

CDM-MP79-A03

Draft Small-scale Methodology

SSC-NM102: Ride-hailing services

Version 02.0

Sectoral scope(s): 07

DRAFT



United Nations
Framework Convention on
Climate Change

COVER NOTE

1. Procedural background

1. A request for new methodology (SSC-NM102) “Greenhouse gas emission reduction methodology for online ride-hailing service”, (hereinafter referred as NM-102) was submitted on 3 August 2018 by Beijing Didi Infinity Technology and Development Co., Ltd.
2. The CDM Executive Board (hereinafter referred as Board) at its 102nd meeting (EB102) reviewed the recommendation from the Meth Panel (MP) to approve the submission NM-102. The Board decided not to approve the proposed methodology and requested the MP to further work on following issues (EB 102 meeting report para 44);
 - (a) Clarify what specific measures and investments may constitute a CDM project activity and how these measures and investments trigger the calculated emission reductions; for example, whether a new software is developed or use of an existing software is promoted;
 - (b) Assess how the prior consideration of the CDM can be assessed in case of use of an existing software;
 - (c) Further assess whether the proposed measures related to booking online taxis is not a business-as-usual activity;
 - (d) Ensure that all possible baseline transportation modes are considered including use of taxis booked using other software.

2. Purpose

3. The revised draft of the new methodology aims to address the issues raised by the Board as above.

3. Key issues and proposed solutions

- 3.1. **Issue 1: Clarify what specific measures and investments may constitute a CDM project activity and how these measures and investments trigger the calculated emission reductions; for example, whether a new software is developed or use of an existing software is promoted.**
4. The methodology is applicable for introduction of new ride-hailing apps (application/platform), extension of an existing app through the increase in the number of participating vehicles is not eligible. Further, no ride-hailing app providing the same ride-hailing service(s) as the proposed project activity is used prior to the project activity in the project city.
5. The project activity includes following measures:
 - (a) Booking online taxi;

- (b) Booking ride-sharing with another passenger(s);
 - (c) Booking ride-sharing with driver.
- 6. The project activity will have following types of investments:
 - (a) Cost for the introduction of the app to the project city;
 - (b) Cost regarding establishment of a company in the project city;
 - (c) Cost regarding apps localization that involves development of local service including detailed local map, location, route planning, service fee settlement, purchase of local digital map and daily operation on ride-hailing app.
- 7. The investment on the encoding and algorithm development should not be considered, since this may be amortised over the future operation in other cities.
- 3.2. Issue 2: Assess how the prior consideration of the CDM can be assessed in case of use of an existing software**
- 8. The methodology is applicable for introduction of new ride-hailing app and therefore decision to invest in the project with CDM revenue will be demonstrated using applicable requirement for prior consideration of CDM.
- 3.3. Issue 3: Further assess whether the proposed measures related to booking online taxis is not a business-as-usual activity**
- 9. The methodology is applicable for introduction of new ride-hailing app in a project city and no ride-hailing app providing the same ride-hailing service(s) as the proposed project activity is used prior to the project activity in the project city. This requirement will prohibit project cities with existing apps providing taxi booking service to claim emission reduction using this methodology.
- 3.4. Issue 4: Ensure that all possible baseline transportation modes are considered including use of taxis booked using other software**
- 10. The methodology is revised and all possible baseline transportation modes including non-motorized transport modes are included under para 19 of the methodology.
- 4. Impacts**
- 11. The new methodology if approved is expected allow for development of new CDM projects in the transport sector.
- 5. Subsequent work and timelines**
- 12. The new methodology is recommended by the MP for consideration by the Board at its 103rd meeting. No further work is envisaged.
- 6. Recommendations to the Board**
- 13. The MP recommends that the Board adopt this new methodology, to be made effective at the time of the Board's approval.

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1. Introduction

1. The following table describes the key elements of the methodology:

Table 1. Methodology key elements

Typical project(s)	Project activities that involve the introduction of on-line ride-hailing services, including booking of taxis, ride-hailing cars (ride-sharing with another passenger(s)) or hitch-riding cars (ride-sharing with the driver) using a ride-hailing app.
Type of GHG emissions mitigation action	Energy efficiency. Displacement of more-GHG-intensive transportation mode by less-GHG-intensive ones

2. Scope, applicability, and entry into force

2.1. Scope and Applicability

2. This methodology is applicable under the following conditions:
- (a) The project activity involves the introduction of a new ¹ ride-hailing application/platform (app) for on-line hailing services in the project city. The project activity enables passengers to book taxis, book ride-hailing cars (hereinafter referred as ride-sharing with another passenger(s)) and/or book hitch-riding cars (hereinafter referred as ride-sharing with the driver);
 - (b) The extension of an existing app through the increase in the number of participating vehicles is not eligible;
 - (c) The cars under this methodology shall be taxis or private passenger cars. The passenger cars shall only be eligible for ride-sharing with another passenger(s) and/or ride-sharing with the driver;
 - (d) All cars under the methodology should be in compliance with local or national regulations on the passenger transport service. The passenger cars without relevant licence that are prevented by law from transporting passengers should not be included in the project activity;
 - (e) No ride-hailing app providing the same ride-hailing service(s) as the proposed project activity is used prior to the project activity in the project city;
 - (f) The number of taxis in the pre-project and project scenario remains same. This is demonstrated by showing that there is a fixed number of taxi licences issued in the project city. If this condition is not met, then emission reductions shall not be calculated for the booking of taxis;
 - (g) Only the company that owns ride-hailing app shall apply for emission reductions from project activities under this methodology;

¹ Modification to an existing app is not considered as a new app.

- (h) The methodology is only applicable to the project activity with the annual emission reductions less than or equal to 60,000 tCO₂.
- 3. The methodology is not applicable for the travelling activity between different cities.

2.2. Entry into force

- 4. The date of entry into force is the date of the publication of the **EB XX** meeting report on **DD Month YYYY**.

2.3. Applicability of sectoral scope

- 5. For validation and verification of CDM projects and programme of activities by a designated operational entity (DoE) using this methodology, sectoral scope 07 is mandatory.

3. Normative references

- 6. This methodology is based on the proposed small-scale methodology “SSC-NM102: DiDi online ride-hailing service emission reduction project in Baoding City” submitted by Beijing Didi Infinity Technology and Development Co., Ltd.
- 7. Project participants shall apply the “General guidelines for SSC CDM methodologies” and the “TOOL21: Demonstration of additionality of small-scale project activities” (previously known as attachment A to appendix B) provided at:
<<http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html>> mutatis mutandis.
- 8. This methodology also refers to the latest approved versions of the following methodologies and tools:
 - (a) “Sampling and surveys for CDM project activities and programme of activities”;
 - (b) “Guidelines for sampling and surveys for CDM project activities and programme of activities”;
 - (c) “TOOL03: Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion”;
 - (d) “TOOL05: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation”;
 - (e) “TOOL07: Tool to calculate the emission factor for an electricity system”;
 - (f) “TOOL18: Baseline emissions for modal shift measures in urban passenger transport”;
 - (g) “TOOL19: Demonstration of additionality of microscale project activities”;
 - (h) “TOOL21: Demonstration of additionality of small-scale project activities”.

4. Definitions

- 9. The definitions contained in the Glossary of CDM terms shall apply.

