

CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE
Hydrogen Gas-Measuring Devices (3.39)
CCR Title 4, § 4002.9

May 31, 2019

INITIAL STATEMENT OF REASONS

PROBLEM STATEMENT

The California Department of Food and Agriculture (Department) is committed to the development of the zero-emission vehicle (ZEV) industry and the fueling infrastructure necessary to support it. Consumer demand for ZEVs is rapidly growing and is becoming the keystone of California's long-term transportation strategy to reduce pollution and greenhouse gas emissions. One important component of the ZEV industry is hydrogen powered fuel cell vehicles. To keep pace with the growth of the industry, it is necessary that the hydrogen fueling infrastructure expand conjointly with sales of hydrogen powered fuel cell vehicles to support and promote ZEV adoption on California highways. It is also necessary to provide consumers with a positive hydrogen fueling experience and ensure fair and accurate transactions take place for consumers to develop trust in the ZEV industry.

In 2014, the Department adopted into regulation the specifications, tolerances, and other technical requirements adopted by the National Conference on Weights and Measures (NCWM) and published in the National Institute of Standards and Technology (NIST) Handbook 44, "*Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices*" (NIST Handbook 44), Section 3.39. Hydrogen Gas-Measuring Devices, along with other adopted regulations specific to hydrogen gas-measuring devices. This regulation applies to commercial devices used to refuel hydrogen powered fuel cell electric vehicles (FEVs) in California. The requirements adopted by the Department ensure an accurate quantity of hydrogen is dispensed by the device. Accuracy tolerances, established by an accuracy classification or class, are established in regulation so neither buyer nor seller suffers economic harm. With the 2014 rulemaking the Department adopted four accuracy classes (2.0), (3.0), (5.0), and (10.0), which are explained later in this document. This range of accuracy classes allows manufacturers of hydrogen gas-measuring devices to install type approved devices meeting any one of the established tolerances. The Department has since determined that no hydrogen gas-measuring device in commercial use meets accuracy classes (2.0) or (3.0), nor has the Department approved for use a device having those accuracy classes. The Department believes those accuracy classes are artifacts of the 2014 rulemaking and are no longer necessary.

When Section 3.39. Hydrogen Gas-Measuring Devices was originally adopted by NCWM in 2010 and added to NIST Handbook 44 in 2011, accuracy class (2.0) was assigned before it was assumed that real-world test data would support any changes to broaden the tolerances. In 2016, the Department submitted test data which served as the basis for NCWM to adopt accuracy class (7.0), a compromise between device functionality, manufacturing cost, and the technologically feasible measurement of hydrogen when sold as retail motor vehicle fuel. With

this rulemaking, the Department proposes to remove the outdated accuracy classes (2.0) and (3.0) and adopt the latest NCWM accuracy class (7.0). The Department proposes to maintain accuracy classes (5.0) and (10.0) to ensure continuity of their commercial use.

BACKGROUND

The Legislature has charged the Department with the responsibility of supervising weights and measures activities within California pursuant to Business and Professions Code (BPC) Division 5, § 12100. The secretary of the Department is granted authority in BPC §§ 12027 and 12107 to adopt regulations as is reasonably necessary to carry out the provisions of Division 5. Weights and Measures. This is no small task since many commercial transactions are based upon the weight, volume, or count of products bought and sold. Today, there are more than 1.5 million registered commercial weighing and measuring devices in California. Specifically, BPC § 12107 authorizes the Department to establish tolerances, specifications, and other technical requirements for all commercial weighing and measuring devices, including hydrogen gas-measuring devices. The Department does so by adopting by reference the latest standards published in NIST Handbook 44, except as specifically modified, amended, or rejected by regulation. The requirements are prescriptive and not permissive because transactions must be consistent, fair, and accurate in the method of sale, labeling, marking, advertising, and other technical specifications of a device used for commercial purposes.

