

# VOLKSWAGEN

GROUP OF AMERICA

Ms. Heidi King  
Deputy Administrator  
National Highway Traffic Safety Administration  
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Washington, D.C. 20590

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August 3, 2018	Date

## **Re: PETITION FOR TEMPORARY EXEMPTION FROM FMVSS 111**

Dear Ms. King:

### **I. PETITIONER**

This petition for temporary exemption is submitted by **Audi of America (AoA)** and its parent company, **AUDI AG** (together the companies are referred to as “Audi”). AoA is incorporated in the State of Virginia, and headquartered in Herndon, VA. Audi AG, is headquartered in Ingolstadt, Germany.

### **II. NATURE, EXTENT, AND BASIS OF THE EXEMPTION REQUEST**

**Pursuant to 49 CFR Part 555.6(b), Audi seeks an exemption from portions of Federal Motor Vehicle Safety Standard (FMVSS) 111, Rear Visibility, in order to facilitate the development and field evaluation of a new motor vehicle safety feature.<sup>1</sup>**

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<sup>1</sup> 555.6(b) requires the applicant to provide the following information:

- (1) A description of the safety or impact protection features, and research, development, and testing documentation establishing the innovational nature of such features.
- (2) An analysis establishing that the level of safety or impact protection of the feature is equivalent to or exceeds the level of safety or impact protection established in the standard from which exemption is sought, including -
  - (i) A detailed description of how a vehicle equipped with the safety or impact protection feature differs from one that complies with the standard;
  - (ii) If applicant is presently manufacturing a vehicle conforming to the standard, the results of tests conducted to substantiate certification to the standard; and
  - (iii) The results of tests conducted on the safety or impact protection features that demonstrates performance which meets or exceeds the requirements of the standard.
- (3) Substantiation that a temporary exemption would facilitate the development or field evaluation of the vehicle.
- (4) A statement whether, at the end of the exemption period, the manufacturer intends to conform to the standard, apply for a further exemption, or petition for rulemaking to amend the standard to incorporate the safety or impact protection features.
- (5) A statement that not more than 2,500 exempted vehicles will be sold in the United States in any 12-month period for which an exemption may be granted pursuant to this paragraph. An application for renewal of such an exemption shall also include the total number of exempted vehicles sold in the United States under the existing exemption.

**Specifically, we seek this exemption in order to facilitate the development and evaluation in the United States of our camera monitoring system (CMS) technology.** This technology replaces the traditional external rearview mirrors with cameras and monitors to provide the driver with excellent field of view to the sides and rear of the vehicle.

CMS technology is on the verge of becoming mainstream worldwide, and we strongly believe that it provides, as required by 555.6(b), a level of safety at least equal to that of FMVSS 111.

This request for exemption does not apply to the interior mounted rearview mirror. For this component, Audi will utilize a traditional mirror system that is fully compliant to the requirements set forth in FMVSS 111.

***A. Audi Models Which Would Use the Exemption:***

At the present time, Audi intends to install CMS on an all new, fully electric multipurpose passenger vehicle for the US called the Audi e-tron Sportback.

***B. The Purpose and Requirements of FMVSS 111***

The purpose of FMVSS 111 is, according to section S2 of the standard, “to reduce the number of deaths and injuries that occur when the driver of a motor vehicle does not have a clear and reasonably unobstructed view to the rear.” The requested exemption is entirely consistent with this purpose because CMS technology provides an as good, if not better, “clear and reasonably unobstructed view to the rear” compared to conventional mirror systems required by FMVSS 111.

The passenger car and multipurpose passenger vehicle (MPV) /light truck requirements of FMVSS 111<sup>2</sup> are, generally stated, as follows [not including the rear (back-up) camera visibility requirements which are not at issue here]:

- Passenger cars
  - Required mirrors -- S5.1(inside mirror), S5.2 (driver side outside mirror), and S5.3 (passenger side outside mirror when inside mirror does not provide specified field of view (FoV))
  - Required mirrors FoV – S5.1.1, S5.2.1
  - Required mirrors mounting –S5.1.2, S5.2.2, S5.3
- MPVs and Light trucks
  - Required mirrors -- S6 (compliance either by mounting passenger car mirror system compliant with S5 or outside mirrors of specified size and meeting a generally stated view requirement)

The heart of the standard – and the portion that truly serves the purpose of the standard – is the required FoV (for passenger cars) and the required general view (for MPVs and light trucks).

