Focus Electric

Preparing for Strategy 2025
AGENDA

CHALLENGES

- Consumers no longer trust VW
- Diesel is losing market-share worldwide
- VW are not focusing on the right geographies

STRATEGY

Focus Electric for 2025

TACTICS

- Gradually withdraw from diesel and focus on electric vehicles
- Stay in the US, and target select areas of Asia and Europe

OUTCOMES

- Survive the $30B emissions scandal
- Become a global market leader in electric vehicles
- Position to take advantage of growth in emerging markets by 2025
Simulations showed that there is a 79% probability that the crisis costs between $23B and $28B USD over the next 10 years.

Monte Carlo Crisis Cost NPV Analysis (10 year timeline)

Breakdown of Costs

Variables are still unknown so a range is required for reliable and accurate forecasting.

<table>
<thead>
<tr>
<th>Breakdown</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recall Costs</td>
<td>30%</td>
</tr>
<tr>
<td>Goodwill Costs</td>
<td>15%</td>
</tr>
<tr>
<td>EPA Legal Costs</td>
<td>10%</td>
</tr>
<tr>
<td>Class Action Legal Costs</td>
<td>5%</td>
</tr>
<tr>
<td>Lost Sales</td>
<td>5%</td>
</tr>
</tbody>
</table>

Single figure estimates are inadequate

<table>
<thead>
<tr>
<th>Source</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forbes</td>
<td>$25.7B</td>
</tr>
<tr>
<td>VW internal</td>
<td>6.75B</td>
</tr>
<tr>
<td>Credit Suisse</td>
<td>$87.3B</td>
</tr>
</tbody>
</table>
Customers have lost trust in Volkswagen, and are moving away from diesel vehicles.

General Customer Perceptions

1. Volkswagen Group is no longer a trustworthy, especially with regards to diesel vehicles.
2. Volkswagen is failing its commitment to the environment.
3. Diesel engines are less powerful, with substandard fuel economies and more emissions.

Key Takeaways

- Volkswagen will not be able to fully regain trust in the short term.
- VW Diesel vehicles in particular have an incredibly bad reputation.
- VW must look beyond their traditional petrol and diesel offerings to build new trust with new products.
The scandal has diminished diesel sales globally for VW but early 2016 sales figures are positive.
Poor Diesel Performance

VW vehicles with a defeat device no longer perform which has lowered confidence and trust in VW diesel vehicles overall.

<table>
<thead>
<tr>
<th>Model</th>
<th>Acceleration to 60 mph</th>
<th>Miles per gallon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jetta Sportwagen 2011</td>
<td>9.9 seconds</td>
<td>50 mpg</td>
</tr>
<tr>
<td></td>
<td>+6%</td>
<td></td>
</tr>
<tr>
<td>Jetta TDI 2015</td>
<td>9.1 seconds</td>
<td>53 mpg</td>
</tr>
<tr>
<td></td>
<td>+1%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10.5 seconds</td>
<td>46 mpg</td>
</tr>
<tr>
<td></td>
<td>-8%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9.2 seconds</td>
<td>50 mpg</td>
</tr>
<tr>
<td></td>
<td>-5.7%</td>
<td></td>
</tr>
</tbody>
</table>
Poor Diesel Performance

Diesel is predicted to shrink while EVs are predicted to take a huge piece of the market

VW must be positioned to succeed in a changing market

Diesel vehicles will become less common while EV market share grows

VW should establish a strong position to move into the next phase of growth
Tesla has received 325,000 preorders for the Model 3

'Biggest one-week launch of any product ever'

By Andrew L. Hawkins on April 7, 2016 12:40 pm. Email. @andrewhawkns

Where does the Volkswagen Group sit in this mix?
Through to 2025 EV sales will experience a CAGR of 19% and represent almost a 10th of global vehicle sales.

**Global EV Sales**

Source: Navigant Research; Research and Markets
Electric Vehicle Focus

Global sales of EVs will be spurred by huge demand for battery technology that will significantly decrease in price by 2025.

Technical advances could increase the capacity of batteries by 80 to 110% by 2025.

Market is primed for companies to compete on a total cost of ownership basis due to falling gasoline prices.

Source: Bloomberg New Energy Finance
VW has a strong foundation to succeed in the EV market with considerable innovation infrastructure but is struggling with sales.

**VW Electronic Research Laboratory**

1. Located in Silicon Valley the laboratory only employs 80 people.

2. Currently a lack of focus on EV innovation and a wide spread of project types.

3. Current offering in BEV limited to e-Golf and Audi R8 e-tron.

**Key EV models ranked 13\textsuperscript{th} and 14\textsuperscript{th} globally at a combined average of just 2.5\% of global sales**

- VW e-Golf
- Hyundai Sonata PHV
- BMW i3
- BMW X5 xDrive40e
- Fiat 500e
- Audi A3 Sprtbk e-tron
- Ford C-Max Energi
- Telsa Model X
- Ford Fusion Energi
- Nissan Leaf
- Chevorlet Bolt
- Telsa Model S
VW should focus on increasing ERL funding and fast-track mass market battery and EV offerings over the next 5 years.

1. Fully Electric Vehicles
   Focus on bringing forwarded more mass market EV models before 2025

2. Charging Infrastructure
   Develop charging station infrastructure for your vehicles

3. EV Batteries
   Fast-track your current innovations in lithium-ion batteries
GEOGRAPHIC TARGETING
Country Targeting

Focus on countries with high automotive demand forecast, low sensitivity to the scandal, and the potential for a large EV market.

- **China**: Not to scale (40% size)
- **Potential for EVs**: Scaled to country's annual automotive purchases
- **Country Targeting**
  - High
  - Low
  - High
  - Low

- **Indonesia**
- **Russia**
- **Brazil**
- **Mexico**
- **Canada**
- **UK**
- **France**
- **Sweden**
- **USA**
- **Japan**
- **Germany**
- **South Korea**
- **Norway**
- **Germany**
- **China**
- **Netherlands**
- **USA**
- **Norway**
Country Targeting

Focus on countries with high automotive demand forecast, low sensitivity to the scandal, and the potential for a large EV market

- USA
- China
- Germany
- Japan
- South Korea
- Norway
- Canada

Size = Scaled to country’s annual automotive purchases (China not to scale - 40% size)
Slowly stop selling diesel cars in the US while focusing on hybrids and EVs – do not exit the market completely.

Diesel vehicle sales are down by over 80% while petrol remains strong.

In addition to being a profitable petrol market, the US is currently the largest EV market in the world.

