

SYSTEM FOR COLLECTION OF CARBON DIOXIDE EMISSION DATA FOR VEHICLES AND MAKING RECOMMENDATIONS BASED ON THE EMISSION DATA

FIELD OF THE INVENTION

[0001] The present disclosure relates generally to a method for collecting carbon dioxide emission data for vehicles, and more particularly for vehicles making repeat trips to the same location, and making recommendations based on such emission data.

BACKGROUND OF THE INVENTION

[0002] Recently it has become desirable to get a better understanding of carbon dioxide emissions, especially of vehicles such as fleet vehicles. Known techniques for estimating carbon dioxide emissions of fleet vehicles make an estimate of carbon dioxide emissions based simply on a distance between a pickup address and a destination address. While this provides an estimate for fleet vehicle carbon dioxide emissions, in order to obtain a more precise measurement it is necessary to manually check the distance travelled by each vehicle or check a volume of fuel consumed by the vehicle during each delivery. This is relatively time consuming and messy. It would therefore be desirable to provide a more accurate method for collecting carbon dioxide emission data.

SUMMARY OF THE INVENTION

[0003] In accordance with a first aspect, a method for collecting an estimated carbon dioxide emission data for a trip made by a vehicle having a vehicle engine is disclosed. The method comprises the steps of calculating a route distance traveled by a vehicle between a departure and a destination, estimating a travel time based on the route distance traveled, estimating an idling time of the vehicle while travelling between the departure and the destination, wherein idling time comprises time the vehicle engine is running but the vehicle is not moving, estimating a turnaround time, wherein the turnaround time comprises time that the vehicle engine is running while the vehicle is at the destination. An assumed amount of carbon dioxide produced per a volume of fuel consumed is assumed, followed by the step of calculating a route distance carbon dioxide emission as a product of the route distance, an amount of fuel consumed per a distance traveled, and the assumed amount of carbon dioxide produced per the volume of fuel consumed, calculating an idling time carbon dioxide emission as a product of the idling time, an assumed amount of fuel consumed per a time of idling time and the assumed amount of carbon dioxide produced per the volume of fuel consumer, and calculating a turnaround time carbon dioxide emission as a product of the turnaround time, an assumed amount of fuel consumed per a time of turnaround time and the assumed amount of carbon dioxide produced per the volume of fuel consumed. The estimated carbon dioxide emission is the sum of the route distance carbon dioxide emission, the idling time carbon dioxide emission, and the turnaround time carbon dioxide vehicle emission.

[0004] From the foregoing disclosure and the following more detailed description of various embodiments it will be apparent to those skilled in the art that the present invention provides a significant advance in the technology of methods for collecting carbon dioxide emission data. Particularly significant in this regard is the potential to accurately measure carbon dioxide emissions from vehicles which regularly are driven to the same location, such as a construction site. Additional elements and advantages of various embodiments will be better understood in view of the detailed description provided below.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] Fig. 1 is a schematic view of a schematic of vehicles driving to and from a construction site having a distance traveled, an idling time and a turnaround time.

[0006] Fig. 2 is a schematic flow chart of cloud software platform using the method of receiving data for the system and making recommendations in accordance with one embodiment.

[0007] Figs. 3-5 are a schematic flow chart of methods of calculating estimated carbon dioxide emission and actual carbon dioxide emission, as well as comparing estimated carbon dioxide emission with actual carbon dioxide emission.

[0008] Fig. 6 is a schematic flow chart of a method for measuring actual carbon dioxide emission of a project (such as a fleet of vehicles), calculating an estimated carbon dioxide emission for the project, and proposing ways to reduce carbon

dioxide.

[0009] It should be understood that the appended drawings are not necessarily to scale, presenting a somewhat simplified representation of various features illustrative of the basic principles of the invention. The specific design features of the method disclosed here, including, for example, the assumptions about emission rates, will be determined in part by the particular intended application and use environment. Certain features of the illustrated embodiments have been enlarged or distorted relative to others to help provide clear understanding. In particular, thin features may be thickened, for example, for clarity of illustration. All references to direction and position, unless otherwise indicated, refer to the orientation illustrated in the drawings.

