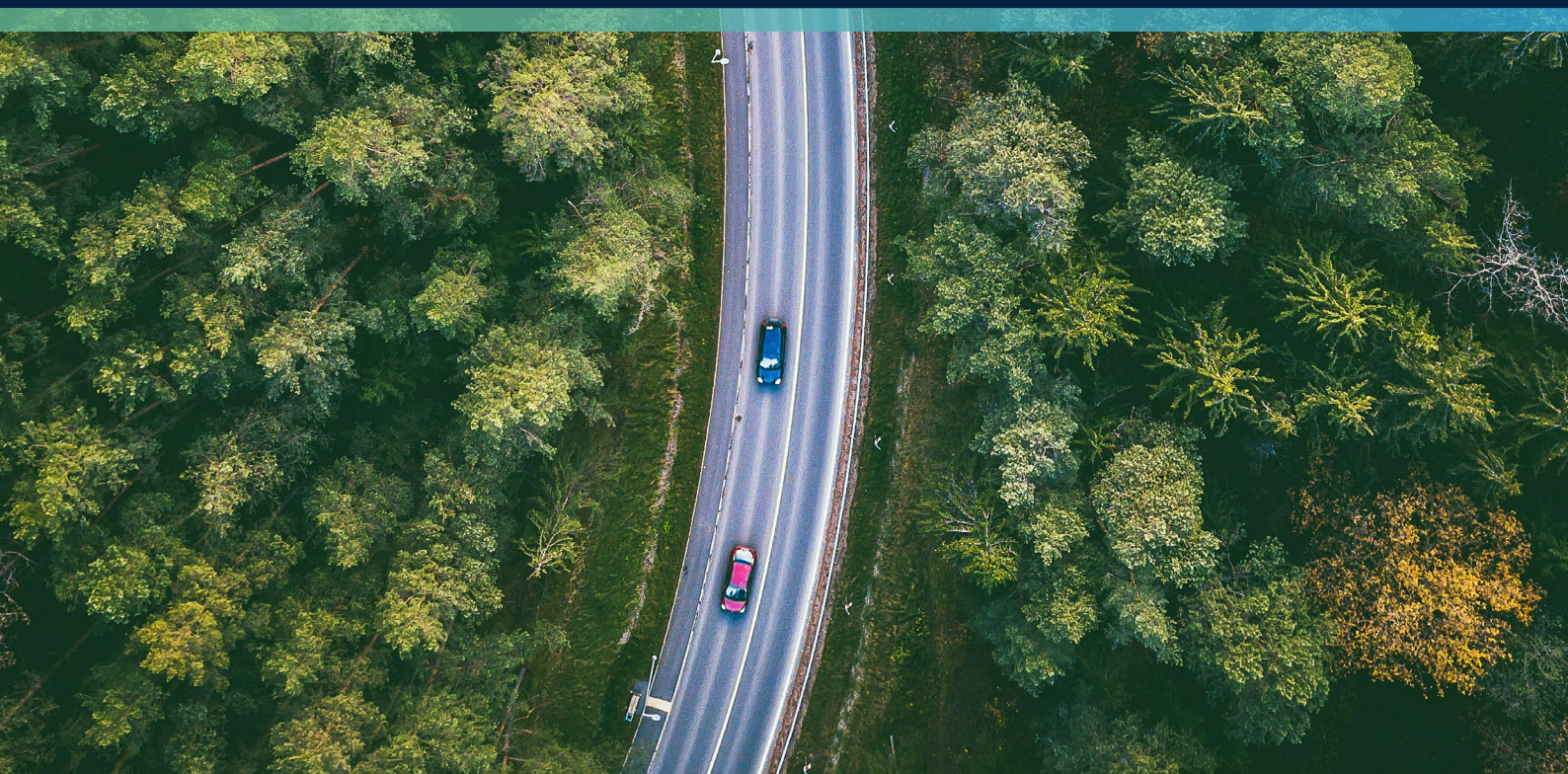
masternaut

MASTERNAUT INSIGHTS

CO_2 Certification Methodology Documentation

March 2019



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Programme overview

We already know that transportation is the leading cause of greenhouse gas emissions in the UK.

Responsible companies are keen to do what they can to help address this problem - and they know that running an efficient fleet is both good for the environment and good for the business bottom line. Bad driving behaviour, poorly maintained vehicles and sub-optimal routing choices all have an impact on fuel costs, vehicle wear and tear and carbon emissions. Fleets that address these issues unlock their hidden advantage and reduce their fuel expenditures and CO_2 emissions.

