Joint Crediting Mechanism Approved Methodology VN\_AM001

"Transportation energy efficiency activities by installing digital tachograph systems"

# A. Title of the methodology

Transportation energy efficiency activities by installing digital tachograph systems, Version **42.0** 

# **B.** Terms and definitions

Terms	Definitions
Digital tachograph system	A system consists of digital tachograph device and
	tachograph data analysis system, whose function includes
	but not limited to the followings:
	(a) Provides real-time feedback, such as alert sounds and
	flashing lights, during instances of inefficient driving,
	following which the driver adjust to a more efficient
	driving pattern in order to deactivate the instant feedback;
	(b) Continuously records the vehicle's operation including
	time, position, speed, acceleration, etc. for all the time of
	operation; and
	(c) Automatically analyzes and provides a graphical
	representation of a driver's performance based on recorded
	data in order to further improve driving efficiency.
Fuel efficiency	Energy efficiency of a particular vehicle given as a ratio of
	fuel consumed per unit of distance travelled. [kL/km]
Similar type of vehicles	Vehicles that have the same capacity (e.g. 2 t, 10 t, 40 t)
	and meet the same emission standards (e.g. EURO2,
	EURO3) and equipped with the same fuel efficiency
	technologies (e.g. radial tires, wind deflector, tire pressure
	monitoring system, fuel consumption monitoring system)
	as the newly added or replaced vehicles.

# C. Summary of the methodology

Items	Summary		
GHG emission reduction	Improvement of driving efficiency by installation of digital		
measures	tachograph system to freight vehicle fleets providing to the		
	drivers a real-time feedback (e.g. alert sounds and flashing		
	lights, etc.) against inefficient driving.		
	Further improvement of driving efficiency by graphical		
	representation based on automatic analysis of drivers'		
	performance.		
Calculation of reference	The reference emissions are calculated for each freight vehicle		
emissions	by multiplying reference fuel efficiency of freight vehicle,		
	project distance travelled by that freight vehicle, net calorific		
	value and CO <sub>2</sub> emission factor of fuel used by freight vehicles.		
Calculation of project	Project emissions are calculated for each freight vehicle on the		
emissions	basis of monitored fuel consumption, net calorific value and		
	CO <sub>2</sub> emission factor of fuel used by freight vehicles.		
Monitoring parameters	Project fuel consumption by each freight vehicle		
	<ul> <li>Project distance travelled by each freight vehicle</li> </ul>		

# D. Eligibility criteria

This methodology is applicable to projects that satisfy all of the following criteria.

Criterion 1	This methodology applies to freight vehicle fleets to which a digital				
	tachograph system has been installed.				
Criterion 2	Data of fuel consumption and distance travelled before activation of digital				
	tachograph system is available for each freight vehicle-, except for the cases				
	of application of Option (c) to the reference fuel efficiency $(\eta_{RE,i})$ in Section				
	F.2 The data is to be collected for at least 60 days within 4 months of lower				
	monthly mean temperature of the year (November, December, January and				
	February).				
Criterion 3	The project includes feedback of a driver's performance with the graphical				
	representation to the driver regularly, at least once in three months.				
Criterion 4	The project does not involve a fuel switch in existing freight vehicles, except				
	for an optional switch to biofuel blends where the blending ratio is not greater				
	than 20% by volume, in which case emission reductions are discounted by the				
	percentage of biofuel in the blend.				
Criterion 5	The project participants identify each freight vehicle included in the project,				

	and ensure that the type of service of the freight vehicle is the same before
	and during the project (e.g. refrigeration vehicle remains as a refrigeration
	vehicle, etc.).
Criterion 6	A plan to present new reference data for freight vehicles of new routes in case
	route changes have occurred due to construction of new expressways or to

## E. Emission Sources and GHG types

Reference emissions	
Emission sources	GHG types
Consumption of fossil fuel by freight vehicles	$CO_2$
Project emissions	
Emission sources	GHG types
Consumption of fossil fuel by freight vehicles	$CO_2$

### F. Establishment and calculation of reference emissions

## F.1. Establishment of reference emissions

Reference emissions are calculated for each freight vehicle by multiplying reference fuel efficiency of the freight vehicle, project distance travelled by that freight vehicle, net calorific value of the fuel used, and the  $CO_2$  emission factor of the fuel used.

The reference fuel efficiency is determined conservatively for each freight vehicle based on actual measurement before activation of digital tachograph system in the following manner to ensure the net emission reductions.

- 1. Due to the use of air conditioners, fuel efficiency of the freight vehicle tends to worsen as the atmospheric temperature becomes higher.
- 2. Selecting data for calculation of reference fuel efficiency during the months with lower temperature will result in improved fuel efficiency, leading to the ensuring of the net emission reduction.
- 3. Therefore, data to determine reference fuel efficiency is collected for at least 60 days within 4 months of lower monthly mean temperature of the year. Based on average temperatures in Hanoi, Da Nang and Ho Chi Minh City, these 4 months will be November, December, January and February.

### F.2. Calculation of reference emissions

$$RE_p = \sum_{\mathbf{i}} RE_{\mathbf{i},p}$$

 $RE_p$ : Reference emissions during the period p [tCO<sub>2</sub>/p]

 $RE_{i,p}$ : Reference emissions of freight vehicle *i* during the period *p* [tCO<sub>2</sub>/p]

$$RE_{i,p} = \eta_{RE,i} \times PD_{i,p} \times NCV_i \times EF_{CO2,i}$$

 $RE_{i,p}$ : Reference emissions of freight vehicle *i* during the period *p* [tCO<sub>2</sub>/p]

 $\eta_{\text{RE},i}$ : Reference fuel efficiency of freight vehicle *i* [kL/km]

 $PD_{i,p}$ : Project distance travelled by freight vehicle *i* during the period *p* [km/p]

NCV<sub>i</sub>: Net calorific value of fuel used by freight vehicle *i* [GJ/kL]

 $EF_{CO_2 i}$ :  $CO_2$  emission factor of fuel used by freight vehicle i [tCO<sub>2</sub>/GJ]

## $\eta_{RE,i} = FC_{i,before} \div D_{i,before}$

 $\eta_{RE,i}$ : Reference fuel efficiency of freight vehicle *i* [kL/km]

 $FC_{i,before}$ : Fuel consumption by freight vehicle i measured during the period b

before activation of digital tachograph system [kL/b]

 $D_{i,before}$ : Distance travelled by freight vehicle i measured during the period b

before activation of digital tachograph system [km/b]

[New addition and replacement of freight vehicles]

The reference fuel efficiency ( $\eta_{RE,i}$ ) for freight vehicles newly added to the fleet and added to replace the existing freight vehicles after the start of the project is determined using one of the following options:

- (a) The reference fuel efficiency is estimated by averaging the reference fuel efficiencies of vehicles in the fleet which are the same models and travel the same route as the newly added vehicle. Routes with the same origin and destination (O.D.) are considered as the same routes. The O.D. can be city names (e.g. Hanoi, HCMC, etc.) in case that the vehicle travels between cities or more detailed area names in case that the vehicles travel within a city;
- (b) If data cannot be obtained from vehicles with the same model and the same routes, the reference fuel efficiency is determined using obtained data from newly added freight vehicles before activation of digital tachograph system for at least 60 days within 4 months of lower monthly mean temperature of the year (November, December, January and February).; or
- (c) If neither option (a) nor (b) can be applied, the reference fuel efficiency is estimated by

averaging the fuel efficiency values of the highest 20 % fuel efficiency vehicles of the similar type of vehicles in the fleet before activation of digital tachograph system, as determined according to travel distance of each vehicle for at least 60 days within 4 months of lower monthly mean temperature of the year (November, December, January and February).

[Construction of new expressways or a modal shift]

In case route changes have occurred due to construction of new expressways or to modal shift (e.g. shift from truck to rail) after the introduction of the project, project participant present new reference data for freight vehicles of new routes as per the provisions for new addition and replacement of freight vehicles.