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<sup>2</sup> FMVSS also has requirements for heavier vehicles, buses and motorcycles, but we are not addressing these provisions in this petition because the vehicles which Audi would plan to sell under the requested exemption are passenger cars, MPVs and light trucks.

**C. Sections of FMVSS 111 from which an Exemption is Requested**

Let us first be clear what Audi is not requesting an exemption from: we are not asking for an exemption from the required FoV/view portions of the standard.

We are requesting an exemption from the requirements to:

- install external side mirrors
- provide the required FoV/view with mirrors
- meet the mirror-mounting specifications

The precise sections of FMVSS 111 from which exemption is sought – and which prevent the installation of CMS for on-road use – are as follows:

Passenger cars:

S5.2 – driver’s side mirror required

S5.2.1 – limited to the portion that requires the FoV to be provided by a mirror

S5.2.2 – driver’s side outside mirror mounting requirements

MPVs and Light Trucks

S6 -- to the extent that this section requires either a passenger car mirror system that is compliant with S5 or requires driver and passenger side outside mirrors meeting specific criteria and which provide the driver a view to the rear along both sides of the vehicle

**D. Period of Exemption and Number of Vehicles:**

Audi requests a two-year exemption commencing on the date the exemption is approved.

On or before the end of the exemption period, Audi hopes that, as requested in the pending Tesla/Alliance petition for rulemaking, FMVSS 111 will be amended to allow CMS. If by the end of the exemption period, FMVSS 111 has not yet been so amended, then Audi intends either to cease offering the system in the USA or, depending upon the circumstances, to request an exemption extension.

Audi requests that it be permitted to import and sell 2500 exempted vehicles during each of the 12-month periods covered by the exemption.

**II.  
CMS BACKGROUND**

**A. USA**

**In 2014, Tesla and the Auto Alliance filed a petition for rulemaking requesting an amendment to FMVSS 111 to allow CMS in lieu of rear view mirrors. See Attachment 1.**

In DOT's Spring 2018 Regulatory Agenda, NHTSA stated that in December 2018, an Advanced Notice of Proposed Rulemaking would be published seeking "public comment on NHTSA's effort to update the rear visibility standard for motor vehicles" and seeking "comment on barriers to the introduction and certification of cameras replacing rear-view mirrors."

Because a final amendment to FMVSS 111 permitting CMS appears to be potentially quite far down the road, Audi has decided to seek the temporary exemption here in order to move forward with its CMS development in the USA, especially as regards USA customer acceptance. A Part 555 exemption will ensure the efficient use of R&D time, and will allow us to have our CMS system ready for mass market introduction in the US as soon as FMVSS 111 is indeed amended.

We note that the Society of Automotive Engineers (SAE) has been pursuing a CMS Recommended Practice, and is close to finalizing its Camera Monitor Systems Test Protocols and Performance Requirements, J3155. This Recommended Practice will provide testing and performance requirements for CMS to replace existing required inside and outside rear-view mirrors for US market road vehicles. This practice should address specific technical content while retaining harmonization with FMVSS 111, and other international standards.

## **B. International CMS Developments**

World-wide efforts are already well underway to make CMS a reality on a large-scale basis. The rest of the world has indeed taken significant steps to promulgate international CMS standards, thereby allowing CMS to deploy in production vehicles. By granting the requested exemption here, Audi will be able to conduct market specific USA development work in the USA as it introduces CMS systems in the rest of the world.