10. The following definitions apply:

- (a) **Car booking model** - a type of project intervention, i.e. booking of taxis, booking of ride-sharing with another passenger(s)) or booking of ride-sharing with the driver using ride-hailing app;
- (b) **Cruising Taxi (hereinafter referred to as Taxi** - vehicle that holds a taxi licence and cruises within a city to find passengers to provide travelling service. The taxi travels according to the needs of passengers and charges based on mileage and time;
- (c) **Private passenger car** - vehicles designed and constructed for the carriage of passengers and comprising no more than eight seats in addition to the driver's seat, and having maximum permissible laden mass not exceeding 3.5 tons;
- (d) **Ride-hailing Car** - vehicle which provide travelling service to passengers through the ride-hailing app without cruising;
- (e) **Hitch-riding Car** - when travelling by cars, drivers pose their own travelling route through the ride-hailing apps. Passengers who have the same or similar travelling route can share the car for travelling;
- (f) **Empty Mileage** - the travelling mileage of the taxis without carrying any passenger;
- (g) **Unloaded Ratio** - the proportion of the empty mileage in the total travelling mileage of the taxis;
- (h) **Ride-hailing App** - the software or application/platform for ride-hailing service;
- (i) **Ride-sharing with another passenger(s)** - process through which two or more passengers travelling separately with the same or similar travelling route, book and share the same taxi or passenger car through the ride-hailing app;
- (j) **Ride-sharing with driver** - process through which a number of passengers and driver of a car travelling separately with the same or similar travelling route, book and share the same passenger car through the ride-hailing app;
- (k) **Travelling mileage** - the distance actually travelled by cars, including the mileage from the location of the car where the booking is accepted to the starting point of the passenger. The travelling mileage included in different travelling sharing orders should not be double counted;
- (l) **Booking order** - is regarded as a passenger ride (with or without companion(s) traveling together) that is booked to fulfil the travel need through ride-hailing app for a taxi, ride-sharing with another passenger(s) or ride-sharing with driver;
- (m) **City** - is a continuous area on which urban settlement has occurred and includes the historical core area and the adjacent suburbs defined by its administrative boundaries.

5. Baseline methodology

5.1. Project boundary

11. The spatial extent of the project boundary covers the city in which the project takes place. As the project, cannot control the trip origins or destinations of passengers, the spatial area of the project is the entire urban zone of the city in which the project operates.
12. In case the cars use electricity from an interconnected grid or captive power plant, the project boundary also includes the power plants connected physically to the electricity system that supply power to the project, and/or the captive power plant.
13. The greenhouse gases included in or excluded from the project boundary are shown in Table 2.

Table 2. Emission sources included in or excluded from the project boundary

Source		Gas	Included	Justification/Explanation
Baseline	Mobile source emissions from different modes of transport that would have taken in absence of project activity	CO ₂	Yes	Major emission source
		CH ₄	No	CH ₄ emissions are a minor source of the total CO ₂ emissions. Neglecting these emissions in baseline as well as project emissions
		N ₂ O	No	N ₂ O emissions are a minor source of the total CO ₂ emissions. Neglecting these emissions in baseline as well as project emissions
Project activity	Mobile source emissions from project vehicles	CO ₂	Yes	Major emission source
		CH ₄	No	See argument above
		N ₂ O	No	See argument above

5.2. Baseline scenario

14. The project activity involves the service for booking taxi, booking a ride-sharing with another passenger(s) or booking a ride-sharing with the driver for travelling using ride hailing app. The project activity promotes improvement in taxi and passenger car loading/utilization factor. The baseline scenario for each car booking model is determined as follows:
 - (a) **Booking of taxis** - the baseline scenario is that the taxis find the passengers through the existing ways, including cruising, waiting at the taxi stand or taxi service centre, web-based booking system or phone booking on non-sharing basis, etc. When a taxi is not available, the passengers would take various transportation modes for travelling;
 - (b) **Booking a ride-sharing with another passenger(s)** - the baseline scenario is that the passengers would take different transportation modes other than ride-sharing with another passenger(s) in the absence of the project activity;

- (c) **Booking a ride-sharing with the driver** - the baseline scenario is that the drivers would travel alone without sharing the cars with the passengers or travel by other transportation modes, and the passengers would take different transportation modes other than ride-sharing with the driver in the absence of the project activity.

5.3. Additionality demonstration

15. The additionality shall be demonstrated applying the latest approved version of the “TOOL19: Demonstration of additionality of microscale project activities” or “TOOL21: Demonstration of additionality of small-scale project activities”.

16. In case the investment barrier is selected, only the investment cost for the introduction of the app to the project city can be considered. The cost may involve the establishment of a company in the project city, apps localization², purchase of local digital map and daily operation, while the cost for the investment of the encoding and algorithm development should not be considered, since this may be amortised over the future operation in other cities.

5.4. Baseline emissions

17. The project activity may lead to modal shift of passengers as well as drivers ride-sharing. The baseline emissions are the mobile emissions of vehicles which would be taken in absence of the project activity. The baseline emissions are calculated by each car booking model respectively, as follows:

$$BE_y = \sum_i BE_{i,y} = BE_{t,y} + BE_{o,y} + BE_{h,y} \quad \text{Equation (1)}$$

$$= BE_{t,y} + BE_{o,y} + (BE_{h,d,y} + BE_{h,p,y})$$

Where:

BE_y	=	Baseline emissions in year y (tCO ₂ e)
$BE_{i,y}$	=	Baseline emissions of car-booking model i in year y (tCO ₂ e)
$BE_{t,y}$	=	Baseline emissions of the passengers travelling by booking taxis in year y (tCO ₂ e)
$BE_{o,y}$	=	Baseline emissions of the passengers travelling by booking a ride-sharing with another passenger(s) in year y (tCO ₂ e)
$BE_{h,y}$	=	Baseline emissions of the passengers and drivers travelling by booking a ride-sharing in year y (tCO ₂ e)
$BE_{h,d,y}$	=	Baseline emissions of the drivers travelling by sharing their ride in year y (tCO ₂ e)

² The cost involving the development of local service on app to realize the following travelling booking functions: detailed local map, location, route planning and service fee settlement.

- $BE_{h,p,y}$ = Baseline emissions of the passengers travelling by booking a ride-sharing with the driver in year y (tCO₂e)
- y = Crediting year when emissions reductions are estimated
- i = Car booking model under project activity, representing t, o, h
- t = Traveling by booking taxis under project activity
- o = Traveling by booking hailing cars sharing under project activity
- h = Traveling by booking hitch riding cars under project activity
18. The emission reductions under the methodology are generated from the shift of transport mode. Thus, the baseline transport mode should be identified for each car booking model i.e. booking of taxi, booking ride-sharing with another passenger(s) or booking ride sharing with the driver.
19. The share of the baseline transport mode should be determined through sampling survey as per requirements mentioned Appendix 1 for the calculation of baseline emissions. All the feasible transport modes in project city should be listed for the survey. The baseline transport modes may include but are not limited to the following vehicle categories:
- (a) Bus;
 - (b) Private passenger car;
 - (c) Taxis;
 - (d) Hailing cars without sharing;
 - (e) Private motorcycles;
 - (f) Urban rail transit (metro, light rail transit, trams);
 - (g) Walking;
 - (h) Bicycles;
 - (i) Passenger tricycle;
 - (j) Cycle rickshaws;
 - (k) Skates;
 - (l) Skateboards;
 - (m) Push scooters;
 - (n) Hand carts;
 - (o) Other vehicle categories such as para-transit;
 - (p) No travelling;
 - (q) Others.
20. If certain vehicle cannot be identified or listed, it should be categorized as “others”, and the baseline emissions should be determined as zero.

