

DIESELGATE – HEAVY FUMES EXHAUSTING THE VOLKSWAGEN GROUP

It has been a run. Since the Volkswagen Group set its target to become the world's largest auto manufacturer, the industry has seen an unprecedented blitz. At the end of 2015, the German automaker was about to reach its goal two years ahead of schedule. A significant proportion of this growth was the US market. Just at the moment when the company seemed invincible to the public and many shareholders, the United States Environmental Protection Agency (USEPA) revealed that Volkswagen had installed software in its most successful TDI diesel engines to rig the test stand in order to pass emission standards. Across brands, about 11 million of its diesel vehicles worldwide were discovered to have the cheating device installed, emitting while on the road as much as 40 times the level of nitrogen oxide and dioxide (NOx) permitted in the USA. The company also admitted to have understated carbon dioxide (CO2) emission figures in Europe. This was the biggest automotive-emissions scandal the world had ever seen, shattering the brand worldwide, and developing into a threat to the formerly pristine image of products "Made in Germany." The Group claimed that the scandal was the result of a chain of errors dating back to 2005. Only days after the news broke, CEO Martin Winterkorn stepped down. Succeeding him, Matthias Mueller, former CEO of the successful Porsche brand, and a Volkswagen Group veteran, took charge. Mueller knew not just the entire Group's products but also the corporate culture. How would he lead the company out of its severest crisis while the scandal was still escalating?

Background

European vs US Vehicle Emission Standards

In line with growing attention to global warming and local air pollution in urban areas, there had been increasing concern about exhaust emissions from motor vehicles. As reported by the environmental organization International Council on Clean Transportation (ICCT), there were many ways to cheat on emission tests [see **Exhibit 1**], and cars built by many auto manufacturers had higher emissions out on the road than during official lab tests. In regards to CO2, while the gap between real-world and official emissions was normally expected to be

Dr. Claudia H. L. Woo prepared this case under the supervision of Dr. Marcus Schuetz for class discussion. This case is based entirely on public sources. This case is not intended to show effective or ineffective handling of decision or business processes.

© 2016 by The Asia Case Research Centre, The University of Hong Kong. No part of this publication may be reproduced or transmitted in any form or by any means—electronic, mechanical, photocopying, recording, or otherwise (including the internet)—without the permission of The University of Hong Kong.

Ref. 16/572C

around 10%, it was found that the gap had been widening from approximately 8% in 2001 to 40% in 2014, in line with the tightening of emissions-reduction targets for car fleets.¹

Standards of vehicle emissions, safety, fuel economy and regulatory processes varied in different regions, such as the European Union (EU) and United States (US) market. The European vehicle-emission standard “Euro 1” was first introduced in the early ’90s to set different emission limits for gasoline and diesel vehicles. The standards were emended over the years, especially tightening diesel-engine emission limits. The Euro 6 standard came into force in September 2014.² In the USA, Tier 1 emission standards were also first adopted in the early ’90s, with emission limits varying according to vehicle weight instead of the kind of fuel used. The Tier II standard was phased in during 2004 and a new sub-ranking introduced within the standard, ranging from BIN 1 to 10 for light-duty vehicles, with 1 representing the cleanest (vehicles with zero emissions) and 10 the dirtiest. The Tier III program would begin in 2017. NOx emissions, which contributed to acid rain and ozone, were more tightly controlled than CO2 in the USA, beginning with the introduction of the US Clean Air Act of 1970, whereas in Europe, CO2, regarded as the pollution behind the greenhouse effect and climate change, was subjected to more stringent control.³

The EU focused more on pre-production certification testing rather than post-production and in-use fuel consumption and emission controls.⁴ Some of the US vehicle emission standards set by the USEPA, such as in-use surveillance testing, mandatory emission warranties, recalls and defect reporting, were not found in the European regulatory structure. In general, the EU and US vehicle emissions standards were not directly comparable, given their different approval processes and testing procedures. However, some observers had found that the European Emission standards issued by the United Nations Economic Commission for Europe (UNECE) had been lagging behind the USA, where the compliance level of emissions-control technology was more stringent.⁵ [See **Exhibit 2.**] This lag was believed to be due to the difficulty of reaching consensus among individual countries in the EU on standards-setting. Nevertheless, each member state was free to enact stricter measures than those issued by UNECE.⁶

Given the different standards of different regions, a car that was lawful in one country might be illegal to sell in another unless the producer was willing to make major investments in redesigning the car in order to comply with the law. For example, the Britain-made Ford ECOnetic diesel engine was not sold in the USA, as it did not comply with the US emissions standards. Ford dropped the idea of making a redesigned version for the US market, as it did not believe consumer demand would justify the additional investment of US\$350 million.⁷

¹ International Council on Clean Transportation (September 2015) “From Laboratory to Road”, http://www.theicct.org/sites/default/files/publications/ICCT_LaboratoryToRoad_2015_Report_English.pdf (accessed 20 January 2016).

² Automoblie Association Developments Limited (1 October 2015) “Euro Emissions Standards”, https://www.theaa.com/motoring_advice/fuels-and-environment/euro-emissions-standards.html (accessed 10 January 2016).

³ See also Fisher, D. (2 October 2015) “VW’s Diesel Was A Creation Of EU Regulators”, *Forbes*, <http://www.forbes.com/sites/danelfisher/2015/10/02/eu-emissions-regulations-made-the-vw-diesel-u-s-regs-brought-it-down/#634aaeda5f2f> (accessed 12 January 2016).

⁴ He, Hui (30 May 2014) “Bought a tiger, got a Hello Kitty? How to Fix Vehicle Fuel Economy Fraud in China”, The International Council on Clean Transportation, <http://www.theicct.org/blogs/staff/bought-tiger-got-hello-kitty-how-fix-vehicle-fuel-economy-fraud-china> (accessed 16 January 2016).

⁵ Canis, B. and Lattanzio, R. (18 February 2014) “U.S. and EU Motor Vehicle Standards: Issues for Transatlantic Trade Negotiations”, Congressional Research Service, P2, <https://www.hsl.org/?view&did=751039> (accessed 8 January 2016).

⁶ Ibid.

Source: Stock Performance of Volkswagen and Some of Its Top Suppliers After the Scandal Broke

⁷ Kiley, D. (3 September 2008) “The 65MPG Ford the U.S. Cant Have”, *Bloomberg Business*, <http://www.bloomberg.com/bw/stories/2008-09-03/the-65-mpg-ford-the-u-dot-s-dot-cant-have> (accessed 10 January 2016).

Diesel vs Gasoline Vehicles in Europe and the US Market

Diesel vehicles were more popular in Europe than in the USA; diesel cars made up about half of the European market and only 3% in the USA.⁸ One of the reasons was that there were heavy taxes on gasoline in the EU, imposed by national governments in an attempt to lower carbon emissions. Diesel fuels enjoyed lower tax rates in many European countries.

In the USA, gasoline was relatively cheaper, and diesel engines were perceived by American consumers as dirty. A number of studies had indicated diesel cars produced higher level of NOx and particulate matter than gasoline cars, and this could trigger a number of health problems.⁹ The more stringent NOx emissions standard in the USA was another reason for the diesel penetration rate. Also, the disastrous failure of General Motors in marketing its Oldsmobile diesel vehicles in the late 1970s and '80s had also helped ruin the prospects of diesel engines in the USA.¹⁰

As diesel-filtering technology became more sophisticated in the last decade, the US perception had begun to change, with more car producers, such as Volkswagen, BMW, Mercedes and Chevrolet, beginning to bring new diesel models into the US market. The diesel cars had been promoted by the car industry as better than gasoline cars for the environment, as the former consumed less fuel in travelling the same distance and thus emitted less carbon.¹¹

Overall, as diesels had been popular in the European market, given government subsidies, the transition to alternative-powered vehicles like hybrids and electric cars in the region was slow compared to the Japanese and US markets. Japanese automakers, particularly Toyota, which was the world's largest car producer, chose the gasoline hybrid route, while US manufacturers such as General Motors and Tesla had invested in plug-in hybrids and pure electrics.¹² Although Americans bought over three times as many hybrids and electric vehicles as diesels, diesel-vehicle sales had risen for eight consecutive years since 2007 [See Exhibit 3].¹³

The Volkswagen Group

Brief History of the Volkswagen Group

Volkswagen (VW), meaning "People's Car" in German, was founded in the early 1930s. It was part of Nazi leader Adolf Hitler's vision to make it affordable for German families to own a car. Its first new factory was built in 1938 in Wolfsburg, a town in Lower Saxony, Germany. The name Volkswagen was not used until after World War II. The original German name was "Kraft durch Freude Wagen," which means, "strength through joy car." Its first car, with a beetle-like shape, was largely designed by Austrian-born German engineer Ferdinand Porsche, who owned a sports car company, Porsche. The original Volkswagen plant was located beside a canal, which allowed transport of goods to the east, and because of this became a strategic

⁸ Lussenhop, J. (23 September 2015) "Why Do American Car Buyers Why Away from Diesel?", BBC News, <http://www.bbc.com/news/world-us-canada-34329596> (accessed 10 January 2016).

⁹ Official website of United States Environmental Protection Agency: <https://www3.epa.gov/airquality/nitrogenoxides/health.html> (accessed 1 March 2016).

¹⁰ Sass, R. (18 May 2008), "G.M.'s Dreadful Engines Gave Diesels a Bad Name", New York Times, http://www.nytimes.com/2008/05/18/automobiles/collectibles/18RUST.html?_r=0 (accessed 12 January 2016).

¹¹ Anderson, R. (16 September 2015), "Diesel Cars: What All the Fuss About?", BBC News, <http://www.bbc.com/news/business-34257424> (accessed 5 January 2016).

¹² Bailey, D. (30 September 2015) "Could the Volkswagen Scandal Power an Electric Car Breakthrough?", The Guardian, <http://www.theguardian.com/commentisfree/2015/sep/30/volkswagen-scandal-electric-car-diesel> (accessed 28 January 2016).

¹³ Clothier, M. (24 September 2015) "Volkswagen Cheating Scandal Seen Hastening Clean Diesel's Demise", Bloomberg Business, <http://www.bloomberg.com/news/articles/2015-09-24/volkswagen-cheating-scandal-seen-hastening-clean-diesel-s-demise> (accessed 26 January 2016).

supply base for military materiel during the war. As components of the Nazi V2 rocket were also produced on the premises, the plant was entirely destroyed by Allied bombing in 1945. It was under the command of the British officer, Major Hirst, that the company started building Beetles again, first supplying British forces, and then expanding. The first Beetles shipped to the USA were brought home by returning US soldiers. VW bought Auto Union, owners of historic Audi brand, in the 1960s and turned it into VW's luxury brand. The automaker also started making a new generation of cars, such as Passat, Golf and Polo, in the early 1970s. By 1975, VW Group (or VW AG¹⁴) was formed as a holding company to cater to its growing business.