Leaving the market would be a poor decision and make it difficult to enter in the future with an EV focused fleet.
Country Targeting

Focus on countries with high automotive demand forecast, low sensitivity to the scandal, and the potential for a large EV market.

- **USA**: High Potential for EVs, high sensitivity to the scandal.
- **China**: High Potential for EVs, low sensitivity to the scandal, not to scale (40% size).
- **Japan**: Low Potential for EVs, high sensitivity to the scandal.
- **Brazil**, **Russia**, **India**, **Mexico**, **France**, **Germany**, **Sweden**, **Canada**, **Netherlands**, **Norway**, **South Korea**, **France**, **UK**, **UK**, **Mexico**, **Brazil**, **Russia**, **India**, **Mexico**, **France**, **Germany**, **Sweden**, **Canada**, **Netherlands**, **Norway**, **South Korea**.

Size = Scaled to country’s annual automotive purchases (China not to scale - 40% size).
Country Targeting

Focus on countries with high automotive demand forecast, low sensitivity to the scandal, and the potential for a large EV market.
Japan, China, and South Korea are the most attractive markets in Asia for Volkswagen.

### Key Insight

<table>
<thead>
<tr>
<th>Country</th>
<th>Insight</th>
</tr>
</thead>
<tbody>
<tr>
<td>NORWAY</td>
<td>Market leader in car sales with MS of 13.84%. EV sales accounted for 22.9% in 2015</td>
</tr>
<tr>
<td>GERMANY</td>
<td>VW remains best selling car brand in Germany 2015 with 3,210,000 automotive sales</td>
</tr>
<tr>
<td>NETHERLANDS</td>
<td>High penetration of charging stations at 1.3 per EV and second largest uptake of EV vehicles</td>
</tr>
</tbody>
</table>

### Drivers

<table>
<thead>
<tr>
<th>Country</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>NORWAY</td>
<td>EVs exempt from fees and related taxes until 2017</td>
</tr>
<tr>
<td>GERMANY</td>
<td>Accounting for 20 percent of all new car registrations (3.2 million)</td>
</tr>
<tr>
<td>NETHERLANDS</td>
<td>2020 EV targets are 200,000 and 1M in 2025</td>
</tr>
</tbody>
</table>

### Looking Ahead

<table>
<thead>
<tr>
<th>Country</th>
<th>Insight</th>
</tr>
</thead>
<tbody>
<tr>
<td>NORWAY</td>
<td>Government stated goal of <strong>All new cars in 2025 being emissions free</strong></td>
</tr>
<tr>
<td>GERMANY</td>
<td>Expected VW growth rates of <strong>50%</strong> for EVs in coming years</td>
</tr>
<tr>
<td>NETHERLANDS</td>
<td>Government has committed to a having <strong>ZERO</strong> petrol and diesel cars from sale in the Netherlands from 2025</td>
</tr>
</tbody>
</table>
Country Targeting

Focus on countries with high automotive demand forecast, low sensitivity to the scandal, and the potential for a large EV market.

Size = Scaled to country’s annual automotive purchases (China not to scale - 40% size)
Country Targeting

Focus on countries with high automotive demand forecast, low sensitivity to the scandal, and the potential for a large EV market.

Size = Scaled to country's annual automotive purchases *(China not to scale - 40% size)*
Asia: Japan, China, South Korea

Japan, China, and South Korea are the most attractive markets in Asia for Volkswagen.

### Key Insight

<table>
<thead>
<tr>
<th>South Korea</th>
<th>Japan</th>
<th>China</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diesel VW #1 selling car in 2015. Low Scandal Impact.</td>
<td>Scandal had large impact but sales are still high</td>
<td>Dropped only 8.5% percent by end of 2015 and have already gained 15% in 2016.</td>
</tr>
</tbody>
</table>

### Drivers

<table>
<thead>
<tr>
<th>South Korea</th>
<th>Japan</th>
<th>China</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011 Germany / South Korea FTA and long time success of VW brand</td>
<td>VW has been the #1 selling foreign car company for over 15 years.</td>
<td>China are 39% of all global sales, consumers reacted quickly.</td>
</tr>
</tbody>
</table>

### Looking Ahead

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<tr>
<th>South Korea</th>
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<th>China</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government stated goal of 375% CAGR in EV sales until 2020. Aiming for 20% of all cars to be fully electric and subsidizing heavily.</td>
<td>Highest EV penetration in the world (Excl. Scandinavia) Also committed to 20% EVs by 2020. Government subsidizing.</td>
<td>Government has committed $15B in subsidies and funding. Fastest growing market for automotive and for EV.</td>
</tr>
</tbody>
</table>
**AGENDA**

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- Consumers no longer trust VW
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**Focus Electric for 2025**
- Gradually withdraw from diesel and focus on electric vehicles
- Stay in the US, and target select areas of Asia and Europe

**TACTICS**
- Survive the $30B emissions scandal
- Become a global market leader in electric vehicles
- Position to take advantage of growth in emerging markets by 2025

**OUTCOMES**
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<th>Presentation Slides</th>
<th>General Index Slides</th>
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</thead>
<tbody>
<tr>
<td>1. Quantifying Cost of Scandal</td>
<td>20. Do EVs pose a risk to limited electricity supply?</td>
</tr>
<tr>
<td>2. Diesel Analysis</td>
<td>21. Low Oil Prices and EVs</td>
</tr>
<tr>
<td>3. Electric Vehicle Market</td>
<td>22. 5 Forces: Global Automotive Market</td>
</tr>
<tr>
<td>4. Geographic Targetting</td>
<td>23. 5 Forces: Global EV Market</td>
</tr>
<tr>
<td>5. USA</td>
<td>24. SWOT Analysis: Global EV Market</td>
</tr>
<tr>
<td>6. European Target Markets</td>
<td>25. Hydrocarbon vs EVs</td>
</tr>
<tr>
<td></td>
<td>27. Public Relations and Damage Control</td>
</tr>
<tr>
<td></td>
<td>28. Scaling Back Diesel</td>
</tr>
<tr>
<td></td>
<td>29. Cost Management</td>
</tr>
<tr>
<td></td>
<td>30. EVs and building new trust</td>
</tr>
<tr>
<td></td>
<td>31. Key Elements of Building Trust</td>
</tr>
<tr>
<td></td>
<td>32. Regaining trust case study: Johnson &amp; Johnson v Arthur Anderson</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Financial Index</th>
<th>Potential Target Countries Macro / PESTLE analysis</th>
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<tbody>
<tr>
<td>10. Monte Carlo Analysis - Assumptions</td>
<td>40. USA</td>
</tr>
<tr>
<td>11. Simulation Results Histogram</td>
<td>41. China</td>
</tr>
<tr>
<td>12. VW Costs / Cash Flows</td>
<td>42. Japan</td>
</tr>
<tr>
<td>13. Recall Costs Cash Flows</td>
<td>43. South Korea</td>
</tr>
<tr>
<td>15. Losses from Sales</td>
<td>45. Germany</td>
</tr>
<tr>
<td>16. EPA Legal Costs / Fines</td>
<td>46. Netherlands</td>
</tr>
<tr>
<td>17. Class Action Costs</td>
<td>50. Canada</td>
</tr>
<tr>
<td>18. Costs Breakdown</td>
<td>51. UK</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>52. Mexico</th>
<th>53. France</th>
</tr>
</thead>
<tbody>
<tr>
<td>54. Sweden</td>
<td>55. Brazil</td>
</tr>
<tr>
<td>56. Russia</td>
<td>57. India</td>
</tr>
</tbody>
</table>
Focus Electric
Preparing for Strategy 2025
Monte Carlo Analysis Assumptions