DETAILED DESCRIPTION OF CERTAIN EMBODIMENTS

[0010] It will be apparent to those skilled in the art, that is, to those who have knowledge or experience in this area of technology, that many uses and design variations are possible for the method of collecting carbon dioxide data disclosed here. The following detailed discussion of various alternate elements and embodiments will illustrate the general principles of the invention with reference to a method for collecting carbon dioxide data for vehicles traveling to and from a construction site or other job site such as fleet vehicles, trucks, lorries, etc. Other embodiments suitable for other applications will be apparent to those skilled in the art given the benefit of this disclosure.

[0011] The present disclosure relates generally to a method for automated delivery management platform for recommending an enhanced inland transportation route for vehicles using a carbon dioxide calculation model and an integrated system of tracking and tracing real-time site information from a job site to help make decisions. Machine learning can be used to compare a large volume of transactions of planned and actual routes to make enhanced decisions to reduce cost and carbon dioxide consumption by (a) recommending an enhanced route, which reduces travelling time and/or distance travelled, and/or by recommending a delivery slot to the construction site with reduced idling time and/or turnaround time, which means that each vehicle will spend less time on site.

[0012] Recently It has become desirable to calculate an embodied carbon dioxide consumption in the construction value chain. The method disclosed herein enables the calculation of transportation carbon dioxide emission calculations, collection of large volumes of simultaneous and concurrent information such as the vehicle type specifications. Collection of such simultaneous and concurrent information advantageously allows for predictions about carbon dioxide emissions. Additional data can be collected such as, for example, actual data about a route travelled by vehicles and the idling time of the vehicles on the road. Such data may be used to make recommendations to help decision making in establishing transport planning which advantageously results in lowering transportation related costs and carbon dioxide emissions.

[0013] The method disclosed herein advantageously can be adaptive and automatically varied and fine-tuned to obtain a more accurate carbon dioxide

emission prediction as part of a real-time integrated system. While estimates of carbon dioxide emissions are available, in order to obtain a more precise measurement it is necessary to manually check the distance travelled by each vehicle or check a volume of fuel consumed by the vehicle during each delivery. This is relatively time consuming and messy.

[0014] Turning now to the drawings, Fig. 1 shows a simplified schematic of one or more vehicle beginning at an origin or departure and driven to a destination. The departure can be a point where the vehicle is loaded with supplies, and the destination can be a construction site or other worksite, for example. The vehicles can be all of the same type, or groups of different types of vehicles. A driver of one of the vehicles can provide driver details such as a clock in at a scheduled booking time and a clock-out at a time recorded in real-time. The system disclosed herein can trace a distance travelled (A), an idling time (B), and a turnaround time (C) in both directions of the trip.

[0015] The vehicles typically have a vehicle engine which uses a combustible fuel which in turn generates carbon dioxide emissions. In accordance with a highly advantageous process, a method for collecting estimated carbon dioxide emission data disclosed herein comprises first calculating a travel/route distance traveled along a travel path/route by each vehicle of a group of vehicles back and forth between the departure and the destination. Next, an idling time is estimated, which is the time spent along the travel path not moving. More specifically idling time happens at any time the engine is running but the vehicle is not moving along the route from the departure to the destination, including queueing at the entrance of the

construction site. Third, a turnaround time is estimated. The turnaround time is defined as the time spent by the vehicle at the destination (where, for example, unloading of cargo can occur), and includes all the time the vehicle takes to enter the construction site, unload or load cargo and exit the site. Importantly, idling time and turnaround time of the vehicle can account for 15%-20% of the whole inland transportation travel time, and have not been accounted for under the known methods of carbon dioxide estimation. Given this data, and a series of assumption about fuel usage for each situation, the estimated carbon dioxide emissions may be obtained. For example, the make and model of the vehicle may be known or assumed (for example each vehicle is a 14 ft lorry); the engine is running during idling time; the vehicle travels at a constant rate during turnaround time (for example, 15km/hr; 2.7kg of carbon dioxide is produced per volume (liter) of fuel (diesel) consumed; 0.286 liters of diesel fuel per km of travel distance, and 3.03 liters of diesel fuel consumed per hour during idle time. Other assumptions will be readily apparent to those skilled in the art given the benefit of this disclosure. One vehicle's estimated carbon dioxide emission may be calculated, or many vehicles' estimated carbon dioxide emissions may be calculated, and may be calculated concurrently.