Ferdinand Porsche's grandson Ferdinand Piëch became the Chairman and Chief Executive Officer (CEO) of VW Group in 1993. He retained the position of CEO until 2002. Piëch, an outstanding engineer, was known for his aggressive approach to growing VW on the world stage. In his memoir *Auto Biographie*, he wrote that VW was only three months away from insolvency when he stepped in as the CEO. By modernizing the company's manufacturing process and acquiring new brands, he laid the foundation for the Group's global presence.¹⁵ One of the technologies Piëch promoted was turbocharged direct injection (TDI), which was VW's trademark technology for diesel engines. The technology was claimed to significantly improve diesel's practicality for passenger cars.¹⁶ Piëch had also doubled the number of brands in the VW Group by bringing in luxury brands such as Bentley, Lamborghini, Bugatti and Porsche. Under his leadership, he set the goal for VW to become the world's top automaker by sales and outplay its long-time rivals, General Motors and Toyota. He was known for his toughness and willingness to demote or dismiss underperforming employees.¹⁷ Piëch had also been criticized for nepotism when he secured the nomination of his wife, a former kindergarten teacher, onto the Group's supervisory board.¹⁸

Strategy 2018 and Development of Clean Diesel Technology

Martin Winterkorn, also an engineer, who became CEO of VW in 2007, adopted an aggressive, demanding leadership style, and would not accept failure.¹⁹ He was often seen as Piëch's executive hand. One of Winterkorn's initiatives was the introduction of the MQB (modular transverse toolkit) platform, which allowed different models of its various automobile brands to be built from a large proportion of shared components, thereby in principle reducing development costs, driving up profit and increasing design flexibility in the rest of the car.²⁰ Winterkorn formulated an aggressive plan for the Group, Strategy 2018 (coined "Mach 18"), aiming to make VW not only the highest-selling automaker in the world, but more profitable than before. He envisioned VW producing 10 million vehicles worldwide annually by 2018 and achieving pre-tax profit margins of 8% or higher, compared with 6% on sales of 6.2 million

¹⁴ AG is the shortened form of the German word Aktiengesellschaft, meaning corporation involving share ownership and tradable on a stock market.

¹⁵ Boston, W. and Buell, T. (26 April 2015) "Volkswagen Chairman Ferdinand Piëch Resigns", *The Wall Street Journal*, <http://www.wsj.com/articles/volkswagen-chairman-ferdinand-piech-resigns-1429978992> (accessed 19 January 2016),

¹⁶ Ewing, J. and Bowley, G. (13 December 2015) "The Engineering of Volkswagen's Aggressive Ambition", *New York Times*, <http://www.nytimes.com/2015/12/14/business/the-engineering-of-volkswagens-aggressive-ambition.html> (accessed 23 January 2016).

¹⁷ Ewing, J. and Bowley, G. (13 December 2015) "The Engineering of Volkswagen's Aggressive Ambition", *New York Times*, <http://www.nytimes.com/2015/12/14/business/the-engineering-of-volkswagens-aggressive-ambition.html> (accessed 23 January 2016).

¹⁸ Crossland, D. (23 March 2012) "VW Chief Keeps Control in Family More out of Wisdom than Nepotism", *The National Business*, <http://www.thenational.ae/business/industry-insights/economics/vw-chief-keeps-control-in-family-more-out-of-wisdom-than-nepotism> (accessed 29 January 2016).

¹⁹ Pritchard, C. (12 October 2015) "Volkswagen AG (ADR) Corporate Culture under Former CEO Martin Winterkorn", *Business Finance News*, <http://www.businessfinancenews.com/24917-volkswagen-ag-adr-corporate-culture-under-former-ceo-martin-winterkorn/> (accessed 25 January 2016).

²⁰ Schmitt, B. (7 August 2011) "The Revolution of The Car Industry: Kit Cars", *The Truth About Cars*, <http://www.thetruthaboutcars.com/2011/08/the-revolution-of-the-car-industry-kit-cars/> (accessed 27 January 2016).

vehicles in 2007.²¹ He was even more ambitious in the US market, targeting one million unit sales annually by 2018, triple the 2008 volume. Compared to other top automakers, VW had a strong position in the European market and the fast-growing Chinese market, but not in the North American market [see **Exhibit 4**]. The company believed that by increasing investment and local production in the USA, the world's second largest automotive market, it could boost VW's growth and profitability, and this would be critical in achieving the 2018 goal.²²

In 2008, VW found itself a unique position in the market with its clean-diesel technology, which it claimed could meet US emission standards. It claimed that this breakthrough technology was able to reduce emissions and trap and destroy residual NOx pollutants without sacrificing vehicle performance.²³ Instead of installing the costly and clunky treatment system used by others in the industry, VW diesel engines could fit in small, affordable cars. This technology had since then enabled VW to account for majority of the US demand for diesel cars [see **Exhibits 3 & 5**].

In 2013, VW achieved over 430,000 total unit sales in the US, the then-highest volume for VW USA since 1973.²⁴ Despite being far from the one million units targeted in the 2018 strategy, VW aimed high to reach as close as possible to that goal by aggressively increasing production and launching new models. On the other hand, through continual expansion and boosting global production, VW exceeded global production of 10 million vehicles for the first time in 2014, well ahead of the 2018 global goal.²⁵ [See **Exhibit 6**.]

Governance of the VW Group Prior to the “Dieselgate Scandal”

Over the decades, VW and Porsche continued to collaborate on car production, despite the wrangling relationship between the two companies, or rather the Piëch and Porsche families, who attempted to take control of each other's companies.²⁶ In 2012, VW Group finally took over Porsche's car-making operation and in return agreed that its family investment company, Porsche Automobil Holding SE (Porsche SE), would own a 50.7% voting stake in the VW Group, which retained management control of all of car brands. Indeed, Piëch and his cousin, Wolfgang Porsche, were the Group's main shareholders, holding 50.7% of voting stake through the family investment company.

Ever since the end of the Second World War, VW had been partly owned by the German government or state of Lower Saxony. Under the controversial Volkswagen Law,²⁷ the state

²¹ Muller, J. (17 April 2013) “How Volkswagen Will Rule the World”, *Forbes*, <http://www.forbes.com/sites/joannmuller/2013/04/17/volkswagens-mission-to-dominate-global-auto-industry-gets-noticeably-harder/#6cfa29521ab6> (accessed 25 January 2016).

²² Forbes (28 July 2014) “Volkswagen Eyes Passenger Car Sales Growth in the U.S.”, <http://www.forbes.com/sites/greatspeculations/2014/07/28/volkswagen-eyes-passenger-car-sales-growth-in-the-u-s/#20c5681a6a1f> (accessed 25 January 2016).

²³ Priddle, A. (27 September 2015) “VW scandal puts diesel engines on trial”, Detroit *Free Press*, <http://www.freep.com/story/money/cars/2015/09/26/vw-cheat-emissions-diesel-engine-fallout/72612616/> (accessed 25 January 2016).

²⁴ Cain, T. (25 July 2013) “Why Isn't Volkswagen USA Selling More Cars? First Half 2013 Sales Figures Analysis”, <http://www.goodcarbadcar.net/2013/07/volkswagen-usa-2013-sales-figures-down.html> (accessed 27 January 2016).

²⁵ Tissshaw, M. (12 January 2015) “Volkswagen Group Exceeds 10m Global Sales for the First Time,” *Autocar*, <http://www.autocar.co.uk/car-news/motor-shows-detroit-motor-show/volkswagen-group-exceeds-10m-global-sales-first-time> (accessed 27 January 2016).

²⁶ Ruddick, G. (23 September 2015) “Volkswagen: A History of Boardroom Clashes and Controversy”, *The Guardian*, <http://www.theguardian.com/business/2015/sep/23/volkswagen-a-history-of-boardroom-clashes-and-controversy> (18 January 2016).

²⁷ The Volkswagen Law was enacted in 1960 to regulate the privatization of VW Group in order to maintain government control in the Group and to prevent its takeover by other shareholders. No shareholder in the Group could exercise more than 20% of the votes at a shareholder meeting, regardless of the size of stock holdings, and major decisions (e.g., capital increases) required 80% agreement. The VW Law also allowed the federal government or the state to have two seats each in VW's supervisory board as long they held shares in the Group. See Bodoni, S. (22 October 2013) “Germany Wins EU Court Over VW Law, Escapes”, *Bloomberg Business*, <http://www.bloomberg.com/news/2013-10-22/germany-wins-eu-court-fight-over-vw-law-legality-escapes-fines.html> (accessed 18 January 2016).

of Lower Saxony owned 20% voting rights in VW Group and had a significant influence on corporate decisions. By contrast, other German automakers, such as Daimler and BMW, had no government officials on their boards.²⁸ The third largest shareholder of the Group was Qatar Holding, a subsidiary of an investment authority owned by the state of Qatar, holding 17% voting stock, and other institutions held the remaining 12.3%. [See **Exhibit 7** for VW's share and voting-rights distribution.]

Similar to other large companies in Germany, VW Group had split boards: a management board and a supervisory board, with half of the 20-member supervisory board elected by employees.²⁹ The responsibility of the supervisory board was to monitor management and approve key corporate decisions. While all the union officials were German workers' representatives, the rest of the VW supervisory board was comprised of five members of the Porsche and Piëch families, two representatives from the state of Lower Saxony, two from Qatar Holding, and one from Swedish Bank, who was regarded by industry analysts as the only outsider in the board. Out of the 20 supervisory board members, 17 were German or Austrian. While the VW management board was entirely male, there were three women on the supervisory board, two of whom from the Porsche and Piëch families. Some of the directors also served on multiple boards.³⁰ The union representatives and state representatives in the supervisory board shared a common social mission: protecting employment. As long as the top management of the Group could deliver on jobs, they were given a relatively free hand to manage the company.³¹

An extensive 24-page Group-wide Code of Conduct³² was introduced in 2010 for all employees, suppliers and business partners globally for sign-off. It also outlined a process for reporting wrongdoing. By combining the risk-management, internal-control and compliance-management systems, the Group adopted a single governance, risk and compliance strategy to ensure all potential risk areas were covered [see **Exhibit 8**.³³ Based on the goals set out in "Mach 18," internal management was based on seven core performance indicators: 1) deliveries to customers; 2) sales revenue; 3) operating profit; 4) operating return on sales; 5) capital expenditure/sales revenue in the automotive division, 6) net cash flow in the automotive division; and 7) return on investment in the automotive division.³⁴ The Group declared itself to have continually complied with the German Corporate Governance Code, as required by the German Stock Corporation Act, with some exceptions. For example, the self-regulated governance code required the independence of the Audit Committee Chairman, but the Group expressed ambiguity about the meaning of independence and believed that it "did not constitute a conflict of interest or impair the Audit Committee Chairman's ability to perform his duties," even with the possible absence of independence in this aspect.³⁵ VW was ranked by the Reputation Institute, a world-leading reputation research firm, as being a top ten "Global CSR

²⁸ Bryant, C. and Milne, R. (4 October 2015) "Boardroom Politics at Heart of VW Scandal", *The Financial Times*, <http://www.ft.com/intl/cms/s/0/e816cf86-6815-11e5-a57f-21b88f7d973f.html#axzz40JRQmTHb> (accessed 17 January 2016).

²⁹ A German act known as co-determination (*Mitbestimmung*) allowed workers in large companies to elect representatives for half of the supervisory board, comprising 20 members in total. The other half of the supervisory board was elected by shareholders.

³⁰ Hymowitz, C. and Webb, A. (28 September 2015) "Insider Named at Volkswagen Shows Germany Inc. Insularity", *Bloomberg Business*, <http://www.bloomberg.com/news/articles/2015-09-27/insider-named-to-head-volkswagen-shows-germany-inc-insularity> (accessed 3 February 2016).

³¹ Cremer, A. and Bergin, T. (10 October 2015) "Fear and Respect: VW's Culture under Winterkorn", *Reuters*, <http://www.reuters.com/article/us-volkswagen-emissions-culture-idUSKCN0S40MT20151010> (accessed 17 January 2016).