**ASSUMPTIONS:**

### General Assumptions:
- **Discount Rate:** 6.37%  
  Based on Prof. Damodaran industry estimate: [http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/wacc.htm](http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/wacc.htm)

### Recall Cost Assumptions
- **11 million cars to be recalled**
- **Distribution of recall based on:** [http://www.forbes.com/dieselgate-scandal-could-cost-volkswagen-up-to-35-billion/#1a4bc1ad3b4d](http://www.forbes.com/dieselgate-scandal-could-cost-volkswagen-up-to-35-billion/#1a4bc1ad3b4d)
- **Cars recalled 2015:** 3 million
- **Cars recalled 2016:** 5 million
- **Cars recalled 2017:** 3 million

### Goodwill Cost Assumptions
- Distribution of $1000 goodwill packages offered to all US owners of affected cars.
- Not all owners will take up full extent of offer. Expected users of goodwill package: 400,000

### Lost Sales Assumptions
- **Starting sales were 10.2 million in 2014.**
- **Sales in 2015 declined by 2% from the previous year.**
- **Baseline sales will continue to decline at gradually lower rates, until 2025, as a result of the VW scandal.**
- **The average price of a Volkswagen vehicle was $33,000 in 2015, with a growth rate of 2%**

### EPA Legal Cost Assumptions
- **Legal costs begin in 2017, progressing over 4 years.**
- **Legal costs determined from range of predictions:** [http://www.wsj.com/articles/u-s-sues-volkswagen-over-emissions-scandal-1451932799](http://www.wsj.com/articles/u-s-sues-volkswagen-over-emissions-scandal-1451932799)

### Class Action Law Suit Cost Assumptions
- **Legal costs begin in 2017, progressing over 4 years.**
- **Legal costs determined from range of predictions:** [http://www.wsj.com/articles/u-s-sues-volkswagen-over-emissions-scandal-1451932799](http://www.wsj.com/articles/u-s-sues-volkswagen-over-emissions-scandal-1451932799)
Monte Carlo Profitability Analysis Histogram

<table>
<thead>
<tr>
<th>Bins</th>
<th>Intervals</th>
<th>Axis</th>
<th>Frequency Count</th>
<th>Percentage Distribution</th>
<th>Order</th>
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<tbody>
<tr>
<td>1</td>
<td>19,730,590,000</td>
<td>19</td>
<td>0</td>
<td>0%</td>
<td>0</td>
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<tr>
<td>2</td>
<td>20,512,862,500</td>
<td>3</td>
<td>0%</td>
<td>1</td>
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<tr>
<td>3</td>
<td>21,295,135,000</td>
<td>8</td>
<td>1%</td>
<td>2</td>
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<tr>
<td>4</td>
<td>22,077,407,500</td>
<td>20</td>
<td>2%</td>
<td>3</td>
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<tr>
<td>5</td>
<td>22,859,680,000</td>
<td>36</td>
<td>4%</td>
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<tr>
<td>6</td>
<td>23,641,952,500</td>
<td>80</td>
<td>8%</td>
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<td>7</td>
<td>24,424,225,000</td>
<td>124</td>
<td>12%</td>
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<td>8</td>
<td>25,206,497,500</td>
<td>152</td>
<td>15%</td>
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<td>9</td>
<td>25,988,770,000</td>
<td>165</td>
<td>16%</td>
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<tr>
<td>10</td>
<td>26,771,042,500</td>
<td>141</td>
<td>14%</td>
<td>9</td>
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<tr>
<td>11</td>
<td>27,553,315,000</td>
<td>126</td>
<td>13%</td>
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<td>12</td>
<td>28,335,587,500</td>
<td>74</td>
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<td>29,117,860,000</td>
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<td>15</td>
<td>30,682,405,000</td>
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<td>16</td>
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<tr>
<td>17</td>
<td>32,246,950,000</td>
<td>32</td>
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<tr>
<td>Mean</td>
<td>25,595,890,651</td>
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# Volkswagen Quantitative Cost Cash Flows

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<tbody>
<tr>
<td>Recall Costs</td>
<td>$718,552,574.81</td>
<td>$1,095,128,331.63</td>
<td>$652,349,194.21</td>
<td></td>
<td></td>
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<tr>
<td>Volkswagen Goodwill Costs (US)</td>
<td>$329,897,681.63</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Volkswagen Goodwill Cost (Global)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Lost Sales</td>
<td>$4,615,042,400.00</td>
<td>$3,779,060,001.55</td>
<td>$2,716,199,963.44</td>
<td>$1,837,563,387.41</td>
<td>$1,692,514,536.16</td>
<td>$1,541,935,743.14</td>
</tr>
<tr>
<td>EPA Legal Costs</td>
<td>-166,285,704</td>
<td>-462,215,028.11</td>
<td>-308,143,352.07</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Class Action Lawsuits</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Legal Cost Offset</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

| Cash Flows                    |          |            |            |            |            |            |
| Net Cash Flow                 | $5,554,992,656.44 | $4,875,188,383.18 | $3,368,519,157.65 | $1,221,276,638.25 | $1,230,299,508.05 | $1,233,792,391.06 |
| Discounting Periods           | 0         | 1          | 2          | 3          | 4          | 5          |
| Discount Factor               | 1         | 0.940114694 | 0.883815638 | 0.830888068 | 0.781130082 | 0.734351868 |
| Discounted Cash Flow          | $5,554,992,656.44 | $4,583,236,188.00 | $2,977,175,422.44 | $1,014,744,223.77 | $961,023,955.27 | $906,037,746.80 |