[(Recommendation) Estimation of reference emissions using freight ton-km]

Project participants are recommended to estimate reference emissions using reference fuel efficiency of freight vehicles calculated with freight ton-km data obtained before activation of digital tachograph system to compare reference emissions calculated with reference fuel efficiency of travel distance.

# G. Calculation of project emissions

$$PE_p = \sum_{i} PE_{i,p}$$

 $PE_n$ : Project emissions during the period p [tCO<sub>2</sub>/p]

 $PE_{i,p}$ : Project emissions of freight vehicle *i* during the period *p* [tCO<sub>2</sub>/p]

 $PE_{i,p} = PFC_{i,p} \times NCV_i \times EF_{CO2,i}$ 

 $PE_{i,p}$ : Project emissions of freight vehicle *i* during the period *p* [tCO<sub>2</sub>/p]

 $PFC_{i,p}$ : Project fuel consumption of freight vehicle *i* during the period *p* [kL/p]

NCV<sub>i</sub>: Net calorific value of fuel used by freight vehicle *i* [GJ/kL]

EF<sub>CO2.i</sub>: CO<sub>2</sub> emission factor of fuel used by freight vehicle *i* [tCO<sub>2</sub>/GJ]

# H. Calculation of emissions reductions

Taking into account possibilities of emission reductions from other factors than installation of

digital tachograph system, emission reductions for the project is limited to 10% of the reference emissions.

 $ER_{p} = min(RE_{p} - PE_{p}, 0.1 \times RE_{p})$ 

 $ER_p$ : Emission reductions during the period p [tCO<sub>2</sub>/p]  $RE_p$ : Reference emissions during the period p [tCO<sub>2</sub>/p]

 $PE_p$ : Project emissions during the period p [tCO<sub>2</sub>/p]

# I. Data and parameters fixed ex ante

The source of each data and parameter fixed ex ante is listed as below.

Parameter	Description of data	Source
NCVi	Net calorific value of fuel used by freight	Country specific data or
	vehicle i [GJ/kL]	IPCC default value from
		"2006 IPCC Guidelines for
		National Greenhouse Gas
		Inventory".
		Lower limit value of the
		default net calorific value is
		applied.
EF <sub>CO2,i</sub>	CO <sub>2</sub> emission factor of fuel used by freight	Country specific data or
	vehicle <i>i</i> [tCO <sub>2</sub> /GJ]	IPCC default value from
		"2006 IPCC Guidelines for
		National Greenhouse Gas
		Inventory".
		Lower limit value of the
		default CO <sub>2</sub> emission factor
		is applied.
$FC_{i,before}$	Fuel consumption by freight vehicle i	Purchase bills or
	measured during the period $b$ before activation	consumption records
	of digital tachograph system [kL/b]	
$D_{i,before}$	Distance travelled by freight vehicle i	Driver logs
	measured during the period $b$ before activation	
	of digital tachograph system [km/b]	
$\eta_{RE,i}$	Reference fuel efficiency of freight vehicle i	Calculated data before
	[kL/km]	activation of digital
		tachograph system

# History of the document

Version	Date	Contents revised
02.0	20 October 2016	<ul> <li>JC5, Annex 8</li> <li>Addition of a new option for determining the reference emissions for freight vehicles newly added to the fleet or added to replace existing freight vehicles.</li> <li>Revision of the description of the Criterion 2.</li> </ul>

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		<ul> <li>Addition of the definition of "Similar type or vehicles".</li> </ul>
01.0	14 January 2015	JC3, Annex 1 Initial approval.

Tab	able 1: Parameters to be monitored ex post		
	Monitoring point		

ble 1:	Parameters to be m	onitored ex post	
(a)	Monitoring point No.	(1)	(2)
(b)	Parameters	PFC <sub>ip</sub>	PD <sub>lp</sub>
(c)	Description of data	Project fuel consumption of freight vehicle <i>i</i> during the period <i>p</i>	Project distance travelled by freight vehicle <i>i</i> during the period <i>p</i>
(e)	Units	kL/p	km/p
(f)	Monitoring option	Option B/C	Option C
(g)	Source of data	purchace bill/fuel meter/company record	odometer/data server
(h)	Measurement methods and procedures	Purchase or consumption records or fuel consumption data. If the fuel consumption is determined by fuel flow sensors (meters), they must be calibrated.	Driver logs or records by GPS tracking system
(i)	Monitoring frequency	Monthly	Continuous
(i)	Other comments		
(d)	Estimated Value of	f vehicle i	
(u)		1 101110101	
	i=1 i=2		
	i=3		
	i=4 i=5		
	i=6		
	i=7		
	i=8 i=9		
	i=10		
	i=11 i=12 i=13		
	i=12 i=13		
	i=14		
	i=15		
	i=15 i=16 i=17		
	i=16 i=17 i=18		
	i=16 i=17 i=18 i=19		
	i=16 i=17 i=18 i=19 i=20 i=21		
	i=16 i=17 i=18 i=19 i=20 i=21		
	i=16 i=17 i=18 i=19 i=20 i=21 i=22 i=23		
	i=16 i=17 i=18 i=19 i=20 i=21 i=22 i=23 i=24		
	i=16 i=17 i=18 i=19 i=20 i=21 i=22 i=23 i=24 i=25 i=26		
	i=16 i=17 i=18 i=19 i=20 i=21 i=22 i=23 i=24 i=25 i=26		
	i=16 i=17 i=18 i=19 i=20 i=21 i=22 i=23 i=24 i=25 i=26 i=27		
	i=16 i=17 i=18 i=19 i=20 i=21 i=22 i=23 i=24 i=25 i=26 i=27 i=28		
	i=16 i=17 i=18 i=19 i=20 i=21 i=22 i=23 i=24 i=25 i=26 i=27 i=28 i=29 i=30 i=30 i=31		
	i=16 i=17 i=18 i=19 i=20 i=21 i=22 i=23 i=24 i=25 i=26 i=27 i=28 i=29 i=30 i=31		
	=16		
	=16		
	i=16		
	=16		
	=16		
	=16		

#### Table 2: Project-specific parameters to be fixed ex ante

(a)	Parameters	NCV <sub>i</sub>	EF <sub>CO2,i</sub>	FC <sub>Lbefore</sub>	D <sub>Lbefore</sub>	η <sub>REJ</sub>
(b)	Description of data	Net calorific value of fuel used by freight vehicle <i>i</i>	CO <sub>2</sub> emission factor of fuel used by freight vehicle <i>i</i>		Distance travelled by freight vehicle <i>i</i> measured during the period <i>b</i> before activation of digital tachograph system	Reference fuel efficiency of freight vehicle i
(d)	Units	GJ/kL	tCO <sub>2</sub> /GJ	kL/b	km/b	kL/km
(e)	Source of data	Country specific data or IPCC default value from "2006 IPCC Guidelines for National Greenhouse Gas Inventory". Lower limit value of the default net calorific value is applied.	Country specific data or IPCC default value from "2006 IPCC Guidelines for National Greenhouse Gas Inventory". Lower limit value of the default CO <sub>2</sub> emission factor is applied.	Purchase bills or consumption records: Data is obtained from newly added freight vehicles or comparable-for the freight vehicles before activation of digital tachograph system for at least 60 days within 4 months of lower monthly mean temperature of the year (November, December, January and February).  For the existing freight vehicle, data of the same vehicle is applied. For the freight vehicle newly added to the fleet or added to replace the existing freight vehicle, data of the vehicle specified in section F.2. is applied.	Driver logs measured: Data is obtained from newly added freight vehicles or comparable of the freight vehicles before activation of digital tachograph system for at least 60 days within 4 months of lower monthly mean temperature of the year (November, December, January and February).  For the existing freight vehicle, data of the same vehicle is applied.  For the freight vehicle newly added to the fleet or added to replace the existing freight vehicle, data of the vehicle specified in section F.2. is applied.	Calculated data before activation of digital tachograph system
(f)	Other comments					
(c)	Estimated value of	vehicle i				
(5)						
	i=1 i=2					
	i=3 i=4					
	i=5					
	i=6 i=7					•
	i=8					
	i=9 i=10					:
	i=11 i=12					-
	i=13					-
	i=14 i=15					-
	i=16					-
	i=17 i=18					
	i=19					-
	i=20 i=21					
	i=22 i=23					-
	i=24					
	i=25 i=26					-
	i=27					
	i=28 i=29					
	i=30					
	i=31 i=32					•
	i=33					-
	i=34 i=35					•
	i=36					
	i=37 i=38					-
	i=39					
	i=40 i=41					