Tolerance Requirements

Part of California's adopted regulations include tolerance requirements for commercial weighing and measuring devices. The tolerance of the device, its accuracy class, is defined according to NIST Handbook 44 as, "a value fixing the limit of allowable error or departure from true performance or value." The tolerance includes under-registration as well as over-registration of allowable error or departure from true performance or value. NIST Handbook 44 publishes two tolerances for each accuracy class: Acceptance Tolerance and Maintenance Tolerance. Acceptance Tolerance is applied to the device when it is submitted for type evaluation. Maintenance Tolerance is applied by a weights and measures official in the field during testing and sealing of the device on a periodic basis. A device is deemed "inaccurate" by the official and cannot be placed in commercial service when it does not meet the tolerance value during type approval or during field testing, respectively. In 2016, NCWM removed accuracy class (2.0) and adopted accuracy class (7.0). The purpose for that change was to broaden the tolerances to reflect the actual capability of hydrogen gas-measuring devices. No other accuracy class has been adopted by NCWM since then.

The California Fuel Cell Partnership (CaFCP) is a public-private partnership to promote hydrogen vehicles in California. CaFCP reports there are 40 retail hydrogen fueling stations open to the public, and another 25 in some stage of preplanning, permitting, and development. Five manufacturers have submitted to the Department six hydrogen gas-measuring devices for type evaluation and approval. All six devices have been issued a California Certificate of Approval issued by the Department. Five devices meet accuracy class (5.0) and one meets accuracy class (10.0). No devices have been submitted or type approved for accuracy classes (2.0) or (3.0).

LEGISLATIVE AND EXECUTIVE HISTORY

Past Legislation

AB 118 (Nuñez, Chapter 750, Statutes of 2007) created the Alternative and Renewable Fuel and Vehicle Technology (ARFVT) Program of the California Energy Commission to, among other objectives, develop and deploy technology and alternative and renewable fuels in the marketplace. Through the ARFVT Program, the CEC provided incentives to develop and deploy clean, efficient, low-carbon alternative fuels and technologies projects that, among other goals, expand alternative fueling infrastructure and hydrogen fueling stations.

AB 8 (Perea, Chapter 401, Statutes of 2013) was enacted to continue to move California toward the goal of expanding the market for clean energy and to reduce greenhouse gasses by providing funding to pay for the newer technologies. AB 8 amended Health and Safety Code § 43018.9 with the goal to have at least 100 publicly available hydrogen-fueling stations in California and allocates \$20,000,000 per year to fund these stations.

AB 808 (Ridley-Thomas, Chapter 591, Statutes of 2015) clarifies the Department's authority for the regulation and enforcement of motor vehicle fuels, lubricants, automotive products, and alternative motor vehicle fuels such as hydrogen, natural gas, and electricity. It also requires the secretary to establish the method of sale of motor vehicle fuels and lubricants sold commercially to the public.

Governor's Executive Orders and Action Plans

Several recent California governors have signed into action various executive orders that establish the formation of working groups focused on the reduction of greenhouse gas emissions from vehicles. Each executive order sets reduction target goals to achieve those tasks. Governor Brown tasked the working groups with publishing ZEV action plans in 2013, 2016, and 2018 that coordinate the responsibilities and tasks of represented state agencies and other non-governmental organizations involved in achieving the reduction of greenhouse gas emissions from vehicles.

REGULATORY HISTORY

In 2014, pursuant to BPC § 12107, the Department adopted into Title 4 California Code of Regulations (CCR) §§ 4000, 4001, and 4002.9 the specifications, tolerances, and other technical requirements for hydrogen gas-measuring devices published in NIST Handbook 44, Section 3.39., along with other California-specific requirements as modified, amended, or rejected by the secretary. In adopting Section 3.39. from NIST Handbook 44, the Department removed the tentative code status of NIST Handbook 44 to make that section enforceable in California. With this rulemaking, the Department proposes to make further modifications, amendments, or rejections to CCR § 4002.9.

PURPOSE AND NECESSITY OF THE PROPOSED REGULATION

The Department is required to adopt the latest standards published in NIST Handbook 44, except as specifically modified, amended, or rejected by regulation adopted by the secretary. In some cases, the Department rejects, or amends paragraphs published in the handbook to make specific changes to meet the needs of California. In doing so, the Department adds paragraphs from NIST Handbook 44 to CCR § 4001. Exceptions. to reject the paragraph as published. Then the Department adopts that paragraph with necessary changes in an appropriate subsection of CCR § 4002. Additional Requirements. (i.e., CCR § 4002.9). In addition, the Department adopts other California-specific requirements not published in NIST Handbook 44, assigns the new requirement an appropriate paragraph designation, and adds it to the appropriate subsection of CCR § 4002. This rulemaking proposes to modify CCR § 4002.9. Hydrogen Gas-Measuring Devices (3.39) as follows:

Amend CCR § 4002.9. Hydrogen Gas-Measuring Devices (3.39)

Non-substantive Changes Without Regulatory Effect

This rulemaking proposes both substantive and non-substantive changes. Throughout this proposed regulation non-substantive grammar or syntax changes are made to keep this section consistent with the formatting of other device regulations and correct typographical errors. Periods (.) that are missing after paragraph designations or paragraph headers are added, and a “short dash” (-) or colon (:) after paragraph headers are removed and replaced with a “long dash” (–) to remain consistent with the formatting of NIST Handbook 44 and other California adopted device regulations. Another non-substantive proposed change adds a hyphen (-) to create the compound word “gas-measuring” in paragraph T.2.

Non-substantive changes to paragraph S.5.2. and its note include edits to grammar, formatting, or syntax of the paragraph. For example, the word “in” is added to paragraph S.5.2. to correct a syntax error. In paragraph S.5.2. and T.6. the title of Table T.2. is fully spelled out as a non-substantive grammatical edit that keeps the reference to the table consistent with the formatting of other sections of NIST Handbook 44. The example explanation of an accuracy class in the note of paragraph S.5.2. is changed from referencing accuracy class (3.0) to referencing the latest published accuracy class (7.0) in NIST Handbook 44. The example label is changed to reference accuracy class (7.0), as well. This change is necessary because the Department proposes to remove accuracy class (3.0) from regulation.

In paragraph T.6. a non-substantive typographical correction is made to replace “Measures” with “Measured” to conform to the proper NIST Handbook 44 heading title and maintain similar language as other adopted device regulations regarding the maximum error of a minimum measured quantity.

Substantive Changes

A.4. Type Evaluation

During the prior rulemaking for hydrogen gas-measuring devices in 2014, the Department removed paragraph A.4. by adopting it in CCR § 4001 without adding amended language for this requirement to CCR § 4002.9. A device must meet the adopted requirements of Handbook 44 as adopted in CCR §§ 4000, 4001, and 4002.9 before being submitted to the Department for evaluation and approval for commercial purposes. With this rulemaking it is necessary to add paragraph A.4. to CCR § 4002.9 to clarify and affirm that the Department will accept only hydrogen gas-measuring devices that meet the adopted requirements for that device. The Department certifies a device using the California Type Evaluation Program (CTEP) process. It will also accept an approved device that has been evaluated by the National Type Evaluation Program (NTEP) and issued a Certification of Conformance. Allowing for either CTEP or NTEP certifications makes this proposed regulation consistent with other California adopted device regulations that allow for either certification and offers manufacturers doing business both in California and throughout the nation to have an option of having either a CTEP or NTEP certification issued for their devices marketed in the state. This requirement is adopted to further clarify the CTEP and NTEP device type approval process in existing state law.

S.5.2. Location of Accuracy Class

The Department proposes to remove accuracy class (3.0) for hydrogen gas-measuring devices throughout this regulation because no device has been manufactured to meet those tolerances nor has a manufacturer submitted to the Department a device with the expectation it will meet the requirements of that class. Additionally, in 2016, NCWM adopted and NIST published the latest accuracy class (7.0) in NIST Handbook 44 because it determined accuracy class (7.0) was reasonable based upon data gathered during testing of hydrogen gas-measuring devices used for commercial purposes. To harmonize and make consistent the CCR with the latest publication of NIST Handbook 44, the Department proposes to add accuracy class (7.0) to this paragraph.

Table T.2. Accuracy Classes and Tolerances for Hydrogen Gas-Measuring Devices

The currently adopted table in this section has four accuracy classes: (2.0), (3.0), (5.0) and (10.0) with two footnotes explaining applicability for certain classes based on the device's installation date. No manufacturer has submitted a hydrogen gas-measuring device for type evaluation by the Department that is capable of meeting either accuracy class (2.0) or (3.0). The Department believes those accuracy classes are not attainable at this time and thus should be removed because they have no commercial application. Therefore, the Department proposes to adopt a new table that removes accuracy classes (2.0) and (3.0), retains accuracy classes (5.0) and (10.0) to maintain existing California type approval certificates, and adopts accuracy class (7.0). This action will make California consistent with NCWM and the national uniform standard. Accuracy class (7.0) is a compromise between functionality, manufacturing cost, and the technologically feasible measurement of hydrogen sold as motor vehicle fuel. Adopting accuracy class (7.0) will allow manufacturers to streamline their production and distribution costs by designing a device that can be marketed both in the state and nationwide. Accuracy class (5.0) has stricter acceptance and maintenance tolerances compared to accuracy class (7.0). A device which meets California's existing accuracy class (5.0) will also meet accuracy class (7.0) and may be marketed nationwide with NTEP approval. This change is also necessary to allow the Department to address any consumer complaints that may be

