

Revision History for EMFAC-HK

Build Number	Cases	Revision Description	Release Date
2020.12.2.1		<ol style="list-style-type: none"> 1. Split two existing vehicle classes Medium & Heavy Goods Vehicles (>15t) and Non-franchised Buses (>15t) into four classes. The revised and new classes are: <ul style="list-style-type: none"> ▪ Medium Goods Vehicles (15-24t), HGV8 ▪ Heavy Goods Vehicles (>24t), HGV9 ▪ Non-franchised Buses (15-24t), NFB8 ▪ Non-franchised Buses (>24t), NFB9 <p>(To prevent outdated information in previous versions of input file being used due to revised definitions of classes, EMFAC-HK Version 4.3 will not accept input files from Version 4.2 or older).</p> 2. Updated default base year to 2018 using the following data: <ol style="list-style-type: none"> a) 2018 vehicle population; b) 2018 technology group fractions; c) 2018 meteorological data; and d) Updated accrual rates to match with 2018 vehicle kilometer travelled. <p>Note also that only actual population of 2018 will be retained in the model, thus population of all other years will be modelled by backcast or forecast.</p> 3. Extended projection year to 2060. 4. Applied analysis result of 2018 remote sensing data of petrol private cars and LPG taxis to their regime growth rates. Regime growth rates of some technology groups are also flattened out at older ages. 5. Updated zero mile emission factors and deterioration rates for some technology groups based on measurements from Portable Emission Measurement Systems (PEMS) with reference to international model standards. 	2021.1.15

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2019.12.16.1		<ol style="list-style-type: none"> Split Euro IV and Euro V in tech groups of LPG public light bus. Aligned hydrocarbons speciation methodology with EMFAC2017 of California Air Resources Board (CARB). Aligned methodology of start emissions for SCR-equipped diesel vehicles with CARB's EMFAC2017. Assumed Euro 3 MC without catalyst. Updated the implementation dates of Euro VI light buses > 3.5t and buses <= 9t and Euro 4 motorcycles. Revised implementation date of Euro IV Diesel Commercial Vehicles (DCV) phase-out programme. Revised default speed fractions due to update of calculation methodology in 2016 vehicle emission inventory. Modified output to include NO₂, PM₃₀, PM₁₀, PM_{2.5} in a single run. Deactivated selection of PM₃₀, PM₁₀, PM_{2.5} in GUI output options. Disabled BCD output. 	2020.1.2
2018.12.10.1		<ol style="list-style-type: none"> Updated default base year to 2016 using the following data: <ol style="list-style-type: none"> 2016 vehicle population; 2016 technology group fractions; 2016 meteorological data; and Updated accrual rates to match with 2016 vehicle kilometer travelled. Updated zero mile emission factors, deterioration rates, regime growth rates and speed correction factors for certain technology groups. Migrated to a new development platform, consisting of Intel Visual FORTRAN (IVF) compiler and Microsoft Visual Studio 2015 from Compaq Visual FORTRAN (CVF) and Microsoft Developer Studio 6 which are not supported on Windows 7, and newer, operating systems. Deactivated the Grid Control, which allowed the user to see and edit 3-D array data in the GUI. This feature is not supported in IVF. User must now perform all 3-D array edits by copy-and-paste to a spreadsheet. 	2019.1.2

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		<p>Features modified included editing population (both forecasted and alternate base year) by vehicle class, fuel, and age; accrual rates by vehicle class, fuel, and age; trips and VKT by class, fuel and hour; speed fractions by class, hour and speed bin.</p> <p>10. Updated the implementation dates of Euro VI light buses > 3.5t and buses <= 9t and Euro 4 motorcycles.</p> <p>11. Deactivated five-year window which was used from Version 3.1 to Version 3.4. It was used to mitigate sharp anomalies in new sales (except franchised buses in versions 3.1 to 3.3; except franchised buses, public light buses and Taxis in version 3.4).</p> <p>12. Updated the speed fractions to require normalized user input. The user is restricted from advancing in the GUI until valid speed fractions are provided (sum to 1). If the user provides an input file (*.INP) with speed fractions that do not sum to 1, the program prints a message to the screen and stops execution.</p> <p>13. Updated the programme of retrofitting Euro II and III double-deck franchised buses with selective catalytic reduction (SCR) devices as of 2017 based on latest schedule.</p> <p>14. Removed Euro 4 Evaporative technology fractions for motorcycles (MC) on the model year 2019.</p> <p>15. Added NOx start emissions for SCR-equipped vehicles (aligned with EMFAC2014 by the California Air Resources Board).</p> <p>16. Introduced Euro IV Diesel Commercial Vehicles (DCV) phase-out programme.</p> <p>17. Improved the existing pre-Euro IV DCV phase-out programme, so that no Euro IV of model year 2006 would be removed in the Pre-Euro IV program (algorithm changed from model year-based, to technology-based algorithm).</p> <p>18. Disabled run-time pop-up window message when sum of tech group fraction over a model year is close to zero, due to excessive unnecessary warnings. But warning log of such message will still remain.</p> <p>19. First GUI screen is widened with button positions</p>	

