

DEPARTMENT OF TRANSPORTATION

National Highway Traffic Safety Administration

[Docket No. NHTSA-2011-0100]

**Notice of Intent to Prepare an Environmental Assessment
for Pedestrian Safety Enhancement Act of 2010 Rulemaking**

AGENCY: National Highway Traffic Safety Administration (NHTSA), Department of Transportation (DOT).

ACTION: Notice of intent; request for scoping comments.

SUMMARY: Pursuant to the National Environmental Policy Act (NEPA), NHTSA plans to analyze the potential environmental impacts of the agency's rulemaking to implement the Pedestrian Safety Enhancement Act of 2010. The Pedestrian Safety Enhancement Act mandates a rulemaking to establish a standard requiring electric and hybrid vehicles to be equipped with a pedestrian alert sound system that would activate in certain vehicle operating conditions to aid visually-impaired and other pedestrians in detecting the presence, direction, location, and operation of those vehicles.

Under NEPA, once an agency determines the purpose and need of the proposed federal action, it engages in scoping. This is the process by which the scope of the issues and the alternatives to be examined are determined. This notice initiates the scoping process by inviting comments from Federal, State, and local agencies, Indian Tribes, and the public to help identify the environmental issues and reasonable alternatives to be examined under NEPA. This notice also provides guidance for participating in the scoping process and additional information about the alternatives NHTSA expects to consider in its NEPA analysis.

DATES: The scoping process will culminate in the preparation and issuance of an Environmental Assessment (EA), which will be made available for public comment. To ensure that NHTSA has an opportunity to consider scoping comments fully and to facilitate NHTSA's prompt preparation of the EA, scoping comments should be submitted in time to ensure that they will be received on or before **[INSERT DATE THAT IS 30 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER]**. NHTSA will try to consider comments received after that date to the extent the rulemaking schedule allows.

ADDRESSES: You may submit comments to the docket number identified in the heading of this document by any of the following methods:

- Federal eRulemaking Portal: Go to <http://www.regulations.gov>. Follow the online instructions for submitting comments.
- Mail: Docket Management Facility, M-30, U.S. Department of Transportation, West Building, Ground Floor, Room W12-140, 1200 New Jersey Avenue, S.E., Washington, DC 20590.
- Hand Delivery or Courier: U.S. Department of Transportation, West Building, Ground Floor, Room W12-140, 1200 New Jersey Avenue, S.E., Washington, DC, between 9 a.m. and 5 p.m. Eastern time, Monday through Friday, except Federal holidays.
- Fax: 202-493-2251.

Regardless of how you submit your comments, you should mention the docket number of this document.

You may call the Docket at 202-366-9324.

Note that all comments received, including any personal information provided, will be posted without change to <http://www.regulations.gov>.

FOR FURTHER INFORMATION CONTACT: For technical issues, contact Gayle Dalrymple, Office of Crash Avoidance Standards, National Highway Traffic Safety Administration, 1200 New Jersey Avenue, S.E., Washington, DC 20590. Telephone: 202-366-1810. For legal issues, contact Thomas Healy, Office of the Chief Counsel, National Highway Traffic Safety Administration, 1200 New Jersey Avenue, S.E., Washington, DC 20590. Telephone: 202-366-2992.

SUPPLEMENTARY INFORMATION: In a forthcoming notice of proposed rulemaking, NHTSA intends to propose a Federal motor vehicle safety standard requiring electric and hybrid vehicles to be equipped with a pedestrian safety (PEDSAFE) sound system that emits a sound in certain operating conditions to aid visually-impaired and other pedestrians in detecting the presence and operation of those vehicles. The issuance of a PEDSAFE standard is mandated by the Pedestrian Safety Enhancement Act of 2010 (“Pedestrian Safety Act”).¹

In connection with this action, NHTSA intends to prepare an EA analyzing the potential environmental impacts of the proposed safety standard and reasonable alternative standards pursuant to the National Environmental Policy Act (NEPA) and implementing regulations issued by the Council on Environmental Quality (CEQ) and NHTSA.² NEPA requires Federal agencies to consider the potential environmental impacts of their proposed actions and reasonable alternatives in their decisionmaking. To inform decisionmakers and the public, the NEPA analysis will compare the potential environmental impacts of the agency's preferred alternative and reasonable alternatives, including a “no action” alternative. As required by NEPA, the

¹ The Pedestrian Safety Act is Public Law No. 111-373, 124 Stat. 4086 (January 4, 2011). 49 USC § 30111 note.

² NEPA is codified at [42 U.S.C. §§ 4321-4347](#). CEQ's NEPA implementing regulations are codified at 40 CFR Pts. 1500-1508, and NHTSA's NEPA implementing regulations are codified at 49 CFR Part 520.

agency will consider direct, indirect, and cumulative impacts and discuss impacts in proportion to their significance.

I. Background

A. 2008 NHTSA public meeting

On May 30, 2008, NHTSA published a notice³ in the Federal Register announcing the holding of a public meeting on June 23, 2008 to bring together government policymakers, stakeholders from the visually-impaired community, industry representatives and public interest groups to discuss the technical and safety policy issues associated with hybrids, all-electric vehicles and quiet internal combustion engine vehicles, and the resultant risks to visually-impaired pedestrians. The prepared presentations submitted at the meeting and a transcript of the meeting can be found in Docket No. NHTSA-2008-0108 on <http://www.regulations.gov>.⁴

B. 2009 and 2010 NHTSA reports

In the two years following the public meeting, NHTSA issued two reports, one in October 2009 and the other in April 2010. The earlier report was entitled “Research on Quieter Cars and the Safety of Blind Pedestrians, A Report to Congress.”⁵ The report briefly discussed the quieter cars issue, how NHTSA’s research plan addresses the issue, and the status of the agency’s research in following that plan. In an effort to quantify the problem of hybrid crashes with pedestrians, NHTSA examined the incidence rates for crashes involving hybrid electric vehicles and pedestrians under different circumstances, using data from 12 states, and compared the results to those for internal combustion engine (ICE) vehicles. This study, which was based

³ 73 Fed. Reg. 31187; May 30, 2008.

