

VW's Dieselgate – Loss of Engineering Integrity; A Poor Excuse for Economic Insanity

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The news had barely broken before the Internet began distributing vitriolic “humor” regarding the Volkswagen turbocharged direct injection (TDI) Diesel scandal. I received this piece of graphic opinion from a friend in Australia scant hours after learning VW had been accidentally caught with its technical pants down by a group of West Virginia University Professors acting in consort with the International Council on Clean Transport (ICCT). TDI Diesels were emitting up to 40 times the oxides of nitrogen (NO_x) allowed by law, yet passing their state emission tests due to “cheating software.” Dr. Martin Winterkorn, VW's CEO since 2007, has taken responsibility for the transgression and stepped down. Volkswagen has placed a “do not sell” order on all TDI Diesels in USA stock, reportedly about 25% of the domestic inventory. Our local news broadcasts immediately bristled with “technical statistics” and the newly coined term *Dieselgate*. It seems the politically correct (PC) are very quick to respond to any tragic situation with an acronym and a proposed punishing solution but they rarely pause to confirm their punishment is being directed against the guilty. I fear that many of my fellow citizens are about to be penalized by actions of the press, the Federal government and State legislators. In my opinion, this absolutely stinks far worse than the NO_x!

I will admit a bias in this situation. Of the two dozen or so automobiles I have owned in my lifetime, six have been Volkswagens. The first was a 1966 Karman Ghia that I drove to work at the General Motors Proving Ground. The most recent is my current 2010 Golf – none of these had Diesel engines. Every VW I have owned was a very satisfactory automobile backed by exceptionally excellent local dealer service. My last three cars have been VWs purchased new from my local Volkswagen dealership (North Penn VW of Colmar, PA). I keep going back because the service is absolutely first-rate (though not bargain-priced), the product is well designed and constructed (and almost bargain-priced) and the local dealership is honest and straightforward. In short, I'm a happy VW customer of long standing.

But it seems that VW has left almost half a million American customers (and nearly 11,000,000 customers worldwide) with Diesel-powered automobiles that currently exhibit superior performance and mileage but don't really meet their emissions specification with regard to various smog-

producing oxides of nitrogen. Volkswagen has admitted that their emissions-control software actually recognizes when the car is being tested and puts its best NO_x-suppression algorithms to work. In all other situations this operation is apparently suspended, yielding higher torque, horsepower and mileage. It's a clever but dishonorable solution – do exactly what has been legislated and no more; work the loopholes, environment be damned. These TDI Diesel cars deliver their rated mileage and power and they meet current emission standards – just not simultaneously.

This late-breaking scandal involves cars built from 2009 until the present. VW was pretty successful at hiding their cheating software from the EPA, or the EPA has proved itself totally inept. It's interesting

management actually caught off-guard by the EPA's September 18th accusation and inquiry? We'll probably never know if Dr. Winterkorn (or someone further down the VW food chain) actually issued an order to code a two-faced environmental response. In short, we are unlikely to learn if this is the result of deliberate criminal action by a company officer or manager; or simply the result of overzealous program scheduling and inadequate software inspection/control. Is the actual felon an immature programmer or an experienced automobile executive? Which of those is more dangerous?

Punishment is already being meted out starting with the innocent. VW stock has fallen 33%, injuring investors who had nothing to do with the TDI design and its execution. The value of TDI-powered

automobiles (and VWs in general) has fallen precipitously and owners fear the recall effort will further devalue their Diesel cars by bringing reduced performance and mileage. They also fear States will force such retrofits as part of their registration renewal process. American VW dealers have already been injured; they must “make their year” without benefit of a unique engine. TDI sales are typically one quarter of their new car sales. The blast of “you can't trust VW” publicity has also hurt their sales of gasoline-powered vehicles – and these locally

owned American businesses had nothing to do with the TDI programming. American employees of the 20 Volkswagen facilities in the United States also stand in jeopardy of seeing their jobs evaporate. I can only advise Federal and State agencies to “go easy with the whip” because you're lashing the wrong mule. I hope that our courts will take a similar view and help minimize the damage being planned by salivating (class-less) class-action attorneys even as I type. We are dealing with an offense perpetrated over at least a seven year span. There is no need to rush to judgment and certainly no excuse for unduly beating the innocent.

We have no clear view (yet) of the environmental injury caused by the TDI scandal. Here in the United States we have stringent 0.07 g/mi maximum NO_x emission standards (per EPA Tier 2, Bin 5). Europe has much less stringent 0.129 g/mi NO_x standards (0.080 g/km per Euro 6, 2014, Diesel) and China has none. Only some 482,000 TDIs pollute in the US; the remaining 11,000,000 cars are not under EPA supervision or US Law. What would be the environmental impact if we did



that an outside consulting group, ICCT, actually found the problem. In seven years of oversight, the EPA never thought to run some road tests to confirm their roller-stand results. That's interesting in light of prior cheating “finds” in the trucking sector made by the EPA. In 1998 they found truck Diesels made by Caterpillar and Volvo were programmed to “run clean” at startup and then gradually relax that control as time passed, resulting in better long-haul mileage and performance, but unacceptable NO_x generation.