### *Europe*

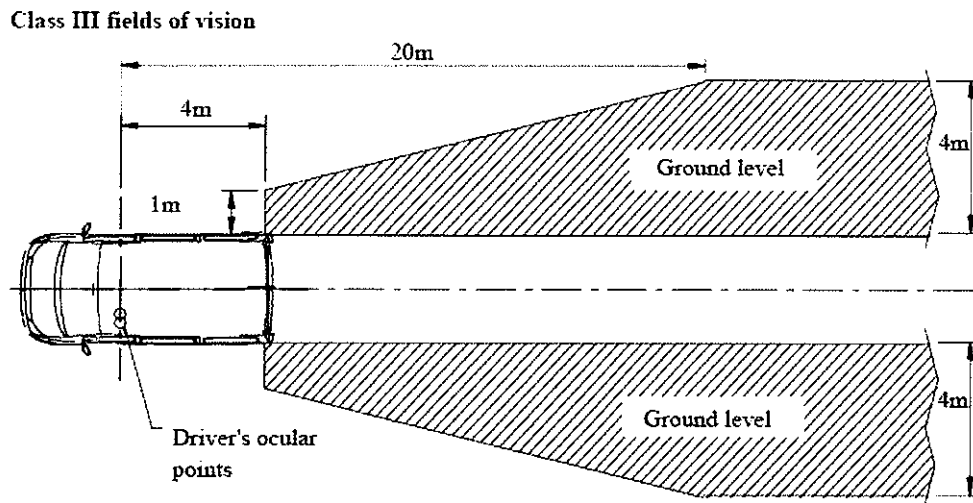
The established European regulation, ECE R46, was amended in July 2016 to permit the use of CMS technology: Regulation No. 46, Uniform provisions concerning the approval of devices for indirect vision and of motor vehicles with regard to the installation of these devices. See <http://www.unece.org/fileadmin/DAM/trans/main/wp29/wp29regs/2016/R046r6e.pdf><sup>3</sup>

**Audi's CMS is currently in the process of obtaining type-approval under ECE Reg. 46.** We already have received approval for the component portion of the type approval. See Attachment 2. We are continuing forward with the vehicle portion of the CMS type approval and expect to receive it by September 2018. Once Audi receives the final type approval, we will submit a supplement to this petition establishing full homologation of its CMS to ECE Reg. 46.

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<sup>3</sup> ISO -- Addendum 45 to ECE Reg 46 arose out of the ISO CMS standard, See <https://www.iso.org/obp/ui/#iso:std:iso:16505:ed-1:v1:en>. ISO 16505 -- Road Vehicles -- Ergonomic and Performance Aspects of Camera-Monitor Systems -- Requirements and Test Procedures. This standard provides minimum safety, ergonomic, and performance requirements as well as test methods for CMS as an acceptable optional replacement for currently mandated rear and side view mirrors for road vehicles.

Significantly, as shown in the figure below, the Audi CMS in default view meets the ECE mirror FoV requirements for Class III rear-view devices (R46 paragraph 15.2.4.3.2 (see Figure 1), with at least the required magnification and resolution as defined in R46 paragraph 16.1.3).



Source: E/ECE/324/Rev.1/Add.45/Rev.6

In addition, the Audi CMS in default view, will provide a FoV that is equal to or greater than that currently required for mirror systems in FMVSS 111.

#### Japan

In 2016, Japan's transportation ministry approved mirrorless cars to drive on its roads. See *The Japan Times* and *Automotive News*. Japan is adopting ECE R46.

#### Canada

While CMS systems in lieu of mirrors is not yet permitted in Canada, in October 2016, Transport Canada solicited comments on potential amendments to the Canadian safety standards to allow rear-view cameras and in-vehicle displays to replace conventional rear-view mirrors. TC said:

Transport Canada is soliciting comments from stakeholders regarding amendments to the Canadian safety standard to allow rear-view cameras and in-vehicle displays to replace conventional rear-view mirrors. Comments must include substantiating evidence to support a stakeholder's position. Based on comments received and the Department's review and/or evaluation of these systems, a decision will be made on whether to permit camera-based rear-view visibility systems on Canadian vehicles in lieu of the conventional rear-view mirrors. If permitted, this allowance would be published as part of the final version of the amendments in the *Canada Gazette*, Part II. See <http://www.gazette.gc.ca/rp-pr/p1/2016/2016-10-29/html/reg3-eng.html>

#### ROW

In addition to Japan, roughly 50 other nations around the world have adopted the amended version of ECE R46 in order to allow CMS on their roads. Audi believes that adoption of amended R46 on this scale further demonstrates that certification to this rigorous standard establishes that the ECE type-approved CMS system is robust and ensures a high level of safety.

In view of the above, Audi's request for a temporary Part 555.6(b) exemption to facilitate CMS development and evaluation in the US is part of a larger Audi effort to implement this technology world-wide. Audi's petition seeks to keep its US vehicle fleet current with international progress towards providing safer rear visibility as well as the benefits of increased fuel economy and lower GHG emissions, as discussed below.