21. The project proponent may undertake promotion campaign which leads to the increase of the travelling trips. The survey should eliminate the impact from the promotion campaign. Only the trips from the passengers those who still choose to use the project app for travelling without promotion campaign can be included in project activity.

22. Baseline emissions of car booking model i are estimated as following equation:

$$BE_{i,y} = PEF_{b,i,y} \times PD_{b,i,y} \times 10^{-6} \quad \text{Equation (2)}$$

Where:

$PEF_{b,i,y}$	=	Baseline emissions factor per passenger-kilometer of car booking model i in year y (gCO ₂ /pkm)
$PD_{b,i,y}$	=	Baseline passenger-mileage of car-booking model i in year y (pkm)
10^{-6}	=	Conversion from gCO ₂ e to tCO ₂ e

5.4.1. Determination of the baseline emission factor:

23. The baseline emission factor should be determined for each car booking model based on the share of passengers shifted from baseline vehicle categories j .

$$PEF_{b,i,y} = \sum_j (EF_{pkm,j,y} \times SD_{i,j}) \quad \text{Equation (3)}$$

Where:

$PEF_{b,i,y}$	=	Baseline emissions factor per passenger-kilometer of car booking model i in year y (gCO ₂ /pkm)
$EF_{pkm,j,y}$	=	Emission factor per passenger-kilometer of vehicle category j in year y (gCO ₂ /pkm)
$SD_{i,j}$	=	Share of vehicle category j as mentioned in paragraph 19, in baseline scenario (%) by passengers using car booking model i in the project scenario

24. The share of passengers booking the taxis ($SD_{t,j}$), share of passengers booking a ride-sharing with another passenger(s) ($SD_{o,j}$), share of passengers booking a ride-sharing with the driver ($SD_{h,p,j}$) and share of cars' drivers sharing their ride ($SD_{h,d,j}$) who would take baseline vehicle category j as mentioned in paragraph 19 in baseline scenario should be determined by a sampling survey.

5.4.1.1. Determination of baseline emission factor per passenger-kilometer:

5.4.1.1.1. Electricity based transport system.

25. The emission factor per passenger-kilometer for electricity-based transport systems (e.g. urban rail-based systems) is determined using the following equation:

$$EF_{pkm,j,y} = \frac{TE_{EL,j,y}}{PE_{EL,j,y} \times D_{EL,j,y}} \times 10^6 \quad \text{Equation (4)}$$

Where:

$EF_{pkm,j,y}$	=	Emission factor per passenger-kilometer for electricity-based vehicle category j in year y (gCO ₂ /pkm)
$TE_{EL,j,y}$	=	Total emissions from electricity-based vehicle category j in year y (tCO ₂), calculated using the "TOOL05: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation"
$PE_{EL,j,y}$	=	Total number of passengers transported by electricity-based vehicle category j in year y (passengers)
$D_{EL,j,y}$	=	Average trip distance travelled by passengers using electricity-based vehicle category j in year y (km)

5.4.1.1.2. Fuel based transport system.

26. Emission factors per PKM for fuel-based transport systems (e.g. road-based vehicles) should be calculated as follows:

$$EF_{pkm,j,y} = \frac{EF_{km,j,y}}{OC_{j,y}} \quad \text{Equation (5)}$$

Where:

$EF_{pkm,j,y}$	=	Emission factor per passenger-kilometer for vehicle category j in year y (gCO ₂ /pkm)
$EF_{km,j,y}$	=	Emission factor per kilometer of vehicle category j in year y (gCO ₂ /km)
$OC_{j,y}$	=	Average occupancy rate of vehicle category j in year y (passengers)

27. Emission factor per kilometer should be calculated based on the fraction of vehicles using a specific fuel type, the consumption of each fuel type and CO₂e emissions per unit of fuel consumed:

$$EF_{km,j,y} = \sum_n \frac{N_{j,n,y}}{N_{j,y}} \times (SFC_{j,n,y} \times NCV_{j,n} \times EF_{CO2,n}) + \frac{N_{j,e,y}}{N_{j,y}} \times [SEC_{j,e,y} \times EF_{CO2,y} \times (1 + TDL_{j,y})] \quad \text{Equation (6)}$$

Where:

$EF_{km,j,y}$	=	Emission factor per kilometer of vehicle category j in year y (gCO ₂ /km)
$N_{j,n,y}$	=	Number of vehicle-kilometers of vehicle category j using fuel type n driven in year y (vkm) or number of vehicles in vehicle category j using fuel type n in year y (units)
$N_{j,e,y}$	=	Number of vehicle-kilometers of vehicle category j using electricity driven in year y (vkm) or number of vehicles in vehicle category j using electricity in year y (units)
$N_{j,y}$	=	Number of vehicle-kilometers of category j driven in year y (VKM) or number of vehicles of category j in year y (units)
$SFC_{j,n,y}$	=	Specific fuel consumption of vehicle category j using fuel type n in year y (mass or volume units of fuel/km)

$SEC_{j,e,y}$	=	Specific electricity consumption of vehicle category j using electricity in year y (kWh/km)
$NCV_{j,n}$	=	Net calorific value of fuel n used in vehicle category j (MJ/mass or volume units of fuel)
$EF_{CO2,n}$	=	Emission factor for fuel type n (gCO ₂ /MJ)
$EF_{CO2,y}$	=	Emission factor for electricity in year y (gCO ₂ /kWh)
$TDL_{j,y}$	=	Average technical transmission and distribution losses for providing electricity to vehicle category j using electricity
n	=	Fuel types used by vehicle category j in year y
y	=	Crediting year when emissions reductions are estimated
j	=	Vehicle categories

28. Instead of the parameters $N_{j,n,y}$, $N_{j,e,y}$ and $N_{j,y}$, it is possible to use one parameter $N_{j,n,y}/N_{j,y}$ or $N_{j,e,y}/N_{j,y}$ which can be defined using the following options, described in the order of preference (refer to “Data and parameters” section for further guidance on data requirements):

- (a) Approach 1. The share of vehicle-kilometers within vehicle category j that are driven by vehicles using fuel type n or electricity, if a reliable data source for this parameter exists (refer to “Data and parameters” section for further guidance on data requirements). This is the preferred option;
- (b) Approach 2. In case data on vehicle-kilometers required in approach 1 is not available the share of vehicles within vehicle category j that use fuel type n or electricity should be used, if a reliable data source for this parameter exists.

5.4.1.2. Determination of baseline passenger-mileage

29. The baseline passenger-mileage should be determined using project passenger number and mileage of each booking order.