[0016] Calculating the estimated carbon dioxide emissions may be completed as follows. Assume an assumed amount of carbon dioxide produced per a volume of fuel consumed, calculate a route distance carbon dioxide emission as a product of the route distance, an amount of fuel consumed per a distance traveled, and the assumed amount of carbon dioxide produced per the volume of fuel consumed. Next, calculate an idling time carbon dioxide emission as a product of the idling time, an assumed amount of fuel consumed per a time of idling time, and the assumed

amount of carbon dioxide produced per the volume of fuel consumer. Then calculate a turnaround time carbon dioxide emission as a product of the turnaround time, an assumed amount of fuel consumed per a time of turnaround time, and the assumed amount of carbon dioxide produced per the volume of fuel consumed. Once these three numbers have been determined for each vehicle, the estimated carbon dioxide emission is calculated as the sum of the route distance carbon dioxide emission, the idling time carbon dioxide emission, and the turnaround time carbon dioxide vehicle emission.

[0017] Such calculating of estimated carbon dioxide emission data can lead to potential reductions in the total emission of carbon dioxide by one or more of the vehicles of the fleet of vehicles. The carbon dioxide emission data can be presented in real time on a computer screen at a remote location and readily available for viewing. For example, the carbon dioxide emission data may be presented to a computer screen viewable by a main contractor. The main contractor may be tasked with a limit on the amount of carbon dioxide emissions, and can adjust behavior of one or more vehicles in the fleet of vehicles in response to receipt of the carbon dioxide emission data. A delivery time can be scheduled for arrival of a vehicle, and when multiple vehicles have their estimated carbon dioxide emission calculated essentially concurrently, different delivery times can be scheduled or staggered to reduce a travel route (and travel time), reduce the idling time (by avoiding congested areas) and/or reduce the turnaround time. Generally, scheduling of delivery time can be based on traffic situations, driver fatigue, driving behavior (does the driver drive the vehicle fast or slow), unforeseen circumstances and last-minute traffic diversions, for example. Reduction of any of these (travel time, idling time, turnaround time) will

reduce the amount of carbon dioxide actually emitted by a vehicle. The travel route/idling time/turnaround time can be selected based on actual traffic conditions, the vehicle make and model, availability of equipment to unload the vehicle present and available at the destination (such as a tower crane), and/or a construction phase at the destination. The system disclosed herein can be continuously updated with real-time data about the information listed above for better recommendation of routes, and delivery timeslots for the vehicles.

[0018] Expanding on the concept of using the emission data to make recommendations to reduce carbon dioxide emissions, and in accordance with a highly advantageous element, the system disclosed herein can make a recommendation for a preferred travel route between the departure and the destination to reduce either travel time, idling time, and/or turnaround time based upon estimated carbon dioxide emissions for a particular vehicle. Further, the system may be provided with knowledge of a schedule/construction phase at a worksite, and may alter a time of arrival/delivery slot at the worksite for a given vehicle to reduce turnaround time at the worksite. The schedule at the worksite may also include information about carbon dioxide emission for machines at the worksite. Reduction of any or all three of these times will help to reduce total carbon dioxide emissions of the vehicles in the fleet of vehicles.

[0019] In accordance with another highly advantageous element, a predicted carbon dioxide emission amount of a vehicle may be calculated based on carbon dioxide emission data collected from a number of previous trips to the worksite. For example, predicted carbon dioxide emission of a vehicle may be determined in part

by the planned travel distance (A), an average idling time (B) based on average idling time for a previous 10 trips to and from the worksite, and an average turnaround time (C) based on an average of the last ten trips. For (A), the planned travel distance, 2.7 kg of carbon dioxide per liter diesel fuel consumed can be assumed as an assumed amount of carbon dioxide produced per a volume of fuel consumed, along with 0.286 liters of diesel fuel per km of travel distance to produce a predicted travel distance carbon dioxide emission data. Predicted travel carbon dioxide emission data given these assumptions is calculated as (A) the planned travel distance * 0.286 l/km * 2.7 kg/l. (A) the planned travel distance is calculated by having a user input an origin address and a destination address, such as, for example, inputting this information into an application (app) on a phone. The distance between origination address/departure X and destination address Y is calculated based on Google map API, for example, to determine a travel distance. This planned travel distance (A) is applied as part of the three variables needed to calculate the estimated carbon dioxide emission data. A series of previous trips can be averaged to create the predicted carbon dioxide emission data.

