



Key achievements

- The design build foundation solution saved over 75% carbon compared to the conventional driven piling solution for the tank structures.
- The low carbon solution resonated with the product of sustainable aviation fuel, planned to be produced and stored in the plant using renewable materials.
- The project is a testament of Keller's commitment for a greener planet.

• The project

Neste, a global leader producing renewable diesel and sustainable aviation fuel invests €1.5b to expand the production capacity of its Singapore refinery by 2023. The Singapore Expansion project will increase its total capacity producing renewable solutions by up to 1.3 million tons, with up to 1 million tons could be sustainable aviation fuel.

• The challenge

The site across the expansion project was highly variable and reclaimed. In addition to satisfy the technical performance, tight schedule and the cost budget, Keller team was also challenged to develop a low carbon solution complimenting the end product i.e., sustainable aviation fuel. After extensive analysis, Keller proposed a hybrid vibro solution using natural materials such as Sand and Stone. The solution did not consider usage of any cement or steel products. The engineers leveraged the reclaimed sand insitu properties to densify followed by the consolidation of underlying marine clay layers using stone columns.

• The solution

Keller's innovative and cost-effective solution with low carbon footprint resonated with Neste's objectives. It also provided a flexibility to the structural designers during the construction process.

Application

Bearing capacity/settlement control

Technique

Vibro compaction & vibro stone column

Sector

Oil, gas and chemical

Client

Neste

Main contractor

TechnipFMC

Contract Value

Approx. S\$25 m

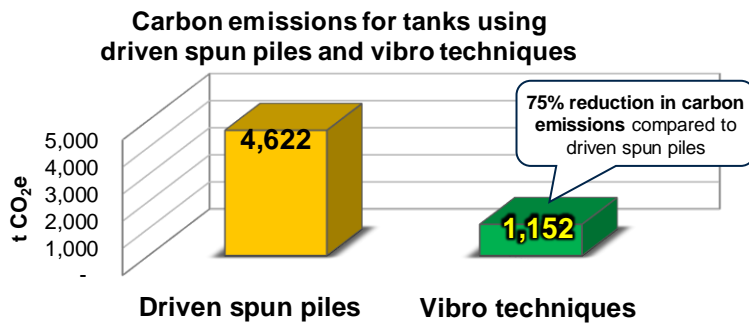
Keller companies

Keller Foundations (S E Asia) Pte Ltd



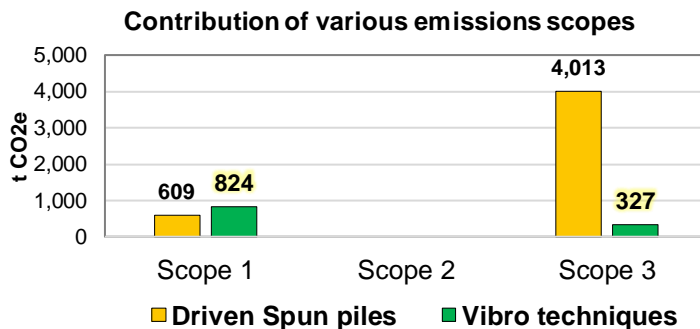
Total carbon emissions savings with vibro techniques

Total carbon emissions in terms of green house gas (GHG) CO₂ equivalents *for tanks was about 1,152 t CO₂e using vibro techniques. It saved nearly 3,400 t CO₂e* than a typical solution using driven spun piles.



Ref: EFFC DFI Carbon Calculator Methodological & User Guide v2.2

The comparative carbon emissions contributed by various scopes are depicted below. The scope 3 emissions were reduced by over 91% due to the fact of non usage of cement and steel for the vibro techniques solutioning. The vibro technique used natural materials such as sand and stone for the construction purposes.



What do these carbon savings mean for the environment?

The saved emissions is equivalent to:

350

energy needed drive an average car 350 times around the earth's equator (14 million kilometres)!

1,224

powering 1,224 housing development board units in Singapore, for 1 year!

4,251

carbon sequestered by 1,720 hectares (4,251 acres) of forest in one year which is about 2.3% of Singapore's land area!

References:

- <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator> .
- https://www.ema.gov.sg/cmsmedia/Publications_and_Statistics/Statistics/8RSU.pdf.