- (a) **For the travelling by booking taxis** - taxi drivers take booking orders from the passengers nearby through ride-hailing app, so long distance cruising to find the passengers could be shortened and the unloaded ratio of taxis is reduced. Thus, the taxis transport more passengers compared with the baseline scenario. The baseline mileages of the passengers travelling by booking taxis are the unloaded mileages reduced under project activity. The baseline passenger-mileages is calculated as:

$$PD_{b,t,y} = PD_{t,y} \times \left(\frac{k_B}{(1 - k_B)} - \frac{k_{p,y}}{(1 - k_{p,y})} \right) \quad \text{Equation (7)}$$

Where:

$PD_{b,t,y}$	=	Baseline passenger-mileage of travelling by booking taxis in year y (pkm)
$PD_{t,y}$	=	Total travelling passenger-mileage of taxis under the project activity (km)
k_B	=	The average unloaded ratio of the taxis under baseline scenario (%)

$k_{p,y}$ = The average unloaded ratio of the taxis under project scenario in year y (%)

- (b) **For the travelling by booking a ride-sharing with another passenger(s)** - the passengers with the same or similar route share the cars for travelling, which avoids the same trip taking place for each passenger under the baseline transportation mode. The baseline passenger-mileages $PD_{b,o,y}$ is calculated through the baseline mileage and number of passengers of each ride-hailing cars booking order k as follows:

$$PD_{b,o,y} = \sum_k (BD_{o,k,y} \times NP_{o,k,y}) \quad \text{Equation (8)}$$

Where:

$PD_{b,o,y}$ = Baseline passenger-mileage of ride-hailing cars (pkm)
 $BD_{o,k,y}$ = Baseline travelling mileage of passengers under booking order k of ride-hailing cars (km)
 $NP_{o,k,y}$ = Number of passengers under booking order k of ride-hailing cars (passenger)
 k = Travelling booking order

- (c) **For the travelling by booking a ride-sharing with the driver** - the baseline passenger-mileage of drivers $PD_{b,d,y}$ and the baseline passenger-mileage of passengers $PD_{b,p,y}$ should be determined separately. The baseline passenger-mileages of drivers $PD_{b,d,y}$ correspond to the mileage of drivers which would not have used their personal car in the baseline scenario. The baseline passenger-mileage of passengers $PD_{b,p,y}$ are calculated through the baseline mileage and the number of passengers of each hitch-riding cars booking order. The baseline passenger-mileages $PD_{b,d,y}$ and $PD_{b,p,y}$ are calculated as:

$$PD_{b,d,y} = \sum_k (BD_{h,d,k,y} \times ND_{h,k,y}) = \sum_k (BD_{h,d,y}) \quad \text{Equation (9)}$$

Where:

$PD_{b,d,y}$ = Baseline passenger-mileage of hitch-riding cars' driver (pkm)
 $BD_{h,d,k,y}$ = Baseline passenger-mileage of hitch-riding cars' driver under booking order k (km)
 $ND_{h,k,y}$ = Number of hitch-riding cars' driver under booking order k , which equals to 1 (person)
 $BD_{h,d,y}$ = Total baseline passenger-mileage of hitch-riding cars' drivers (pkm)
 k = Travelling booking order

$$PD_{b,p,y} = \sum_k (BD_{h,k,y} \times NP_{h,k,y}) \quad \text{Equation (10)}$$

Where:

$PD_{b,p,y}$ = Baseline passenger-mileage of passengers travelling by hitch-riding cars (pkm)

$BD_{h,k,y}$	=	Baseline travelling mileage of passengers under booking order k of hitch-riding cars (km)
$NP_{h,k,y}$	=	Number of passengers under booking order k of hitch-riding cars (passenger)
k	=	Travelling booking order

30. In the case that negative overall emission reductions arise in a year, certified emission reductions are not issued to project participants for the year concerned and in subsequent years, until emission reductions from subsequent years have compensated the quantity of negative emission reductions from the year concerned³.
31. The baseline emissions are the summation of the baseline emissions from each car booking model covered by the project activity.
32. To obtain the parameters of baseline mileage $BD_{o,k,y}$, $BD_{h,d,y}$ and $BD_{h,k,y}$, the planned shortest mileage between starting point and destination of each booking order should be used to avoid the inclusion of the detour mileage.

5.5. Leakage

33. No leakage emissions are considered.

5.6. Project emissions

34. The project emissions are to be calculated as follows:

$$PE_y = PE_{t,y} + PE_{o,y} + PE_{h,y} \quad \text{Equation (11)}$$

Where:

PE_y	=	Project emissions in year y (tCO ₂ e)
$PE_{t,y}$	=	Project emissions of the travelling by booking taxis in year y (tCO ₂ e)
$PE_{o,y}$	=	Project emissions of the travelling by booking hailing cars sharing in year y (tCO ₂ e)
$PE_{h,y}$	=	Project emissions of the travelling by booking hitch-riding cars in year y (tCO ₂ e)

35. Project emissions of travelling by booking taxis $PE_{t,y}$ is deemed as zero since the total travelling mileages of taxis remains the same under project activity scenario.
36. The project emissions of the travelling by booking a ride-sharing with another passenger(s) are calculated as follows:

$$PE_{o,y} = D_{o,y} \times EF_{km,o,y} \times 10^{-6} \quad \text{Equation (12)}$$

³ For example, if negative emission reductions of 30 tCO₂e occur in the year t and positive emission reductions of 100 tCO₂e occur in the year $t+1$, only 70 CERs are issued for the year $t+1$.

Where:

- $PE_{o,y}$ = Project emissions of the travelling by booking ride-hailing cars in year y (tCO₂e)
- $D_{o,y}$ = The total travelling mileage of the ride-hailing cars o under car-sharing booking orders (km)
- $EF_{km,o,y}$ = The emission factor per kilometer of ride-hailing cars o in year y (gCO₂/km), to be calculated according to equation (6), in which the vehicle category j refers to ride-hailing cars

37. The project emissions of the booking a ride-sharing with the drivers are calculated as follows:

$$PE_{h,y} = D_{h,y} \times EF_{km,h,y} \times 10^{-6} \quad \text{Equation (13)}$$

Where:

- $PE_{h,y}$ = Project emissions of the travelling by booking cars sharing with the drivers in year y (tCO₂e)
- $D_{h,y}$ = The total travelling mileage of the hitch-riding cars h (km)
- $EF_{km,h,y}$ = The emission factor per kilometer of hitch-riding cars h in year y (gCO₂/km), to be calculated according to equation (6)

38. The emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y \quad \text{Equation (14)}$$

Where:

- ER_y = Emission reductions in year y (tCO₂e)
- BE_y = Baseline emissions in year y (tCO₂e)
- PE_y = Project emissions in year y (tCO₂e)

39. Only the data of the booking orders which have been fulfilled can be included in the emission reductions.

6. Monitoring methodology

40. In addition to the parameters listed in the tables below, the procedures contained in the tools referred to in this methodology also apply.

6.1. Data and parameters monitored

Data / Parameter table 1.

Data / Parameter:	$SD_{i,j}$
Data unit:	%
Description:	Share of vehicle category j which would be taken in baseline scenario by passengers using car booking model i in the project scenario

Source of data:	Survey
Measurement procedures (if any):	The sampling survey on the travelling modes could be conducted by the project system operator or by third-party entity. The sampling could be questionnaire survey. The target could be the passengers who take the taxis or cars using the ride-hailing app.
Monitoring frequency:	For fixed crediting period or first seven years of a renewable crediting period: The year 1 and 4. The data from the survey in year 1 shall be used for the first three years of the first crediting period while the data from the survey in year 4 shall be used until the end of the crediting period of the project activity. Second and third crediting periods of a renewable crediting period: Year 1.
QA/QC procedures:	Samples shall be based on 90/10 confidence/precision
Any comment:	-

Data / Parameter table 2.

