

Conceptual Tier 5 Emission Credits Calculation Methodology (8/30/22)

On August 8, 2022, CARB staff held a Tier 5 workgroup meeting to discuss hybrid credit concepts in addition to concepts for a low load cycle, greenhouse gas capping standards, and small volume manufacturer provisions. During the meeting, stakeholders had questions about how hybrid emission credits could be generated and used. In response, CARB staff showed an example equation of how hybrid emission credits might be calculated in comparison to the existing equation used for an averaging, banking, and trading program. This is CARB staff's initial concept for discussion purposes and is subject to change.

For each participating family, calculate positive or negative emission credits relative to the otherwise applicable emission standard. Calculate positive emission credits for a family that has a Family Emission Limit (FEL) below the standard. Calculate negative emission credits for a family that has an FEL above the standard. Sum your positive and negative credits for the model year before rounding. Round the sum of emission credits to the nearest kilogram (kg), using consistent units throughout the following equation:

$$\text{Emission credits (kg)} = (\text{Std} - \text{FEL}) \times (\text{Volume}) \times (\text{AvgPR}) \times (\text{UL}) \times (10^{-3})$$

Where:

Std = the emission standard, in grams per kilowatt-hour.

FEL = the family emission limit for the engine family, in grams per kilowatt-hour.

Volume = the number of engines sold in California that are eligible to participate in the averaging, banking, and trading program within the given engine family during the model year

AvgPR = the average maximum engine power of all the engine configurations within an engine family, calculated on a sales-weighted basis, in kilowatts.

UL = the useful life for the given engine family, in hours.

$$\text{Emission credits generated by a Hybrid (kg)} = 5\% \text{ or } 10\% \times (\text{Std}) \times (\text{Volume})_{\text{Hyb}} \times (\text{AvgPR})_{\text{Hyb}} \times (\text{UL}) \times (10^{-3})$$

Where:

Std = Tier 4f or Tier 5 emissions standard, in grams per kilowatt-hour

Volume_{Hyb} = the number of hybrids sold in California in a calendar year

$(\text{AvgPR})_{\text{Hyb}}$ = the average rated power for all the engine+hybrid* configurations within a hybrid powertrain family, calculated on a sales-weighted basis, in kilowatts.

UL = the useful life for the given engine family, in hours.

* CARB staff's current thinking is that the average power rating should be based on both the combustion engine and the hybrid system.