filed against a class (7.0) device. The proposed regulation will allow the Department or local agencies to engage in enforcement activity when necessary.

Table Footnotes

Footnote one ⁽¹⁾ of the table applies to accuracy classes (3.0) and (5.0) while footnote two ⁽²⁾ applies to accuracy class (10.0). The Department proposes to remove footnote one ⁽¹⁾ because the Department is proposing to remove accuracy class (3.0) and allow manufacturers to continue to install accuracy class (5.0) devices after January 1, 2020, making the footnote no longer necessary. The proposed change to footnote two ⁽²⁾ of the table is non-substantive. Since the Department proposes to remove footnote one ⁽¹⁾, it is necessary to renumber footnote two ⁽²⁾ to footnote one ⁽¹⁾ without changing its meaning or intent in regulation. The language of this footnote still applies to accuracy class (10.0).

In summary of the proposed changes to Table T.2. Accuracy Classes and Tolerances for Hydrogen Gas-Measuring Devices, any type approved device with accuracy class (10.0) installed prior to January 1, 2018, will be registered, tested, and sealed by county officials as a class (10.0) device. All other device models installed in the state thereafter, will be type approved and subsequently registered, tested, and sealed by county officials as either class (5.0) or (7.0) in accordance with California law and regulation.

BENEFITS OF THE REGULATION

The proposed regulation will continue to support the growth of the ZEV market; a cornerstone of California's long-term transportation strategy to reduce pollution and greenhouse gas emissions. The proposed regulation will facilitate the development of more hydrogen fueling stations and, in turn, promote increased production and sales of hydrogen gas-measuring devices installed in the state. With this proposed regulation hydrogen gas-measuring device manufacturers may develop and sell devices with accuracy class (7.0) alongside devices of accuracy class (5.0). Manufacturers may benefit by being able to market accuracy class (7.0) devices in other states thereby streamlining design, production, and marketing costs.

ECONOMIC IMPACT ASSESSMENT/ANALYSIS

1. Large Business Types

The Department has initially determined this proposed regulation will not cause a direct or indirect economic impact to large businesses currently doing business in California. Five large businesses are currently doing business in the state and already manufacture hydrogen gas-measuring devices. Four of five businesses manufacture devices type approved for accuracy class (5.0) and are currently marketing and installing them for commercial purposes. Those businesses may continue to produce and market those devices without additional economic costs or benefits. The Department proposes to keep accuracy class (5.0), yet remove its associated footnote, to accommodate businesses currently marketing that device in the state. In the future, a business that chooses to design and market a hydrogen gas-measuring device with accuracy class (7.0) will need to submit it to the Department to be evaluated and approved for commercial use. It remains a voluntary decision by each manufacturer to design

and produce such a device and is not a direct or indirect requirement of this regulation. Device manufacturers will continue to pay all costs associated with type evaluation services as authorized in BPC § 12500.9, but that, too, is not a direct or indirect impact of this rulemaking.

2. Small Business Types

The Department is not aware of any small businesses involved in the commercial hydrogen gas-measuring device industry. The primary businesses in this industry are international corporations. Businesses are considered small according to California Government Code Title 2, Chapter 3.5, § 11342.610. The Department initially determines this proposed regulation does not cause a direct or indirect economic impact to small businesses currently doing business in California.

3. Registered Service Agencies (RSAs)

The Department initially determines this proposed regulation will not incur additional financial costs or benefits to RSAs registered to install, test, and repair hydrogen gas-measuring devices since those businesses are already approved by the Department and have the necessary equipment and qualifications to perform that work. RSAs will not need to change their testing methods or acquire additional testing equipment to comply with this proposed regulation.