Data / Parameter:	$SD_{t,j}$
Data unit:	%
Description:	Share of passengers booking the taxis who would take vehicle category j in baseline scenario
Source of data:	Survey
Measurement procedures (if any):	The sampling survey on the travelling modes could be conducted by the project system operator or by third-party entity. The sampling could be questionnaire survey. The target could be the passengers who take the taxis using the ride-hailing app.
Monitoring frequency:	For fixed crediting period or first seven years of a renewable crediting period: The year 1 and 4. The data from the survey in year 1 shall be used for the first three years of the first crediting period while the data from the survey in year 4 shall be used until the end of the crediting period of the project activity. Second and third crediting periods of a renewable crediting period: Year 1.
QA/QC procedures:	Samples shall be based on 90/10 confidence/precision
Any comment:	-

Data / Parameter table 3.

Data / Parameter:	$SD_{o,j}$
Data unit:	%
Description:	Share of passengers booking a ride with another passenger(s) who take vehicle category j in baseline scenario
Source of data:	Survey
Measurement procedures (if any):	The sampling survey on the travelling modes could be conducted by the project system operator or by third-party entity. The sampling could be questionnaire survey. The target could be the passengers who use the hailing cars sharing.

Monitoring frequency:	For fixed crediting period or first seven years of a renewable crediting period: The year 1 and 4. The data from the survey in year 1 shall be used for the first three years of the first crediting period while the data from the survey in year 4 shall be used until the end of the crediting period of the project activity. Second and third crediting periods of a renewable crediting period: Year 1.
QA/QC procedures:	Samples shall be based on 90/10 confidence/precision
Any comment:	-

Data / Parameter table 4.

Data / Parameter:	$SD_{h,p,j}$
Data unit:	%
Description:	Share of passengers booking a ride with the driver, where passenger take vehicle category j in baseline scenario
Source of data:	Survey
Measurement procedures (if any):	The sampling survey on the travelling modes could be conducted by the project system operator or by third-party entity. The sampling could be questionnaire survey. The target could be the passengers who use the hitch-riding cars.
Monitoring frequency:	For fixed crediting period or first seven years of a renewable crediting period: The year 1 and 4. The data from the survey in year 1 shall be used for the first three years of the first crediting period while the data from the survey in year 4 shall be used until the end of the crediting period of the project activity. Second and third crediting periods of a renewable crediting period: Year 1.
QA/QC procedures:	Samples shall be based on 90/10 confidence/precision
Any comment:	

Data / Parameter table 5.

Data / Parameter:	$SD_{h,d,j}$
Data unit:	%
Description:	Share of hitch-riding cars' drivers who take vehicle category j in baseline scenario
Source of data:	Survey
Measurement procedures (if any):	The sampling survey on the travelling modes could be conducted by the project system operator or by third-party entity. The sampling could be questionnaire survey. The target could be the hitch-riding cars' drivers.

Monitoring frequency:	For fixed crediting period or first seven years of a renewable crediting period: The year 1 and 4. The data from the survey in year 1 shall be used for the first three years of the first crediting period while the data from the survey in year 4 shall be used until the end of the crediting period of the project activity. Second and third crediting periods of a renewable crediting period: Year 1.
QA/QC procedures:	Samples shall be based on 90/10 confidence/precision
Any comment:	-

Data / Parameter table 6.

Data / Parameter:	$PE_{EL,j,y}$
Data unit:	passengers
Description:	Total number of passengers transported per annum by electricity-based vehicle category j in year y
Source of data:	As per "TOOL18: Baseline emissions for modal shift measures in urban passenger transport"
Measurement procedures (if any):	-
Monitoring frequency:	Annually
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 7.

Data / Parameter:	$DEL_{j,y}$
Data unit:	km
Description:	Average trip distance travelled by passengers using electricity-based vehicle category j in year y
Source of data:	As per "TOOL18: Baseline emissions for modal shift measures in urban passenger transport"
Measurement procedures (if any):	-
Monitoring frequency:	Annually
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 8.

Data / Parameter:	$OC_{j,y}$
Data unit:	passengers
Description:	Average occupancy rate of vehicle category j in year y
Source of data:	As per "TOOL18: Baseline emissions for modal shift measures in urban passenger transport"

Measurement procedures (if any):	As per "TOOL18: Baseline emissions for modal shift measures in urban passenger transport"
Monitoring frequency:	Annually
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 9.

Data / Parameter:	$N_{j,n,y}$
Data unit:	vkm or units
Description:	Number of vehicle-kilometers vehicle category j using fuel type n driven in year y (VKM) or number of vehicles in vehicle category j using fuel type n in year y (units).
Source of data:	The data from the project system operator, municipal transit authorities based on vehicle registration statistics from the respective city or data from vehicle control stations (technical and emission control stations). If no city/municipal data is available, regional data (canton, state) or national data from the statistical data or other publicly available information, such as industry research data, literature data can be used.
Measurement procedures (if any):	-
Monitoring frequency:	Annually
QA/QC procedures:	In case the data of vehicle category j is obtained from the system operator, the registration information of the cars in the project system should be used. Used for all vehicle categories identified as relevant. In the cases of buses and taxis, informal or illegal units may operate. While estimates on the number of informal units may be available, these are by nature not trustworthy. For both categories it is thus recommended to only include formally registered units. For consistency, it is important that transported passengers are also based on the official records thus not including passenger trips on informal transport.
Any comment:	Used for all relevant vehicle categories. Or use the parameter $N_{j,n,y}/N_{j,y}$

Data / Parameter table 10.

Data / Parameter:	$N_{j,e,y}$
Data unit:	vkm or units
Description:	Number of vehicle-kilometers vehicle category j using electricity driven in year y (VKM) or number of vehicles in vehicle category j using electricity in year y (units).

Source of data:	The data from the project system operator, municipal transit authorities based on vehicle registration statistics from the respective city or data from vehicle control stations (technical and emission control stations). If no city/municipal data is available, regional data (canton, state) or national data from the statistical data or other publicly available information, such as industry research data, literature data can be used
Measurement procedures (if any):	-
Monitoring frequency:	Annually
QA/QC procedures:	In case the data of vehicle category j is obtained from the system operator, the registration information of the cars in the project system should be used. In the cases of buses and taxis, informal or illegal units may operate. While estimates on the number of informal units may be available, these are by nature not trustworthy. For both categories it is thus recommended to only include formally registered units. For consistency, it is important that transported passengers are also based on the official records thus not including passenger trips on informal transport.
Any comment:	Used for all relevant vehicle categories. Or use the parameter $N_{j,e,y}/N_{j,y}$

Data / Parameter table 11.