[0020] Different assumptions about fuel consumption may be made for the idling time (B) and the turnaround time (C). For the idling time, given a calculation based on a number of previous trips (such as 10), a predicted idling time carbon dioxide emission can be calculated assuming 2.7kg of carbon dioxide per liter diesel consumed, and 3.03 liters of diesel fuel consumed per hour of idle time as the average idling time (hrs) * 3.03 (l/hr) * (2.7 kg/l). For the turnaround time, again given a calculation based on a number of previous trips (such as 10) may be made. An average turnaround time carbon dioxide emission can be calculated as the

average turnaround time and distance (hrs) * 15 kh/hr * 3.03 (l/hr) * 2.7 (kg/l). If there are less than 10 trips, then a number of trips used to calculate an average is the number less than 10. For example, if there are only 7 trips clocked in, then only 7 trips are taken into account to calculate the average idling time carbon dioxide emission data, and the average turnaround time carbon dioxide emission data. Optionally, if more than a certain number of trips have been made (such as 20), only the most recent number of trips (such as 10) may be needed for calculations.

[0021] Given these assumptions and calculations, a predicted carbon dioxide emission is the sum of the average travel distance carbon dioxide emission data, the average idling time carbon dioxide emission data, and the average turnaround time carbon dioxide emission data, all expressed in kg of carbon dioxide. The method and system disclosed herein enables prediction of carbon dioxide emission before an actual delivery by a vehicle has been made to the destination.

[0022] Actual carbon dioxide emission of a vehicle driven along a trip from a departure and a destination can be measured directly as the sum of carbon dioxide emitted along the route distance, during idling time and during turnaround time. The actual carbon dioxide emission can be collected and presented, for example, for project compliance purposes, and to generate a report tracking carbon dioxide emissions for a particular work site. Such actual data can allow a customer, agency or other entity to keep track of total carbon dioxide emission at the work site. In accordance with a highly advantageous element, the actual carbon dioxide emission data can be compared to the estimated carbon dioxide emission data, which can allow for continuous improvement in terms of carbon dioxide reduction. To measure

actual carbon dioxide, it is necessary to measure the travel time, the idling time and the turnaround time. A time is measured from the beginning of the trip at the departure to the destination for the vehicle. A time is measured at a time of arrival at the destination. And a time is measured at completion at the destination. The actual travel time is the time from the beginning of the trip to the time of arrival at the destination minus the idling time, the idling time is the difference between the actual travel time and the estimated travel time, and the turnaround time is the difference between the time of arrival at the destination and the time of completion at the destination. The same assumption about fuel usage per km of travel distance, fuel usage per idling time, and fuel usage per turnaround time used for estimated carbon dioxide emission can be used for the same types of vehicles for actual carbon dioxide emission. For example, in the system disclosed herein, a main contractor or other manager can approve a delivery slot for the vehicle of a subcontractors/supplier based at least in part on, for example, the estimated carbon dioxide emission. After this occurs, the platform/system/app generates a unique shareable web link, which the subcontractor/supplier can send to the driver of the vehicle. When the driver clicks on the shareable web link, the start of the delivery trip is considered to begin, and the app records the time that the driver is taking from the departure to the destination. It is envisioned that the calculation of actual carbon dioxide is made taking into account the predicted route distance or the actual route distance if it is available. Other driver details may also be provided to the system as requested and/or required.

[0023] Once the driver arrives to the site, a gate manager can use the app to check in the status of the delivery, which means that the delivery has arrived to the

destination. The actual time of this arrival can be recorded and can be used to calculate the idling time (as a difference between estimated time to the destination vs. the actual time).