⁴ The presentations are in document # 0012 and the transcript is in document # 0023 (Docket No. NHTSA-2008-0108-0012 and Docket No. NHTSA-2008-0108-0023, respectively).

⁵ Research on Quieter Cars and the Safety of Blind Pedestrians, A Report to Congress, National Highway Traffic Safety Administration, U.S. Department of Transportation, Washington, D.C., October 2009, available at <http://www.nhtsa.gov/DOT/NHTSA/NVS/Crash%20Avoidance/Technical%20Publications/2010/RptToCongress091709.pdf>.

on a small sample size, found an increased rate of pedestrian crashes for hybrid vehicles compared to their peer ICE vehicles.

In the April 2010 report,⁶ NHTSA said that it recognized that quieter cars, such as hybrid-electric vehicles in low-speed operation using their electric motors, may introduce a safety issue for pedestrians who are visually-impaired. This study documented the overall sound levels and general spectral content (i.e., the characteristics of the sound such as frequency, phase, and amplitude values of the sound) for a selection of hybrid-electric and internal combustion vehicles in different operating conditions, evaluated vehicle detectability for two surrounding (or ambient) sound levels, and considered countermeasure concepts that are categorized as vehicle-based, infrastructure-based, and systems requiring vehicle-pedestrian communications.

Some of the main findings were that overall sound levels for the hybrid-electric vehicles tested were lower at low speeds than for the internal combustion engine vehicles tested. There were also significant differences in human subjects' response time depending on whether electric or internal combustion propulsion was used at both the lower and higher levels of ambient sound. Candidate countermeasures were discussed in terms of types of information provided (direction, vehicle speed, and rate of speed change, etc); useful range of detection of vehicles by pedestrians, warning time, user acceptability, and barriers to implementation. This study provided baseline data on the acoustic characteristics and auditory detectability of a vehicle when a single vehicle is tested at a time.

C. 2011 Pedestrian Safety Act

⁶ Garay-Vega, Lisandra; Hastings, Aaron; Pollard, John K.; Zuschlag, Michael; and Stearns, Mary D., Quieter Cars and the Safety of Blind Pedestrians: Phase I, John A. Volpe National Transportation Systems Center, DOT HS 811 304 April 2010, available at <http://www.nhtsa.gov/DOT/NHTSA/NVS/Crash%20Avoidance/Technical%20Publications/2010/811304rev.pdf>.

The Pedestrian Safety Act requires NHTSA to conduct a rulemaking to establish a Federal motor vehicle safety standard⁷ requiring an alert sound for pedestrians to be emitted by all types of motor vehicles⁸ that are electric vehicles⁹ or hybrid vehicles¹⁰ (EVs and HVs). Thus, the covered types of vehicles include not only light vehicles (passenger cars, vans, sport utility vehicles and pickup trucks), but also low speed vehicles, motorcycles, medium and heavy trucks and buses.

The rulemaking must be initiated not later than 18 months after the date of enactment of the Pedestrian Safety Act. Given that the date of enactment was January 4, 2011, rulemaking must be initiated by July 4, 2012.

The PEDSAFE standard must specify performance requirements for an alert sound that enables visually-impaired and other pedestrians to reasonably detect EVs and HVs operating below their cross-over speed.¹¹ The Pedestrian Safety Act defines “alert sound” as a vehicle-emitted sound that enables pedestrians to discern the presence, direction,¹² location, and operation of the vehicle.¹³

⁷ NHTSA is delegated authority by the Secretary of Transportation to carry out Chapter 301 of Title 49 of the United States Code. See 49 CFR § 501.2. This includes the authority to issue Federal motor vehicle safety standards. 49 U.S.C. § 30111.

⁸ Section 2(4) of the Pedestrian Safety Act defines the term “motor vehicle” as having the meaning given such term in section 30102(a)(6) of title 49, United States Code, except that such term shall not include a trailer (as such term is defined in section 571.3 of title 49, Code of Federal Regulations). Section 30102(a)(6) defines “motor vehicle” as meaning a vehicle driven or drawn by mechanical power and manufactured primarily for use on public streets, roads, and highways, but does not include a vehicle operated only on a rail line.

⁹ Section 2(10) of the Pedestrian Safety Act defines “electric vehicle” as a motor vehicle with an electric motor as its sole means of propulsion.

¹⁰ Section 2(9) of the Pedestrian Safety Act defines “hybrid vehicle” as a motor vehicle which has more than one means of propulsion. As a practical matter, this term is currently essentially synonymous with “hybrid electric vehicle.”

¹¹ Section 2(3) of the Pedestrian Safety Act defines “cross-over speed” as the speed at which tire noise, wind resistance, or other factors make an EV or HV detectable by pedestrians without the aid of an alert sound. The definition requires NHTSA to determine the speed at which an alert sound is no longer necessary.

¹² The Pedestrian Safety Act does not specify whether vehicle “direction” is to be defined with reference to the vehicle itself (thus meaning forward or backward) or the pedestrian.

¹³ Section 2(2) of the Pedestrian Safety Act.

