



### Paperwork Reduction Act Burden Statement

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[The purpose of this form is to provide manufacturers with a uniform way to submit PHEV data to the agency.](#)

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### Instructions for Completing PHEV Calculator Tab

The data that is needed to complete this calculator is on the 'PHEV Calculator' tab. All data is in Column J under the heading "ENTER BASIC VEHICLE INFORMATION HERE". The required fields have a background color of orange. Many have a pre-populated drop down to select from.

Once the required fields are complete, click on the "Import CD XML File" and "Import CS XML File" buttons to import the EV-CIS exported XML files for the corresponding PHEV label. There are 3 buttons to allow the user to import up to 3 different data sets.

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### Authorities and References

<b>Definitions</b>	<a href="#"><u>40 CFR 600.002</u></a>
<b>Guidance</b>	<a href="#"><u>IACD-2025-07</u></a>
<b>Fuel Economy Regulations</b>	<a href="#"><u>40 CFR Part 600</u></a>

**Form #**

PFN-3420

<b>OMB Control #</b>
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<u>Version</u>	<u>No.</u>	<u>Release Date</u>	<u>Comments</u>
			Same calculations as version 22.
23			Expanded data input range to allow up to 30 charge-depleting cycles. Updated label inputs (fuel prices, ratings scales, etc.) for 2018 model year based on EPA guidance. Some text changes to improve clarity.
24			Found an error in some of the calculations for multiple test sets. These calculations referenced the transition cycle for the first test set, instead of the current test set. This would only impact the unusual situation where the transition cycle differed across test sets.
			Fixed an error where the 5-cycle adjustment (0.7 or derived 5-cycle result) was incompletely propagated throughout the charge-depleting calculations. The impact on label values should be none to very minor, affecting only those vehicles that would have been able to use an adjustment for the transition cycle that differs from 0.7. This does not happen often. Fixed an error in the calculation of the unadjusted highway electricity Kw-Hr/100 miles, where the calculation was referencing the charge-depleting fraction from the city schedule. This does not affect any label values, only values put on the web in the online spreadsheets. Revised the calculation of all-electric range. Previous versions summed the distances of all-electric cycles without attention to whether the first cycle was all-electric. Thus PHEVs with no all-electric range could have appeared to have an all-electric range. You should, of course, continue to override this estimate with the actual range recorded from the test, if available.
25	12/27/2017		Improved the ability to look at all-electric range and determine whether or not a PHEV is eligible for Corporate Average Fuel Economy (CAFE) dual fuel vehicle calculations. Corrected an error in the Average New Vehicle 5-Year Fuel Cost for model year 2018. The correct value is \$6,750, per EPA guidance CD-16-18. Added label inputs - fuel prices, ratings scales, etc. - for the 2019 model year. From EPA guidance letter cd-17-18. Added error-checking where Carbon Related Exhaust Emissions (CREE) will not be calculated without both charge-depleting and charge-sustaining CREE data. Fixed some cell references in Test Set #2 and #3 cost per mile calculations where formulae inadvertently referred to Test Set #1 test data.
			Added some conditional formatting to visualize non-default values entered by users. For example, fuel density and heating value. Corrected the equation in cell F84, for Hwy2 Unadj FE - Alternative Fuel. There was a cell referencing error that could possibly affect vehicles with multiple highway tests. This does not affect CAFE, GHG, or label values. Added the capability to use Deterioration Factors (DF) for CREE values. Because City and Highway values are submitted via a table in Verify, at this point a DF must be applied separately to each value, thus adjusting each value with a DF. The user may enter different City and Highway DFs. Equations were changed to perform rounding consistent with Engines and Vehicles Compliance Information System (EV-CIS) rounding. Superfluous values were removed.
26a	5/31/2019		Default method for calculating Zn is now using Amp-hours, per the regulations. This is also designed into the EV-CIS calculations. Calculated intermediate values were rearranged to consolidate those values calculated specifically and solely from charge-depleting test data. Those values requiring charge-sustaining or other inputs are grouped separately. Similar metrics are now grouped together. Increased the number of charge-depleting cycles accommodated by the calculator to 35. Explanatory comments have been added to many of the inputs and calculated parameters.
			Changed release date of v26a above from "TBD" to May 31, 2019. Added cell borders to charge-sustaining input section. Amended formulae for "CD AC electricity consumption rate (Rcda), adjusted" to round the kW-hr input to 4 decimal places; was previously rounded to 1 decimal.
26b	8/15/2019		Changed cell F23 (combined CD electricity consumption) to be rounded to 4 decimal places. Was previously rounded to one decimal. Correct an error in cells D23 and E23. Values need to be multiplied by 100. Corrected cell references in cells D15 and E15.
26c	10/10/2019		Changed the rounding of label city and highway Kilowatt-hours per 100 miles to 3 decimal places. Previously was rounded to 4 decimals. Added 2020 model year label inputs. See guidance document CD-18-13, 12/17/2018. Revised these version notes to reflect the current state of the calculator. Removed values from the blank version of the template.

