOP)	Pre-MTR (2015-17) Accomplishments	Target/ Actual	2018	2019	Rating
	product quality control procedures, staff training and technology transfer, feasibility studies planned and operated	received direct support in development of feasibility studies, optimization of inputs materials, production management, quality control, etc. and operated;		Actual	16 SMEs get the project supports on preparation of FS, loan application, Production and quality procedures; optimizing mix of raw materials, application of solar energy in NFB curing, etc.	22 replication projects	
		<ul style="list-style-type: none"> <li>50 NFB plants with approved investment plan</li> </ul>	15 NFB plants	Target		50	HS
			Actual	32	53		
	<ul style="list-style-type: none"> <li>% of market share of NFB’s in the local brick market</li> </ul>	<ul style="list-style-type: none"> <li>25 % of the NFB market share in the local brick markets by EOP</li> </ul>	New indicator since MTR	Target	13%	25 %	HS
			Actual	24%	28.5% of the NFB market share (Project survey, calculated based on consumption of NFB)		

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Strategy (objective/ outcome)	Indicators	Target Level at End of Project (EOP)	Pre-MTR (2015-17) Accomplishments	Target/ Actual	2018	2019	Rating
						against the total consumption of bricks estimated for 2019) <sup>36</sup>	

**List of Policies Issued by Provincial GoV up to EOP**

- 1) Lao Cai Provincial Development Planning of construction materials until 2020, with a vision to 2030
- 2) Nam Dinh Provincial Development Planning of construction materials till 2020, with vision to 2030
- 3) Bac Kan Provincial Plan on the Implementation of the roadmap to remove traditional FCB kilns;
- 4) Tien Giang Provincial development plan for construction materials to 2020, with a vision to 2030;
- 1) An Giang Provincial Development plan for construction materials to 2020 and vision to 2030
- 2) Khanh Hoa Provincial Development plan for construction materials to 2020 and vision to 2030;
- 3) Hai Duong Provincial development plan for construction material to 2020 and vision to 2030;
- 4) Lai Chau Provincial Development plan for building materials to 2020 and vision to 2030;
- 5) An Giang Provincial Development plan for construction materials to 2020 and vision to 2030;
- 6) Thua Thien Hue Provincial Development plan for building materials till 2020 and vision to 2030;
- 7) Binh Dinh Provincial revised Development Plan for building materials till 2020 and vision to 2030;
- 8) Lam Dong Provincial Plan for ending production of Fired Clay Brick (FCB) traditional kilns, using outdated technology;
- 9) Ninh Thuan Provincial Development Plan for building materials till 2020 and a roadmap for elimination of traditional FCB kilns;
- 10) Kon Tum Provincial Directive on Production of NFB in the province;
- 11) Can Tho Provincial plan for ending production of traditional FCB kilns using outdated technology for period 2017- 2020;

<sup>36</sup> Based on the survey done by the project. The survey covered the installed production capacity, actual production outputs, and consumption of both NFB and FCB of 63 provinces. Data was provided by the Departments of Construction of 63 on annual basis during 2016-2020. The market share of NFB’s (28.5%) is calculated based on the consumption of NFB against the total consumption bricks estimated for 2019

**Annex H1. Rating Scales Used**

There are two rating scales that appeared during the TE:

a) **TE TOR Rating Scale:** This is the rating scale indicated in Annex D of the TE TOR as seen attached herewith as Table H1a.

Based on the definition in this rating scale, if the Output achieved is exceeding what was the targeted level in the ProDoc, the rating awarded is HS, especially if there are no shortcomings experienced and/or reported. The implementation performance is not highlighted in detail, and therefore, generalized.

**Table H1a. TE TOR Ratings Definitions**

(As indicated in Annex D of the NFB Project Terminal Evaluation Terms of Reference (TE TOR))

Rating Scales		
<p><b>Ratings for Outcomes, Effectiveness, Efficiency, M&amp;E, I&amp;E Execution</b></p> <p><b>6: Highly Satisfactory (HS):</b> The project had no shortcomings in the achievement of its objectives in terms of relevance, effectiveness, or efficiency</p> <p><b>5: Satisfactory (S):</b> There were only minor shortcomings</p> <p><b>4: Moderately Satisfactory (MS):</b> there were moderate shortcomings</p> <p><b>3. Moderately Unsatisfactory (MU):</b> the project had significant shortcomings</p> <p><b>2. Unsatisfactory (U):</b> there were major shortcomings in the achievement of project objectives in terms of relevance, effectiveness, or efficiency</p>	<p><b>Sustainability ratings:</b></p> <p><b>4. Likely (L):</b> negligible risks to sustainability</p> <p><b>3. Moderately Likely (ML):</b> moderate risks</p> <p><b>2. Moderately Unlikely (MU):</b> significant risks</p> <p><b>1.Unlikely (U):</b> severe risks</p>	<p><b>Relevance ratings:</b></p> <p>2. relevant (R) 1. Not relevant (NR)</p> <p><b>Impact ratings:</b></p> <p>3. Significant (S) 2. Minimal (M) 1. Negligible (N)</p>

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<b>1. Highly Unsatisfactory (HU):</b> The project had severe shortcomings		
<i>Additional ratings where relevant:</i> Not Applicable (N/A) Unable to Assess (U/A)		

**Table H1b. PIR Ratings Definitions**

<p><u>Development Objective Progress Ratings Definitions</u></p> <p>(HS) Highly Satisfactory: Project is on track to exceed its end-of-project targets and is likely to achieve transformational change by project closure. The project can be presented as 'outstanding practice'.</p> <p>(S) Satisfactory: Project is on track to fully achieve its end-of-project targets by project closure. The project can be presented as 'good practice'.</p> <p>(MS) Moderately Satisfactory: Project is on track to achieve its end-of-project targets by project closure with minor shortcomings only.</p> <p>(MU) Moderately Unsatisfactory: Project is off track and is expected to partially achieve its end-of-project targets by project closure with significant shortcomings. Project results might be fully achieved by project closure if adaptive management is undertaken immediately.</p> <p>(U) Unsatisfactory: Project is off track and is not expected to achieve its end-of-project targets by project closure. Project results might be partially achieved by project closure if major adaptive management is undertaken immediately.</p> <p>(HU) Highly Unsatisfactory: Project is off track and is not expected to achieve its end-of-project targets without major restructuring.</p>
<p><u>Implementation Progress Ratings Definitions</u></p> <p>(HS) Highly Satisfactory: Implementation is exceeding expectations. Cumulative financial delivery, timing of key implementation milestones, and risk management are fully on track. The project is managed extremely efficiently and effectively. The implementation of the project can be presented as 'outstanding practice'.</p> <p>(S) Satisfactory: Implementation is proceeding as planned. Cumulative financial delivery, timing of key implementation milestones, and risk management are on track. The project is managed efficiently and effectively. The implementation of the project can be presented as 'good practice'.</p> <p>(MS) Moderately Satisfactory: Implementation is proceeding as planned with minor deviations. Cumulative financial delivery and management of risks are mostly on track, with minor delays. The project is managed well.</p> <p>(MU) Moderately Unsatisfactory: Implementation is not proceeding as planned and faces significant implementation issues. Implementation progress could be improved if adaptive</p>

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management is undertaken immediately. Cumulative financial delivery, timing of key implementation milestones, and/or management of critical risks are significantly off track. The project is not fully or well supported.

