

# **POLITECNICO DI TORINO**

College of Management Engineering

## **Master of Science in Engineering & Management**

Master's Thesis

### **Adapting the pricing strategy to the Worldwide Harmonized Light-Duty Vehicles Test Procedures: the FCA case**



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## **Abstract**

The automotive industry is going to change more in the next ten years than in the last century. Developments taking place in Artificial Intelligence, Internet of Things, self-driving technologies, Big Data, alternative powertrains, new regulations, car-sharing and ride-hailing services are going to drive the change.

In this thesis we are going to focus on one of these aspects, the new regulations, and try to understand the legal framework that, in the following years, will condition European automakers to reduce the CO<sub>2</sub> emissions of their light-duty vehicles – cars and vans – in order to contribute to the achievement of the European Union's commitments under the Kyoto Protocol and the Paris Agreement, since nowadays they represent around 15% of the total emissions of carbon dioxide – the main greenhouse gas.

After having properly introduced the company in which I have done my internship, by the way, my first work experience, I am going to deepen from a theoretical point of view on what is pricing, the challenging task I was assigned to carry out, and what it particularly means within the organization.

Continuing with a theoretical approach I will move to identify which are the variables that influence the decision of setting vehicles prices. In that way, we will find out that the vehicles' CO<sub>2</sub> emissions is a variable to give serious attention because it is every day becoming more and more important, as not only impacts on registration taxes in most of the countries but also on the penalties that automakers will have to pay if they surpass the CO<sub>2</sub> emission targets set by the European Commission. Moreover, these issues are going to be exacerbated by the introduction of WLTP, a more realistic and transparent new lab test that vehicles will have to undergo, which will provide higher CO<sub>2</sub> emission values than its predecessor, the NEDC test, and it will radically change the way of doing pricing.

Afterwards, analyzing the FCA's current pricing approval process, it will come out that it fails in some ways to act in response to these new challenges which need to be carefully managed, otherwise the company could even be out of the market in a few years' time if it is not able to adapt.

Finally, I am going to focus on the strategies the company should undertake to overcome these challenges and particularly on a project I was actively involved, which will substantially modify and improve the day-to-day running of the company's pricing process.





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## **List of Abbreviations and Definitions**

- ACEA: European Automobile Manufacturers' Association.
- APAC: Asia Pacific.
- BEV: Battery Electric Vehicle.
- BCG: Boston Consulting Group.
- BoD: Board of Directors.
- BV: Base Version.
- CEO: Chief Executive Officer.
- CM: Contribution Margin.
- CO<sub>2</sub>: Carbon Dioxide.
- COC: Certificate of Conformity.
- COO: Chief Operating Officer.
- CRM: Customer Relationship Management.
- EDLP: Everyday Low Pricing.
- EEA: European Environment Agency.
- EMEA: Europe, Middle East and Africa.
- ERTRAC: European Road Transport Research Advisory Council.
- EU: European Union.
- FCA: Fiat Chrysler Automobiles.
- FIAT: Fabbrica Italiana Automobili Torino.
- GA: Giovanni Agnelli BV.
- GEC: General Executive Council.
- GHG: Greenhouse Gases.
- HQ: Headquarters.
- ICE: Internal Combustion Engine.
- ICT: Information and Communication Technologies.
- ICCT: International Council on Clean Transportation.
- IoT: Internet of Things.
- JAMA: Japanese Automobile Manufacturers' Association.
- KAMA: Korean Automobile Manufacturers' Association.

- LATAM: Latin America.
- LDV: Light-Duty Vehicles.
- MCA: Minor Change Approval.
- MHEV: Mild Hybrid Electric Vehicle.
- NAFTA: North America Free Trade Agreement.
- NEDC: New European Driving Cycle.
- NV: Naamloze vennootschap (Dutch legal company structure).
- OBFCM: On-Board Fuel and/or Energy Consumption Monitoring Device.
- OEM: Original Equipment Manufacturer.
- PAP: Pricing Approval Process.
- PB: Price Book.
- PHEV: Plug-in Hybrid Electric Vehicle.
- PwC: Price Waterhouse Coopers.
- R&D: Research and Development.
- SG&A: Selling, General and Administrative Expenses.
- SUV: Sport Utility Vehicle.
- TR: Take Rate.
- US: United States of America.
- USSR: Union of Soviet Socialist Republics.
- WLTP: Worldwide Harmonized Light-Duty Vehicles Test Procedures.
- ZLEV: Zero- and Low-Emission Vehicles

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# **Chapter 1 - Introduction**

## **1.1. History of the Company**

The history of FCA – Fiat Chrysler Automobiles – began in July 11<sup>th</sup>, 1899, when the deed of incorporation was signed, giving birth to Società Anonima Fabbrica Italiana di Automobili Torino – F.I.A.T. One year later, the first plant was inaugurated and the production of its first car, the 4HP, reached 24 cars a year (FCA Group, 2018b).

In 1903, with Giovanni Agnelli as Managing Director, the company was listed on the stock exchange with the aim of raising capital and becoming one of the world's leading industrial groups. In 1920, Giovanni Agnelli became Chairman of FIAT (FCA Group, 2018b).

Before the beginning of the First World War, the company would start the production of buses, trucks, trams and aircraft engines, in addition to several new car models (FCA Group, 2018b). During the war period, the company transformed itself to support the military effort of the nation; it began to construct in Turin the largest factory in Europe at that time, the Lingotto factory, besides entering the steel and railway sectors (FCA Group, 2018b).

In 1923, after the post-war crisis having passed, the Lingotto factory was finally inaugurated with the introduction of the assembly line and new working methods (FCA Group, 2018b).

In the '30s, FIAT not only inaugurated a new plant in Turin, the Mirafiori plant, but also expanded its manufacturing base from France to Spain, Poland and the USSR.

Again, under the Second World War, FIAT had to convert production to military purposes, reducing production of cars and multiplying that of trucks, as well as the production of armored vehicles, airplanes and marine engines (FCA Group, 2018b).

The '50s were characterized by Italy's economic prosperity, mostly driven by the car industry: in this period, the company doubled the number of its employees and increased production by 6 times (FCA Group, 2018b).

In the following decade, taking advantage of its continuing growth, the company decided to make some investments in the automotive sector: it took a majority stake in Magneti Marelli, acquired a 50% of the Sefac-Ferrari shares and purchased Lancia. The number of employees had already achieved 171 thousands (FCA Group, 2018b).

In 1966, Giovanni Agnelli, grandson of the founder, became Chairman of the company.

The '60s finished with a period of strong disputes and social claims that affected the company results; nevertheless, in the '70s, the investments continued, and it started the construction of

new plants at Bari, Lecce, Brindisi, Sulmona, Vasto, Termoli, Cassino, Termini Imerese and also in Brazil. At the same time, FIAT started its management decentralization converting itself in an industrial holding with: FIAT AUTO clustering Fiat, Abarth, Lancia, Ferrari and Autobianchi brands; and the newly established ones, FIAT Engineering, FIAT Macchine Movimento Terra and IVECO. In 1978 there were also established Teksid and Comaud.

In 1984 Alfa Romeo became also part of the Group as well as Maserati in 1993. In 1999 was constituted CNH – Case New Holland – which would rapidly conquer a worldwide leading position in agricultural and construction equipment (FCA Group, 2018b).

In 2000 it was signed an industrial alliance with General Motors, but it was finally revoked in 2005 (FCA Group, 2018b).

In 2003, after almost half a century of driving the destinies of the company, died Giovanni Agnelli and took his position Umberto Agnelli, his brother, who would die one year later, leaving the role of Chairman to Luca Cordero di Montezemolo. At the same time, John Elkann and Sergio Marchionne were nominated as Vice Chairman and Chief Executive Officer, respectively (FCA Group, 2018b).

Two years later it was established FPT – Fiat Powertrain Technologies (FCA Group, 2018b).

In 2009 the FIAT Group and Chrysler Group LLC announced a strategical global alliance including optimization of their global suppliers and manufacturing bases, the access to new markets and the sharing of technologies. In that framework, FIAT purchased a 20% stake of Chrysler and, at the same time, Sergio Marchionne was also nominated as CEO for the Chrysler Group (FCA Group, 2018b).

The Vice Chairman, John Elkann, was nominated as Chairman in 2010 (FCA Group, 2018b).

After three years of the alliance announcement with Chrysler, the FIAT Group's ownership in Chrysler Group reached 58,5% (FCA Group, 2018b).

In January 2014, the FIAT Group purchased the remaining stake of Chrysler Group to bring its ownership on the American Group to a 100%. In October, the two companies were finally merged to form Fiat Chrysler Automobiles (FCA) with its shares being traded in the Milano Stock Exchange and the New York Stock Exchange (FCA Group, 2018b).

In 2015 the Jeep brand opened in Goiana, Brazil the biggest factory of the Group with a capacity to produce 250.000 vehicles a year. The same year the Group decided the spin-off of Ferrari and its consequent listing on the New York Stock Exchange (FCA Group, 2018b).

In 2017, FCA signed a memorandum of understanding with BMW, Intel and Mobileye for the development of a self-driving platform at the very forefront (FCA Group, 2018b).

In the beginning of 2018, the Group decided a new spin-off, this was the time for Magneti Marelli. Months later, the 25<sup>th</sup> July, died Sergio Marchionne, the CEO responsible of the merge between FIAT and Chrysler (FCA Group, 2018b).

Some days before the death of Marchionne, the 21<sup>st</sup> July, Michael Manley, ex head of the Jeep and Ram brands, was appointed as the new Chief Executive Officer of the Group (FCA Group, 2018b).

## 1.2. Company's Overview

Fiat Chrysler Automobiles is a company that projects, develops, produces and commercializes vehicles worldwide, as well as providing post-sale services, spare parts, components and production systems through 159 plants, 87 R&D centers, and dealers over more than 140 countries; as summed up by Figure 1.1. (FCA Group, 2018a)

The company also offers financial services to support the Group's car business through its subsidiaries or financial partners.

### FCA at a Glance

At 31 December 2017



\* Combined shipments include all shipments by the Group's unconsolidated joint ventures

Figure 1.1: Group Overview

At 31<sup>st</sup> December 2017, the 14 brands under the control of the Group were: Abarth, Alpha Romeo, Chrysler, Dodge, Fiat, Fiat Professional, Jeep, Lancia, Ram, Maserati, and Mopar (parts and service), Comau (production systems), Teksid (iron and castings) and the current spinned-off, Magneti Marelli (components) (FCA Group, 2018a).

### 1.3. Corporate Structure

Fiat Chrysler Automobiles NV Group is a public limited liability company incorporated under the laws of the Netherlands which has set its tax residence in the United Kingdom.

The main shareholder of the company is the EXOR NV Group, which controls a 29,18% of the shares and owns the 42,34% of the voting power; the second most important shareholder is Baillie Gifford & Co. with just a 3,39% stake, while the rest of the shareholders owned less than 3% of FCA's capital (see Fig. 1.3) (FCA Group, 2018a). In that way, EXOR NV, can strongly influence all matters subject to vote in the company, as election or removal of directors and approval of annual dividends.

EXOR NV is controlled by Giovanni Agnelli BV (GA), which holds 52,99% of its capital (Fig. 1.2). GA is a private limited liability company, also under the Dutch law, whose shareholders are members of the Agnelli and Nasi families, all descendants of Giovanni Agnelli, founder of FIAT. The Chairman of GA is the same as that of FCA and the EXOR group, and his name is John Elkann (FCA Group, 2018a).

Moreover, the EXOR NV group, controls: 22,91% of Ferrari with 32,75% of voting rights; 26,89% of CNH Industrial with 41,68% of voting rights; 43,40% of The Economist with 20% of voting rights; 100% of PartnerRe with 99,66% of voting rights; and 63,77% of Juventus (EXOR NV, 2018).

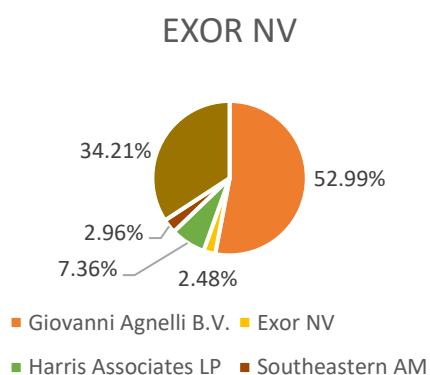


Figure 1.2: EXOR's shareholders

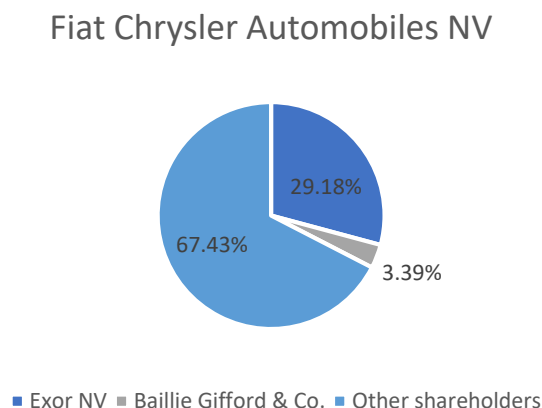


Figure 1.3: FCA's shareholders

## 1.4. Corporate Governance

In accordance to what stated in the Company's Articles of Association, the Board of Directors is elected every year by the company's shareholders at the annual general meeting. This entity is responsible for the strategic direction of the Company and is currently composed of two executive Directors – the Chairman (John Elkann) and the Chief Executive Officer (Michael Manley) – who are responsible for the day-to-day running, and nine non-executive Directors. The only two entities that have the authority to represent the company are the BoD as a whole, and the CEO (FCA Group, 2018a).

The CEO is supported by the Group Executive Council (GEC) in what regards to the operational management of the company. This entity is a decision-making body led by the CEO and composed of 4 main groups: regional Chief Operating Officers (COO), brand leaders, industrial processes leaders, and support processes leaders, as illustrated by Figure 1.4 (FCA Group, 2018a).

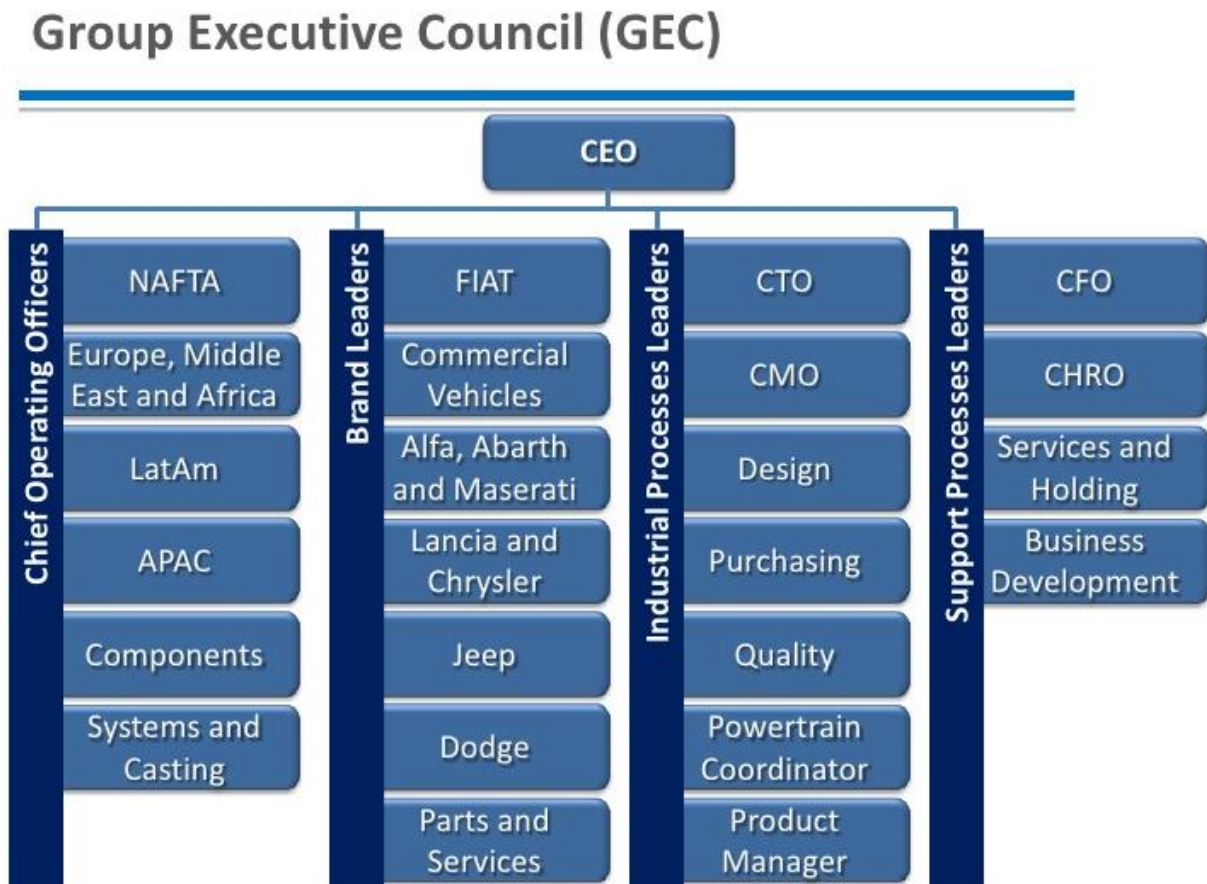


Figure 1.4: Group Executive Council

## 1.5. Jeep Brand

From now on, I will specifically focus on this brand of the FCA Group because is it the one where I did my internship.