Data / Parameter:	$N_{j,y}$
Data unit:	vkm or units
Description:	Number of vehicle-kilometers of category j driven in year y (VKM) or number of vehicles of category j in year y (units)
Source of data:	The data from the project system operator, municipal transit authorities based on vehicle registration statistics from the respective city or data from vehicle control stations (technical and emission control stations). If no city/municipal data is available, regional data (canton, state) or national data from the statistical data or other publicly available information, such as industry research data, literature data can be used.
Measurement procedures (if any):	-
Monitoring frequency:	Annually
QA/QC procedures:	In case the data of vehicle category j is obtained from the system operator, the registration information of the cars in the project system should be used. In the cases of buses and taxis, informal or illegal units may operate. While estimates on the number of informal units may be available, these are by nature not trustworthy. For both categories it is thus recommended to only include formally registered units. For consistency, it is important that transported passengers are also based on the official records thus not including passenger trips on informal transport.

Any comment:	Used for all relevant vehicle categories. Or use the parameter $N_{j,n,y}/N_{j,y}$, $N_{j,e,y}/N_{j,y}$
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Data / Parameter table 12.

Data / Parameter:	$N_{j,n,y}/N_{j,y}$
Data unit:	%
Description:	The fraction of vehicles using fuel type <i>n</i> in vehicle category <i>j</i>
Source of data:	National transport statistics based on vehicle registration statistics, company data (for buses), surveys or other publicly available information, such as industry research data, literature data.
Measurement procedures (if any):	-
Monitoring frequency:	Annually
QA/QC procedures:	In case the data of vehicle category <i>j</i> is obtained from the system operator, the registration information of the cars in the project system should be used. In the cases of buses and taxis, informal or illegal units may operate. While estimates on the number of informal units may be available, these are by nature not trustworthy. For both categories, it is thus recommended to only include formally registered units. For consistency, it is important that transported passengers are also based on the official records thus not including passenger trips on informal transport.
Any comment:	Used for all relevant vehicle categories

Data / Parameter table 13.

Data / Parameter:	$N_{j,e,y}/N_{j,y}$
Data unit:	%
Description:	The fraction of vehicles using electricity in vehicle category <i>j</i>
Source of data:	National transport statistics based on vehicle registration statistics, company data (for buses), surveys or other publicly available information, such as industry research data, literature data, etc.
Measurement procedures (if any):	-
Monitoring frequency:	Annually
QA/QC procedures:	In case the data of vehicle category <i>j</i> is obtained from the system operator, the registration information of the cars in the project system should be used. In the cases of buses and taxis, informal or illegal units may operate. While estimates on the number of informal units may be available, these are by nature not trustworthy. For both categories, it is thus recommended to only include formally registered units. For consistency, it is important that transported passengers are also based on the official records thus not including passenger trips on informal transport.
Any comment:	Used for all relevant vehicle categories

Data / Parameter table 14.

Data / Parameter:	$SFC_{j,n,y}$
Data unit:	mass or volume units of fuel/km
Description:	Specific fuel consumption of vehicle category j using fuel type n in year y
Source of data:	As per "TOOL18: Baseline emissions for modal shift measures in urban passenger transport"
Measurement procedures (if any):	As per "TOOL18: Baseline emissions for modal shift measures in urban passenger transport"
Monitoring frequency:	Annually
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 15.

Data / Parameter:	$SEC_{j,e,y}$
Data unit:	kWh/km
Description:	Specific electricity consumption of vehicle category j using electricity in year y
Source of data:	As per "TOOL18: Baseline emissions for modal shift measures in urban passenger transport"
Measurement procedures (if any):	As per "TOOL18: Baseline emissions for modal shift measures in urban passenger transport"
Monitoring frequency:	Annually
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 16.

Data / Parameter:	$NCV_{j,n}$
Data unit:	MJ/mass or volume units of fuel
Description:	Net calorific value of fuel n used in vehicle category j
Source of data:	As per "TOOL18: Baseline emissions for modal shift measures in urban passenger transport"
Measurement procedures (if any):	-
Monitoring frequency:	As per "TOOL18: Baseline emissions for modal shift measures in urban passenger transport"
QA/QC procedures:	As per "TOOL18: Baseline emissions for modal shift measures in urban passenger transport"
Any comment:	As per "TOOL18: Baseline emissions for modal shift measures in urban passenger transport"

Data / Parameter table 17.

Data / Parameter:	$EF_{CO_2,n}$
Data unit:	gCO ₂ /MJ
Description:	Emission factor for fuel type n
Source of data:	As per “TOOL18: Baseline emissions for modal shift measures in urban passenger transport”
Measurement procedures (if any):	-
Monitoring frequency:	As per “TOOL18: Baseline emissions for modal shift measures in urban passenger transport”
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 18.

Data / Parameter:	$EF_{CO_2,y}$
Data unit:	gCO ₂ /kWh
Description:	Emission factor for electricity in year y
Source of data:	As per “TOOL05: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation”
Measurement procedures (if any):	As per “TOOL05: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation”
Monitoring frequency:	Annually
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 19.

Data / Parameter:	$TDL_{j,y}$
Data unit:	%
Description:	Average technical transmission and distribution losses for providing electricity to vehicle category j using electricity in year y
Source of data:	As per “TOOL05: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation”
Measurement procedures (if any):	As per “TOOL05: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation”
Monitoring frequency:	Annually
QA/QC procedures:	-
Any comment:	-

Data / Parameter table 20.

Data / Parameter:	$PD_{t,y}$
Data unit:	km
Description:	Travelling passenger-mileage of the taxis under the project activity
Source of data:	Project system operator

Measurement procedures (if any):	Accumulated by the carrying mileage multiplying passenger number of each taxi booking order. Default value of taxi passenger number from “TOOL18: Baseline emissions for modal shift measures in urban passenger transport” may be used.
Monitoring frequency:	Monitored by each booking order, recorded at least annually
QA/QC procedures:	The maintenance and management of GPS-based positioning system or taxi odometer shall meet the requirements of relevant international/national standards. The carrying mileage should be checked with the billing data.
Any comment:	-

Data / Parameter table 21.

Data / Parameter:	k_B
Data unit:	%
Description:	Average unloaded ratio of the taxis in the project city under baseline scenario
Source of data:	Calculated by monitoring the unloaded mileage and total travelling mileage of the (conventional) taxi fleet in the project city.
Measurement procedures (if any):	The monitoring of the mileage of the taxis can be monitored with the assistance of the local taxi professional association or an administrative department, possibly through a sampling survey. The vintage of the data could be as follows in decreasing order of preference: <ol style="list-style-type: none"> 1. The data of the taxis without ride-hailing app in year y; 2. The lowest value of the data in the most recent 3 years before the starting date of the project.
Monitoring frequency:	Once, before the project start date
QA/QC procedures:	In case sampling survey is conducted, samples shall be based on 90/10 confidence/precision. The mileage data should be monitored and recorded by GPS, odometer or other electronic method. The maintenance and management of GPS-based positioning system or odometer shall meet the requirements of relevant international/national standards. Compare the data for cross-check purpose with one of the following; <ol style="list-style-type: none"> (a) Statistical data for the city, region or the country where the project activity takes place; (b) Data from other publicly available information, such as industry research data, technical literature data, etc.
Any comment:	All the existing practices for booking taxi should be considered for the determination of k_B . The existing practices may include taxis cruising, taxis waiting at the taxi stands or passenger calling taxi service centre, etc.