(U) Unsatisfactory: Implementation is not proceeding as planned and faces major implementation issues and restructuring may be necessary. Cumulative financial delivery, timing of key implementation milestones, and/or management of critical risks are off track with major issues and/or concerns. The project is not fully or well supported.

(HU) Highly Unsatisfactory: Implementation is seriously under performing and major restructuring is required. Cumulative financial delivery, timing of key implementation milestones (e.g. start of activities), and management of critical risks are severely off track with severe issues and/or concerns. The project is not effectively or efficiently supported.

## Annex I: GEF Fund and Co-Financing

**Table I.1: Project Financial Performance under the GEF & UNDP Funded Components, as of January 30, 2020, including anticipated expenses up to EOP**

Project Strategy	Total Budgeted Amounts for all Years (Revised) [A]	Total Expenses up to MTR	Budgeted (US\$) (Revised)			Actual Expenses (US\$) as of January 31, 2020 (including anticipated)			Total Actual Expenses [B]+[C]	Percent of Actual Total Expenses/ Total Budgeted (%)
		Year 1 -3	Year 4	Year 5	Total	Year 4	Year 5	Total Yr 4&5 [C]		[B+C]/[A]
		2015-2017								
		[B]	2018	2019	Year 4 to 5	2018	2019			
<b>Outcome 1: Approval and enforcement of an improved legal framework to encourage NFB production and use, and enhanced government capacity and knowledge to regulate NFB development and usage</b>										
Output 1.1		52,070			-	-	-	-	52,070	
Output 1.2		36,288	6,750		6,750	11,876	-	11,876	48,164	
Output 1.3		13,458	64,500	13,000	77,500	61,271	12,548	73,819	87,277	
Output 1.4		212,843	67,118	44,627	111,745	54,124	47,224	101,348	314,191	
Output 1.5		6,929	23,200		23,200	21,163	-	21,163	28,092	
Output 1.6					-	-	-	-	-	
Output 1.7			19,000		19,000	15,932	-	15,932	15,932	
Output 1.8				60,000	60,000	-	62,334	62,334	62,334	

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Project Strategy	Total Budgeted Amounts for all Years (Revised) [A]	Total Expenses up to MTR	Budgeted (US\$) (Revised)			Actual Expenses (US\$) as of January 31, 2020 (including anticipated)			Total Actual Expenses [B]+[C]	Percent of Actual Total Expenses/ Total Budgeted (%)
		Year 1 -3	Year 4	Year 5	Total	Year 4	Year 5	Total Yr 4&5 [C]		[B+C]/[A]
		2015-2017								
		[B]	2018	2019	Year 4 to 5	2018	2019	2019		
Output 1.9				26,400	26,400	-	26,410	26,410	26,410	
<b>Sub Total Outcome 1</b>	<b>568,550.00</b>	<b>321,588</b>	<b>180,568</b>	<b>144,027</b>	<b>324,595</b>	<b>164,366</b>	<b>148,516</b>	<b>312,882</b>	<b>634,470</b>	<b>111.59%</b>
<b>Outcome 2: Increased availability of technically skilled and qualified local service providers for NFB plants, and enhanced stakeholder knowledge on NFB usage</b>										
Output 2.1		20,000			-	-	-	-	20,000	
Output 2.2		99,586	25,000	7,744	32,744	31,338	8,946	40,284	139,870	
Output 2.3					-	-	-	-	-	
Output 2.4		458,158	92,310		92,310	65,801	-	65,801	523,959	
Output 2.5		12,123			-	-	-	-	12,123	
Output 2.6		21,551	11,500	5,500	17,000	7,809	6,871	14,680	36,231	
Output 2.7					-	25,892	4,258	30,150	30,150	
Output 2.8					-	-	-	-	-	
<b>Sub Total Outcome 2</b>	<b>562,820</b>	<b>611,418</b>	<b>128,810</b>	<b>13,244</b>	<b>142,054</b>	<b>130,840</b>	<b>20,075</b>	<b>150,915</b>	<b>762,333</b>	<b>135.45%</b>

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Project Strategy	Total Budgeted Amounts for all Years (Revised) [A]	Total Expenses up to MTR	Budgeted (US\$) (Revised)			Actual Expenses (US\$) as of January 31, 2020 (including anticipated)			Total Actual Expenses [B]+[C]	Percent of Actual Total Expenses/ Total Budgeted (%)
		Year 1 -3	Year 4	Year 5	Total	Year 4	Year 5	Total Yr 4&5 [C]		[B+C]/[A]
		2015-2017								
		[B]	2018	2019	Year 4 to 5	2018	2019	Year 4 to 5		
<b>Outcome 3: Improved availability and sustained access to financial support for NFB technology applications</b>										
Output 3.1		16,509			-	-	-	-	16,509	
Output 3.2					-	-	-	-	-	
Output 3.3		73,284	60,000	30,000	90,000	1,264	2,418	3,682	76,966	
Output 3.4					-	-	-	-	-	
Output 3.5		35,997	32,000	25,500	57,500	14,725	8,302	23,027	59,024	
Output 3.6			31,000	32,898	63,898	30,756	28,152	58,908	58,908	
Output 3.7			40,000	10,000	50,000	28,000	10,000	38,000	38,000	
Output 3.8			20,000	27,000	47,000	-	27,000	27,000	27,000	
<b>Sub Total Outcome 3</b>	<b>267,950.00</b>	<b>125,790</b>	<b>183,000</b>	<b>125,398</b>	<b>308,398</b>	<b>74,745</b>	<b>75,872</b>	<b>150,617</b>	<b>276,407</b>	<b>103.16%</b>
<b>Outcome 4: Boosted confidence in NFB technology application resulting in an increased market share of NFB’s</b>										
Output 4.1		139,015	21,732	21,731	43,463	21,909	21,757	43,666	182,681	
Output 4.2					-	-	-	-	-	

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Project Strategy	Total Budgeted Amounts for all Years (Revised) [A]	Total Expenses up to MTR	Budgeted (US\$) (Revised)			Actual Expenses (US\$) as of January 31, 2020 (including anticipated)			Total Actual Expenses [B]+[C]	Percent of Actual Total Expenses/ Total Budgeted (%)
		Year 1 -3	Year 4	Year 5	Total	Year 4	Year 5	Total Yr 4&5 [C]		[B+C]/[A]
		2015-2017								
		[B]	2018	2019	Year 4 to 5	2018	2019	2019		
Output 4.3		28,792			-	-	-	-	28,792	
Output 4.4					-	-	-	-	-	
Output 4.5		39,924			-	-	-	-	39,924	
Output 4.7		20,853	50,000	12,400	62,400	35,162	8,689	43,851	64,704	
Output 4.8		1,976	35,000	40,300	75,300	19,534	33,222	52,756	54,732	
Output 4.9		105,334	112,250	15,500	127,750	175,406	18,065	193,471	298,805	
Output 4.10		65,254	127,000	249,380	376,380	95,646	177,844	273,490	338,744	
<b>Sub Total Outcome 4</b>	<b>1,267,780.00</b>	<b>401,148</b>	<b>345,982</b>	<b>339,311</b>	<b>685,293</b>	<b>347,657</b>	<b>259,577</b>	<b>607,234</b>	1,008,382	<b>79.54%</b>
<b>Project management (including M&amp;E)</b>	<b>132,900</b>	<b>54,342</b>	<b>21,965</b>	<b>43,576</b>	<b>65,541</b>	<b>13,307</b>	<b>9,046</b>	<b>22,353</b>	76,695	<b>57.71%</b>
<b>TOTALS</b>	<b>2,800,000.00</b>	<b>1,514,286</b>	<b>860,325</b>	<b>665,556</b>	<b>1,525,881</b>	<b>730,915</b>	<b>513,086</b>	<b>1,244,001</b>	<b>2,758,287</b>	98.51%
<b>Anticipated Remaining Funds at EOP</b>									<b>41,713</b>	