[0024] Turnaround time can be calculated in a similar manner. The actual time of arrival at the destination would be the beginning of the turnaround time. During the turnaround time, the vehicle enters the destination to, for example, load or unload materials. A checkout time occurs when the process is complete. The turnaround time is calculated as the difference between the check in time and the checkout time and then multiplied by the assumption of an average speed during turnaround time (for example, 15km/hr). This average speed is based on the assumption that the truck is moving at a speed of 15km/hr within the site. The actual turnaround distance is multiplied it by the fuel consumption per km and carbon dioxide per liter of diesel consumed in a manner similar to the calculation for estimated carbon dioxide emission above.

[0025] The actual carbon dioxide emission is calculated as the sum of the actual carbon dioxide emitted during the travel time, the idling time and the turnaround time. Thus, the carbon dioxide emitted during the travel time is a product of the travel time, the amount of carbon dioxide emitted per volume of fuel, and a volume of fuel used per distance traveled. The carbon dioxide emitted during the idling time is a product of the idling time, the amount of carbon dioxide emitted per volume of fuel, and the assumed rate of fuel consumption per unit of time idling. The carbon dioxide emitted during the turnaround time is a product of the turnaround distance, the amount of carbon dioxide emitted per volume of fuel, and the amount of fuel consumed per unit

of distance. The method disclosed herein can further comprise using recorded data from multiple trips to recommend the travel path for additional trips, which can potentially materially reduce costs.

[0026] Actual carbon dioxide emission data calculations can be used as a check against estimated carbon dioxide emissions, comparing the two in part to ensure the estimated carbon dioxide emission are meaningful, and to check against a quota, and for continuous improvement (kaizen) analysis. Further, actual carbon dioxide emissions can take into account the vehicle make and model, mileage, age and maintenance schedule (which may vary from other vehicles and therefore emit higher or lower amounts of carbon dioxide). Advantageously, recordation and collection of real time data can be used to modify the travel route of a particular vehicle, (to shorten travel distance and/or idling time), for example. Also, recordation and collection of real time data about conditions at the work site may be used to stagger arrival of vehicles at the work site, for example, which also can in some instances reduce carbon dioxide emissions by reducing turnaround time.

Advantageously route road conditions and/or destination work site conditions may be considered to adjust the route of one or more of the vehicles to reduce carbon dioxide emissions. Real time visualization of the data collected can be presented on a computer screen in an app and made available to drivers of any of the vehicles or other users of the system disclosed herein. Such real time data can comprise, for example, not just conditions about the trip route and the destination condition, but also presentation of a trip route, a position of the vehicle on the trip, the actual or estimated carbon dioxide emissions, the travel time, the estimated time of arrival and vehicle and driver details. Optionally data about the vehicle, including real time data

about the trip along the route may be input and outputs made without making either the estimated carbon dioxide emission estimate, the actual carbon dioxide emission estimate, or both.

[0027] The data collected by the system can be archived and made available for analysis and comparisons in the future. Post-processing analysis of such data may make a comparison between proposed planned trips and actual trips for future trip selection and recommendation. Data about actual trips can be aggregated to create averages for trips. Data collected by the system advantageously can be integrated/networked with external software/third party systems or other applications for secure sharing of such data (or subsets of the data). More specifically, the estimated carbon dioxide emission data and/or the actual carbon dioxide emission data can be provided to a network (such as an internet-based system), and such data can be sent to the third-party system or data can be received from the third-party system (push-pull). Such data include different algorithms than the one initially used by the system to calculate estimated carbon dioxide emission data, real-time updates, etc. Advantageously, the information/data used to create estimated carbon dioxide emission data can be updated and revised in real time. For example, information about an accident ahead of the vehicle along the intended travel path can be provided to create a revised travel path.