³² Volkswagen Group(n.d.) "Code of Conduct," http://www.volkswagenag.com/content/vwcorp/info_center/en/publications/2015/09/Verhaltensgrundsaetze_des_Volkswagen_Konzerns.bin.html/binarystorageitem/file/20150930_Verhaltensgrundsaetze++update_coc_englisch_digital.pdf (accessed 10 January 2016).

³³ Volkswagen Group (2014) Sustainability Report 2014, <http://sustainabilityreport2014.volkswagenag.com/strategy/risk-management> (accessed 20 February 2016).

³⁴ Volkswagen Group (2013) Annual Report 2013, <http://annualreport2013.volkswagenag.com/group-management-report/internal-management-system-and-kpis.html> (accessed 26 February 2016).

³⁵ Volkswagen Group (2014), Corporate Governance Report, http://www.volkswagenag.com/content/vwcorp/content/en/investor_relations/corporate_governance/Corporate_Governance_Report.bin.html/downloadfilelist/downloadfile/downloadfile_17/file/CG+2014_e.pdf, p. 54 (accessed 16 January 2016).

Reputation Winner" in 2014, reflecting its outstanding performance in citizenship, governance and workplace practice.³⁶ In particular, it was awarded Governance Best Practices.

Corporate Social Responsibility at the VW Group

The Group's Strategy 2018 also set the goal of becoming "the most successful, fascinating and sustainable automobile manufacturer in the world by 2018," while simultaneously aiming to achieve economic, social and environmental sustainability.³⁷ Back in the 1970s, the Group had already engaged in promoting education and health at its sites in less-developed regions, such as Brazil and South Africa. The Group had also been involved in the United Nations' Global Compact since 2002, supporting sustainable and inclusive global economy.³⁸ A CSR (Corporate Social Responsibility) and Sustainability steering group, which included all central Group departments and the Group Works Council, had been set up since 2006 to facilitate strategic planning of CSR activities (e.g., community-infrastructure development projects, health-promotion projects). In 2009, a Group-wide CSR Committee was formed to strengthen regular interaction with the CSR coordinators of its brands and different regions.

To support the Group's Environmental Policy, an energy management system was established in 2010 to enhance the environmental efficiency of its products. Some of the general environmental and climate-change risks identified by the Group included extreme weather situations that could interrupt its supply chain and communications technology, the differences in CO2 regulations between major markets, and related sanction mechanisms, as well as the development of new drive technology.³⁹ Following the internationally recognized 2009 GRI (Global Reporting Initiatives) guidelines, the Group's sustainability reports disclosed impressive data on performance indicators related to social (e.g., local community engagement and employee compliance training) and environmental performance (e.g., energy consumption and CO2 emissions) aspects. Over the years, the Group had received several sustainability and environmental awards from external independent parties, including, in 2014, the recent "Gold Medal Award for Sustainable Development" from the US-based non-profit World Environment Center for its contribution to sustainable development and environmentally conscious business practices.

By 2015, VW Group owned and controlled 12 brands, including Volkswagen Passenger Cars, Audi, Seat and Skoda, Bentley, Bugatti, Lamborghini, Porsche and Ducati, as well as Volkswagen Commercial Vehicles, Scania and MAN. With a global workforce of almost 600,000 employees, the Group's production network comprised 118 locations around the world, and Europe remained its major vehicle and component production location, with 29 of the sites located in Germany alone.⁴⁰ Wolfsburg, where the VW Group's headquarters were located, became the richest city in Germany due to the Group's thriving growth in the auto industry. With about 120,000 residents in the city, VW employed over half of the population.⁴¹ While the Group continued to record robust profit performance under Winterkorn's leadership [see

³⁶ Reputation Institute (December 2014) "2014 Global CSR RepTrak 100: Annual Corporate Social Responsibility Reputation Ranking", https://www.reputationinstitute.com/CMSPages/GetAzureFile.aspx?path=~\media\media\documents\2014_csr_reptrak_100-topline_report.pdf&hash=49a074f19bbf592bc2f5ecfd4560caf5e2b6bcba4ad38d95b9879b03b1d3708&ext=.pdf (accessed 20 February 2016).

³⁷ Volkswagen Group (2014) Annual Report 2014, <http://annualreport2014.volkswagenag.com/group-management-report/sustainable-value-enhancement/environmental-management/environmental-awards.html> (accessed 31 January 2016).

³⁸ Volkswagen Group (2010) Annual Report 2010, <http://annualreport2010.volkswagenag.com/managementreport/value-enhancingfactors/csrandssustainability.html> (accessed 31 January 2016).

³⁹ Volkswagen Group (2014) Sustainability Report, <http://sustainabilityreport2014.volkswagenag.com/strategy/risk-management> (accessed 20 February 2016).

⁴⁰ Volkswagen AG (2014) Annual Report 2014, p. 130, http://www.volkswagenag.com/content/vwcorp/content/en/misc/pdf-dummies_bin.html/downloadfilelist/downloadfile/downloadfile_30/file/Y_2014_e.pdf (accessed 31 January 2016).

⁴¹ Milne, R. (12 October 2015) "Volkswagen's Home City Enveloped in Fear, Anger and Disbelief", *Financial Times*, <http://www.cnbc.com/2015/10/12/volkswagens-home-city-wolfsburg-enveloped-in-fear-anger-and-disbelief.html> (accessed 18 January 2016),

Exhibit 9] the power struggle within top management and the board had continued to receive the media spotlight. In April 2015, Piëch surprisingly stepped down as chairman of the Group after failing to prevent Winterkorn, who was backed by the Porsche family, from becoming chairman.⁴² Together with his wife, Piëch resigned from all posts at the VW Group, effective immediately, but remained as board member in Porsche SE. His departure from the VW Group was regarded by the media as the end of a Volkswagen era that had begun in 1993.⁴³

The Dieselgate Scandal

In early September 2015, the Dow Jones Sustainability Index selected VW as the overall global winner in the auto industry for its environmental commitment. Just a week later, on September 18, 2015, the USEPA alleged VW manipulated US emission tests by installing cheating software known as “defeat devices” in diesel-engine cars issued between 2009 and 2015.⁴⁴ This sophisticated software could detect emission-test conditions—based on steering wheel, vehicle speed, the duration of the engine’s operation and barometric pressure⁴⁵—and then allowed NOx emission controls to run full-tilt in order to pass the test. The device would automatically switch off while on the road and emitted 10 to 40 times the amount allowed by the USEPA, seriously violating the country’s Clean Air Act. 482,000 VW diesel cars sold in the US were found to be affected, including TDI Jetta, Beetles, Golfs, Audi A3s and Passats. With US\$37,500 civil fine per vehicle under US law, VW faced a possible penalty of US\$18 billion, excluding the cost of fixing recalled cars.⁴⁶

As early as 2013, independent researchers from ICCT and West Virginia University had already found two VW models showing huge gaps between the NOx in lab tests and on the road, exceeding 35 times the US emission limits in extreme cases. The results were brought to the attention of the USEPA and California Air Resources Board (CARB), which started an investigation into VW in May 2014. VW was informed of the matter and agreed to conduct its own investigation. It later issued a voluntary recall of 500,000 cars in the USA in December 2014, claiming that this was due to technical problems. When CARB conducted follow-up tests in July 2015, the cars again failed. None of the technical explanations given by VW engineers justified CARB’s results. When CARB and the EPA threatened not to certify VW’s 2016 diesel lineup, the Group admitted to rigging emissions tests with the cheating software.⁴⁷ The USEPA finally decided to tell the press on September 18, 2015.

Winterkorn’s Resignation as More Cars Affected

On September 20, 2015, VW commented publicly for the first time on the accusations. Winterkorn issued a videotaped apology, saying that he deeply regretted breaking the trust of customers and the public, and that the Group was working with the authorities to investigate the issue, and would conduct internal probe. He also asked for the trust from the public as the investigation moved on. “It would be wrong to cast suspicion on the honest hard work of so

⁴² Rauwald, C. and Behrmann, E. (26 April 2015) “VW Patriarch Piëch Ends Two-Decade Reign After Failed Putsch”, *Bloomberg*, <http://www.bloomberg.com/news/articles/2015-04-25/vw-chairman-ferdinand-piech-resigns-as-power-struggle-backfires> (accessed 10 January 2016).

⁴³ Bryant, C. (27 April 2015) “VW Chairman Resigned After Alienating Group’s Key Directors”, *Financial Times*, <http://www.ft.com/intl/cms/s/0/361c5686-ecdf-11e4-b82f-00144feab7de.html#axzz41p4uBLay> (accessed 18 January 2016).

⁴⁴ Makortoff, K. (22 September 2015) “What You Need to Know About the Volkswagen Scandal”, *CNBC*, <http://www.cnbc.com/2015/09/22/what-you-need-to-know-about-the-volkswagen-scandal.html> (accessed 8 January 2016).

⁴⁵ Hulac, B. (21 September 2015) “Volkswagen Uses Software to Fool EPA Pollution Tests”, *Scientific American*, <http://www.scientificamerican.com/article/volkswagen-uses-software-to-fool-epa-pollution-tests/> (accessed 3 February 2016).

⁴⁶ Wolff-Mann, E. (21 September 2015) “The Volkswagen Diesel Emissions Scandal, By the Numbers”, *Time*, <http://time.com/money/4042745/volkswagen-epa-diesel-scandal/> (accessed 18 January 2016).

⁴⁷ Niiler, E. (22 September 2015) “VW Could Fool the EPA, But It Couldn’t Trick Chemistry”, *Wired.com* <http://www.wired.com/2015/09/vw-fool-epa-couldnt-trick-chemistry/> (accessed 1 February 2016).

many because of the terrible mistakes of only a few. Our team doesn't deserve that," said Winterkorn in the video.⁴⁸

On the very next day, the stock of VW plunged 20%, losing several billion euros of its market capitalization. VW ordered dealers to halt the sales of all its 2.0-litre four-cylinder TDI diesel cars, including the Audi A3. Despite being under pressure to step down, Winterkorn insisted he was the right person to probe into the issue. On September 22, 2015, VW further announced that some 11 million diesel cars worldwide had the same defeat device installed, of which 8.5 million were in Europe, including over 2 million in Germany and 1.2 million in the UK, and around 500,000 in the USA.⁴⁹ Although the affected countries were largely in Europe, as well as the USA, many other locations, such as Asia and Australia, were affected [see **Exhibit 10**]. Among the 11 million diesel vehicles, around 5 million were Volkswagen brands, 2.1 million were Audi, 1.2 million were Skoda, and 1.8 million were light commercial vehicles.⁵⁰ The Group announced that it would set aside €6.5 billion (US\$7.3 billion) to fix the affected cars.

As the pressure on Winterkorn escalated, he eventually resigned from the CEO post on September 23, 2015. In his words, "Volkswagen needs a fresh start – also in terms of personnel. I am clearing the way for this fresh start with my resignation."⁵¹ He expressed shock at the extent of the misconduct, but stressed that he was unaware of any personal wrongdoing, even though he admitted that he had responsibility. Meanwhile, the VW scandal prompted USEPA and CARB to extend testing and spot-check all diesel vehicles to look for defeat devices, including models already on the road, and those of other diesel automakers.⁵²

New CEO and Chairman Onboard

On September 25, 2015, the Porsche SE CEO, Matthias Mueller, became Winterkorn's successor. He told the media that his most crucial task was to "win back trust for the Volkswagen Group — by leaving no stone unturned and with maximum transparency, as well as drawing the right conclusions from the current situation."⁵³ He wanted to establish and enforce the strictest compliance and governance standards in the auto industry. A new Chief Finance Officer (CFO) and two well-regarded external appointments were also brought onto the management board. The former CFO of VW for more than a decade, who was also a member of the management board close to the Porsche and Piëch family, was named chairman of the supervisory board, assigned with leading the investigation of the scandal. The Group launched a whistleblower program to give VW employees until November 30, 2015 to provide information about how the emissions tests were cheated, and promised to absolve them from dismissal and damage claims if they did so. This offer was said to be made in the interests of "full and swift clarification" of the scandal.⁵⁴ However, VW could not guarantee employees that admitting involvement would avoid prosecution.⁵⁵

⁴⁸ Winterkorn, Martin (22 September 2015) : Video statement of the former CEO of Volkswagen AG, https://www.youtube.com/watch?v=wMPX98_H0ak (accessed 20 January 2016).