<table>
<thead>
<tr>
<th>2021</th>
<th>2022</th>
<th>2023</th>
<th>2024</th>
<th>2025</th>
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<tbody>
<tr>
<td>$1,049,891,052.09</td>
<td>$679,528,924.02</td>
<td>$659,849,766.38</td>
<td>$637,471,432.87</td>
<td>$612,207,949.63</td>
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</tr>
<tr>
<td>-$154,071,676.04</td>
<td></td>
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</tr>
<tr>
<td>$469,400,345</td>
<td>$352,050,259</td>
<td>$234,700,172</td>
<td>$117,350,086</td>
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<table>
<thead>
<tr>
<th>2026</th>
<th>2027</th>
<th>2028</th>
<th>2029</th>
<th>2030</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$895,819,376.05</td>
<td>$1,148,929,268.91</td>
<td>$1,011,900,025.05</td>
<td>$872,171,605.32</td>
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<tr>
<td>$6</td>
<td>7</td>
<td>8</td>
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<td>0.690374981</td>
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<td>0.573624334</td>
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<tr>
<td>$618,451,285.11</td>
<td>$745,691,475.69</td>
<td>$617,425,173.90</td>
<td>$500,298,856.65</td>
<td>$393,430,706.75</td>
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</tr>
</tbody>
</table>

| NPV          | $27,900,691,276 |            |            |            |            |

**-INDEX-**
### Volkswagen Recall Costs Cash Flows

<table>
<thead>
<tr>
<th>VOLKSWAGEN RECALL COSTS</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost per Year EPA</td>
<td>493,489,603</td>
<td>728,873,653</td>
<td>313,575,075</td>
</tr>
<tr>
<td>Discount Rate</td>
<td>1</td>
<td>0.940114694</td>
<td>0.8838</td>
</tr>
<tr>
<td>Discounted Cash Flow</td>
<td>$493,489,603</td>
<td>$685,224,831</td>
<td>$277,142,555</td>
</tr>
</tbody>
</table>

**NPV of Recall Costs**  
$1,455,856,989

**Assumptions:**

11 million cars to be recalled over 3 years.

- Cars recalled 2015: 3 million
- Cars recalled 2016: 5 million
- Cars recalled 2017: 3 million

Discount Rate: 6.37%

<table>
<thead>
<tr>
<th>Volkswagen Recall Costs</th>
<th>min</th>
<th>max</th>
<th>mean</th>
<th>sigma</th>
<th>value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recall Cost per Car</td>
<td>$50.00</td>
<td>$450.00</td>
<td>$250.00</td>
<td>66.66666667</td>
<td>219,986,0614</td>
</tr>
<tr>
<td>Cars recalled 2015</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3,000,000.00</td>
</tr>
<tr>
<td>Cars recalled 2016</td>
<td>3,000,000</td>
<td>6,000,000</td>
<td>$4,500,000.00</td>
<td>5000000</td>
<td>4,377,156.52</td>
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<tr>
<td>Cars recalled 2017</td>
<td>500,000</td>
<td>3,500,000</td>
<td>$2,500,000.00</td>
<td>5000000</td>
<td>2,824,455.76</td>
</tr>
</tbody>
</table>
Volkswagen Goodwill Costs Cash Flows

<table>
<thead>
<tr>
<th>VOLKSWAGEN GOODWILL COSTS</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost per Year EPA</td>
<td>459,742,202</td>
</tr>
<tr>
<td>Discount Rate</td>
<td>1</td>
</tr>
<tr>
<td>Discounted Cash Flow</td>
<td>$ 459,742,202</td>
</tr>
<tr>
<td>NPV of Goodwill Costs</td>
<td>$ 459,742,202</td>
</tr>
</tbody>
</table>

Assumptions:
Distribution of $1000 goodwill packages offered to all US owners of affected cars. Source: Case materials
Not all owners will take up full extent of offer. Expected users of goodwill package: 400,000

<table>
<thead>
<tr>
<th>Volkswagen Goodwill Costs (US)</th>
<th>min</th>
<th>max</th>
<th>mean</th>
<th>sigma</th>
<th>value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goodwill Package Cost</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$1,000</td>
</tr>
<tr>
<td>Number of Packages</td>
<td>180,000</td>
<td>580,000</td>
<td>400,000</td>
<td>66666.66667</td>
<td>459,742.20</td>
</tr>
</tbody>
</table>
Lost Volkswagen Sales Costs Cash Flows

<table>
<thead>
<tr>
<th>LOST VOLKSWAGEN SALES</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost per Year EPA</td>
<td>$4,616,042,400.00</td>
<td>$4,626,299,600.88</td>
<td>$2,879,067,637.20</td>
<td>$1,896,620,982.50</td>
<td>$1,676,785,068.59</td>
</tr>
<tr>
<td>Discount Rate</td>
<td>1.00</td>
<td>0.940</td>
<td>0.884</td>
<td>0.831</td>
<td>0.781</td>
</tr>
<tr>
<td>Discounted Cash Flow</td>
<td>$4,616,042,400.00</td>
<td>$4,349,252,233.59</td>
<td>$2,544,565,000.21</td>
<td>$1,575,879,743.75</td>
<td>$1,309,787,257.67</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
<th>2024</th>
<th>2025</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>$1,628,737,850.68</td>
<td>$1,018,878,239.34</td>
<td>$679,528,924.02</td>
<td>$659,849,766.38</td>
<td>$637,471,432.87</td>
<td>$612,207,949.63</td>
</tr>
<tr>
<td>Discount Rate</td>
<td>0.734</td>
<td>0.690</td>
<td>0.649</td>
<td>0.610</td>
<td>0.574</td>
<td>0.539</td>
</tr>
<tr>
<td>Discounted Cash Flow</td>
<td>$1,196,066,682.725</td>
<td>$703,408,045.566</td>
<td>$441,035,788.572</td>
<td>$402,616,707.845</td>
<td>$365,669,126.429</td>
<td>$330,147,012.940</td>
</tr>
</tbody>
</table>

NPV of Lost Sales Costs: $17,834,469,999.311

---INDEX---
EPA Legal Costs Cash Flows

### EPA LEGAL COSTS FORECASTING

<table>
<thead>
<tr>
<th></th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost per Year EPA</td>
<td>$2,148,721,416</td>
<td>$1,611,541,062</td>
<td>$1,074,360,708</td>
<td>$537,180,354</td>
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<tr>
<td>Discount Rate</td>
<td>0.8309</td>
<td>0.7811</td>
<td>0.7344</td>
<td>0.6904</td>
</tr>
<tr>
<td>Discounted Cash Flow</td>
<td>$1,785,346,986</td>
<td>$1,258,823,201</td>
<td>$788,958,793</td>
<td>$370,855,877</td>
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</tbody>
</table>