Many companies and drivers are making positive changes. Every year, Masternaut customers save 230,000 tonnes of CO_2. To recognise this major achievement, Masternaut has a Fleet CO_2 Certification programme. Fleets that improve their environmental performance or lead in efficiency can monitor and publish their achievements, reflecting their progress and demonstrating how they compare to competitors.

CO_2 certification at a glance

The Fleet CO_2 Certification programme is automatically available for all Masternaut customers at no extra charge. Customers are included if they use the Connect platform or have CAN Clip telematics devices active in over 50% of their fleet for the past 3 months, as of the date of the analysis. Tracking with CAN Clip technology in 2017 is also required to calculate YoY improvement.

We certify three tiers:

GOLD	SILVER	BRONZE
Greater than 5% YoY improvement in MPG or 5% above Masternaut benchmark.	YoY improvement in MPG or above Masternaut benchmark.	Committed to measuring performance by installing CAN clip technology across your fleet.



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Methodology

What data is used?

Masternaut's patented CAN Clip technology allows us to capture the most accurate vehicle data possible. We collect data from the vehicle CAN Bus which connects sensors and onboard computing all over the vehicle. Using induction, the Clip can read data directly without interfering with vehicle systems.

Key data captured for this analysis are odometer readings (for journey distances) and fuel usage data (to measure the volume of fuel used during each journey).

We use this data, combined with our knowledge of the specific vehicle (including class, make and model) to calculate the most accurate CO_2 savings available in the industry.

How is it collected and processed?

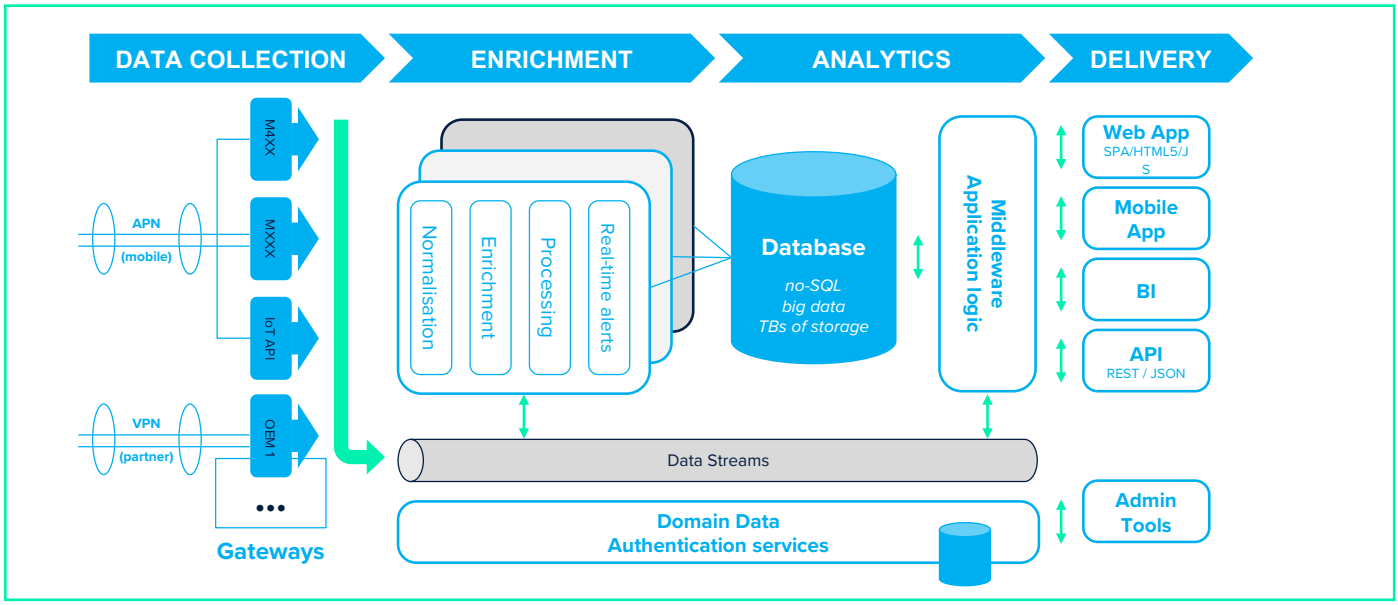
Via the CAN Clip, we monitor fuel injector pulses to calculate fuel usage. This is important not only because it is the most accurate way of measuring fuel, but also because we know exactly when the fuel was burnt, allowing us to adjust for seasonality. This ensures that companies who operate a lot in the winter months (e.g. Christmas deliveries) are not unfairly penalised when compared to summer operators.

