

Dieselgate

MVE220 Reading Project

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Declaration

This report was solely done by the named authors and all used sources are specified. The authors wrote this report to the best of their knowledge and belief in accordance with the *student ethics* document provided for the course.

1 Introduction

Volkswagen (VW) is one of the largest car manufacturers in the world. In 2017 it sold about 10 million cars world wide [1]. VW is a big part of the German economy and especially important for the state of Lower Saxony. The state of Lower Saxony plays a big role in the Volkswagen group so that it even has a share of the company and about 20% voting rights in it [2]. At its height on April 10th in 2015 the company stock price listed at 253.2 Euros.

Volkswagen stunned the world when the United States Environmental Protection Agency (EPA) announced on 18th September 2015 that Volkswagen had installed defeat device in their cars. With these devices they were able to achieve the environmental goals set by the US Government. However, these practices are highly illegal. The stock plummeted and on October 2nd 2015 the price was 92.36 Euro. The chart for that time period can be found in figure 1. In this report we elaborate on this corporate scandal and present a clear timeline and structure to understand this case.

1.1 Background

To understand this matter one has to look into the history of Volkswagen. In the beginning of the 1990s Volkswagen was on the verge of bankruptcy. The quality of their cars was worse than the ones of other car manufacturers and for the most people Volkswagen was not a preferable car brand.

In 1993 Ferdiand Piëch took over as CEO of Volkswagen. Piëch was a big visionary for Volkswagen and started to manufacture cars using Diesel. Something that was basically never done



Figure 1: Volkswagen stock price on the 18th September 2015 and the time after [3]

before. Before that Diesel was only used for commercial vehicles and big trucks. However, using Diesel for personal cars and especially the Volkswagen developed *Turbocharged direct injection* (TDI) was a huge success especially for the German and European market.

However, there is one big problem with Diesel - the emissions, especially the particulate matter and Nitrogen oxide (NOx) is very unhealthy for humans. There are filters, so called NOx traps, to filter the emissions and make them less dangerous, but these filter are very expensive and need to be changed rather often. Especially the US laws in the late 2000s aimed to reduce emission, which turned out to be a problem for the Volkswagen cars.

At the same time, in 2009, Volkswagen published its Strategy 2018. It reads as follows: *"The key element of our "Strategy 2018" is to position the Volkswagen Group as a global economic and environmental leader among automobile manufacturers. In 2018, the Volkswagen Group aims to be the most successful and fascinating automaker in the world."* [4]. To achieve this goal, the US is a crucial market for Volkswagen. But to be able to sell cars in the US the US emission goals need to be met. This poses a problem for Volkswagen, since it is very expensive to manufacture cars that meet these goals, but in order to be able to compete with the US market, the Volkswagen cars need to be reasonable priced. Winterkorn is the CEO at that time. Piëch and Winterkorn know each other for a long time and are good friends and colleagues and both have to same aim to be the industries leader. One can only speculate that the defeat devices seemed like an easy and quick option to take over the market with false promises.

In the next chapter we give key-dates and a timeline of the most important things that happened to understand the scandal. We follow the timeline with a more in depth few in the most important questions of what happened and who is responsible for that. We end our report with a conclusion and a outlook for Volkswagen in the future.

2 Timeline

In the following we provide a timeline with the most important key dates. Most of the information was aggregated by the *Norddeutscher Rundfunk* (NDR; Northern German Broadcasting) [5] which is the German public broadcaster responsible among others for the state of Lower Saxony.

In **1993** *Ferdinand Piëch* became the new CEO of Volkswagen. He was succeeded in **2002** by *Bernd Pischetsrieder* who was planned to be the CEO of Volkswagen until 2012 but was succeeded in **2006** by *Martin Winterkorn*. Martin Winterkorn resigned as CEO of Volkswagen as a result of the Scandal and was succeeded by *Matthias Müller* a few days after EPA published their results.

As reported by the *Deutsche Presse-Agentur* (DPA; German Press Agency) the decision to install defeat devices in cars by Volkswagen was made some time in **2005** in the engine development department in the Volkswagen headquarters in Wolfsburg (Germany). This happened during the time *Bernd Pischetsrieder* was the CEO of Volkswagen

In **2007** Martin Winterkorn became the new CEO of Volkswagen. Additionally, *Bosch* warned Volkswagen, that the defeat devices are illegal and could lead to potential problems. Volkswagen ignored all warnings and used the defeat devices and the coming years in million of cars.

In **2008** the first defeat devices were out in cars and sold like this to customers.

In **2014** then, the first study recognizes that the emissions of Volkswagen cars are too high. This study was done by the University of West Virginia in the USA. Volkswagen got knowledge of these results in May of 2014. More studies followed towards the emissions of Volkswagen cars and especially the United States Environmental Protection Agency (EPA) was interested in the cars by Volkswagen and analyzed their emission. On the **3rd September 2015** Volkswagen confessed the manipulation of the emissions towards the EPA.