Version	No.	Release Date	Comments
26d	1/8/2020		<p>Added 2021 model year label inputs. See guidance document CD-19-13 (Dec. 16, 2019).</p> <p>Changed fleet utility factor calculations such that each individual calculated FUF is not rounded. Continue to round the incremental fractional FUF (i.e., FUF(n) - FUF(n-1) ) to 3 decimals. This fix was applied both the 55/44 and 43/57 utility factors.</p> <p>The Highway calculations in column BY were found to apply slightly different rounding than the UDDS calculations in column AX. The UDDS calculations are correct, and Highway calculations were fixed to match, rounding to a whole number after the calculation.</p>
26e	3/24/2020		<p>Added 2022 model year label inputs. See EPA Guidance Letter CD-2020-20 (Dec. 28, 2020). Added the following comments:</p> <ul style="list-style-type: none"> <li>- Added a comment in cells S10, S58, S106, AA10, AA58, AA106 "Please enter a positive amp-hour value when current is flowing out of the battery and a negative amp-hour value when current is flowing into the battery." This change is needed in order to help determine whether the cycle is CD or CS based on NEC 1% Tolerance (in columns BR and CS).</li> <li>- Added a comment in cells T10, T58, T106, AB10, AB58, AB106 "Ref. SAE J1711 (June 2010); Section 6.3."</li> <li>- Revised terms in cells C53 to C117 to be more consistent with the terms used in EPA's EV-CIS (formerly Verify) database.</li> </ul>
26f	3/22/2021		<p>Fuel properties (CWF, Specific Gravity, Net Heating Value), HC-Total, and CO added to charge-depleting data tables. Fuel economy and CREE are now calculated by PHEV calculator. These values are now used in the remainder of the intermediate calculations. Values of fuel economy and CREE entered by mfr are only included for comparison. No support for Opt-CREE, there were no Opt-CREE GHG submissions by any manufacturer for 2020.</p> <p>Transition cycle is no longer calculated automatically. Manufacturers are now required to enter it for each CD test.</p> <p>Recharge energy (AC kilowatt-hours) fields were changed from 3 decimal to 4 decimal to match calculations in EV-CIS. This was a pre-existing field for electric only vehicles prior to PHEV implementation. The rounding in all formulas prior to using these values was changed from ASTM(x,3) to ASTM(x,4).</p> <p>Support for model years prior to 2017 has been removed.</p> <p>'Average Recharge Time of Test Vehicles' calculation for both CD_UDDS and CD_Hwy added. Combined recharge time using a 55/45 weighting and a 50/50 weighting of those values has also been added. These new calculations were requested by manufacturers.</p> <p>Data validation and conditional formatting added for most/all input fields including main CD data input tables. Incorrect values will be highlighted in orange.</p> <p>New table added for entering CD and CS test numbers. CS conditional formatting based on the number of EV-CIS test numbers entered.</p> <p>New macro for importing data from an EV-CIS validated xml file (from Request Database Report). Can also be used to compare calculator data to xml file data and highlight differences. To run macro: select the 'blank calculator v27' tab and select one of the cells labeled 'Miles [3]' (one of the headers of largest input tables) and type: &lt;Alt-t&gt;,m,m. Select the desired macro. Main macro can also be ran by clicking the button included in the spreadsheet. Additional macros included for clearing a single CD test or all user data.</p> <p>Custom 'D5C' function added to perform Derived 5-cycle FE and CO2 calculations for gasoline vehicles (2017+ coefficients only). New function can only be used in cells for charge-sustaining adjusted FE and adjusted CO2. These cells are in the block labeled "ENTER CHARGE-SUSTAINING TEST RESULTS HERE". See "Sample EPA data" tab for examples on this function. No function available for modified or full 5-cycle labels.</p> <p>CREE DF calculations corrected to add the DF for each CD/CS combination rather than after all tests have been combined.</p> <p>For questions specifically about the changes to the V27 release, contact Robert Peavyhouse at Peavyhouse.Robert@epa.gov.</p>
27	9/16/2021		
27a	1/12/2022		<p>Added 2023 model year label inputs. See EPA Guidance Letter CD-2022-01, January 3, 2022.</p> <p>Added support for HD 2b/3, where calculations are based on CO2 instead of CREE. When 2b/3 is selected for 'Vehicle Category', many calculations will be disabled, and others modified to use CO2 instead of CREE. For example: Fuel economy calculations in columns Z and AL will be disabled, and CREE calculations in columns AA and AM will be set to their corresponding CO2 values. When 2b/3 is selected all fuel economy, 5-cycle adjusted, and CAFE values will be set to N/A. Cell formatting will be enforced to require the CREE inputs in columns N and O to be set equal to their corresponding CO2 values in the same columns.</p>
27b	5/3/2022		
27c	3/1/2023		Added 2024 model year label inputs. See EPA Guidance Letter CD-2022-16, December 26, 2022.
27d	11/28/2023		CD_Hwy fuel economy calculation for datasets 2 and 3 were using fuel properties for dataset 1.