For distance data, we take an odometer reading via the CAN Clip at the "ignition on" point and again at the "ignition off" point. This gives us an accurate reading of the total journey distance. We also compare this against GPS-logged distance to check for anomalies.

Data from our devices is sent to our ISO 27001-certified servers in Aberford and Val-de-Reuil. We then process the data by filtering out highly unusual journeys or journeys with anomalous data – but this amounts to well less than 1% of total logged distance.

Note that Masternaut removes personally-identifiable information in accordance with GDPR and Masternaut's data retention policies.

Masternaut Connect: functional architecture



In summary:

- Data is sent securely from boxes directly to our processing platform
- We aggregate the data to see how far a vehicle has travelled and how much fuel was used
- We conduct sense checking and eliminate data anomalies
- You see this data in Connect

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Calculation approach

Year-on-year (YoY)

This metric compares an entire calendar year with the previous year to see whether MPG has improved for each type of vehicle tracked by Masternaut. Two entire years of data is required to do this, and any vehicle types with insufficient data (e.g. due to data retention policies) do not form part of the calculations.

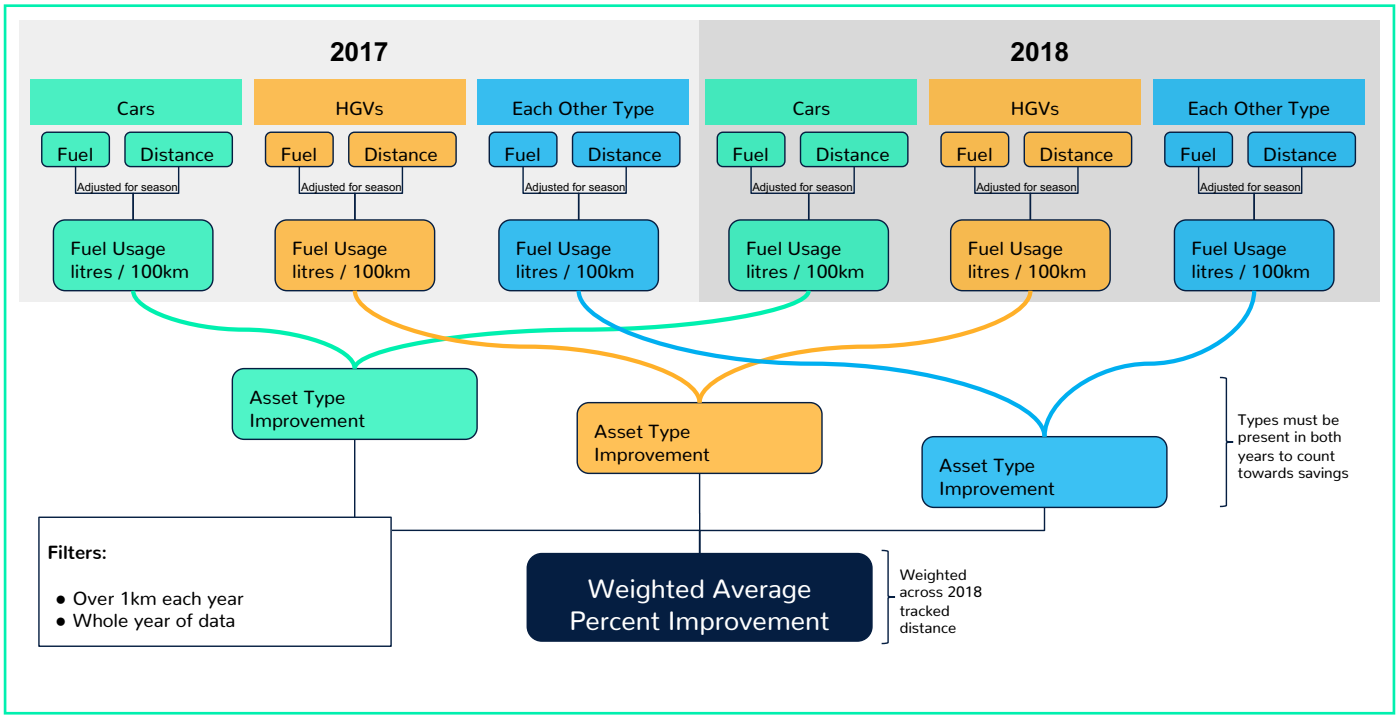
For each year, we take the total distance travelled alongside the total fuel used while travelling that distance.