[0028] In addition to making a recommendation for a travel route, an estimated time of arrival may be calculated. Delivery slot times for vehicles may be scheduled to avoid congestion and time waste from too many vehicles arriving at the worksite at the same time. Further the system can recommend and propose combinations and

aggregation of loading of cargo into vehicles in batches to reduce a number of trips, advantageously reducing travel distances, and reducing underuse of empty spaces,

[0029] In accordance with another aspect, the system can use multiple algorithm types for calculations, which optionally can be external to the system. The system is preferably adapted to work with and receive new and algorithms for calculating estimated carbon dioxide emissions, actual carbon dioxide emissions, calculation of trip routes, and other data, even those algorithms not developed at the time of adoption of this system. The ability to receive new algorithms advantageously allows for the ability to fine tune and improve the accuracy of the estimated carbon dioxide emission, for example.

[0030] Fig. 2 is a schematic flow chart of cloud software platform using the method of receiving data for the system and making recommendations in accordance with one embodiment. The method can be calculated in the cloud, that is, on a computer remote from the vehicles, point of departure, destination, etc., and transmitted to other devices over the internet or other suitable network. On the far right, an open connection is provided to external software (which can, for example, provide a new algorithm as discussed above). The system has a data repository for accumulation of data about the vehicles and the destination site, and can include storage of real time data. The system may be operatively connected to input/output devices, such as the app of a device to be operated by a driver of each vehicle. A variable formula selector is provided which can select among algorithms, make recommendations (such as which route to take) as discussed above. Data collection can comprise variable resource planning, systems monitoring (such as, for example, a change in

status of the vehicle like encountering a traffic jam, or delays at the work site), recommendation to pool deliveries as discussed above (to increase efficiency and reduce carbon dioxide emissions), and output can comprise variable recommendations. Also, a machine learning algorithm may be provided to provide continuous improvements (such as improvements to the estimated carbon dioxide emission as discussed above).

[0031] Figs. 3-5 show a representative example of a logic chart for part of the system disclosed herein. In Fig. 3 data about a departure site (such as a warehouse), the destination/work site address, vehicle make and model may be input into the system. The system may also use geographic information system data as part of the calculation to establish a recommended route. Estimated carbon dioxide may be calculated in a manner similar to that described above, as a sum of carbon dioxide emitted by the vehicle (or group of vehicles) traveling along the route, carbon dioxide emitted during idling time, and carbon dioxide emitted during turnaround time. The information can be stored on the system (such as on a cloud server) as mentioned above. Fig. 4 shows the steps of creation of data about a trip by the vehicle and calculation of the actual carbon dioxide emission data. Steps of data collection are shown for (after approval of a delivery by one or more vehicles) such generating unique qualifier for each vehicle, which can include a web link, sending the web link to the driver and optionally to a gate manager at the destination, and having the driver indicate he has started to travel from the departure to the destination, such as by clicking on a link. The system may also send a time from departure (or time to destination) along with a location of the vehicle at an interval based upon calculations from the data received from the driver at the start of

the trip. When the vehicle arrives at the destination, this information can be chronicled in the system, such as by having the gate manager, driver or other suitable person click on a link indicating arrival. The gate manager, driver or other suitable manager may also indicate a time departure, again by clicking on a link to the system, this time indicating departure from the destination. Having the arrival time and departure time allows for calculation of the turnaround time as discussed above. Actual carbon dioxide emissions may be calculated in a manner similar to that discussed above, and recorded and stored in the network, along with the algorithm used and any variables. In Fig. 5, the system can compare the actual carbon dioxide emission with the estimated carbon dioxide emission. The data about this comparison can be presented to management, workers at the work site, drivers, etc., as needed or required. The data can be used as part of a setup for a new project or follow on to the existing project. Optionally carbon dioxide emission can be formulated using different algorithms. Based on this data, a travel path can be recommended for new and/or follow on projects with vehicles delivering to destinations.

[0032] Fig. 6 shows a simplified schematic for enhancement (that is, reduction) of carbon dioxide emissions by first measuring actual carbon dioxide emissions for a vehicle or a plurality of vehicles for a project, using this data to make an estimated carbon dioxide emission for vehicles used in a follow-on project and/or new project, and calculating a route which reduces or keeps the same carbon dioxide emissions compared to the previous trips. Using different algorithms, the system can simulate more than one estimated carbon dioxide emission for the vehicles. The system disclosed herein can be part of a web-based network/system for approving,

collecting and scheduling arrival times at the destination for cargo, and the system can take into account volume and total weight of each vehicle.