### **III. DESCRIPTION OF THE AUDI CMS SYSTEM AND HOW IT WORKS**

The Audi CMS uses 2 small cameras mounted externally where traditional side view mirrors are typically installed, at the base of the A-pillar. The cameras face rearward and feed into a control unit (1 on each side) where the camera data is processed and then displayed on high resolution OLED displays mounted in the interior of the vehicle. See Attachment 3 for images of the integrated system.

#### **Camera:**

The camera used on each side of the vehicle provides a resolution of over 1 million pixels (1289x1080) with a refresh rate of over 60 frames per second. Additionally, the lens has an opening of 40° vertical and 30° horizontal. This enables the driver to use pan and zoom functions with a jerk-free image display. The camera cube housing measures 20x20x34mm which allows the use of a camera wing providing a significant improvement of 1.5% to vehicle range and a reduction of about 1 g of CO<sub>2</sub>/km. In order to avoid camera obstruction from water, ice, dirt, or road grime, the exterior lens of the camera is heated and coated with an anti-stick material.

#### **Control Unit:**

Each display has a control unit mounted behind it which serves a variety of functions for the CMS. First, the control unit is responsible for taking the raw camera data and processing it to transmit it to the display. Second, it enables the CMS display to provide a driver interface which allows adjustment to certain aspects of the system by physically manipulating the screen. Third, the control unit allows the CMS to be calibrated at the workshop when necessary, and to run self-diagnostics to ensure the system is working properly. Lastly, the control unit is able to optimize system functionality by showing sophisticated warnings and advanced indicators to the driver, based on camera information.

#### **Display:**

The display is mounted near the top forward corner of the door with a slight rotation towards the driver's seating position. The OLED display mounted inside the vehicle is approximately 7 inches wide and features a resolution of 1280x800 with a 60 FPS frame rate. The display also uses a capacitive touch system that enables the driver to interact and adjust the display similar to how they would on a conventional mirror system.

#### **Additional CMS Safety Functions:**

In addition to meeting the performance requirements of ECE R46, the Audi CMS system also features innovative safety functions that provide enhanced safety information to the driver. These integrated functions include:

- critical object detection
- marking and warning
- safe exit information (which monitors approaching objects from the rear and can alert occupants if they are opening their door to avoid a collision)
- blind spot detection that can indicate when another vehicle is located in the driver's blind spot

**These additional systems which are integrated into the CMS are clear safety advantages, and granting the requested exemption will make these advantages available to USA purchasers.**

#### **IV. RESEARCH, DEVELOPMENT, AND TESTING ESTABLISHING THE INNOVATIONAL AND SAFETY-IMPROVING NATURE OF THE CMS.**

##### **The BASt Study in Germany**

In 2015, the German Federal Highway Research Institute (BASt) conducted a study in which CMS and conventional exterior mirrors were compared and assessed in both on-road and static tests under different external conditions<sup>4</sup>. The study looked at both technical aspects of the systems as well as issues pertaining to the human- machine interface.

The study concluded that, in general, it is possible to use CMS to display a quality rear view for the driver, both for cars and trucks. In fact, depending on the design of the CMS system, it is even possible to receive more information from a CMS than is possible with mirror systems – and possible to provide such additional information without information overload. The study did conclude that the change from mirrors to CMS requires a certain period of driver familiarization, but that this period is relatively short.<sup>5</sup> We note that the BASt study did not indicate any significant differences between eye glance patterns/durations for mirrors and CMS. See Attachment 4 for more information regarding the BASt study.

##### **Audi Virtual Mirror Study with Spiegel Institut Manheim**

In 2017, Audi worked in conjunction with the Spiegel Institut Manheim to conduct a study that aimed to investigate the performance and acceptability of CMS compared to conventional mirror systems (see Attachment 5). By analyzing driver gaze and vehicle data, the study measured the performance of test subjects in various scenarios, while the vehicle was both stationary and driving. 51 drivers were given a fixed 19km route and were instructed to conduct a series of lane change, overtaking, and parking maneuvers at various points throughout the route. The performance of these tasks was evaluated, along with an extensive driver survey, to determine

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<sup>4</sup> Schmidt, E. A., Hoffmann, H., Krautscheid, R., Bierbach, M., Gail, J., Lotz-Keens, C. (2015), Camera-Monitor Systems as a Replacement for Exterior Mirrors in Cars and Trucks, Federal Highway Research Institute (BASt)

<sup>5</sup> This last conclusion is consistent with the introduction of rear view back up cameras and the familiarization to looking at the back up camera display.

how well the system performed, in which ways the system provided benefit to the drivers, and how the system could be improved.

