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TAXES ON ELECTRIC VEHICLE CHARGING

This memorandum provides information regarding the equivalency in power generated from a gallon of gasoline and a kilowatt-hour (kWh) of electricity. It reviews energy equivalence, state taxes on electricity sold as vehicle fuel, additional features of laws regarding electricity as fuel, and calculation of fiscal effect.

Equivalency Between a Gallon of Gasoline and a Kilowatt-hour

In its April 2023 notice of proposed rulemaking on updates to the Petroleum-equivalent Fuel Economy Calculation (10 CFR Part 474) used to determine corporate average fuel economy for fleets of light-duty vehicles, the U.S. Department of Energy (DOE) states, "The energy content of a gallon of gasoline is 115,000 British Thermal Units (Btu) [a measure of the heat content of a fuel]. With a standard conversion factor of 3.412 Btu/Wh, the same gallon of gasoline can be said to have an energy content of 33,705 watt hours (Wh)." The figure of 33.7 kWh/gallon is commonly used.

The DOE is amending those values with publication of a final rule effective June 12, 2024.[1] The petroleum-equivalency factor (PEF) established by this final rule will establish a PEF of 29,996 watt hours (Wh) for vehicles of model years 2030 and later.

Using these DOE equivalencies, a tax of $0.24 per gallon of gasoline (the current Kansas rate) would translate to a tax of $0.07 per kWh using the current standard of 33,705 Wh per gallon and a tax of $0.08 per kWh using the upcoming PEF of 29,996 Wh per gallon.

Another approach to this question is the number of kWh or gallons it takes, on average, to drive 100 miles. Data from the Federal Highway Administration (FHWA) Highway Statistics Series for 2023, the most recent available, indicate the average fuel consumption was 4.05 gallons per 100 miles for light-duty vehicles with short wheelbases and 4.42 gallons per 100 miles for all light-duty vehicles.

1 The final rule, 89 FR 22041, provides background on the DOE requirements and how they are used. Federal law has required fuel economy standards for automobiles produced in, or imported into, the United States since 1975. Law since the late 1970s has required the DOE to calculate petroleum equivalence for electric vehicles, which the U.S. Environmental Protection Agency uses to determine compliance with corporate average fuel economy standards.

Information on the fuel economy of model year 2023 vehicles from the DOE, at www.fueleconomy.gov, shows a combined fuel economy range of 24 to 69 kWh per 100 miles, with an average of 37.5 kWh per 100 miles, for all-electric vehicles and an average of 23 miles per gallon, or 4.35 gallons per 100 miles, for gasoline-powered vehicles.[2]

Taxes on Electricity Used as a Vehicle Fuel

A tax of $0.03 per kWh has been imposed in at least four states, but some rates for electricity as a vehicle fuel are variable or not per kWh. Taxes on electricity used as vehicle fuel were found for the following eight states:

- Georgia: For the purposes of determining the tax, the statute ties the tax rate for alternative fuels, such as compressed natural gas, electricity, and hydrogen, to Georgia's variable motor fuel tax. The motor fuel tax of $0.26 per gallon has been adjusted each year since 2016 based on fuel economy and the Consumer Price Index; the tax on a fuel is to be set by its Department of Revenue "in accordance with and measured by the nearest power potential equivalent to that of one gallon of regular grade gasoline." Georgia law sets standards for that equivalent, including that the gallon equivalent of electricity "shall not be more than 11 kilowatt-hours." (2023 SB 146; Ga. Code Ann., §48-9-3(a)(4)(A)(ii))[3]

- Iowa: "An excise tax of two and six-tenths cents is imposed on each kilowatt hour of electric fuel delivered or placed into the battery or other energy storage device of an electric motor vehicle at a location in this state other than a residence." (I.C.A. §452A.41; 2019 HF 767)

- Kentucky: "An excise tax with an initial base rate of three cents ($0.03) per kilowatt hour is imposed on electric vehicle power distributed in this state by an electric vehicle power dealer for the purpose of charging electric vehicles in this state" starting January 1, 2024. The rate is to be adjusted each January 1, based on the National Highway Construction Cost Index 2.0, within certain limits. (KRS §138.477; 2022 HB 8; 2024 HB 122)