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		shifted.	
2018.01.13.1		<ol style="list-style-type: none"> Fixed a bug related to NOx emissions from taxis whose catalytic converters are replaced under the Subsidy Programme for the Replacement of Catalytic Converters and Oxygen Sensors on LPG/petrol taxis and LPG light buses. Updated Euro 6/VI and motorcycle Euro 4 implementation schedule. Capped the number of diesel private cars. Updated growth rates of petrol private cars and motorcycles based on Transport Department's latest forecast. Applied air condition correction factors to high/super regimes. Updated basic emission factors for private cars and motorcycles with reference to EMFAC2014. Revised technology group descriptions of the following: <ol style="list-style-type: none"> Motorcycle "Euro 3 & 4" to "Euro 3"; Taxi "Euro 3" to "Euro 2 & 3"; and Taxi "Euro 3 CAT Replaced" to "Euro 2 & 3 CAT Replaced". Placed the impact of the Strengthened Emissions Control for Petrol and LPG Vehicles (an I/M program using remote sensing and dynamometer testing) (the Existing I/M Program) as defaults. Added feature for extra programs for inspection and maintenance provided by users. For taxi and public light bus, disabled the feature for mitigating sharp anomalies in population estimates. Set NOx speed correction factors of high emitters of HGV7 the same as those of normal emitters for Tech 	13/02/2018

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		<p>Groups 137 & 138.</p> <p>11. For franchised buses, survival rates are revised to remove vehicles reaching 18 to 20 years old (originally, only vehicles reaching 18 will be removed).</p>	
2017.01.03.1		<p>1. Revised to the latest Euro VI/6 implementation schedule.</p> <p>2. Updated default base year to 2015 with updated vehicle population, technology group fractions, meteorological data and Reid Vapour Pressure, accrual rates to match with 2015 vehicle kilometer travelled.</p> <p>3. Updated zero mile emission factors, deterioration rates, regime growth rates and speed correction factors for some technology groups.</p> <p>4. Disabled the percentage reduction assumed due to the remote sensing program (I&M program) for private cars and taxis from the graphical user interface (GUI). 2015 remote sensing data of private cars and taxis were analyzed to estimate their I&M impacts due to the Remote Sensing Program and applied to their regime growth rates directly</p> <p>5. Updated the programme of retrofitting franchised buses with selective catalytic reduction (SCR) devices as of 2017 based on latest schedule.</p> <p>6. Used separate exhaust Tech Groups (TGs) (total 4 new TGs) to implement Euro VI petrol PC/Taxi, LGV3/4, PV4 and LPG Taxi (see Appendix IV).</p> <p>7. Revised descriptions of some technology groups to reflect relevant Euro standards.</p> <p>8. Reconstructed regime growth rate to mileage-bin format.</p>	27/1/2017

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2016.02.17.1		<p>Adjustment for:</p> <ol style="list-style-type: none"> 1. Tech Group (TG) fractions for LPG private light bus >3.5t, taxi & public light bus and franchised bus. 2. Basic emission rates, regime growth rates and speed correction factors for some vehicles classes. 	17/2/2016
2016.01.04.1		<ol style="list-style-type: none"> 1. Changed the unit of vehicle distance travelled, accrual rates and temperature into SI unit in input file. 2. Added feature of allowing population forecast from alternate base year and revised the Graphical User Interface accordingly. 3. Updated default base year to 2013 with updated vehicle population, technology group fractions, activity data and meteorological data. 4. Added 2002-2013 vehicle populations. 5. Updated basic emission rates, regime growth rates and speed correction factors for some technology groups. 6. Removed Cycle Correction factor to reflect the changes. 7. Revised the population forecast methodology (except franchised bus) in order to mitigate sharp anomalies in population estimates. 8. Re-ordered vehicle classes (see Appendix I). 9. Updated the programme of retrofitting franchised buses with selective catalytic reduction (SCR) devices as of 2017. 10. Revised implementation date of I/M programme using remote sensing and dynamometer testing for petrol/ LPG vehicles to Oct 2014. 11. Used separated technology groups to implement subsidy programme for the replacement of catalytic converters and oxygen sensors on LPG/petrol taxi and LPG light bus. 12. Added 22 new exhaust technology groups for Euro VI diesel PC and other diesel and LPG vehicles to reflect differences in the emission impacts of various after-treatment devices within the same Euro standard; 	4/1/2016

