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Fixing the Foul Play

Mitigating the Environmental and Public Health Damage Caused by the Volkswagen Emissions Scandal

By Greg Dotson, Alison Cassady, and Myriam Alexander-Kearns March 2016

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Introduction and summary

State and federal agencies continue to investigate Volkswagen's alleged efforts to cheat on emissions tests in the United States. As the investigations come to a close, the U.S. Environmental Protection Agency, or EPA, should consider how to resolve this scandal in a way that both mitigates the public health and environmental damage caused by Volkswagen's actions and builds momentum toward a cleaner transportation sector.

On January 4, 2016, the Department of Justice, or DOJ, on behalf of the EPA, filed a civil complaint against Volkswagen and two of its subsidiary companies, Audi and Porsche, in federal court. In the complaint, the DOJ alleges that the company installed software in certain light-duty diesel passenger vehicles that allows those vehicles to circumvent emissions testing, violating the Clean Air Act. The DOJ states that Volkswagen installed this device in approximately 499,000 2.0-liter and 85,000 3.0-liter vehicles.[1] The California Air Resources Board, or CARB, which first started examining these allegations in 2014, also is pursuing enforcement action.[2]

The defeat device in question detects when the vehicle is undergoing emissions testing. During this testing, the vehicle activates full emissions controls for pollution from nitrogen oxides, or NOx. During normal driving conditions, however, the vehicle emits more nitrogen oxides than allowed by law. By using this software, Volkswagen allegedly was able to claim that its diesel vehicles met tough air pollution standards while also delivering high fuel economy to its customers.

The EPA estimates that 2.0-liter diesel vehicles with this software emitted up to 40 times the legal amount of NOx pollution into the air, while 3.0-liter diesel vehicles emitted up to nine times the allowed levels.[3] Nitrogen oxides are a key component of soot and smog, exposure to which can trigger asthma attacks and cause premature death.

In parallel with this federal court action, the EPA and CARB have asked Volkswagen to develop a plan to retrofit the vehicles that have defeat devices so that they comply with all air quality standards. The agencies will require Volkswagen to recall and repair the defective vehicles, assuming the company can develop a remedial plan that the agencies approve.[4] The timing and scope of any such recall remains uncertain, as the company and agencies have not yet agreed on a plan that satisfies regulators' concerns about vehicle performance, safety, and emissions compliance.[5] A top CARB official said that it "may not be possible" to return the cars to their "certified configuration" and has publicly raised the possibility of allowing the vehicles to stay on the road.[6] On March 24, 2016, Volkswagen missed a court deadline to provide a plan to bring the cars into compliance. The company now has until April 21 to deliver a solution.

In addition to continuing to pursue a recall plan, the EPA and the DOJ will spend the coming weeks and months working to determine how to penalize Volkswagen for the company's alleged violations and, in some way, make up for the damage that the extra emissions from the defective vehicles imposed on human health and the environment.

If the EPA's allegations are true, then Volkswagen has been flagrantly violating the law for years, defrauding consumers, harming public health, and degrading the environment. Just as importantly, the company appears to have taken policymakers and the public down a false road by promising that diesel vehicles could meet the multiple objectives necessary for a modern vehicle fleet, including low tailpipe emissions and better fuel economy.

The Center for American Progress recommends that the EPA and the DOJ pursue a three-pronged approach to resolve these alleged violations:

- Require Volkswagen to mitigate or offset the NOx emissions attributable to its past or ongoing violations by replacing or retrofitting diesel engines in publicly operated vehicle fleets with cleaner technology. The EPA often includes mitigation actions as part of final settlements with companies regarding violations of the Clean Air Act, Clean Water Act, and other statutes.

- Assess large civil penalties for these violations in order to dissuade other carmakers from violating the law in the future. The Clean Air Act sets a maximum penalty of $37,500 for each vehicle with the illegal software. Consequently, Volkswagen could face more than $18 billion in monetary penalties.

- Work with Volkswagen to develop a significant Supplemental Environmental Project, or SEP, to clean up the U.S. transportation sector. Volkswagen would be motivated to work with the EPA to create a SEP, which could offset a portion of the civil penalties while achieving concrete pollution reductions. The SEP should direct a substantial amount of funds, perhaps calculated on a per-car basis, to create a fund for state and local governments, as well as private-sector entities, to implement projects to reduce pollution from on-road vehicles and increase deployment of zero-emission electric vehicles.

By taking this approach, the EPA could deliver NOx pollution reductions that exceed the excess emissions released by the defective Volkswagen vehicles while helping redirect and accelerate the nation's transition to a cleaner transportation sector. By ensuring that the penalties, mitigation action, and SEP total in the billions of dollars, this approach also would deter other automakers from violating the Clean Air Act in the future.

The health and environmental effects of Volkswagen's actions

By allegedly claiming that vehicles used clean diesel technology, Volkswagen sold millions of defective cars under the premise of offering a less-polluting alternative to gasoline without compromising performance or driving experience.[7]

In reality, many of these cars were releasing up to 40 times more pollution than the Clean Air Act emissions standards allow.[8] Domestically, this means that the vehicles in question emitted an extra 10,392 metric tons to 41,571 metric tons of nitrogen oxides each year.[9] Assuming that the affected models internationally incur similar mileage as cars driven in the United States, these cars released between 237,161 metric tons and 948,691 metric tons of previously unknown NOx emissions worldwide each year.[10]

The Environmental Protection Agency has been limiting NOx emissions under the Clean Air Act since the 1970s by setting standards for nitrogen dioxide, or NO2, as a representative for all compounds in the NOx family, since it is the most common.[11]