### 1.5.1. Overview

The brand was born in 1941 with its first model, the Willys (see Fig. 1.5), after the U.S. Army solicited bids from 135 automakers for a 1/4 ton "light reconnaissance vehicle" tailored to Army specifications. The story says that the origin of the word "*jeep*" comes from the military designation GP (for General Purpose) which was distorted into Jeep (FCA Group, 2018c).



Figure 1.5: Jeep Willys MB

Jeep is worldwide famous for being not only the 4x4 creator, but also for generating the concept of SUV. The brand owns a consistent positioning and strong core values:

- Brand Positioning: *"The authentic SUV with class-leading capability, craftsmanship and versatility for people who seek extraordinary journeys"*.
- Brand Promise: *"Provide vehicles that support a lifestyle of boundless freedom, responsible adventure and are reliable, safe, fun and environmentally friendly"*.
- Core Values:
  - FREEDOM: *"Being true to your dreams and working to make them real"*.
  - ADVENTURE: *"The ultimate search for a place where you can be true to who you really are"*.
  - AUTHENTICITY: *"The higher standard pursued in all you do and dream"*.
  - PASSION: *"Stretching your limits to achieve greatness"*.

### 1.5.2. Business Plan

In 2014 it was presented a Business Plan for the period 2014-2018 that contemplated the following ambitious objectives (FCA Group, 2018d):



- ✓ Expand the product portfolio by adding a Small SUV – Renegade – and one 3-Row SUV offering.
- ✓ Extend the manufacturing footprint globally from 4 plants in just one country – the U.S. – to 10 plants in 6 countries.
- ✓ Increase the production capacity by 138% to reach 1.9 million units by 2018 (see Fig. 1.6).

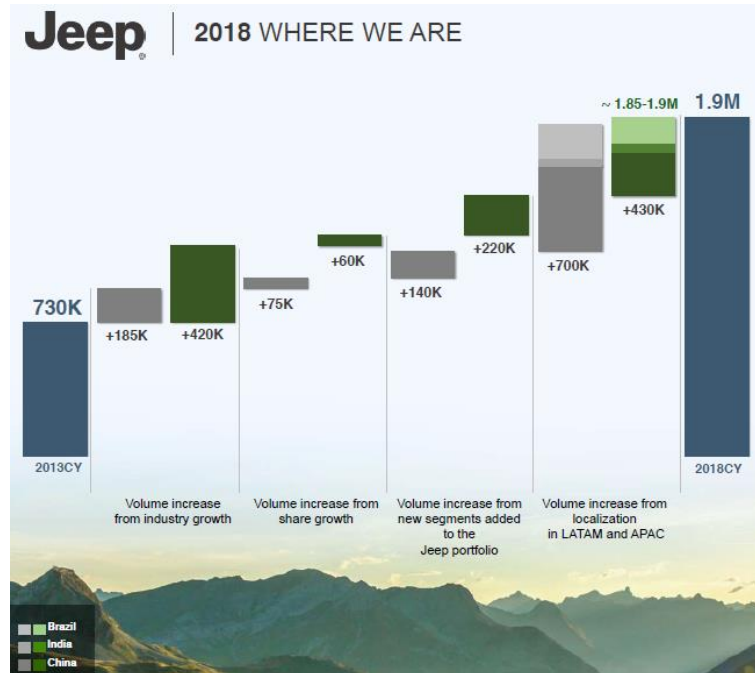


Figure 1.6: Jeep's 2013-2018 sales volumes growth

- ✓ Expand the distribution channels to reach a 6.000 dealers network.

Despite for the introduction of the 3-Row SUV, which was deferred to 2020, the brand has achieved all the objectives that were raised, what explains why Jeep has adopted such an important role within the Group.

Continuing with these trends, the brand has issued a new business plan for the 2018-2022 period, more ambitious than the previous one, consisting of (FCA Group, 2018d):

- Enter 3 new segments to reach 100% market coverage.
- 2 launches per year: 10 PHEVs and 4 BEVs by 2022.
- Electrification options available across each nameplate by 2021.
- Level 3 of vehicle autonomy reached by 2022.
- One out of every 12 utility cars sold worldwide by 2022 to be a Jeep.
- Future vision: one out of every 5 utility cars sold worldwide to be a Jeep.

Particularly, in what respects to EMEA, the region that concern us, the main market driver is that of be compliant in terms of CO<sub>2</sub> emissions in order to avoid huge penalties from the EU. In addition, the other objectives set are (FCA Group, 2018d):

- Stop the selling of diesel vehicles.
- Introduction of 7 new/refreshed products.

- 8 PHEVs and 5MHEVs available on the market.
- Level 3 of vehicle autonomy reached by 2021.
- Vehicles 100% connected.
- Localize the production of 2 additional nameplates in the region.
- Increase the production capacity by 3,5 times with respect to the end of 2017.
- Increase dealer network coverage.

### 1.5.3. Organization

The Jeep brand is present in each one of the FCA's operating regions – NAFTA, EMEA, LATAM and APAC –. In EMEA – the region I will focus my following studies given that it was the one in which I was involved – the headquarters are located in Turin (Italy), and its main operations are carried out by the departments listed below:

- Marketing Planning: analyzes the marketplace to determine how the company can compete on it and develops consequently the strategy to meet the targets set.
- Product Planning: is responsible for creating a product idea and defining its configuration.
- Product Marketing: is in charge of bringing a product to the market and drive its demand and usage through its life-cycle.
- Pricing: its aim is that of maximizing corporate revenues and profits through effective management of pricing and billing functions.
- Sales Planning: defines and implements the strategy of sales within the distribution network.
- Commercial Development: monitors commercial targets and supports business centers in defining commercial actions to achieve them.
- Customer Experience: develops and implements strategies that grow the customer base and drive sales and traffic, leveraging CRM and loyalty.
- Marketing Communication: creates awareness in the market through the deployment of messages and media.
- Finance Controlling: verifies that the products economics are aligned to the financial targets of the company.

- Supply Chain Management: centralizes the cars orders from business centers and is responsible for making them available.



## Chapter 2 - What is Pricing?

In this chapter we will try to understand the importance that pricing has within an organization. Unfortunately, despite its importance, many marketing managers still neglect their pricing strategy, which in turn should be based on the overall business objectives and aligned with the other commercial levers.

### 2.1. Strategic Pricing

Historically, the price was the result of the negotiation between buyers and sellers. It was just at the end of the nineteenth century, with the advent of large-scale retailing, when the idea of setting a unique price for all buyers came up (Kotler & Keller, 1967).

The first person to introduce the concept of the 4 Ps of marketing – product, price, place (or distribution) and promotion – was Edmund Jerome McCarthy who, in contrast to the marketing mix model developed by Neil H. Borden in the late 1940s – based on 12 different factors –, proposed a simplified framework consisting of four controllable variables that companies combine in order to develop an optimum offering (McCarthy, 1960).

Some years later, Philip Kotler, one of the greatest marketing experts in the world, would rightly state that “Price is the one element of the marketing mix that produces revenue; the other elements produce costs”. In that opportunity, he would also develop a six-step procedure that companies should follow in order to set their pricing policy (Kotler & Keller, 1967):

- 1) Select its pricing objective: the company needs to identify which is the aim it wants to chase with its market offering and, from that point, it will be easier to set a price. These objectives can be:
  - a. Survive: is a short-run objective through which the company stays in business as long as prices cover the total costs.
  - b. Maximize profitability: assuming that the company knows its demand and cost functions it can choose the price producing the maximum profit.
  - c. Maximize market share: assuming that the market is sensitive to price changes, the company can lower prices to grow its market share, what will consequently bring lower unit costs – fixed costs can be prorated over more units – and higher margins.

- d. Product-quality leadership: by offering high levels of perceived quality and status, with a price just high enough not to be out of consumers' reach.
  - e. Premium brand: ensuring price premium over competitors based on perceived value.
  - f. Other objectives: like for example those of nonprofit organizations, that can be just to recover their costs.
- 2) Determine the demand: it is important to know how customers can respond to different prices, what is known as elasticity of demand – percentage volume change related to a 1% change in the price – and in that way estimate the demand curve.
  - 3) Estimate costs: and how they vary with the level of production, the accumulated production experience and for differentiated marketing offers. As the demand sets the ceiling price, costs are the floor.
  - 4) Analyze competition: the company must consider what are competitors offering and examine their costs, prices and possible reactions they may perform against a price being set or changed. They provide an orientating point.
  - 5) Select a pricing method: the company can choose between different approaches to adopt as its pricing model:
    - a. Markup Pricing: consists in adding a standard markup to the product's unit cost. It doesn't make sense as it ignores the actual willingness to pay, so profits might literally be given away. Moreover, cost advantages are automatically transferred into price reductions.
    - b. Target-Return Pricing: for an expected sales volume, the company sets the price according its target rate of return on investment. With this method, the problem comes when the firm is not able to sell as expected, so in that way it has to estimate the break-even volume under which it will not cover the total costs.
    - c. Perceived-Value Pricing: consists in setting a price based on the perception that customers have about the benefits offered by the product such as: status, quality, aesthetics, customer support, etc. In that way, the smartest thing is to compare how the company's product performs against to its next best alternative and raise prices according to its pricing power, which was defined by Warren Buffett as

“the power to raise prices without losing business to a competitor”. (Buffett, 2010)

- d. Value Pricing: is based on setting a quite low price for a high-quality product with the aim of gaining loyalty from the customer. It involves the concept of reengineering the company’s operations to become a low-cost producer without sacrificing quality. The two most important policies of this method are the everyday low pricing (EDLP) which sets a constant low price with almost no price promotions, and the high-low pricing, which sets higher prices on an everyday basis but runs frequent promotions that drive prices even cheaper than the EDLP level.
  - e. Going-Rate Pricing: is used in contexts where costs are difficult to estimate so the firm charges its prices based on competitors’ prices, as for example the commodities industry.
  - f. Auction-Type Pricing: is getting popular mainly in electronic marketplaces where the most popular are the ascending bids, but there are also descending bids and sealed-bid auctions.
- 6) Select the final price: finally, the company can choose the price, now with a more restricted range, and for that purpose it must consider additional factors as: the impact of the other marketing activities, the company pricing policies, the gain and risk sharing with the customers, and its impact over other parties as dealers or suppliers.

## **2.2. Tactical Pricing**

After having deepened on the steps that the company has to follow in order to set its pricing strategy, we are going to introduce which are the tactic actions that it can adopt to adapt that strategy to the challenges given by the market.

One tactic action is to adapt the product’s prices to different customers in different countries, in which case the company not only have to consider the shipping costs but also the exchange rates (Kotler & Keller, 1967).

Another one is to adjust the list prices by giving discounts to buyers who pay bills promptly, to dealers performing certain functions, to those who buy in large volumes, or to those buying products or services out of season; as well as adjusting list prices by giving trade-in allowances

for turning in old items when buying new ones, or by promotional allowances to dealers, rewarding them for participating in support programs. Companies have to manage discounts very carefully, because they can act against their products if customers perceive that list prices are “soft” and seem to be always on sale (Kotler & Keller, 1967).

Other way to stimulate products purchase are the promotions, which are different types of list price reductions that are mainly directed to the final customer, unlike discounts that address retailers. Unfortunately, most of the time they are waste of money because, if they work, competitors may copy them, and in that case, they lose their effectiveness.

Finally, the last tactic action we will list is performing a differentiated pricing. This tactic consists in selling a product or service at more than one price, without reflecting a proportional difference in the cost, depending on the customer-segment, the channel, the image, the location, or the time (Kotler & Keller, 1967).

### 2.3. Price Changes

Sometimes companies need to change prices. From one side, price cuts are always motivated by the desire of gaining market share, but companies have to be very careful before doing it, as it can lead to possible traps as a price-war between competitors, or customer’s assumptions like “the quality has been reduced”, “the firm is in financial trouble”, “prices are going to decrease even further”, “the product is going to be replaced by a new model”, etc. Moreover, it has to be considered that the volume increase needed in order to keep constant profit is significant as can be seen in Table 2.1 for different level of margins and price drops.

Price drop (%)	Margin												
	5	10	15	20	25	30	35	40	50	60	70	80	90
	Volume increase in order to keep profit constant (%)												
2.0	67	25	15	11	9	7	6	5	4	3.5	3	2.5	2.3
3.0	150	43	25	18	14	11	9	8	6	5.3	4.5	4	3.5
4.0	400	67	36	25	19	15	13	11	9	7	6	5	4.7
5.0		100	50	33	25	20	17	14	11	9	8	7	6
7.5		300	100	60	43	33	27	23	18	14	12	10	9
10.0			200	100	67	50	40	33	25	20	17	14	12.5
15.0				300	150	100	75	60	43	33	27	23	20
30.0	Example: Price drop of 5% requires volumes increase of 20% @ 30%GM						600	300	150	100	75	60	50
40.0									400	200	133	100	80

Table 2.1: Volume/Price trade-off



On the other hand, as can also be inferred from the above table, a price increase can raise profits considerably. The Table 2.2 illustrates that a 1 percent increase in a company which has a 3% profit margin, will increase profits by 33% if volumes are not affected.

	Before	After	
Price	\$10	\$10.10	(a 1% price increase)
Units sold	100	100	
Revenue	\$1,000	\$1,010	
Costs	-970	-970	
Profit	\$30	\$40	(a 33 1/3% profit increase)

*Table 2.2: Profits before and after price increase*

In general, price increases are performed in case of cost inflation or overdemand, since generally consumers dislike higher prices and prefer gradually increases to sudden ones.

## **2.4. What is Pricing for FCA EMEA?**

In every operating region, each brand of the Group, has a target trading profit to reach that is set by top management in the definition of the business plan.

This trading profit can be obtained through: Contribution margins (CM), Volumes, and Selling, General & Administrative Expenses (SG&A).

The function carried out by the pricing department is of great importance given that it has the power to act on two of them, CM and Volumes; which are strictly related to each other.

In order to achieve this aim, the HQ pricing department of each brand develops four main activities in the EMEA perimeter:

- Manage the income statement of the range of products offered.
- Track the competition.
- Analyze the commercial actions of the market.
- Avoid cannibalization between products.

### **2.4.1. Managing the Income Statement of the Products Range**

Represents the key activity of the pricing department and is of great importance because it is what brings money to the company.

It starts with the negotiation between pricing HQ and the product managers of the FCA's business centers in order to reach a good price proposal for a new model, in terms of list prices, versions' mix, distribution channels, discounts and margins among the main important factors.

These price proposals are currently managed through Excel files, called price books (PB), that represent an official document for the company. In each PB it is deployed the full income statement for every single version of the model being discussed, in every single channel in which it is going to be sold. It means that, for every single version, it is detailed its: list price, taxes, detax price, complementary revenues, different kind of discounts, production costs, other costs and the economic impact of the optional contents available for that version, until reaching to the final contribution margin of the version (see Tab. 2.3).

As said in the previous chapter, the pricing aim is that of maximizing profits and is in that file where it is done.

But the thing doesn't stop here, as the pricing department is responsible for managing the income statement of the products along their whole life-cycle so, once the first PB is approved for a new model, then it may be subject to subsequent reviews motivated by cost inflation, product configuration changes, face-liftings, new model year or minor change approvals (MCA).