The study found that while initial reactions to the CMS were mixed, with many participants indicating skepticism towards the system, once participants became familiar with CMS, their skepticism began to fade. As familiarization increased, the successful usage of the system during driving maneuvers improved. Participants found that in many driving scenarios the CMS gave them a sense of safety and reliability on par with conventional mirrors. Overall, participants found viewing the rear view image in the CMS to be more pleasing compared to the conventional mirrors.

With respect to the driving maneuvers, data from the second trial showed CMS results roughly the same as results with the conventional mirror system. In the end, just over half of the participants said that they would choose a CMS over a mirror system. Audi believes this to be a strong positive result for CMS technology as, prior to participating in this study, all participants had only ever driven with mirror systems and their familiarity with CMS was very limited.

Audi took the criticisms and feedback gathered from the test group participants and implemented improvements that would alleviate these concerns. Specifically, according to the Study, the attributes of the CMS that needed to be addressed in the future included increasing the display size and simplifying the adjustability process, especially for the passenger side display. The CMS for which we are seeking exemption has undergone updates since this study was conducted in order to address the concerns expressed by the participants.

### **USA Naturalistic Driving Study for CMS**

Volkswagen Group (including Audi), along with 4 other OEMs and 2 Tier One suppliers, are currently participating in a Naturalistic Driving Study (NDS) being conducted by the Virginia Tech Transportation Institute (VTTI). This study is also researching the acceptance and performance of CMS systems relative to conventional mirror systems. The final results are expected to be available by December, 2019. The project aims to achieve the following objectives:

1. Gather data to support NHTSA rulemaking efforts with regard to camera-based side view systems by assessing the safety and relative performance of camera-based systems compared to conventional mirror systems;
2. Explore potential user adaptations (changes in driver behavior) or unintended consequences associated with camera-based systems;
3. Identify the influence of moderating factors (driver age, system experience, environmental conditions, driving maneuvers, etc.) on performance; and
4. Assess usability and customer acceptance of camera-based systems.

The results of this study will provide important objective data to support an amendment to FMVSS 111 permitting the use of CMS technology. If NHTSA were to grant our exemption request, Audi would have an opportunity provide to the Agency additional feedback -- *beyond and in addition to the NDS study* -- based on thousands of records from consumers who purchase the vehicles to which this exemption would apply.



## **The Current Audi CMS System Has Been Improved Based on NHTSA Comments on Earlier Version of the CMS**

In 2016, NHTSA made the following positive qualitative observations about an earlier version of the Audi CMS:

- Image clarity seems good
- In dawn and dusk conditions, displayed images appeared
- Brighter (helpful) than what would be seen with traditional mirrors
- Field of view seems adequate
- No problems observed with reflections on the displays

NHTSA did have a few suggestions on how to improve the system, and since the NHTSA evaluation, numerous technical elements of the Audi CMS have been upgraded and enhanced to address NHTSA concerns. The camera, image processor, OLED display, and optical element, for example, have all been given significant improvements to address opportunities for optimization identified in the NHTSA evaluation.<sup>6</sup>

### **V.**

#### **THE LEVEL OF SAFETY OF THE CURRENT AUDI CMS IS EQUIVALENT TO, OR EXCEEDS, THE LEVEL OF SAFETY ESTABLISHED IN FMVSS 111, AND THE EXEMPTION IS IN THE PUBLIC INTEREST**

##### ***A. The Audi CMS is Fully Consistent with the Purpose of FMVSS 111; the CMS Meets and Exceeds Current FMVSS 111 Field of View Requirements***

As noted above, the purpose of FMVSS 111 is “to reduce the number of deaths and injuries that occur when the driver of a motor vehicle does not have a clear and reasonably unobstructed view to the rear.” The requested exemption is entirely consistent with this purpose because CMS technology provides an as good, if not better, “clear and reasonably unobstructed view to the rear.” In fact, the Audi CMS meets the FMVSS 111 FoV requirements -- we are only requesting an exemption from the requirement that we must meet the required FoV/view requirements with mirrors.