Exposure to NOx is harmful to human health. Studies show that individuals exposed to NOx are at risk of respiratory issues, including asthma attacks.[12] NOx also is a precursor to other dangerous air pollutants. In the presence of sunlight, NOx and volatile organic compounds react chemically to form ozone. Exposure to ozone can cause shortness of breath and aggravate existing respiratory illnesses, including asthma.[13] In addition, NOx reacts with ammonia and moisture to form fine particles, which when inhaled lodge in the lungs and can trigger asthma attacks and cause premature death in people with heart and lung disease.[14] Even generally healthy people without chronic lung conditions experience inflammation of the airways when exposed to these pollutants. Children and the elderly are the most vulnerable.[15]

Emissions from the road have negative health effects on people all over the country—not just drivers. EPA studies have shown that concentrations of NO2 are higher near roadways, with increases of 30 percent to 100 percent compared with

concentrations away from roadways.[16] Sixteen percent of housing units in the United States sit within 300 feet of a major highway, airport, or railroad, so approximately 48 million Americans reside in areas with these higher concentrations of NO2.[17]

Researchers from the Massachusetts Institute of Technology and Harvard have evaluated the public health effects of the affected Volkswagen cars on public health in the United States.[18] Between 2008 and 2015, they estimate that all affected Volkswagen vehicles in the United States traveled 40.5 billion kilometers in total, resulting in a release of 36.7 million kilograms of excess NOx emissions.[19] The researchers conclude that exposure to this excess NOx pollution over this seven-year period will shorten the lives of 59 individuals, costing an estimated $450 million in mortality costs, and will result in more hospital admissions for cardiac and respiratory conditions.[20] The researchers also examined the potential health effect of allowing all of the defective vehicles to stay on the road without any other program to mitigate NOx emissions from the transportation sector. Under these circumstances, the study estimates that the excess emissions from the Volkswagen vehicles could shorten the lives of an additional 140 people.[21]

Although the health effects are the most urgent concern, NOx emissions also harm the natural environment. Nitrogen emissions contribute to algal blooms in water bodies and acid rain, both of which threaten the health and viability of ecosystems.[22]

The EPA's options for responding to the Volkswagen violations

As the agencies responsible for implementing and enforcing the Clean Air Act, the Environmental Protection Agency and the Department of Justice are tasked with responding to Volkswagen's violations of the act in such a way that dissuades other companies from breaking the law and, to the maximum extent possible, mitigates the harm caused by the excess pollution released by the faulty vehicles. The federal government has a number of tools at its disposal to achieve this outcome, including forcing a recall of the defective Volkswagen vehicles; requiring the company to implement a pollution mitigation plan; assessing significant civil penalties; and working with Volkswagen to develop a Supplemental Environmental Project to achieve additional emissions reductions.

Force a recall of defective Volkswagen vehicles

From the beginning, the EPA and the California Air Resources Board have been working with Volkswagen to identify a way to retrofit the defective cars to ensure that they comply with air pollution standards.[23]

The timing and scope of any such recall remain uncertain. When announcing the civil complaint, the EPA also stated that ongoing recall discussions with Volkswagen have not yet produced "an acceptable way forward."[24] To date, an acceptable recall plan has not been identified for either 2.0-liter vehicles or 3.0-liter vehicles. On January 12, 2016, CARB rejected Volkswagen's proposed recall plan for the 2.0-liter vehicles sold in California between 2009 and 2015 that allegedly violated state clean air standards, arguing that it lacked sufficient detail in many areas. On February 2, 2016, Volkswagen submitted a recall plan for the 3.0-liter vehicles sold in California, but no evaluation of the acceptability of this plan has yet been rendered.[25] On March 24, Volkswagen missed a court-ordered deadline to deliver a plan to bring the defective cars into compliance with emissions standards. The judge gave the company an extension until April 21, 2016, after which point the matter could go to trial if no solution has been identified.[26]

At a state legislative hearing on the Volkswagen scandal in March 2016, Todd Sax, division chief of CARB's enforcement division, warned that it "may not be possible" to return the cars to their "certified configuration" and publicly raised the possibility of allowing the vehicles to stay on the road.[27] He also said that the agency, working with the EPA, will have to "decide what the best approach is to dealing with these vehicles, and one of the options potentially would be to accept something less than a full fix."[28]

A recall would be a multibillion dollar venture for Volkswagen. The company has estimated the cost of recalling the vehicles as being at least $9.5 billion on top of fines and penalties.[29] The agencies will continue to work with Volkswagen to identify a potential recall plan that satisfies regulators' concerns about vehicle performance, safety, and emissions.[30]

In addition to the expense, a recall poses significant logistical challenges that may reduce its effectiveness at achieving emissions reductions and ensuring compliance on a timely basis. Some experts suggest that retrofitting will involve installing a multigallon urea tank that mixes urea into exhaust to render the nitrogen oxides harmless. In addition, more than 300,000 of the affected cars in the United States could require hardware fixes.[31] After these retrofits are installed, owners could experience a decrease in engine power and fuel economy.[32]

As a result, even if Volkswagen engineers a solution, some owners may choose not to retrofit their vehicles. According to the National Highway Traffic Safety Administration, on average, only 70 percent of vehicles subject to safety recalls are fixed within 18 months.[33] The Government Accountability Office found that the recall completion rate varies significantly by year, ranging from 55 percent to 75 percent.[34] It is reasonable to assume that this recall success rate could be even lower for defects that are not safety related, as in the case with the Volkswagen vehicles.