<u>Version</u>	<u>No.</u>	<u>Release Date</u>	<u>Comments</u>
			Added 2025 model year label inputs. Removed intermediate charge-depleting calculations already performed by the EV-CIS test module. All test data including both charge-depleting and charge-sustaining tests are now imported directly from validated EV-CIS xml files. Charge-sustaining derived 5-cycle, modified 5-cycle, and vehicle specific 5-cycle calculations are performed by macro. When the macro asks to select a Charge-Depleting test, select ONE test. When the macro asks to select Charge-Sustaining tests, select ALL of the corresponding tests. For this reason, all Charge-Sustaining tests should be located within the same directory. Validated xml files can be exported from EV-CIS by using the "Request Database Report" option in the Test Information Module.
28		9/10/2024	Any questions about this PHEV Calculator should be directed to "Peavyhouse.Robert@epa.gov".
28a		2/3/2025	Corrected code that was too specific. FTP 21 worked, but didn't allow other FTP procedures. All FTP test procedures now ok (21, 25, 31, 35).
28b		3/24/2025	Added 2026 model year label inputs. They include the corrected five-year fuel costs from IACD-2025-03 (Revised). Locked workbook structure changes to prevent renaming sheets and to prevent multiple PHEV calc sheets in same workbook. Corrected formula in cells O87 and O136 that was preventing validation of vehicle data in datasets #2 and #3.
28c			Corrected formula in cell F22 from arithmetic weighted averaging to harmonic weighted averaging.  Five year savings changed from ABS() to display negative sign. Minor VBA macro logic change to detect Null data when importing CD xml data. Occasionally it would detect a zero as null data and reject the file.

## LABEL INPUTS: FROM EPA GUIDANCE LETTERS APPLICABLE TO THE APPROPRIATE MODEL YEAR

Model Year	Fuel Prices							Model Year	Average New Vehicle Fuel Economy		Model Year	Average New Vehicle 5-Year Fuel Cost	
	Regular Unleaded	Mid-Grade Unleaded	Premium Unleaded	Diesel	E85	LPG	CNG	Electricity	Hydrogen	MPG	5-Year Cost		
2011	3.00	3.10	3.20	3.10	2.60	1.90	0.11			2011	NA	2011	NA
2012	3.70	3.85	3.95	3.95	3.25	2.15	0.12			2012	NA	2012	NA
2013	3.55	3.65	3.80	3.80	3.10	2.00	0.12			2013	23	2013	11,600
2014	3.50	3.60	3.75	3.85	3.10	2.00	0.12			2014	23	2014	11,500
2015	3.50	3.65	3.80	3.75	3.10	2.00	0.12			2015	24	2015	11,000
2016	3.00	3.15	3.30	3.35	2.60	1.55	0.13			2016	25	2016	9,000
2017	2.45	2.65	2.80	2.75	2.05	2.10	0.13			2017	26	2017	7,000
2018	2.40	2.60	2.80	2.65	1.95	2.10	0.13			2018	27	2018	6,750
2019	2.55	2.80	3.00	2.85	2.15	2.10	0.13			2019	27	2019	7,000
2020	2.70	3.00	3.25	3.15	2.30	2.10	0.13			2020	27	2020	7,500
2021	2.70	3.00	3.25	3.00	2.25	2.15	0.13			2021	27	2021	7,500
2022	2.35	2.70	2.95	2.55	1.95	2.15	0.13			2022	27	2022	6,500
2023	2.95	3.40	3.65	3.20	2.60	2.15	0.14			2023	28	2023	8,000
2024	3.60	4.05	4.30	4.40	3.15	2.20	0.15			2024	28	2024	9,750
2025	3.50	4.00	4.25	4.10	3.05	2.25	0.16			2025	28	2025	9,500
2026	3.30	3.80	4.15	3.60	2.85	2.30	0.17			2026	29	2026	8,500