Table I.2: Project Co-Financing Actually Realized vs. Commitment

Contributor	Classification	Committed Value of Inputs as indicated in ProDoc (USD)	Actual Co-Financing as of MTR (2015-2017) (USD)	Actual Co-Financing as of EOP (Dec 31, 2019) (USD)	% Realized
<b>ORIGINAL COMMITMENT (ProDoc)</b>					
<b>1. GOVERNMENT</b>		<b>8,220,000</b>	<b>4,227,322</b>	<b>12,356,000</b>	<b>150.32</b>
MoST	Grant (cash)	3,000,000	1,770,000	3,000,000	
MoC	Grant (cash)	1,000,000	1,356,000	1,356,000	
Local government (DOC Hai Duong)	In-kind	220,000			
VEPF	Soft loan	3,000,000	1,101,322	8,000,000	
NAFOSTED	Loan Guarantee	1,000,000	-		
<b>2. GEF Agency</b>		<b>550,000</b>	<b>305,000</b>	<b>550,000</b>	<b>100.00</b>
UNDP	In-kind	550,000	305,000	550,000	
<b>3. Private Sector</b>		<b>27,310,000</b>	<b>52,383,452</b>	<b>84,099,949</b>	<b>307.95</b>
<b>3.1. Viet Nam Association of Building Materials (VABM)</b>	<b>In-kind</b>	<b>110,000</b>	<b>34,700</b>	<b>50,000</b>	<b>45.45</b>
<b>3.2 VIETINBANK</b>	<b>Market-based loan</b>	<b>21,200,000</b>	<b>18,237,885</b>	<b>20,700,000</b>	<b>97.64</b>
<b>3.3 NFB Enterprises Demo</b>	<b>Equity/loan</b>	<b>6,000,000</b>	<b>34,110,867</b>	<b>34,110,423</b>	<b>568.5</b>
VIGLACERA	Equity/loan	3,000,000	5,973,451	5,973,451	
Private sector entrepreneurs (06)	Equity/loan	3,000,000			
Luu Xa Cement Factory	Equity/loan	-	300,000	300,000	
Thanh Phuc Company	Equity/loan	-	8,013,317	8,013,317	
Hong Hoang Hong Company	Equity/loan	-	385,000	385,000	

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Contributor	Classification	Committed Value of Inputs as indicated in ProDoc (USD)	Actual Co-Financing as of MTR (2015-2017) (USD)	Actual Co-Financing as of EOP (Dec 31, 2019) (USD)	% Realized
Minh Tuan Company	Equity/loan	-	402,655	402,655	
Dak Nong Company	Equity/loan	-	610,444	610,000	
Duc Thanh JSC	Equity/loan	-	11,182,000	11,182,000	
DMC Corporation	Equity/loan	-	7,244,000	7,244,000	
<b>3.4 NEW CO-FINANCING PARTNERS/Replication</b>				<b>29,239,526</b>	
Thành An-Thái Bình	Equity/loan			2,025,862	
Trần Châu Hà Tĩnh	Equity/loan			2,952,586	
Kiên Giang	Equity/loan			1,293,103	
DIC Thanh Hóa	Equity/loan			586,207	
BA TA Hà Nam	Equity/loan			1,939,655	
Toàn Cầu Hòa Bình	Equity/loan			3,060,345	
Anh Duc Hai Phòng	Equity/loan			129,310	
Ha Long 135	Equity/loan			818,966	
Thành Nhân Hà Tĩnh	Equity/loan			625,000	
Vật liệu xanh Vĩnh Long	Equity/loan			143,966	
Vật liệu xanh Đại Dũng	Equity/loan			7,758,621	
Biconsì Binh Dương	Equity/loan			991,379	
SOMI Quảng Bình	Equity/loan			443,966	
Lâm Việt Phú Thọ	Equity/loan			918,103	

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Contributor	Classification	Committed Value of Inputs as indicated in ProDoc (USD)	Actual Co-Financing as of MTR (2015-2017) (USD)	Actual Co-Financing as of EOP (Dec 31, 2019) (USD)	% Realized
VLXD Cao Bằng	Equity/loan			237,069	
Tân Phú Xuân	Equity/loan			560,345	
Bảo Lâm Quảng Ninh	Equity/loan			1,234,914	
Tri Tôn An Giang	Equity/loan			1,058,922	
Pu zơ lan Sơn Tây	Equity/loan			637,931	
Dúc Thủy Thái Bình	Equity/loan			866,379	
Thịnh Đạt Hải Dương	Equity/loan			956,897	
<b>Totals</b>		<b>36,080,000</b>	<b>56,915,774</b>	<b>97,005,949</b>	
Less support for Demo projects already accounted as VEPP funds for GoV				<b>8,000,000</b>	
<b>Total co-financing</b>				<b>89,005,949</b>	

\*Of US\$ 97,005,949 investment by the private sector, US\$8 million is concessional loan provided by VPEF to the projects as part of the GoV input

## Annex J: Demonstration and Replication Plants and Training Evaluation

### Annex J.1: Summary of the Demonstration and Replication NFB Plants and their Potential GHG and Energy Savings Contributions

(Note: Calculations are based on Production Capacity. The TE Team was not able to validate if the CO<sub>2</sub> and toe contributions have been normalized to consider typical annual rate of capacity utilization of the plants; i.e. if all NFB produced are assumed sold and used)

N°	Name of Project	Address	Capacity (million SBUs/year)	Start of Operation	Type of technical support	Investment (Billion VND)	CO <sub>2</sub> (tons)	toe (tons of oil equivalent)
	<b>Demonstration Plants</b>							
1	Luu Xa Cement Factory, Thai Nguyen		40	2016	Prepare a feasibility study report and prepare a preferential loan dossier of Vietnam Environment Protection Fund.	6.7	12,760.94	2 451,76
2	Hong Hoang Hong Joint Stock Company, Hoa Vang, Da Nang.		30	2016	Prepare feasibility study report.	8.6	9,570.71	1 838,82
3	Thanh Phuc Mechanical and Construction Material Joint Stock Company	160 Hoang Quoc Viet, Kien An District, Hai Phong City	55	2016	Prepare feasibility study report.	25	17,546.30	3 371,17
4	Viglacera Autoclaved Aerated Concrete Joint Stock Company, Bac Ninh.	Yen Phong Industrial Zone, Yen Phong District, Bac Ninh	140	2017	+ Auditing technology and energy + Implementing solutions to upgrade technology	135		
	<b>Total of 4 demonstration projects (million SBU)</b>		<b>265</b>			<b>175.35</b>	<b>84,541.25</b>	<b>16 242,91</b>
	<b>Replication Plants</b>							
1	Thien Vu Dak Nong NFB Production Plant of Thien Vu	Tam Thang industrial park, Cu Jut district, Dak			Prepare a feasibility study report and	13	3,987.79	766,18