We wish to repeat and emphasize that in its default view, the Audi CMS provides the same perspective, and other FoV criteria as an FMVSS 111-compliant mirror, displaying the entire FoV mandated by FMVSS.

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<sup>6</sup> In the e-tron, the vehicle which would use the requested exemption here, Audi has placed the display of the CMS slightly higher and closer to where a traditional mirror would be placed compared to the prototype CMS that had been evaluated by NHTSA. This was possible because the e-tron was designed from the beginning to have a CMS installed, allowing the display position to be optimized and more user friendly.

Moreover, the exempted Audi cars will actually have a FoV better than that required by FMVSS 111.

Today, blind spots still exist with FMVSS 111-compliant mirror systems. Audi's CMS is capable of delivering an unobscured view of up to 43°. In order to fulfill the magnification factor requirement of ECE R46, the CMS default view displays approximately 35° of unobstructed view, however, an auxiliary viewing mode can display the full 43° view if the driver chooses.

### ***B. The Audi CMS Complies with ECE Requirements***

Audi's compliance with ECE R46 is further evidence that the CMS will offer a level of safety at least equal to that of a US vehicle equipped with conventional mirrors.

ECE R46 is focused on safety and provides substantial minimum requirements for numerous aspects of a CMS including; luminance adjustment, image quality, monitor isotropy, directional uniformity, lateral uniformity, luminance and contrast rendering (in direct sunlight conditions as well as a day condition daylight exposure test designed to ensure the functionality of the system in direct sunlight conditions), grey scale and color rendering, blooming and lens flare, sharpness and depth of field, geometric distortion, system latency, monitor glare, magnification factor and resolution.

### ***C. Other Factors Support the Conclusion that the Audi CMS Offers an Equivalent Level of Safety***

The Audi CMS camera is subjected to a variety of durability and reliability development tests which simulate a lifetime of 15 years and validate design requirements which include: humidity with temperature shock; salt spray and dust.

The durability and reliability of the CMS will be comparable to other electronic systems and displays already used in US vehicles, including countermeasures that are currently employed for FMVSS 111 back up cameras (humidity requirements and test procedures).

The cover of the CMS rearward looking camera includes the following features to minimize lens obstruction due to dirt or water:

- Aerodynamically optimized to optimize wind flow over cover glass
- Coated protective cover glass
- Heater to dry lens
- Focus point of camera is well past the cover glass surface and “looks past” a significant amount of obstructions
- If the driver does not notice that the view is being obscured, algorithms are used to calculate the degree of obstruction to:
  - 1st: Turn the protective cover glass heater on to dry the cover glass
  - 2nd: Inform the driver that the camera cover glass is obstructed and needs to be cleared.

#### ***D. Audi's Real World Experience with CMS Shows They are at Least as Safe as Conventional Mirrors***

The above discussed BAST, Manheim and NDS studies do not reveal a significant safety risk associated with CMS.

In addition, in 2013, VW produced a novel vehicle called the XL1 which was designed to display the brand's approach to optimizing maximum energy efficiency. In order for the vehicle to achieve its 261 MPG figure, a CMS was installed to minimize aerodynamic drag. While CMS was not permitted in Europe at the time, an exemption was granted which permitted VW to sell 250 XL1s in Germany and Austria.

The overall feedback received from the customers who purchased these vehicles was positive. Once familiar with the system, they found the performance and usability of the system to be just as good as or better than a conventional mirror system.

**To date, VW is not aware of any customer complaints or warranty claims regarding the XL1 CMS. Additionally, VW is not aware of any accidents or property damage claims caused by a failure or misuse of the CMS in the XL1.**

#### ***E. Additional Environmental Benefit of the CMS System***

Greenhouse gas and corporate average fuel economy requirements are front-page news and of significant importance to the US and the world. CMS technology provides increased fuel efficiency through lighter weight (compared to mirrors) and improved aerodynamics (by replacement of large wind-catching mirrors and with smaller cameras). CMS allow reduction in GHG without regard to whether the vehicle is an ICE, EV or fuel cell. CMS is clearly in the public interest because of the fuel savings provided without regard to the propulsion system of the vehicle.