Some states, such as California, require proof of retrofits before issuing a vehicle registration, making recalls an effective way to implement the retrofits.[35] However, more than half of states require either no emissions testing at all or vary requirements by county or municipality, making it difficult to enforce the recall and retrofits. Some states that do require regular emissions testing only mandate it every two years.[36] This means that if consumers are reluctant to participate in a recall of their Volkswagen vehicles, the mechanisms to help ensure participation in a recall are uneven among the states and unlikely to assure broad and consistent participation.

This assumes that Volkswagen will eventually develop a recall plan for all defective vehicles that passes muster with the EPA and CARB. If it does not, the car company could face pressure to buy back each defective vehicle. This could cost the company $7.3 billion, according to Kelley Blue Book estimates.[37]

Implement pollution mitigation measures

The EPA often includes mitigation actions in settlements for violations of environmental laws in order to minimize the harm caused by illegal conduct. According to the EPA, mitigation actions are "sought by the government to remedy, reduce or offset past (and in some cases ongoing) harm caused by the alleged violations in a particular case."[38] These actions must provide identifiable benefits, such as limiting the amount of future pollutants emitted to address past excesses.[39] Because the purpose of a mitigation action would be to, "as nearly as possible, restore the *status quo ante*," there must be a close connection between the mitigation action and the harm caused by the violation.[40] In general, the EPA is able to demand mitigation action as part of a settlement because a court likely would order such mitigation as injunctive relief if the case were litigated.[41]

In May 2015, for example, the EPA and the DOJ announced a settlement with Marathon Petroleum Corporation over Clean Air Act violations at 10 facilities. As part of the settlement, the consent decree requires Marathon to mitigate the harm caused by its excess emissions by spending $3 million to retire sulfur dioxide credits and install protective seals on 14 fuel storage tanks.[42] As another example, in April 2015, the EPA, the DOJ, and the state of Colorado settled with Noble Energy for violations of the Clean Air Act related to vapor control systems at the company's condensate storage tanks. Noble agreed to spend $4.5 million to retrofit its drilling equipment and improve company processes to reduce ozone-forming emissions.[43]

Assess significant civil penalties

The Clean Air Act sets maximum penalties for violations. Should the EPA and the DOJ decide to settle the case against Volkswagen, the EPA has discretion to determine the appropriate total penalty to assess on top of other measures to mitigate or offset the environmental harm caused by the excess pollution. The EPA has established a policy to guide its actions related to negotiated settlements of violations of the Clean Air Act's vehicle and engine certification requirements, such as those at issue with Volkswagen.[44]

According to the EPA, a penalty should recover "any economic benefit of noncompliance" and "an additional amount to reflect the seriousness of the violation."[45] While EPA policy prescribes a rule of thumb for estimating the economic benefit of violating the Clean Air Act, this approach is not appropriate in cases in which an automaker uses emissions control defeat devices, as these devices allow the automaker to offer consumers vehicles with performance and prices that may not be possible with legal engines or design. In defeat device cases, the EPA conducts a fact-specific inquiry that examines the actual benefits of noncompliance.[46] The additional penalty sum that reflects the seriousness of the violation, known as the "gravity-based" portion of the penalty, is based on specific objective factors and consideration of a variety of factors and circumstances.[47] This analysis would examine the following issues:

- **Actual or potential harm.** This factor focuses on whether the violation results in excess emissions and if so, the magnitude of those emissions.[48] The EPA categorizes a violation as "major"—the most egregious category of violation—if the vehicle in question generates greater emissions than a compliant vehicle.[49] The agency can use its discretion to reduce the penalty if "effective remedial actions are taken promptly," or it can increase the gravity-based portion of the penalty by up to 30 percent if the company takes no or ineffective remedial action.[50]

- **Importance to the regulatory scheme.** This factor examines how important the violated requirement is to achieving the goals of the Clean Air Act.[51]

- **Scaling factors.** EPA policy prescribes that the penalties on a per-engine basis decrease as the number of violating engines increases.[52] For example, the penalty on the 400,000th noncompliant vehicle sold is less than the penalty for the 10th noncompliant vehicle sold. Otherwise, the per-engine gravity-based calculation could result in unreasonably large penalties, perhaps beyond the company's ability to pay without going out of business.

- **Business size.** EPA policy states that for larger companies, a larger penalty is necessary to create an appropriate deterrent.[53]

The EPA also seeks to ensure equitable treatment of the regulated community in assessing civil penalties by considering the violator's degree of willfulness or negligence. For example, the agency looks at how much control the company had over the alleged violation; whether the company took reasonable precau-

tions to prevent the violation; and whether the violation was foreseeable.[54] When the violator has acted with a particular degree of willfulness or negligence, the EPA can increase the gravity-based portion of the penalty by up to 20 percent based on this analysis.[55]

Additionally, the EPA's policy states "that where a party has violated a similar environmental requirement before, this is usually clear evidence that the party was not deterred by the Agency's previous enforcement response."[56] For repeat offenders, the EPA has the discretion to increase the gravity-based portion of the penalty by up to 35 percent for one prior violation and up to 70 percent for more than one prior violation.[57]

Develop a Supplemental Environmental Project

As part of a settlement, the EPA also can work with companies to develop a SEP. According to the EPA's guidance, a SEP is:

> *[An] environmentally beneficial project or activity that is not required by law, but that a defendant agrees to undertake as part of the settlement of an enforcement action. SEPs are projects or activities that go beyond what could legally be required in order for the defendant to return to compliance, and secure environmental and/or public health benefits in addition to those achieved by compliance with applicable laws.*[58]