The Pedestrian Safety Act specifies several requirements regarding the performance of the alert sound to enable pedestrians to discern the operation of motor vehicles. First, the alert sound must be sufficient to allow a pedestrian to reasonably detect a nearby EV or HV operating at constant speed, accelerating, decelerating and operating in any other scenarios that NHTSA deems appropriate.¹⁴ Second, it must reflect the agency's determination of the minimum sound level emitted by a motor vehicle that is necessary to allow visually-impaired and other pedestrians to reasonably detect a nearby EV or HV operating below the cross-over speed.¹⁵ Third, it must reflect the agency's determination of the performance requirements necessary to ensure that each vehicle's alert sound is recognizable to pedestrians as that of a motor vehicle in operation.¹⁶

The Pedestrian Safety Act mandates that the PEDSAFE standard shall not require the alert sound to be dependent on either driver or pedestrian activation. It also requires that the safety standard allow manufacturers to provide each vehicle with one or more alert sounds that comply, at the time of manufacture, with the safety standard. Each vehicle of the same make and model must emit the same alert sound or set of sounds. The standard is required to prohibit manufacturers from providing anyone, other than the manufacturer or dealers, with a device designed to disable, alter, replace or modify the alert sound or set of sounds emitted from the vehicle. A manufacturer or a dealer, however, is allowed to alter, replace, or modify the alert sound or set of sounds in order to remedy a defect or non-compliance with the safety standard.

Because the Pedestrian Safety Act directs NHTSA to issue these requirements as a motor vehicle safety standard under the National Traffic and Motor Vehicle Safety Act (Vehicle Safety

¹⁴ Section 3(a) of the Pedestrian Safety Act.

¹⁵ Section 3(b) of the Pedestrian Safety Act.

¹⁶ Section 3(b)(2) of the Pedestrian Safety Act.

Act),¹⁷ the requirements must comply with that Act as well as the Pedestrian Safety Act. The Vehicle Safety Act requires each safety standard to be performance-oriented, practicable,¹⁸ and objective¹⁹ and meet the need for safety. In addition, in developing and issuing a standard, NHTSA must consider whether the standard is reasonable, practicable, and appropriate for each type of motor vehicle covered by the standard.

As a federal motor vehicle safety standard, the pedestrian alert sound system standard would be enforced in the same fashion as any other safety standard issued under the Safety Act. Thus, violators of the standard would be subject to civil penalties.²⁰ A vehicle manufacturer would be required to conduct a recall and provide remedy without charge if its vehicles were determined to fail to comply with the standard or if the alert sound system were determined to contain a safety related defect.²¹ Further, vehicle manufacturers, distributors, dealers, and motor vehicle repair businesses would be prohibited from rendering the sound system inoperative.²²

The Pedestrian Safety Act requires NHTSA to consider the overall community noise impact of any alert sound required by the safety standard. In addition, NHTSA will consider the environmental analysis prepared under NEPA when setting the standard.

As part of the rulemaking process, NHTSA is expressly required by the Pedestrian Safety Act to consult with:

¹⁷ 49 U.S.C. Chapter 301.

¹⁸ In a case involving passive occupant restraints, the U.S. Circuit Court of Appeals for D.C. said that the agency must consider public reaction in assessing the practicability of required safety equipment like an ignition interlock for seat belts. *Pacific Legal Foundation v. Department of Transportation*, 593 F.2d 1338 (D.C. Cir. 1978). cert. denied, 444 U.S. 830 (1979).

¹⁹ In a case involving passive occupant restraints, the U.S. Circuit Court of Appeals for the 6th Circuit said, quoting the House Report (H.R. 1776, 89th Cong. 2d Sess. 1966, p. 16) for the original Vehicle Safety Act, that “objective criteria are absolutely necessary so that ‘the question of whether there is compliance with the standard can be answered by objective measurement and without recourse to any subjective determination.’” *Chrysler v. Department of Transportation*, 472 F.2d 659 (6th Cir. 1972).

²⁰ 49 U.S.C. §§ 30112 and 30165.

²¹ 49 U.S.C. §§ 30118-30120.

²² 49 U.S.C. § 30122.

- The Environmental Protection Agency (EPA) to assure that any alert sound required by the rulemaking is consistent with noise regulations issued by that agency;
- Consumer groups representing visually-impaired individuals;
- Automobile manufacturers and trade associations representing them;
- Technical standardization organizations responsible for measurement methods such as
 - the Society of Automotive Engineers,
 - the International Organization for Standardization, and
 - the United Nations Economic Commission for Europe, World Forum for Harmonization of Vehicle Regulations.²³

Under the Act, NHTSA must publish a final rule establishing the standard requiring an alert sound for EVs and HVs by January 4, 2014. The Pedestrian Safety Act requires that the agency provide a phase-in period, as determined by NHTSA. However, full compliance with the standard must be achieved for all vehicles manufactured on or after September 1st of the calendar year beginning three years after the date of publication of the final rule. Thus, if the final rule were promulgated sometime in 2013, the three-year period after the date of publication of the final rule would end sometime in 2016. The first calendar year that would begin after that date in 2016 would be calendar year 2017. Thus, under that time scenario, full compliance would be required not later than September 1, 2017.

Finally, the Pedestrian Safety Act requires NHTSA to conduct a study and report to Congress whether the agency believes that there is a safety need to require alert sounds for motor vehicles with internal combustion engines. The report must be submitted to Congress by January

²³ NHTSA officials have been participating in the meetings of the World Forum informal working group charged with addressing the problem of quiet cars. NHTSA is sending copies of this notice to that group and to each of the other organizations with which it is required to consult.