**The vehicle on which the CMS will be mounted under the requested exemption will be fully electric, so the energy savings will be in range, not MPG. But our estimates indicate an increase in vehicle range of about 1.5%, or a 1 gram/km decrease in CO2 emissions.**

#### ***F. Additional Safety Features Included in the CMS System***

As noted above, the Audi CMS system features innovative safety functions that provide enhanced information to the driver. These integrated functions include:

- critical object detection,
- marking and warning;
- safe exit information (which monitors approaching objects from the rear and can alert occupants if they are opening their door to avoid a collision);
- blind spot detection that indicates when another vehicle is located in the driver's blind spot.

**These additional safety systems – not mandated by FMVSS but provided by the Audi CMS -- are clear advantages, and granting the requested exemption will make these available to USA purchasers.**

In addition, the benefits of utilizing an exterior mounted camera versus a conventional mirror also affords the driver increased side/forward visibility. In the case of the e-tron, the smaller camera decreases the forward field of view obstruction caused by a conventional mirror by roughly 90%. This enables the driver to see a less obstructed side-forward view in situations where they are making sharp turns or performing parking maneuvers at low speeds where objects such as potholes, parking pillars, and pedestrians require the driver to have an acute sense of the vehicle's position and intended path of travel.

### ***G. In Sum***

Based on the above, the Audi CMS provides an equivalent level of safety to that mandated by FMVSS 111.

The benefits of CMS, and how such systems are indeed in the public interest, are further discussed in the Tesla/Alliance Petition for Rulemaking (Attachment 1), and the description of those benefits is herein incorporated by reference.

## **VI.**

### **A TEMPORARY EXEMPTION WOULD FACILITATE AUDI'S DEVELOPMENT AND FIELD EVALUATION OF THE CMS**

A temporary exemption would facilitate Audi's field evaluation of the CMS. Most importantly, the annual 2500 car USA CMS fleet is needed to obtain data on customer acceptance/reaction and to evaluate the performance of the CMS in specific real-world, in-use situations unique to the US market.

Audi intends to collect feedback from customers who purchase exempted vehicles and to obtain data multiple times throughout the duration of the exemption. Each time the customer brings their vehicle to the dealer for service or routine maintenance, the customer will be given a survey. The survey will inquire about the customer's typical driving characteristics, satisfaction with the CMS, overall CMS performance, and views on the safety of the CMS. Audi thinks that, by conducting the survey in this way, we will be able to both achieve a relatively high response rate as well as monitor changes in customer responses based on length of time of ownership and mileage.

Additionally, Audi will collect customer feedback through our customer care center. Any case that customer contact with customer care -- as a result of a phone, email, or social media -- will be recorded and collected for further analysis as part of the exemption program.

CMS on exempted vehicles will provide first hand data on the human factors associated with such things as monitor location during real world driving during prolonged usage of the system on a regular basis.

## VII. CONCLUSION

*Based upon the foregoing, Audi requests an exemption from the above-referenced sections of FMVSS 111 for vehicles produced on or after the date of approval of our request and lasting for 24 months thereafter.*

Granting Audi's exemption request would be consistent with the January 2016 DOT Policy Statement supporting innovation. The Policy states in part as follows:

- *DOT and NHTSA policy is to facilitate and encourage wherever possible the development and deployment of technologies with the potential to save lives.*
- *To that end, NHTSA will use all available tools to determine the safety potential of new technologies; to eliminate obstacles that would prevent or delay technology innovations from realizing that safety potential; and to work with industry, governmental partners at all levels, and other stakeholders to develop or encourage new technologies and accelerate their adoption where appropriate*
- *NHTSA will fully utilize its currently available regulatory tools, such as interpretations and exemptions, to more rapidly enable safety innovations. (Emphasis added.)*

See also <https://www.transportation.gov/fastlane/detroit-auto-show-automated-vehicles>

NHTSA has further indicated -- in its September 2016, automated vehicle policy announcement - that its goal is to decide advanced technology exemption requests within 6 months of submission. Adherence by NHTSA to this expedited schedule in deciding Audi's request would benefit both CMS development as well as roadway safety.

### ***One Final Note on State Laws***

Should NHTSA grant the requested exemption to permit CMS in lieu of mirrors, NHTSA should make clear in its Federal Register notice granting the exemption that the exemption will preempt any State laws requiring mirrors. Under 49 USC §30103, NHTSA has authority to supersede such State requirements.

Respectfully submitted,



Thomas Zorn  
Senior Director  
Safety Affairs & Advanced Research