

## TERMS OF REFERENCE

|                             |  |
|-----------------------------|--|
| Project Name:               | Promotion of non-fired bricks production and utilization in Viet Nam                     |
| Assignment Name:            | Compiling the handbook: Guideline for use of non-fired building materials and components |
| Recruitment of consultants: | Wide selection of individual consultants in the country                                  |
| Working location:           | Ha Noi and other provinces as required   |
| Duration                    | Estimated 85 days of work within 7 months since December 2018                            |
| Direct supervisor:          | Building Material Expert   |

### 1. Background

On 29 August 2008, Decision No. 121/QD-TTg approving the “Master Plan on development of building materials up to 2020” was issued by the Government. Later on, this was replaced by Decision No. 1469/QD-TTg dated 22 August 2014 of the Prime Minister on “Master Plan on building materials development up to 2020 with vision to 2030”

To motivate the development of Non-Fired Bricks (NFB), Decision No. 567/QD-TTg dated 28 April 2010 on NFB development program up to 2020 (Program 567) was issued by the Prime Minister. Major objectives of the program are as follows:

- Market share of NFB will increase by 20%-25% by 2015 and 30% – 40% by 2020, respectively;
- Utilization of around 15-20 million tonnes of industrial waste (ash) from coal-fired power generation and other industries to produce non-fired building materials, saving around 1,000 hectares of agriculture land annually; and
- All traditional fired clay brick (FCB) making plants will be gradually replaced by NFB production facilities.

On 19 September 2014, the Prime Minister issued Decision No. 1686/QD-TTg on approval of Project Categories, funded by the United Nations Development Programme (UNDP) and assigned the Ministry of Science and Technology as main in charge entity, Ministry of Construction is co-implementing agency.

The objective of the NFB 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 in Vietnam. This objective will be achieved by removing barriers to increase production and utilization of NFBs through 4 components:

- i) Component 1: Policy support for NFB technology development.
- ii) Component 2: Technical capacity building on NFB technology application and operation and use of NFB products.

iii) Component 3: Sustainable financing support for NFB technology application.

iv) Component 4: NFB production technology demonstration, investment and replication.

The Project will be 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 is estimated at 383 kilo tonnes CO<sub>2</sub>. Indirect emission reduction is estimated at 13,409 kilo tonnes CO<sub>2</sub> that is cumulative for a 10-year period after the end of the Project.

The necessity to compile a handbook “**Guideline for use of non-fired building materials and components**”:

a) At present, engineers and workers should have handbook/guide book or pocket book, so that they can carry for consulting and reference conveniently during working time related to non-fired building materials (printed manual and A5 format in color with many illustrations)

b) The technique of using non-fired building materials is the weakest stage (as the result of more than 30 classes and workshops in the provinces), which is one of the causes of cracking, permeability, no quality assurance and aesthetics.

c) Since each locality has different types of non-fired building materials, there are several types of non-fired materials in the same building, while only one of them can be taught in one project. Therefore, during construction, workers encounter different types of materials will be embarrassing and making mistakes.

d) Many investors do not have knowledge about non-fired building materials, so it's very important to disseminate these knowledge to them (especially the private investors, large numbers)

The compilation of the Handbook for the use of non-fired building materials and components is very necessary and important to:

a) Instructing the contractor, supervising consultants, design consultants, investors to understand and use non-fired building materials according to the standard in all cases and for all types of these materials.

b) Ensure the acceptance test in accordance with Vietnamese standards (TCVN) and techno-economic norms.

c) Disseminate the technology for using non-fired building materials for many people, especially workers and private investors.

The project “Promotion of non-fired bricks production and utilization in Viet Nam” added to the 2018 plan the task of “Research on compiling handbook: **Guideline for use of non-fired building materials and components**” for documentation, reference in research, teaching, design, inspection, appraisal, construction, acceptance of works using non-fired building materials.

## **2. Objectives:**

The objective of assignment is to support a research on the compilation of a handbook “Guideline for use of non-fired building materials and components”, including at least

the following main products: concrete bricks, inter-locking bricks, non-fired heavy building components (Acotec panels), autoclave aerate concrete, non-autoclave aerate concrete, foamed concrete, non-fired lightweight building components as references in research, teaching, design, inspection, appraisal, construction, acceptance of works using non-fired building materials.