DESCRIPTION	1.0 GSE T3 120CV C630 - S&S SPORT FWD
SINCOM	L20
SPECIAL SERIE	000
MIX %	
PVP (currency)	
DETAX (currency)	
Complementary revenue (curr.)	
Tot gross revenue BV	
Discount % - Base	
Discount % - Conditional	
Discount - Discretionary (curr.)	
Discount % - Discretionary	
Discount % - Total	
Discount BV (curr.)	
Net Revenue BV (curr.)	
Production Cost (Base Vehicle) (curr.)	
Market Configuration Specific Cost (curr.)	
Tassativo Cost (curr.)	
Local Completion Cost (curr.)	
Total Other Unit Cost of Sales	
Total Cost (curr.)	
Gross Margin BV ( curr.)	
Opt Gross Revenue Detax (curr.)	
Opt Discount (curr.)	
Opt Net Revenue (curr.)	
Opt Cost (curr.)	
Opt Gross margin (curr.)	
Gross Margin BV + Opt ( curr.)	
% Margin on net revenue	
Variable Cost (Base Vehicle) (curr.)	
Contribution margin (MDC)	

Table 2.3: Product income statement

#### 2.4.2. Tracking Competitors

The competitors tracking is done through another Excel file called Competitiveness report, which is the output of the FCA's competitiveness system used to perform all competitive analysis. The system uses data from JATO Dynamics, a global supplier of automotive business intelligence, and this data is updated on a monthly basis.

In order to make representative comparisons, the pricing specialists have to choose which are the most important versions of every model that makes sense to track for every business center and identify similar versions from the competitors offering in terms of trim level, equipment and performance. In addition, the Competitiveness report requires a list of items to be tracked

in order to have a proper comparison among competitors' product offering (standard equipment level, specific by segment) and an economic evaluation of those items allowing comparison under the same conditions.

Consequently, what the system does is, starting from the list price, it adds to the competitor's prices the value of the features offered by the firm that are not offered by them. In the same way, it subtracts from the firm's own price the value of the features contained in the competitors' offer which are not offered by the firm, until arriving to an adjusted price.

In this way, the report shows the comparison of an FCA model with competitor's models on the basis of some indexes, in which the FCA model is always the benchmark and is set at 100, while competitors can be placed at more than 100, in case they are less competitive, or over 100, when they are more competitive. The indexes used are:

- Visual Index: compares list prices.
- Real Index: compares equipment adjusted prices.
- Promo Visual/Real Index: compares prices adjusted considering equipment and promotional activities.

The Competitiveness report provides also the average models' positioning in the market segment (see Tab. 2.4). It is a synthetic index coming from the average of all versions' competitiveness indexes weighted by their registered volumes in the last three months. This index is useful for:

- ✓ Consistency check of the model positioning in the market.
- ✓ Delta to strategic target measurement.
- ✓ Early warning for reaction.

Model Synthesis	Visual	Real	Promo	
			Visual	Real
JEEP RENEGADE	100,0	100,0	100,0	100,0
AUDI Q2	109,9	116,1	113,2	120,2
FIAT 500X	87,6	89,6	84,3	86,7
HYUNDAI KONA	90,1	84,7	88,4	82,3
OPEL MOKKA X	101,2	102,9	95,7	98,1
PEUGEOT 2008	80,3	87,1	76,8	84,5
RENAULT CAPTUR	83,0	88,4	80,3	86,4
SUZUKI VITARA	88,2	85,5	83,4	80,3
VOLKSWAGEN T-ROC	103,1	96,4	107,0	99,5

Table 2.4: Average model competitiveness positioning

#### 2.4.3. Analyzing Promotional Activities

When purchasing a car, the customers will always attempt to get the best possible price. In that way they can take advantage of different kind of incentives, offered by OEMs or dealers, that help them to lower the list price of vehicles.

This activity consists in the tracking of the competitors' commercial offers in order to understand where the FCA's models are positioned, and how to properly react.

The data of the "promos" is also supplied on a monthly basis by JATO Dynamics to the FCA's ICT department which is responsible to make it available through the competitiveness system. Subsequently, the pricing specialists can download the Competitiveness report, provided with that information, and they are responsible for adjusting the take-rates for each promotional category in order to show a more realistic situation. The four categories that must be considered are:

- Scrap: are the discounts that are given to the customers that arrive to the dealer with an old car to give back as scrap.
- Trade-in: are the discounts that are given to customers that arrive to the dealer with cars that still have a resale value and can be given back to him as a trade-in for the new vehicle.
- Discount: are generic discounts that are given to customers that arrive to the dealer without a car to give back.
- Finance: are the discounts that are given to customers who purchase the vehicle through different kind of financing programs.

Once the take-rates have been adjusted we can see which is the actual positioning of the model at Promo Visual Index – list price adjusted by "promos" – and Promo Real Index – list price adjusted by "promos" and equipment –, which shows the full market picture. At that point the Competitiveness report is ready and can be upload to the system and shared with the FCA's business centers.

#### 2.4.4. Avoiding Cannibalization

Another important activity carried out by the pricing department is to ensure that there is not going to be cannibalization between products, not only of the same brand, but also between products offered by the other brands of the Group.

In that way, the pricing departments control that there is no more than one car model for each segment of the market and, if that is the case, the different offerings have to keep a safe distance in price positioning.

The cannibalization must also be analyzed between different business centers, in order to prevent potential customers in a country from buying vehicles from a neighboring country due to price advantage. In that sense, the pricing department needs to ensure for every country, that prices in the nearby countries, plus registration taxes in the matter country, doesn't make it cheaper for a potential customer to go buy the vehicle from a foreign country.



## **Chapter 3 - Methodology**

### **3.1. Problem Definition**

In this chapter I will set the methodology that will drive my study. For that reason, firstly, we need to properly identify which is the problem we want to solve.

In that way, the problem that the company is facing is the introduction of a new cycle of homologation for vehicles, more realistic than the previous one, that will show higher CO<sub>2</sub> emission values which, coupled with the CO<sub>2</sub> emission targets set by the European Commission, will have huge economic implications for the company.

Having identified the issue and considering the scope of the department in which I am involved, I am able to formulate the question that will motivate my thesis that is: “How to adapt the FCA’s operations, and particularly the pricing function, to the challenges introduced by WLTP?”.

### **3.2. Research Objectives**

The final objective is to prevent the company from the penalties set by the European Commission for CO<sub>2</sub> emissions and to reduce the impact on the vehicles’ taxation, aiming not to lose attractiveness on the products offering. Therefore, as far as my research is concerned, the purpose will be that of identifying the weak points of the current pricing approval process and to find out a new way of carrying out the function in order to solve these issues as well as general strategies to overcome the challenges introduced by the new regulations.

### **3.3. Research Design**

Given the qualitative characteristic of the study, we can consider the project as an “exploratory research” since it is a problem that needs to be more precisely defined to get more insights before developing alternative courses of action (Kinnear & Taylor, 1979).

It consists in collecting both primary and secondary data through unstructured procedures to be interpreted later on.

Due to its flexibility, it is the research design incorporating the least amount of scientific method (Shukla, 2008).

### **3.4. Need for Information**

In first place, I need to inform myself about the legal framework affecting the EMEA operating region in what regards to CO<sub>2</sub> emissions.

On the other hand, I also need to collect information about the new homologation cycle coming into force, known as WLTP, in order to understand how it will affect the FCA's operations and, in particular, the pricing function.

Not of less complexity will also be understanding how it actually works the pricing approval process within the organization and which are the flows of information through the different departments participating on it.

### **3.5. Instruments**

The qualitative data collection techniques that I am going to use will be: literature search, in-depth interviews and focus groups.

#### **3.5.1. Literature Search**

The first part of the data collection will be a literature search, consulting several secondary data sources, to be aware about the current legislation regarding CO<sub>2</sub> emissions and homologation tests for vehicles so that to have a better idea of which are their implications and from that point starting with knowledge of the facts.

#### **3.5.2. In-depth Interviews**

I will have several meetings with senior representatives from the different departments to understand which their actual contribution to the pricing approval process is, which are the information flows between departments, where do they find the most important weak points and which are their ideas to improve the process.

The exploratory nature of the research will allow me some flexibility in the way I will formulate the questions for each individual participant and ask for more information and clarification where it will be necessary.



### **3.5.3. Focus Groups**

I will also actively participate in several sessions with representatives from the different departments and brands of the company in order to brainstorm about a new and more efficient tool to manage the pricing approvals, which should also be able to deal with the environmental challenges previously mentioned.

## **3.6. Procedure**

The procedure that will be followed to have the interviews with the representatives from the different departments involved in the pricing approval process will be that of sending them a meeting through the calendar component of Outlook detailing the scope of the interview and its objectives within a thesis project, explaining that will not compromise any confidential information of the company.

In the meantime, I will formulate specific open-ended questions depending on the role of the person that is going to be interviewed to obtain useful information for my study.

The interviews will consist of 30 minutes, starting with a brief description of the purpose of the study, asking for consent to record them with audiotape, and continuing with the formulated open-ended questions, considering also the possibility of asking more questions if necessary clarification as we said before.

## **3.7. Data Analysis**

In the data analysis phase I will organize the transcripts of the interviews' records and the field notes. This raw data will be converted into information through the understanding of the pricing approval process, which will allow a better analysis and where I will identify: the information exchanges between the different departments, where are located the weak points that the respondents mentioned and in which stages of the process we can take actions for a better management of the CO<sub>2</sub> emissions.

### **3.8. Research Report**

The final step will be that of writing down the results of the research, including a description of the research process, conclusions and recommended courses of action. As well as preparing a representation of my findings for presentation purposes.

It is important to do it in a language easy to understand, finding a balance between completeness and conciseness, without getting the information too much technical overwhelming the audience (Smith & Albaum, 2012).

## **Chapter 4 - Environmental Challenges**

### **4.1. Variables Influencing Price Definition**

There are several variables that influence the decision of setting prices and all of them must be taken into consideration at the time of carrying out such activity. Particularly, in the automotive industry, we have to consider:

- **Costs:** is one of the most important ones, because the price must cover at least them to allow the company to survive. There are different kind of costs, so they can be subdivided into Direct Costs – costs of production – and Indirect Costs – are not strictly related to the product, but they need to be prorated on them as they are essential for the day-to-day running of the company –. Direct Costs can also be subdivided into Variable Costs and Fixed Costs, depending respectively if they vary or not with the level of production.
- **Customer perception:** once the costs are covered, the prices should be set considering the customer perception of the value proposition in order to extract the willingness to pay as much as possible (Anderson, Jain, & Chintagunta, 1993).
- **Lifetime operating costs:** price has to consider also the total costs in which the customer will incur in the whole life-cycle of the product because, if the company is able to let them know that they will be lower than its competitors, they can charge a higher price on its product (Kotler & Keller, 1967).
- **Competitors:** as we have already said in Chapter 2, it is important to have a clear idea of what are competitors doing in terms of costs, prices and offers in order to set a competitive price not risking being out of the market.
- **Price sensitivity:** as also we have said in Chapter 2, the possible changes in the customer demand after price changes have to be estimated and strongly considered.
- **Previous prices:** it is very important to consider as reference the prices of previous model year versions or previous models because any difference of price has to be motivated with a rational. Otherwise, the company risks that customers may make wrongful guesses such as a quality decline after a price decrease.

- Taxes: for sure that taxes are a big issue when talking about of setting a price. They vary from country to country and pricing specialists must be aware of them as they are included on the visual price of the products.
- Government regulations: especially in such a global industry as is the automotive sector where the local and international regulations can heavily influence the pricing decisions.
- Exchange rate: usually big companies carry out their activities taking as reference a strong currency as can be the American Dollar (\$) or the Euro (€) so, when setting prices for countries that have their own currencies, they have to estimate how the exchange rates will move and define a price based on it.
- Discounts: prices must be set considering the possibility of giving discounts since they are a very important commercial lever. There are different types of discounts that are given; dealers can take base discounts agreed by contract with the company for the “sell-in” and also conditional discounts in case they accomplish some volume targets, both should constitute their profit on the products they sell. Moreover, the company usually gives discretionary discounts to dealers to help them in the “sell-out”, these discounts should be transferred to the final customers in terms of “promos”.
- Channel: prices can be differentiated depending on the channel the product is going to be sold since the willingness to pay may be different or simply because some channels assure the company to sell larger volumes.
- Price differentiation: each vehicle is always differentiated in at least three trim levels following the “good-better-best” logic, so the same car can have more than three different prices depending on its equipment. OEMs always try to offer a level of customer advantage for the acquisition of the higher trims, compared to the price the customer should pay for acquiring the contents separately.
- Price endings: many sellers believe that prices should end in an odd number, as a vehicle priced at 29.999€ seems to be in the 20.000€ range rather than in the 30.000€ one. On the other hand, it brings the idea of a discount, so companies pursuing a high-price image should avoid odd-ending prices. In that way, price encoding is important if it exists a mental price break at the higher rounded number (Kotler & Keller, 1967).
- Residual value: is a very important variable when it concerns to the automotive sector since every potential customer aims to purchase a vehicle with a good future resale

power. Otherwise, in a couple of years, he will be stuck with that car. Automakers have to properly think before offering great discounts as they can be compromising the residual value of their products.

## **4.2. Reducing CO<sub>2</sub> Emissions from Light-Duty Vehicles**

The purpose of identifying the variables affecting the vehicles' price was to realize the strong impact that government regulations can have over the automotive industry. In that sense, considering the FCA's EMEA operating region, the events that have taken place in the EU the last years made up a complex environment which obliges automakers to take actions in order to adapt for new challenges.

### **4.2.1. EU's Energy Roadmap**

Transforming the European energy system is of vital importance for reasons of security, economy and climate. Therefore, Member States must commit themselves in achieving an energy system transformation which can be able to deliver higher security of supply, greater competitiveness and more sustainability (European Commission, 2011). In that sense, the EU has developed an energy strategy based on five priorities (European Commission, 2010):

- Achieving an energy efficient Europe.
- Building a truly Pan-European integrated energy market.
- Empowering consumers and achieving the highest levels of safety and security.
- Extending Europe's leadership in energy technology and innovation.
- Strengthening the external dimension of the EU energy market.

In order to achieve some of these objectives, in the last years, the European Union has issued a combination of regulations and financial support for preventing dangerous climate change – in accordance to its commitments under the Kyoto Protocol and the Paris Agreement – through cutting its greenhouse gas emissions substantially and encouraging other regions to do the same. To give an idea of how seriously the EU is committed on reverting the actual trend we can just point out the fact that, until 2020, it is going to spend a 20% of its budget on climate action, which represents 180€ billion (European Commission, 2014).

The targets of its plan can be summed up in:

- ✓ Cutting a 20% by 2020 and a 40% by 2030 of the greenhouse gas emissions compared with the levels of 1990.
- ✓ By 2020, a 20% of the total energy consumption must come from renewable energy, while for 2030 this percentage must reach a 27%.
- ✓ Increase the energy efficiency by 20% in 2020 and by 27% in 2030.

The long-term goal aimed for 2050 is that of cutting the emissions of an 80% below the 1990 levels and becoming a low-carbon economy, spurring growth and jobs (European Commission, 2011).

The low-carbon transition is feasible and affordable, however, achieving such an ambitious goal requires great efforts from all sectors. In that sense, automakers will have to do some commitments to help in reducing the transport emissions as can be seen in Figure 4.1.

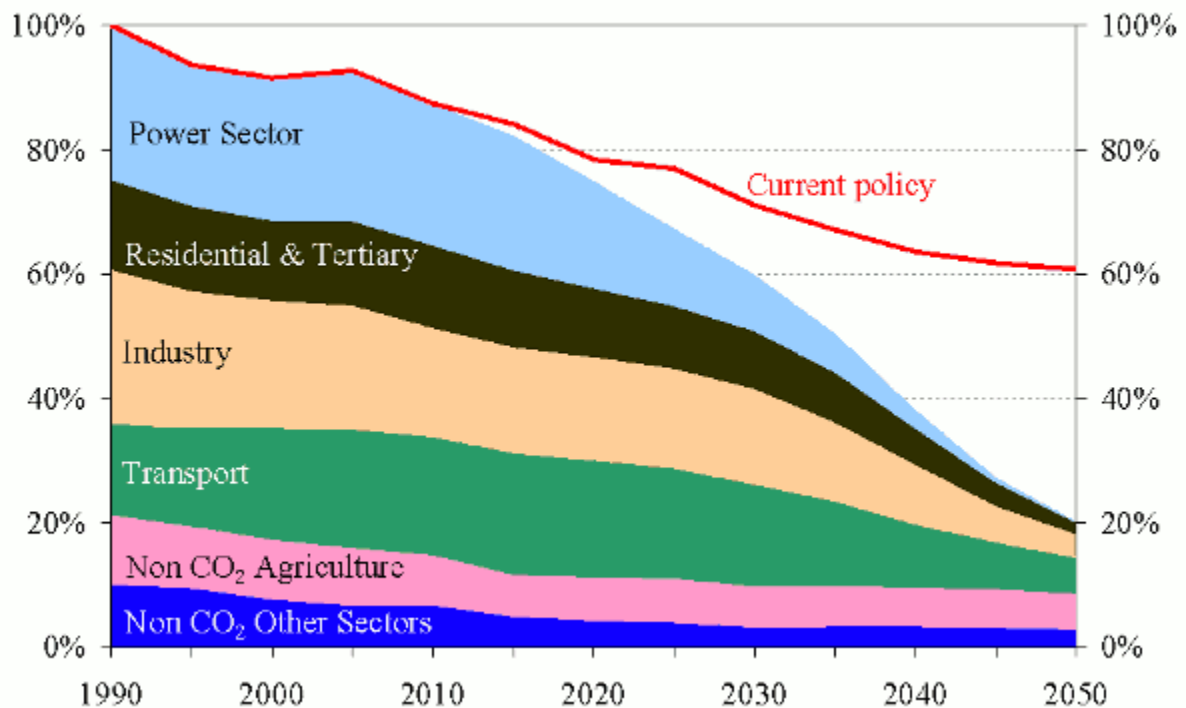


Figure 4.1: Possible reduction of 80% in GHG by sector

#### 4.2.2. Legal Framework in force for Light-Duty Vehicles

About 15% of the overall EU emissions of CO<sub>2</sub>, the main GHG, come from the fuel consumption of Light-Duty Vehicles, so we can certainly assure that car usage constitutes a significant factor of climate change (European Commission, 2007).