SEPs differ from the mitigation actions described above in important ways. Foremost, whereas a court likely would order mitigation as injunctive relief if a case were litigated, a SEP is a voluntary project that "results from negotiation between the parties and cannot be secured outside the settlement context."[59] Secondly, SEPs are designed to achieve broadly defined public health or environmental benefits that are not necessarily closely linked to the violation at hand. In contrast, mitigation actions must demonstrate a close nexus to the harm caused by the violation.[60] Finally, the EPA can offer an offending company the option of reducing the civil penalties in exchange for performing a SEP—an option that does not apply to a mitigation action.[61]

The EPA often uses SEPs in combination with civil penalties and other pollution mitigation requirements. In its 2015 settlement with the EPA, for example, Noble Energy agreed to pay a $5 million civil penalty, devote $4.5 million to environmental mitigation actions, and spend $4 million on SEPs, including the replace-

ment of wood stoves in an area with poor air quality and the development of improved testing procedures for vapor control systems.[62] Also in 2015, ASARCO agreed to pay a $4.5 million civil penalty, spend $150 million to install new pollution control technology, and allocate $1 million for a SEP to replace a diesel switch locomotive operated at its Arizona facility with a less-polluting diesel-electric switch locomotive.[63]

Recommendations

The Environmental Protection Agency and the California Air Resources Board are likely to continue to work with Volkswagen to identify a technical fix that allows the diesel-powered vehicles in question to comply with the Clean Air Act. However, it is uncertain whether Volkswagen will be able to identify such a fix and whether most vehicle owners will take their cars in for repair. Either way, the EPA needs to ensure that a final settlement with Volkswagen mitigates the harm caused by the vehicles' excess emissions; deters future illegal conduct; and expedites the transformation of the U.S. transportation sector toward a cleaner, less-polluting, and lower-carbon future.

CAP recommends that the EPA pursue a three-pronged strategy to achieve these important goals. First, the EPA should require Volkswagen to implement a mitigation action with the goal of reducing emissions of nitrogen oxides from diesel engines. Second, the EPA should assess significant per-vehicle penalties that reflect the seriousness of the violations. Third, the settlement should include a Supplemental Environmental Project that funds projects at the state and local levels to clean up the U.S. transportation sector, including initiatives to put more electric vehicles on the road.

This approach can do more than merely offset the additional emissions associated with Volkswagen's noncompliant automobiles. It can deliver a public health and environmental dividend—one that focuses on the penalties associated with each violating vehicle and maximizes the pollution reductions possible from such funds. This would be a fitting consequence for actions that sought to profit from fraudulent claims associated with protecting public health and the environment. Furthermore, a strong settlement also would be in the interest of Volkswagen, whose reputation has suffered and can be resuscitated by making amends for past actions.

Require Volkswagen to mitigate its environmental harm

The EPA should require Volkswagen to undertake mitigation action to offset the environmental and health effects of its violations. Any mitigation action should be linked to the company's violations—meaning that Volkswagen's mitigation effort should offset NOx emissions from the transportation sector. CAP recommends that Volkswagen pay into a fund that would finance projects to reduce NOx emissions from diesel engines.

The Diesel Emissions Reduction Act, or DERA, would provide a good model for such mitigation. Congress established the DERA with the Energy Policy Act of 2005.[64] DERA-funded projects target emissions reductions from diesel vehicles, equipment, and engines. Eligible projects can involve retrofitting diesel equipment and engines to make them cleaner or replacing components or whole engines at the end of life. Under DERA, grant recipients also can invest in technology to increase the fuel efficiency of diesel fleets—such as idle reduction, aerodynamics, or low-rolling resistance tires—which have been demonstrated to reduce NOx emissions and fuel use.[65] DERA grants are available to agencies at the regional, state, and tribal levels, as well as port authorities, with jurisdiction over transportation issues and air quality. Cities, counties, municipalities, and school districts that operate diesel fleets are also eligible.[66]

However, because a settlement agreement cannot provide funds to an agency to supplement its appropriations, Volkswagen cannot provide funds directly to the DERA program.[67] Instead, the EPA and Volkswagen could model the mitigation action on the methodology and approach of the DERA program to ensure an effort that is transparent and effective.

There is clear precedent for this approach. In 2003, for example, Toyota agreed to spend $20 million to clean up public diesel fleet vehicles as part of its settlement with the EPA over violations of the Clean Air Act.[68] Toyota created a "Clean Buses for Kids" program that offered grants to school districts to purchase filters and ultra-low sulfur diesel fuel for buses.[69] While this program utilized the knowledge gained by the DERA program, the EPA did not operate it.

This mitigation action not only will make up for past excess emissions to the extent that such pollution can be offset, but it also will be an important element in addressing future excess emissions from vehicles that escape the recall process or otherwise remain in use.

Assess civil penalties that reflect the seriousness of the violation

Under the Clean Air Act, using a defeat device to exceed emissions standards warrants a maximum fine of $37,500 per affected car.[70] In the civil complaint, the Department of Justice also asks the court to hold Volkswagen liable for up to $3,750 for each defeat device installed in the vehicles and suggests that Volkswagen could face an additional $37,500 in penalties for each day of violation.[71] If required to pay the maximum fine, Volkswagen would face an extraordinary penalty of approximately $18 billion.[72] The actual amount Volkswagen pays could be substantially less, however, as the EPA and the DOJ resolve the charges through a negotiated settlement.

