Feasibility of clays in Nepal for use in Limestone Calcined Clay Cement (LC^3)

CONTEXT

About half of the cement consumed in Nepal is Portland Pozzolana Cement (PPC) whereas, Ordinary Portland Cement (OPC) accounts for 40% of consumption and is used in building construction and developing infrastructure like roads and bridges. On one hand, cement is the most used industrial commodity required for infrastructure development, but on the other hand, it is also responsible for high GHG emissions. Cement production is a continuous process. It requires an uninterrupted power supply, making it a highly energy-intensive industry with a regular supply of high-quality coal as fuel. The cost of coal (used for clinker units) in Nepal ranged from around $75 to $90 per metric ton (2021), depending on the grade and location, also there is usually no fly ash available within the country. Most of the fly ash required to produce PPC (280kg fly ash per ton of PPC) is supplied from India. The landing cost of fly ash in Nepal ranged from around $30 to $45 per metric ton (2021), depending on the grade and location. Importing fly ash and coal to produce cement to meet the growing economy's demands is significant. The foreign exchange against the import is very expensive to the economy. According to Nepal's Nationally Determined Contributions (NDC) announced in 2020, the country has announced adopting low-emission technologies in the cement sector to reduce coal consumption and air pollution, including thorough development and/or enactment of emission standards.

OBJECTIVES

The project aims to prepare an inventory of available clay occurrences and their reserve potential based on field survey data for Nepal while establishing an integrated GIS-based map on the availability of clays and raw materials as a public decision support tool for investing in LC^3 technology. The project will be initiated through a synergy between the Department of Mines & Geology, Govt. of Nepal and the Nepal Cement Manufacturing Association (NCMA) to conduct extensive field surveys. Subsequently, raw materials will be scientifically tested and analysed for their feasibility in applications of LC^3. The project will review applicable standards for existing cement blends and suggest modifications required to obtain approval of the LC^3 cement standard in Nepal. Overall it will enhance capacity, build an ecosystem to promote active stakeholder participation in the LC^3 technology.

EXPECTED OUTCOMES

- Raw material suitable and available in Nepal for LC^3 technology.
- GIS map on clay availability.
- Potential reserve of clays estimated.
- Economics of LC3 production based on clay availability.
- Market potential in Nepal for LC^3 production proven.
- Recommendation Report for Nepal LC3 Standards.

IMPACT

- 24% cheaper to produce LC^3 as compared to PPC
- Lower production cost of LC^3 compared to PPC and OPC
- Savings USD 123 million per year in foreign exchange against the import of fly ash
- Saving USD 144 million per year in foreign exchange against coal imports.
- Create up to 3,000 local skilled and un-skilled jobs in the organised sector
- Catalyse USD 320 million investment by the private sector

LC3 NEPAL

PROJECT AT A GLANCE

Project Name :
LC3 Cement Feasibility Study

Duration :
Sep 2023 - Dec 2024

Supported by :
Embassy of Switzerland in Nepal

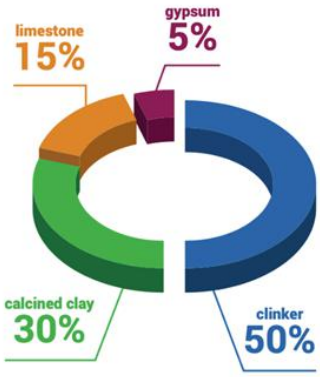
Partners :