4, 2015. If NHTSA determines that there is a safety need to require alert sounds for those motor vehicles the agency must initiate a rulemaking to require alert sounds for them.

D. Related Activities

Other national regulatory bodies, international standards organizations, and automotive manufacturers are considering the possibility of adding alert sounds to EVs and HVs to aid pedestrian detection of these vehicles.

The Japanese Ministry of Land, Infrastructure, Transport and Tourism (MLIT), after studying the feasibility of alert sounds for EVs and HVs, issued guidelines for pedestrian alert sounds in 2010. MLIT concluded that pedestrian alert sounds should be required only on HVs that can run exclusively on an electric motor, EVs, and fuel-cell vehicles.²⁴ MLIT guidelines require that EVs and HVs generate a pedestrian alert sound whenever the vehicle is moving forward at any speed less than 20 km/h and when the vehicle is operating in reverse. MLIT guidelines do not require vehicles to produce an alert sound when the vehicle is operating, but stopped, such as at a traffic light.²⁵ The manufacturer is allowed to equip the vehicle with a switch to deactivate the alert sound temporarily.

The MLIT includes the following guidelines for the type and volume of sounds emitted by EVs and HVs:

- The sound shall be a continuous sound associated with a motor vehicle in operation.

²⁴ Guidelines for Measure against Quietness Problem of HV, [sic] MLIT and JASIC (2010). GRB Informal Group on Quiet Road Transport Vehicles (QRTV) Working papers of the 3rd informal meeting. Tokyo, 13-15 July 2010. Available at: http://www.unece.org/trans/main/wp29/wp29wgs/wp29grb/QRTV_3.html.

²⁵ The MLIT guidelines do not require that an EV or HV emit an alert sound when the vehicle is idling. Idling and stopped refer to the same operating scenario.

- The sound is not allowed to sound like sirens, chimes, bells, a melody, or a horn. The sound of animals, insects, and natural phenomena such as waves, wind, and river currents, are also prohibited.
- The sound shall be automatically altered in volume or tone, depending on the vehicle's speed for easier recognition of the movement of the vehicle.
- The volume of the sound shall not exceed the level of the sound generated by ICE vehicles operating at the speed of 20 km/h.

During its March 2011 session, the World Forum for Harmonization of Vehicle Regulation of the United Nations Economic Commission for Europe (UNECE) adopted guidelines covering alert sounds for EVs and HVs that are closely based on the Japanese guidelines.²⁶ The guidelines will be published as an annex to the UNECE Consolidated Resolution on the Construction of Vehicles (R.E.3). The guidelines developed by the UNECE recommend that EVs and HVs emit pedestrian alert sounds beginning when the vehicle starts moving and continuing until the speed of the vehicle reaches 20 km/h. The guidelines do not specify that a vehicle emit an alert sound when the vehicle is stopped or when a HV's ICE is engaged and thus emitting sound. As under the Japanese guidelines, manufacturers would be allowed to equip vehicles with an on-off switch that the driver can use to silence the alert sound. The UNECE guidelines also contain the same provisions for the type and volume of alert sounds emitted by EVs and HVs as do the Japanese guidelines.

²⁶ The guidelines were developed by the Informal Group on Quiet Road Transport Vehicles (QRTV), which operates under the auspices of the Working Party on Noise (GRB). Papers relating to the informal group's six periodic meetings may be found at http://live.unece.org/trans/main/wp29/wp29wgs/wp29grb/qrtv_1.html, http://live.unece.org/trans/main/wp29/wp29wgs/wp29grb/qrtv_2.html, http://live.unece.org/trans/main/wp29/wp29wgs/wp29grb/qrtv_3.html, http://live.unece.org/trans/main/wp29/wp29wgs/wp29grb/qrtv_4.html, http://live.unece.org/trans/main/wp29/wp29wgs/wp29grb/qrtv_5.html, and http://live.unece.org/trans/main/wp29/wp29wgs/wp29grb/qrtv_6.html.

The Vehicle Sound for Pedestrians (VSP) subcommittee of the Society of Automotive Engineers (SAE) is working to develop a test procedure to measure sound emitted by ICE vehicles and sound systems that procedure alert sounds for use on EVs and HVs.²⁷ SAE has developed a draft version of standard J2889-1, Measurement of Minimum Noise Emitted by Road Vehicles. The purpose of J2889-1 is to provide an objective, technology neutral test to measure the sound emitted by a vehicle in a specified ambient noise condition.²⁸ J2889-1 does not account for psychoacoustic factors such as annoyance, recognizability, or detectability. J2889-1 specifies the test site conditions, meteorological conditions, and ambient noise level under which the sound should be recorded. The test contains procedures for measuring the sound pressure level (loudness) in decibels and frequency content²⁹ and changes in sound pressure level and frequency content of sounds emitted by a vehicle in order to measure how the sounds relate to vehicle speed.

The International Organization for Standardization (ISO) is cooperating with SAE in its efforts to develop a vehicle minimum noise measurement standard. The ISO document (ISO/NP 16254 Measurement of minimum noise emitted by road vehicles)³⁰ and SAE document are reportedly technically identical. The standard will provide procedures for assessing the performance of countermeasure systems, including, for example, a pitch shift measurement procedure.

Automotive manufacturers that produce EVs for the U.S. market have developed various pedestrian alert sounds, recognizing that those vehicles, when operating at low speeds, pose a

²⁷ A late 2010 status report on this work can be found at <http://www.sae.org/events/gim/presentations/2011/VSP.pdf>.