Once we have these figures, we calculate an Asset Type Improvement for your company by taking the difference between the years, and combine these using the distances travelled in the most recent year into an overall percentage improvement.

Using this method, we can control for actual distances travelled. Note that we do not penalise any business for increasing the amount of business conducted or penalise a business if it is busier in winter months.

Large savings here are achieved by **upgrading to more efficient vehicles**, and by **improving driver behaviour**. Switching HGVs for vans, or vice versa, does not result in savings on this metric.

Year-on-year improvement savings



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Calculation approach

Benchmark

This metric determines whether your specific vehicle models are being used more or less efficiently than the average across the entire Masternaut fleet.

We start with all the data for your company from 2018. Then, for each vehicle make and model (for example, Mercedes Sprinter), we add up the distance travelled and total fuel used. As with the YoY savings, we adjust fuel volumes for seasonality, so that winter is compared fairly with summer travel.

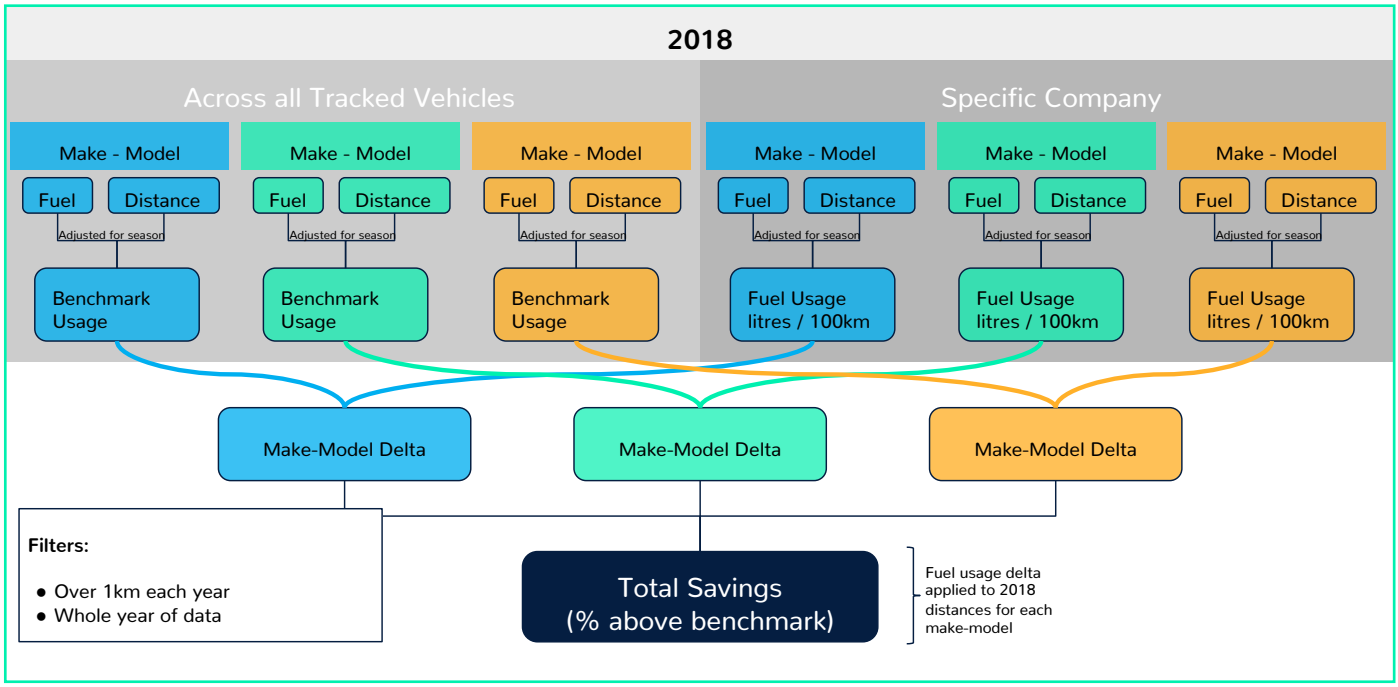
We then compare this for the total make-model usage figures, which are calculated from all vehicles tracked by Masternaut, to come up with a list of make-model deltas for each model of vehicle you use.