#### Table3: Ex-ante estimation of each CO<sub>2</sub> emission reduction

(a)	Parameters	RE <sub>p</sub>	PE <sub>p</sub>
(b)	Description of data	Reference emissions during the period $ ho$	Project emissions during the period <i>p</i>
(d)	Units	[tCO <sub>2</sub> /p]	[tCO <sub>2</sub> /p]
(c)	Estimated value of	vehicle i	
	i=1 i=2		
	i=2 i=3		
	i=4		
	i=5		
	i=6 i=7		
	i=7 i=8	-	
	i=9	-	-
	i=10 i=11		
	i=11 i=12 i=13 i=14		
	i=13	-	
	i=15		-
	i=16		
	i=17 i=18	- :	
	i=19		
	i=20 i=21	-	
	i=21 i=22		•
	i=22 i=23		
	i=24		:
	i=25 i=26	- :	
	i=27 i=28		
		-	
	i=28		
	i=29 i=30		•
	i=29 i=30 i=31	-	
	i=29 i=30 i=31 i=32 i=33	•	•
	i=29 i=30 i=31 i=32 i=33 i=34		: : :
	i=29 i=30 i=31 i=32 i=33 i=34 i=35		
	i=29 i=30 i=31 i=32 i=33 i=34		: : :

#### Table3: Ex-ante estimation of ${\rm CO_2}$ emission reductions

CO <sub>2</sub> emission reductions	Units
0	tCO <sub>2</sub> /p

### [Mor

onit	toring option	1
	Option A	Based on public data which is measured by entities other than the project participants (Data used: publicly recognized data such as statistical data and specifications)
	Option B	Based on the amount of transaction which is measured directly using measuring equipments (Data used: commercial evidence such as invoices)
	Option C	Based on the actual measurement using measuring equipments (Data used: measured values)