### **3. Results**

**3.1. Report 1:** The outline of the content of the handbook has been completed as per the expert's comments.

**3.2. Report 2:** Draft Handbook: “Guideline for use of non-fired building materials and components”, compiled in accordance with the detail outline of section 3.1, including at least the following sections:

*Preamble (Introduction) should be in both Vietnamese and English;*

*Part 1: Guideline for use of heavy non-fired building materials and components with 2 chapters:*

Chapter 1: Guideline for use of concrete bricks

Chapter 2: Guideline for use of non-fired heavy building components (acotec panels)

*Part 2: Guideline for use of lightweight non-fired building materials and components, including 3 chapters:*

Chapter 1: General introduction;

Chapter 2: Guideline for use of lightweight non-fired building materials (autoclave aerate concrete bricks, non-autoclave aerate concrete bricks, foamed concrete bricks);

Chapter 3: Guideline for use of lightweight building components.

*Part 3: Guideline for use of other non-fired building materials (soil-cement brick, laterite bricks, natural stone bricks)*

*Part 4: Guideline for use of mortars and ready-mixed mortars*

*Part 5: Safety technique in the use of non-fired building materials and components (for details: see the detailed outline in Appendix 1)*

**3.3. Report 3:** Draft Handbook: “Guideline for use of non-fired building materials and components”, compiled in accordance with the detail outline of section 3.1 has been revised, supplemented and completed as per the expert's comments

**3.4. Report 4:** Draft Handbook: “Guideline for use of non-fired building materials and components”, compiled in accordance with the detail outline of section 3.1 has been revised, supplemented and completed as per the comments of Evaluation council of Vietnam Association for Building Materials.

The Handbook should be presented with concise and clear languages and colourful pictures and graphs illustrated the text and the procedure.

### **4. Scope of works**

The tasks and responsibilities of the experts are to achieve the objectives set out above; some of the main activities are as follows:

- 4.1. Establish the outlines and detailed plans for implementing the tasks.
- 4.2. Investigate, collect and consult domestic and foreign textbook, and documents of the Project Management Unit on concrete bricks, autoclaved aerate concrete and other related documents including 5 training materials, lecture materials for technical staff and supervisors and technical workers in construction of buildings using concrete bricks.
- 4.3. Establish the detailed outline of Handbook “Guideline for use of non-fired building materials and components”. Consult the expert’s opinions. Revise and complete the detailed outline.
- 4.4. Proceeding of the draft Handbook: “Guideline for use of non-fired building materials and components” including the basic contents agreed with the Project Management Unit in section 3.1.
- 4.5. Organizing the workshop for comments on the draft Handbook: “Guidelines for use of non-fired building materials and components”. Finalize the draft of the manual according to the conclusion of the workshop.
- 4.6. Organizing the Scientific and Technological Council to evaluate the draft Handbook: “Guidance on the use of non-fired building materials and components”. Complete the manual according to the conclusion of the Science and Technology Council.
- 4.7. Report on the performance of assigned tasks

## **5. Methods**

- 5.1. The consultant should come from the objective of the task is “Research on compiling handbook: **Guideline for use of non-fired building materials and components**”, to establish a suitable and effective method of implementation.
- 5.2. The consultant has to apply the latest analysis and evaluation methods in research, survey, data collection and updating, processing data to obtain a full handbook “Guideline for use of non-fired building materials and components” highly practical which could be widely applied to many subjects.
- 5.3. Referring to the domestic and international experience of writing handbooks on the use of construction materials, the Project Management Unit's documentation of the handbook of building materials and construction components will help the consultant a more comprehensive view of the content of the outline, writing the handbook, updating new knowledge, new approaches and new products suitable to Vietnam's conditions.
- 5.4. Working closely with experts from the Vietnam Association for Building Materials, Vietnam Concrete Association, research institutes, universities, non-fired building materials manufacturers, contractors in process of performing the task.
- 5.5. Consulting regularly the Project Management Unit during the implementation of project.

## **6. Implementation plan**

The consultant will provide a detailed roadmap for the implementation of the task. The PMU requires the following key milestones:

- 31/1/2019: The consultant will complete the task of researching, collecting data, consulting domestic and foreign textbooks, and documents of the Project Management Unit on non-fired bricks. Establish and complete the detailed outline of Handbook “Guideline for use of non-fired building materials and components” - **Report 1**.
- 30/4/2019: The consultant will complete **Report 2**: draft Handbook “Guideline for use of non-fired building materials and components” including the main content of section 3.1
- 31/5/2019: The consultant will complete **Report 3**: draft Handbook “Guideline for use of non-fired building materials and components” including the main content of section 3.1, revised, supplemented and completed as per the expert's comments
- 30/06/2019: The consultant will complete **Report 4**: draft Handbook “Guideline for use of non-fired building materials and components” including the main content of section 3.1, revised, supplemented and completed as per the comments of Evaluation council of Vietnam Association for Building Materials.