- Montana: Effective July 1, 2023, there is a tax of $0.03 per kWh or its equivalent in addition to the public utility's approved rate on the electric current used to charge or recharge the battery or batteries of an electric vehicle at public charging stations installed after July 1, 2023. This tax extends to "legacy" public charging stations as of July 1, 2025. The charging station owner may retain $0.0025 per kWh for costs associated with administering the tax. (MCA 15-70-802)

2 These numbers were calculated by KLRD and represent all models listed by the DOE in the 2023 Datafile. They do not represent weighted averages based on actual sales or usage. (For example, it would be expected that more Chevrolet Bolt models are sold than Porsche Taycan models.) DOE listings, calculated using data gathered under laboratory conditions, for 2024 all-electric models show a median of 38 kWh per 100 miles, with the most efficient quartile at 33 and the least efficient quartile at 63 kWh per 100 miles.

3 In 2022, Georgia's Joint Study Committee on the Electrification of Transportation reviewed multiple aspects of this topic. Its 500-plus-page final report does not include any information on the origin of the "no more than 11 kilowatt-hours" equivalence. The equivalence was not addressed specifically in testimony to the House.

- Oklahoma: The state imposes "a tax of three cents ($0.03) per kilowatt hour or its equivalent, as determined by the Oklahoma Corporation Commission, on the electric current used to charge or recharge the battery or batteries of an electric vehicle." (68 Okl. St. Ann. § 6504; 2021 HB 2234; 2023 HB 2315)

- Pennsylvania: $0.0172 per kWh, for 2025. Pennsylvania's fuel taxes vary based on the price of gasoline. Since 1997, rates for alternative fuels have been based on a "gallon equivalent basis" and are subject to change annually; each year's rate is published in the *Pennsylvania Bulletin*. (A Pennsylvania Department of Revenue website shows fuel tax rates for electricity back to 2013.) (75 Pa.C.S.A. § 9004)

- Utah: Electric current sold by a charging-station operator to charge or recharge an electric vehicle is taxed at 12.5 percent, whether by the kWh or as a subscription fee. (2023 HB 301; U.C.A. 1953 §59-30-102) A similar tax as a percentage of fuel price is imposed on other motor vehicle fuels, with maximum fuel prices for purposes of this tax established in law. (U.C.A. 1953 §59-13-201)

- Wisconsin: A "tax is imposed at the rate of 3 cents per kilowatt-hour on the electricity delivered or placed by a Level 3 charger of an electric vehicle charging station into the battery or other energy storage device of an electric vehicle [unless] the Level 3 charger is located at a residence." (2023 SB 791; W.S.A. 77.9972)

The bills either tax specifically electricity sold at vehicle charging stations or tax all electricity used as vehicle fuel but with exceptions for electricity provided at a residence, as in Georgia, Oklahoma, and Wisconsin. Oklahoma excludes charging stations with charging capacity of less than 50 kilowatts and those that do not require payment for use. Kentucky defines an "electric vehicle power dealer," who must collect the tax, as a person who owns or leases an electric vehicle charging station with a charging capacity of at least 20 kilowatts. Montana defines a "charging station" to mean equipment with a rated capacity greater than 25 kilowatts that is not installed at a residence or owned by an association of owners of real property. Montana and Oklahoma specify the tax does not apply to fees or charges associated with the method of payment.