During the settlement process, the EPA will use its discretion to determine the appropriate penalty amount. According to EPA policy, the penalty should recover "any economic benefit of noncompliance" and "an additional amount to reflect the seriousness of the violation."[73]

The EPA first will have to conduct a case-specific inquiry to determine the economic benefit of these violations to Volkswagen.[74] This economic benefit is likely to be substantial, given the large number of defective vehicles at issue. Moreover, Volkswagen allegedly gained a competitive advantage in the marketplace by marketing these diesel-fueled vehicles as meeting strong pollution standards while delivering superior fuel economy and performance.

The EPA then will calculate the "gravity-based" portion of the penalty that reflects the seriousness of the allegations.[75] The EPA has a sound case for assessing significant penalties based on the gravity of Volkswagen's actions. The violations caused actual and potential harm in the form of excess emissions, qualifying the violation as "major" on the EPA's scale of egregiousness.[76] Moreover, because Volkswagen has been slow to identify a satisfactory fix to bring the cars into compliance, the EPA has the discretion to increase the gravity-based portion of the penalty by up to 30 percent.[77]

Adding to the gravity of the violation is the importance of engine certification requirements to achieving the goals of the Clean Air Act.[78] Compliance with engine certification requirements is central and fundamental to controlling emissions from motor vehicles, and Volkswagen appears to have systematically and deceptively violated those requirements. This fact is likely to increase the amount of penalties assessed.

Since Volkswagen is a large multinational corporation worth tens of billions of dollars, a larger penalty is necessary to create an appropriate financial deterrent.[79] The agency also will look at Volkswagen's degree of willfulness in committing the violation. News reports indicate that Volkswagen's CEO knew about the defeat devices in diesel vehicles more than a year before the violation was discovered.[80] As a result, the EPA could increase the gravity-based portion of the penalty by up to 20 percent.[81]

The EPA is likely to consider Volkswagen's track record as well. This is not the first time Volkswagen has run afoul of Clean Air Act requirements by installing devices that turn off pollution controls. In 1974, Volkswagen settled charges that the company failed to properly disclose two temperature-sensing switches that deactivated part of the emissions control systems in about 25,000 vehicles.[82] In light of this history of noncompliance, the EPA could increase the gravity-based portion of the penalty by up to 35 percent.[83]

Given this analysis, the EPA should assess a multibillion dollar penalty for these Clean Air Act violations. Although one commentator has suggested that applying the EPA penalty policy described above would yield a penalty of $3.2 billion, this analysis fails to consider both the economic benefit of noncompliance and the potential application of some of the penalty multipliers.[84] Based on CAP's calculations, the gravity-based portion of the total penalty could amount to at least $5 billion should the parties decide to settle the offenses.[85]

Develop a SEP to expedite the deployment of electric vehicles

In addition to the direct harm to the environment and public health, the Volkswagen emissions scandal misled policymakers and the public about the role of diesel engines in achieving a clean, modern vehicle fleet. Consumers who chose Volkswagen models for the alleged emissions profile could have purchased cleaner vehicles. To address this issue, a settlement with Volkswagen should include a large SEP to help clean up the transportation sector by accelerating the transition to cleaner vehicles, including the deployment of electric vehicles. This will benefit communities most affected by pollution from the transportation sector: those in close proximity to America's network of roads and highways.

Electric vehicles and plug-in hybrid electric vehicles offer drivers the opportunity to reduce their NOx emissions and other pollutants significantly.

Studies show that electric vehicles are, on average, cleaner than gasoline vehicles

A 2015 report by the Union of Concerned Scientists found that from "cradle to grave"—or across the entire life cycle of the vehicle, including manufacturing—battery electric vehicles on the market today produce less than half the greenhouse gases of similar gas-powered vehicles.[86] Similarly, a 2015 study by the Electric Power Research Institute found that nationally, as of 2013, the average plug-in electric vehicle produced the emissions equivalent of a gas-powered vehicle that gets 61 miles per gallon. Regionally across the country, the miles-per-gallon equivalents of these vehicles ranged from 46 miles to 251 miles per gallon.[87] A 2013 study of Maricopa County, Arizona, concluded that compared with a gasoline vehicle in that county, battery electric vehicles reduced NOx emissions by 76 percent. Plug-in hybrids also reduced NOx emissions 30 percent to 48 percent, depending on how many of the miles driven were electric miles.[88]

As the United States transitions to a less carbon-intensive electricity grid with cleaner sources, the emissions benefits created by electric vehicles and plug-in hybrids will compound.[89]

Volkswagen could provide significant funds for a SEP, perhaps calculated on a per-noncompliant-vehicle basis. A substantial portion of the SEP should be devoted to financially incentivizing deployment of electric vehicles and related infrastructure. These incentives, however, should not simply serve as an incentive to purchase electric vehicles manufactured by Volkswagen.

Instead, the EPA and the DOJ could structure the SEP to designate funds to help state and local governments, as well as private-sector entities, increase the deployment of electric vehicles or finance other projects to reduce emissions from the transportation sector. These projects could vary by the existing circumstances and desires of different communities. One state might seek to encourage the retirement of polluting vehicles. Another city might incentivize the replacement of diesel school buses. A private company might seek an incentive to replace a fleet of diesel delivery vans with electric vehicles. The SEP could allocate these funds by state based on population or the number of defective Volkswagen vehicles sold in each state—or some combination thereof. The SEP could include an application process to vet and approve eligible projects, much like the DERA program.