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N°	Name of Project	Address	Capacity (million SBU/year)	Start of Operation	Type of technical support	Investment (Billion VND)	CO <sub>2</sub> (tons)	toe (tons of oil equivalent)
	Dak Nong Production - Trading Company Limited.	Nong province	12,5	8-2017	prepare a preferential loan dossier of Vietnam Environment Protection Fund.			
2	Investment project on constructing Thanh An non-fired building material factory of Thanh An Infrastructure Development and Investment Joint Stock Company, Thai Binh province	Trong Quan Commune, Dong Hung District, Thai Binh Province.	50	6-2018	Prepare a feasibility study report and prepare a preferential loan dossier of Vietnam Environment Protection Fund.	47	15,951.18	3 064,70
3	NFB factory and commercial BT production, precast concrete components	Bac Cam Xuyen industrial cluster, Cam Vinh commune, Cam Xuyen district, Ha Tinh province.	60+50	9- 2017	Prepare a feasibility study report and prepare a preferential loan dossier of Vietnam Environment Protection Fund.	68.5	35,092.59	6742,34
4	Phase II expansion project of Kien Giang NFB Joint Stock Company, Kien Giang Province	Hon Dat Town, Hon Dat District, Kien Giang Province.	55	4 – 2018	Prepare a feasibility study report and prepare a preferential loan dossier of Vietnam Environment Protection Fund.	30	17,546.30	3 371,17
5	Investment project of Hoang Long construction materials factory of DIC Hanoi Construction Investment and Development Joint Stock Company	Hoang Long Industrial Park, Tao Xuyen Ward, Thanh Hoa City, Thanh Hoa Province	10	7 – 2017	Prepare a feasibility study report and prepare a preferential loan dossier of Vietnam Environment Protection Fund.	13.6	3,190.24	612,94
6	Unburnt brick factory of Bata	Bui Mountain, Thanh Son			Optimization of	45	12,760.94	2 451,76

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N°	Name of Project	Address	Capacity (million SBUs/year)	Start of Operation	Type of technical support	Investment (Billion VND)	CO <sub>2</sub> (tons)	toe (tons of oil equivalent)
	materials Co., Ltd., Ha Nam province	Commune, Kim Bang District, Ha Nam Province	40	4-2017	materials proportion to improve the quality and reduce the cost of concrete bricks			
7	Global NFB Factory of Global Construction Material Joint Stock Company	Tan Son Hamlet, Hoa Son Commune, Luong Son District, Hoa Binh Province	150	7 – 2018	Prepare feasibility study report.	71	47,853.54	9 194,10
8	Anh Duc NFB Factory of Anh Duc-Hai Phong Manufacturing and Trading Co., Ltd.	No. 20, Phuc Hai Residential Group, Street 361, Da Phuc Ward, Duong Kinh District, Hai Phong City	10	10 – 2017	Supporting the development of documents on product standard conformity certification.	3	3,190.24	612.94
9	NFB Plant of Ha Long Joint Venture Joint Stock Company 135	Dong Tam Hamlet, Le Loi Commune, Hoanh Bo District, Quang Ninh Province, Vietnam	44	11 – 2017	Supporting the development of documents on product standard conformity certification.	19	14,037.04	2 696.94
10	NFB factory of Thanh Nhan Co., Ltd., Ha Tinh.	Khe Co industrial cluster, Son Le commune, Huong Son district, Ha Tinh - Company’s Office: Block 9, Pho Chau Town, Huong Son District, Ha Tinh Province	30	11 – 2017	Supporting the development of documents on product standard conformity certification.	14.5	9,570.71	1 838.82
11	Vinh Long NFB Factory – Vinh Long Green Material Company Limited.	No. 9, Pham Hung Street, Ward 2, Vinh Long City, Vinh Long Province	08	9 – 2017	Prepare feasibility study report.	3.34	2,552.19	490.35
12	Unburnt brick factory, Dai Dung Green Material	Hiep Phuoc Industrial Park, Hiep Phuoc	110		Support the transfer of heat-curing technology	180	35,092.59	6742.34

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N°	Name of Project	Address	Capacity (million SBUs/year)	Start of Operation	Type of technical support	Investment (Billion VND)	CO <sub>2</sub> (tons)	toe (tons of oil equivalent)
	Company.	Commune, Nha Be District, Ho Chi Minh City.		<b>9-2018</b>	for Concrete bricks with solar energy			
13	Bicons- Binh Duong NFB Factory.	No. 02 Tran Van On, Phu Hoa Ward, Thu Dau Mot, Binh Duong.	<b>55</b>	<b>8 – 2018</b>	Prepare a feasibility study report and prepare a preferential loan profile of Vietnam Environment Protection Fund.	23	17,546.30	3 371.17
14	Investment in building NFB SOMI factory – Quang Binh	Thuan Duc Industrial Cluster, Dong Hoi City, Quang Binh Province. Hop Hai-Kinh Ke industrial cluster, Lam Thao district, Phu Tho province.	<b>15</b>	<b>7 – 2018</b>	Prepare feasibility study report.	10.3	4,785.35	919.41
15	Investment project to build production of NFB and light BT bricks Phu Tho. Belonging to Lam Viet VLKN One Member Co., Ltd.	Thuan Duc Industrial Cluster, Dong Hoi City, Quang Binh Province. Hop Hai-Kinh Shelf industrial cluster, Lam Thao district, Phu Tho province.	<b>- 15</b>	<b>6-2018</b>	Prepare feasibility study report.	21.3	4,785.35	919.41
16	Cao Bang Construction Material Production Joint Stock Company.	Group 8, Ngoc Xuan Ward, Cao Bang City – Cao Bang Province.	<b>35 of 2 lines</b>	<b>12-2018</b>	Optimization of materials proportion to improve the quality and reduce the cost of concrete bricks	5.5	11,165.83	2 145.29
17	The project of manufacturing aggregate cement raw materials factory of Tan Phu	Lien Khe Commune – Thuy Nguyen District – Hai Phong City.	<b>32</b>	<b>3- 2018</b>	Prepare feasibility study report.	13	10,208.75	1 961.41

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N°	Name of Project	Address	Capacity (million SBUs/year)	Start of Operation	Type of technical support	Investment (Billion VND)	CO <sub>2</sub> (tons)	toe (tons of oil equivalent)
	Xuan Cement Joint Stock Company							
18	Bao Lam Service JSC – Thong Nhat Industrial Park, Hoanh Bo Commune, Ha Long City, Quang Ninh	-Tour 5 zones 4 C-P, Hong Hai, Ha Long City, Quang Ninh	30	12/2018	Prepare feasibility study report.	28.65	9,570.71	1 838.82
19	Factory manufacturing NFB Tan Ky – Tri Ton – An Giang.	An Tuc commune, Tri Ton district, An Giang province.	30	01/2020	<ul style="list-style-type: none"> <li>- Prepare feasibility study report.</li> <li>- Completing FS</li> <li>- End of year will report the results.</li> </ul>	24.57	9,570.71	1 838.82
20	Son Tay NFB Puzzolan factory.	N° 56, Thanh Vi, Sơn Lộc Ward, TX. Son Tay, Hanoi.	25	12/2019	<ul style="list-style-type: none"> <li>- Current status survey</li> <li>- Testing optimum proportion of samples</li> <li>- Optimize the coordination and technology process.</li> <li>- Technology transfer training</li> </ul>	14.80	7,975.59	1532,35
21	Duc Thuy Construction and Trading Co., Ltd, Thai Binh.	+ No. 51, Area 2, Diem Dien town, Thai Thuy district, Thai Binh + Thai Ha brick factory, Thai Thuy Thai Binh	30	12/2019	<ul style="list-style-type: none"> <li>- Prepare feasibility study report.</li> <li>- Completing FS</li> <li>- End of year will report the results.</li> </ul>	20.1	9,570.71	1 838.82
22	Thinh Dat Construction and Trading Joint Stock Company, Hai Duong.	+ Village 4, Tan Huong commune, Ninh Giang district, Hai Duong + Brick factory: Hamlet 1, Van Phuc commune, Ninh Giang district, Hai	30	12/2019	<ul style="list-style-type: none"> <li>- Completing FS</li> <li>- End of year will report the results.</li> </ul>	22.2	9,570.71	1 838,82