Since the CO<sub>2</sub> emissions are linked to the fuel consumption of vehicles and considering that a 26,5% of the overall EU energy consumption is represented by road transport, reducing CO<sub>2</sub> emissions from LDVs will positively impact over the EU energy security, while improving air quality and therefore European citizens' health (European Commission, 2007).

With emissions raising continuously despite significant improvements in vehicle technology – due to increasing traffic and car size – particular attention must be given to the road transport sector: taking actions both on the supply and the demand sides. For addressing both, the EU adopted from 1995 a Community Strategy for reducing CO<sub>2</sub> emissions from passenger cars based on three pillars (European Commission, 1995):

- Voluntary commitments from the car industry to cut emissions.
- Improvements in consumer information.
- Promotion of fuel-efficient cars by means of fiscal measures.

On the demand side we are going to concern later, when we will deal with taxes that Member States are providing for vehicle's CO<sub>2</sub> emissions, encouraging customers to shift to the purchase of less polluting cars.

On the supply side, the EU started from 1995 to gradually set, through voluntary agreements with car manufacturers associations, more and more challenging target values for the average new cars fleet CO<sub>2</sub> emissions that should be accomplished by OEMs. It started with a 140 g CO<sub>2</sub>/km target for 2008/2009 and continued with 120 g CO<sub>2</sub>/km for 2012 (Council of the European Union, 2006).

In 1998, the European Automobile Manufacturers' Association (ACEA) adopted a commitment to reduce the average CO<sub>2</sub> emissions of new cars sold to 140 g CO<sub>2</sub>/km by 2008. One year later it happened the same with the Japanese Automobile Manufacturer's Association (JAMA) and the Korean Automobile Manufacturers' Association (KAMA). Their improvements in the EU-15 until 2004 – prior to the accession of ten candidate countries on May 1<sup>st</sup>, 2004 – can be observed in Figure 4.2 (European Parliament and Council of the European Union, 2009).

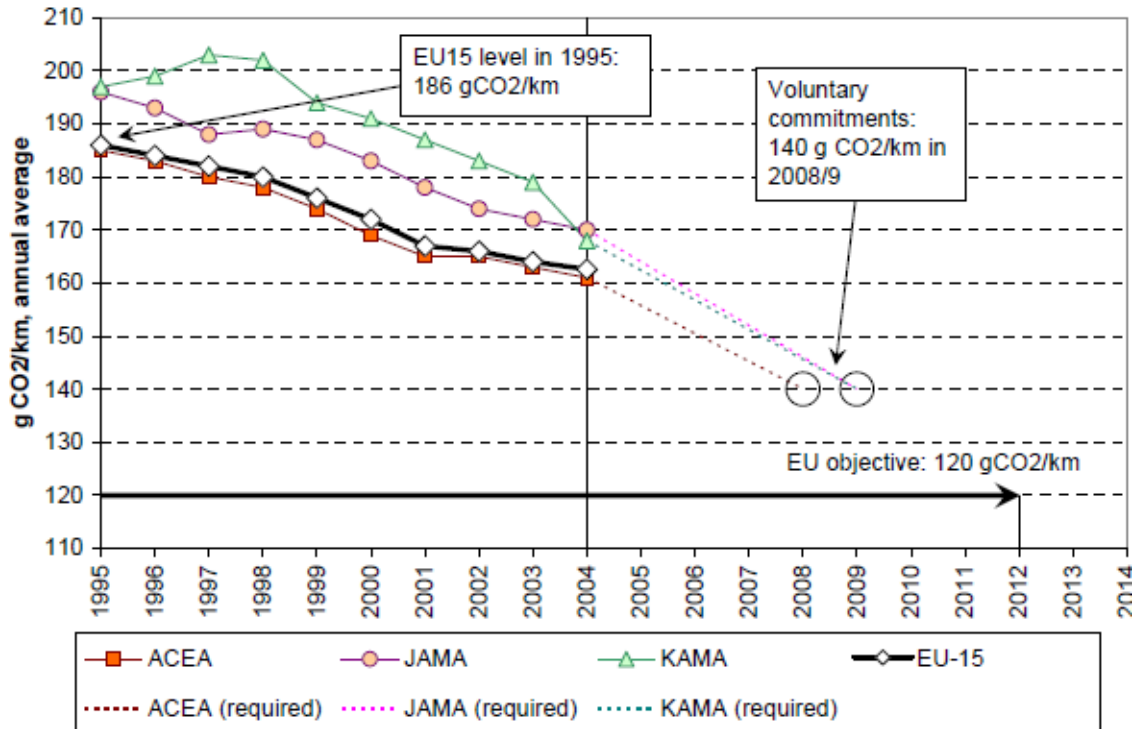


Figure 4.2: EU-15 average new car fleet CO<sub>2</sub> emissions between 1995 and 2004

The EU's legislative procedures require that any regulatory proposal coming from the European Commission must be discussed and voted on in the European Parliament as well as in the Council of the European Union. Therefore, changing approach due to the failure to make acceptable progress, in April 2009, the European Parliament together with the Council issued a regulation setting for the first time a mandatory emission performance standard for new passenger cars as part of the Community's integrated approach to reduce CO<sub>2</sub> emissions from LDVs (European Parliament and Council of the European Union, 2009). In that opportunity, they set a target of 130 g CO<sub>2</sub>/km for the average new passenger car fleet of all manufacturers combined to be reached by 2015 and, two years later, it was introduced a similar CO<sub>2</sub> standard of 175 g CO<sub>2</sub>/km for new LCVs registered in the Union to be accomplished by 2017 (European Parliament and Council of the European Union, 2011).

The target for the average emissions of the new passenger car fleet was revised in 2014 through a new regulation which set it to 95 g CO<sub>2</sub>/km, to be achieved by 2020 (European Parliament and Council of the European Union, 2014b). The same happened for LCVs and their CO<sub>2</sub> emission target, which was set to 147 g CO<sub>2</sub>/km, also to be reached by 2020 (European Parliament and Council of the European Union, 2014a).



The vehicle weight still remains to be the utility parameter. Therefore, all CO<sub>2</sub> standards adopted are adjusted by the average mass of the automakers' fleet, meaning that: the heavier the fleet, the higher the CO<sub>2</sub> emission level that they are allowed (ICCT, 2014). That is the reason why we must refer to the CO<sub>2</sub> emission targets as specific emission target of a manufacturer. This target has to be calculated as follows:

- From 2016 (European Parliament and Council of the European Union, 2009):

$$\text{Specific emissions of CO}_2 = 130 + a \times (M - M_0)$$

Where:

$$a = 0,0457$$

M = average mass of the new passenger car fleet

M<sub>0</sub> = average mass of the new passenger cars in the previous three years

- From 2020 (European Parliament and Council of the European Union, 2014b):

$$\text{Specific emissions of CO}_2 = 95 + a \times (M - M_0)$$

Where:

$$a = 0,0333$$

M = average mass of the new passenger car fleet

M<sub>0</sub> = average mass of the new passenger cars in the previous three years

The regulation applies only for vehicles registered for the first time in the European Community that haven't been registered outside the Community previously and just for OEMs whose registrations surpass 1.000 passenger cars a year, aiming to protect small automakers from their competitive disadvantages (European Parliament and Council of the European Union, 2014b). For determining the average new passenger car CO<sub>2</sub> specific emissions target, automakers shall consider the following percentages of their new passenger car registrations in the relevant year (European Parliament and Council of the European Union, 2014b):

✓ 65% in 2012.	}	CO <sub>2</sub> specific emission target: 130 g/km + a x (M-M <sub>0</sub> )
✓ 75% in 2013.		
✓ 80% in 2014.		
✓ 100% from 2015 to 2019.		
✓ 95% in 2020 (the worst 5% are ignored)	}	CO <sub>2</sub> specific emission target: 95 g/km + a x (M-M <sub>0</sub> )
✓ 100% from 2021 onwards.		

The regulation also provides some “super-credits”, establishing that each new passenger car registered from 2020 to 2022 with CO<sub>2</sub> emissions below 50 g CO<sub>2</sub>/km can be counted as (European Parliament and Council of the European Union, 2014b):

- 2 passenger cars in 2020.
- 1,67 passenger cars in 2021.
- 1,33 passenger cars in 2022.
- 1 passenger cars from 2023 onwards.

There is a limit of “super-credits” set at a maximum of 7,5 g CO<sub>2</sub>/km for the three years 2020-2022 combined, understood as the difference between the average CO<sub>2</sub> emissions of the new passenger car fleet with and without the application of the “super-credits” (European Parliament and Council of the European Union, 2014b).

Automakers also have the possibility to raise the CO<sub>2</sub> specific emission target up to 7 g CO<sub>2</sub>/km in case of developing innovative technologies which help to reduce the CO<sub>2</sub> emissions on devices that are: mandatory; beyond what is measured over the standardized test cycle during the vehicle homologation approval; and which produce verifiable, comparable and repetitive results (European Parliament and Council of the European Union, 2014b). Automakers must ask the Commission for the approval of less strict CO<sub>2</sub> emissions targets on cars fitted with these technologies that so far include: LED lights, solar roofs and other five kind of technologies (European Federation for Transport and Environment, 2018).

In addition, manufacturers are supposed to issue a certificate of conformity accompanying each new passenger car, containing the information about its CO<sub>2</sub> emission values as a requisite to be legally registered. Member States, on their own, are responsible for recording the information related to every new passenger car registered in its territory for monitoring purposes (European Parliament and Council of the European Union, 2009).

Manufacturers can form pools in order to accomplish the target. Otherwise, if they are not able to comply with it, from 2019 they will be subject to pay penalties for the following amount (European Parliament and Council of the European Union, 2009):

- (Average excess emissions of the new cars’ fleet x 95 €/g CO<sub>2</sub>/km) x Number of new passenger cars registered during the calendar year.

There are also some niche derogations allowed for smaller manufacturers which can apply for the following reductions on their specific CO<sub>2</sub> emission target (European Parliament and Council of the European Union, 2014b):

- Between 10.000 and 300.000 new passenger cars registered per year: can apply for a target of a 25% reduction from their 2007 average emissions for the 2012-2019 period, and a target of a 45% reduction from the 2007 level as of 2020.
- Between 1.000 and 10.000 new passenger cars registered per year: just in case they don't want to join a pool, they can propose their own emission reduction target subject to the Commission's approval.
- Less than 1.000 per year: as said before, they are excluded from the scope of the legislation.

The previous aspects were all mentioned for new passenger cars, however, the regulation in force for new LCVs only differs in the following points (European Parliament and Council of the European Union, 2014a):

- 2020 CO<sub>2</sub> emission target: 147 g CO<sub>2</sub>/km.
- Slope factor for the calculation of the specific CO<sub>2</sub> emission target:  $a = 0,0960$ .
- Percentages of new LCVs' registrations that shall be considered by automakers for the purpose of determining the manufacturers' specific CO<sub>2</sub> emissions:
  - 70 % in 2014,
  - 75 % in 2015,
  - 80 % in 2016,
  - 100 % from 2017 onwards.
- There is no "super-credits" scheme provided from the beginning of 2018.
- The derogations provided for smaller manufacturers consist just of:
  - OEMs responsible of less than 22.000 new LCVs' registrations per year can propose their own emission reduction target subject to the Commission's approval.
  - OEMs responsible of less than 1.000 new LCVs' registrations per year are excluded from the scope of the legislation.

#### 4.2.3. CO<sub>2</sub> Based Motor Vehicle Taxes in the EU

Dealing now with the actions taken by Member States on the demand side, we have to refresh what we had said before and bring back another variable that we mentioned as an important factor for price definition; we are talking about taxes.

Since taxation is a powerful instrument to influence the purchasing behavior of customers, most European governments, aligned with the EU's commitments to decrease the CO<sub>2</sub> emissions, have set different kind of taxes based on the vehicle's CO<sub>2</sub> emission values discouraging thus customers from buying cars presenting high emission values and therefore, straining OEMs to produce more ecofriendly cars and helping them to reduce their compliance costs.

In appendix 1 we can find a list of all CO<sub>2</sub>-based motor vehicle taxes provided by the 28 Member States of the EU. As can be seen, most countries charge cars depending on their CO<sub>2</sub> emission levels – or based on fuel consumption, which is strictly related to CO<sub>2</sub> emissions – but there are some exceptions (Bulgaria, Czech Republic, Estonia, Hungary, Italy, Lithuania, Poland and Slovakia). Among the countries that decided to impose taxes on CO<sub>2</sub> emissions there are those that prefer charging on car buyers the whole amount of the tax at the registration time, while others charge the ownership, collecting taxes through periodic installments. There are also some cases in which governments apply some form of tax both on registration and on the car's ownership (ACEA, 2018).

#### 4.2.4. 2020-2021 Scenario for Major Car Manufacturer Groups

Coming back to the challenges presented by the current legal framework, the data collected from the EU Member States by part of the EEA about the car manufacturers' performance in 2017 shows that most OEMs are more than away from complying with the 2020 target. What is particularly worrisome is the fact that this data is the same one that the European Commission uses to monitor and evaluate if automakers are complying with the CO<sub>2</sub> emission targets defined.

Before the introduction of the agreements with the manufacturing associations on CO<sub>2</sub> emissions targets for passenger cars, the fleet average CO<sub>2</sub> emissions of new passenger cars were decreasing 1,2% yearly, but this rate was significantly improved after the introduction of the mandatory CO<sub>2</sub> emissions target through the regulation of 2009, achieving almost a 3% decrease per year in the 2007-2017 period (see Fig. 4.3). In that way, manufacturers were on

track to accomplish the 95 g CO<sub>2</sub>/km emission target by 2021, but in 2017 the trend changed and it was the first year in which the fleet average CO<sub>2</sub> emissions from passenger cars in the EU were increased with respect to the previous year, reaching average emissions of 119 g CO<sub>2</sub>/km (1 g higher than in 2016) (ICCT, 2018).