**Expected progress and working day:**

| No   | Content of task   | Number of workdays | Tentative deadline |
|------|---|--------------------|--------------------|
| 1    | <b>Report 1:</b> Research, collect data, consult domestic and foreign textbooks, and documents of the Project Management Unit on non-fired bricks. Establish and complete the detailed outline of Handbook “Guideline for use of non-fired building materials and components” | 14                 | 31 January, 2019   |
| 1.1  | Researching, collecting data, referring to foreign documents  | 4                  |                    |
| 1.2  | Studying, collecting data, consulting documents, in Vietnam, teaching materials of the Project Management Unit.   | 4                  |                    |
| 1.3  | Investigating, collecting actual data of concrete bricks factories, autoclave aerate concrete bricks, non-autoclave aerate concrete bricks, foamed concrete bricks, soil-cement bricks in the country   | 4                  |                    |
| 1.4  | Establish and complete the detailed outline of Handbook “Guideline for use of non-fired building materials and components”  | 2                  |                    |
| 2    | <b>Report 2:</b> draft Handbook “Guideline for use of non-fired building materials and components”  | 45                 | 30 April 2019      |
| 2.1  | <i>Preamble (Introduction);</i>   | 1                  |                    |
| 2.2. | <i>Part 1: Guideline for use of heavy non-fired building materials and components</i>   | 17                 |                    |

|        |   |           |              |
|--------|---|-----------|--------------|
| 2.2.1  | Chapter 1: Guideline for use of concrete bricks   | 10        |              |
| 2.2.2  | Chapter 2: Guideline for use of non-fired heavy building components (acotec panels)   | 7         |              |
| 2.3    | <i>Part 2: Guideline for use of lightweight non-fired building materials and components</i>   | 17        |              |
| 2.3.1. | Chapter 1: General introduction   | 1         |              |
| 2.3.2. | Chapter 2: Guideline for use of lightweight non-fired building materials (autoclave aerate concrete bricks, non-autoclave aerate concrete bricks, foamed concrete bricks)   | 7         |              |
| 2.3.3  | Chapter 3: Guideline for use of lightweight building components   | 7         |              |
| 2.3.4  | Chapter 4: Guideline for use of inter-locking bricks  | 2         |              |
| 2.4    | <i>Part 3: Guideline for use of other non-fired building materials (soil-cement brick, laterite bricks, natural stone bricks)</i>   | 5         |              |
| 2.5    | <i>Part 4: Guideline for use of mortars and ready-mixed mortars</i>   | 5         |              |
| 3      | <b>Report 3:</b> Draft Handbook “Guideline for use of non-fired building materials and components”, revised, supplemented and completed as per the expert's comments  | 15        | 31 May 2019  |
| 3.1    | Organizing the workshop for comments on the draft Handbook: “Guidelines for use of non-fired building materials and components”   | 2         |              |
| 3.2    | Finalize the draft of the manual according to the conclusion of the workshop  | 13        |              |
| 4      | <b>Report 4:</b> Draft Handbook “Guideline for use of non-fired building materials and components” including the main content of section 3.1, revised, supplemented and completed as per the comments of Evaluation council of PMU. | 8         | 30 June 2019 |
|        | <b>Total working days</b>   | <b>85</b> |              |

## 7. Capacity and experience requirements

- Participants must have at least an engineer degree, preferably with doctoral or master degree in the following specializations: building materials engineering, construction materials technology, chemical silicate engineer, architecture, civil engineering.

- The consultant must have at least 10 years of experience in the areas of research, consultancy, design, inspection, construction, supervision, project management, and production of building materials/non - fired bricks; understand the norms, standards, laws of non-fired building materials.

- English minimum level C.

### **8. Relevant payment conditions**

- The level of remuneration is paid on the basis of the professional capacity and experience of each consultant in accordance with the cost norms set by the United Nations in Viet Nam, the Delegation of the European Union in Vietnam and the Ministry of Planning and Investment.

- Other costs are applied in accordance with HPPMG regulations and cost norms issued by United Nations Organizations in Viet Nam, Delegation of the European Union in Vietnam and the Ministry of Planning and Investment