⁴⁹ Hotten, R. (10 December 2015) "Volkswagen: The Scandal Explained", BCC News, <http://www.bbc.com/news/business-34324772> (accessed 25 January 2016).

⁵⁰ Trefis (24 November 2015) "Trefis Analysis of Volkswagen AG", *Trefis.com*, http://www.trefis.com/stock/vlkay/model/trefis?easyAccessToken=PROVIDER_26f0e65c96bdd20d815a14eb1351cc79b5cf304b (18 January 2016).

⁵¹ EjinSight (24 September 2015) "VW Chief Quits After Emissions Scandal; Firm 'Needs Fresh Start'", <http://www.ejinsight.com/20150924-vw-chief-quits-saying-company-needs-a-fresh-start/> (accessed 31 January 2016).

⁵² Mays, K. (25 September 2015) "EPA to Test Other Diesels", *Cars.com*, <https://www.cars.com/articles/epa-to-test-other-diesels-1420681265599/> (accessed 31 January 2016).

⁵³ Mays, K. (23 September 2015) "VW Diesel Crisis: Timeline of Events", *Cars.com*, <https://www.cars.com/articles/vw-diesel-crisis-timeline-of-events-1420681251993/> (accessed 31 January 2016).

⁵⁴ Ruddick, G. (12 November 2015) "VW's New Boss Matthias Müller Must Step Down, Says Shareholder", *The Guardian*, <http://www.theguardian.com/business/2015/nov/12/vw-boss-matthias-muller-must-step-down-shareholder-union-investment-emissions-scandal> (accessed 30 January 2016).

⁵⁵ Cremer, A. (13 November 2015) "Volkswagen sets end-November deadline for scandal whistleblowers", *Reuters*, <http://www.reuters.com/article/us-volkswagen-emissions-whistleblower-idUSKCN0T11WW20151113> (accessed 18 January 2016).

On September 27, 2015, VW launched an official website,⁵⁶ with an apology statement, to provide consumers with information about the models affected and answers to some frequently asked questions in regards to the scandal. However, many customers remained doubtful about the environmental impact caused by the affected vehicles, as well as the possible impact of any repairs on the performance and value of their cars.⁵⁷ Since the scandal only broke during the last third of the month, the impact on VW's September sales was mild. This was not the case for its stock, though, which plummeted 40% by the end of September, once the scandal became known. Many automakers and some of the Group's top suppliers were forced to become part of the scandal [see **Exhibits 11 and 12**],⁵⁸ along with the tarnishing the image of the "Made in Germany" label. The VW Group of America had chosen to return three Cars.com awards for its TDI diesel cars, including 2015 Best Bet Award for the Jetta TDI and the Eco-Friendly Car of the Year Awards for the Passat TDI in 2012 and 2015. Effective October 6, 2015, VW Group was removed from the Dow Jones Sustainability Index. It was also later kicked out of the UK's FTSE4Good sustainable index series.⁵⁹

In the heat of the scandal, Reuters cited two German newspapers in reporting that VW's supervisory board had received internal reports from a VW supplier and a VW employee as early as 2007 and 2011 to warn the company about the software designed to cheat emissions testing.⁶⁰ However, the matter was not addressed then. VW refused to comment on the newspaper reports.

In early October 2015, the Group outlined a five-step plan to remedy the crisis:⁶¹

- Conducting a worldwide probe to find out how the problem occurred and to hold responsible parties accountable
- Reassuring the public the vehicles were safe to drive
- Developing fixes for all affected vehicles that used the 2.0-liter diesel engine.
- Reviewing VW's compliance, processes and standards, and adopting preventive measures
- Adopting regular and open communication systems with customers, dealers, employees and the public, including designated hotline, website, and letters to each affected customer

Mueller announced publicly that VW hoped to fix all the affected vehicles in Europe by the end of 2016. However, due to varied transmissions and country-specific designs, VW still struggled to find applicable solutions for the US market.⁶² To manage the fallout from the scandal, VW offered existing VW owners in the USA a US\$2,000 loyalty bonus from October 7, 2015 through November 2, 2015 toward the purchase or lease of any new VW petrol or

⁵⁶ VW's official consumer website regarding the scandal: <https://www.vvdieselinfo.com>; Audi's customer website: <https://www.audiusa.com/about/diesel-information> (accessed 17 January 2016).

⁵⁷ Ahmed, K. (9 October 2015) "American Lessons For VW in Britain", BBC News, <http://www.bbc.com/news/business-34485060> (accessed 2 February 2016).

⁵⁸ Whiteaker, C. and Prince, J. (19 October 2015) "The VW Effect", *Bloomberg Business*, <http://www.bloomberg.com/graphics/2015-vw-supply-chain/> (accessed 10 February 2016).

⁵⁹ The FTSE4Good Index Series included companies demonstrating strong Environmental, Social and Governance (ESG) performance. See: <http://www.ftse.com/products/indices/FTSE4Good>.

⁶⁰ Cremer, A. and Scherer, S. (27 September 2015) "VW Staff, Supplier Warned Of Emissions Test Cheating Years Ago: Reports" Reuters, http://www.reuters.com/article/us-volkswagen-emissions-idUSKCN0RP14U20150927?feedType=RSS&feedName=topNews&utm_source=twitter (accessed 18 February 2016).

⁶¹ Schmitz, M. (8 October 2015) "VW Withdraw Some 2016 Diesels from EPA Certification", Cars.com, <https://www.cars.com/articles/vw-withdraws-some-2016-diesels-from-epa-certification-1420681338810/> (accessed 31 January 2016).

⁶² Schmitz, M. (8 October 2015) "VW Withdraw Some 2016 Diesels from EPA Certification", Cars.com, <https://www.cars.com/articles/vw-withdraws-some-2016-diesels-from-epa-certification-1420681338810/> (accessed 31 January 2016).

hybrid model.⁶³ Nonetheless, October sales in the USA for the VW brand were flat.

Even though VW had in fact been working on electric vehicles (EV), such as the e-Golf, it was slow out of the blocks in capturing the EV market. Besides, some VW engineers had been quoted for years as being resistant to EV technology and publicly criticized EVs for merely shunting emissions from cars to power-generating plants.⁶⁴ However, given that the future of clean diesel had become a big question mark after the scandal, VW announced in mid-October that it was going to refocus its core technologies on plug-in hybrid and electric vehicles to meet increasingly stringent emissions regulations in the USA and Europe.⁶⁵ The strategic approach taken by the VW Group included:⁶⁶

- Making future generations of the VW Phaeton, its flagship brand over the next decade, electric
- Reorientation of its diesel vehicles with advanced environmental technology
- Further development of standardized toolkits, including MQB platform, to suit plug-in hybrid and electric vehicles
- Streamlined processes to cut costs and reduce investment by approximately one billion euros annually

Widening of Scandal and More to Fix

With the hope that the outrage over the scandal would gradually subside, VW further received a notice from the USEPA and CARB in early November 2015 that certain 3.0L V6 engines were also found to have the defeat devices. Six more models were affected, including the 2014 Volkswagen Touareg, 2015 Porsche Cayenne SUV, 2016 Audi A6 and A8 sedan, A7 hatchback and Q5 SUV. Even though VW expressed confusion over the allegation about these six models, which VW claimed to be legal, it instructed dealers to stop selling them. With at least 10,000 vehicles affected, such a revelation also meant that VW might face an extra US\$375 million in penalties in addition to US\$18 billion if found guilty. As the Porsche model was caught up in the diesel scam, Mueller, the former Porsche executive, faced questions about his credibility in cleaning up the VW Group.

Widening the scandal was another irregularities discovery found during the VW vehicle CO2 certification process, which the Group itself revealed, according to an internal investigation reported on November 3, 2015:

⁶³ Beene, R (5 October 2015) “VW Offers \$2000 Loyalty Bonus to Avert Defections”, *Autonews.com*, [http://www.autonews.com/article/20151005/RETAIL/151009910/vw-offers-\\$2000-loyalty-bonus-to-avert-defections](http://www.autonews.com/article/20151005/RETAIL/151009910/vw-offers-$2000-loyalty-bonus-to-avert-defections) (accessed 20 January 2016).

⁶⁴ Ross, P. (16 October 2015) “Can VW Catch Up With Electric-Car Technology?”, *IEEE Spectrum*, <http://spectrum.ieee.org/cars-that-think/transportation/advanced-cars/can-vw-catch-up-with-electriccar-technology> (accessed 30 January 2016).

⁶⁵ Golsen, J. (13 October 2015) “VW Plans to Recover From Its Scandal by Going Electric “, *Wired.com*, <http://www.wired.com/2015/10/vw-plans-to-recover-from-its-scandal-by-going-electric/> (30 January 2016).

⁶⁶ Volkswagen (13 October 2015) “Volkswagen Brand Board Of Management Takes Strategic Decisions”, <http://media.vw.com/release/1088/> (accessed 5 February 2016).

From the very start I have pushed hard for the relentless and comprehensive clarification of events. We will stop at nothing and nobody. This is a painful process, but it is our only alternative. For us, the only thing that counts is the truth. That is the basis for the fundamental realignment that Volkswagen needs.⁶⁷

- Matthias Mueller, CEO of VW

The CO2 emissions and fuel consumption of some 800,000 of its cars sold under the Volkswagen, Audi, SEAT and Skoda brands was said to be understated. Some of the models emitted 15 to 18 percent more CO2 than was officially reported.⁶⁸ The majority of the cars had a diesel engine, and 98,000 were gasoline cars. Most of them were sold in Europe and none in the US.⁶⁹ VW shares sank again by 5.6% the next day.⁷⁰

As some European countries, such as Germany and Britain, set vehicle tax rates according to their CO2 emissions, vehicles with lower CO2 emissions contributed lesser tax. Therefore, if VW rigged the CO2 tests, it would need to repay governments and affected car owners for misstating the vehicles' fuel economy.⁷¹ VW estimated the cost of the CO2 problem was €2 billion, while market analysts believed the total in fines and lost sales could be much more.⁷² The widespread scandal also prompted Moody's Investors Service to downgrade VW's debt rating, making it more costly for the company to borrow money.⁷³ The Group recorded a third-quarter operating loss of €3.5 billion, and it set aside a total of €6.7 billion to cover costs related to the diesel and CO2 scandal.⁷⁴ This was its first quarterly operating loss for 15 years. Mueller told the media that VW would have recorded a profit of €3.2 billion if the scandal had not happened.⁷⁵

As part of its move to restore the trust of its US customers specifically, VW issued a "Goodwill Package"⁷⁶ on November 9, 2015 to owners of affected 2.0L TDI vehicles. The package included a US\$500 VW prepaid Visa Card, US\$500 credit for VW dealer services or products, and 24-hour roadside assistance for three years. Owners accepting the package were assured that they would not be precluded from future compensation and eventual vehicle repair. This package was further extended to certain affected 3.0L TDI vehicles two months later.