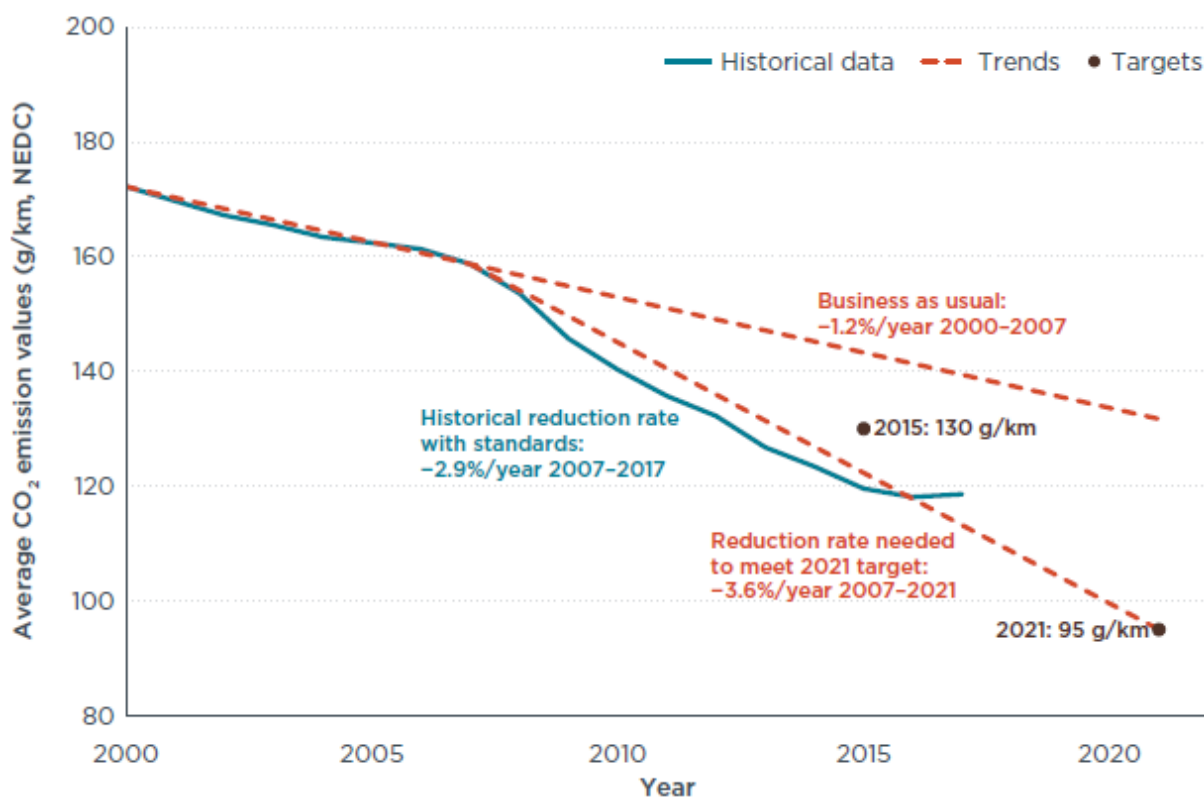


Figure 4.3: Annual reduction rates on CO<sub>2</sub> emissions of EU's new passenger cars

This stagnation can be explained, from one side, through the continued fall in the Diesel sales – Diesel engines emanate less CO<sub>2</sub> than Petrol ones – after the “Dieselgate” broke out and, from the other side, through the shift from small and medium-sized vehicle segments to larger ones – particularly SUVs – which have comparatively much higher CO<sub>2</sub> emission values; as can be observed in Figure 4.4 (ICCT, 2018).

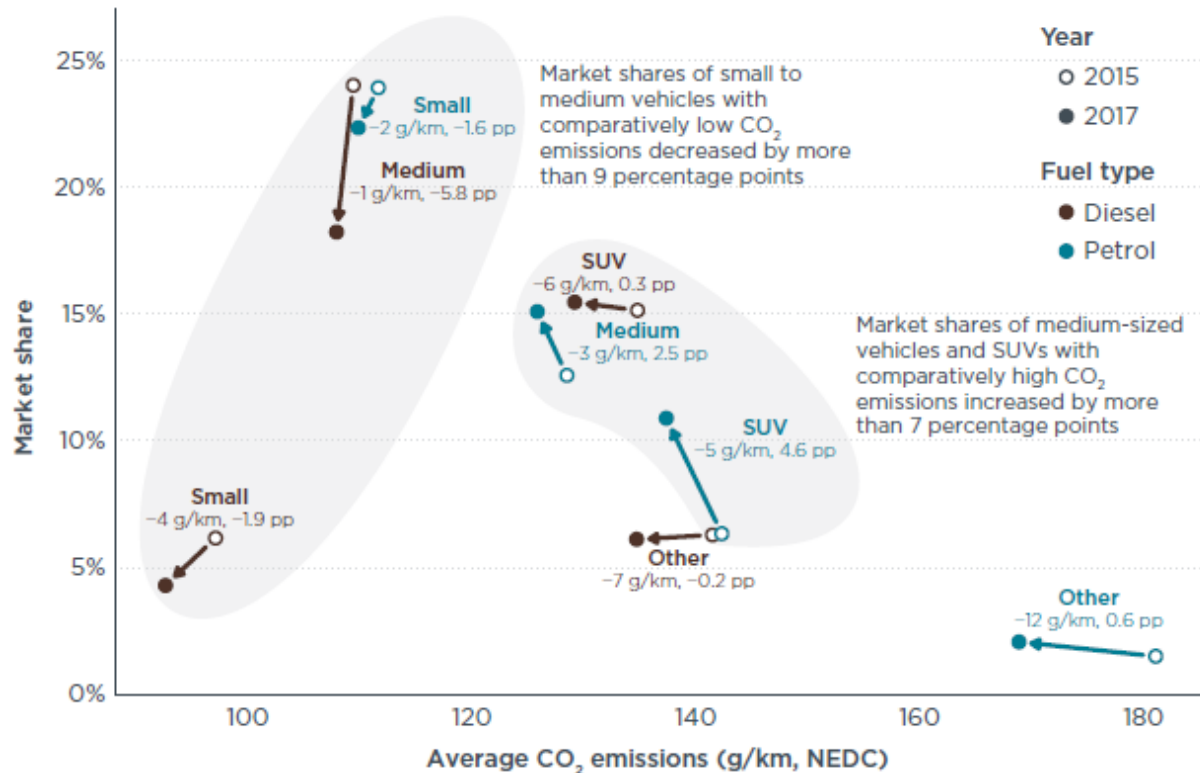


Figure 4.4: Market share changes by segment and fuel type between 2015 and 2017

Now, looking at the situation of each car manufacturer group in this dataset, we can see how far is each one from the 2020/2021 target depending on their average fleet mass. We don't have to forget that OEMs may pool together for meeting the CO<sub>2</sub> targets and, in that case, the 2020/2021 scenario would be different. Anyway, if we analyze their current situation as separated manufacturer groups, observing the data present in Table 4.1, we can say that: Toyota is the one that presents the lowest CO<sub>2</sub> emission values and one of the few that managed to reduce its emissions from 2016 despite the fuel type and segment trends we pointed out; only Hyundai beat the Japanese manufacturer with a one point higher reduction – 3% to the Toyota's 2% – but it is still one of the manufacturers that is farther away from complying with the target, as well as FCA, both OEMs are respectively 28 and 29 g CO<sub>2</sub>/km far from the standard (EEA, 2018).

Manufacturer group	EU market share	Average mass (kg)	CO <sub>2</sub> values (g/km, NEDC)			
			2017 average	Change 2016–2017	2020/21 target	Distance to target
Toyota	5%	1,359	103	-2	94	9
PSA	16%	1,273	112	2	91	21
Renault-Nissan	15%	1,310	112	1	93	19
Average	—	1,390	119	1	95	24
FCA	6%	1,259	120	0	91	29
Ford	7%	1,393	121	1	95	26
BMW	7%	1,570	122	-1	101	21
Hyundai Motor Company	6%	1,348	122	-3	94	28
Volkswagen	23%	1,420	122	2	96	26
Daimler	6%	1,607	127	2	103	24

Table 4.1: OEMs' CO<sub>2</sub> performance in 2017 and distance to specific CO<sub>2</sub> emission target

In average, fleet CO<sub>2</sub> emissions will have to decrease by 24 g CO<sub>2</sub>/km, which represents a 20% considering the current levels, so there is still a long way for OEMs to come across. In that way, an analysis from IHS Markit, a business information provider, estimates that OEMs failing to comply with the CO<sub>2</sub> emission target for passenger cars sold in the EU could be fined around 11€ billion in 2020 and more than 14€ billion in 2021 if the forecasted levels of excess emissions are unable to be curtailed (IHS Markit, 2018).

In addition, the European Federation for Transport and Environment has estimated the potential annual fines in which each OEM may incur in 2021 if they fail to meet their targets, considering different scenarios depending on the level of flexibility that they can be given according to their investments in eco-innovation technologies and low emission cars. The minimum, moderate and maximum levels of flexibility are given by: 3,5 g CO<sub>2</sub>/km, 7 g CO<sub>2</sub>/km and 14,5 g CO<sub>2</sub>/km respectively – the maximum level corresponds to the sum of both maximum allowances provided by the regulation in concept of eco-innovation technologies and low emission cars.

These estimations are summed up in Table 4.2, in which we observe that, nonetheless the efforts in developing eco-technologies and increasing its registrations of low emission cars, it is very probable for FCA to incur in fines in the order of 1€ billion by 2021 (European Federation for Transport and Environment, 2018).

<i>Potential annual fines in million euros (2021)</i>	<b>Without using flexibilities</b>	<b>With using flexibilities</b>		
		Minimum level	Moderate level	Maximum level
Volkswagen Group	713	0	0	0
BMW Group	425	95	0	0
Ford	490	146	0	0
Suzuki*	175	110	46	0
Mazda*	252	179	106	0
Opel-Vauxhall	1,295	973	651	0
Kia	606	465	325	25
Subaru*	49	39	29	8
Honda	259	209	159	51
Fiat-Chrysler	1,346	1,035	723	56
Hyundai	888	725	562	212

**\*Manufacturers with a niche derogation target**

*Table 4.2: Potential fines for OEMs not complying with their 2021 CO<sub>2</sub> emission targets*

#### 4.2.5. Proposal for Post-2020 CO<sub>2</sub> Targets for Cars and Vans

On November 8<sup>th</sup>, 2017, the European Commission presented a proposal to the European Parliament and the Council of the European Union for setting emission performance standards for new passenger cars and new LCVs in the EU for the period after 2020. For that purpose, they have involved stakeholders and the public through different consulting elements to have their feedback. The proposal was revised at the beginning of 2018, but just to correct some minor errors and recast markings.

Like the existing regulations, this proposal aims to:

- ✓ Contribute to the accomplishment of the EU's commitment under the Paris Agreement.
- ✓ Reduce the fuel consumption costs for consumers.
- ✓ Improve the European automotive industry's competitiveness while stimulating employment.

It is expected that these general objectives will result in (European Commission, 2018a):

- Saving around 380 million tons of oil during the 2020-2040 period, reducing in that way the use and imports of oil.
- Increasing GDP up to 6.8€ billion in 2030 through the creation of 70.000 new jobs.
- Consumers savings of around 18€ billion in fuel costs per year.
- Reducing 170 million tons of CO<sub>2</sub> in the 2020-2030 period.



For the first time, both new passenger cars and new LCVs targets are treated in the same document. In this opportunity, the CO<sub>2</sub> emission targets are not expressed as absolute values but as percentage reductions with respect to the fleet average starting point of all manufacturers in 2021, since from that year CO<sub>2</sub> emission targets will be based on a new homologation test procedure, called WLTP – Worldwide Harmonized Light-Duty Vehicles Test Procedures – which came into force in September 1<sup>st</sup>, 2017 (see Fig. 4.5). In that way, the target CO<sub>2</sub> emission reductions proposed are (European Commission, 2018b):

- By 2025: 15% lower than in 2021 – both for cars and vans.
- By 2030: 30% lower than in 2021 – both for cars and vans.

Most aspects from the existing regulations are maintained, including: the excess emission premium OEMs will have to pay; the exclusion of OEMs responsible for the registration of less than 1.000 vehicles as well as the derogations for middle-volume manufacturers; the pooling scheme; the utility parameter continue to be the vehicles' mass; and also the credits for eco-innovation technologies, proposing to include air-conditioning systems to the current range of considered technologies and providing for a revision of the 7 g CO<sub>2</sub>/km limit from 2025 (European Commission, 2018b).

The most interesting aspects of this proposal are the following key points (European Commission, 2018b):

- Technology-neutral incentive mechanism for zero-emission vehicles (battery electric or fuel cell vehicles) and low-emission vehicles (emitting less than 50 g CO<sub>2</sub>/km, mainly plug-in hybrid vehicles), giving the industry a clear signal to invest, stimulate employment, promote innovation and competitiveness.
  - The incentives would be based on a crediting system through which OEMs reaching a ZLEVs share higher than the proposed benchmark – 15% for 2025 and 30% for 2030 – would be rewarded with a less strict target of CO<sub>2</sub> emissions.
- Market surveillance mechanisms to ensure representativeness of the test procedure with respect to real-world driving. This surveillance would be done through the following activities:
  - Collection, publication and monitoring of real-world fuel consumption data through an “on-board fuel and/or energy consumption monitoring device” (OBFCM) which OEMs would be obliged to fit in new vehicles

- In-service conformity checks to ensure that vehicles on the road perform as those approved in the type approval. In case of deviations, they would be considered at the OEM's compliance assessment.

This proposal was finally agreed upon by representatives of the European Commission, the European Parliament and the European Council on December 17<sup>th</sup>, 2018 introducing just the following changes (ICCT, 2019):

- Average CO<sub>2</sub> emissions from new cars: 15% reduction by 2025 and 37,5% by 2030, both relative to the 2021 starting point.
- Average CO<sub>2</sub> emissions from new vans: 15% reduction by 2025 and 31% by 2030, both relative to the 2021 starting point.

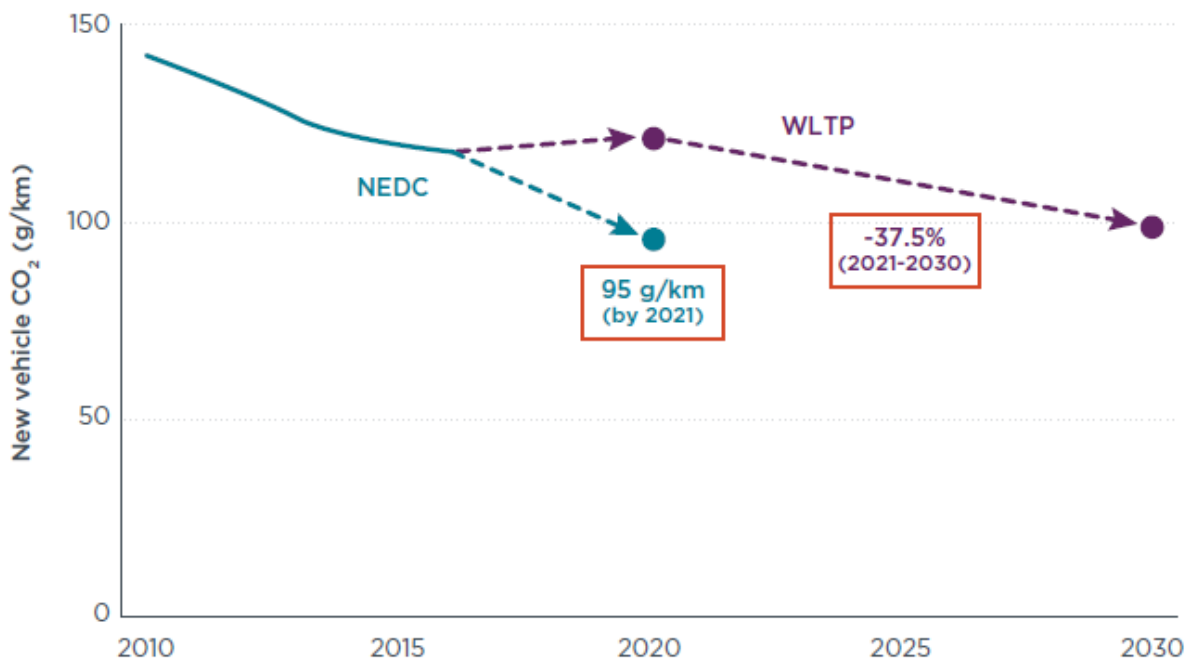


Figure 4.5: NEDC-based target for 2021 and WLTP-based target for 2030

### 4.3. WLTP: The New Type-Approval Procedure

Since the Dieselgate scandal broke in September 2015 – after Volkswagen admitted installing illegal devices in more than two million cars to manipulate exhaust emissions depending on whether the car was running on a test or on the road – the automotive industry has been under the spotlight of media and regulatory attention for its contribution to the air pollution crisis in our cities (European Federation for Transport and Environment, 2018).

The European regulations regarding CO<sub>2</sub> emission standards for passenger cars and LCVs are based on the values obtained through a test cycle, which until recently was a lab test designed in the 1980s known as New European Driving Cycle (NEDC). The difference between the real-world CO<sub>2</sub> emission values and those obtained through the official test has been increasing over the years and in 2016 reached a 42% gap (ICCT, 2018). So, in response to this increasing gap, the EU has developed a new type-approval test, called Worldwide Harmonized Light Vehicles Test Procedure (WLTP) which will include much more realistic testing conditions, summarized in Table 4.3, bringing CO<sub>2</sub> official emission values closer to real-world emissions – but still

	NEDC	WLTP
Test cycle	Single test cycle	Dynamic cycle more representative of real driving
Cycle time	20 minutes	30 minutes
Cycle distance	11 kilometre	23.25 kilometre
Driving phases	2 phases, 66% urban and 34% non-urban driving	4 more dynamic phases, 52% urban and 48% non-urban
Average speed	34 kilometre per hour	46.5 kilometre per hour
Maximum speed	120 kilometre per hour	131 kilometre per hour
Influence of optional equipment	Impact on CO <sub>2</sub> and fuel performance not considered under NEDC	Additional features (which can differ per car) are taken into account
Gear shifts	Vehicles have fixed gear shift points	Different gear shift points for each vehicle
Test temperatures	Measurements at 20-30°C	Measurements at 23°C, CO <sub>2</sub> values corrected to 14°C

Table 4.3: Main differences between the two Test Procedures

under estimating real-world emissions by around 20% (European Federation for Transport and Environment, 2018).