Terminal Evaluation Report: Project “Promotion of Non-Fired Brick Production and Utilization in Viet Nam”

N°	Name of Project	Address	Capacity (million SBUs/year)	Start of Operation	Type of technical support	Investment (Billion VND)	CO <sub>2</sub> (tons)	toe (tons of oil equivalent)
		Duong.						
	<b>Total capacity of 22 factories</b>		<b>926.5</b>		-	<b>692.057</b>	295,575.35	56 788, 91
	<b>Total of 26 Demo and replication projects</b>		<b>1,191</b>			<b>867.407 billion VND</b>	<b>380,116.60* tons CO<sub>2</sub></b>	<b>73,031.82 toe*</b>

Reference: Results of Investigation, Survey, Efficiency Assessment and Impact of Demonstration and Replication Programs on Non-fired Brick Production Projects. Contract 2709/2019-HDTV-TDS. February 2020.

## Annex J.2: Highlights on the Implementation and Results of the NFB demonstration Plants and a Replication Plant

The following four (4) NFB Demonstration Plants were implemented by the Project with the key innovations being supported:

### 1. Thanh Phuc Mechanical and Construction Material JSC: *Production Equipment Manufacturing*

#### *Background*

- Founded in 1998, the company’s business areas include production of cement tiles, terrazzo, color tiles, non-fired bricks and tiles.
- With business history of nearly 30 years, it has manufactured, supplied and transferred technology of more than 700 NFB production lines and equipment with various designs at local and overseas market.
- It operates 8 NFB production lines (including, 4 Terrazzo tiles production lines, 3 concrete tiles production lines, and 1 artificial stone production lines).



**NFB production line manufactured by Thanh Phuc JSC**

#### *Technical assistance provided*

- Development of Business Strategy in Viet Nam market and potentially in the overseas
- Building up production capacity, including (i) design and re-plan the overall factory ‘s layout to suit with the company’s production scale; and (ii) design and re-organize each production steps (technological procedures, machines, equipment, technical staff and operation workers) in order to improve labor efficiency, reduce number of workers, etc.
- Technical support to improve product quality, which includes improvement of mechanical processing technology and heat treatment, with particular priority given to technical solutions to improve the quality of heat treatment for localized parts to increase life of the parts.

#### *Scope of Demonstration*

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- Investment in Non-Fired Bricks production line (TP54) with a design capacity of 55 million SBUs/year, using press-vibration technology.
- Automated production line, designed, manufactured and installed by the Company.
- Improvement of the brick mold to address the sharpness problem of hollow bricks produced, due to mold atrophy.

### *Accomplishment*

- Investment in 1<sup>st</sup> automated NFB production line (TP54) designed and manufactured by Thanh Phuc Company, which includes (i) selection of NFB production technology and equipment (available in Vietnam market) that have potentials for replication in Vietnam; (ii) Technical and cost benefit analyses, considering energy efficiency and effectiveness and preparation of the feasibility study; (iii) completed detail design, supervision of equipment assembling, training and instructing operation of the NFB production line at the company premises; presentation of the demonstration results at a workshop with participation of the Project’s stakeholders and customers of the Company.
- Upgrading of annealing technology for NFB molds.
- Preparation of quality standard for NFB molds manufactured by the Company.

### *Results and impacts of the technical assistance*

- Completed NFB production line and sold 31 NFB production lines in 2017, 30 NFB production line in 2018 contributing significantly in NFB development in Vietnam.
- Completed heat treatment technology for NFB mold and parts of NFB production line according to standards.
- Reduction in the use of agricultural land in lieu of FCB production), environmental pollution, and GHG emission.

### *Lessons learnt from implementation of the demonstration project*

- To ensure achievement of an NFB project, it is necessary to carefully study customers’ need, product characteristics, ability to replace traditional FCBs, NFB production line, production technology and implementation approach before making investment decision.
- As a supplier of the NFB production lines, it is important that the supplier does not only provide the production lines/ equipment but also be involved in assembling and technology transfer procedures for operation and management of the production line, procedures for quality control of products, guidance for optimal mixture of input materials and training of staff and workers on management, operation and maintenance (O&M) of the plant.
- It is necessary to organize a workshop presenting results of demonstration project to relevant stakeholders to promote development of NFB market.

## **2. Hong Hoang Hong Investment Joint Stock Company: Expanding & Optimizing NFB Production**

### *Background*

- Founded in 2014 located in Phuoc Thuan Village, Hoa Nhon Commune, Hoa Vang district, Da Nang City, the Company invested in 2014 a 1<sup>st</sup> CBB production line with capacity of 30 million SBUs/year,

using press-vibration technology. The 2<sup>nd</sup> CBB production line with the same capacity (i.e. 30 million SBUs/year) and technology has been invested in 2016.

- The plant is currently operating with stability, achieving the designed capacity. Key raw materials used for production of concrete brick blocks (CBBs) are locally available, which include grit, cement and water. Key products at Hong Hoang Hong JSC are solid and hollow concrete brick blocks (CBB) illustrated in below figure. The products are produced following TCVN 6477: 2011- CBBs.
- Curing method applied for bricks produced at Hong Hoang Hong JSC is a natural process. Bricks are preliminary cured in roofed workshops. They are then transferred into an open warehouse area to continue curing from 5 to 7 days depending on the request.
- If production reaches to its design capacity (i.e. 30 million SBUs/ year), 7,000 tonnes of CO<sub>2</sub> / year is reduced and 1570 TOE (tonne of oil equivalent) is saved on an annual basis.



**Hong Hoang Hong NFB Plant Production Expanded and Optimized**

*Technical assistance provided*

- Completing detailed design of the NFB plant, advising in selection of equipment, production line
- Supervision of assembling of the NFB production line, training (by supplier) to workers on operation of the NFB production line at Hong Hoang Hong JSC
- Involving in identification of technical errors/mistakes, adjustment and replacement of technical parts to make the line work well
- Supervising the operation of the NFB production line and evaluation of the project implementation (on energy savings, reduction of environmental pollution, period of return investment costs
- Identifying obstructions during the project’s demonstration as well as lessons learnt for replication projects

*Accomplishment*

- A good automated production line with optimal input material mixture invested;

- Compared to Fired Clay bricks, energy savings at Hong Hoang Hong JSC is 66.16% (1,572 TOE/year), GHG reduction of 47.18% per year (7,077 tones CO<sub>2</sub>/year) if the production reaches its full designed capacity.