[0033] From the foregoing disclosure and detailed description of certain embodiments, it will be apparent that various modifications, additions and other alternative embodiments are possible without departing from the true scope of the invention. The embodiments discussed were chosen and described to provide the best illustration of the principles of the invention and its practical application to thereby enable one of ordinary skill in the art to use the invention in various embodiments and with various modifications as are suited to the particular use contemplated. All such modifications and variations are within the scope of the invention as determined by the appended claims when interpreted in accordance with the breadth to which they are fairly, legally, and equitably entitled.

What is claimed is:

1. A method for collecting an estimated carbon dioxide emission data for a trip made by a vehicle having a vehicle engine, comprising, in combination, the steps of:
 - calculating a route distance of a route traveled by a vehicle between a departure and a destination;
 - estimating a travel time based on the route distance traveled;
 - estimating an idling time of the vehicle while travelling between the departure and the destination, wherein idling time comprises time the vehicle engine is running but the vehicle is not moving;
 - estimating a turnaround time, wherein the turnaround time comprises time that the vehicle engine is running while the vehicle is at the destination;
 - assuming an assumed amount of carbon dioxide produced per a volume of fuel consumed;
 - calculating a route distance carbon dioxide emission as a product of the route distance, an amount of fuel consumed per a distance traveled, and the assumed amount of carbon dioxide produced per the volume of fuel consumed;
 - calculating an idling time carbon dioxide emission as a product of the idling time, an assumed amount of fuel consumed per a time of idling time and the assumed amount of carbon dioxide produced per the volume of fuel consumer; and
 - calculating a turnaround time carbon dioxide emission as a product of the turnaround time, an assumed amount of fuel consumed per a time of turnaround time and the assumed amount of carbon dioxide produced per the volume of fuel consumed;

wherein the estimated carbon dioxide emission is the sum of the route distance carbon dioxide emission, the idling time carbon dioxide emission, and the turnaround time carbon dioxide vehicle emission.

2. The method of claim 1 wherein multiple vehicles estimated carbon dioxide emission are calculated concurrently.
3. The method of claim 1 further comprising scheduling a delivery time for arrival at the destination for the vehicle.
4. The method of claim 2 further comprising scheduling different delivery times for arrival at the destination for different vehicles.
5. The method of claim 1 further comprising the step of selecting a travel route for the vehicle based upon at least one of actual traffic conditions, a vehicle make and model, an availability of equipment to unload the vehicle present and available at the destination, and construction phase at the destination.
6. The method of claim 1 comprising a step of
creating a predicted carbon dioxide emission by taking an average of a number of previous trips of the vehicle.
7. The method of claim 1 further comprising the step of calculating actual carbon dioxide emission data by measuring the travel time, idling time and turnaround time, measuring a time from the beginning of the trip at the departure to the

destination for the vehicle, measuring a time of arrival at the destination, and a measuring a time of completion at the destination; and

the actual travel time is the time from the beginning of the trip to the time of arrival at the destination minus the idling time, the idling time is the difference between the actual travel time and the estimated travel time, and the turnaround time is the difference between the time of arrival at the destination and the time of completion at the destination.

8. The method of claim 7 wherein the step of calculating the actual carbon dioxide emission data is further calculated as the sum of the actual carbon dioxide emitted during the travel time, the idling time and the turnaround time.

8. The method of claim 7 wherein the actual carbon dioxide emission data is compared to the estimated carbon dioxide emission data.

9. The method of claim 7 further comprising collecting real time data, and making a recommendation to adjust the route in real time based on the real time data.

10. The method of claim 7 wherein real time data comprises at least one of a condition at the work site, a condition of the route, a presentation of a route, a position of the vehicle on the route, the actual carbon dioxide emissions, the travel time, the estimated time of arrival and vehicle and driver details; and

the real time data is made available to a user.

11. The method of claim 7 wherein the estimated carbon dioxide emission data and the actual carbon dioxide emission data are provided to a network, and the network is operatively connected a third-party system such that data can be both sent to and received from the third-party system.
12. The method of claim 11 wherein the estimated carbon dioxide emission data is updated in real time.