⁶⁷ Ruddick, G. (4 November 2015) "VW Admission Suggests Cheats Went Much Further Than Emissions", *The Guardian*, <http://www.theguardian.com/business/2015/nov/03/vw-c02-emission-problems-800000-vehicles> (accessed 30 January 2016).

⁶⁸ D'Orazio, D. (8 November 2015) "VW Admits False Carbon Dioxide Readings On 800,000 Vehicles After Engineer Steps Forward", *The Verge*, <http://www.theverge.com/2015/11/8/9693628/volkswagen-falsified-carbon-dioxide-emissions-on-800000-vehicles> (accessed 2 February 2016).

⁶⁹ Mchugh, D. and Moulson, G. (4 November 2015) "Amid widening VW scandal, a stock sell-off, a credit downgrade and a halt to some car sales", *Associated Press*, <http://www.theprovince.com/business/news/that+volkswagen+overstated+carbon+dioxide+efficiency+sends/11491770/story.html> (accessed 30 January 2016).

⁷⁰ BBC News (4 November 2015) "VW Scandal: Germany Says 98,000 Volkswagen Petrol Cars Affected by CO2 Issues", <http://www.bbc.com/news/business-34723420> (accessed 28 January 2016).

⁷¹ Ruddick, G. and Farrell, S. (4 November 2015) "VW Could Face Billions In Car Tax Repayments Over Latest CO2 Scandal", *The Guardian*, <http://www.theguardian.com/business/2015/nov/04/vw-volkswagen-shares-slide-10-carbon-dioxide-revelations> (accessed 3 January 2016).

⁷² Ruddick, G. (12 November 2015) "VW's New Boss Matthias Müller Must Step Down, Says Shareholder", *The Guardian*, <http://www.theguardian.com/business/2015/nov/12/vw-boss-matthias-muller-must-step-down-shareholder-union-investment-emissions-scandal> (accessed 30 January 2016).

⁷³ Mchugh, D. and Moulson, G. (4 November 2015) "Amid widening VW scandal, a stock sell-off, a credit downgrade and a halt to some car sales", *Associated Press*, <http://www.theprovince.com/business/news/that+volkswagen+overstated+carbon+dioxide+efficiency+sends/11491770/story.html> (accessed 30 January 2016).

⁷⁴ Cremer, A. (28 October 2015) "VW Slumps to First Quarterly Loss in At Least 15 Years", *Reuters*, <http://www.reuters.com/article/us-volkswagen-results-idUSKCN0SM0QB20151028> (accessed 25 January 2016).

⁷⁵ SkyNews (28 October 2015) "VW Hit By £2.5bn Loss After Emissions Scandal", <http://news.sky.com/story/1577509/vw-hit-by-2-5bn-loss-after-emissions-scandal> (accessed 20 January 2016).

⁷⁶ For more information about the Goodwill Package, please refer to VW's and Audi's customer websites respectively <https://www.vwdieselinfo.com> and <https://www.audiusa.com/about/diesel-information..>

Behind the Scandal

Updates on the Internal Investigation

To provide an update of the Group's internal investigation, VW held a two-hour press conference in Wolfsburg on December 10, 2015. The investigation involved 450 people internally and externally. VW's appointed law firm had interviewed 87 staff members, seized 1,500 devices belonging to 400 employees and studied data equivalent to 50 million books.⁷⁷ Nine managers were suspended from duties, but none were named, nor were those who authorized the scam or their seniority disclosed.⁷⁸ However, VW admitted for the first time that the scandal was caused by a "chain of errors" within the company, rather than merely by the actions of some engineers.

The "chain of errors" was said to have started when VW decided to boost US diesel car sales in 2005, but was aware that its early diesel four-cylinders would fail to achieve US NOx emission targets under existing budgetary and time constraints. Mueller pledged to create a more open and less hierarchical culture within the company. He called for employees to follow their instincts rather than being "merely guided by the possible consequences of impending failure."⁷⁹

According to VW, the EU recall would start in 2016 and the Group had found solutions to fix the cars sold in Europe by either a software reboot or fixing the device. Nonetheless, the solutions for handling affected vehicles in the USA remained unsolved, as emissions standards there were more stringent. The company was working on a compensation package for affected owners that would reflect any drop in their cars' resale value. VW told the media that more details of the investigation were expected in the second quarter of 2016.

Following the press conference, VW shares rose 2%, but remained down over 20% since the scandal broke in September. VW also announced the day after the press conference that only 36,000 of the cars it produced had CO2 irregularities, down from the initially reported 800,000 units.⁸⁰

More Stories from the Media

Almost 80 years of proud VW history went up in flames as more inside stories were revealed by the media. According to the German papers,⁸¹ former CEO Winterkorn had made a promise in an auto show in 2012 that CO2 emissions from the company's vehicles would be 30% lower by 2015 compared to 2006. Such a goal was viewed as impossible within legal means by VW engineers, but they were afraid of not meeting expectations, and decided to rig the tests and compiled data with no relation to real-life results into official reports for use-of-type approvals and vehicle-tax calculations. Since Germany's Federal Motor Transport Authority relied on data

⁷⁷ Ruddick, G. (19 December 2015) "VW Admits Emissions Scandal Was Caused by 'Whole Chain' of Failures", *The Guardian*, <http://www.theguardian.com/business/2015/dec/10/volkswagen-emissions-scandal-systematic-failures-hans-dieter-potsch> (accessed 25 January 2016).

⁷⁸ Pratley, N. (10 December 2015) "Volkswagen Takes Its Cue From the Bankers' Book of Excuses", *The Guardian*, <http://www.theguardian.com/business/nils-pratley-on-finance/2015/dec/10/volkswagen-emissions-scandal-german-carmaker> (accessed 28 January 2016).

⁷⁹ Ruddick, G. (19 December 2015) "VW Admits Emissions Scandal Was Caused by 'Whole Chain' of Failures", *The Guardian*, <http://www.theguardian.com/business/2015/dec/10/volkswagen-emissions-scandal-systematic-failures-hans-dieter-potsch> (accessed 25 January 2016).

⁸⁰ Tovey, A. (9 December 2015) "VW Says It Overestimated Number Of Cars With CO2 'Irregularities'", *The Telegraph*, <http://www.telegraph.co.uk/finance/newsbysector/industry/12041445/VW-says-its-overestimated-number-of-cars-with-CO2-irregularities.html> (accessed 20 January 2016).

⁸¹ D'Orazio, D. (8 November 2015) "VW Admits False Carbon Dioxide Readings On 800,000 Vehicles After Engineer Steps Forward", *The Verge*, <http://www.theverge.com/2015/11/8/9693628/volkswagen-falsified-carbon-dioxide-emissions-on-800000-vehicles> (accessed 2 February 2016); Schmitt, B. (8 November 2015) "Cheat, Or Get Fired: Scared Volkswagen Engineers Pour Diesel In Gasoline Cars To Fool CO2 Tests", <https://daillykanban.com/2015/11/cheat-or-get-fired-scared-volkswagen-engineers-poured-diesel-in-gasoline-cars-to-fool-co2-tests/> (accessed 4 February 2016).

provided by manufacturers' own tests, VW got away with it. Confessing engineers also told the media that they had doctored CO2 emissions tests in several ways, including using artificially high tire pressures and mixing diesel fuel into engine oil to improve fuel-economy figures.

Another German magazine reported that VW was well-known for its culture of "anticipatory obedience" (*vorauselender Gehorsam*). "In that system, one isn't obedient -- and worthy of being promoted -- if one simply follows orders. You obey by not having to have explained what the guys on top desire."⁸² Many company departments, especially the sales department, were said to have worked in a climate of fear. Some former VW executives interviewed by media also described the top management style within the company as authoritarian.⁸³

While Mueller expressed his determination to change the culture within VW during the December press conference, in a media interview in January 2016, he was quoted as disagreeing that there was ethical problem within the company and said this was rather a technical problem and misinterpretation of US law.

*Frankly spoken, it was a technical problem. We made a default, we had a ... not the right interpretation of the American law. And we had some targets for our technical engineers, and they solved this problem and reached targets with some software solutions which haven't been compatible to the American law. That is the thing. And the other question you mentioned — it was an ethical problem? I cannot understand why you say that.*⁸⁴

- Matthias Mueller, CEO of VW

On the next day, Mueller requested a do-over and apologized for mishandling the situation the evening before. He once again admitted the violation and apologized to all stakeholders.

VW's Journey Ahead

The real impact of the scandal on VW Group's sales became more obvious after October 2015. The Group's US sales fell 24.7% for the month of November, after the US\$2000 loyalty bonus expired. In Europe as a whole, where it still had a large loyal customer base, the Group gained a small increase in its sales but failed to keep pace with the growth rate of the market or its competitors.⁸⁵ Being the market leader in Europe for over two decades, the core VW brand market share in the region tumbled from 13.5% in November 2014 to 12.2% in November 2015 [see **Exhibit 13**.]⁸⁶ In China, the single largest market for VW, where 30% of its sales were sourced,⁸⁷ the Dieselgate scandal had little impact on VW sales, as it sold far fewer diesel cars

⁸² Schmitt, B. (4 October 2015) "Dieselgate: Hackenberg In The Crosshairs, Engineers Talk", *Daily Kanban*, <http://dailykanban.com/2015/10/dieselgate-hackenberg-in-the-crosshairs-engineers-talk/> (accessed 4 February 2016).

⁸³ Cremer, A. and Bergin, T. (10 October 2015) "Fear and Respect: VW's Culture under Winterkorn", *Reuters*, <http://www.reuters.com/article/us-volkswagen-emissions-culture-idUSKCN0S40MT20151010> (accessed 17 January 2016).

⁸⁴ Clinton, S. (11 January 2016) "'We Didn't Lie,' Volkswagen CEO Says Of Emissions Scandal", *npr.org*, <http://www.npr.org/sections/thetwo-way/2016/01/11/462682378/we-didnt-lie-volkswagen-ceo-says-of-emissions-scandal> (accessed 2 February 2016).

⁸⁵ New vehicle sales in Europe grew 14% in November 2015 over the same month in the previous year, but VW Group's sales increased only 4.2%, while Ford of Europe had increased 21% and the Fiat brand gained 20% in volume. See: *Automotive News* (21 December 2015) "VW Scandal's Impact on European Sales Just Beginning", <http://www.autonews.com/article/20151221/RETAIL01/312219978/vw-scandals-impact-on-european-sales-just-beginning?> (accessed 18 February 2016).

⁸⁶ *Automotive News* (21 December 2015) "VW Scandal's Impact on European Sales Just Beginning", <http://www.autonews.com/article/20151221/RETAIL01/312219978/vw-scandals-impact-on-european-sales-just-beginning?> (accessed 18 February 2016).

⁸⁷ Lu, A. (21 July 2015) "Volkswagen China Car Sales Hit by Slowdown", *Shanghai Daily*, <http://www.shanghaidaily.com/business/auto/Volkswagen-China-car-sales-hit-by-slowdown/shdaily.shtml> (accessed 19 January 2016)

there than gasoline engines.⁸⁸ Nonetheless, due to the economic slowdown in the country and VW's inability to capture the large local demand for budget SUVs—given that it had only one localized SUV in its portfolio there—its deliveries in China had been falling all through 2015.⁸⁹ Overall in 2015, VW Group reported a decline of 2% in its worldwide deliveries, falling from 10.1 million in 2014 to 9.9 million. Toyota regained the world's top seller status. As the sales of VW, Audi, and Porsche diesel vehicles had been put on hold in certain regions until their emission levels were brought into compliance and approved by regulators, the Group was expected to suffer a slowdown in future vehicle sales—not to mention the possible impact of its tainted reputation on its future sales worldwide.