*Experience and Lessons learnt from implementation of the demonstration project*

A workshop has been organized by the UNDP/GEF project in Da Nang City, with participation of various stakeholder groups, to discuss results and practical experience gained from the demonstration project at Hong Hoang Hong JSC. Following summarizes experience and lesson learnt gained from implementation of the Hong Hoang Hong Demonstration project:

- NFB is a new product, people do not have the habit of using NFBs for building their houses. Although Government of Viet Nam and Danang city has mechanisms and policies to promote the use of NFBs, the application of the NFB in practice is still limited. Therefore, NFB factory should put priority in communication, marketing, building flexible sale mechanisms, improving product quality, etc.
- Cracked walls and exterior water penetration appeared in construction works where NFB are used and therefore determining causes to the problems and solutions to address the problems are needed;
- Training to various stakeholders, including investors, designers, constructors- workers, supervisors and quality assurance organizations are needed;
- Lack of code for NFBs construction and certification hinder NFB usage and affect the quality of construction works;
- NFBs investors and producers are currently follow the local market trend, to produce small- sized NFB (220x110x60mm) which is going against the general trend of the world to produce big-sized NFB. While the large size bricks ensure quick, efficient construction, saving mortars and are soundproof and waterproof, the small size products could not ensure such the benefit features.

**3. Luu Xa Cement Factory (Investment and Industrial Production JSC): Material Mix Optimization**

*Background*

- Founded in 1998, located in Phu Xa Ward, Thai Nguyen City, the Company is a branch of Investment and Industrial Production JSC. The company’s business areas include production of cement, clinker, precast concrete structures, bricks, stone exploitation and trafficking, trading building materials, etc.
- In terms of Demonstration, a project called “investment in a modern NFB production line QT10-15, with capacity of 40 million SBUs/year” was developed and built in 2015 in an area of about 4,000m<sup>2</sup> by Luu Xa factory. The production line (using press-vibration technology) is automated, with estimated investment capital of about VND 6.3 billion for a 10-years period. Raw materials for the CBB production are locally available and include sand, grit, coal slag, fly ash, cement, water, admixture.

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- Curing method applied for bricks produced at Luu Xa factory for CBB produced is natural process. Bricks are preliminary cured in roofed workshops. They are then transferred into an open warehouse area to continue curing for 5 to 7 days depending on the request.
- Key products are solid brick blocks (size 220x110x60mm) produced following TCVN 6477: 2011-CBBs. The products got environmental certification and are widely used in the province.



**Training at the Factory and testing various material mix**

### *Technical Assistance provided*

The Project provided technical assistance in developing methods for calculation and selection of an optimal material mix for CBB production, taking into consideration of using slag/fly ashes as input materials for CBB production and completing procedures for product quality control, procedures for machines' operation and maintenance (O&M), strengthening production and marketing capacity as well as staff capacity. More specifically, the TA include:

- Preparing a guide document for the design and calculation of concrete components to produce qualified CBB;
- Coaching the company's staff in designing and determining optimal technological parameters for producing CBB to ensure Luu Xa factory able to adjust the concrete mix and production technological parameters;
- Preparing CBB quality control plan for Luu Xa factory to help improve production efficiency and product quality;
- Preparing procedures for operation and maintenance (O&M) of equipment which include (i) guidance on operation of mixing process; (ii) Guidance on operation of QT10-15 brick press machines; (iii) cleaning when a production shift ended and (iv) note during equipment maintenance; and training to workers on the above procedures.

With the technical assistance provided by UNDP/GEF NFB project, the factory is able to reduce from 15% - 20% of the raw material costs and energy savings of about 2,334 TOE/year, in addition to gaining other social and environmental benefits such as creation of jobs to local people, reduction of pressure on using agricultural soil for fired brick production, Utilization of slag/fly ashes generated at coal thermal power plants; reduction of GHG and pollutant emission. If production reaches 40 million SBUs/

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year, 12,788 tonnes of CO<sub>2</sub> / year is reduced and 2,334 TOE (tonne of oil equivalent) is saved on an annual basis

### *Lessons learnt from implementation of the demonstration project*

- Low people’s awareness on NFB. Communication should therefore further strengthen to make people understanding and use more and more NFB.
- Using industrial waste (slag, fly ashes) available in the area could help reducing production costs while protecting environment;
- It’s important to allocate sufficient budget for trainings staff, especially those from department of technical production and marketing on respective NFB aspects;
- Ensuring product quality control system set up and operated right at the beginning of the project operation phase;
- Certified products like those of Luu Xa Factory are to be widespread.
- Low quality products should be discouraged to create fair competition.

## **4. Viglacera Autoclaved Aerated Concrete (AAC) Brick Factory: Energy Systems Optimization**

### *Background*

- Viglacera, located in Yen Phong Industrial Zone (Bac Ninh Province), was founded in 2010. The factory’s business areas include production of AAC bricks and Panels. Capacity of Viglacera is currently 200,000m<sup>3</sup> AAC products/ year (1st production line with capacity of 100,00m<sup>3</sup>/year invested in 2010. The factory in 2018-2019 upgraded the plant to full capacity of 200,000m<sup>3</sup>/year).
- In 2010, the 1<sup>st</sup> production line (capacity of 100,000m<sup>3</sup> AAC brick/year) was put into operation. At the initial stage, the factory produced approximately 40,000-50,000 m<sup>3</sup> annually; the production was gradually increased and reached nearly designed capacity of 100,000 m<sup>3</sup> by 2016. The product quality is however unstable and sometime do not meet national product standard TCVN 7959:2011. The factory was able to sell only about 50 % of the AAC products produced, although the AAC products are characterized by advanced properties such as light weight, high thermal insulation, heat – resistance, environmentally friendly products.



**AAC bricks and AAC panel produced at Viglacera**

### *Scope of Technical Assistance*

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- Optimizing the AAC brick production technology by (i) determining optimal mix of raw materials to improve quality of products produced at the factory and (ii) Utilizing by-products generated during the production process as input materials for AAC production or use fly ash, as input materials to replace part of sand.
- Providing technical assistance to improve energy system, including energy audit and measures provided for reduction of energy loss, using solar energy, etc. to improve energy efficiency at the factory.

### *Results and impacts of the technical assistance*

- With the project support, (i) production capacity of the factory was strengthened (ii) Better quality of the products is achieved compared to quality of the ACC bricks produced before TA. AAC products meet with Vietnamese standard TCVN 7959:2011. These, as results, increase AAC sale to about 70% of the products produced; (iii) production costs is reduced and products are more environmentally friendly, by utilization of by-products generated at the factory during production process (about 5,600m<sup>3</sup>/year) and energy savings (estimated savings of about 2-5% of the electricity consumption); and GHG emission is further reduced due to less energy required for brick production and due to reduction of energy loss).
- Energy audit report as well as assessment the factory production status and recommendations for improving product quality, production efficiency have been useful documents and basics for the factory to increase capacity of the factory from 100,000m<sup>3</sup>/year to present 200,000m<sup>3</sup>/year with improved products quality.
- It is estimated that if production reaches to its full design capacity, 9,029 tonnes of CO<sub>2</sub> / year is reduced and about 5,632 TOE (tonne of oil equivalent) is saved on an annual basis.