The bills establishing these taxes provide definitions of the terms used and address additional topics, including the following:

- Licensing or registering electric fuel businesses: Georgia, Iowa, Montana, Oklahoma, Pennsylvania, and Wisconsin;

- Directing the proceeds of the tax to a transportation-related fund: Iowa (Road Use Tax Fund), Kentucky (Road Fund); Montana (proceeds remitted to the Department of Transportation), Oklahoma (Driving on Road Infrastructure with Vehicles of Electricity [DRIVE] Revolving Fund), Utah (Transportation Fund), and Wisconsin (Transportation Fund);

- Requiring the rate per kWh to be posted: Georgia (total of price and tax or posted separately), Montana, Oklahoma (also on the owner or operator's website or app), and Utah (in a required itemized invoice to the purchaser)[4];

- Directing specific state agencies to administer the tax: Iowa, Oklahoma, Utah, and Wisconsin;

- Assigning responsibility for inspection of electric vehicle (EV) charging stations: Georgia (Commissioner of Agriculture), Iowa (Department of Agriculture and Land Stewardship[5]), and Oklahoma (Tax Commission);

    - The Kansas Department of Agriculture (KDA) provided the following response to an inquiry as to whether it would have authority to inspect vehicle charging stations: "We do have the authority to test electric vehicle chargers pursuant to K.S.A. 83-206. However, we will not have the necessary standards to apply to the testing of those devices until the 2024 versions of NIST handbook 44 and NIST handbook 130 are adopted in regulation, as the currently adopted version of the handbook does not provide standards for inspection and testing of electric vehicle fueling systems and methods of sale. We intend to pursue these regulatory updates after we can get some statutory amendments adopted during this legislative session"; and

    - 2025 HB 2255, as approved by the House on February 20, 2025, includes provisions regarding the KDA's authority to test EV chargers;

- Requiring meters for charging stations: Georgia, Montana, and Oklahoma (on meters placed into service after November 1, 2021);

- Changing an EV registration fee: Kentucky (imposing an EV ownership fee), Montana (reducing any additional EV registration fee by 30 percent, as of July 1, 2028), and Pennsylvania (imposing an EV road user charge);

- Exempting electricity sold at an EV charging station from sales tax: Iowa (added electricity exemption to those of other vehicle fuels) and Wisconsin;

    - According to Kansas Department of Revenue Pub. KS-1510 Sales Tax and Compensating Use Tax, "Residential and agricultural use of the utilities (except water) are subject only to local tax—the state sales tax of 6.50% does not apply to utilities used for a residential or agricultural purpose. Water for residential and agricultural use is exempt from both state and local sales tax"[6]; and

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4 The National Institute of Standards and Technology (NIST), U.S. Department of Commerce, 2024 Handbook, requires kWh to be the unit of measurement for "electric vehicle supply equipment" in its standards for Electric Vehicle Fueling Systems. Standard 3.40 also requires the devices to be "capable of indicating the start and stop time, the total quantity of energy delivered, the unit price, and the total price for the quantity of energy delivered during each discrete phase corresponding to one of the multiple unit prices."

5 Added by Iowa 2023 HF 666.

6 See also KSA 12-189a.

- Specifying penalties for violations: Georgia, Iowa, Kentucky, Oklahoma, and Utah.

Certain aspects of the bills were unique to one state, *e.g.*, providing for refunds of the tax to entities that do not pay taxes on gasoline or diesel fuel (Iowa), regulating government-owned charging stations (Wisconsin), and requiring a utility to create a separate entity to sell electricity at EV charging stations (Georgia).

Fiscal Effects

Equivalents to Kansas fiscal notes on bills were found for only two of the states imposing kWh taxes on electricity sold as vehicle fuel. The fiscal note for Kentucky 2022 HB 8 contained no estimate of revenues from the $0.03 tax imposed per kWh, and a "local mandate" fiscal note on a similar bill also imposing a $0.03 per kWh tax and a registration fee on electric and hybrid vehicles states "Revenue from the excise tax is indeterminable at this time."