NPV of EPA Legal Costs $4,203,984,857

### Assumptions:
- Legal costs begin in 2017, progressing over 4 years.
- Discount Rate: 6.37%
- Based on Prof. Damodaran industry estimate: [http://pages.stern.nyu.edu/~adamodar/New_Homepages/damodaran/](http://pages.stern.nyu.edu/~adamodar/New_Homepages/damodaran/)

<table>
<thead>
<tr>
<th>Description</th>
<th>min</th>
<th>max</th>
<th>avg</th>
<th>sigma</th>
<th>rand</th>
</tr>
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<tbody>
<tr>
<td>EPA Legal Costs</td>
<td>$3,000,000,000.00</td>
<td>$15,000,000,000.00</td>
<td>$6,323,298,977.88</td>
<td>2000000000.00</td>
<td>$7,025,060,621</td>
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<tr>
<td>EPA Legal Cost 2017</td>
<td>$2,810,024,248.29</td>
<td>$2,107,518,186.21</td>
<td>$1,405,012,124.14</td>
<td>$702,506,062.07</td>
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</tr>
<tr>
<td>EPA Legal Cost 2018</td>
<td>$2,810,024,248.29</td>
<td>$2,107,518,186.21</td>
<td>$1,405,012,124.14</td>
<td>$702,506,062.07</td>
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<tr>
<td>EPA Legal Cost 2019</td>
<td>$1,405,012,124.14</td>
<td>$1,405,012,124.14</td>
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<tr>
<td>EPA Legal Cost 2020</td>
<td>$702,506,062.07</td>
<td>$702,506,062.07</td>
<td>$702,506,062.07</td>
<td>$702,506,062.07</td>
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</table>
## Class Action Legal Costs Cash Flows

### Class Action Legal Costs Forecasting

<table>
<thead>
<tr>
<th></th>
<th>2022</th>
<th>2023</th>
<th>2024</th>
<th>2025</th>
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<tbody>
<tr>
<td>Cost per Year EPA</td>
<td>$608,843,544</td>
<td>$456,632,658</td>
<td>$304,421,772</td>
<td>$152,210,886</td>
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<tr>
<td>Discount Rate</td>
<td>0.649</td>
<td>0.610</td>
<td>0.574</td>
<td>0.539</td>
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<tr>
<td>Discounted Cash Flow</td>
<td>$395,158,739</td>
<td>$278,620,902</td>
<td>$174,623,736</td>
<td>$82,083,170</td>
</tr>
</tbody>
</table>

NPV of Class Action Legal Costs: $930,486,547.38

### Assumptions:

- Legal costs begin in 2017, progressing over 4 years.
- Legal costs determined from range of predictions: [Source](http://www.wsj.com/articles/u-s-sues-volkswagen-over-emissions-scandal-1451932799)
- Discount Rate: 6.37%
- Based on Prof. Damodaran industry estimate: [Source](http://pages.stern.nyu.edu/~adamodar/New_Home_Page/c)

### Class Action Law Suits

<table>
<thead>
<tr>
<th>Class Action Law Suits</th>
<th>$440,000,000.00</th>
<th>$2,200,000,000.00</th>
<th>$1,320,000,000.00</th>
<th>2933333333.3</th>
<th>$1,449,032,012</th>
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<tbody>
<tr>
<td>EPA Legal Cost 2017</td>
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<td>$579,612,804.63</td>
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<td>EPA Legal Cost 2018</td>
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<td>$434,709,603.47</td>
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<tr>
<td>EPA Legal Cost 2019</td>
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<td>$289,806,402.32</td>
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<tr>
<td>EPA Legal Cost 2020</td>
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<td>$144,903,201.16</td>
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</table>
Breakdown of Costs

<table>
<thead>
<tr>
<th>Description</th>
<th>NPV</th>
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<tbody>
<tr>
<td>NPV of Recall Costs</td>
<td>$1,716,404,514</td>
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<tr>
<td>NPV of Goodwill Costs</td>
<td>$417,719,022</td>
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<tr>
<td>NPV of Lost Sales Costs</td>
<td>$16,772,283,176.164</td>
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<tr>
<td>NPV of EPA Legal Costs</td>
<td>$4,939,186,176</td>
</tr>
<tr>
<td>NPV of Class Action Legal Costs</td>
<td>$930,486,547.38</td>
</tr>
</tbody>
</table>

Breakdown of Volkswagen Quantitative Costs

- NPV of Class Action Legal Costs: 4%
- NPV of Recall Costs: 7%
- NPV of EPA Legal Costs: 20%
- NPV of Goodwill Costs: 1%
- NPV of Lost Sales Costs: 68%
A growing number of EVs will cause a higher demand for electricity but this will only lead to a moderate rise in total demand.

**The Challenge**

Driving an EV 15,000 km per year and charging it solely at home would roughly double the household’s electricity demand, taking it from about 3,500 kWh to about 6,500 kWh per year.

Moment of charging impacts the grid along with demand following the load curve (peaks and levels) + clusters can impact power infrastructure

**The Actual Result**

Even if EVs comprised 20% of all cars on the road in Europe by 2020, associated incremental electricity demand would be 3-4% of base case without large-scale EV adoption.
Even if crude oil prices fell drastically over the forecast period mass adoption of EVs would only be delayed until the early 2030s.

What about a crash in oil prices?

Key analysts are basing EV demand on crude oil price recovering to $50 and then trending back up to $70-a-barrel or higher by 2040.

Even if oil prices fell to $20 a barrel and remained there through until 2025 – this would only delay adoption of EV on a mass scale until early 2030.

This is in line with the price trajectory mentioned by the US Energy Information Administration in its Annual Energy Outlook 2015.