#### 4.3.1. Transitional Period

The regulation regarding the WLTP was issued by the European Commission in June 1<sup>st</sup>, 2017, stating that from September 2017 all passenger car models introduced on the market for the first time had to be approved by the new WLTP test, while cars that had been already homologated could still be sold using NEDC values (European Commission, 2017a). So, in order to allow consumers to compare different car models, new types of cars had to contain in their certificate of conformity (COC) – the “cars’ birth certificate” through which they can be registered

anywhere in Europe – their CO<sub>2</sub> emission values from both the lab tests, since until the “one-shot” WLTP introduction, which was provided for January 1<sup>st</sup>, 2019, the use of NEDC values for labelling purposes continued to be binding (ACEA, 2017).

Instead, from September 2018, the regulation provided that all new passenger cars registrations must be type-approved only through the WLTP, except for end-of-series vehicles to allow a limited number of unsold vehicles in stock, that had been approved under the old NEDC test, to be sold for one more year (September 2019). In that way, from January 1<sup>st</sup>, 2019, all new cars in dealerships have to show only WLTP-CO<sub>2</sub> values in their labels in order to avoid confusion among customers.



*Figure 4.6: Transition timeline from NEDC to WLTP*

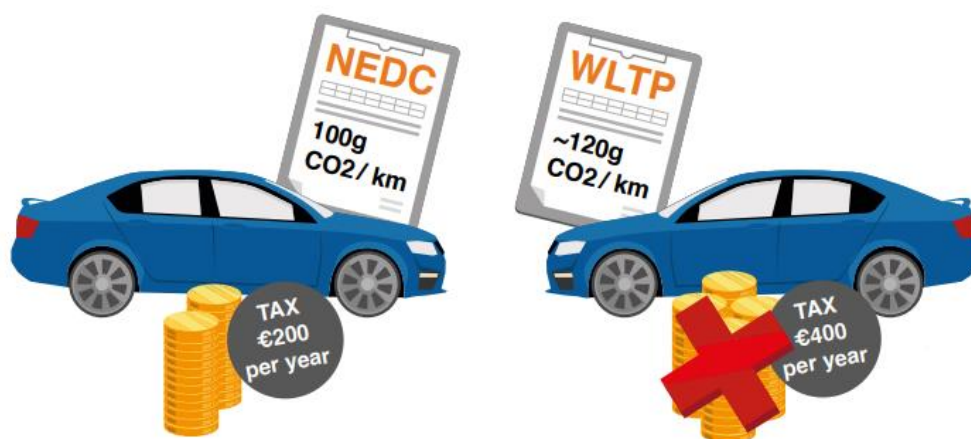
However, all these transitional dates worked in a different way for LCVs, as can be seen in Figure 4.6.

#### 4.3.2. Adjusting CO<sub>2</sub>-emission Targets and Taxation

After the regulation came into practice, WLTP started to run in parallel with NEDC for at least two years time – until the transitional period will be over. The NEDC fuel consumption and CO<sub>2</sub> values for new type homologation vehicles are evaluated through a tool called CO<sub>2</sub>MPAS, in order to create a correlation between the two test procedures, since taxes are still based on NEDC values. It means that, once a new type homologation vehicle is tested under the WLTP criteria, CO<sub>2</sub>MPAS calculates the CO<sub>2</sub> emission level, numerically changing the test conditions, discarding the optional contribution and finally providing the NEDC-CO<sub>2</sub> correlated value. This

started to be done from September 2017 for new type homologation vehicles and continued from September 2018 for all other vehicles (JATO Dynamics, 2017).

From 2019, the EU's Member States charging vehicles with some form of CO<sub>2</sub> tax will have to adapt their vehicle taxation systems to the WLTP-CO<sub>2</sub> emission values, respecting the principle that the new test procedure should not impact on customers in a negative way (see Fig. 4.7), since the official CO<sub>2</sub> emission values will be given by a more realistic test cycle – providing higher CO<sub>2</sub> and fuel consumption values compared to NEDC (ACEA, 2017).



*Figure 4.7: Adapting taxation systems to WLTP*

In the same way, the European Commission will have to convert the CO<sub>2</sub> emission targets for 2020/2021 into WLTP values of comparable stringency, since they were set based on the previous NEDC test.

From the introduction of the new WLTP test procedure in September 2017, the European Commission had to translate back the WLTP-CO<sub>2</sub> emission values to NEDC equivalent values for compliance monitoring against CO<sub>2</sub> targets set by the EU. These correlated NEDC values are either calculated using the CO<sub>2</sub>MPAS correlation tool or based on the results of the physical NEDC test (see Fig. 4.8).

Given the fact that the CO<sub>2</sub>MPAS tool has some limitations that may result in higher NEDC-CO<sub>2</sub> values, if the correlation tool doesn't confirm the OEMs' declared CO<sub>2</sub> value or if it is not able to deal with specific technologies, the CO<sub>2</sub> values from the correlation exercise can be replaced by physically measured values using NEDC (ACEA, 2017).



Figure 4.8: Translating back WLTP-CO<sub>2</sub> values to NEDC correlated ones

Nevertheless, as there is an updated version of the NEDC – called NEDC2 – which is tougher than the previous one, new cars homologated under WLTP have both WLTP-CO<sub>2</sub> and NEDC2-CO<sub>2</sub> values higher than the previous NEDC-CO<sub>2</sub> ones (ACEA, 2017).

Combining the new WLTP-CO<sub>2</sub> values and the NEDC-CO<sub>2</sub> ones over the period of transition into a statistical sample to correlate both values will be the basis for the European Commission to calculate WLTP-specific targets for 2020 as well as for national governments to adapt their taxation systems (JATO Dynamics, 2017). The revised targets are required by EU legislation to be as stringent as the current CO<sub>2</sub> emission targets set on the basis of the NEDC test (ACEA, 2017).

Finally, from 2020 onwards, both EU Member States and the European Commission will start monitoring WLTP-CO<sub>2</sub> emission values of new cars registered against OEMs' new CO<sub>2</sub> emission targets now based on the WLTP test procedure.

#### 4.3.3. Impact on Car Design

Considering the fact that, from the introduction of the new type-approval procedure, the implication of the optional equipment on CO<sub>2</sub> emissions is for the first time taken into account (European Commission, 2017a), a customer willing to purchase a vehicle adding some optional contents will pay higher taxes on that specific car, compared to the one with just the standard equipment, whenever the car will pass from one CO<sub>2</sub> tax band to another – just for countries where there is some form of CO<sub>2</sub> based taxes. In consequence, option design will be a key factor, driving the decision-making process of consumers and shaping the sales and marketing processes for OEMs, as the trend may shift towards more affordable versions, simpler and with fewer options (JATO Dynamics, 2017).

On the other side, it will also increase the OEMs' fleet average CO<sub>2</sub> emissions from new cars registered, which is an undesirable effect since companies will have to pay more money to the EU in terms of fines. Therefore, automakers will have to estimate if they are still making money

on selling optional equipment or if they should rather replicate the Japanese or Korean approach, simplifying the optionals offering strategy through reducing the range of optional equipment available and moving to more simplified models as standard (Fleet News, 2018).





## **Chapter 5 - Current Pricing Approval Process**

In this chapter I will analyze the current Pricing Approval Process (PAP) in order to see how it deals with the challenges introduced by the new regulations regarding CO<sub>2</sub> emissions and the WLTP type-approval procedure, and to identify which are the weak points that made necessary to take improving actions.

For that aim, as I stated in the methodology of the study, I arranged some meetings with representatives of the different departments involved in the process to interview them on: which their role is, where do they identify the main criticalities, and which are their proposals.

As said before, when I presented what means Pricing for FCA, there are different situations that motivate taking a pricing action, like: a new model launch, face-liftings, cost inflations, product configuration changes, MCAs or a new model year. But, for the purpose of this analysis, we will just consider the case of a new model launch in order to see the whole process from the beginning, clarifying in that way its understanding.

### **5.1. Price Book Inputs**

Having recorded all the interviews with the departments' representatives, the data analysis phase started writing down the results of them and organizing this data in order to produce valuable information.

From these interviews it resulted that, in the case of a new model launch, the process starts when Product Planning realizes the need of a new car, in a mid-term period of 4 to 5 years, and asks Engineering for the development of it, giving them just some general guidelines.

Several back and forth between them, supported also by Product Marketing, will happen until the approval of a new model that covers a specific segment of the market can be agreed. This part is out of the scope of the current study as it doesn't concern the PAP. Anyway, is important to point it out since, from the moment when the new model is approved, Product Planning will be responsible for managing the "Product Grid", which is basically a file consisting of the product configuration of all the versions that will be available of that car model, what means: every single combination of engine, traction, transmission, and standard plus optional equipment.

The Product Grid is very important for our study since it constitutes one of the two inputs for the creation of the price books (PB) which is the fundamental tool for the PAP.

The other input for the PB creation is the “V99”, which is a file developed and managed by the Finance department, consisting of all the costs for each single version of the model, considering its: engine, traction, transmission and standard equipment, but also providing the costs for the optional contents.

## 5.2. Price Book Creation

Currently the whole PAP, from the PB creation to its approval, is managed through an Intranet site called “Competitiveness System” because the tasks related to the competitive analysis are also managed through the same site.

There, for the creation of the PB, among other things – as choosing the market, the model, etc. – we need to choose which Product Grid and which V99 we want to use, as illustrated by Figure 5.1.

**Create Price Proposal Object**

New PriceBook (Advanced Settings) | Generic Request | Inflation | Change OPT Prices (Advanced Settings)

Brand: 57 - JEEP

Market: 1000 - ITALY

Model: 685 - NEW WRANGLER UNLIMITED

Reference Series for Budget and Forecast: 1

Description: JL 685 MY19 CZECH REPUBLIC

Mission: MODEL YEAR

Id Actual Grid: 6850201822 - MY18 GRID NEW WRANGLER UNLIMITED EDITION 98IS

Id Proposed Grid: 6851201920 - MY19 GRID NEW WRANGLER EDITION 1

Use Mandatory Optionals of Product Catalogue: ☐

Add Special Series of Product Catalogue: ☐

Include approved Special Series: ☐

Optional take rates (mix): ☐

MVS volumes from PO: ☐

Actual range, mix and economics: ☐

Source: OCF

Series: 1

Date From: 03-2018

Date To: 09-2018

Series: 1

Month: 6

Date From: 03-2018

Date To: 09-2018

V99

☐ From latest official actual V99 ADM 000

☒ Custom V99 Version MY19 685 carry over MY18 - base C9'18 (17785)

Figure 5.1: Price Book creation

Once the PB is created we can download its Excel interface in order to work on it. Work on it means opening just the versions that the market can order and making some adjustments in the product configuration and in the costs since there may have been some updates in the last Product Grid and/or in the V99 in the meantime.

### **5.3. Discussion of the Price Proposal with Business Centers**

When the PB is ready, it can be sent to the markets – also referred to as Business Centers – together with some guidelines in order to let them send back a first price proposal consisting not only of the list price of each version but also their discounts policy, their sales channeling, their MIX of volumes for each version in each channel, and the prices and take-rates for the optional equipment.

From that moment a series of back and forth with the markets' Product Managers start in order to support them in achieving a price proposal with a Contribution Margin (CM) aligned to Finance guidelines, but also consistent in terms of competitiveness positioning.

Every time the markets send a new version of the PB to Pricing HQ, in order to do the checks, we have to launch an Excel macro called “APG” – standing for the Italian word *appoggio* – which creates a support file through copying and pasting every single sheet of the original Excel file into a new one. Otherwise, all the macros running on the official PB slow down significantly its control and makes the task very difficult. Anyway, all the changes have to be made into the official file.

These checks consist in verifying:

- Whether the exchange rate applied for the costs in V99 is the one determined at the year's budget – for non-eurozone members.
- Whether the exchange rate applied for the revenues is the one determined at the latest forecast – for non-eurozone members.
- Which is the price change with respect to the last prices approved in case of a new model year or a face-lifting.
- The taxes calculations.
- If there is any negative contribution margin both in the base vehicle and in the optional equipment, as they are not acceptable at all.
- If the price guidelines for the optional contents were followed.
- The consistency of the volume MIX inserted in the different versions.
- The consistency of the price-steps among the different trim levels, body type, horse power and fuel type.
- If the product configuration is consistent with the latest release of the product grid.
- If the costs in V99 are updated to its latest release.

Usually we sent the markets a complete e-mail, after having controlled their price proposals, with all our suggestions and pointing out the things they have to fix so as not to modify the work they have done so far, so that they can send us back a new and better price proposal.

#### 5.4. CO<sub>2</sub> Emissions Impact

Considering all the regulations that we have been analyzing in Chapter 4, and particularly the entry into force of the WLTP test procedure from 2019, it becomes very important to track the CO<sub>2</sub> emissions provided for every single possible car configuration since they will impact not only on the amount of taxes charged on that specific car but also on the fines in which the company will incur if the car trespasses the emission target. For that reason, it is not admissible to continue working with a tool that doesn't consider them before setting the prices for the different versions of a car model and for its optional equipment – from the WLTP introduction it also impacts on the final CO<sub>2</sub> emission value of the car.

Nowadays there is no indication of CO<sub>2</sub> values in the current price books as can be seen in Table 5.1, neither for the base version nor for the optional contents. This is why markets, when working on a price proposal, need to calculate the taxation out of the price book, starting from

DESCRIPTION	2.0 Mjet 170cv 948TE - E6dd S&S TRAILHAWK 4WD LOW	1.0 GSE T3 120CV C630 - S&S SPORT FWD	1.6 Mjet 120cv C635 - E6dd S&S SPORT FWD	1.0 GSE T3 120CV C630 - S&S LONGITUDE FWD	1.0 GSE T3 120CV C630 - S&S BUSINESS FWD	1.3 GSE 150CV T4 DDCT E6d - S&S LONGITUDE	1.3 GSE 150CV T4 DDCT E6d - S&S BUSINESS
SINCOM	H3E	L20	L27	M20	M20	M22	M22
SPECIAL SERIE	000	000	000	000	S6	000	S7
MIX %							
PVP (curr.)							
Immatricolazione							
Iva							
Notaio							
Trasporto							
DETAX (curr.)							
Complementary revenue (curr.)							
Tot gross revenue BV							
Discount % - Base							
Discount % - Conditional							
Discount - Discretionale (curr.)							
Discount % - Discretionale							
Discount % - Total							
Discount BV (curr.)							
Net Revenue BV (curr.)							
Production Cost (Base Vehicle) (curr.)							
Market Configuration Specific Cost (curr.)							
Tassativo Cost (curr.)							
Local Completion Cost (curr.)							
Total Other Unit Cost of Sales (curr.)							
Total Cost (curr.)							
Gross Margin BV ( curr.)							

Table 5.1: CO<sub>2</sub> emission values not contemplated by the current PB

a DETAX price, and then inserting both the DETAX price and the list price in the PB manually. In the case of optional contents impacting CO<sub>2</sub> calculations, what markets are currently doing is to apply the CO<sub>2</sub> tax rate of the base version on them, while actually the tax rate related to every optional content won't be a static value and it will vary depending on the final homologated CO<sub>2</sub> emission value of the car.

However, the greatest problem is not that one, the real problem is that at the beginning, until the WLTP will be stabilized, the WLTP figures are not 100% confirmed, so markets may work for months on a price proposal till reaching a good average contribution margin and then come the news from Platform in the USA or in Melfi – for the Renegade model production – that the official CO<sub>2</sub> values are changed. This means that all the price proposal has to be revised, significantly slowing down the PAP.

In addition to the difficulties related to the test procedure change from NEDC to WLTP, there is also an information flow issue, since all this information travels on the outside of the PB. Starting at the Platform with the type-approval, passing through the hands of Product Planning who needs to update that data on the product grid and communicate Product Marketing, which finally notice the markets and Pricing about the new official CO<sub>2</sub> emission values.

On the other hand, and not less important, is that the current price book doesn't provide the amount of the fines that the company will have to pay on each version registered if it goes beyond the CO<sub>2</sub> emission target. This is also of great importance, since the actual margin that FCA will earn will be the after CO<sub>2</sub>-compliance one, which is the contribution margin of the version approved in the PB less the fines related to its own CO<sub>2</sub> emissions.