The fiscal note from Wisconsin on its 2023 bill, as introduced, included the following:

> In its fiscal estimate to the bill, the Department of Transportation (DOT) estimates revenue from the 3-cent per kilowatt-hour charging station excise tax to be $15,900 to $23,800 per month, at the start of calendar year 2024, or up to $286,000 for all of 2024. DOT further indicates that assuming the growth rate in EV ownership remains constant, estimated revenue would range from $211,400 to $314,100 in 2024-25 and $285,100 to $427,600 in 2025-26. To arrive at this estimate, the Department assumes that the average efficiency for an electric vehicle is 3.5 miles per kilowatt-hour, and that the annual vehicle miles traveled (VMT) for the average electric vehicle is 5,300 miles per year, which is significantly lower than the average annual VMT of gas and diesel vehicles which is typically between 11,000 and 14,000 miles. In addition, DOT indicates that since charging an electric vehicle at home is more cost-effective and convenient for the consumer, a 20% to 30% usage of public charging stations was assumed by the Department. . . . DOR estimates that the sales and use tax exemption would reduce sales tax revenue by $1,300,000 annually. . . . Using DOT assumptions, it is estimated that the exemption would reduce sales tax revenues by between $50,000 and $80,000 in 2024-25 and by between $120,000 and $180,000 in 2025-26.

The Wisconsin fiscal note does not include the number of EVs in the state. Data from the DOE indicate 24,943 EVs in Wisconsin in 2023 and 11,271 in Kansas.

A policy analyst with the Utah Legislature provided the following information in September 2024:

> "Utah's kWh charging tax went into effect January 1, 2024. From Jan. 1, 2024 – May 31, 2024 (5 months), the tax generated $239,402.
>
> Utah's 2024 fleet as of Feb. 15, 2024, was 2,942,473 registered on-highway vehicles (includes motorcycles, passenger vehicles, light trucks, and heavy trucks). Of those, 37,175 are fully electric (1.25%); 76,598 are

gas hybrid (2.6%); 11,777 are plug-in hybrid (0.4%). Passenger vehicles totaled 1,126,505 registrations; of those, 18,071 are electric (1.6%); 39,454 are hybrid (3.5%); and 5,253 are plug-in hybrids (0.47%)."

Calculation of Fiscal Effect

The Assistant Director of Legislative Economic Analysis for the Kentucky Legislative Research Commission noted multiple assumptions would be required to determine fiscal effect:

- How many EVs are registered in Kansas? How many EVs pass through Kansas, and would that number change if Kansas imposed a kWh fee?
    - According to the Division of Vehicles, Kansas Department of Revenue, in 2023 8,195 electric and 27,170 hybrid vehicles were registered in Kansas. Of those hybrid vehicles, 1,245 were plug-in electric hybrid vehicles. As noted above, the DOE reported 11,271 electric vehicles in Kansas; and
    - No estimate was found for the number of any types of vehicles that pass through Kansas, although the Kansas Turnpike Authority estimates about half of the vehicles using the Turnpike originate from out of the state[7].
- How many miles does each car drive each year?
    - Estimates vary. One large study found electric passenger vehicles of model years 2016–2022 were driven an average of 7,165 miles a year for smaller vehicles and 10,184 miles a year for sport utility vehicles (SUVs). (More detail is provided below.)
- Where does the charging occur?
    - Data are not readily available on this. Multiple secondary sources state the DOE found 80 percent of charging is at home, but a search of the DOE website did not find the original data. A 2024 report from ChargeLab, a company that "builds software for managing electric vehicle chargers," on results of a survey of 500 U.S. EV drivers found that, "While 86.0% of EV drivers now have access to a home charger, 59.6% still use public chargers weekly." This may be because home chargers are Level 1 (120-volt) or Level 2 (240-volt), whereas commercial chargers are more likely to be faster Level 3 chargers.
- What is the conversion rate between miles driven and kWhs?
    - See the first section of this memorandum.

FHWA data do not provide information by type of fuel, but they do provide information on averages. The averages for light-duty vehicles for 2023 (the most recent year available when this memorandum was prepared) were 11,106 annual miles driven and 492 gallons of fuel consumed.

7 Personal conversations with the Kansas Turnpike Authority Director of Business Services and Customer Relations. No breakdown on commercial versus passenger vehicles was available. Additional data is expected to become available from the cashless tolling system after July 2025.