²⁸ <http://standards.sae.org/wip/j2889/1/>

²⁹ Low frequency sounds have a low pitch like the notes on the lower end of a musical scale and high frequency sounds have a high pitch like the notes on the upper end of such a scale.

³⁰ http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=56019

risk to pedestrians. For example, the pedestrian alert system for the Nissan Leaf produces a sound that could be described as a high-pitched whirring sound that increases in volume as the vehicle accelerates forward. The pedestrian alert sound deactivates once the vehicle reaches 32 km/h (20 mph). The Leaf produces a beeping sound when operating in reverse. The vehicle is equipped with a switch that allows the driver to turn off the alert sound. The Leaf does not produce a sound when the vehicle is operating, but stopped.

The Chevrolet Volt, produced by General Motors, is equipped with a driver activated pedestrian alert system. The system, which is activated when the driver pulls back on the turn signal handle, emits a short horn pulse.

Automotive equipment manufacturers have begun developing speaker systems designed to produce alert sounds to install on EVs and HVs. Most of the systems have a single speaker that projects sound forward. The same speaker is used to provide an alert sound both when the vehicle is moving forward and when the vehicle is moving backward. Other systems currently under development would allow the pedestrian alert sound to be projected only in the direction of travel of the vehicle. Manufacturers of these systems indicate that the directional projection of warning sounds will reduce the amount of noise that the system must produce to provide acoustic cues to pedestrians of the presence of a nearby vehicle.

II. Purpose and Need for Rulemaking

The purpose of the rulemaking mandated by the Pedestrian Safety Act is to require EVs and HVs, which tend to be quieter than the ICE vehicles, to be equipped with a pedestrian alert sound system that would activate in certain vehicle operating conditions to aid visually-impaired and other pedestrians in detecting the presence, direction, location, and operation of those

vehicles. Taking this action is expected to reduce the number of incidents in which EVs and HVs strike pedestrians.

III. The Alternatives

This notice briefly describes a variety of possible alternatives that are currently under consideration by the agency, and seeks input from the public about these alternatives and about whether other alternatives should be considered as we proceed with the rulemaking and the EA. In developing Alternatives 2 through 5, NHTSA considered, as it is required to do so, the Pedestrian Safety Act's requirements for establishing a PEDSAFE standard. Those requirements are set out above in section I of this notice.

These alternatives are based on agency research seeking to determine, with due concern for environmental considerations, what type or types of sound will be most appropriate and effective for aiding pedestrians in detecting, identifying and localizing³¹ the sound of EVs and HVs both in the near future and in the more distant future as the percentage of EVs and HVs in the vehicle fleet increases. The agency notes that its research is ongoing and that outcome of that research could affect the array of alternatives from which a preferred alternative is selected for the notice of proposed rulemaking.

The alternatives currently under consideration are:

A. Alternative 1: “No Action” Alternative

This alternative assumes, strictly for purposes of NEPA analysis, that NHTSA would not issue a rule requiring pedestrian alert sounds for any electric or hybrid motor vehicles.³² NEPA requires agencies to consider a “no action” alternative in their NEPA analyses and to compare the effects of not taking action with the effects of the reasonable action alternatives to

³¹ Sound localization refers to determining the distance and direction of a detected sound.

³² See [40 CFR §§ 1502.2\(e\), 1502.14\(d\)](#).

demonstrate the different environmental effects of the action alternatives. In defining this baseline alternative, the agency would consider what actions might be taken by other parties in the absence of action by this agency. In other words, the agency would consider what the world would be like if a federal rule were not adopted. In this regard, the agency notes that manufacturers of electric vehicles have generally been equipping their vehicles with various types of pedestrian warning sounds,³³ but manufacturers of hybrid vehicles have generally not been doing so. NHTSA notes further that since the Pedestrian Safety Act directs the agency to issue a PEDSAFE standard for electric and hybrid vehicles, the statute does not permit the agency to take no action on this issue.³⁴

B. Alternative 2: Recordings of Actual Internal Combustion Engine Sounds

Under this regulatory alternative, recordings of sounds produced by ICE vehicles would be used to create the pedestrian alert sound. The sounds produced by an ICE vehicle would be recorded when the vehicle is operating at constant speeds, forward from 0 potentially up to 32 km/h (0 to 20 mph) and in reverse potentially up to 10 km/h (6 mph). Other components of a vehicle's noise output such as tire noise, aerodynamic noise, and air conditioning fan noise would not be included in the recording used for the alert sound because these sounds are also emitted by EVs and HVs. The sound system would be programmed so that the pedestrian alert sound would vary based on the speed and operating mode of the vehicle in which the system was installed. Regulatory compliance with this alternative might be determined by an objective test

³³ Until NHTSA completes its rulemaking under the Pedestrian Safety Act, the agency cannot fully determine the extent to which any of those systems might be compliant.

³⁴ CEQ has explained that “[T]he regulations require the analysis of the no action alternative even if the agency is under a court order or legislative command to act. This analysis provides a benchmark, enabling decision makers to compare the magnitude of environmental effects of the action alternatives. [See [40 CFR 1502.14\(c\)](#).] * * * Inclusion of such an analysis in the EIS is necessary to inform Congress, the public, and the President as intended by NEPA. [See [40 CFR 1500.1\(a\)](#).] “[Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations](#),” 46 FR 18026 (1981) (emphasis added).

that measured the overall decibel level and the average one-third octave band level³⁵ of the sound to ensure that the sound mimics as nearly as possible that of the ICE vehicle from which it was recorded.³⁶ The results from the sound recordings would be compared to the sound profile of an ICE reference.