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		<ul style="list-style-type: none"> 13. Added one evaporative technology group for MC Euro IV (see Appendix IV). 14. Revised description of some technology groups to reflect already installed after-treatment devices in the Euro standards. 15. Combined Euro IV & V LPG public light bus (PLB) into same technology group because they are of the same emission limits 16. Removed Euro II LPG Taxis which do not exist in the vehicle fleet. 17. Updated petrol private car and motorcycle growth rates based on Transport Department's updated forecast. 18. Updated INP headers to accommodate relevant changes. 19. I&M program parameters are shown in the graphical user interface. User is able to enable/disable the program, modify the reduction fractions or the program start years. 20. Disabled speed bin report in EMFAC mode. 21. Updated the modeling fractions of vehicles removed from the fleet due to the programme on mandatory retirement of pre-Euro IV diesel commercial vehicles. 	
2014.01.02.1	Merged BC & I/M	<ul style="list-style-type: none"> 1. Revised tech group fraction to reflect updated tentative implementation schedule for Euro VI standards 2. Included subsidy programme for the replacement of catalytic converters and oxygen sensors on LPG/petrol taxi and LPG light bus. For LPG private light bus >3.5t, new technology groups are added. 3. Revised implementation date of I/M programme using remote sensing and dynamometer testing for petrol/ LPG vehicles will start from Apr 2014 4. Implemented the programme on mandatory retirement of pre-Euro IV diesel commercial vehicles¹. This lead to the following changes in EMFAC-HK 	2/1/2014

¹ The term “diesel commercial vehicles” refers to all diesel commercial vehicles excluding franchised buses.

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		<ul style="list-style-type: none"> a. Removed the diesel commercial vehicles from the fleet in the population forecasting function according to the following target implementation dates: <ul style="list-style-type: none"> Pre-Euro 1 Jan 2016 Euro I 1 Jan 2017 Euro II 1 Jan 2018 Euro III 1 Jan 2020 b. Set a service life limit of 15 years for diesel commercial vehicles first registered on or after 1 February 2014. 5. Updated survival rates and revised the methodology for survival rates which features short-term and long-term survival rates 6. Removed the upper and lower limits on new vehicle sales in the population forecast function. 7. Fully implemented the programme of retrofitting franchised buses with selective catalytic reduction (SCR) devices as of 2017 8. Revised technology group description and fractions for Euro VI diesel private cars and petrol private light bus >3.5t 	
2013.03.05.1	Merged BC & I/M	1. Corrected Tech Group (TG) fractions for private light bus >3.5t in model year 2008.	11/3/2013
2013.01.02.1	Merged BC & I/M	<ul style="list-style-type: none"> 1. Revised outputs for both EMFAC and Burden modes to exclude items below, which are not modelled by EMFAC-HK V2.x: <ul style="list-style-type: none"> Idle Exhaust, Tire wear, Brake wear, Sulphur Dioxide, Sulphur Oxides, Fuel consumptions & Lead 2. Enabled "Enable Scientific Notation to Report" under "Help menu" 3. Improved backcast function 4. Changed EMFAC mode output (RTL) to CSV extension 5. Revised 2010 vehicle population for private car & taxi (2 diesel taxis relocated to diesel private car) and private light bus (4 LPG light buses <=3.5t to light buses >3.5t) 6. Corrected incorrect technology group descriptions 7. Changed the unit of vehicle distance travelled in input file from vehicle kilometers travelled (VKT) to vehicle 	2/1/2013

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		miles travelled (VMT)	
2012.4.3.1	Both BC & I/M	<ol style="list-style-type: none"> 1. Improved the execution speed 2. Added a message on Edit Speed for Emfac Calculation dialog 	3/4/2012
2012.3.15.1	Both BC & I/M	First Release of Emfac-hk v2.1	2/4/2012