Source: Bloomberg New Energy Finance
5 Forces Analysis of global automotive industry

**Threat of New Entry**
- Barriers to entry in this industry are *medium* and are *steady*.

**Supplier Power**
- Fragmented suppliers of raw materials with low cost of substitution and no real supplier power.

**Competitive Rivalry**
- Industry is highly fragmented and concentration is low.

**Threat of Substitution**
- Low cost of substitution in most markets to another vehicle or a car / bus / Uber.

**Buyer Power**
- Buyers are extremely price sensitive and have high ability to substitute. There is moderately low buyer power.
Porter’s 5 Forces in the Global EV Market

**Threat of New Entry**
- Barriers to entry in this industry are *slightly lower* and are *increasing*

**Supplier Power**
- Concentrated suppliers of raw materials with high cost of substitution and *some supplier power*

**Supply Power**

**Competitive Rivalry**
- Industry is highly fragmented and concentration is low

**Threat of Substitution**
- Low cost of substitution in most markets to another vehicle or a car / bus / Uber

**Buyer Power**
- Buyers have more power in this market due to a *low product offering*
## SWOT Analysis of entering the EV segment

### Strengths
- Maximize ERL capacity → re-invest diesel funds
- Established presence in the market with two key models
- Concept vehicles have sent signals to market of preparedness
- Leading automotive group with established brands and experience

### Weaknesses
- Requires significant funding
- Decreased brand equity could hamper adoption rates
- Late entrant to the market
- Lack of focus on geography
- Inability to calculate level of focus for EV as a result of crisis costs

### Opportunities
- Strong global growth in EV sales over the forecast period
- 35% global sales by 2040
- 41M EVs by 2040
- Reduction in battery prices will reduce costs and increase competitive ability
- Increases in battery capacity technology

### Threats
- Increase in demand could increase supply and create a highly fragmented market
- Current infrastructure (charging stations) may not support demand over forecast period
- Stronger competitor position → isolated from crisis
Currently, hydrocarbon is not a viable alternative venture to electric

Industry case study

1. Hydrocarbon cars consume 3x more fuel than electric
2. Hydrocarbon cars cost 46% more to run
3. The transformation to energy for hydrocarbon engines is 55-60% less efficient

Undeveloped technology
Lack of infrastructure
Limited consumer interest
Autonomous driving technology is an attractive investment, however it does not align with VW’s current position and outlook

Attractiveness of autonomous driving technology

1. Potentially a 42B USD market by 2025
2. Technology is projected to be ready for sale by 2022
3. Forecasted to make up 10% of light vehicle sales by 2035

Investing in autonomous technology will not address VW’s issue of declining sales

VW’s trust issue is a barrier to implementation and success

VW is not currently in the market – requires significant investment

Toyota announced a 1B USD investment over a 5 year period
The window for a public relations campaign has lapsed

VW publically admitted to use of the deceptive software in September 2015
VW has taken mitigating steps

1. The CEO during scandal has been removed and an independent inquiry into the controlling board is underway
2. Publicly admitting the use of the deceptive software
3. Announced scheme for rebate

Grow trust in emerging markets

Scale back in most affected markets
Markets to target for scaling back diesel focus, due to impact of scandal on monthly sales

- Russia: -26%
- USA: -25%
- Brazil: -44%
Cost Management

Cost Breakdown

1. Predicted NPV of costs: 25.6 Bil dollars
2. Cash Costs 2016: $500,000 for recall
3. Legal Costs begin in 2018 at $2B
4. Legal Costs will continue until 2025 for a total NPV of $6B

Cash on Hand

1. Currently set aside $7.3B for costs, with $25B cash on hand
2. $7.3B allocation will be sufficient to cover 2016 costs
3. 25B cash on hand is ample to cover 2018 costs
4. Further loans of 21B plus remaining cash of hand will be ample for ongoing costs

Strategy Investment

1. Up to 500 million worth of investment for charging station infrastructure, EV batteries and expanded EV range
2. VW will have ample cash to cover costs of the scandal and further EV investments
Where customer trust cannot be regained through the creation of new trust in new products, VW has two alternatives available.

What if the *creation* of new trust in EV product development doesn’t assist in regaining customer trust?

1. **Reputation Capital**
   - Announcements of reputation-repair actions lift share prices, on average by 2%

2. **Credible Commitments to Prevention**
   - Johnson & Johnson credibly followed through on their commitments by creating new product type

3. **Greater CEO Involvement**
   - CEO’s can accelerate rebuilding customer trust by targeting softer constituencies

*Sources:* Stanford Graduate School of Business; McKinsey; PwC
Regaining customer trust involves a primary focus on addressing the issue straightforwardly and a secondary focus on rebuilding reputation capital. Effective restoration of trust includes:

1. Trust harmed by untrustworthy behaviour can be restored when individuals observe a consistent series of trustworthy actions.
2. Commitment to change behaviour help accelerate the trust recovery process.
3. Implement tangible efforts to address to issue and ensure it does not happen again e.g. Johnson and Johnson.

Source: Wharton School of Business

Source: Rawlins (2007)
Key business case studies reveal that regaining customer trust for long term success is based on a commitment to change behavior create new trust.

Source: PwC (2015)
## USA Macro-Environmental Factors

### Political
- **Corruption:** 16th ranked, CPI: 76
- **Political Stability:** Upper 30%, Rating: 0.62
- **EV Scheme:** Billions of USD allocated for development of EVs

### Economic
- **GDP:** 1st ranked, $17,419,000 million USD
- **GDP Growth:** 114th ranked, Real GDP growth rate of 2.6%
- **Human Development Index (HDI):** 8th globally, HDI Rating: 0.915

### Social
- **Infrastructure:** Gross Fixed Capital Formation Annual Growth: 2.4%

### Technological
- **Emission Standards:** Enforced by Environmental Protection Agency with large penalties for breach of relatively strong emission standards

### Legal

### Sales
- **VW Sales:**
  - 2014: 367,789
  - 2015: 349,400
- **Automobile Sales:** 7,570,000
- **EV Sales:** 280,000
China Macro-Environmental Factors

**Political**
- Corruption: Ranked 37th
  - CPI: 56
- Political Stability: Lower 30%
  - Rating: -0.46

**Economic**
- GDP: Ranked 2nd
  - $10,354,832 million USD
- GDP Growth: Ranked 19th
  - Real GDP growth rate of 6.9%
- Human Development Index (HDI):
  - Ranked 90th globally
  - HDI Rating: 0.727
- Infrastructure:
  - Gross Fixed Capital Formation Annual Growth: 7.2%
- Emission Standards:
  - Relatively weak China emission standards implemented, with plans to implement 2011 EU Emission standards in 2018

**Social**

**Technological**

**Legal**

**Sales**
- VW Sales:
  - 2014: 3,674,948
  - 2015: 3,550,000
- Automobile Sales 2015: 21,150,000
- EV Sales 2015: 258,328
Japan Macro-Environmental Factors