The advantage of a pedestrian warning sound consisting of a recording of an ICE vehicle is that the sound would have the same sound characteristics and volume levels of ICE vehicles currently in use. Further, ICE sounds are known and accepted by pedestrians. The agency anticipates that ICE-based and ICE-like synthetic sounds (i.e., sounds that are representative of an ICE vehicle, but are not from a recording of an ICE vehicle) played at current vehicle sound levels would not significantly change the overall sound profile of urban (low-speed) traffic noise, except for some loss of lower frequencies. The overall sound of traffic noise would be similar for ICE sounds if ICEs were replaced one-to-one with HVs/EVs.

An ICE vehicle recording would be reasonably recognizable to pedestrians as the sound of a motor vehicle. However, if the recording were played through low-fidelity speakers, it would tend to sound somewhat higher, thinner, and more metallic than an ICE vehicle.³⁷ This is because this type of speaker cannot reproduce the low frequency components of ICE sounds, but can effectively project non-ICE vehicle sounds that are comprised of components in the higher frequency ranges. On the other hand, a pedestrian alert sound based on an ICE vehicle recording would also limit acoustic variation among alert sounds, thereby reducing the possibility that a

³⁵ An octave refers to the interval between one frequency and its double or its half. An octave relates exponential increases in the frequency spectrum to how humans perceive sound. A one-third octave band is an octave divided into thirds with the upper frequency limit being $2^{1/3}$ (1.26) times the lower frequency. A one-third octave band roughly corresponds to a human's ability to analyze different frequencies of sound separately. A measure of the one-third octave level captures the sound pressure level, also referred to as decibel level, of the different frequencies that make up the frequency spectrum that is audible to humans.

³⁶ As noted elsewhere in this document, given the limitations of the speakers that are likely to be used to comply with the standard to be issued by this agency, the sound as broadcasted will differ from the sound as recorded.

³⁷ This problem would also affect all of the other action alternatives.

multitude of different alert sounds from different vehicle models would annoy or confuse pedestrians.

In view of its similarity to ICE vehicle sounds, an ICE vehicle recording is presumed to be recognizable at the same distance as ICE vehicles are recognizable. The drawback to using an ICE vehicle recording as a pedestrian alert sound is that non-ICE vehicle sounds could possibly be designed so as to provide better detectability for pedestrians, presumably at lower decibel levels.

C. Alternative 3: Synthesized ICE-Equivalent Sounds

In this alternative, simulated ICE vehicle sounds would be synthesized directly by a digital-signal processor programmed to create ICE vehicle-like alert sounds that would vary pitch and loudness in relation to the speed and operating mode of the vehicle. The synthetic sounds would be based on actual ICE vehicle sounds.

The resulting synthesized sounds would resemble those of Alternative 2, and thus have advantages and disadvantages similar to those of that alternative.

The synthesized sounds would have an additional advantage as a result of having fewer components along the frequency spectrum. This could allow for better detectability in ambient noise environments in which those frequency components are not present. To the extent that detectability was aided, the decibel level could be commensurately lowered to reduce the potential for any environmental impact.³⁸ This adjustment would be intended to ensure that the sound impact of EVs and HVs would be no greater than that of existing ICE vehicles.

The compliance test method for alternative 3 would be the same as the method used in alternative 2.

³⁸ The same step would be taken for Alternatives 4 and 5.

D. Alternative 4: Combination of Synthesized Non-ICE Sounds and ICE

Components to Aid Recognition

This regulatory alternative would consist of a pedestrian alert sound combining some of the acoustic characteristics of sounds produced by ICE vehicles and some characteristics of non-ICE vehicle sounds engineered for enhanced detectability.

These types of sounds share some of same advantages and disadvantages of the sounds discussed in some of the other alternatives, especially Alternative 5.

One advantage of the combination of a synthesized sound and components of an ICE sound is that there is a greater likelihood that a pedestrian will recognize the sound as one coming from a motor vehicle.

Because this sound would not have a comparable ICE vehicle profile for which a safe detection distance at a given decibel level has been established, detectability of these sounds would likely need to be assessed through human subject testing. These combination ICE and non-ICE sounds would also vary pitch and loudness in relation to the speed and operating mode of the vehicle. Further, in addition to the issue of detectability, the agency must consider the issue of recognizability. It too likely could be assessed only through human-subject testing.

To the extent that the non-ICE elements permitted detection at lower decibel levels than the alternatives based on ICE sounds, the agency could specify such a lower decibel level in an effort to ensure that the potential for environmental impact would not be any greater than that for Alternatives 2 and 3. Because the sound for this alternative would contain acoustic characteristics of an ICE sound, it might prove more acceptable to the public than that for Alternative 5.

E. Alternative 5: Synthesized Non-ICE Sounds Developed to Enhance Detectability

Under this alternative, pedestrian alert sounds would be created based on psychoacoustic principles³⁹ using a digital-signal processor. Some characteristics common to these non-ICE vehicle sounds would include:

- Pitch shifting denoting vehicle speed change (in order to replicate a vehicle accelerating from 0 to 32 km/h (0 to 20 mph), a linear pitch change of approximately 40% is necessary, based on changes in vehicle speed);
- Pulsating quality, with pulse widths of 100 to 200 msec and about three to ten pulses per second interval;
- Inter-pulse intervals of no more than 150 msec;
- A fundamental tonal component in the 150 to 1000 Hz frequency range;
- At least three prominent harmonics in the 1 to 4 kHz frequency range;
- Four or more frequencies with average sound pressure exceeding 50 dB(A).