Data / Parameter table 22.

Data / Parameter:	Unloaded mileage of taxis under baseline scenario
Data unit:	km
Description:	Unloaded travelling mileage of the taxis under baseline scenario
Source of data:	If the data source of k_B by monitoring is chosen, the data can be monitored with the assistance of local taxi company or administrative department or by sampling survey.
Measurement procedures (if any):	<p>Using GPS and odometer to record the total travelling mileage and the mileage carrying passenger. The difference should be the unloaded mileage.</p> <p>All the existing practices for booking taxi should be considered. The existing practices may include taxi cruising, taxi waiting at the taxi stand or passenger calling taxi service centre, etc.</p> <p>For total travelling mileage, only the mileage under business mode of taxis should be considered. The mileage during the period when the taxi is not available for carrying passengers, such as shifting duty or the driver travelling home, should not be included as total travelling mileage.</p>
Monitoring frequency:	Once, before the project start date
QA/QC procedures:	<p>In case sampling survey is conducted, samples shall be based on 90/10 confidence/precision.</p> <p>The mileage data should be monitored and recorded by GPS, odometer or other electronic method. The maintenance and management of GPS-based positioning system or odometer shall meet the requirements of relevant international/national standards.</p> <p>The carrying mileage should be checked with the billing data.</p>
Any comment:	Used for calculating k_B when option (a) is selected.

Data / Parameter table 23.

Data / Parameter:	$k_{P,y}$
Data unit:	%
Description:	Average unloaded ratio of the taxis under project scenario in year y
Source of data:	The data obtained from local taxi company by monitoring the taxis' unloaded mileage and total travelling mileage in the city.
Measurement procedures (if any):	The data could be obtained by monitoring 100% of the taxis under the project activity, or by sampling survey
Monitoring frequency:	Annually
QA/QC procedures:	<p>In case sampling survey is conducted, samples shall be based on 90/10 confidence/precision.</p> <p>The mileage data should be monitored and recorded by GPS, odometer or other electronic method. The maintenance and management of GPS-based positioning system or odometer shall meet the requirements of relevant international/national standards.</p>

Any comment:	The traveling mileage during the period when driver turn-off their availability in the system should be included. If it is not able to know whether the taxi is taking any passenger during the period, the mileage during the period should be deemed as unloaded mileage to be conservative.
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Data / Parameter table 24.

Data / Parameter:	Unloaded mileage of taxis under project scenario
Data unit:	km
Description:	Unloaded travelling mileage of the taxis under project scenario
Source of data:	Project system operator
Measurement procedures (if any):	<p>The data could be obtained by monitoring 100% of the taxis under the project activity, or by sampling survey.</p> <p>Using GPS and odometer to record the total travelling mileage and the mileage carrying passenger. The difference should be the unloaded mileage.</p> <p>The traveling mileage during the period when driver turn-off their availability in the system should be included in the total travelling mileage. If it is not able to know whether the taxi is taking any passenger during the period, the mileage during the period should be deemed as unloaded mileage to be conservative.</p>
Monitoring frequency:	Annually
QA/QC procedures:	<p>In case sampling survey is conducted, samples shall be based on 90/10 confidence/precision.</p> <p>The mileage data should be monitored and recorded by GPS, odometer or other electronic method. The maintenance and management of GPS-based positioning system or odometer shall meet the requirements of relevant international/national standards.</p>
Any comment:	Used for calculating $k_{P,y}$ when option (a) is selected.

Data / Parameter table 25.

Data / Parameter:	$BD_{o,k,y}$
Data unit:	km
Description:	Baseline travelling mileage under booking order k of ride-hailing cars
Source of data:	Project system operator
Measurement procedures (if any):	<p>The baseline mileage should be recorded as the shortest planned mileage between the starting point and the destination of each booking order of a ride-hailing car.</p> <p>The method how the planned mileage is determined should be justified to ensure the reasonableness and conservativeness of baseline travelling mileage data.</p>
Monitoring frequency:	Monitored by each booking order, recorded at least annually

QA/QC procedures:	The maintenance and management of GPS-based positioning system or odometer shall meet the requirements of relevant international/national standards. The mileage data should be checked with the billing data.
Any comment:	-

Data / Parameter table 26.

Data / Parameter:	$NP_{o,k,y}$
Data unit:	passenger
Description:	Number of passenger under booking order k of ride-hailing cars
Source of data:	Project system operator
Measurement procedures (if any):	When booking hailing cars, passenger usually need to submit the number of passenger under the booking order to meet the carrying capacity of ride-hailing cars. The project system should record the data correspondingly to $BD_{o,k,y}$
Monitoring frequency:	Monitored by each booking order, recorded at least annually
QA/QC procedures:	The passenger data shall be recorded by a data logger and be protected such that it cannot be modified artificially.
Any comment:	-

Data / Parameter table 27.

Data / Parameter:	$BD_{h,d,y}$
Data unit:	km
Description:	Total baseline passenger-mileage of hitch-riding cars' drivers
Source of data:	Project system operator
Measurement procedures (if any):	Accumulated and recorded as the shortest planned mileage between the starting point and the destination of the hitch-riding cars' drivers. The method how the planned mileage is determined should be justified to ensure the reasonableness and conservativeness of baseline travelling mileage data.
Monitoring frequency:	Monitored by each booking order, recorded at least annually
QA/QC procedures:	The maintenance and management of GPS-based positioning system or taxi odometer shall meet the requirements of relevant international/national standards.
Any comment:	-

Data / Parameter table 28.

Data / Parameter:	$BD_{h,k,y}$
Data unit:	km
Description:	Baseline travelling mileage under order k of hitch-riding cars
Source of data:	Project system operator

Measurement procedures (if any):	The baseline mileage should be recorded as the shortest planned mileage between the starting point and the destination of each hitch-riding cars booking order booking order. The method how the planed mileage is determined should be justified to ensure the reasonableness and conservativeness of baseline travelling mileage data.
Monitoring frequency:	Monitored by each booking order, recorded at least annually
QA/QC procedures:	The maintenance and management of GPS-based positioning system or odometer shall meet the requirements of relevant international/national standards. The mileage data should be checked with the billing data.
Any comment:	-

Data / Parameter table 29.

Data / Parameter:	$NP_{h,k,y}$
Data unit:	passenger
Description:	Number of passenger under order k of hitch-riding cars
Source of data:	Project system operator
Measurement procedures (if any):	When booking hitch-riding cars, passenger usually need to submit the number of passenger under the booking order to meet the carrying capacity of hitch-riding cars. The project system should record the data correspondingly to $BD_{h,k,y}$
Monitoring frequency:	Monitored by each booking order, recorded at least annually
QA/QC procedures:	The passenger data shall be recorded by a data logger and be protected such that it cannot be modified artificially.
Any comment:	-

Data / Parameter table 30.

Data / Parameter:	$D_{o,y}$
Data unit:	km
Description:	The total travelling mileage of the ride-hailing cars under car-sharing booking orders.
Source of data:	Project system operator
Measurement procedures (if any):	The data should be monitored and recorded by GPS, odometer or other electronic method.
Monitoring frequency:	Continuously, recorded at least annually
QA/QC procedures:	The maintenance and management of GPS-based positioning system or taxi odometer shall meet the requirements of relevant international/national standards.
Any comment:	

Data / Parameter table 31.