**Political**
- Corruption: Ranked 18th
  - CPI: 75
- Political Stability: Upper 20%
  - Rating: 1.02

**Economic**
- GDP: Ranked 3rd
  - $4,601,461 million USD
- GDP Growth: Ranked 191st
  - Real GDP growth rate of 0.6%

**Social**
- Human Development Index (HDI):
  - Ranked 20th globally
  - HDI Rating: 0.891

**Technological**
- Infrastructure:
  - Gross Fixed Capital Formation Annual Growth: 3.2%

**Legal**
- Emission Standards:
  - Japan’s emission control requirements for vehicles are the strictest in Asia and among the strictest in the world

**Sales**
- VW Sales:
  - 2014: 67,446
  - 2015: 54,766
- Automobile Sales 2015:
  - 4,240,000
- EV Sales 2015:
  - 130,000

**EV Scheme**
- Rebates for up to $29,500 USD per electric vehicle
South Korea Macro-Environmental Factors

### Political
- **Corruption:** Ranked 83rd, CPI: 37
- **Political Stability:** Upper 50%, Rating: 0.19

### Economic
- **GDP:** Ranked 13th, $1,410,383 million USD
- **GDP Growth:** Ranked 112, Real GDP growth rate of 2.7%

### Social
- **Human Development Index (HDI):** Ranked 17th globally, HDI Rating: 0.898

### Technological
- **Infrastructure:** Gross Fixed Capital Formation Annual Growth: 3.1%

### Legal
- **Emission Standards:** Relatively strong emission standards, following European precedent

### Sales
- **VW Sales:**
  - 2014: 28,853
  - 2015: 35,778
- **Automobile Sales 2015:**
  - 1,408,182
- **EV Sales 2015:**
  - 1,181
## Norway Macro-Environmental Factors

### Political
- **Corruption:** Ranked 5th (CPI: 87)

### Economic
- **GDP:** Ranked 26th ($499, 817 million USD)
- **GDP Growth:** Ranked 183rd (Real GDP growth rate of 0.9%)
- **EV Scheme:** Goal to reach 50,000 zero emission vehicles by 2018

### Social
- **Human Development Index (HDI):**
  - Ranked 1st globally
  - HDI Rating: 0.944

### Technological
- **Infrastructure:**
  - Gross Fixed Capital Formation Annual Growth: 6.6%

### Legal
- **Emission Standards:**
  - Predominantly enforces emission standards with incentives as opposed to penalties

### Sales
- **VW Sales:**
  - 2014: 21,593
  - 2015: 26,344
- **Automobile Sales 2015:**
  - 181,416
- **EV Sales 2015:**
  - 84,401

### Volkswagen Sales
- **VW Sales:**
  - 2014: 21,593
  - 2015: 26,344
- **Automobile Sales 2015:**
  - 181,416
- **EV Sales 2015:**
  - 84,401
Germany Macro-Environmental Factors

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
</table>
| **Political**     | **Corruption:** Ranked 10th  
CPI: 81  
**Political Stability:** Upper 20%  
Rating: 0.93  
**EV Scheme:** Government initiatives for 1 million EV’s by 2020 |
| **Economic**      | **GDP:** Ranked 4th  
$3,868,291 million USD  
**GDP Growth:** Ranked 161st  
Real GDP growth rate of 1.5% |
| **Social**        | **Human Development Index (HDI):** Ranked 6th globally  
HDI Rating: 0.916 |
| **Technological** | **Infrastructure:** Gross Fixed Capital Formation Annual Growth: 3.5% |
| **Legal**         | **Emission Standards:** Subject to EU air pollution regulations, but expecting to be unable to comply next year in 2016 |

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
</table>
| **Sales**         | **VW Sales:**  
2014: 685,669  
2015: 656,494  
**Automobile Sales 2015:**  
3,210,000  
**EV Sales 2015:**  
48,669 |
Netherlands Macro-Environmental Factors

**Political**
- Corruption: Ranked 5th, CPI: 87
- Political Stability: Upper 15%, Rating: 1.05
- EV Scheme: 1 million EV target for 2025

**Economic**
- GDP: Ranked 17th, $879,319 million USD
- GDP Growth: Ranked 153rd, Real GDP growth rate of 1.8%

**Social**
- Human Development Index (HDI):
  - Ranked 5th globally
  - HDI Rating: 0.922

**Technological**
- Infrastructure:
  - Gross Fixed Capital Formation Annual Growth: 3.5%

**Legal**
- Emission Standards:
  - Complies with EU standards for emissions with further guidelines for additional emission reductions.

**Sales**
- VW Sales:
  - 2014: 42,693
  - 2015: 56,355
- Automobile Sales:
  - 2015: 340,896
- EV Sales 2015: 88,991
Canada Macro-Environmental Factors

### Political
- **Corruption:**
  - Ranked 9th
  - CPI: 83
- **Political Stability:**
  - Upper 10%
  - Rating: 1.18

### Economic
- **GDP:**
  - Ranked 11th
  - $1,785,387 million USD
- **GDP Growth:**
  - Ranked 178th
  - Real GDP growth rate of 1%
- **Human Development Index (HDI):**
  - Ranked 9th globally
  - HDI Rating: 0.913
- **Infrastructure:**
  - Gross Fixed Capital Formation Annual Growth: 4.8%
- **Emission Standards:**
  - Follows USA emission standards which are relatively strong with large penalties.

### Social
- **Ev Scheme:**
  - Rebates of $5000-$10000 for 10,000 EV purchasers

### Technological
- **Potential Market:**
  - Strong Government support, growing infrastructure
  - Growing EV sales
    - 2014: 5000
    - 2015: 6700
  - Growing market share of EV segment
    - 2015: 1%
### United Kingdom Macro-Environmental Factors

#### Political
- **Corruption:** Ranked 10th, CPI: 81
- **Political Stability:** Upper 40%, Rating: 0.44
- **EV Scheme:** 25% EV subsidies and 300 million USD grants

#### Economic
- **GDP:** Ranked 5th, $2,988,893 million USD
- **GDP Growth:** Ranked 122nd, Real GDP growth rate of 2.5%
- **Human Development Index (HDI):**
  - Ranked 14th globally
  - HDI Rating: 0.907
- **Infrastructure:**
  - Gross Fixed Capital Formation Annual Growth: 7.5%

#### Social

#### Technological
- **Emission Standards:** Successfully complies with EU emission standards and regulations.

#### Legal

#### Potential Market
- **Strong Government support, growing infrastructure**
- **Growing market share of EV segment**
  - 2014: 2.1%
  - 2015: 2.8%
- **Relatively sensitive to the scandal, VW sales dropped 14%.**
Mexico Macro-Environmental Factors