Sounds having the characteristics listed above might not resemble the sound of an ICE vehicle, although recordings of ICE vehicle noise can be processed through a digital signal processor to conform to the characteristics above while retaining a quality that would allow pedestrians to identify the sound as coming from a motor vehicle. Although the alert sound would not sound like an ICE vehicle, it would still vary pitch and loudness in relation to the speed and operating mode of the vehicle, which would enable pedestrians to identify the sound as that of a motor vehicle in operation.

³⁹ Psychoacoustics is the field of science that studies how humans perceive and react to sounds.

An advantage to some synthetically developed alert sounds with no ICE vehicle references is that the sounds appear to offer a detection distance comparable to that of an ICE vehicle sound at a lower decibel level. If this alternative were selected, the agency would specify such a lower decibel level in an effort to ensure that the potential for environmental impact would not be any greater than that for Alternatives 2 and 3.

The detectability of a specific non-ICE sound, however, likely could be assessed only through human-subject testing because these non-ICE vehicle sounds do not have an ICE vehicle reference for which a decibel level corresponding to a safe detection distance has been measured. Further, in addition to the issue of detectability, the agency must consider the issue of recognizability. It too likely could be assessed only through human-subject testing.

Using non-ICE vehicle sounds as pedestrian alert sounds, however, could entail some disadvantages. If the open-endedness of this approach resulted in a wide variety of different alert sounds for different vehicle models, it could complicate the learning and recognizing of alert sounds and thereby confuse pedestrians. Further, there are questions as to whether all non-ICE vehicle sounds would be recognizable as those of a motor vehicle. Multiple different alert sounds with no common acoustic characteristics might have a negative impact on community noise levels.

F. The Alternatives in General

Each of the alternatives set forth above by NHTSA represents a different way in which NHTSA conceivably could balance the potentially competing considerations of recognizability, detectability, effectiveness, environmental noise impact and cost. For example, Alternative 2 places more weight on the recognizability of the alert sound as that of an ICE motor vehicle and minimization of any risk of an adverse noise impact on the community than Alternative 5 does.

Conversely, the latter alternative places more weight on detectability than the former alternative does.

The agency may select one of the above-identified alternatives as its preferred alternative. Under NEPA, the purpose of and need for an agency's action inform the range of reasonable alternatives to be considered in its NEPA analysis. The above alternatives represent a broad range of approaches under consideration for setting the proposed PEDSAFE standard and whose environmental impacts we plan to evaluate under NEPA.

As detailed below, NHTSA invites comments to ensure that the agency considers a range of reasonable alternatives in setting a PEDSAFE standard and that the agency identifies the environmental impacts associated with each alternative. Comments may go beyond the approaches and information that NHTSA used in developing the above. The agency may modify the alternatives and environmental effects that will be analyzed in depth based upon the comments received during the scoping process and upon further agency analysis.

IV. Scoping and Public Participation

The scoping process initiated by this notice seeks public comment on the range of alternatives and impacts to be considered in the EA and to identify the most important issues for in-depth analysis involving the potential environmental impacts of NHTSA's PEDSAFE standard.⁴⁰ NHTSA's NEPA analysis for the PEDSAFE standard will consider the direct, indirect and cumulative environmental impacts of the proposed standards and those of reasonable alternatives.

In preparing this notice of public scoping, NHTSA has consulted with agencies, including CEQ, Department of Energy, EPA, and the Department of Interior. Through this notice, NHTSA invites participation by the public and all Federal agencies, and by Indian Tribes, State and local

⁴⁰ See 40 CFR §§ 1500.5(d), 1501.7, 1508.25.

agencies with jurisdiction by law or special expertise with respect to potential environmental impacts of the proposed PEDSAFE standard, and the public to participate in the scoping process.⁴¹

Specifically, NHTSA invites all stakeholders to participate in the scoping process by submitting written comments concerning the appropriate scope of NHTSA's NEPA analysis for the proposed PEDSAFE standard to the docket number identified in the heading of this notice, using any of the methods described in the ADDRESSES section of this notice. NHTSA does not plan to hold a public scoping meeting, because written comments will be effective in identifying and narrowing the issues for analysis.

NHTSA is especially interested in comments concerning the evaluation of community noise impacts. Information on some of the basic elements of evaluating those impacts can be found in "Technology for a Quieter America," a 2010 report by the National Academy of Engineering (NEA) of the National Academies.⁴² For example, chapter 2 of the report addresses community noise and chapter 3 addresses metrics for assessing environmental noise.

Specifically, NHTSA requests:

- Peer-reviewed scientific studies relevant to any environmental issues associated with this rulemaking.

⁴¹ Consistent with NEPA and implementing regulations, NHTSA is sending this notice directly to: (1) Federal agencies having jurisdiction by law or special expertise with respect to the environmental impacts involved or authorized to develop and enforce environmental standards; (2) the Governors of every State, to share with the appropriate agencies and offices within their administrations and with the local jurisdictions within their States; (3) organizations representing state and local governments and Indian Tribes; and (4) other stakeholders that NHTSA reasonably expects to be interested in the NEPA analysis for the proposed pedestrian alert sound standards. See 42 U.S.C. § 4332(2)(C); 49 CFR § 520.21(g); 40 CFR §§ 1501.7, 1506.6.

⁴² The report can be found at: http://www.nap.edu/openbook.php?record_id=12928&page=R1. See also World Health Organization, *Guidelines for Community Noise*, edited by B. Berglund, T. Lindvall, and D. H. Schuella, Cluster of Sustainable Development and Healthy Environment, Department of the Protection of the Human Environment, Occupational and Environmental Health. Geneva, Switzerland, 1999.