EVIDENCE SUPPORTING FINDING OF NO SIGNIFICANT STATEWIDE ADVERSE ECONOMIC IMPACT DIRECTLY AFFECTING BUSINESSES

The Department initially determines there is no significant statewide adverse economic impact directly affecting businesses in California. Business and Professions Code § 12107 requires the Department to adopt into regulation the latest version of NIST Handbook 44, except as specifically modified, amended, or rejected by regulation adopted by the Department. This proposed regulation removes two accuracy classes and adopts the latest accuracy class (7.0). There are no direct costs to businesses because of this regulation. The Department has based its determination on these reasons and those stated below:

Creation or Elimination of Jobs within California

Adopting the proposed regulation does not directly or indirectly require regulated businesses in California to create or eliminate jobs to comply.

Creation of New Businesses or the Elimination of Existing Businesses in California

Adopting the proposed regulation does not directly or indirectly create new businesses or eliminate existing businesses in California.

Expansion of Businesses Currently Doing Business in California

Several manufacturers currently produce hydrogen-gas measuring devices capable of meeting accuracy (5.0) requirements. These businesses are not directly or indirectly incentivized or

required by this rulemaking to change their current business model, business practices, or acquire additional equipment to comply with this regulation.

Benefits of the Regulation to the Health and Welfare of California Residents, Worker Safety, and the State's Environment

This proposed regulation supports the state's goals to increase the number of ZEVs operating on state highways, reduces dependence on petroleum-sourced fuels, and decreases California's carbon footprint. Governor's Executive Order B-16-2012 predicts that over 1.5 billion gallons of petroleum-sourced fuels will be displaced by increasing the number of ZEVs in California. The proposed regulation both supports the growth of the ZEV market and facilitates the development of a hydrogen fueling infrastructure having accurate hydrogen fueling devices; two paramount factors positively influencing California's long-term transportation strategy.

The California Air Resources Board's Greenhouse Gas Emission Inventory website reports that the transportation sector is the biggest contributor (41%) to California's greenhouse gas emissions. Vehicle emissions are a primary source of particulates, air toxins, and smog in California. Conversely, hydrogen fuel cell vehicles emit only water vapor. Hydrogen powered vehicles help improve air quality and potentially reduce medical risks associated with vehicular emissions. This proposed regulation facilitates the growth of the infrastructure supporting zero-emission hydrogen fuel cell vehicles by adopting a more lenient accuracy class.

ESTIMATED COST OR SAVINGS TO PUBLIC AGENCIES OR AFFECTED PRIVATE INDIVIDUALS OR ENTITIES

The Department initially determines that the proposed regulation:

1. Will not impose a mandate on local agencies or school districts. The proposed regulation does not mandate local county agencies to register, test, and seal commercial hydrogen gas-measuring devices. It is California law, BPC §§ 12103.5 and 12104 that provides county officials with that oversight authority and responsibility. No other public agency or special district has oversight authority in this matter.
2. Will not result in any cost or savings to any other state agency. The proposed regulation will not affect the oversight activity or expenses of any other state agency. No other state agency has statutory authority to oversee and enforce the proposed regulation.
3. Will not result in any reimbursable costs or savings under Part 7 (commencing with § 17500) of Division 4 of the Government Code to local agencies or school districts. The proposed regulation does not involve state-mandated local programs and does not provide for reimbursable costs regulated under Government Code Division 4, Part 7, § 17500.
4. Will not result in any nondiscretionary costs or savings to local agencies or school districts. For the reasons stated in number (1.) above, the proposed regulation will not result in any nondiscretionary costs or savings to local agencies or school districts.
5. Will not result in any cost or savings in federal funding to the state. Neither federal nor California law provides for federal funding to oversee and enforce hydrogen dispensed as

motor vehicle fuel. The proposed regulation does not impose any costs or savings of federal funding to California.

Public Agencies

Based on its analysis, the Department initially determines this proposed regulation will not have a significant statewide adverse financial impact on housing costs, public agencies, or other public entities in California. Each county agency has authority to offset the cost of regulating hydrogen gas-measuring devices, up to the statutory maximum established in BPC § 12240, by assessing device registration fees for providing those services.

There is no fiscal impact to the Department as all costs of enforcing and overseeing this proposed regulation are offset by revenues for services provided. Direct and indirect costs associated with type evaluation performed by the Department are borne by manufacturers of new commercial devices. The Department will not need to change its regulatory procedures, hydrogen testing methods, or acquire additional testing equipment to enforce and oversee this proposed regulation.