On the **18th September 2015** the EPA announced publicly the manipulation of Volkswagen and one day later, on the **19th of September**, Volkswagen itself confessed the manipulation and also promised to look for the reasons and publish an explanation for the public. On the **21st September 2015** the United States Department of Justice (DOJ) announces that it will look into this matter and do it own research. One day after, on the **22nd September 2015**, the Volkswagen stock plummet to under 100 Euros and thus lost within only a few hours about 40% of its value. The next day, **23rd September 2015**, Martin Winterkorn resigns from his position as CEO of Volkswagen. In the following days more and more high executives resign from their positions with Volkswagen.

On the **28th September 2015** Volkswagen announces that additionally to the known Volkswagen brand cars, also more than two million cars by *Audi*, about one million cars by *Skoda* and the *Volkswagen commercial cars* are affected by this matter.

On the **4th October 2015** multiple engineers of Volkswagen confess that they start putting in the defeat devices in the cars in 2008. This resulted from the fact that there was no other way to combine Volkswagen objective for the cost of the engines and to comply with the emission rules set by the law for the engine EA 189.

On the **15th October 2015**, the Kraftfahrt-Bundesamt (KBA; Federal Office for Vehicles in Germany) forces Volkswagen to take back 2.4 million cars. Volkswagen additionally offers to take back all cars in Europe that are affected by the defeat devices - a total of 8.5 million cars.

On the **28th October 2015**, Volkswagen has to publish a loss of 3.5 billion Euros for its EBIT in the third quarter. To balance this loss, Volkswagen sells its shares of *Suzuki*. On 29th March 2016 the news gets published, that Volkswagen won't be able to pay dividends in this period. And the annual report published on 22nd April 2016 shows that Volkswagen made a loss of 1.6 billion Euros in total.

On the **20th June 2016** prosecutions by the public prosecutor Braunschweig against Martin Winterkorn are started because of market manipulation.

On the **27th October 2016** the quarterly numbers for Volkswagen are published. These indicate that Volkswagen recovers with an EBIT of 8.65 billion Euros for the first three quarters of 2017. This is more than the year before (3.34 billion Euros) but still less than the year before the scandal (9.4 billion Euros)

On the **10th January 2017**, despite the scandal, Volkswagen is the biggest car manufacturer in the world with more than 10.3 million cars sold world wide.

On the **27th January 2017**, the prosecutions against Martin Winterkorn are broadened and now also include also fraud referring to the emissions scandal

On the **26th August 2017** a Volkswagen engineer is sent to prison for three years by the USA and on **7th December 2017**, the Volkswagen manager Oliver Schmidt is fined and sent to prison for seven years because of the manipulation of the engines.

Brand	Number of Infected Cars
Volkswagen	5,000,000
Volkswagen Commercial Cars	1,800,000
Audi	2,100,000
Skoda	1,200,000
Seat	700,000
Total	10,800,000

Table 1: Number of infected cars by brand [6]

The timeline shows a clear trend for the Volkswagen company. The company itself seems to be able to recover. It again sells a big amount of cars and the stock by now is higher then before the scandal became public knowledge¹. However, the persons involved seem the be held accountable more and more. So that some people got jailed in the USA and also the prosecutions in Germany are still going on. It still remains to be completely seen which people are responsible for this scandal. In the next chapter we give answers to more in depth questions - especially who is responsible and how was it possible to implement these defeat devices.

3 What is a defeat device

After we used the term of *defeat devices* before in this report we want to clarify what a defeat device exactly is and why it is illegal to use in cars to manipulate the emission test. A defeat device is a device that recognizes that the car is running an emissions test and then reduces engine performance such that the car would pass then emissions test. The defeat device is integrated into the engine control unit (ECU), which all modern cars have, the software however installed on the ECU was developed with intent to defeat the emissions test. Once testing and analysis of the software was done, it became clear that the intention could not be anything other than cheating the test, and could not have just been a malfunction. During regular driving the car would emit 40 % more NOx gasses than during the emission test.

¹172.72 Euro on the 6th May 2018 compared to 167.80 Euro on the 17th September 2015

Defeat devices were installed on all Volkswagen and Audi diesel cars sold in the United States between 2008-2015, resulting in approximately 482 000 cars [7].

4 Lower Saxony ownership and the need for growth

Volkswagen is partially owned by the state of Lower Saxony in Germany and thus is intertwined with the German politics. Volkswagen is owned 11.8% by the state of Lower Saxony. However, they have 20% voting rights, this makes the state of Lower Saxony a significant voice in the company [2]. A by product of the Lower Saxony ownership is that the workers union is very strong. By not only being able to apply pressure to the management of the company but also to the elected official of Lower Saxony the union manages to control the increase of pay and jobs at Volkswagen.