## **5.5. Sending Price Book for Approval**

Once Pricing HQ considers that the market has reached an acceptable price positioning, the latest version of the price book can be uploaded to the system (Fig. 5.2) and, if the check integrity test is passed, the following step is to change the ownership of the PB to Finance HQ to let them check the economic consistency of the proposal.

If Finance HQ gives their validation, the official approval request can be done. In that opportunity, the price book has to be approved by the market's Managing Director, the HQ's Finance Controller and the HQ's Head of Pricing.

Once the three approvals are made, the market can communicate the prices and is also able to start invoicing the cars that have been ordered by the clients.

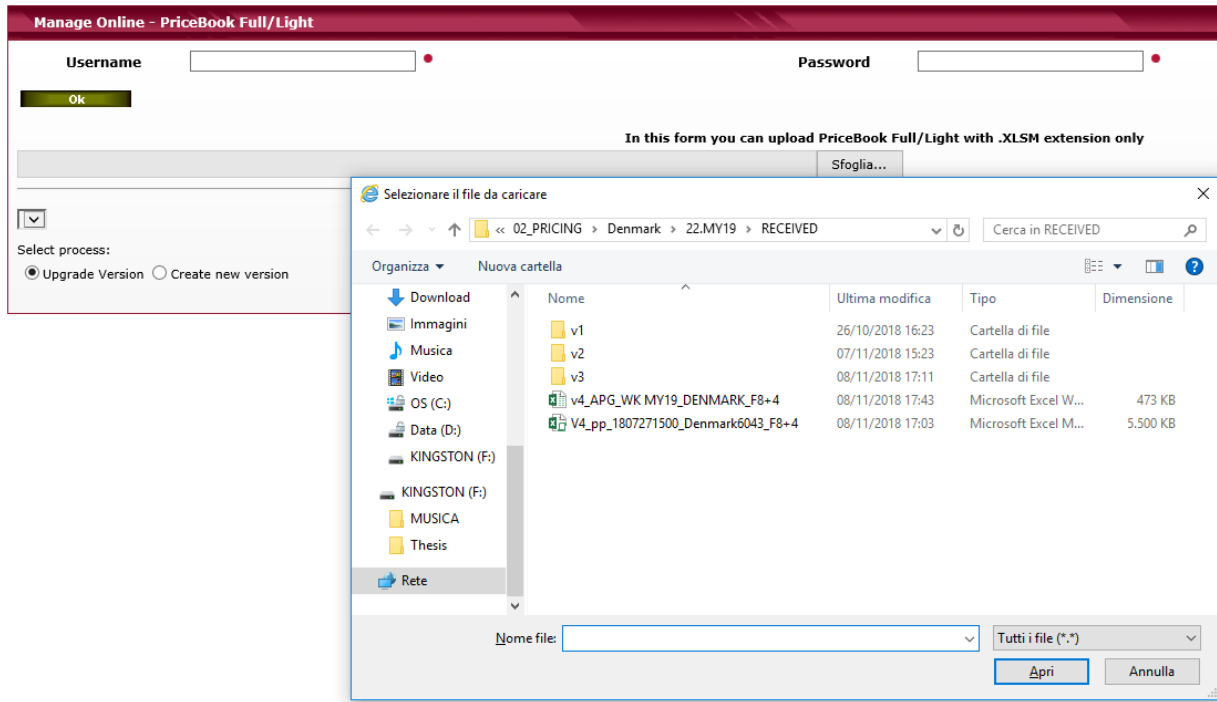


Figure 5.2: Uploading the final Price Book

## 5.6. Weak Points

Therefore, doing a recap of all the weak points present in the current pricing approval process previously explained, we can list them as follows:

- Extremely low work speed with the current pricing system and Excel tool.
- No indication of the CO<sub>2</sub> emission values of each version in the pricing approval document.
- No information of optional contents contributing to the CO<sub>2</sub> emissions.
- No possibility to configure versions on the basis of their CO<sub>2</sub> emissions.
- No data about CO<sub>2</sub> fines that will be paid on each version, risking to approve prices with a completely different figure of what will be actually performed by that model.
- No possibility to track the annual contribution of the brands to the FCA's average CO<sub>2</sub> emissions in Europe.
- Taxes must be calculated manually outside from the tool, risking not to contemplate all of them or to mistake in their calculation.

- Wrong CO<sub>2</sub> taxes calculation for optional contents.
- Product configuration and costs changes must be fixed manually by pricing specialists on the ongoing proposals – which shouldn't be their responsibility – originating the risk of not being aligned and losing information in the way.
- Changes in the exchange rates must be updated manually.
- Not clear to realize which were the last prices approved for each version.
- Not clear valorization of the fuel type, the transmission, the traction, the trim level, the body type and the performance in order to make a consistent price walk between the different versions of a model.
- No information incorporated about previous take-rates of car versions and optional contents.
- No possibility to track changes made within the Excel files from one proposal to the other.
- There is no view incorporated to control the status of the price proposals in order to see in whose hands they are (e.g. Market, Pricing, Product Marketing, Finance or already approved).

All these issues produce waste of time for the pricing specialists who have to deal with these operative tasks instead of using their time in valuable activities or analysis which can improve the revenues and profits of the company, which should actually be their role.





## **Chapter 6 - How to Deal with WLTP Challenges?**

The aim of the last chapter of my thesis is to propose different courses of action that the company should follow in order to overcome the challenges introduced by WLTP and the CO<sub>2</sub> emission targets. Moreover, we will give an insight of the new pricing tool the company has been working on, in collaboration with a consulting company, in order to manage the price approvals taking into consideration the CO<sub>2</sub> emissions and solving some of the problems identified as weak points in the previous chapter.

### **6.1. Reducing the Range Complexity**

Given the fact that every variant of a model must undergo the WLTP test procedure, since that different equipment configurations and powertrains affect CO<sub>2</sub> emissions, it will be convenient for the company to reduce the range of versions of the cars offering. It has to be considered also that from 2020 the Group will start to launch their hybrid and electric vehicle versions – which take more time to test than the internal combustion engines – in order to be CO<sub>2</sub> compliant, so there are going to be even more versions in the range, giving the company no other option than simplifying the range of the ICE versions.

Otherwise, there will be undesirable bottlenecks at the agencies that perform the type-approval tests which will not allow OEMs a normal flow of their sales, as already happened in 2018 when all automakers required to certify their vehicles by September 1<sup>st</sup> to be legally sold in Europe and customers were not able to order cars since they had not been already approved. The problem doesn't end here, because if sales get stuck also the production will be interrupted as the company will not be willing to accumulate stock due to the costs that represents holding it (Automotive News Europe, 2018).

The simplification would need to affect also the range of the optional equipment offered as, from one side, they add more delay for the type-approval and, from the other side, make more difficult to determine the specific impact of every optional content in the CO<sub>2</sub> emissions – as they impact on weight, aerodynamics and/or rolling resistance – complicating in that way to rightly price them since that, in addition to the penalties for not compliance, they can impact on the final taxation of the vehicle. All these issues add a high level of complexity for the customer understanding when he is willing to buy a new car, which may affect his decision-making process if he finds it not that clear.

This last point will particularly affect the Group because it is currently offering a wide range of optional packages in contrast to Korean or Japanese OEMs whose strategy has always been offering a higher level of standard equipment than the European manufacturers but at a similar price. Not by chance other manufacturers as BMW or SEAT are already offering their cars with fewer equipment options and less engine variants (Fleet News, 2018).

We can predict that vehicles with fewer options may become more popular among customers looking for more affordable vehicles, while optionals raising weight and emissions without any significant improvement in performance will see a decline in their orderings. On the other hand, it is well-known that extras improving CO<sub>2</sub> emissions are turned into standard quickly, so we can expect a shift towards more simplified vehicles as standard (JATO Dynamics, 2017).

Therefore, the option offering should be reconsidered. A smart approach would be that of identifying which are the optional contents that customers give more importance to and bundling them together into clear packages which can be logically understood by the customers as well as bundling low impact optionals together in markets where a CO<sub>2</sub>-based taxation is applied.

From a marketing and pricing point of view, it will be of transcendental importance to position vehicles as eco-models, to give customers the impression of avoiding unnecessary tax liabilities and further costs (JATO Dynamics, 2017).

## 6.2. Pushing Less Polluting Versions

Despite the abrupt shift to gasoline that can be observed in sales trends after the Dieselgate scandal broke out in September 2015 (see Fig. 6.1), the best way for the company to accomplish

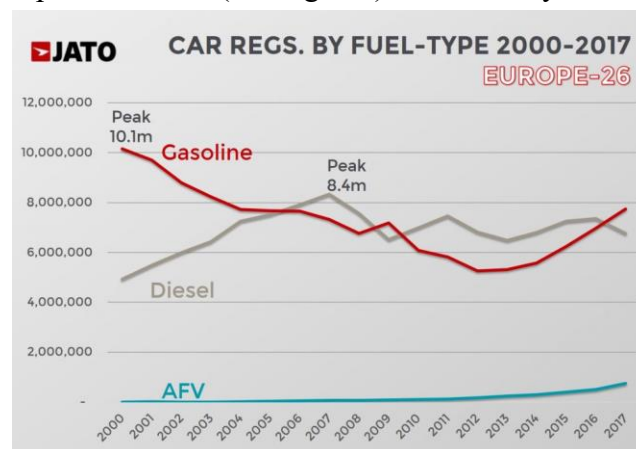


Figure 6.1: Cars registrations by fuel-type 2000-2017

the emission target will be that of pushing their less polluting versions which are precisely the diesel ones. Notwithstanding diesel cars are far more polluting in terms of NO<sub>x</sub> and particulate matter than gasoline ones, it is well known that the CO<sub>2</sub> emissions of the latter are way more higher. However, after the Dieselgate, “diesel” is nowadays perceived as a dirty word among car buyers.

Moreover, our gasoline supply is not going to last forever, but fortunately we can produce diesel from a vast range of natural products to create bio-diesel, which actually produces fewer emissions than gasoline and can be used in almost every diesel engine without any modification. Therefore, running out wouldn't be a problem (Seeker, 2012).

In any way, the company will have to find out a way to push the sales of the Diesel versions if it wants to survive to the huge CO<sub>2</sub>-fines present for not compliance. It can try to bypass the first wave through commercial actions on the Diesel while it waits for the launch of their new full hybrid, plug-in hybrid, mild hybrid and electric versions which are expected to improve the average new cars fleet CO<sub>2</sub> emissions.

We have to bear in mind also the fact that if the company can make it to develop, produce and sell cars with fewer CO<sub>2</sub> emissions than the 50 g/km target set by the European Commission before 2023, it will be able to claim for a reduction of up to 7,5 g in its CO<sub>2</sub> specific emissions target based on the super-credits scheme provided by the regulation (European Parliament and Council of the European Union, 2014b).

When we think about the traction it comes quite obvious that 4x4 versions consume more fuel than 4x2 ones since they weight more and add more friction. So, the smartest thing for the company would be that of decreasing its share of 4x4 vehicles, but this represents a contradiction for some brands of the Group, particularly for Jeep, which is completely associated to the concept of 4x4 and will be difficult to convince customers that now they should buy a 4x2 Jeep.

Another trend that can be observed is the global shift towards the SUV segments, accounting for a 19,2% sales increase in EMEA in 2017 with respect to the previous year (see Fig. 6.2). This fact means heavier cars on the streets and in consequence more polluting ones therefore representing a problem for the Group as it should think in promoting much lighter cars in order to diminish the average new car fleet CO<sub>2</sub> emissions.

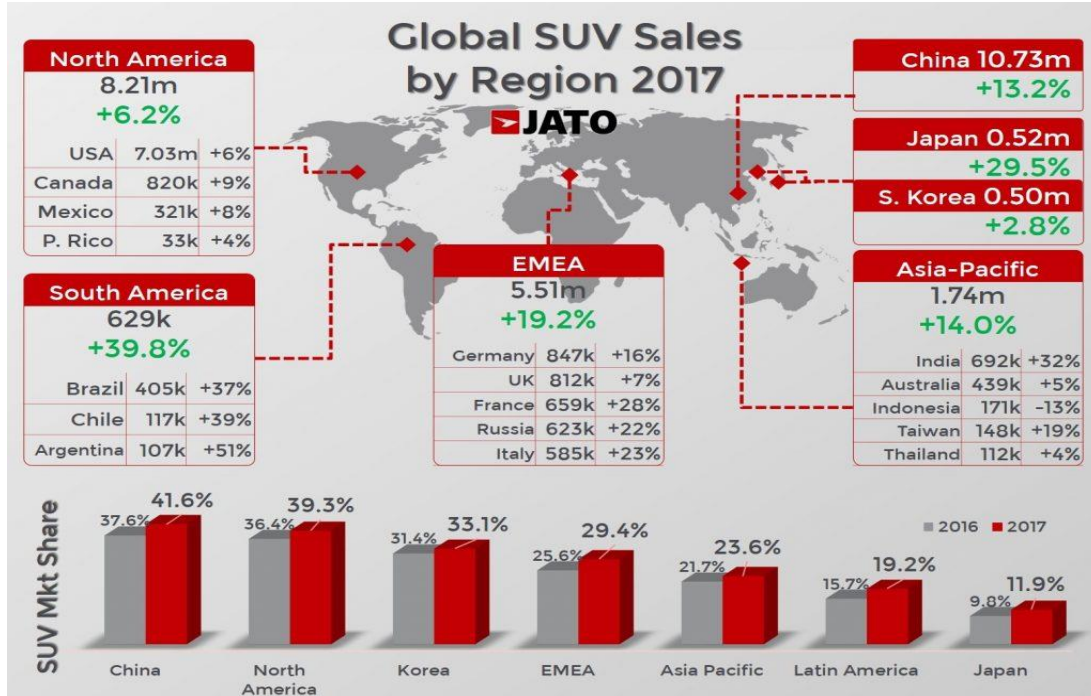


Figure 6.2: Global SUV sales by region in 2017

### 6.3. Eco-Innovating

As we already presented in Chapter 4, automakers can be awarded up to a 7 g CO<sub>2</sub> reduction on its CO<sub>2</sub> specific emission target by fitting new cars with approved eco-innovations helping to significantly reduce emissions which are not otherwise considered during the vehicle type-approval. Moreover, these technologies must be new to the market, meaning that for being considered they shouldn't have exceeded a market penetration of 3% in 2009.

For the purpose of measuring how much these technologies contribute to reduce the emissions, the vehicles are tested in a first step under modified conditions proposed by the

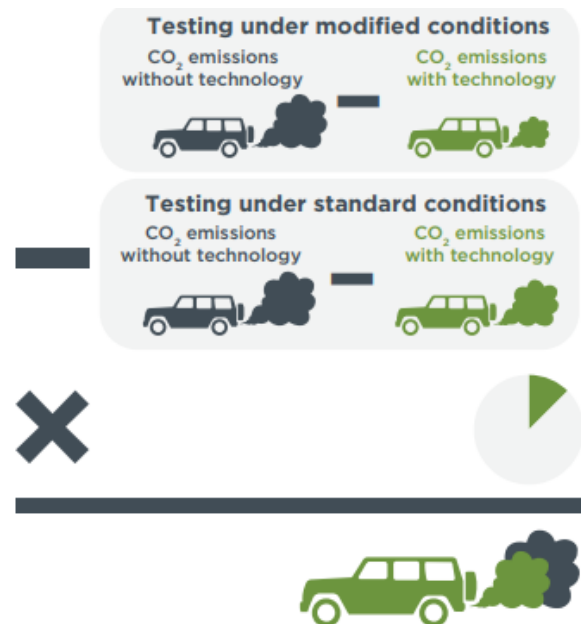


Figure 6.3: CO<sub>2</sub> savings calculation for eco-innovations

applicants, then tested under standard conditions in order to see the difference, and finally that value is multiplied by the usage factor depending on how often the technology is active during real world driving as illustrated by Figure 6.3 (ICCT, 2018).

Therefore, carmakers are incentivized to develop and uptake eco-innovations to meet the CO<sub>2</sub> targets. So, this is another warfront in which the company should work on since the only one eco-innovation that the Group has been given an approval at the moment is for the LED “E-Light”, which reduces CO<sub>2</sub> emissions by 1 g and was developed by Automotive Lighting Reutlingen, a Magneti Marelli’s division, while it can still work on the development of several other technology types, like thermal encapsulation or highly efficient alternators, as well as uptaking and fitting them on their new cars (see Tab. 6.1).