On January 4, 2016, the USEPA announced it had filed a lawsuit against VW for polluting the air illegally. VW also faced a record-breaking lawsuit from investors for €40 billion in losses due to the scandal.⁹⁰ While VW's solution of fixing the affected cars across Europe had been approved by European regulators, American VW owners were still operating vehicles that emitted 40 times over the limit. As USEPA was pushing VW for an acceptable solution, there was news that VW might have to buy back at least 115,000 diesel cars in the USA (one-fifth of the 580,000 cars affected there, including Porsche and Audi), or offer a new car to affected American owners at significantly reduced prices.⁹¹ In February 2016, the German media once again revealed that VW's internal memos and emails suggested that senior executives knew about the cheating in early 2014, long before they admitted it to regulators.⁹² The news was confirmed by the *New York Times*, which had reviewed the documents. As a result, the USEPA might make VW produce electric cars in its US factories as part of the settlement agreement, and help build a network of electric-vehicle recharging stations in the country.⁹³

Amidst slowing sales, gloomy stock performance [see **Exhibit 14**], a massive investor lawsuit, huge fines, and immense repair and settlement costs, Mueller was confident that VW would bounce back in two to three years and would not let its technology fall behind competitors.⁹⁴ The Dieselgate scandal made one ponder: Why would a leading corporation in social responsibility link itself to such a scam? What were the causes of corporate misbehavior at such a huge scale? Had VW responded to the crisis well enough? What should it do to prevent similar crises in the future?

⁸⁸ Bradsher, K. (21 September 2015) "VW's Recall Troubles May Have Little Effect on China, Its Largest Market", *New York Times*, http://www.nytimes.com/2015/09/22/business/international/volkswagens-recall-troubles-may-have-little-effect-on-china-its-largest-market.html?_r=0 (accessed 19 January 2016).

⁸⁹ Trefis Team (18 November 2015) "Volkswagen: Volumes Start Showing the Impact Of The Scandal", *Forbes*, <http://www.forbes.com/sites/greatspeculations/2015/11/18/volkswagen-volumes-start-showing-the-impact-of-the-scandal/#7d6c06d6609f> (accessed 17 January 2016).

⁹⁰ Tovey, A. and Williams, C. (17 October 2015) "Volkswagen faces €40bn lawsuit from investors", *The Telegraph*, <http://www.telegraph.co.uk/finance/newsbysector/industry/11938077/Volkswagen-faces-40bn-lawsuit-from-investors.html> (accessed 30 January 2016).

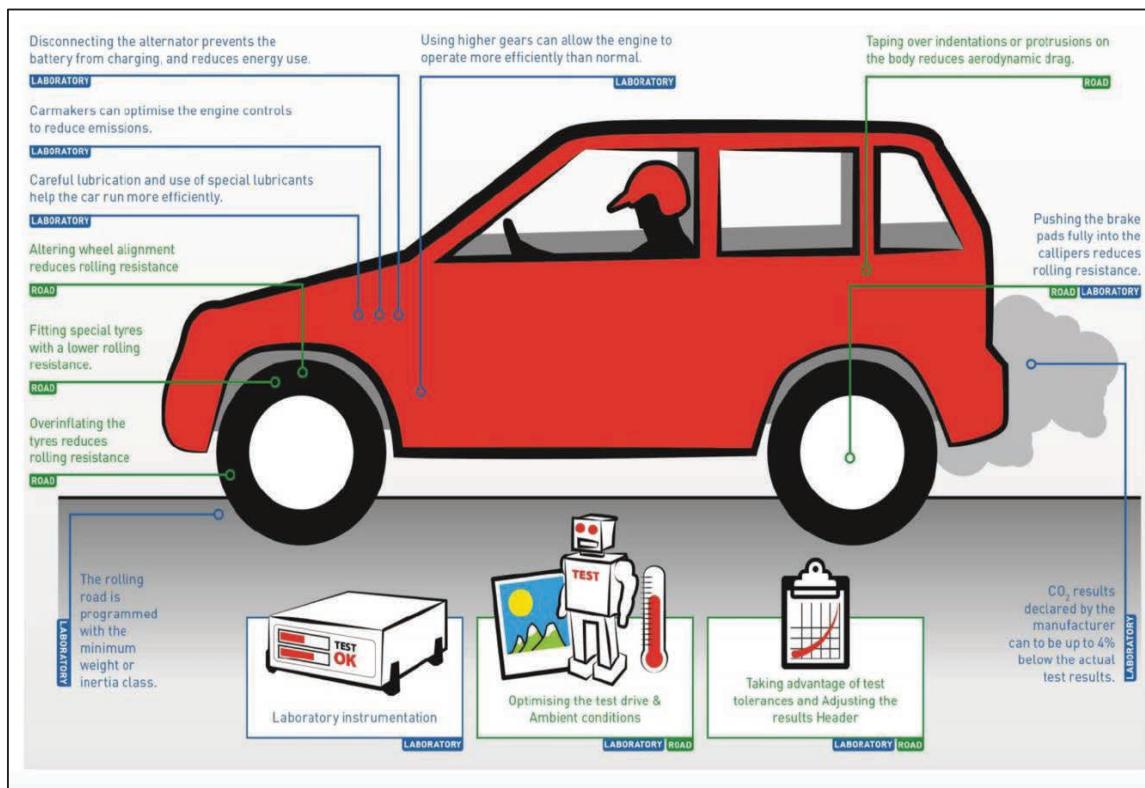
⁹¹ Thomasson, E. (7 January 2016) "Volkswagen Will Likely Buy Back 115,000 Cars in U.S.", *Reuters*, <http://time.com/money/4171003/volkswagen-buyback-emissions-scandal/> (accessed 1 February 2016).

⁹² Ewing, J. (18 February 2016) "Volkswagen Memos Suggest Company Misled U.S. Regulators", *The New York Times*, http://www.nytimes.com/2016/02/19/business/volkswagen-memos-suggest-emissions-problem-was-known-earlier.html?_r=0 (accessed 22 February 2016).

⁹³ Rosevear, J. (22 February 2016) "Will the Feds Force Volkswagen to Build Electric Cars in the U.S.?", *The Motley Fool*, http://www.fool.com/investing/general/2016/02/22/will-the-feds-force-volkswagen-to-build-electric-c.aspx?source=epctcnlnk0000002&utm_campaign=article&utm_medium=feed&utm_source=cnnmoney (accessed 24 February 2016).

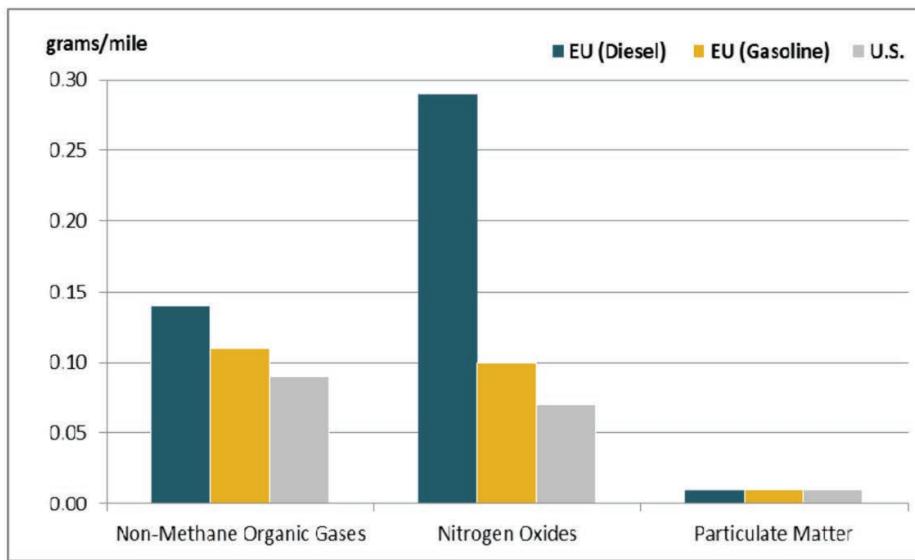
⁹⁴ Schwartz, J. and Cremer, A. (15 October 2015) "VW Says Can Bounce Back As Recalls 8.5 Million EU Cars", *Reuters*, <http://www.reuters.com/article/us-volkswagen-emissions-idUSKCN0S910Y20151015> (Accessed 30 January 2016).

EXHIBIT 1: WAYS TO OPTIMIZE VEHICLES FOR THE LABORATORY TESTING



Source: Blumberg, K. and Posada, F. (5 April 2015) "Comparison of US and EU Programs to Control Light-Duty Vehicle Emissions", Slide 24, The International Council on Clean Transportation, http://www.theicct.org/sites/default/files/ICCT_comparison%20Euro%20v%20US.pdf (accessed 7 January 2016)

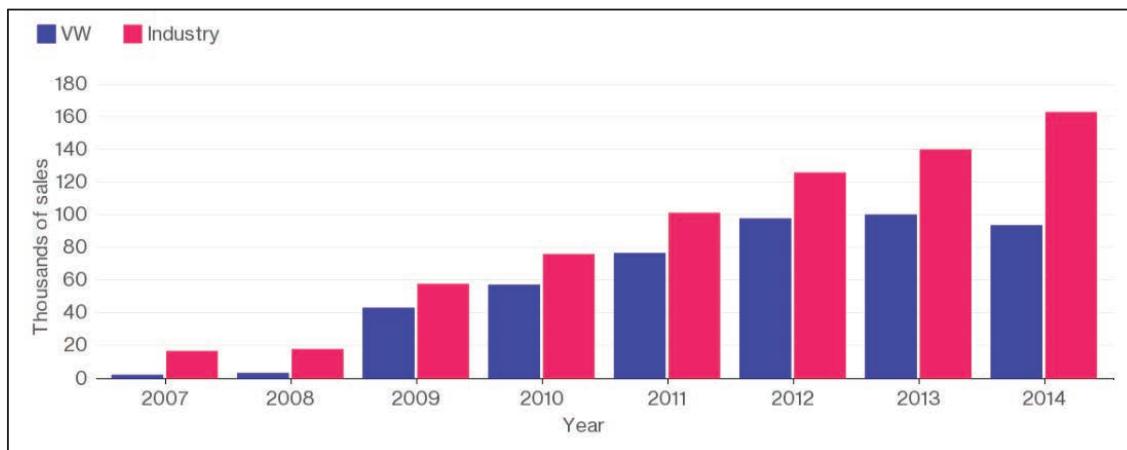
EXHIBIT 2: VEHICLE EMISSIONS STANDARDS FOR SELECTED POLLUTANTS IN THE UNITED STATES AND EUROPE



Note: The above chart shows Tier 2, Bin 5 values for U.S. vehicles tested under the FTP procedure and Euro 5 values for EU vehicles tested under the NEDC procedure. Shorter bars represent more stringent standards.