Private Individuals

The Department initially determines there is no direct or indirect costs or benefits to private individuals in California because of this proposed rulemaking. This proposed regulation does not change their hydrogen fueling experience or change the retail price of hydrogen as motor vehicle fuel.

DUPLICATION OR CONFLICT WITH FEDERAL REGULATIONS

The proposed regulation is not in conflict with any federal regulations contained in the Code of Federal Regulations. Moreover, the proposed regulation is not mandated by federal law or regulation.

REASONABLE ALTERNATIVES TO THE REGULATIONS AND THE DEPARTMENT'S REASONS FOR REJECTING THOSE ALTERNATIVES

The Department must determine that no reasonable alternative it considered or that has otherwise been identified and brought to its attention would be more effective in carrying out the purpose for which the action is proposed or would be as effective and less burdensome to affected private persons than the proposed action, or would be more cost effective to affected private persons and equally effective in implementing the statutory policy or other provision of law.

Alternative 1 – No Action

If the Department takes no action, it will fail to fulfill its statutory mandate in BPC § 12107 to regulate commercial hydrogen gas-measuring devices dispensing motor vehicle fuel by adopting the latest publication of NIST Handbook 44. Consequently, the Department will not be able to enforce the latest accuracy class (7.0) requirements in NIST Handbook 44, Section

3.39. The rapidly growing hydrogen fueling infrastructure will be susceptible to inconsistencies and confusion with the metering, dispensing, and method of sale requirements of hydrogen as motor vehicle fuel. The Department will be unable to take enforcement action in response to consumer complaints about deceptive and misleading business practices involving a class (7.0) device. If the Department takes no action, it will not be in support of or in compliance with the Governor's executive orders.

The Department rejects the alternative of no action because of the Department's statutory mandate to adopt and enforce prescriptive standards for commercial weighing and measuring devices, support the goals outlined in the Governor's executive orders, and protect California consumers and regulated businesses by maintaining fair trade and competition in the marketplace. The requirements of Handbook 44 are prescriptive and not permissive because transactions must be consistent, fair, and accurate in the method of sale, labeling, marking, advertising, and other technical requirements of a device that is used for commercial purposes.

Currently, the Department is not aware of any other reasonable alternative, and thus no other alternatives have been considered by the Department at this time.

TECHNICAL, THEORETICAL, AND/OR EMPIRICAL STUDY, REPORTS, OR DOCUMENTS

The Department relied on the following documents to draft the proposed regulatory language of this rulemaking:

1. Office of Governor, <https://gov.ca.gov>, "2013 ZEV Action Plan, A roadmap toward 1.5 million zero-emission vehicles on California roadways by 2025, Governor's Interagency Working Group on Zero-Emission Vehicles," February 2013, [http://opr.ca.gov/docs/Governors_Office_ZEV_Action_Plan_\(02-13\).pdf](http://opr.ca.gov/docs/Governors_Office_ZEV_Action_Plan_(02-13).pdf), accessed on 3/18/19.
2. Office of Governor, <https://gov.ca.gov>, "2018 ZEV ACTION PLAN Priorities Update, Governor's Interagency Working Group on Zero-Emission Vehicles," September 2018, <http://business.ca.gov/Portals/0/ZEV/2018-ZEV-Action-Plan-Priorities-Update.pdf>, accessed on 3/18/19.
3. National Institute of Standards and Technology, <https://www.nist.gov/>, Office of Weights and Measures, <https://www.nist.gov/pml/weights-and-measures>, NIST Handbook 44, "*Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices*," Section 3.39. Hydrogen Gas-Measuring Devices, 2019 edition, <https://nvlpubs.nist.gov/nistpubs/hb/2019/NIST.HB.44-2019.pdf>, accessed on 3/14/19.
4. Office of Governor, <https://gov.ca.gov>, "2016 ZEV Action Plan, Governor's Interagency Working Group on Zero-Emission Vehicles," October 2016, https://www.gov.ca.gov/wp-content/uploads/2018/01/2016_ZEV_Action_Plan-1.pdf, accessed on 3/18/19.
5. U.S. Department of Energy, <https://energy.gov>, Office of Energy Efficiency & Renewable Energy, Alternative Fuels Data Center, "Alternative Fueling Station