As noted above, DOE fuel economy data for model year 2023 all-electric passenger vehicles show a combined fuel economy range of 24 to 69 kWh per 100 miles, with an average of 37.5 kWh per 100 miles, and an average mile per gallon equivalent (mpge) of 94.2.[8]

The data presented could be used to make assumptions on a per-vehicle basis, shown using 2023 data:

- The gasoline tax for a conventional light-duty vehicle traveling 11,100 miles a year (approximate FHWA average) using 490 gallons (approximate FHWA average) and purchasing all that fuel in Kansas with its gasoline tax rate of $0.24 per gallon would be $117.60, or $0.0106 per mile driven.

- If a tax of $0.03 were applied to each kWh and all the electricity were purchased at a charger at which the tax would be applied, the tax on an all-electric vehicle traveling 11,100 miles a year using 37.5 kWh per 100 miles (DOE average) would pay $124.90 in tax, or $0.01125 per mile driven.

    - If the miles driven by an all-electric vehicle were reduced to 8,000 miles a year, the tax would be $90.

- A vehicle traveling 11,100 miles a year getting 94.2 mpg (average mpge for model year 2023 all-electric vehicles) would pay $28.30 in gasoline tax at $0.24 per gallon.

    - If the miles driven by an all-electric vehicle getting 94.2 mpg were reduced to 8,000 miles a year, the gasoline tax would be $20.40.

The calculations above address the amount of tax only and do not take into consideration the generally higher prices for all-electric vehicles, the cost of gasoline excluding taxes ($2.81 per gallon, as of March 10, 2025, in Kansas[9]), or the average rate per kWh ($0.1156 per kWh, as of March 2025, in Kansas[10]).

Miles driven. The calculations above also do not reflect whether electric passenger vehicles are driven more or fewer miles annually than conventional-fuel passenger vehicles. Data vary. FHWA data based on the 2022 National Household Travel Survey (the most recent available as of publication of this memorandum) and published by the DOE state gasoline-powered vehicles were driven an average of 14,133 miles in 2022 and all-electric vehicles were driven an average of 12,393 miles.[11]

A study published in 2023[12] reviewed dealership records of 12.5 million used cars and 11.4 million used SUVs driven in the United States in 2016 through 2022. It found the following regarding average annual miles driven:

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8 These calculations do not represent weighted averages based on actual sales or usage or the actual electric-vehicle fleet.

9 https://gasprices.aaa.com

10 https://www.electricchoice.com/electricity-prices-by-state/

11 Fact of the Week #1337, based on the 2022 National Household Travel Survey

12 *Quantifying electric vehicle mileage in the United States*, Lujin Zhao, Elizabeth R. Ottinger, Arthur Hong Chun Yip, John Paul Helveston, Joule, Volume 7, Issue 11, 15 November 2023, pages 2537 – 2551.

- Conventional gasoline cars: 11,642 miles;
- Battery electric cars: 7,165 miles;
- Conventional gasoline SUVs: 12,979 miles; and
- Battery electric SUVs: 10,184 miles driven.

The study noted the ranges for EVs have continued to improve over time, which may be leading to more miles driven annually. The DOE provided ranges for 33 2023 EV models; the average was 276 miles. Researchers associated with the Massachusetts Institute of Technology found that, "Once one accounts for battery range, the sharp difference in annual miles driven between EVs and gasoline and diesel-powered vehicles goes away for long-range EVs."[13] Information from the International Energy Agency shows average range for a battery EV at 21 miles (211 kilometers) in 2015 and 210 miles (338 km) in 2020. EPA data for 2024 model electric vehicles available in the United States show an average range of 291.5 miles.[14]

13 "How Much Are Electric Vehicles Driven? Depends on the EV," Climate Portal, MIT Center for Energy and Environmental Policy Research, January 26, 2023, accessed February 2025.

14 International Energy Agency, https://www.iea.org/data-and-statistics/charts/evolution-of-average-range-of-electric-vehicles-by-powertrain-2010-2021; EPA data compiled at https://insideevs.com/reviews/344001/compare-evs/