The EPA has experience using settlements to promote electrification of vehicles. In 2015, for example, the EPA and Duke Energy announced a consent decree resolving the company's violations of the Clean Air Act at some of its coal-fired power plants. As part of the settlement, Duke Energy agreed to spend $4.4 million on supplemental environmental mitigation projects, which could include a project to install electric vehicle charging infrastructure or advanced truck stop electrification equipment in North Carolina.[90]

Agreement to the establishment of a SEP in a negotiated settlement is voluntary and would require Volkswagen's consent. Volkswagen, however, has reason to agree to such a SEP. First, if Volkswagen agrees to settle, the negotiated settlement with a SEP will likely yield a lesser civil penalty than if the matter is pursued in court. Second, the emissions scandal has harmed Volkswagen's international reputation, and a SEP that provides substantial funding to clean up the transportation sector could help Volkswagen turn the page on an alleged campaign of fraudulent assertions about the environmental benefits of their products.

Conclusion

The Department of Justice, working with the Environmental Protection Agency and the California Air Resources Board, will hold Volkswagen accountable for its alleged efforts to deceive the government and consumers by installing defeat devices in diesel vehicles, allowing the cars to release dangerous pollutants into the air undetected. While billed as clean diesel vehicles, the nitrogen oxides emitted from their tailpipes have rendered them anything but clean.

CAP recommends that the EPA and the DOJ impose tough monetary penalties on the company in order to deter future violations. The EPA also should require the company to pursue mitigation actions to clean up diesel engines in trucks, buses, and other vehicles already on the road. Finally, the EPA should work with Volkswagen to develop a Supplemental Environmental Project to achieve additional emissions reductions by funding governmental and nongovernmental agencies to deploy more electric vehicles and expedite the transition to a cleaner transportation sector.

While the pollutants from the defective Volkswagen vehicles cannot be returned to the tailpipes, and while the damage to health cannot be reversed, future damage can be mitigated by taking this threefold approach.

About the authors

Greg Dotson is the Vice President for Energy Policy at the Center for American Progress. For more than 18 years, Dotson was the lead environmental and energy staffer for former Rep. Henry A. Waxman (D-CA) and a top staffer on the House Energy and Commerce Committee and the House Committee on Oversight and Government Reform. His major accomplishments include House passage of comprehensive climate change legislation and the enactment of laws on clean energy, pesticide safety, drinking water, and clean air.

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Endnotes

1 *United States of America v. Volkswagen AG, Audi AG, Volkswagen Group of America, Inc., Volkswagen Group of America, Chattanooga Operations, LLC, Dr. Ing. H.c. F. Porsche AG, and Porsche Cars North America, Inc.* (2016), available at http://www.justice.gov/opa/file/809826/download.

2 Letter from Annette Herbert to David Geanacopoulos and Stuart Johnson, September 18, 2015, available at http://www.arb.ca.gov/newsrel/in_use_compliance_letter.pdf; letter from Annette Herbert to David Geanacopoulos, Stuart Johnson, and Walter J. Lewis, November 2, 2015, available at http://www.arb.ca.gov/newsrel/in_use_compliance_letter_110215.pdf.

3 U.S. Environmental Protection Agency, "Frequent Questions about Volkswagen Violations," available at http://www.epa.gov/vw/frequent-questions-about-volkswagen-violations (last accessed February 2016).

4 U.S. Environmental Protection Agency, "Learn About Volkswagen Violations," available at http://www.epa.gov/vw/learn-about-volkswagen-violations (last accessed February 2016); California Air Resources Board, "VW 2-liter diesel car denial of recall, and Notice of Violation: Frequently Asked Questions" (2016), available at http://arb.ca.gov/msprog/vw_info/jan_12_vw.pdf.

5 U.S. Environmental Protection Agency, "United States Files Complaint Against Volkswagen, Audi and Porsche for Alleged Clean Air Act Violations," Press release, January 4, 2016, available at http://yosemite.epa.gov/opa/admpress.nsf/0/AC7B52362207DAD-785257F300060442E.

6 Rory Carroll, "California may allow partially repaired VW diesels to remain on road," Reuters, March 8, 2016, available at http://www.reuters.com/article/us-california-volkswagen-repairs-idUSKCN0WB05H.

7 Jad Mouawad and Christopher Jensen, "The Wrath of Volkswagen's Drivers," *The New York Times*, September 21, 2015, available at http://www.nytimes.com/2015/09/22/business/the-wrath-of-volkswagens-drivers.html?_r=0.

8 U.S. Environmental Protection Agency, "Learn About Volkswagen Violations," available at http://www2.epa.gov/vw/learn-about-volkswagen-violations (last accessed February 2016).

9 Gwyn Topham and others, "The Volkswagen emissions scandal explained," *The Guardian*, September 23, 2015, available at http://www.theguardian.com/business/ng-interactive/2015/sep/23/volkswagen-emissions-scandal-explained-diesel-cars.

10 Ibid.

11 California Office of Environmental Health Hazard Assessment, "Health Effects of Diesel Exhaust," available at http://oehha.ca.gov/public_info/facts/dieselfacts.html (last accessed February 2016).

12 U.S. Environmental Protection Agency, "Nitrogen Dioxide: Health," available at http://www3.epa.gov/airquality/nitrogenoxides/health.html (last accessed February 2016).

13 U.S. Environmental Protection Agency, "Ozone Pollution," available at https://www.epa.gov/ozone-pollution (last accessed March 2016).

14 U.S. Environmental Protection Agency, "Particulate Matter (PM): Health," available at http://www3.epa.gov/airquality/particlepollution/health.html (last accessed February 2016).

15 U.S. Environmental Protection Agency, "Nitrogen Dioxide: Health."

16 Ibid.

17 Ibid.

18 Steven R H Barrett and others, "Impact of the Volkswagen emissions control defeat device on US public health," *Environmental Research Letters* 10 (11) (2015): 1–10, available at https://dspace.mit.edu/handle/1721.1/99727.