Mail					
	:-44	1-44			
Mail	i=44 i-45	i=44			
	i=46	i=46			
	i=47				
	i=48	i=48			-
	i=49	i=49			-
100   100	i=50	i=50			-
	i=51				
	i=52	i=52			
Main	1=53				
March   Marc	1=54	i=54			
Color	1-56	1-55			
Color	i=50				
Color   Colo	i=58	i=58			
Column   C	i=59				-
10	i=60	i=60			
Column   C	i=61				
Mail	i=62	i=62			
Color   Colo	i=63				
100	1=64	1=64			
	1=05	1=65			-
Manual Color	i=67				
Manual Color	i=68	i=68			
107	i=69	i=69			-
Column   C	i=70	i=70			-
Column   C	i=71	i=71			
100   100	i=72	i=72			
100   100	I=73 i=74	1=73			
107	I=/4 i=75	1=74			
107	i=76	i=76			
100   100	i=77	i=77			
100   100	i=78	i=78			
100   100	i=79	i=79			
10	i=80	i=80			
146	i=81	i=81			
146	i=82	i=82			
165   167   168   169	1=83	1=83		-	
168	i=04	i=85			
1-97     1	i=86	i=86			
Columb   C	i=87				
Columb   C	i=88	i=88			-
183	i=89	i=89			-
1486	i=90	i=90			
1-96	i=91	i=91			
1-96	1=92	1=92			
1-95	i=93	i=93			
1-96	i=95	i=95			
1-97	i=96	i=96			
1-49	i=97	i=97			
1-100	i=98	i=98			
1610	i=99	i=99			-
1-102	i=100	i=100			
H103		i=101			
HISS	i=102	i=102			
1-105	i=104	i=104			
	i=105	i=105			
1-107	i=106	i=106			
i=110	i=107	i=107			
i=110	i=108	i=108			
i=111	i=109	i=109			
i=112	i=110 i=111	i=110			
i=118		i=111			
in115	i=113	i=113			
i=115	i=114	i=114			
i=116	i=115	i=115			
in118   in119   in119   in119   in119   in119   in119   in119   in120   in121   in121   in122   in123   in123	i=116	i=116			
i=120     i=121     i=121     i=121     i=121     i=122     i=122     i=123     i=123     i=123     i=123     i=123     i=123     i=124     i=125     i=125     i=125     i=126     i=127     i=128     i=129     i=129     i=129     i=130     i=130     i=131   i=132   i=133   i=133   i=134   i=135   i=135   i=135   i=135   i=135   i=136   i=136   i=137   i=138   i=	i=117	i=117			
i=120     i=121     i=121     i=121     i=121     i=122     i=122     i=123     i=123     i=123     i=123     i=123     i=123     i=124     i=125     i=125     i=125     i=126     i=127     i=128     i=129     i=129     i=129     i=130     i=130     i=131   i=132   i=133   i=133   i=134   i=135   i=135   i=135   i=135   i=135   i=136   i=136   i=137   i=138   i=	i=118	i=118			
i=121	j=120	i=120			
i=122	i=121	i=121			
i=123	i=122	i=122			•
i=125	i=123	i=123			
i=126	i=124	i=124			
i=127					
i=128   i=129   i=129   i=129   i=130   i=130   i=131   i=131	i=125	i=125		I .	
i=130   i=130   i=131   i=131   i=131   i=131   i=132   i=133   i=133   i=133   i=133   i=134   i=135   i=135   i=135   i=135   i=135   i=136   i=137   i=138   i=139   i=139   i=139   i=140   i=140   i=141   i=144   i=145   i=146   i=146   i=146   i=146   i=146   i=146   i=148   i=148   i=148   i=148   i=148   i=149   i=149	i=126	i=126			
i=130   i=130   i=131   i=131   i=131   i=131   i=132   i=133   i=133   i=133   i=133   i=134   i=135   i=135   i=135   i=135   i=135   i=136   i=137   i=138   i=139   i=139   i=139   i=140   i=140   i=141   i=144   i=145   i=146   i=146   i=146   i=146   i=146   i=146   i=148   i=148   i=148   i=148   i=148   i=149   i=149	i=126 i=127	i=126 i=127			-
i=131	i=126 i=127 i=128 i=129	i=126 i=127 i=128 i=129			-
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i=135   i=135	i=126 i=127 i=128 i=129 i=130 i=131	i=126 i=127 i=128 i=129 i=130 i=131			- - -
i=135   i=135   i=135   i=136   i=136   i=136   i=136   i=136   i=137   i=138   i=138   i=138   i=138   i=138   i=139   i=140   i=140   i=140   i=140   i=140   i=140   i=141   i=141	i=126 i=127 i=128 i=129 i=130 i=131 i=132	i=126 i=127 i=128 i=129 i=130 i=131 i=132			•
i=136	i=126 i=127 i=128 i=129 i=130 i=131 i=132	i=126 i=127 i=128 i=129 i=130 i=131 i=132			
i=138 - i=139 - i=139 - i=139 - i=139 - i=140 - i=141 - i=144 - i=144 - i=145 - i=145 - i=146 - i=146 - i=146 - i=147 - i=148 - i=149	i=126 i=127 i=128 i=129 i=130 i=131 i=132 i=133 i=134	i=126 i=127 i=128 i=129 i=130 i=131 i=132 i=133 i=134			
i=138 - i=139 - i=139 - i=139 - i=139 - i=139 - i=140 - i=141 - i=141 - i=142 - i=143 - i=144 - i=144 - i=144 - i=145 - i=145 - i=146 - i=146 - i=147 - i=148 - i=148 - i=149	i=126 i=127 i=128 i=129 i=130 i=131 i=132 i=133 i=134	i=126 i=127 i=128 i=129 i=130 i=131 i=132 i=133 i=134			
i=140   i=140   i=141   i=141   i=141   i=141   i=142   i=143   i=143   i=143   i=144   i=145   i=145   i=145   i=146   i=146   i=146   i=146   i=146   i=148   i=148   i=149   i=149	i=126 i=127 i=128 i=129 i=130 i=131 i=132 i=133 i=134 i=135 i=136	i=126 i=127 i=128 i=129 i=130 i=131 i=132 i=133 i=134 i=135 i=136			-
i=140   i=140   i=141   i=141   i=141   i=141   i=142   i=143   i=143   i=143   i=144   i=145   i=145   i=145   i=146   i=146   i=146   i=146   i=146   i=148   i=148   i=149   i=149	i=126 i=127 i=128 i=129 i=130 i=131 i=132 i=133 i=134 i=135 i=136	i=126 i=127 i=128 i=129 i=130 i=131 i=132 i=133 i=134 i=135 i=136			
i=142   i=142   i=143   - i=143   - i=143   - i=144   i=144   i=145   - i=145   - i=145   - i=146   i=146   i=147   i=148   i=148   i=149   i=149   - i=149	i=126 i=127 i=129 i=130 i=130 i=131 i=132 i=133 i=134 i=135 i=136 i=137 i=138	i=126 i=127 i=128 i=129 i=130 i=131 i=132 i=134 i=135 i=136 i=136 i=137			-
i=143 i=144	i=126 i=127 i=128 i=129 i=130 i=131 i=132 i=133 i=134 i=135 i=136 i=137 i=138 i=140	=126  =127  =128  =129  =130  =131  =133  =134  =145  =136  =136  =136  =138			-
i=145 i=145 - i=146 - i=147 - i=148 - i=149 -	i=126 i=127 i=129 i=130 i=130 i=131 i=132 i=133 i=134 i=135 i=138 i=139 i=140	i=126 i=127 i=128 i=129 i=130 i=131 i=132 i=133 i=134 i=135 i=136 i=136 i=137 i=139 i=140			-
i=145 i=145 - i=146 - i=147 - i=148 - i=149 -	i=126 i=127 i=128 i=129 i=130 i=131 i=132 i=133 i=134 i=138 i=138 i=139 i=138 i=139 i=140 i=141	i=126 i=127 i=128 i=129 i=130 i=131 i=133 i=133 i=133 i=134 i=134 i=136 i=136 i=136 i=146 i=146			
i=146 i=146 i=147 i=147 i=147 i=148 i=149	i=126 i=127 i=128 i=129 i=130 i=131 i=132 i=133 i=134 i=138 i=138 i=139 i=138 i=139 i=140 i=141	i=126 i=127 i=128 i=129 i=130 i=131 i=133 i=133 i=133 i=134 i=134 i=136 i=136 i=136 i=146 i=146			
i=148 i=149	i=126 i=127 i=128 i=129 i=130 i=131 i=133 i=133 i=133 i=138 i=138 i=138 i=138 i=138 i=138 i=138 i=140 i=140 i=140 i=141 i=142 i=142 i=142 i=142 i=142 i=142	1=126   1=127   1=128   1=129   1=130   1=131   1=133   1=133   1=133   1=135   1=135   1=135   1=136   1=136   1=136   1=144			
i=148 i=149	i=126 i=127 i=128 i=129 i=130 i=131 i=132 i=133 i=135 i=135 i=136 i=136 i=137 i=138 i=139 i=140 i=142 i=142 i=144 i=144	I=126 I=127 I=128 I=129 I=130 I=130 I=130 I=130 I=130 I=130 I=130 I=130 I=134 I=136 I=136 I=137 I=138 I=139 I=140 I=141 I=141 I=144 I=144			
i=149 i=149 i=149	i=126 i=127 i=128 i=129 i=130 i=131 i=133 i=133 i=133 i=135 i=135 i=136 i=136 i=140 i=141 i=140 i=141 i=142 i=142 i=142 i=142 i=144 i=144 i=144 i=144 i=144 i=144 i=144 i=144 i=144 i=144 i=144 i=144 i=146 i=146	I=126 I=127 I=128 I=129 I=130 I=130 I=130 I=130 I=130 I=130 I=130 I=130 I=134 I=136 I=136 I=137 I=138 I=139 I=140 I=141 I=141 I=144 I=144			
i=150 i=150	i=126 i=127 i=128 i=129 i=130 i=131 i=133 i=133 i=133 i=135 i=135 i=136 i=136 i=136 i=146 i=146 i=146 i=146 i=146 i=146 i=146 i=146 i=146 i=146	1			
	i=126 i=127 i=128 i=129 i=130 i=130 i=130 i=130 i=130 i=130 i=130 i=130 i=130 i=140	I=128 I=127 I=128 I=129 I=130 I=140 I=141 I=142 I=143 I=145 I=145 I=145			
	i=126 i=127 i=128 i=129 i=130 i=130 i=130 i=130 i=130 i=130 i=130 i=130 i=130 i=140	I=128 I=127 I=128 I=129 I=130 I=140 I=141 I=142 I=143 I=145 I=145 I=145			

| i=44 | i=45 | i=46 | i=47 | i=48 | i=47 | i=48 | i=50 | i=50 | i=50 | i=50 | i=50 | i=61 | i=50 | i=62 | i=63 | i=62 | i=63 | i=64 | i=65 | i=66 | i=67 | i=62 | i=63 | i=66 | i=67 | i=68 | i=69 |

2

# Monitoring Plan Sheet (Calculation Process Sheet) [Attachment to Project Design Document]

1. Calculations for emission reductions	Fuel type	Value	Units	Parameter
Emission reductions during the period p	N/A	0.0	tCO <sub>2</sub> /p	ERp
2. Selected default values, etc.				
3. Calculations for reference emissions				
Reference emissions during the period p	N/A	0.0	tCO <sub>2</sub> /p	REp
4. Calculations of the project emissions				
Project emissions during the period p	N/A	0.0	tCO <sub>2</sub> /p	PEp

# Monitoring Structure Sheet [Attachment to Project Design Document]

Responsible personnel	Role

Гab	able 1: Parameters monitored ex post						
	(a)	Monitoring period					
	(b)	Monitoring point No.	(1)	(2)			
	(c)	Parameters	PFC <sub>Lp</sub>	PD <sub>lp</sub>			

		period p	репоц р
(f)	Units	kL/p	km/p
(g)	Monitoring option	Option B/C	Option C

Source of data purchace bill/fuel meter/company record odometer/data server

Project fuel consumption of freight vehicle *i* during the Project distance travelled by

		Purchase or consumption records or fuel consumption data.		
(i)	Measurement methods and procedures	If the fuel consumption is determined by fuel	Driver logs or records by GPS tracking system	

(i)	Monitoring frequency	Monthly	Continuous

flow sensors (meters), they must be calibrated.