For each make-model, we then combine the deltas, weighted by how much you use that model of vehicle, into a single percentage. This represents how much better or worse your economy was compared to the average in Masternaut.

It is worth mentioning that this will result in about half of our customers performing worse than benchmark. This does not necessarily mean the company is inefficient. Companies with Masternaut perform better than other companies who do not track fuel usage, and we also cannot take into account the precise nature of your business.

Performance tips for this benchmark include **good driver behaviour, using the latest Euro 5 or 6 vehicles,** and **scheduling jobs to avoid traffic and unnecessary urban driving.**

Vehicle benchmark savings



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Independent, 3rd party verification

After a thorough review of our patented hardware technology and analytic methodology, the Energy Saving Trust has provided an independent, third-party statement on our certification programme:

The Energy Saving Trust has conducted a limited assurance verification of Masternaut's Fleet CO_2 Certification methodology and can give assurance on its accuracy as a measurement of CO_2 improvement. The method of CO_2 emissions calculation used by Masternaut is based on primary fuel data captured which generates the highest precision level for CO_2 emissions calculations. When these values are combined with vehicle distances then the resultant outputs can be used to assess vehicle efficiency on an ongoing basis.

The Energy Saving Trust has also assessed that Masternaut's Fleet CO_2 Certification Programme will provide outputs that will allow operators to attain specific measured values, transport operator specific values or transport operator fleet specific values for transport services in accordance with EN 16258:2012 Methodology for the calculation and declaration of energy consumption and GHG emissions of transport services (freight and passengers).

The Energy Saving Trust has reviewed that Masternaut's Fleet CO_2 Certification Programme will help freight transport operators provide inputs with respect to primary fuel consumption values into GHG calculations required for the adoption of the Global Logistics Emissions Council (GLEC) Methodology Framework Version 1.0 (2016).

A limitation of the Masternaut Fleet CO_2 Certification methodology data is that only "tank to wheel" (TTW) or "tailpipe" emissions are captured and GLEC Methodology Framework requires "well to wheel" (WTW) assessment. Also further limitation is a measure of freight transport activity is needed to generate a full fuel consumption factor per transport activity in tonnekilometres (tkm) which is not captured under the Masternaut programme .

In addition, the Masternaut Fleet CO_2 Certification methodology data can support organisations in their Environmental Management Systems (EMS) that are certified to the ISO 14001:2015 standard where CO_2 emissions are considered as a significant environmental impact and Energy Management Systems (EnMS) that are certified to ISO 50001:2018 standard where the data captured under the Masternaut system can form the basis of energy consumption assessment of vehicle fleets. This in turn can assist in Energy Savings Opportunity Scheme (ESOS) reporting should the organisation be mandated to report energy consumption information and be subject to energy auditing.

energy saving trust

The Energy Saving Trust (EST) is a UK based organisation with a mission to help people save energy every day, by promoting energy efficiency and the sustainable use of energy across all sectors. The Energy Saving Trust's transport related activity revolves around avoiding unnecessary mileage, using the most energy efficient and cleanest vehicles and driving them as efficiently as possible. Its Fleet Review programme has been active for over a decade, interacting with over 1100 fleets, covering nearly half a million vehicles in both the public and private sectors. In 2016-17, EST's ecodriving training programme engaged with over 10,000 drivers from approximately 550 organisations, achieving an immediate average fuel saving of nearly 15%.

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How to improve fleet performance

Both your drivers' safety and your fuel spend depend heavily on speed. There are lots of resources available online to help you find new ways to increase your score. Take a look at the following:

- 5 ways to reduce fuel waste
- How to choose the right vehicle for each job with telematics
- How to calculate your fleets carbon footprint
- Advising fuel efficient driving techniques for your fleet from the Department of Transport and Energy Savings Trust

Questions

Please contact us at co2@masternaut.com if you have any questions or would like to discuss your fleet performance in more detail.

ABOUT MASTERNAUT

At Masternaut, we believe every business is sitting on unrealised potential. Your vehicles create oceans of data every day. Hidden in that data are insights that have the power to transform your fleet – and possibly even your business. We specialise in revealing these transformative insights so you can turn them to your advantage. From telematics devices to expert analysis, every one of our tools helps your business unlock potential.

Learn more about us at
www.masternaut.com

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