Data / Parameter:	$D_{h,y}$
Data unit:	km
Description:	The total travelling mileage of the hitch-riding cars

Source of data:	Project system operator
Measurement procedures (if any):	The data should be monitored and recorded by GPS, odometer or other electronic method.
Monitoring frequency:	Continuously, recorded at least annually
QA/QC procedures:	The maintenance and management of GPS-based positioning system or taxi odometer shall meet the requirements of relevant international/national standards.
Any comment:	

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Appendix 1. Methodological design of survey

1. Survey objective

1. The survey objective is to determine the baseline travelling modes in absence of the project activity and the ratio of each baseline travelling mode.

2. Target population

2. The target population are all passengers who use taxis, hailing cars sharing, or hitch-riding cars, as well as the drivers of hitch-riding cars under the project activity, respectively.

3. Sample frame

3. Data for the passenger/driver frame is obtained from the project system.

4. Sample design

4. Since the travelling activity take place across the city, the simple random sampling could be applied.

5. Sample frequency

5. The survey is realized minimum once during the year 1 and 4 of the crediting period. The survey shall take place during an entire week. The selected week shall not correspond to a public holiday and shall be representative for the average demand for transport services in the considered year.

6. Sample size

6. The latest version of “Sampling and surveys for CDM project activities and programme of activities” and “Guidelines for sampling and surveys for CDM project activities and programme of activities” should be applied.

7. Selection method of the sample

7. It is necessary to ensure that the sample selection process is completely random and not affected by any variables such as age and gender. The selection of the sample will be performed according to the systematic sampling design and considering the following steps:
 - (a) A random starting point is generated according to the statistics tables of uniform distribution between 1 and the average flow of passengers in the evaluation hour;
 - (b) Systematic selection of passengers: every n th passenger using the taxi, ride-hailing cars or hitch-riding cars service, starting with the random number. In this way, if the random number is 10, the first passenger selected is the 10th that uses the booking service for taxis, ride-hailing cars or hitch-riding cars, the 2nd $n+10$ and thus successively every n th passenger. The number n , called selection

interval, will be determined based on the passenger flow per hour and the sample distribution of the specific measurement day. For the driver of hitch-riding cars, the similar approach could be applied.

8. Survey realization

8. The following principles are to be followed in the survey realization:
 - (a) Non-responses should be recorded;
 - (b) Record and store all original surveys;
 - (c) Surveys can be conducted through the ride-hailing app. The respondents should be numbered based on the survey date and time. It should be avoided to realize the survey with people de-boarding the cars as latter will not want to invest time in a survey thus potentially giving wrong answers.
9. The questionnaire can be sent to the target to be surveyed through the ride-hailing app. The following phase should be followed:
 - (a) Preparation phase - this phase is characterized by the development of all the activities previous to the execution of the survey realization and it is divided in:
 - (i) Determine the survey questionnaire, and draft the manual on information collection and basic concepts. The manual on information collection and basic concepts covers the questionnaire structure, the instructions and specifications for filling in the questionnaire, the definitions and basic concepts of the study and the instructions and formats used;
 - (ii) Relevant materials should be prepared including the explanation on the basic concepts, relevant instructions, and so on. The materials should be sent to the passengers through the project system platform before the investigation begins, so that the participants can understand the background, significance and requirements of the survey when they receive the questionnaire. Preliminary tests can be conducted prior to the actual survey to understand passenger acceptance of the questionnaire and to ensure that all the concepts are clearly defined and the questions are not ambiguously phrased and avoid interviewer errors. Interviewers may misread the question or twist the answers in their own words and thereby introduce bias. The pre-test has to detect and minimize this potential error;
 - (iii) The results of the pre-test will be documented and will be taken into consideration for the modification of the final instrument and for the preparation of the model of information collection.
 - (b) Validation process of the information:
 - (i) A supervisor should be used to carry out the survey verifications, guaranteeing the validity of the gathered information as well as the attained coverage. At least the questions on the default questionnaire included below is to be used. This questionnaire should be used by all projects except if valid arguments exist to change the questionnaire and to adapt it to local circumstances. The questionnaire shall be realized in the local language. The questionnaire needs to be adapted to national or local

circumstances, the wording needs to be checked locally and local test-runs should be performed to ensure that the questions are simple, easily understood, cannot be misinterpreted and lead to reliable results.

- (c) Collection of the survey result:
 - (i) The result of the survey should be archived in time to avoid missing data.

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Appendix 2. Default questionnaire

Date:

Time:

Location:

General Data of Interviewed Person

Age of interviewed person:

- ☐ 12-17 years
- ☐ 18-25 years
- ☐ 26-35 years
- ☐ 36-45 years
- ☐ 46-55 years
- ☐ 56-65 years
- ☐ over 65 years

Gender of the interviewed person

☐ Female ☐ Male

Details about the current trip

1. Starting point of the travelling:

2. Destination of the travelling:

3. Car booking model used to travel

- ☐ Booking taxi;
- ☐ Booking a ride with another passenger(s);
- ☐ Booking a ride driver (passenger);
- ☐ Hitch-riding cars' driver.

4. The frequency of your use (or plan to use) of taxi/ride-hailing /hitch-riding cars is:

Car booking model	Frequency of usage		
	Almost every day	Occasionally	Rarely
Booking taxi			
Booking a ride with another passenger(s);			
Booking a ride driver (passenger)			

Car booking model		Frequency of usage	
Hitch-riding cars' driver			

5. Which kind of promotion campaign do you receive for this trip?

☐ No campaign; ☐ Discount of travelling fee; ☐ Rebate on travelling fee; ☐ Other campaign

6. (For those who have received promotion campaign for the trip) If there is no promotion campaign, would you choose the app to book travelling?

☐ Yes; ☐ No

7. If there is no taxi/ride-hailing cars /hitch-riding cars booking service, which way do you choose to arrive at your destination? (please choose one item)

Note: Please choose your answer considering there is **NO** promotion campaign for this trip.

☐ Bus;

☐ **Private** passenger car

If you choose a private car: does your private car use renewable fuels? Yes ☐; No ☐

☐ Taxi⁴;

☐ Hailing cars without sharing;

☐ **Private** motorcycles

If you choose a private motorcycle: does your motorcycle use renewable fuels? Yes ☐; No ☐

☐ Urban rail transit (metro, light rail transit, trams);

☐ **Walking;**

☐ **Bicycles;**

☐ **Passenger tricycle;**

☐ **Cycle rickshaws;**

☐ **Skates;**

☐ **Skateboards;**

☐ **Push scooters**

☐ **Hand carts;**

☐ Other vehicle categories such as para-transit;

☐ **No travelling;**

☐ Others

Note: The information on date, time, location and travel information can also be automatically recorded by the project system platform to reduce the content to be filled by the respondents and to improve the response ratio and the accuracy of information.

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⁴ Should not be an option for passengers booking a taxi using ride-hailing app

Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
02.0	20 May 2019	MP 79, Annex 3 To be considered by the Board at EB 103. This version incorporates the input and guidance provided by the Board at EB 102.
01.0	11 March 2019	MP 78, Annex 8 To be considered by the Board at EB 102.
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