All of this leaves me with a myriad of questions. Who is the inventor of VW's cheating algorithm? Was it some lowly code-cutter who found a way to meet an otherwise impossible assignment or time-table? Did knowledge of how the TDI actually met its numbers “bubble up” from the bottom to the board room or was it suppressed at a far lower level? Or was creation of that algorithm actually ordered from on high? Is it possible VW Engineering management really didn't know what was being burned into the memory of their Diesel control microprocessors? Was corporate

nothing to modify the currently registered TDI Diesel-powered cars subject to US law? Would it make a measurable difference in the World's NO_x ? Could we detect an atmospheric difference here in the USA? I'm not an expert in this field, but I have a strong intuitive feeling that these cars don't amount to a hill of beans (or a small bucket of NO_x) compared to all of our Diesel trucks and fossil power-generating and processing plants. If the damage isn't truly measurable, we should be careful not to punish the innocent any more severely than we already have. I think the EPA owes us a clear, non-political and unemotional answer to this question.

Why am I suspicious the illegal emission of 482,000 US-based Volkswagens isn't nationally significant? Consider this: if each car functioned at the EPA mandated 0.07 g/mi and operated at the EPA assumed average of 12,000 miles per year, it would generate 840 grams (1.85 lb) of NO_x . But, assume that they all generate 40 times this amount or 74 lb per car per year. Hence the entire 482,000 fleet would generate 17,836 tons of NO_x per year. The EPA will also tell you that the average coal-fueled power plant produces 10,300 tons of NO_x per year. If the plant is upgraded with emission control systems including selective catalytic reduction, this can be reduced to about 3,300 tons per year. We have 1,512 coal-fired power plants operating in the US today.

NASA will surprise you by explaining that a single lightning strike can produce 15.4 lb of NO_x . A satellite-borne lightning flash counter has determined there are some 410 million lightning strikes per year between latitudes 35°N and 35°S. That works


out to 3,160,000 tons of NO_x per year or over 177 times what the 482,000 TDIs might be outputting. Sure, NASA may be wrong in their estimate, but even if they have erred by an order of magnitude (which I doubt because they got to the moon and back!) the TDIs are not significant contributors.

Note further that those Volkswagen Diesels represent only 0.37% of the (EPA counted) 130,163,354 passenger automobiles on our roads. Those gasoline powered cars generate NO_x , too. And we really shouldn't overlook the large fleet of long-haul Diesel trucks cruising our highways every day. Each of these aging behemoths runs 40,000 to 50,000 miles per year while returning 10 miles/gallon or less. Hence each of these consumes at least 4,000 gallons of Diesel oil per year. The average Northeastern US home consumes 600 gallons for heating. A 30 MPG TDI uses 400 to provide 12,000 miles of commutation per year. Plainly, there are many contributors to our national NO_x budget and some are likely far more influential than the flawed automobiles under discussion.

Forty-five years ago, I would have been better informed. I was employed at the General Motors Proving Ground when its Emission Laboratory was first inaugurated. We automotive engineers prided ourselves on being informed about all aspects of car design, testing and regulations. In short, a lunch hour spent with my contemporaries from that lab would have answered all of my technical questions regarding Diesel-gate. Perhaps some of their progeny (or some of those guys across town at Ford or Fiat-Chrysler) will wade in here and clarify some of these issues for us. I do know from

watching the press that it is very difficult to get "the straight story" on matters automotive; there's always too much money at stake and too much emotion involved. I don't want to see ignorance maim Volkswagen owners for absolutely no good reason. I don't want to see it destroy locally owned VW agencies and damage their employees and I don't want to see this proud German industrial giant chopped off at the knees over matters of political correctness.

I am no stranger to the evil and dishonest tactics employed by the politically correct (the politically corrupt?) who seem to have almost total control of our public airways and most of our printed news sources. I'm an honest citizen and a proud card-carrying member of the NRA, a target shooter and pistol collector who has grown used to being vilified and threatened every time something horrible is perpetrated by a mentally-aberrant monster. Yeah, a wrong has been committed here and punitive reaction is called for. But, let's be certain who committed it and how damaging it really was before crucifying everyone in sight for wearing a VW sweatshirt. Fairness is, after all, an American trait.

You and I are Engineers and our honor is called into question by this debacle. Each of us must be continuously vigilant of our actions. We cannot afford to lose our credibility nor the trust of coworkers unskilled in our disciplines. We must discharge our often difficult technical mission with integrity, always. There is no other behavior worthy of the title, Engineer. 

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