(k)	Other comments	

(e)	Monitored Value of	vehicle i	
	i=1		
	i=2		
	i=3		
	i=4		
	i=5		
	i=6		
	i=7		
	i=8		
	i=9		
	i=10		
	i=11		
	i=12		
	i=13		
	i=14		
	i=15		
	i=16		
	i=17		
	i=18		
	i=19		
	i=20		
	i=21		
	i=22		
	i=23		
	i=24		
	i=25		
	i=26		
	i=27		
	i=28		
	i=29		
	i=30		
	i=31		
	i=32		
	i=33		
	i=34 i=35		
	i=36		
Γ	i=37		
	i=38		
	i=39		
	i=40		
	i=41		

Table 2: Pro	ject-specific	parameters	fixed	ex an
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(a)	Parameters	NCV <sub>i</sub>	EF <sub>COZJ</sub>	FC <sub>i,before</sub>	D <sub>Lbefore</sub>	η <sub>REJ</sub>
(b)	Description of data	Net calorific value of fuel used by freight vehicle i	CO <sub>2</sub> emission factor of fuel used by freight vehicle <i>i</i>	measured during the period b before activation	Distance travelled by freight vehicle <i>i</i> measured during the period <i>b</i> before activation of digital tachograph system	Reference fuel efficiency of freight vehicle i
(d)	Units	GJ/kL	tCO <sub>2</sub> /GJ	kL/b	km/b	kL/km
(e)	Source of data	Country specific data or IPCC default value from "2006 IPCC Guidelines for National Greenhouse Gas Inventory". Lower limit value of the default net calorific value is applied.	Country specific data or IPCC default value from "2006 IPCC Guidelines for National Greenhouse Gas Inventory". Lower limit value of the default CO2 emission factor is applied.	Purchase bills or consumption recordss: Data is obtained from newly added freight vehicles or comparable for the freight vehicles before activation of digital tachograph system for at least 60 days within 4 months of lower monthly mean temperature of the year (November, December, January and February).  For the existing freight vehicle, data of the same vehicle is applied.  For the freight vehicle newly added to the fleet or added to replace the existing freight vehicle, data of the vehicle specified in section F.2. is applied.	Driver logs measured: Data is obtained from newly added freight vehicles or eemparable of the freight vehicles before activation of digital tachograph system for at least 60 days within 4 months of lower monthly mean temperature of the year (November, December, January and February).  For the existing freight vehicle, data of the same vehicle is applied.  For the freight vehicle newly added to the fleet or added to replace the existing freight vehicle, data of the vehicle specified in section F.2. is applied.	Calculated data before activation of digital tachograph system
<b>(f)</b>	Other comments					
(c)	Estimated value of	vehicle i				
(0)	i=1	Verlicie i				
	i=2					-
	i=3 i=4					•
	i=4 i=5					
	i=6					
	i=7 i=8					
	i=9					
	i=10 i=11					
	i=12					-
	i=13 i=14					
	i=15					
	i=16 i=17					-
	i=18 i=19					-
	i=20					-
	i=21					
	i=22 i=23					
	i=24					•
	i=25 i=26					
	i=27					-
	i=28 i=29					
	i=30					
	i=31 i=32					
	i=33					-
	i=34 i=35					
	i=36					
	i=37 i=38					
	i=39					
	i=40					

RE p

#### Table3: Ex-post calculation of $\text{CO}_2$ emission reductions Table3: Ex-post calculation of $CO_2$ emission reductions

PE,

Monitoring Period	CO <sub>2</sub> emission reductions	Units
	0	tCO <sub>2</sub> /p

			[Monitoring op	stion!
			Option A	Based on public data which is measured by entities other than the project participants (Data used: publicly recognized data such as statistical data and specifications)
			Option B	Based on the amount of transaction which is measured directly using measuring equipments (Data used: commercial evidence such as invoices)
ription of data	Reference emissions during the period <i>p</i>	Project emissions during the period p	Option C	Based on the actual measurement using measuring equipments (Data used: measured values)

(c)	Estimated value of	vehicle i	
	i=1		
	i=2		
	i=3		
	i=4		
	i=5		
	i=6		
	i=7		
	i=8		
	i=9		
	i=10		
	i=11		
	i=12		
	i=13		
	i=14		
	i=15		
	i=16		
	i=17		
	i=18		
	i=19		
	i=20		
	i=21		
	i=22		
	i=23		
	i=24		
	i=25		
	i=26		
	i=27		
	i=28		
	i=29		
	i=30		
	i=31		
	i=32		
	i=33		
	i=34		
	i=35		
	i=36		
	i=37		
	i=38		
	i=39		
	i=40		-

[tCO<sub>2</sub>/p]

[tCO<sub>2</sub>/p]

