NAME : Yuto Moriwake	GROUP REF. : B2
COUNTRY : JAPAN	PREF. SUBJECT : PS3
REGISTRATION NUMBER : 6940	QUESTION N° : 3.11

Comparison of CO_2 emissions from vehicles and helicopters used to transport materials of OHL towers.

The effect of the method of transporting steel towers during transmission line construction on CO_2 emissions was compared. Two transportation methods, vehicles and helicopters were compared in terms of the percentage of use.

1. Area of the tower installation

A case study was conducted on installing steel towers in two areas.

- Case 1 : Installation of towers in forested areas

When vehicles are used in forested areas, the forest should be logged.

- Case 2 : Installation of towers on flat land with no trees

In this case, there is no need to cut down trees for vehicle access.

2. Evaluation conditions for CO_2 emissions

The following conditions were set for the evaluation of CO_2 emissions:

- Scope: 21 steel towers, 30 tons/tower, OHL length 9km.
- Temporary roads are constructed in proportion to the rate at which vehicles and helicopters are used.
- Temporary road width: 7 m.
- Forest is logged using a chainsaw, and root removal is not conducted.
- The density of trees in the forested area is 0.1075 trees/m^2.
- The chainsaw fuel for cutting one tree is 0.14 L / tree.
- Four-ton trucks are used to transport the logged forest, with 20 km to the tree collection point.
- Only the backhoe is used for paving temporary roads, and the slope is not considered.
- The fuel consumption of the backhoe shall be 10.5 L/h.
- Transportation distance from the materials storage yard to each site: 10 km.
- The round-trip flight time of the helicopter from the storage yard to each site is 20 minutes.
- Vehicle load: 10 tons/way, Helicopter load: 3 tons/way.
- CO_2 emissions are evaluated for the transport of steel towers only.
- CO_2 emissions related to manufacturing, transportation from manufacturers to the material yard, construction, maintenance, and removal are not evaluated.

3. Results

Even if forests were logged and temporary roads were built, transporting steel tower materials by vehicles resulted in lower CO_2 emissions (Figure1).

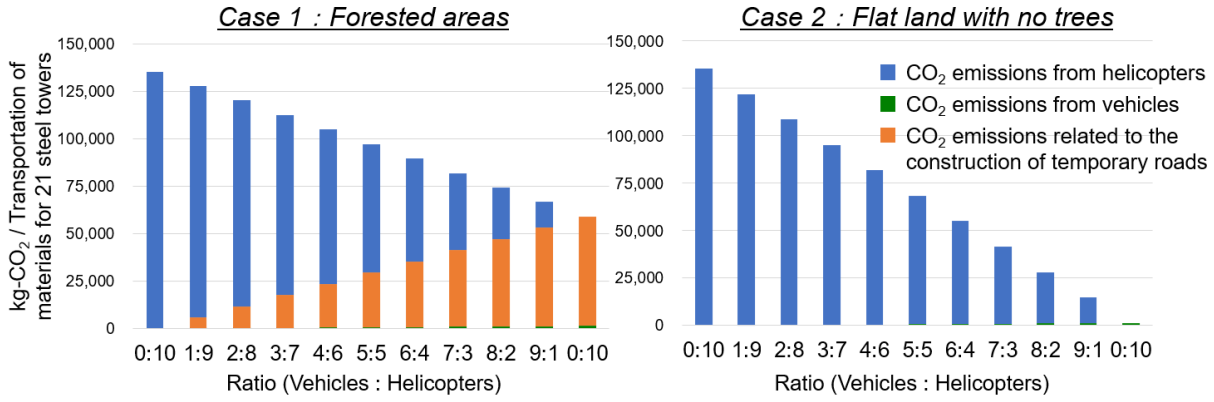

Figure 1 Without considering CO_2 absorption by forests

Some vehicle and helicopter usage patterns can offset CO_2 emissions over several years by reducing the logging trees area (Figure 2).

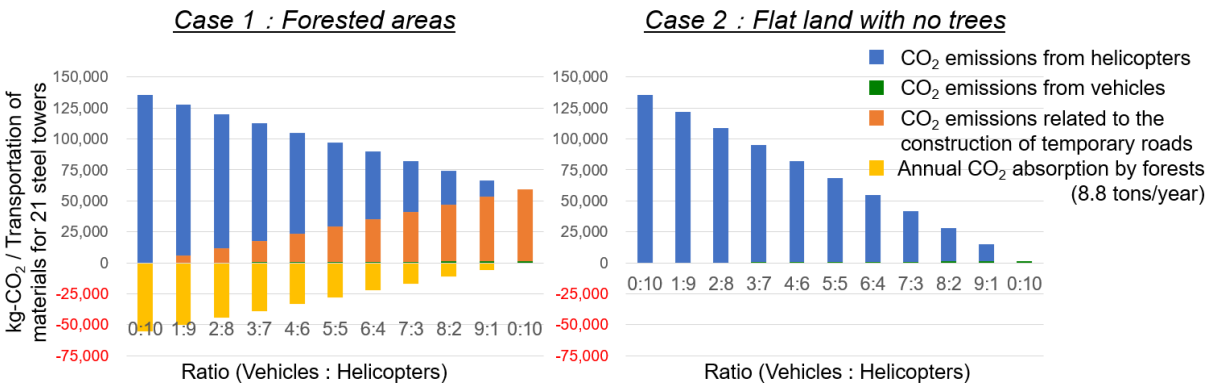

Figure 2 Considering CO_2 absorption by forests

4. Conculisions

Transportation methods with low CO_2 emissions depend on the installation area and other factors. It should be noted that only the transport of steel towers was evaluated. Temporary roads can also be used to transport workers and construction equipment.