19 Ibid., p. 8.

20 Ibid., pp. 6–7.

21 Ibid., p. 7.

22 U.S. Environmental Protection Agency, "What is Acid Rain?", available at https://www3.epa.gov/acidrain/what/index.html (last accessed March 2016); U.S. Environmental Protection Agency, "Harmful Algal Blooms," available at https://www.epa.gov/nutrientpollution/harmful-algal-blooms (last accessed March 2016).

23 U.S. Environmental Protection Agency, "Learn About Volkswagen Violations"; California Air Resources Board, "VW 2-liter diesel car denial of recall, and Notice of Violation Frequently Asked Questions."

24 U.S. Environmental Protection Agency, "United States Files Complaint Against Volkswagen, Audi and Porsche for Alleged Clean Air Act Violations."

25 California Air Resources Board, "Air Resources Board rejects VW 2-liter diesel recall plan and issues Notice of Violation," Press release, January 12, 2016, available at http://www.arb.ca.gov/newsrel/newsrelease.php?id=780; Dana Hull and Jeff Plungis, "VW Submits Recall Plan for 3-Liter Diesels to CARB, EPA," Bloomberg Business, February 2, 2016, available at http://www.bloomberg.com/news/articles/2016-02-03/vw-submits-recall-plan-for-3-liter-diesels-to-u-s-regulators.

26 Jack Ewing, "Court Sets Deadline for a VW Diesel Fix, but Solution Could Prove Elusive," *The New York Times*, March 24, 2016, available at http://www.nytimes.com/2016/03/25/business/international/volkswagen-emissions-scandal-fix-hearing.html?_r=0.

27 Carroll, "California may allow partially repaired VW diesels to remain on road."

28 Ibid.

29 Bethan Howe, "Volkswagen scandal: 5 scary numbers," CNNMoney, November 4, 2015, available at http://money.cnn.com/2015/11/04/news/companies/volkswagen-scandal-five-things-to-know/index.html?iid=EL.

30 U.S. Environmental Protection Agency, "United States Files Complaint Against Volkswagen, Audi and Porsche for Alleged Clean Air Act Violations"; California Air Resources Board, "Air Resources Board rejects VW 2-liter diesel recall plan and issues Notice of Violation."

31 Jeff Plungis and Alan Katz, "VW's Emissions Retrofit May Be Among Costliest Recalls Ever," Bloomberg Business, October 22, 2015, available at http://www.bloomberg.com/news/articles/2015-10-22/vw-s-emissions-retrofit-may-be-among-costliest-recalls-ever.

32 Alex Davies, "VW Owners aren't going to like the fixes for their diesels," *Wired*, September 22, 2015, available at http://www.wired.com/2015/09/vw-owners-arent-going-like-fixes-diesels/.

33 Government Accountability Office, "Auto Safety: NHTSA Has Options to Improve the Safety Defect Recall Process," GAO-11-603, June 2011, p. 24, available at http://www.gao.gov/assets/320/319698.pdf.

34 Ibid., p. 25.

35 California Vehicle Code § 4750(c) - Grounds Requiring Refusal of Registration, available at http://www.leginfo.ca.gov/cgi-bin/displaycode?section=veh&group=04001-05000&file=4750-4767 (last accessed March 2016); FindLaw, "California Health and Safety Code Section 43105," available at http://codes.findlaw.com/ca/health-and-safety-code/hsc-sect-43105.html (last accessed March 2016); California Code of Regulations, 13 CCR § 2117 – Proof of Correction Certificate.

36 AAA Digest of Motor Laws, "Emissions Inspection," available at http://drivinglaws.aaa.com/tag/emissions-inspection/ (last accessed February 2016).

37 Ron Lieber, "How Volkswagen Could Compensate Diesel Owners," *The New York Times*, September 25, 2015, available at http://www.nytimes.com/2015/09/26/your-money/how-volkswagen-could-compensate-diesel-owners.html?_r=0.

38 U.S. Environmental Protection Agency, "Memorandum on Securing Mitigation as Injunctive Relief in Certain Civil Enforcement Settlements" (2012), p. 2, available at https://www.epa.gov/sites/production/files/2013-10/documents/2ndeditionsecuringmitigationmemo.pdf.

39 Ibid.

40 Ibid., p. 4.

41 Ibid., p. 3.

42 U.S. Environmental Protection Agency, "Marathon Petroleum Corporation Clean Air Settlement," May 19, 2015, available at https://www.epa.gov/enforcement/marathon-petroleum-corporation-clean-air-settlement.

43 U.S. Environmental Protection Agency, "Noble Energy, Inc. Settlement," April 22, 2015, available at https://www.epa.gov/enforcement/noble-energy-inc-settlement.

44 U.S. Environmental Protection Agency, "Clean Air Act: Mobile Source Civil Penalty Policy: Title II of the Clean Air Act Vehicle and Engine Emissions Certification Requirements" (2009), p. 3, available at http://www.epa.gov/sites/production/files/documents/vehicleengine-penalty-policy_0.pdf.

45 Ibid., p. 11.

46 Ibid., pp. 7, 11.

47 Ibid.

48 Ibid.

49 Ibid., p. 13.

50 Ibid., p. 14.

51 Ibid., p. 11.

52 Ibid., p. 15.

53 Ibid.

54 Ibid., pp. 23–24.

55 Ibid., p. 23.

56 Ibid., p. 25.

57 Ibid., p. 26.

58 U.S. Environmental Protection Agency, "U.S. Environmental Protection Agency Supplemental Environmental Projects Policy: 2015 Update" (2015), p. 1, available at http://www2.epa.gov/sites/production/files/2015-04/documents/sepupdatedpolicy15.pdf.