- Reports analyzing the potential impacts within the United States, in particular geographic areas of the United States or in special habitats and environments like those in the National Park System.⁴³

- Suggestions on how to assess the potential for this rulemaking to result in the emission of sound which, either because of its volume or nature, causes annoyance, as well as suggestions for how to limit that potential while achieving the safety purposes of the Pedestrian Safety Act. While the issue of volume could be addressed by placing a limit on the maximum volume of the alert noise, what steps could be taken to address the nature of the sound emitted?

To aid commenters in understanding the differing sound levels in different environments, we have set out below two tables from the introduction to NEA’s report “Technology for a Quieter America:”⁴⁴ a 2010 report by the National Academy of Engineering (NEA):

Comparison of A-weighted Sound Levels in Common Outdoor Environments

A-Weighted Sound Level (decibels)	Typical Outdoor Setting	
80		Non-Park
70	Noisy Urban Area (daytime)	
60	Commercial Retail Area	
50	Suburban Area (daytime)	
40	Suburban Area (nighttime)	
30		
	Hawaiian volcanoes (crater overlook)	

⁴³ In these areas, there may be a special need to use quiet vehicles for purposes such a wildlife tours. See, for example, the brochure of the National Park Service on its program, the Natural Sounds Program, for protecting the acoustic environment of the areas in the National park System. The brochure can be found at http://www.nature.nps.gov/naturalsounds/PDF_docs/NSP_standard_brochure_final_10_1_08.pdf.

⁴⁴ See page 6 of the report.

20		
10		
	Haleakala (in crater, no wind)	
0		

Sound Pressure Levels Generated by Various Noise Sources

<u>Sound Pressure Level</u>	<u>dB(A)</u>
Quiet library, soft whispers	30
Living room, refrigerator	40
Light traffic , normal conversation, quiet office	50
Air conditioner at 20 feet, sewing machine	60
Vacuum cleaner, hair dryer, noisy restaurant	70
Average city traffic , garbage disposals, alarm clock at 2 feet	80
Subway, motorcycle, truck traffic , lawn mower	90
Garbage truck, chain saw, pneumatic drill	100
Rock band concert in front of speakers, thunderclap	120
Gunshot blast, jet plane	140
Rocket launching pad	180

NHTSA understands that there are a variety of potential alternatives that could be considered that fit within the purpose and need for the proposed rulemaking, as set forth in the Pedestrian Safety Act. Therefore, NHTSA seeks comments on how best to structure a reasonable alternative for purposes of evaluating it under NEPA. Specifically, NHTSA seeks comments on what criteria should be used to structure such alternative. When suggesting a possible alternative, please explain how it would satisfy the Pedestrian Safety Act's requirements and other provisions.

Two important purposes of scoping are identifying the issues that merit in-depth analysis and identifying and eliminating from detailed analysis minor issues that need only a brief discussion.⁴⁵ In light of these purposes, written comments should include an Internet citation

⁴⁵ 40 CFR § 1500.4(g), 1501.7(a).

(with a date last visited) to each study or report you cite in your comments if one is available. If a document you cite is not available to the public on-line, you should attach a copy to your comments. Your comments should indicate how each document you cite or attach to your comments is relevant to the NEPA analysis and indicate the specific pages and passages in the attachment that are most informative.

The more specific your comments are, and the more support you can provide by directing the agency to peer-reviewed scientific studies and reports as requested above, the more useful your comments will be to the agency. For example, if you identify an additional area of impact or environmental concern you believe NHTSA should analyze, or an analytical tool or model that you believe NHTSA should use to evaluate these environmental impacts, you should clearly describe it and support your comments with a reference to a specific peer-reviewed scientific study, report, tool or model. Specific, well-supported comments will help the agency prepare a NEPA analysis that is focused and relevant, and that will serve NEPA's overarching aims of making high quality information available to decisionmakers and the public by concentrating on important issues, "rather than amassing needless detail."⁴⁶ By contrast, mere assertions that the agency should evaluate broad lists or categories of concerns, without support, will not assist the scoping process for the proposed standard.

Please be sure to reference the docket number identified in the heading of this notice in your comments. In addition to meeting the notice requirements in the implementing regulations issued by CEQ, NHTSA intends to provide notice to interested parties by e-mail. Thus, please also provide an e-mail address (or a mailing address if you decline e-mail communications).⁴⁷

These steps will help NHTSA to manage a large volume of material during the NEPA process.

⁴⁶ 40 CFR § 1500.1(b).

⁴⁷ If you prefer to receive NHTSA's NEPA correspondence by U.S. mail, NHTSA intends to provide its NEPA publications via a CD readable on a personal computer.

All comments and materials received, including the names and addresses of the commenters who submit them, will become part of the administrative record and will be posted on the Web at <http://www.nhtsa.dot.gov>.

Based on comments received during scoping, NHTSA expects to prepare an EA for public comment in conjunction with the proposal, which is to be issued by July 4, 2012, and a final EA to accompany the final rule, which is to be issued by January 4, 2014.

Separate Federal Register notices will announce the availability of the EA, which will be available for public comment, and the final NEPA document, which will be available for public inspection. NHTSA also plans to continue to post information about the pedestrian safety rulemaking, including information relating to the NEPA process, on its Web site (<http://www.nhtsa.dot.gov>).

Issued:

Christopher J. Bonanti,
Associate Administrator for
Rulemaking

BILLING CODE 4910-59-P

[Signature page for Federal Notice of Intent to Prepare an Environmental Assessment for
Pedestrian Safety Enhancement Act of 2010 Rulemaking]