**Political**
- **Corruption:** Ranked 95th, CPI: 35
- **Political Stability:** Lower 20%, Rating: -0.76
- **EV Scheme:** Government offering small incentives to purchasing EVs

**Economic**
- **GDP:** Ranked 15th, $1,294,690 million USD
- **GDP Growth:** Ranked 131st, Real GDP growth rate of 2.3%

**Social**
- **Human Development Index (HDI):** Ranked 74th globally, HDI Rating: 0.756

**Technological**
- **Infrastructure:** Gross Fixed Capital Formation Annual Growth: 2.9%

**Legal**
- **Emission Standards:** Moderate emission standards for passenger vehicles, with world class emission standards for heavy-duty vehicles

**Why not?**
- **High corruption, low infrastructure, low Government support**
- **Low consumer interest. Amount of EVs on the road**
  - 2012: 200
  - 2014: 676
France Macro-Environmental Factors

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Political</strong></td>
<td>- Corruption: Ranked 23rd, CPI 70</td>
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<tr>
<td></td>
<td>- Political Stability: Upper 15%, Rating 1.02</td>
</tr>
<tr>
<td><strong>Economic</strong></td>
<td>- GDP: Ranked 6th, $2,829,192 million USD</td>
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<td></td>
<td>- GDP Growth: Ranked 169th, Real GDP growth rate of 1.2%</td>
</tr>
<tr>
<td><strong>Social</strong></td>
<td>- Human Development Index (HDI): Ranked 22nd globally, HDI Rating 0.888</td>
</tr>
<tr>
<td><strong>Technological</strong></td>
<td>- Infrastructure: Gross Fixed Capital Formation Annual Growth: -1.2%</td>
</tr>
<tr>
<td><strong>Legal</strong></td>
<td>- Emission Standards: Successfully complies with EU emission standards, with pushes for increased regulation and more stringent limit values for emissions</td>
</tr>
<tr>
<td><strong>Potential Market</strong></td>
<td>- Strong Government support for shift to electric</td>
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<tr>
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<td>- Strong CAGR of 50% for EV sales</td>
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<td></td>
<td>- Relatively small EV sales 2014: 14,731</td>
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</tbody>
</table>
Sweden Macro-Environmental Factors

<table>
<thead>
<tr>
<th>Political</th>
<th>Economic</th>
<th>Social</th>
<th>Technological</th>
<th>Legal</th>
<th>Potential Market</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Corruption:</strong></td>
<td><strong>GDP:</strong></td>
<td><strong>Human Development Index (HDI):</strong></td>
<td><strong>Infrastructure:</strong></td>
<td><strong>Emission Standards:</strong></td>
<td><strong>Growing infrastructure</strong></td>
</tr>
<tr>
<td>Ranked 3rd</td>
<td>Ranked 21st</td>
<td>Ranked 14th globally</td>
<td>Gross Fixed Capital Formation Annual Growth:</td>
<td>Successfully complies with EU emission</td>
<td></td>
</tr>
<tr>
<td>CPI: 89</td>
<td>$571,090 million USD</td>
<td>HDI Rating: 0.907</td>
<td>7.6%</td>
<td>standards with national frameworks for</td>
<td></td>
</tr>
<tr>
<td><strong>Political Stability:</strong></td>
<td><strong>GDP Growth:</strong></td>
<td></td>
<td></td>
<td>low emission zones and congestion road</td>
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<tr>
<td>Upper 15%</td>
<td>Ranked 108th</td>
<td></td>
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<td>tolling</td>
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<tr>
<td>Rating: 1.07</td>
<td>Real GDP growth rate of 2.8%</td>
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<tr>
<td><strong>EV Scheme:</strong></td>
<td></td>
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<tr>
<td>9 million USD allocated to funding EV subsidies</td>
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</table>

- **Growing infrastructure**
- **Small car sales** representing less than 1% of total car sales worldwide
# Brazil Macro-Environmental Factors

## Political
- **Corruption:** Ranked 65th, CPI: 38
- **Political Stability:** Lower 50%, Rating: -0.01
- **EV Scheme:** Moderate tax exemptions for purchasers of EVs

## Economic
- **GDP:**
  - Ranked 7th
  - $2,346,076 million USD
- **GDP Growth:**
  - Ranked 211st
  - Real GDP growth rate of -3.0%

## Social
- **Human Development Index (HDI):**
  - Ranked 75th globally
  - HDI Rating: 0.755

## Technological
- **Infrastructure:**
  - Gross Fixed Capital Formation Annual Growth: -1.2%

## Legal
- **Emission Standards:**
  - Follows emission standards generally similar to the European precedent

## Why not?
- High corruption, low infrastructure
- Highly sensitive to the scandal, VW sales dropped 44%
Russia Macro-Environmental Factors

- **Political**
  - Corruption: Ranked 119th
    - CPI: 29
  - Political Stability: Lower 20%
    - Rating: -0.84
  - EV Scheme: Gas stations ordered to provide chargers for EVs

- **Economic**
  - GDP: Ranked 10th
    - $21,860,598 million USD
  - GDP Growth: Ranked 213rd
    - Real GDP growth rate of -3.9%

- **Social**
  - Human Development Index (HDI):
    - Ranked 50th globally
    - HDI Rating: 0.798

- **Technological**
  - Infrastructure:
    - Gross Fixed Capital Formation Annual Growth: -2%

- **Legal**
  - Emission Standards:
    - Successfully complies with EU emission standards, but typically behind the curve in adopting to stricter limits on emissions

- **Why not?**
  - High corruption, low political stability
  - Highly sensitive to the scandal, VW sales dropped 26%
## India Macro-Environmental Factors

### Political
- **Corruption:** Ranked 76th
  - CPI: 38
- **Political Stability:** Lowest 15%
  - Rating: -0.96
- **EV Scheme:**
  - Incentives of up to $2,177 USD available for electric cars

### Economic
- **GDP:**
  - Ranked 9th
  - $2,048,000 million USD
- **GDP Growth:**
  - Ranked 14th
  - Real GDP growth rate of 7.3%

### Social
- **Human Development Index (HDI):**
  - Ranked 130th globally
  - HDI Rating: 0.609
- **Infrastructure:**
  - Gross Fixed Capital Formation Annual Growth: 4.13%
- **Emission Standards:**
  - Low emission standards and regulation

### Technological

### Legal

### Why not?
- **High corruption, Low HDI, low infrastructure**
- **Low EV Sales:**
  - 2012: 85,000–100,000 EVs sold
  - 2014: 7000-8000 EVs sold