- Locator,” February 2018, <https://www.afdc.energy.gov/locator/stations>, accessed on 3/14/19.
6. California Fuel Cell Partnership, <https://cafcp.org>, “Hydrogen Station List,” February 2019, https://cafcp.org/sites/default/files/h2_station_list.pdf, accessed on 3/14/19.
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 8. Office of Governor, <https://gov.ca.gov>, Executive Order S-3-05, June 2005, <https://web.archive.org/web/20060922231000/http://gov.ca.gov/index.php?/executive-order/1861>, accessed on 3/8/19.
 9. Office of Governor, <https://gov.ca.gov>, Executive Order B-16-2012, March 2012, <https://www.ca.gov/archive/gov39/2012/03/23/news17472/index.html>, accessed on 3/8/19.
 10. Office of Governor, <https://gov.ca.gov>, Executive Order B-30-15, “Governor Brown Establishes Most Ambitious Greenhouse Gas Reduction Target in North America,” April 2015, <https://www.gov.ca.gov/2015/04/29/news18938>, accessed on 10/1/18.
 11. Office of Governor, <https://gov.ca.gov>, Executive Order B-48-18, “Governor Brown Takes Action to Increase Zero-Emission Vehicles, Fund New Climate Investments,” January 2018, <https://www.gov.ca.gov/2018/01/26/governor-brown-takes-action-to-increase-zero-emission-vehicles-fund-new-climate-investments/#>, accessed on 3/8/19.
 12. California Air Resources Board, <https://arb.ca.gov>, “California Greenhouse Gas Emissions for 2000 to 2016, Trends of Emissions and Other Indicators,” 2018 Edition, https://www.arb.ca.gov/cc/inventory/pubs/reports/2000_2016/ghg_inventory_trends_00-16.pdf, accessed on 3/13/19.
 13. National Institute of Standards and Technology, OWM, <https://www.nist.gov/pml/weights-and-measures>, “National Conference on Weights and Measures, Committee Reports for the 95th Annual Meeting, July 11-15, 2010, St. Paul Minnesota,” as Adopted by the 95th National Conference on Weights and Measures, 2010, https://www-ncwm-net-files.s3.amazonaws.com/c3b4-034089-10_Pub_16_ST.pdf?versionId=0VBcG1BAmefnZaxbMojhVhubYsylRUr, Specifications and Tolerances Committee agenda item 360-1, page 51, accessed on 4/26/19.
 14. National Institute of Standards and Technology, OWM, <https://www.nist.gov/pml/weights-and-measures>, “National Conference on Weights and Measures, Committee Reports for the 101st Annual Meeting, July 24-28, 2016, Denver, Colorado,” as Adopted by the 101st National Conference on Weights and Measures, 2016, https://www-ncwm-net-files.s3.amazonaws.com/f391-13816557-4-ST-Report-Master-Web.pdf?versionId=3_jITmjiZH9_IQq9u4oPRwt33N5LITZm, Specifications and Tolerances Committee agenda item 339-2, page 45, accessed on 4/26/19.
 15. California Department of Food and Agriculture, <https://www.cdffa.ca.gov>, Division of Measurement Standards, “CTEP Certificates of Conformance Database Search,”

- <https://apps.cdfa.ca.gov/CTEP/default.aspx?srchCertificateNumber=&srchApplicant=&srchModels=&srchDeviceType=59&srchDateSearchType=equal&srchEffective=&srchEffectiveRangeMin=&srchEffectiveRangeMax=>, accessed on 3/18/19.
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 19. California Department of Food and Agriculture, <https://www.cdfa.ca.gov>, Division of Measurement Standards, "California Type Evaluation Program, Certificate of Approval Measuring Devices," Quantum Fuel Systems LLC, <http://www.qtww.com/>, Certificate Number: 5774(a)-18, Effective Date: February 14, 2018, accessed on 4/22/19.
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 21. California Department of Food and Agriculture, <https://www.cdfa.ca.gov>, Division of Measurement Standards, "California Type Evaluation Program, One-of-a-Kind Certificate of Approval Weighing and Measuring Devices," California State University, Los Angeles (CSULA), www.calstatela.edu/ecst/h2station, Certificate Number: 5741(a)-18, Effective Date: December 27, 2018, accessed on 4/22/19.