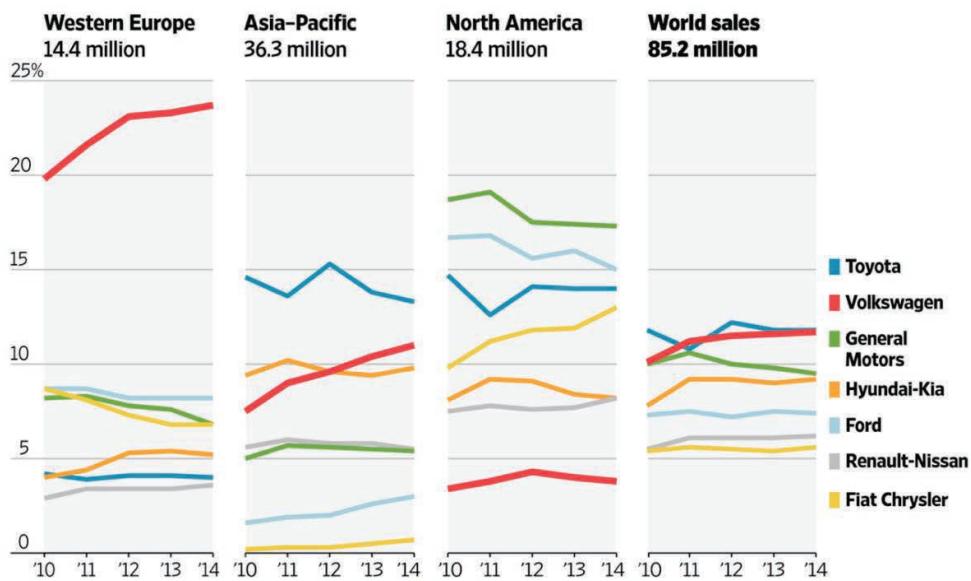
Source: Canis, B. and Lattanzio, R. (18 February 2014) “U.S. and EU Motor Vehicle Standards: Issues for Transatlantic Trade Negotiations”, Congressional Research Service, P16, <https://www.hsl.org/?view&did=751039> (accessed 8 January 2016)

EXHIBIT 3: SALES OF DIESEL PASSENGER VEHICLES IN THE US: COMPARISON OF VOLKSWAGEN SALES WITH THE TOTAL INDUSTRY SALES IN US



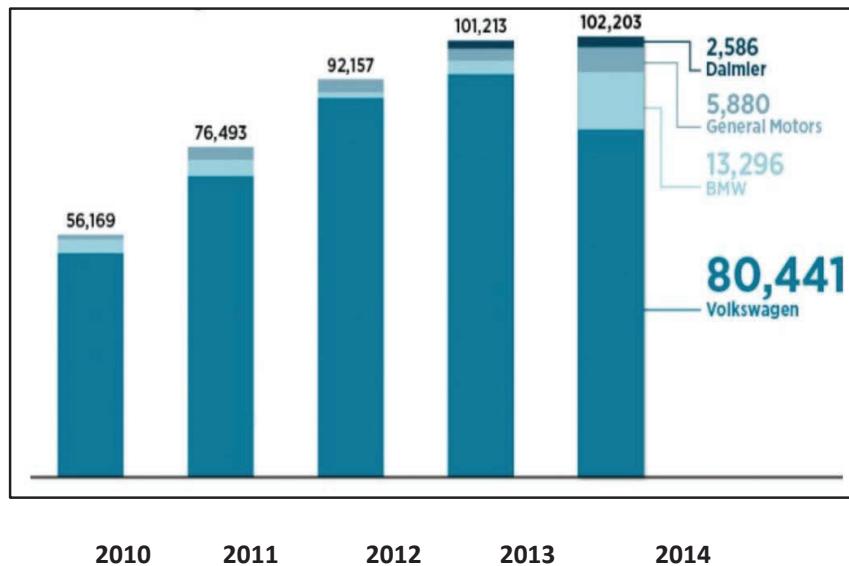
Source: Extracted from Clothier, M. (24 September 2015) "Volkswagen Cheating Scandal Seen Hastening Clean Diesel's Demise", Bloomberg Business, <http://www.bloomberg.com/news/articles/2015-09-24/volkswagen-cheating-scandal-seen-hastening-clean-diesel-s-demise> (accessed 26 January 2016)

EXHIBIT 4: MARKET SHARE BY REGION OF TOP AUTOMAKERS, RANKED BY 2014 GLOBAL LIGHT-VEHICLE SALES



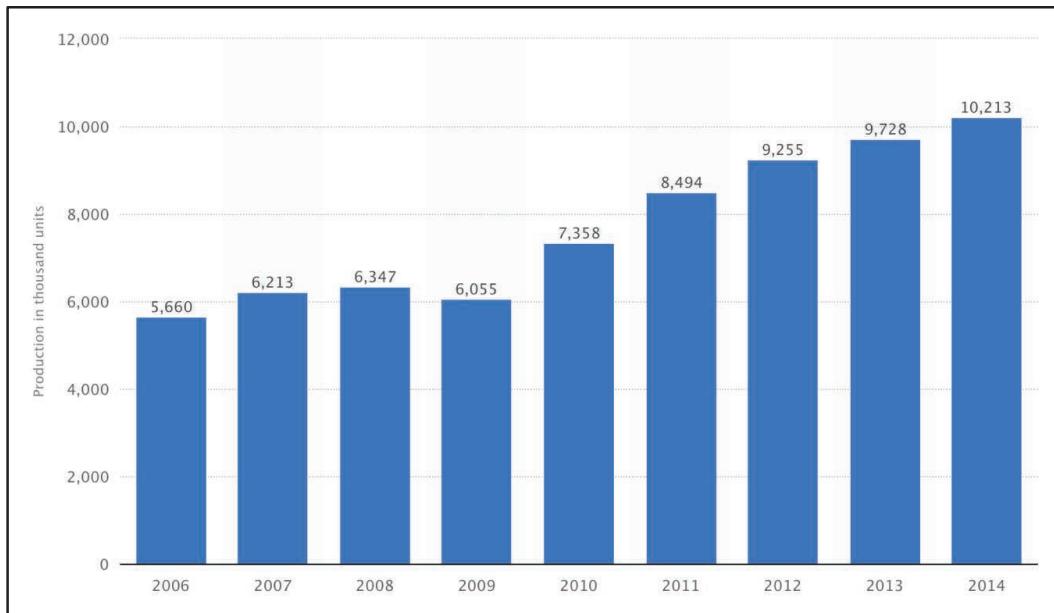
Source: Extracted from Bender, R. and Geiger, F. (24 September 2015) "Volkswagen Cars in Europe Affected by Tainted Software", The Wall Street Journal, <http://www.wsj.com/articles/volkswagen-european-cars-affected-by-emissions-evading-software-1443100840> (accessed 22 January 2016)

EXHIBIT 5: NEW U.S. DIESEL CAR REGISTRATION



Source: Durden, T. (2015) "Volkswagen: A Decade of Deception – Full Chronology", Zero Hedge, <http://www.zerohedge.com/news/2015-10-02/volkswagen-decade-deception-full-chronology> (accessed 28 January 2016)

**EXHIBIT 6: VOLKSWAGEN'S WORLDWIDE VEHICLE PRODUCTION FROM 2006 TO 2014
(IN 1,000S)**

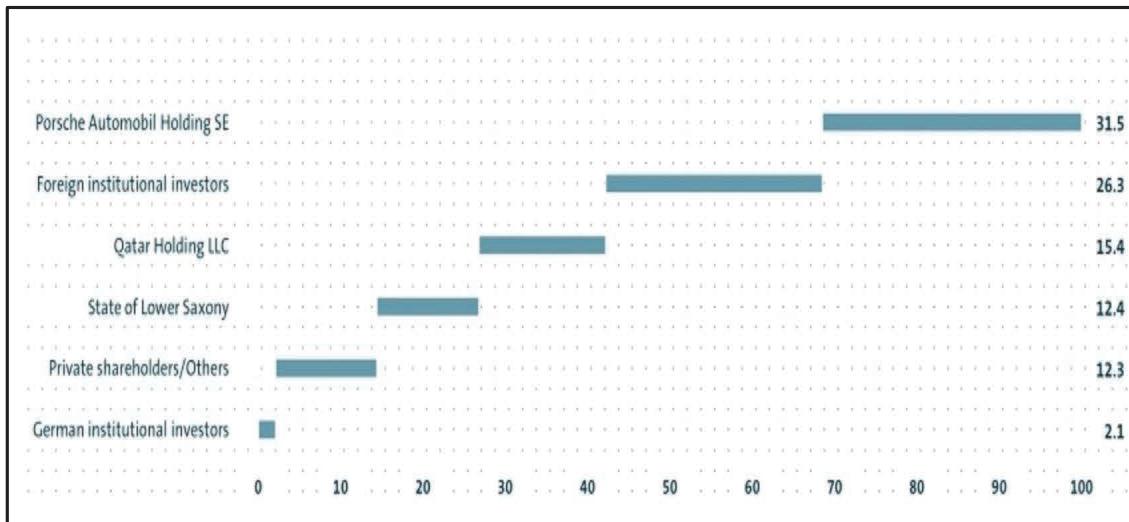


Source: Statista (2016)

<http://www.statista.com/statistics/272050/worldwide-vehicle-production-of-volkswagen-since-2006/> (accessed 25 January 2016)

EXHIBIT 7: VOLKSWAGEN'S DISTRIBUTION OF SUBSCRIBED CAPITAL AND VOTING RIGHTS (AS AT 31 DECEMBER 2014)

Subscribed Capital in Percent



Voting rights distribution

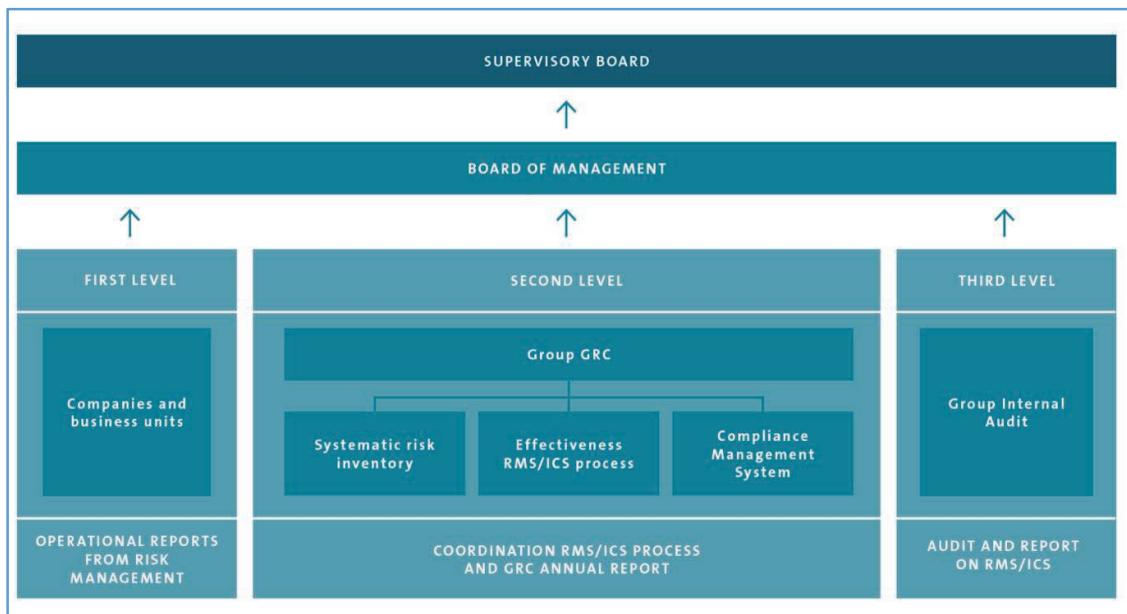
Porsche Automobil Holding SE, Stuttgart	50.73%
State of Lower Saxony, Hanover	20.0%
Qatar Holding	17.0%
Others	12.3%

Note: All figures shown were rounded

Source: Volkswagen's Official Website

http://www.volkswagenag.com/content/vwcorp/content/en/investor_relations/share/Shareholder_Structure.html (accessed 20 January 2016)