	i=42 i=43							
	i=43	i=42			-	i=42	•	-
		i=43				i=43		
	i=44	i=44			-	i=44	-	-
	i=45	i=45				i=45		-
	i=46	i=46				i=46		-
	i=47	i=47				i=47		
		1-40						
	1=40	1=40				1=40		
	1=49	1=49				1=49		-
	i=50	i=50			-	i=50		-
	i=51	i=51				i=51		-
	i=52	i=52			-	i=52	-	
	i-53	i-53				i-53		
	1-54	i-54				1-55		
	1=54	1=34				1=34		-
	1=55	1=55				1=55		-
	i=56	i=56			-	i=56	-	-
	i=57	i=57			-	i=57		
	i=58	i=58			-	i=58		-
	i=59	i=59			-	i=59		-
	i-60	i-60				i_60		
	1=00	1=00				1=00		
	1=01	1=01				1=01		
Mail	1=62	1=62				1=62		-
Mail	i=63	i=63				i=63		
	i=64	i=64			-	i=64	-	-
	i=65	i=65			-	i=65		-
	i=66	i=66				i=66		-
	i_67	i=67				1-67		
	1-07	1_07						-
	1=68	1=68				1=68		
	i=69	i=69				i=69		
	i=70	i=70				i=70		-
	i=71	i=71			-	i=71		-
	i=72	i=72			-	i=72		
	i=73					i=73		
	i=74	i=74				1-74		
	1=74	1=74				1=74		
	1=75	1=75				1=75		
	i=76	i=76				i=76		
	i=77					i=77		-
	i=78	i=78			-	i=78		-
	i=79	i=79				i=79		-
Column   C	i=80	i=80				i=80		
Column   C	i-81	i-81				i-81		
	i=02	1=01				1-01		
Mail	1=82	1=82						
100   100	1=83	1=83				i≐83		
100   100	i=84	i=84			-	i=84		-
Column	i=85	i=85			-	i=85		
Column	i=86	i=86			-	i=86		
Column   C	i=87	i=87				i=87		
March   Marc	1_00	1_00						
100   100	1=00	1=00				1=00		-
100   100	1=89	1=89				1=89		-
100	i=90	i=90				i=90	-	-
100	i=91	i=91			-	i=91	-	-
150	i=92	i=92				i=92		-
Color	i=93	i=93			-	i=93	-	-
1-90	i=94	i-94			_	i=94		
1-97	1-05	1-05				1-05		
1-97	1=95	1=32				1=95		-
1-10	1=96	1=96				1=96		
Column   C	i=97	i=97				i=97		
1-100	i=98	i=98				i=98		
1-100	i=99	i=99			-	i=99		-
1-00   1-00	i=100	i=100				i=100		
14100	i-101	i-101						-
160   160	i=102				-	i-101		
1-16		i=102				i=101	•	
1-165	1.400	i=102				i=101 i=102		-
1-160	i=103	i=103			-	i=101 i=102 i=103	•	-
1-160	i=103 i=104	i=103 i=104			•	i=101 i=102 i=103 i=104	-	
1407	i=103 i=104 i=105	i=103 i=104 i=105			· ·	i=101 i=102 i=103 i=104 i=105		
1410   1410	i=103 i=104 i=105	i=103 i=104 i=105			· ·	i=101 i=102 i=103 i=104 i=105		
1-100	i=103 i=104 i=105	i=103 i=104 i=105				i=101 i=102 i=103 i=104 i=105		-
1110	i=103 i=104 i=105 i=106 i=107	i=103 i=104 i=105 i=106 i=107				i=101 i=102 i=103 i=104 i=105 i=106 i=107		-
	i=103 i=104 i=105 i=106 i=107 i=108	i=103 i=104 i=105 i=106 i=107 i=108				i=101 i=102 i=103 i=104 i=105 i=106 i=107 i=108		
	i=103 i=104 i=105 i=106 i=107 i=108 i=109	i=103 i=104 i=105 i=106 i=107 i=108 i=109				i=101 i=102 i=103 i=104 i=105 i=106 i=107 i=108 i=109		
	i=103 i=104 i=105 i=106 i=107 i=108 i=109 i=110	i=103 i=104 i=105 i=106 i=107 i=108 i=109 i=110				i=101 i=102 i=103 i=104 i=105 i=106 i=107 i=108 i=109		
	i=103 i=104 i=105 i=106 i=107 i=108 i=109 i=110	i=103 i=104 i=105 i=106 i=107 i=108 i=109 i=110				i=101 i=102 i=103 i=104 i=105 i=106 i=107 i=108 i=109		
	i=103 i=104 i=105 i=106 i=107 i=108 i=109 i=110 i=111 i=111	i=103 i=104 i=105 i=106 i=107 i=108 i=109 i=110 i=111				i=101 i=102 i=103 i=104 i=105 i=106 i=107 i=108 i=110 i=111 i=111	-	
1415   1415	i=103 i=104 i=105 i=106 i=107 i=108 i=109 i=110 i=111 i=111	i=103 i=104 i=105 i=106 i=107 i=108 i=109 i=110 i=111				i=101 i=102 i=103 i=104 i=105 i=106 i=107 i=108 i=110 i=111 i=111	-	
in 116	i=103 i=104 i=105 i=106 i=107 i=108 i=109 i=111 i=111 i=112 i=113	i=103 i=104 i=105 i=106 i=107 i=108 i=109 i=111 i=111 i=112 i=113				i=101 i=102 i=103 i=104 i=105 i=106 i=107 i=108 i=110 i=111 i=111 i=112 i=112	-	
	i=103 i=104 i=105 i=106 i=106 i=107 i=108 i=110 i=111 i=112 i=113 i=113	i=103 i=104 i=105 i=106 i=107 i=108 i=110 i=111 i=112 i=113 i=113				=101  =102  =103  =104  =105  =106  =107  =108  =109  =110  =111  =111  =112		
	i=103 i=104 i=105 i=106 i=107 i=108 i=109 i=110 i=111 i=112 i=113 i=114 i=115	i=103 i=104 i=105 i=106 i=107 i=108 i=109 i=110 i=111 i=112 i=113 i=114 i=115				i=101 i=102 i=103 i=104 i=105 i=106 i=107 i=108 i=110 i=111 i=111 i=112 i=113 i=114 i=114		
in   19	i=103 i=104 i=105 i=106 i=107 i=108 i=109 i=110 i=111 i=112 i=113 i=114 i=115	i=103 i=104 i=105 i=106 i=107 i=108 i=109 i=110 i=111 i=112 i=113 i=114 i=115				i=101 i=102 i=103 i=104 i=105 i=106 i=107 i=108 i=110 i=111 i=111 i=112 i=113 i=114 i=114		
i=120	=103  =104  =105  =106  =106  =107  =108  =110  =111  =111  =112  =113  =114  =115  =115	in 103 in 104 in 105 in 106 in 107 in 108 in 107 in 108 in 109 in 110 in 111 in 112 in 113 in 114 in 115 in 116 in 117				i=101 i=102 i=103 i=104 i=108 i=108 i=108 i=109 i=109 i=109 i=109 i=111 i=112 i=113 i=114 i=115 i=115 i=115 i=116 i=117		
	i=103 i=104 i=105 i=106 i=106 i=107 i=108 i=109 i=110 i=111 i=112 i=113 i=114 i=115 i=116 i=117	i=103 i=104 i=105 i=106 i=106 i=107 i=108 i=109 i=110 i=111 i=112 i=113 i=114 i=115 i=116 i=117				i=101 i=102 i=103 i=104 i=105 i=104 i=105 i=106 i=107 i=118 i=111 i=111 i=114 i=115 i=116 i=117 i=116 i=117 i=116 i=117 i=117 i=118		
	=103  =104  =105  =106  =106  =107  =108  =110  =111  =111  =112  =113  =114  =115  =115  =117  =117	i=103 i=104 i=105 i=105 i=106 i=107 i=108 i=110 i=111				i=101 i=102 i=103 i=104 i=104 i=105 i=106 i=107 i=108 i=109 i=108 i=109 i=111 i=111 i=111 i=111 i=115 i=117 i=118 i=117		
	i=103 i=104 i=105 i=106 i=106 i=107 i=108 i=110 i=111 i=112 i=113 i=114 i=115 i=116 i=117 i=118 i=119	i=103 i=104 i=105 i=106 i=106 i=107 i=108 i=109 i=110 i=111 i=112 i=113 i=114 i=115 i=116 i=117 i=118 i=118 i=119				i=101 i=102 i=103 i=104 i=105 i=106 i=106 i=107 i=108 i=109 i=111		
int   123	i=103 i=104 i=105 i=106 i=106 i=107 i=108 i=110 i=111 i=112 i=113 i=114 i=115 i=116 i=117 i=118 i=119	i=103 i=104 i=105 i=106 i=106 i=107 i=108 i=109 i=110 i=111 i=112 i=113 i=114 i=115 i=116 i=117 i=118 i=118 i=119				i=101 i=102 i=103 i=104 i=105 i=106 i=106 i=107 i=108 i=109 i=111 i=111 i=112 i=113 i=114 i=115 i=116 i=117 i=118 i=118 i=118 i=119 i=118 i=119 i=118 i=119 i=118 i=119		
int   24	i=103 i=104 i=105 i=106 i=106 i=107 i=108 i=110 i=111 i=112 i=113 i=114 i=115 i=116 i=117 i=118 i=119	i=103 i=104 i=105 i=106 i=106 i=107 i=108 i=109 i=110 i=111 i=112 i=113 i=114 i=115 i=116 i=117 i=118 i=118 i=119				i=101 i=102 i=103 i=104 i=105 i=106 i=106 i=107 i=108 i=109 i=111 i=111 i=112 i=113 i=114 i=115 i=116 i=117 i=118 i=118 i=118 i=119 i=118 i=119 i=118 i=119 i=118 i=119		