### *Lessons learnt from implementation of the demonstration project*

- It's extremely important to understand raw materials, product properties, production technology and methods, for the success of the demonstration Project.
- Training to staff and workers by the factory is needed, especially those from department in charge of production and marketing techniques.
- Saving energy/minimization of energy loss could help to reduce production costs.
- Company/Factory has invested on advanced technology such as automation of raw material input, upgraded laboratory for testing product quality and raw material, panel production line etc...

Aside from the 4 NFB demonstration plants described above, a Replication NFB Plant is featured below for its innovative approach in NFB curing using solar energy and heat trapping techniques.

### **Dai Dung Green Material Joint Stock Company (JSC) – Solar Energy and Heat Trapping for Curing**

#### *Background*

This NFB **Plant is** a replication project located in Hiep Phuoc Industrial Zone (Hiep Phuoc Commune, Nha Be District, Ho Chi Minh City) with three (3) production lines with design

capacity of 110 million of concrete brick blocks (CBB) per production line. Presently, actual production capacity is 85 million CBUs yearly. The Company is able to sell about 90% of its products produced following national standard TCVN 6477: 2011- CBBs.

One of the main features determining quality of the concrete bricks produced is the curing process which often takes about 28 days in normal conditions. Because of this, the company has been looking for curing methods that can help reducing curing time while keeping good brick strength and quality.

#### *Scope of Technical Assistance*

The Project provided technical assistance in designing, implementing and transferring the curing system using solar energy and heat trapping systems via a two-layer-glass roof system provided to each of a close curing tunnel.

#### *Results and impacts of the technical assistance*

After a year operation of the demonstration, the following benefits have been achieved:

- Shortening by half the time required for curing the products (CBBs), i.e. from 28 days to 14 days
- Saving energy (9.6 tons of Fuel Oil diesel per day if this type of fuel is used or an equivalent 16.7 tons per day if coal is used).
- Better quality of the products compared to other curing methods available in Vietnam (curing under natural conditions or using steam at temperature of 70—85°C from fuel burning), due to evenly distribution of humid heat and steam to every concrete brick unit.
- Reducing production costs (no fuel is required, less water used for steaming due to water circulation system applied.
- Reducing significantly GHG emissions making the products environmentally friendly.
- If production reaches its design capacity, 35,167 tons of CO<sub>2</sub> / year is reduced and 6,420 TOE (tons of oil equivalent) is saved on an annual basis.



**Concrete Brick production and curing using solar energy and heat-trapping system**

*Lessons learnt from implementation of the demonstration project*

- If solar energy and heat trapping system is to be applied for NFB curing, it is best to include it right in the design stage in order to optimize the factory layout and investment as an integrated system.
- It is important to provide sufficient training to operators on maintenance and operation of the curing system.
- It is important to provide guidance and training to users to minimize cracking problems.
- Larger size CBB products are preferred as they will help reducing cracking and water penetration problems and also reducing construction costs. This could be realized by a regulation adopted by the Government.

### **Annex J.3: Summary of Training Course Evaluations**

The modules have been used for training to four main target groups from 63 provinces and cities all over the country, which include:

- Group 1: Management Officers from Department of Construction and related departments at provincial and district levels
- Group 2: Managers and technicians of NFB producers
- Group 3: Design consultancy companies, construction supervisors, construction contractors
- Group 4: Other stakeholders (technology transfer institutions, financial institutions and other institutions).

In total, 26 training courses have been provided by the Project to 1,890 participants from the above target groups using the above-mentioned modules.

The post-training evaluations were done focusing on following aspects:

- Level of knowledge and actual results obtained from the training courses and applied by the trainees in practice;
- Training methods and tools applied, training contents, advantages and shortages;
- Training demand, recommendations for improvement of future training programs towards sustainable capacity building of NFB production and usages
- Recommendation on other NFB aspects.

The results of the evaluation are available. Regarding application of knowledge gained, the following highlight the responses of the trainees:

- Majority of the trainees find the training contents are appropriate and relevant to their work
- Knowledges obtained from the training have been applied in their work depending on level of their work associated to NFB area (the high application level are for those who work in government agencies responsible for NFB management, production investors, users, designers and construction evaluators
- The courses are effective to a certain extent and needs to be updated with new and more practical contents.

The following were recommended for improvement of the training methods:

- Present more case studies, photos, practical cases, and associated videos at the training courses for easy understanding
- Provide more time for experience exchange and discussions

## Terminal Evaluation Report: Project “Promotion of Non-Fired Brick Production and Utilization in Viet Nam”

- Shortening the theoretical lectures to focus on main ideas
- Provide more in-depth instructions on the design, construction, and construction acceptance, common problems and remedies
- Include analysis of problems in the NFB use and solutions to improve the quality and minimize disadvantages of NFBs
- Include application instruction in practice for each region
- Include instructions on production materials and concrete mixing, brick curing, brick quality control at the factory
- Include methods for calculating economic efficiency.

Nearly half of the trainees interviewed (96/206) find that additional training is needed, with focus on the following topics for the improvement of future training programs per target group:

### a. Target Group 1

- Guiding documents or legal requirement associated inspection of construction quality, and management of construction material
- Standards on design, construction and acceptance of masonry using NFBs
- Documents related to combination between NFB and FCB in a building
- Assessment of limitations that need to overcome when using NFBs
- Training courses servicing state management, evaluation of cost estimate designs, acceptance test and handling of incidents arising in the using NFBs.

### b. Target Group 2

- Technology for manufacturing prefabricated houses with AAC lightweight concrete panels
- Manufacturing process and skills to handle machinery failures during production process
- Design and adjustments necessary for the NFBs material gradation, incidents and solutions to overcome problems when constructing and using NFBs
- Solutions for the allocation of ratio between NFB and FCB for the most optimal construction material mix
- NFBs quality management, common errors in production, construction and incidents.

### c. Target group 3

- Detailed guidance on the process of design, construction, engineering, use of construction materials at construction works where NFBs are used
- Field visit and sightseeing of some construction works

## Terminal Evaluation Report: Project “Promotion of Non-Fired Brick Production and Utilization in Viet Nam”

- More case studies given during the training
- Solutions to limit cracks in construction blocks using NFBs
- Modify norms to suit the reality, i.e. reflection of cracks in construction blocks.

Following are difficulties, concerns and recommendations provided by the trainees:

### a. Target Group 1

- No specific technical standards for design, construction, and inspection of construction works, using NFBs is available;
- Small and individual construction works (not under requirement of circular 13/2017/TT-BXD) and private construction works are not yet interested in using NFBs;
- Cracking occurred at construction works where NFBs are used make anxiety to NFB users;
- Skill of workers on NFB construction techniques is not good enough to meet the requirement.

### b. Target Group 2

- Difficult in selling products; NFB production increases but NFB consumption is low;
- Most of ACC bricks manufacturers have to cease their operation or shifting to other products due to difficulties in selling AAC product (originated from problems such as cracking, water-seepage when application)
- New standards are not sufficient, i.e. not cover all NFB associated criteria including sizes of NFBs
- SMEs have outdated NFB production technology, limited capacity for NFB production which results in poor quality of NFBs produced and badly affects to users.