In 1993 there was a global recession, which especially affect the European market. With unemployment reaching close to 8%, In German factories workers accept a four-day-week with a 15% pay cut. The union and the state of Lower Saxony needed Volkswagen to grow. In this climate with desperate need of growth, Volkswagen decide to increase their presence in America. Especially because of the environmental protection laws, this seemed like a hard task to do. Somehow, however, Volkswagen was able to introduce the new *Clean Diesel* technology, which turned out to be fraud.

5 American Markets

Insight into the American market for Volkswagen provides some facts that are assumed to shed light on Volkswagen's motives to implement defeat devices in their cars. The American market has long had stricter pollution laws than Europe. This is due in large to the Clean air act of 1970 (42 U.S.C. § 7401). In the early 1990 California and especially Los Angeles had a severe smog problem, and decided to pass separate stricter laws for pollution, these would apply in the state of California only. In order to get this done the Congress in 1998 passed a law giving California the right to impose stricter laws [8]. These two two different laws created a problem for all car companies wanting to sell their vehicles in the United States. They would need to construct two models of each car, one that would pass the standards in California and one that they could sell to the rest of the United States. These two could additionally be fundamentally different from the models the companies could sell in Europe, thus three versions of the same car.

In 2007 the EPA decided that the rules surrounding the California exemptions should not apply. Arnold Schwarzenegger acting as Governor of California fought a law suit for four years, to keep the California exemptions. Finally, the Obama administration solved the conflict by applying the California laws to all of the United States. With the automakers support the the new law was passed. However, one clause was written into the law, a revisit clause set for for 2017, when Obama no longer would be president, this clause would allow automakers in the United States to rewrite the regulations if they where "unattainable" in the eyes of the manufacturers.

6 Who as responsible?

After the scandal happened the question about the responsibility for the manipulation is the most important one. The responsibilities are not conclusively clarified, which is why we want to show up the current state of the investigations. It is easy to jump to conclusions and accuse a lot of people with knowledge of this. However, we try to stay neutral and only present results, that are publicly known without making our own accusations.

The state of Lower Saxony and their 20% voting right need Volkswagen to grow. Their message to the board of Volkswagen was clear in the mid 90's, they could not accept more unemployment in the region. With unemployment so high already the region could not handle Volkswagen laying off workers as a cost cutting measure. In fact they needed Volkswagen to hire more people if possible. The same thing applies to the worker's union in Volkswagen, that by the nature of its reason for existence wanted to protect its members. This environment created by the state of Lower Saxony and the worker's union could be one piece to the manipulations.

Furthermore, the introduction of Diesel to personal cars and the Volkswagen own *TDI* technology was done by Piëch. Piëch is a very ambitious man and wanted the Diesel to succeed - which is understandable since the future of Volkswagen was dependent on that during that time. The fact that Pischetsrieder was premature replaced by Piëch's long time colleague and friend Winterkorn seems suspicious, especially since the defeat devices are installed short time after the change. However, there no legal accusations towards Piëch, which makes it seem that he is not responsible for the defeat devices, his strive for success for the Volkswagen brand however could have lead the management that succeeded him to these drastically means. There are also no accusations towards Pischetsrieder, which makes it seem that Winterkorn is the CEO who is responsible for the defeat devices, especially since there are criminal investigations from multiple countries against him.

There are also several people jailed in the USA, who are made responsible for the manipulations. However, the CEO of the Volkswagen group in America - Michael Horn - left the company in 2016 without any criminal charges. Furthermore, it is hard to lay any real responsibility at the hands of the programmers of defeat device. However, its is curious that we never hear of a whistle blower coming out and letting the public know what is going on. The programming of the defeat device could not be misconstrued as anything other than deceit.

All in all it probably will take several years to come until we have an conclusive answer what exactly happened at Volkswagen that lead to the implementation of defeat devices in their cars.

7 Aftermath and future risk minimization

The aftermath is still ongoing. But the consensus is that Volkswagen got off easy. By now the stock is back on the level as it was before the scandal. Additionally, the image of the brand is still high in Germany and the rest of the world. At the moment, Volkswagen is basically able to operate as if the scandal never happened.

As for the investors, could they have know about the risk? Knowing what we now know it is fair to say that the American regulation along with need for growth, the competitiveness of the industry, and the governmental ownership could have influenced the risk assessment. However there was a deliberate effort to conceal the deceit, and it was successful for a long

time, so any investor not digging into specifics of the ECU could not have had suspicions of fraud.

8 Further reading

Since this scandal is rather young there is not so much literature on it. The best thing to do to get a better image of the scandal is to read into news articles from the last years - especially the ones we used as references. Additionally, the documentary *Dirty Money* explains the scandal in great detail combined with a great story telling in its episode *Hard Nox*. Even though this documentary focuses nearly solely on the American market it gives a great insight in what happened at Volkswagen.

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