59 U.S. Environmental Protection Agency, "Memorandum on Securing Mitigation as Injunctive Relief in Certain Civil Enforcement Settlements," p. 3.

60 Ibid., p. 4.

61 Ibid., p. 4.

62 U.S. Environmental Protection Agency, "Noble Energy, Inc. Settlement."

63 U.S. Environmental Protection Agency, "ASARCO LLC Settlement," November 3, 2015, available at https://www.epa.gov/enforcement/asarco-llc-settlement.

64 *Energy Policy Act of 2005*, Public Law 58, 109th Cong., 1st sess. (August 8, 2005), sections 791–797, available at http://energy.gov/sites/prod/files/2013/10/f3/epact_2005.pdf.

65 U.S. Environmental Protection Agency, "SmartWay Technology," available at http://www3.epa.gov/smartway/forpartners/technology.htm (last accessed February 2016).

66 U.S. Environmental Protection Agency, "Clean Diesel National Grants: Projects (2012-2015)," available at http://www2.epa.gov/cleandiesel/clean-diesel-national-grants (last accessed March 2016).

67 U.S. Environmental Protection Agency, "Memorandum on Securing Mitigation as Injunctive Relief in Certain Civil Enforcement Settlements," p. 9.

68 U.S. Environmental Protection Agency, "Toyota Motor Corporation Settlement," March 7, 2003, available at http://www.epa.gov/enforcement/toyota-motor-corporation-settlement.

69 School Bus Fleet, "Toyota offers $20 million for cleaner school buses," November 1, 2004, available at http://www.schoolbusfleet.com/article/610862/toyota-offers-20-million-for-cleaner-school-buses.

70 Clean Air Act § 201-219; 42 U.S. Code § 7521-7554.

71 *United States of America v. Volkswagen AG, Audi AG, Volkswagen Group of America, Inc., Volkswagen Group of America, Chattanooga Operations, LLC, Dr. Ing. H.c. F. Porsche AG, and Porsche Cars North America, Inc.*

72 Timothy Gardner and Bernie Woodall, "Volkswagen could face $18 billion penalties from EPA," Reuters, September 18, 2015, available at http://www.reuters.com/article/2015/09/18/us-usa-volkswagen-idUSKCN0RI1VK20150918.

73 U.S. Environmental Protection Agency, "Clean Air Act: Mobile Source Civil Penalty Policy."

74 Ibid., p. 7.

75 Ibid., p. 11.

76 Ibid., p. 13.

77 Ibid., p. 14.

78 Ibid., p. 11.

79 Ibid., p. 15.

80 Nicholas Comfort, "VW's Winterkorn Told of Defeat Device Probe in 2014, Bild Says," Bloomberg Business, February 14, 2016, available at http://www.bloomberg.com/news/articles/2016-02-14/vw-s-winterkorn-told-of-defeat-device-probe-in-2014-bild-says.

81 U.S. Environmental Protection Agency, "Clean Air Act: Mobile Source Civil Penalty Policy," p. 23.

82 *Autoweek*, "VW emissions 'defeat device' isn't the first," September 24, 2015, available at http://autoweek.com/article/car-news/vw-emissions-defeat-device-isnt-first.

83 U.S. Environmental Protection Agency, "Clean Air Act: Mobile Source Civil Penalty Policy."

84 Aaron Cole, "This is Why Volkswagen Won't Pay $18 Billion," The Truth About Cars, September 25, 2015, available at http://www.thetruthaboutcars.com/2015/09/volkswagen-wont-pay-18-billion/.

85 This calculation reflects only the gravity-based portion of the penalty and followed the formula detailed in U.S. Environmental Protection Agency, "Clean Air Act: Mobile Source Civil Penalty Policy." The calculation assumes, per EPA guidance, that each vehicle has a 250 horsepower, or HP, engine. The penalty was calculated on a per-HP, per-vehicle basis, adjusted for egregiousness and to reflect the size of Volkswagen. The penalty was scaled for the adjusted number of vehicles. Discretionary multipliers were used in the calculation to reflect the lack of remediation, the willfulness and noncooperation of the violations, and the company's history of noncompliance.

86 Rachel Nealer, David Reichmuth, and Don Anair, "Cleaner Cars from Cradle to Grave" (Washington: Union of Concerned Scientists, 2015), available at http://www.ucsusa.org/sites/default/files/attach/2015/11/Cleaner-Cars-from-Cradle-to-Grave-exec-summary.pdf.

87 Electric Power Research Institute, "Environmental Assessment of a Full Electric Transportation Portfolio, Volume 1: Background, Methodology, and Best Practices" (2015), p. 2-1, available at http://www.epri.com/abstracts/Pages/ProductAbstract.aspx?productId=000000003002006875.

88 Mike Salisbury, "Air Quality and Economic Benefits of Electric Vehicles in Arizona" (Boulder, CO: Southwest Energy Efficiency Project, 2013), available at http://www.swenergy.org/data/sites/1/media/documents/publications/documents/AZ%20EV%20AirQuality.EconAnalysis.9.26.13%20.pdf.

89 Roland Hwang, "Clearing the Air on Electric Cars and Pollution," Roland Hwang's Blog, January 24, 2014, available at http://switchboard.nrdc.org/blogs/rhwang/clearing_the_air_on_electric_c.html.

90 U.S. Environmental Protection Agency, "Duke Energy Corporation Clean Air Act (CAA) Settlement," September 10, 2015, available at http://www.epa.gov/enforcement/duke-energy-corporation-clean-air-act-caa-settlement.

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