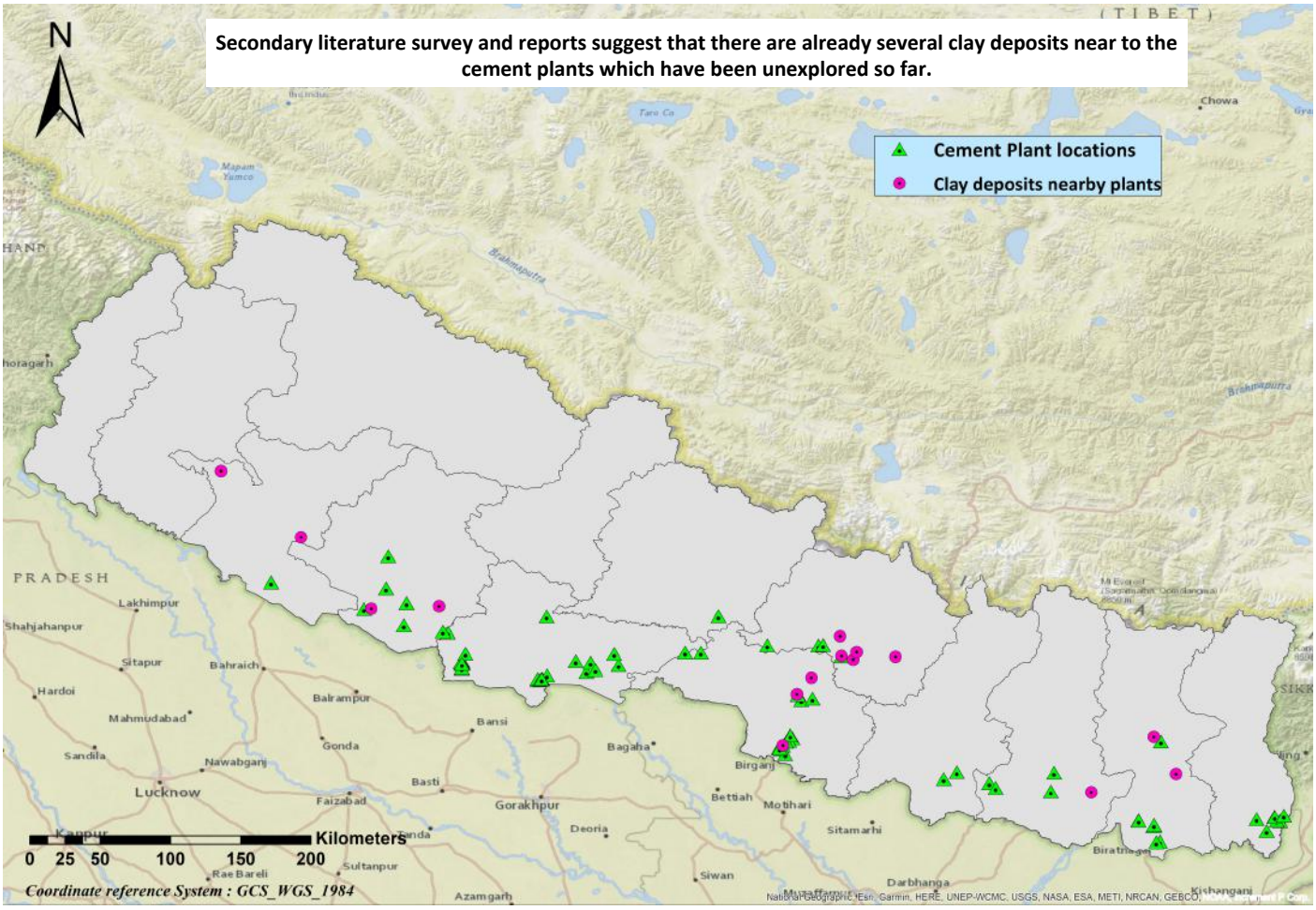
- Department of Geology and Mines, Nepal.
- Society for Technology and Action for Rural Advancement.
- Nepal Cement Manufacturers' Association.

Goal :
The main goal of the LC^3 project is to position LC^3 as a low-carbon, general-use cement in the Nepal cement market by establishing the feasibility of clays for LC^3 applications in Nepal.

WHAT IS LC^3?

Limestone Calcined Clay Cement (LC^3) technology is a family of composite cement containing Portland clinker, calcined clay and low-grade limestone. As LC^3 cement uses raw materials and technologies already commonly used in cement production, they provide a practically viable solution. Additionally, the fact that LC^3 can be used the same way as ordinary cement is an excellent prerequisite for its smooth market introduction on the consumer side. The LC3 technology is quite promising from cost, energy, and environmental perspectives.





The Society for Technology & Action for Rural Advancement (TARA) is a social enterprise of the Development Alternatives Group, set up in year 1985 at New Delhi, India. TARA's vision is to develop "scalable solutions for people and the planet". As an 'incubation engine', TARA's organisational objectives have been defined around impact in the areas of Employability, Entrepreneurship, Clean Technology, Basic Needs, Natural Resource Management and Institutional Strengthening. TARA has spearheaded technological and social interventions for the last four decades to provide sustainable development solutions. One of TARA's major interventions has been in the construction sector, which is responsible for a large part of any nation's carbon emissions and resource consumption. Swiss Agency for Development and Cooperation (SDC), in association with the Indian Institute of Technology at Delhi and Madras and TARA, has developed a breakthrough technology to produce a new kind of cement widely known as Limestone Calcined Clay Cement (LC^3). This cement will significantly reduce carbon emissions by giving better strength simultaneously. The TARA team, has been working with several established national and international cement manufacturers to accelerate the adoption of this breakthrough innovation in their existing plants.

CONTACT US

dbasuroy@devalt.org, smaity@devalt.org

B-32, Tara Crescent, Qutub Institutional Area, New Delhi, India

Embassy of Switzerland in Nepal

Department of Mines and Geology, Nepal

Nepal Cement Manufacturers' Association

Society for Technology and Action for Rural Advancement