### c. Target Group 3

- NFBs associated problems (cracking) and their solutions are not sufficient enough to guide construction activities
- Specific guideline for NFB application (construction procedures, which types of NFB is appropriate for which construction works, etc.) is not yet available;
- Lack of technical guideline on NFB curing days, evaluation process of product quality, construction and inspection
- Lack of Technical guideline for construction works where combination of NFB and FCB are used, especially in areas where two types of bricks are contacted (how to handle cracks, shrinkages between these two types of bricks, etc.).

## Annex K: Evaluation Consultant Agreement Form

**Evaluation Consultant Agreement Form – International Consultant**  
Terminal Evaluation of  
UNDP/GEF Project-- *Promotion of Non-Fired Brick (NFB) Production and Utilization in Viet Nam Project (PIMS 4546)*

Agreement to abide by the Code of Conduct for Evaluation in the UN System

Name of Consultant: Rogelio Z. Aldover

Name of Consultancy Organization (where relevant): \_\_\_\_\_

I confirm that I have received and understood and will abide by the United Nations Code of Conduct for Evaluation.

Signed at Quezon City, Philippines on May 28, 2020

Signature: 

**Evaluation Consultant Agreement Form – National Consultant**  
Terminal Evaluation of  
UNDP/GEF Project: *Promotion of Non-Fired Brick (NFB) Production and Utilization in Viet Nam Project (PIMS 4546)*

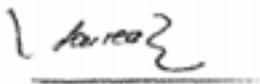
Agreement to abide by the Code of Conduct for Evaluation in the UN System

Name of Consultant: Vu Thi Thu Ha

Name of Consultancy Organization (where relevant): \_\_\_\_\_

I confirm that I have received and understood and will abide by the United Nations Code of Conduct for Evaluation.

Signed at Hanoi, Viet Nam on May 31, 2020

Signature: 

## Annex L: Evaluation Report Clearance Form

Terminal Evaluation of  
UNDP/GEF Project-- Promotion of Non-Fired Brick (NFB) Production and Utilization in Viet  
Nam Project (PIMS 4546)

Evaluation Report Reviewed and Cleared by M&E Analyst, UNDP Country Office	
Name: Nguyen Thi Ngoc Han _____	
Signature:  _____	Date: 9 Jan 2021 _____
UNDP GEF RTA	Milou Beerepoot
Name: _____	
Signature:  _____	Date: 9 Jan 2021 _____

## Annex M: TE Audit Trail

To the comments received on April 27, 2020 and May 15, 2020 from the Terminal Evaluation of UNDP/GEF Project-- Promotion of Non-Fired Brick (NFB) Production and Utilization in Viet Nam Project (PIMS 4546)

The following comments were provided in track changes to the draft Terminal Evaluation report; they are referenced by institution (“Author” column) and track change comment number (“#” column):

Author	#	Para No./ comment location	Comment/Feedback on the draft TE report	TE team response and actions taken
TE Team	RA1	Table 1, page iii and other locations related to the comment	Co-financing data was updated with reference to Ms. Hang and Ha’s email dated May 15, 2020 in consultation with PMU (Mr. Vinh)	Updated paragraphs and tables related to Co-financing
UNDP RCB	MB2, MB 45  MB3	Para #2 and #3, Page iv and other locations related to the comment	This may have to be reformulated into something like: The project officially ended on November 4, 2019 with a small number of activities (Closing workshop, TE evaluation), continuing after this date.  The project did not have an official project extension so this sentence should be removed.	Reviewed Outputs achievements with reference to quantity and timeliness vis-à-vis EOP Nov 2019 and revised texts on related paragraphs and of ratings to reflect that the Project did not need extension and has completed Outputs significantly within the official EOP while exceeding majority of the targets at the Log Frame Activity level.
UNDP Viet Nam	VITH4, VITH43	Para #3, Page iv and other locations related to the comment	Agreed with Milou’s above points. Should reformulate in the way that after the closing date, the project is wrapping up and complete some pending activities	

**Terminal Evaluation Report: Project “Promotion of Non-Fired Brick Production and Utilization in Viet Nam”**

<b>Author</b>	<b>#</b>	<b>Para No./ comment location</b>	<b>Comment/Feedback on the draft TE report</b>	<b>TE team response and actions taken</b>
UNDP Viet Nam	VITH5	Table 2, Page v and other locations related to the comment	The PMU revised the rating, but as discussed via email earlier, I could suggest the reviewing team based on the rating criteria and your independent assessment to re-confirm the rating with justification	In consultation with PMU and referring back to project reports, reviewed details of Output achievements with reference to quantity and timeliness vis-à-vis EOP Nov 2019 and revised texts on related paragraphs and of ratings on the relevant tables and conclusions.
TE Team	RA6	Table 2, Page v and other locations related to the comment	The TE Team reviewed the ratings in view of the additional information and clarification of achievement of outputs by the PMU and considering timeliness and effectiveness of the implementation	
PMU	D9, D10, etc. and other related comments	Para #3, Page vi and other locations related to the comment	Additional information on the details in the accomplishments of the Outputs	Revised the sentences and paragraphs to incorporate the clarifications and additional information
UNDP Viet Nam	VITH5, V14, V16 and other related comments	Para # 2 and other locations related to the comment	Clarifications and suggested revisions	Revised the sentences and paragraphs to incorporate the clarifications and additional information
UNDP RCB	MB2	Para # 1 and other locations related to the comment	Should these barriers also be included and addressed in the exit strategy to be developed (see recommendations)?	Elaborated further on the TE recommendations for GoV to develop the post-project

**Terminal Evaluation Report: Project “Promotion of Non-Fired Brick Production and Utilization in Viet Nam”**

<b>Author</b>	<b>#</b>	<b>Para No./ comment location</b>	<b>Comment/Feedback on the draft TE report</b>	<b>TE team response and actions taken</b>
				sustainability plan as normally expected during project completion for planning and implementation by GoV (MoST and MoC) especially that Program 567 will also end in 2020.
PMU	D22	Para #1, Recommendations, page viii and other locations related to the comment	<p>NFB program is a long-term program of GoV led by MoC. During project implementation especially in annual Steering Committee Meeting, workshop and training courses all these recommendation and issues have been recognized and reported to members of Steering Committee including MoC. MoC has responsibility to collect and process all recommendations and opinions from Project and workshop to coordinate activities and, if needed, to report to Prime Minister to have the necessary action plan.</p> <p>This program still continued and GoV is going to approve the Development Strategy</p>	Elaborated further on the TE recommendations for GoV to develop the post-project sustainability plan as normally expected during project completion for planning and implementation by GoV (MoST and MoC) especially that Program 567 will also end in 2020.

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			<p>for Building Material (including NFB/NFBM) to 2030 and with a vision for a longer period.</p> <p>Recently, with the support of international expert from Canada and the National Consultants, the Project has completed the report: Integrated Strategy for NFB Demand Side Development. This document has been used by MoC to incorporate the findings and recommendations into the above-mentioned Development Strategy. In the Terminal Project Report, PMU has noted the main recommendations to the ministries and other agencies as well as to the Project Steering Committee.</p>	
UNDP Viet Nam	VITH24, V25, V16 and other related comments	Para #2, Recommendations, Page vii and other locations related to the comment	<p>Who should undertake this since the project is closing?</p> <p>Who could support this? Also, is that the need of these plants in getting the investment/funding?</p>	(As explained above)

**Annex N: GEF Focal Area Terminal Tracking Tool (Annexed in a separate file)**