i=125	i=103 i=104 i=105 i=106 i=106 i=107 i=108 i=109 i=110 i=111 i=112 i=113 i=114 i=115 i=116 i=117 i=118 i=119 i=120 i=121	i=103 i=104 i=105 i=106 i=106 i=107 i=108 i=109 i=110 i=111 i=112 i=114 i=115 i=116 i=116 i=117 i=118 i=119 i=119 i=120 i=121				i=101 i=102 i=103 i=104 i=105 i=106 i=106 i=107 i=108 i=109 i=111 i=111 i=111 i=114 i=115 i=116 i=117 i=118 i=118 i=119 i=120 i=121 i=120 i=121		
i=126	=103  =104  =105  =106  =106  =108  =108  =111  =111  =1113  =114  =115  =115  =116  =117  =119  =120  =121	in 103 in 104 in 105 in 106 in 106 in 107 in 108 in 109 in 110 in 111 in 112 in 112 in 115 in 116 in 117 in 118 in 119 in 120 in 121 in 122 in 122				i=101 i=102 i=103 i=104 i=105 i=106 i=106 i=107 i=108 i=109 i=110 i=111		
i=127	=103  =104  =105  =106  =107  =108  =109  =110  =111  =111  =1113  =114  =115  =115  =116  =116  =119  =120  =120  =122  =122  =123	i=103 i=104 i=105 i=1007 i=1007 i=1007 i=1007 i=1007 i=1109 i=1109 i=111 i=1112 i=1115 i=1116 i=1116 i=1117 i=1116 i=1117 i=1116 i=1117 i=1119 i=11119 i=11119 i=11119 i=11119 i=11119 i=1119 i=1119 i=1119 i				i=101 i=102 i=103 i=104 i=104 i=105 i=106 i=107 i=107 i=107 i=107 i=117 i=111		
i=128	=103  =104  =105  =106  =106  =108  =109  =110  =111  =113  =114  =115  =115  =116  =117  =119  =120  =121  =122  =123  =124  =123  =124  =123  =124	in 103 in 104 in 105 in 106 in 106 in 107 in 108 in 109 in 110 in 110 in 111 in 111 in 111 in 115 in 116 in 117 in 117 in 118 in 118 in 119 in				i=101 i=102 i=103 i=104 i=105 i=106 i=106 i=107 i=108 i=110 i=111		
i=128	=103  =104  =105  =106  =106  =108  =109  =110  =111  =113  =114  =115  =115  =116  =117  =119  =120  =121  =122  =123  =124  =123  =124  =123  =124	in 103 in 104 in 105 in 106 in 106 in 107 in 108 in 109 in 110 in 110 in 111 in 111 in 111 in 115 in 116 in 117 in 117 in 118 in 118 in 119 in				i=101 i=102 i=103 i=104 i=105 i=106 i=106 i=107 i=108 i=110 i=111		
i=129	=103  =104  =105  =106  =106  =107  =108  =110  =111  =111  =112  =113  =114  =115  =116  =116  =117  =119  =120  =121  =122  =123  =124  =125  =125  =125  =125  =126	in 103 in 104 in 105 in 106 in 106 in 107 in 108 in 109 in 110 in 110 in 110 in 111 in				i=101 i=102 i=103 i=104 i=105 i=106 i=106 i=107 i=108 i=110 i=111 i=112		
i=130	=103  =104  =105  =106  =107  =108  =109  =110  =111  =111  =112  =113  =115  =115  =116  =117  =118  =119  =122  =123  =124  =125  =126  =126  =126  =126  =126  =127  =126	in 103 in 104 in 1104 in 1105 in 1107 in 111 in 110				i=101   i=102   i=103   i=104   i=105   i=106   i=106   i=106   i=106   i=106   i=106   i=106   i=107   i=111   i=112   i=113   i=114   i=115   i=116   i=117   i=118   i=119   i=102   i=123   i=124   i=126   i=127   i=128   i=126   i=12		
i=131	=103  =104  =105  =106  =107  =108  =109  =110  =111  =111  =112  =113  =115  =115  =116  =117  =118  =119  =122  =123  =124  =125  =126  =126  =126  =126  =126  =127  =126	in 103 in 104 in 1104 in 1105 in 1107 in 111 in 110				i=101   i=102   i=103   i=104   i=105   i=106   i=106   i=106   i=106   i=106   i=106   i=106   i=107   i=111   i=112   i=113   i=114   i=115   i=116   i=117   i=118   i=119   i=102   i=123   i=124   i=126   i=127   i=128   i=126   i=12		
i=132	=103	in 103 in 104 in 105 in 106 in 106 in 107 in 108 in 109 in 110 in 110 in 111 in				i=101 i=102 i=103 i=104 i=106 i=106 i=106 i=107 i=108 i=110 i=111		
i=133	=103	in 103 in 104 in 105 in 106 in 107 in 108 in 108 in 109 in 109 in 109 in 110 in 110 in 111 in 112 in 113 in 116 in 117 in 118 in 119 in 120 in 121 in 122 in 123 in 123 in 123 in 123 in 123 in 123 in 128 in 129 in				i=101   i=102   i=103   i=104   i=106   i=106   i=106   i=107   i=108   i=108   i=108   i=108   i=111   i=115   i=116   i=117   i=118   i=119   i=120   i=122   i=123   i=12		
i=134	=103	in 103 in 104 in 105 in 106 in 107 in 108 in 108 in 109 in 109 in 109 in 110 in 110 in 111 in 112 in 113 in 116 in 117 in 118 in 119 in 120 in 121 in 122 in 123 in 123 in 123 in 123 in 123 in 123 in 128 in 129 in				i=101   i=102   i=103   i=104   i=106   i=106   i=106   i=107   i=108   i=108   i=108   i=108   i=111   i=115   i=116   i=117   i=118   i=119   i=120   i=122   i=123   i=12		
i=134	=103	in-103 in-104 in-105 in-106 in-106 in-106 in-106 in-107 in-108 in-109 in-110 in-111 in-112 in-113 in-116 in-117 in-118 in-119 in-120 in-122 in-122 in-122 in-123 in-124 in-128 in-129 in				i=101   i=102   i=103   i=104   i=106   i=106   i=106   i=106   i=106   i=106   i=106   i=106   i=106   i=107   i=111   i=112   i=113   i=114   i=115   i=116   i=117   i=118   i=120   i=122   i=123   i=12		
i=135	=103  =104  =105  =106  =106  =107  =108  =1109  =1110  =1113  =113  =114  =115  =116  =116  =117  =118  =120  =120  =121  =122  =123  =124  =125  =125  =126  =127  =127  =129  =130  =131  =131  =131  =131  =133	in 103 in 104 in 105 in 106 in 106 in 107 in 108 in 109 in 110 in 110 in 111 in				i=101 i=102 i=103 i=104 i=105 i=106 i=106 i=107 i=108 i=109 i=111		
i=136	=103  =104  =105  =106  =106  =109  =110  =1110  =1111  =1112  =1113  =1114  =1115  =116  =117  =118  =119  =120  =121  =122  =122  =123  =124  =126  =127  =128  =128  =130  =130  =131  =132  =132	in-103 in-104 in-105 in-106 in-106 in-106 in-107 in-108 in-108 in-109 in-110 in-111 in-112 in-113 in-114 in-115 in-116 in-117 in-118 in-119 in-120 in-122 in-122 in-123 in-124 in-128 in-129 in-130 in-131				i=101   i=102   i=103   i=104   i=106   i=106   i=106   i=107   i=108   i=109   i=109   i=109   i=109   i=111   i=115   i=116   i=117   i=118   i=119   i=120   i=122   i=123   i=124   i=12		
i=138	=103	i=103 i=104 i=105 i=106 i=107 i=108 i=108 i=109 i=119 i=111 i=112 i=111 i=115 i=116 i=116 i=117 i=116 i=117 i=118 i=118 i=118 i=119				i=101   i=102   i=103   i=104   i=105   i=108   i=108   i=108   i=108   i=109   i=110   i=111   i=112   i=113   i=114   i=115   i=116   i=117   i=119   i=128   i=128   i=128   i=128   i=128   i=128   i=128   i=129   i=12		
i=138	=103	in 103 in 1104 in 1105 in 1106 in 1107 in 1107 in 1107 in 1107 in 1107 in 1107 in 111				i=101   i=102   i=103   i=104   i=105   i=108   i=108   i=108   i=108   i=109   i=110   i=111   i=112   i=113   i=114   i=115   i=116   i=117   i=119   i=128   i=128   i=128   i=128   i=128   i=128   i=128   i=129   i=12		
i=139	=103	in 103 in 1104 in 1105 in 1106 in 1107 in 1107 in 1107 in 1107 in 1107 in 1107 in 111				i=101   i=102   i=103   i=104   i=105   i=108   i=108   i=108   i=108   i=109   i=110   i=111   i=112   i=113   i=114   i=115   i=116   i=117   i=119   i=128   i=128   i=128   i=128   i=128   i=128   i=128   i=129   i=12		