EXHIBIT 8: THE VOLKSWAGEN GROUP' S GOVERNANCE, RISK & COMPLIANCE STRATEGY



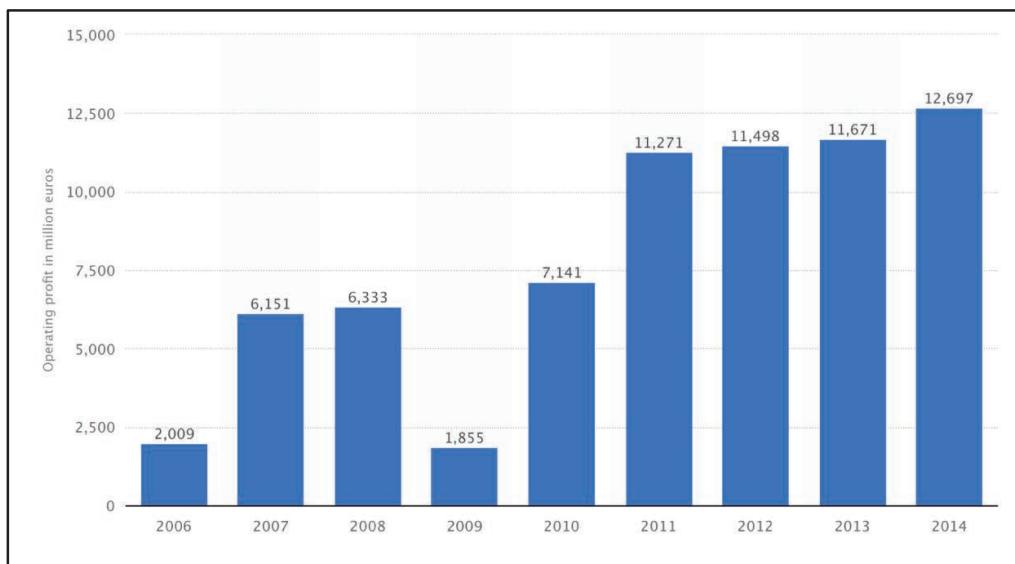
Note:

RMS/ICS : Risk Management And Internal Control System

GRC: Governance Risk and Compliance

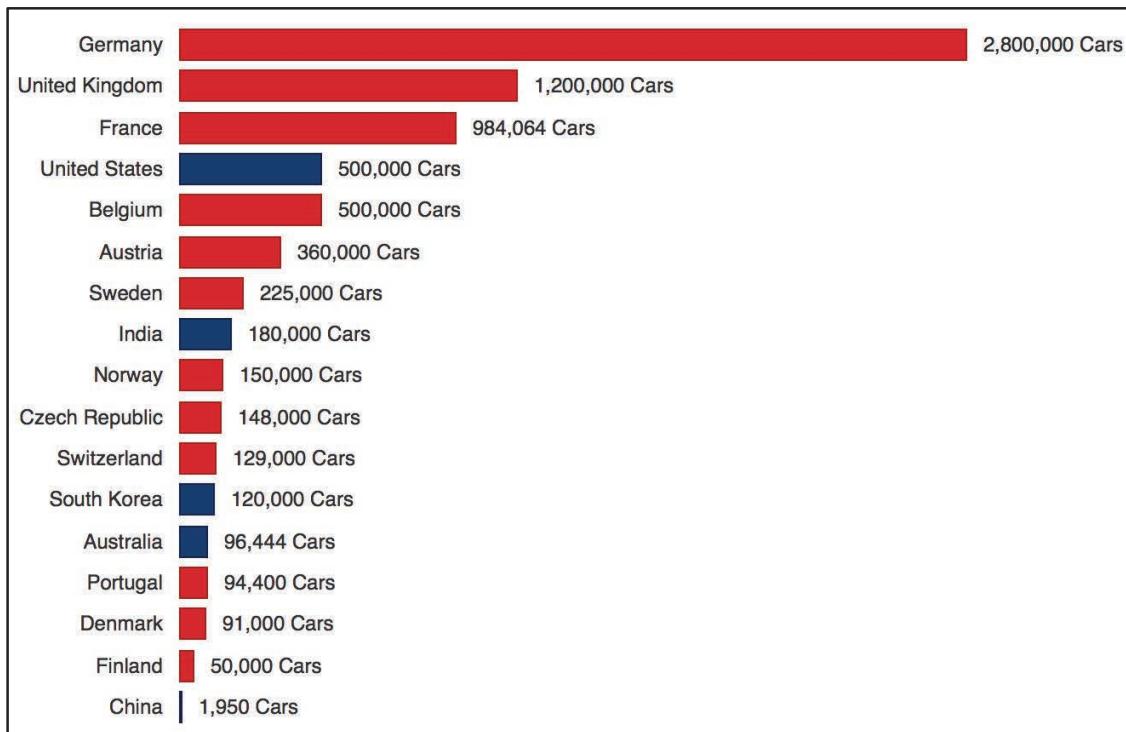
Source: Official Website of The Volkswagen Group- Sustainability Report 2014,
<http://sustainabilityreport2014.volkswagenag.com/strategy/risk-management> (accessed 20 February 2016)

EXHIBIT 9: VOLKSWAGEN'S OPERATING PROFIT FROM FISCAL YEAR 2006 TO 2014 (IN MILLION EUROS)



Source: Statista (2016)

<http://www.statista.com/statistics/272053/operating-profit-of-volkswagen-since-2006/> (accessed 25 January 2016)

EXHIBIT 10: NUMBER OF VOLKWSAGEN CARS AFFECTED BY DIESELGATE SCANDAL

Note: Canada and South Africa had also been affected by the diesel scandal, but exact figures are not yet known

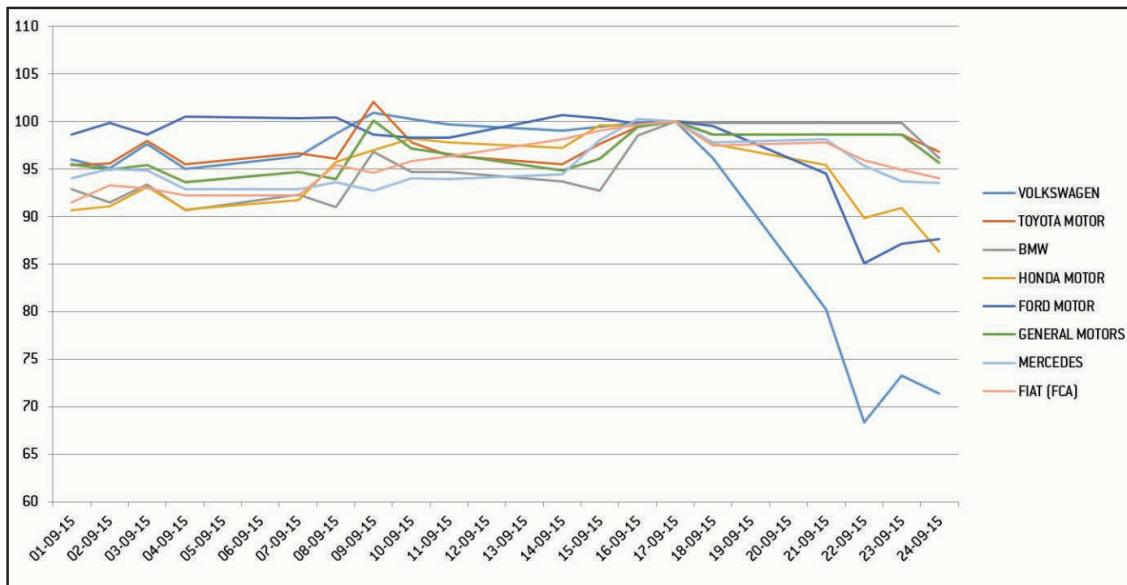
Source: Mchugh, J. (12 October 2015) "Volkswagen Diesel Scandal Update 2015: Affected Countries Are Largely In North America, Europe, But Asia Not Immune", International Business Times, <http://www.ibtimes.com/volkswagen-diesel-scandal-update-2015-affected-countries-are-largely-north-america-2137284> (accessed 10 February 2016)

EXHIBIT 11: STOCK PERFORMANCE OF VOLKSWAGEN AND SOME OF ITS TOP SUPPLIERS AFTER THE SCANDAL BROKE



Source: Whiteaker, C. and Prince, J. (19 October 2015) "The VW Effect", Bloomberg Business, <http://www.bloomberg.com/graphics/2015-vw-supply-chain/> (accessed 10 February 2016)

EXHIBIT 12 : STOCK PERFORMANCE OF VOLKSWAGEN VS COMPETITORS AFTER THE SCANDAL BROKE



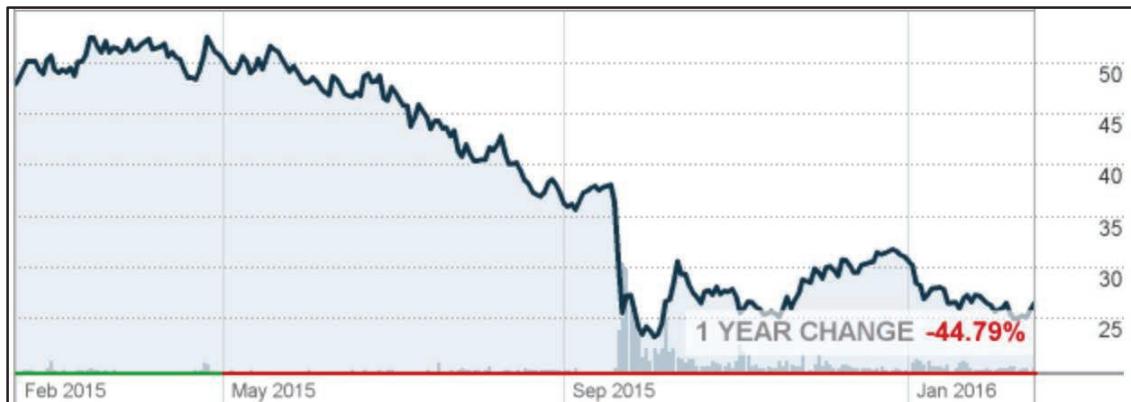
Source: Vaccarino, E. (26 September 2015) "The Impact Of Volkswagen On The Automobile Stock Market", Bruegel.org, <http://bruegel.org/2015/09/chart-of-the-week-the-impact-of-volkswagen-on-the-automobile-stock-market/> (accessed 6 February 2016)

EXHIBIT 13: LEADERS IN EUROPEAN MARKET SHARE BY BRAND

	Nov. 2015 share	Nov. 2014 share
Volkswagen	12.20%	13.50%
Renault	7.00%	6.70%
Opel/Vauxhall	6.70%	6.40%
Peugeot	6.00%	5.90%
Mercedes-Benz	5.60%	5.30%
BMW	5.40%	5.60%
Audi	5.20%	5.70%
Fiat	4.60%	4.30%

Source: Extracted from Automotive News (21 December 2015) "VW Scandal's Impact on European Sales Just Beginning", <http://www.autonews.com/article/20151221/RETAIL01/312219978/vw-scandals-impact-on-european-sales-just-beginning?> (accessed 18 February 2016)

EXHIBIT 14 : STOCK PERFORMANCE OF VOLKSWAGEN AG (VLKAY) FEBRUARY 2015-JANUARY 2015



Source: CNN Money (2016), <http://money.cnn.com/quote/quote.html?symb=VLKAY> (accessed 2 February 2016)