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Model Year	MPG Rating		
	Min	Max	Rating
2016	0	13	1
2016	14	15	2
2016	16	17	3
2016	18	20	4
2016	21	24	5
2016	25	27	6
2016	28	31	7
2016	32	37	8
2016	38	45	9
2016	46	99999	10
2017	0	14	1
2017	15	16	2
2017	17	18	3
2017	19	21	4
2017	22	25	5
2017	26	28	6
2017	29	32	7
2017	33	37	8
2017	38	43	9
2017	44	99999	10
2018	0	14	1
2018	15	16	2
2018	17	19	3
2018	20	22	4
2018	23	26	5
2018	27	29	6
2018	30	32	7
2018	33	37	8
2018	38	43	9
2018	44	99999	10
2019	0	14	1
2019	15	16	2
2019	17	19	3
2019	20	22	4
2019	23	26	5
2019	27	29	6
2019	30	32	7
2019	33	37	8
2019	38	43	9
2019	44	99999	10
2020	0	14	1
2020	15	16	2
2020	17	19	3
2020	20	22	4
2020	23	26	5
2020	27	29	6
2020	30	33	7
2020	34	38	8
2020	39	44	9
2020	45	99999	10
2021	0	14	1
2021	15	16	2
2021	17	19	3
2021	20	22	4
2021	23	26	5
2021	27	30	6
2021	31	35	7
2021	36	42	8
2021	43	52	9
2021	53	99999	10
2022	0	13	1
2022	14	15	2
2022	16	18	3
2022	19	21	4
2022	22	26	5
2022	27	30	6
2022	31	36	7
2022	37	44	8
2022	45	57	9
2022	58	99999	10
2023	0	13	1
2023	14	15	2
2023	16	17	3
2023	18	21	4
2023	22	27	5
2023	28	33	6
2023	34	40	7
2023	41	51	8

Model Year	GHG Rating		
	Min	Max	Rating
2016	659	658	1
2016	574	573	2
2016	509	573	3
2016	435	508	4
2016	364	434	5
2016	324	363	6
2016	283	323	7
2016	238	282	8
2016	196	237	9
2016	0	195	10
2017	614	613	1
2017	540	613	2
2017	481	539	3
2017	414	480	4
2017	350	413	5
2017	313	349	6
2017	274	312	7
2017	238	273	8
2017	205	237	9
2017	0	204	10
2018	614	613	1
2018	540	613	2
2018	457	539	3
2018	396	456	4
2018	336	395	5
2018	302	335	6
2018	274	301	7
2018	238	273	8
2018	205	237	9
2018	0	204	10
2019	614	613	1
2019	540	613	2
2019	457	539	3
2019	396	456	4
2019	336	395	5
2019	302	335	6
2019	274	301	7
2019	238	273	8
2019	205	237	9
2019	0	204	10
2020	614	613	1
2020	540	613	2
2020	457	539	3
2020	396	456	4
2020	336	395	5
2020	302	335	6
2020	266	301	7
2020	232	265	8
2020	201	231	9
2020	0	200	10
2021	614	613	1
2021	540	613	2
2021	457	539	3
2021	396	456	4
2021	336	395	5
2021	292	335	6
2021	251	291	7
2021	210	250	8
2021	170	209	9
2021	0	169	10
2022	659	658	1
2022	574	658	2
2022	481	573	3
2022	414	480	4
2022	336	413	5
2022	292	335	6
2022	244	291	7
2022	201	243	8
2022	156	200	9
2022	0	155	10
2023	659	658	1
2023	574	658	2
2023	509	573	3
2023	414	508	4
2023	324	413	5
2023	266	323	6
2023	220	265	7
2023	174	219	8