i=140     i=140       i=141       i=141       i=141       i=141       i=142       i=142       i=142       i=142       i=142       i=142       i=143       i=143       i=144       i=144       i=144       i=144       i=144         i=145       i=145         i=146         i=146	=103	in 103 in 1104 in 1105 in 1106 in 1107 in 1107 in 1107 in 1107 in 1107 in 1107 in 111				i=101   i=102   i=103   i=104   i=104   i=105   i=106   i=106   i=106   i=107   i=107   i=110   i=111   i=11		
i=141	=103	in-103 in-104 in-105 in-106 in-106 in-107 in-108 in-109 in-109 in-111 in-112 in-113 in-114 in-115 in-116 in-117 in-118 in-119 in-120 in-122 in-122 in-123 in-124 in-125 in-128 in-129 in				i=101   i=102   i=102   i=103   i=104   i=105   i=106   i=106   i=106   i=107   i=108   i=107   i=1108   i=1108   i=1108   i=1111   i=1112   i=112		
i=143	=103	in 103 in 1104 in 1105 in 1106 in 1107 in 111 in 111 in 111 in 111 in 111 in 111 in 110				i=101   i=102   i=103   i=104   i=105   i=105   i=106   i=106   i=107   i=107   i=107   i=107   i=107   i=110   i=111   i=112   i=113   i=114   i=115   i=116   i=117   i=118   i=119   i=122   i=128   i=12		
i=143	=103	in-103 in-104 in-105 in-106 in-106 in-107 in-108 in-109 in-109 in-119 in-119 in-119 in-119 in-119 in-129 in				i=101 i=102 i=103 i=104 i=105 i=106 i=106 i=107 i=108 i=108 i=109 i=110 i=111 i=111 i=111 i=111 i=111 i=111 i=111 i=112 i=112 i=122 i=122 i=122 i=123 i=124 i=125 i=126 i=127 i=128 i=128 i=128 i=129 i=130 i=131 i=133 i=134		
i=143	=103	in 103 in 104 in 1104 in 1105 in 1106 in 1107 in 1107 in 1108 in 1109 in 1109 in 1109 in 1109 in 1109 in 111 in 11				i=101 i=102 i=103 i=104 i=105 i=106 i=106 i=107 i=108 i=108 i=109 i=110 i=111 i=111 i=111 i=111 i=111 i=111 i=111 i=112 i=112 i=122 i=122 i=122 i=123 i=124 i=125 i=126 i=127 i=128 i=128 i=128 i=129 i=130 i=131 i=133 i=134		
i=144	=103	in 103 in 104 in 1104 in 1105 in 1106 in 1107 in 1108 in 1109 in 1109 in 1109 in 1109 in 1109 in 111				i=101 i=102 i=103 i=104 i=105 i=106 i=106 i=107 i=108 i=108 i=109 i=110 i=111 i=111 i=111 i=111 i=111 i=111 i=111 i=112 i=112 i=122 i=122 i=122 i=123 i=124 i=125 i=126 i=127 i=128 i=128 i=128 i=129 i=130 i=131 i=133 i=134		
i=145	=103	in 103 in 104 in 105 in 106 in 107 in 108 in 109 in 109 in 109 in 109 in 109 in 119 in 120 in				i=101   i=102   i=103   i=104   i=105   i=106   i=106   i=106   i=106   i=107   i=108   i=109   i=109   i=109   i=109   i=109   i=111   i=112   i=113   i=113   i=128   i=129   i=130   i=140   i=140   i=141   i=142   i=14		
i=146	=103	in 103 in 104 in 106 in 106 in 107 in 108 in 108 in 108 in 108 in 109 in 109 in 109 in 119 in 119 in 117 in 118 in 116 in 117 in 118 in 118 in 119 in 129 in				i=101   i=102   i=103   i=104   i=106   i=106   i=106   i=106   i=106   i=106   i=106   i=106   i=106   i=107   i=108   i=109   i=111   i=112   i=113   i=114   i=115   i=116   i=117   i=118   i=119   i=120   i=123   i=123   i=128   i=12		
i=147 i=148 - i=148 - i=148 - i=149	=103	in 103 in 104 in 105 in 106 in 107 in 108 in 109 in 109 in 110 in 111 in 112 in 113 in 114 in 115 in 116 in 117 in 118 in 119 in 120 in 120 in 120 in 121 in 122 in 122 in 123 in 124 in 125 in 126 in 127 in 128 in 129 in 129 in 120 in 120 in 121 in 121 in 122 in 123 in 124 in 125 in 126 in 127 in 128 in 129 in 130 in				i=101 i=102 i=103 i=104 i=105 i=106 i=106 i=107 i=108 i=108 i=109 i=110 i=111 i=111 i=111 i=111 i=111 i=111 i=111 i=112 i=112 i=112 i=122 i=122 i=122 i=123 i=124 i=125 i=126 i=127 i=128 i=128 i=128 i=129 i=129 i=130 i=131 i=133 i=134 i=144 i=144 i=144		
i=149 i=149 - i=149 - · ·	=103	in 103 in 104 in 106 in 106 in 107 in 108 in 119 in 116 in 117 in 118 in 119 in 120 in 122 in 123 in 124 in 125 in 126 in 127 in 128 in 129 in 139 in 139 in 139 in 139 in 140 in 141 in 144 in 144				i=101   i=102   i=103   i=104   i=105   i=106   i=107   i=111   i=112   i=112   i=113   i=114   i=116   i=117   i=118   i=119   i=120   i=123   i=12		
i=149 i=149 - i=149 - · ·	=103	in 103 in 104 in 105 in 106 in 107 in 108 in 109 in 109 in 110 in 111 in 112 in 113 in 114 in 115 in 116 in 117 in 118 in 119 in 120 in				i=101   i=102   i=103   i=104   i=105   i=108   i=108   i=108   i=108   i=108   i=108   i=109   i=111   i=11		
i=149 i=149 - i=149 - · ·	=103	in 103 in 104 in 105 in 106 in 106 in 107 in 108 in 108 in 108 in 109 in 109 in 109 in 110 in 111 in 112 in 113 in 116 in 117 in 118 in 119 in 120 in 122 in 122 in 123 in 124 in 133 in 133 in 134 in 135 in 136 in 137 in 138 in 139 in 140 in 141 in 144 in 145 in 146 in 147				i=101   i=102   i=103   i=104   i=105   i=108   i=108   i=108   i=108   i=108   i=108   i=109   i=111   i=11		
i=150	=103	i=103 i=104 i=105 i=106 i=108 i=108 i=108 i=108 i=108 i=108 i=109 i=111 i=112 i=111 i=115 i=116 i=116 i=116 i=117 i=118 i=148				i=101   i=102   i=103   i=104   i=105   i=108   i=108   i=108   i=108   i=108   i=108   i=108   i=109   i=111   i=11		
	=103	in-103 in-104 in-105 in-106 in-106 in-106 in-107 in-108 in-108 in-109 in-109 in-110 in-111 in-112 in-113 in-114 in-115 in-116 in-117 in-118 in-119 in-120 in-121 in-122 in-123 in-124 in-125 in-126 in-127 in-128 in-128 in-129 in				i=101   i=102   i=103   i=104   i=105   i=106   i=107   i=108   i=109   i=109   i=109   i=109   i=110   i=110   i=111   i=115   i=116   i=117   i=118   i=120   i=122   i=123   i=12		
	=103	in-103 in-104 in-105 in-106 in-106 in-106 in-107 in-108 in-108 in-109 in-109 in-110 in-111 in-112 in-113 in-114 in-115 in-116 in-117 in-118 in-119 in-120 in-121 in-122 in-123 in-124 in-125 in-126 in-127 in-128 in-128 in-129 in				i=101   i=102   i=103   i=104   i=105   i=106   i=107   i=108   i=109   i=109   i=109   i=109   i=110   i=110   i=111   i=115   i=116   i=117   i=118   i=120   i=122   i=123   i=12		

# Monitoring Report Sheet (Calculation Process Sheet) [For verification]

1. Calculations for emission reductions	Fuel type	pecific param	Units	Parameter
Emission reductions during the period p	N/A	0.0	tCO <sub>2</sub> /p	ERp
2. Selected default values, etc.				
3. Calculations for reference emissions				
Reference emissions during the period <i>p</i>	N/A	0.0	tCO <sub>2</sub> /p	REp
4. Calculations of the project emissions				
Project emissions during the period p	N/A	0.0	tCO <sub>2</sub> /p	PEp