ID	Company	Description	Type
01	Audi	LED lights	Lights
02	Valeo	Efficient alternator	Alternator
03	Daimler	Engine compartment encapsulation system	Thermal
04	Bosch	Adaptive state of charge control in hybrids	Kinetic
05	Automotive Lighting Reutlingen	LED lights	Lights
06	DENSO	Efficient alternator	Alternator
07	Webasto Roof & Components	Solar roof	Solar
08	Bosch	Efficient alternator	Alternator
09	Bosch	Efficient alternator	Alternator
10	Daimler	LED lights	Lights
11	Asola Technologies	Solar roof	Solar
12	Mitsubishi Electric Corporation	Efficient alternator	Alternator
13	Porsche	Coasting function	Kinetic
14	DENSO	Efficient alternator	Alternator
15	Toyota	LED lights	Lights
16	Mitsubishi Electric Corporation	Efficient alternator	Alternator
17	Bosch	Efficient alternator	Alternator
18	Valeo	Efficient alternator	Alternator
19	MAHLE Behr	Enthalpy storage tank	Thermal
20	Honda	LED lights	Lights
21	Mazda	LED lights	Lights
22	Toyota	LED lights	Lights
23	a2solar	Solar roof	Solar
24	Valeo	Efficient alternator	Alternator
25	BMW	Coasting function	Kinetic

Table 6.1: List of approved Eco-Innovations

#### 6.4. Pooling with other Automakers

One of the other flexibilities provided by the regulation is the possibility for automakers to pool with other automakers in order to be compliant with the CO<sub>2</sub> emission target.

Estimations made by an NGO, called European Federation for Transport and Environment (T&E), say that, without considering the flexibilities given as super-credits and eco-innovation

	Without using flexibilities	With using flexibilities		
		Minimum level	Moderate level	Maximum level
Volvo	2017	2017	2017	2017
Mitsubishi	2018	2018	2017	2017
Toyota-Lexus	2019	2018	2017	2017
Daimler	2020	2019	2019	2017
Jaguar-Land Rover*	2020	2019	2019	2018
Peugeot	2020	2019	2018	2017
Citroën-DS	2020	2019	2018	2017
Nissan-Infiniti	2020	2019	2018	2017
Renault Group	2021	2020	2019	2017
Volkswagen Group	2022	2021	2020	2018
BMW Group	2023	2022	2021	2018
Ford	2023	2022	2021	2018
Suzuki*	2025	2024	2022	2020
Mazda*	2026	2024	2023	2021
Opel-Vauxhall	2027	2026	2024	2021
Kia	2028	2026	2025	2022
Subaru*	2028	2026	2025	2022
Honda	2029	2028	2026	2023
Fiat-Chrysler	2030	2028	2026	2022
Hyundai	2033	2030	2028	2024

\*Manufacturers with a niche derogation target

**Note:** dates before 2020 are illustrative – super-credits cannot be earned and used before 2020

Table 6.2: Estimated dates for CO<sub>2</sub> target accomplishment by pool

credits, half of the pools they established will be ready to meet the 2021 CO<sub>2</sub> target on time. Nonetheless, eight OEMs would be way late for meeting their targets, among which we find: Fiat-Chrysler, Hyundai-Kia and Opel-Vauxhall, as can be seen in Table 6.2 (European Federation for Transport and Environment, 2018).

In that way, in 2017 the PSA Group – at that time composed by Peugeot and Citroën-DS – took over Opel-Vauxhall, coming after almost two decades of crisis for the General Motors's European division. After this acquisition, the estimations provided by T&E assure that the PSA Group would be just one year later for the accomplishment of the CO<sub>2</sub> target, so that reducing significantly the potential fines for Opel-Vauxhall.

In a similar case, during 2018 there had been some rumors about Hyundai-KIA waiting for a decline in the price of FCA's shares to acquire the Group. That intention, among other factors, can be motivated in some way by the idea of pooling both groups together in order to reduce the potential fines for not compliance after 2020. Anyway, considering the date expectations for the Korean group to reach the CO<sub>2</sub> target, should be better for FCA to pool with another OEM

while a potential merge with Hyundai-KIA could help the Group to build a stronger position in Asia, decrease overcapacity and afford the huge investments needed for the development of its electric vehicles (Autoblog, 2018).

## **6.5. New Pricing Tool**

As we have evidenced in Chapter 5, the current pricing approval process was not able to deal with the challenges introduced by WLTP. So that, at the time of my arrival, the company started to develop, in collaboration with a consulting firm called Boston Consulting Group (BCG), a new pricing tool in which process I actively participated, supporting the development team with my expertise in the pricing function and proposing ideas to make the tool easier, more intuitive and more useful.

This new tool is based on an integrated software platform developed by BCG, which is called MSP Catalyst, standing for Marketing, Sales and Pricing, and performs advanced analytics that allow to make smart, data-driven decisions in all that functions while improving margins and market performance. Particularly, in the FCA case, the developed tool is thought to improve the Pricing function, but there are other departments as well that will be interpellated through it and they are: Finance, Product Planning and Product Marketing. Its most important features will be (BCG, 2019):

- Cloud-based platform to process big data.
- Powerful advanced analytics engine to build pricing models.
- Intuitive visualization tools for interactive visuals.
- Scenario models for pricing moves.
- Workflow management system to effectively manage pricing decisions and approvals.
- Long-term pricing enablement that continues to drive insights and impact well after the engagement with BCG has ended.

### **6.5.1. Overview of the application**

This tool was developed substantially to track the CO<sub>2</sub> emissions of the cars the company sells, and we will explore in which way it will work on this subject over the next subsection, but among the other ambitions this new pricing tool aims to offer we find:

- Faster performances for creating, discussing and approving price proposals thanks to its cloud-based platform where it brings together all the information necessary for the process.
- Collaboration between the different departments and business centers of the company involved in the process.
- Pre-filled data sources for volumes, version mixes, taxes, equipment configuration, and optionals take rates.
- CO<sub>2</sub> simulations to assess the impact of the optionals on the total emissions of different car versions while configuring them.
- Reporting dashboards to monitor performance and CO<sub>2</sub> emissions based on historical data.
- Automatic checks to evaluate the price proposals' alignment to the budgeted business plan and the financial forecasts.

#### 6.5.2. Tracking CO<sub>2</sub>

The introduction of WLTP made absolutely necessary to track the CO<sub>2</sub> emissions of the cars produced and sold by the company since from 2019 they will play a crucial role in the penalties that are going to be paid and so that in the Group's profits. The instrument used before in order to approve the vehicles prices didn't consider them, so it was not possible to continue working in that way.

The new pricing tool will import from the Product Grid, developed and provided into the system by Product Planning, the data of CO<sub>2</sub> emissions of the vehicles' base versions and it will then provide an estimation of the emissions of CO<sub>2</sub> relevant optional contents so that allowing pricing specialists to configure cars taking into account this important data (see Fig. 6.4). Therefore, when pricing specialists will set local standards on the cars, following any strategy to make the products more competitive or aligning them to the competition in different markets, they will see which is going to be the new picture regarding the total CO<sub>2</sub> emissions in order to evaluate if it makes sense to add them or not, considering the potential fines.



TASKFLOW	<input type="checkbox"/> Optional <input checked="" type="checkbox"/> Standard <input type="checkbox"/> Tassativo <input type="checkbox"/> Not Available			
PRICE BOOK INFO				
VERSION SELECTION	> Sincom - Special series			
OPTION CONFIGURATION	PVP Base Version		P20	P22
PRICE WALK	CO2 (BV + Tassativi)		138	144
PRICE SETTING	Tassativo cost		0	0
CHECKS				
	Code ↓	Description	Max Cost	CO2 (g/Km)
	- (290)			
	XTX	KEY FOB CONTROL POWER ...	30	-
	XPX	PARK & UNPARK P&P PARK A...	65	-

Figure 6.4: Vehicles' option configuration

These estimations will also help pricing specialists to evaluate how to price CO<sub>2</sub> relevant optionals as they may have an impact on the fines which would reduce the margins of the vehicles. For that purpose, the tool will calculate the CO<sub>2</sub> emissions of every version as follows:

$$CO_2 \text{ emissions}_i = CO_2 (BV + local \text{ std})_i \pm \sum estimated \text{ CO}_2 \text{ opt } i \times TR_{opt \text{ } i}$$

Being: "i" each car version, "BV" the vehicle's base version and "TR<sub>opt</sub>" the take rate of each optional

The tool will also provide an estimation of the potential fines on each version based on how far to the CO<sub>2</sub> target the cars will actually be.

$$Penalties_i = (CO_2 \text{ emissions}_i - CO_2 \text{ target}) \times 95 \frac{\text{€}}{\text{g CO}_2/\text{km}}$$

$$CM \text{ after CO}_2 \text{ compliance}_i = CM_i - Penalties_i$$

Being: "CM<sub>i</sub>" the contribution margin of each car version

All these calculations will support pricing specialists to set proper prices in order to be competitive but at the same time avoiding the Group to incur in huge amounts of fines and allowing its business activity to remain being profitable.

Moreover, the platform will provide CO<sub>2</sub> reporting dashboards where to assess the actual performance of the new cars registered in the different markets by each brand of the Group, based on historical data provided by Member States' monitoring schemes (see Fig. 6.5).

Weighted Average CO2(g/km) by Model/Country					
Model	AUSTRIA	BELGIUM	DENMARK	FINLANDIA	FRANCE
603-N.Cherokee	151	142		149	149
604-G.Cherokee	287	254	184	184	262
609-Renegade	139	136	122	150	130
664-Wrangler	231	232			242
665-Wrangler	249	240			261
674-Jeep C-Suv	142	138	146	160	137
680-Jeep C-Suv					
Grand Total	164	143	141	167	150

Table 6.3: CO<sub>2</sub> reporting dashboard by Model/Country

### 6.5.3. Improvements

In addition to the main reason for the development of this new pricing tool, which was detailed in the previous subsection, there are several other improvements that can be experienced through its utilization. These new features, that in some way face the weak points we've found in Chapter 5, are summarized by the following bullet points:

- Fully integration of the whole pricing approval process in a unique cloud-based platform which allows to process big amounts of data in a fast manner. This feature will solve several types of problems present before like the low working speed of desktop tools, the no possibility to track changes made on the ongoing price proposals or the uncertainty of who is the current owner of a specific price proposal.
- There won't exist the necessity to fix the Product Grid manually for pricing specialists since it will be full responsibility of Product Planning to upload the official latest one into the platform. The only responsibility for Pricing will be that of setting into "live" the latest Grid as told by Product Planning. This action will automatically update the data on all the price proposals on progress, but it will not modify those that have been already approved.
- Pricing will not be any longer responsible for updating the costs in V99 for the ongoing price proposals since that Finance will take full responsibility of it. As well as for the Product Grid, when the new V99 will be upload into the system it will appear a pop-up to notify pricing specialists that there has been made changes on the costs, affecting just the price proposals on progress but not those that have been already approved.

- Finance will be also responsible for updating in the system the exchange rates for the different non-euro currency markets in which the company operates.
- There will not be any longer errors at the time of calculating taxes manually, since the tool will automatically fill them appropriately for each different market.
- The tool presents a new way to price the vehicles starting from the very base version of a model and allowing to clearly define the price steps in terms of: fuel type, body type, engine size, trim level and will possibly incorporate later on the possibility to price transmission type and traction type, as suggested by myself. In that way, it creates a logic and consistent price walk, which can also be modified.
- It provides the possibility to pre-fill some fields of the price proposal with information that is integrated in the platform in order to allow the pricing specialists to create a consistent price proposal. Some examples can be: filling the expected volumes and version mixes based on what validated at the business plan, configuring the special series of a model according to the product catalogue or filling the different optionals' take rates based on the actual customer orders for a chosen period.
- Makes it easier to perform some checks before sending the price proposals to Finance for their approval, offering the possibility to compare some important KPIs like contribution margins or total discounts with the business plan validated at budget and its subsequent forecasts.



## Conclusions

I am very grateful to FCA for having allowed me the opportunity of having done my first professional experience because I remember that, at the time in which I applied, I was just thinking about the possibility of adding one line more to my CV while improving my computer and Italian language skills, while I actually ended the internship having achieved, not only that initial objectives, but also having: a deep understanding of the automotive sector; commercial awareness; plenty of new knowledge about marketing activities; ability to work under pressure and to tight deadlines thanks to a good time management; and improved communication and interpersonal skills.

In what regards to my personal contributions I can say that I feel very proud of knowing that the activity I carried out in these months had positively impacted in the company's profits thanks to the efforts I made in order to raise revenues and margins in each price proposal I managed. Moreover, I can point out the several opportunities in which I provided my boss with valuable information that allowed him to make decisions, as well as my participation and insights in the development of the new pricing tool, or the support I've given to new colleagues on the tasks they were supposed to carry out as pricing specialists to agile their insertion in the team.

If I had to suggest something to improve the day-to-day running of the department that would be the implementation of a clear procedures and functions manual consisting of all the activities that a pricing specialist is supposed to carry out, so that to allow a faster insertion for future employees or trainees in order to provide value for the company as soon as possible.

At the beginning of the internship, I spent about two months to gain expertise in the function. Once I felt comfortable in the position, I started looking for a possible thesis topic and it took me about another month to define it properly. By the time I was looking for it, everybody was talking about WLTP and I understood that there was a big issue around it. After doing some previous research I found that the issue was worth to be studied because there was a big economic risk threatening the company. So, approaching to extract conclusions from my thesis, we should start remembering which was the question that motivated this study, and that question was: "How to adapt the FCA's operations, and particularly the pricing function, to the challenges introduced by WLTP?".

Therefore, in order to answer it, I developed a methodology of study which consisted in: a literature search to be aware of the legislation in force, some in-depth interviews with

representatives of the different departments to better understand the pricing approval process and the implications of the legislation at issue, and a series of focus groups to think about a new tool that can deal with the identified issues.

I would have liked to have more time at work to perform my research and also being given more attention from the personnel when it comes to provision of material or the availability for on-site meetings regarding my project work but, despite their full willingness to help me, for obvious reasons of confidentiality and full working agendas I had to conduct most of the study during after-working hours and disregarding some information.

Anyway, I managed to find all the information that I needed to have a full picture of the issues the company is facing, regarding the new regulations on topic, which allowed me to draw some conclusions.

It results noticeable that FCA will have to improve in a great manner its annual reduction rate of average CO<sub>2</sub> emissions to meet the 2021 target since that, as of the end of 2017, the Group was 29 grams far from its specific emission target, needing a reduction rate of 6,7%/year while the historical data shows that, from the agreement on standards in 2008, the historical reduction rate of all automakers has been equal to 2,9%/year. This fact brings us to give even more validity to the study we have presented in this thesis which estimates that the company will incur in fines in the order of the 1€ billion by 2021.

Therefore, it will lay on pricing specialists the responsibility of assessing the tradeoff between the cost of the fines and the profits that can be obtained through the sale of optional equipment as well as that of driving competitiveness considering CO<sub>2</sub> taxation. And, at a more strategical level, to make use of the flexibilities provided by the regulation by means of investing in zero and low emissions cars and eco-innovations, in addition to evaluating the possibility to pool with other automakers in order to act jointly in pursuance of the emission target, so as to mitigate the effects of the new regulations.

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## Appendix 1 – CO<sub>2</sub> based motor vehicle taxes in the EU



European  
Automobile  
Manufacturers  
Association

### CO<sub>2</sub> BASED MOTOR VEHICLE TAXES IN THE EU

AUSTRIA	<p>A deduction of VAT is applicable for zero-CO<sub>2</sub> emission passenger cars.</p> <p>Fuel consumption/pollution tax (<i>Normverbrauchsabgabe</i> or <i>NoVA</i>) is levied on the purchase of a new car. It's calculated as follows: [(CO<sub>2</sub> emissions in g/km minus 90) divided by 5] minus NoVA deduction, plus NoVA malus fee (ie €20 for each g/km of CO<sub>2</sub> emission exceeding 250g/km).</p> <p>The company car tax is also based on CO<sub>2</sub> emissions.</p>
BELGIUM	<p>Registration tax:</p> <ul style="list-style-type: none"> <li>in Flanders is based on CO<sub>2</sub> emissions as well as fuel, age and emission standards.</li> <li>The Walloon Region operates a CO<sub>2</sub>-based bonus/malus system whereby cars emitting 146g/km or more pay a penalty (max €2,500 for cars emitting more than 255g/km).</li> </ul> <p>The Flemish Region applies an environmental correction on the annual circulation tax depending on CO<sub>2</sub> emissions, fuel type and emission standards. The Flemish Government also grants a so-called Ecology Premium to companies that invest in environmentally friendly and/or energy-efficient technologies (<a href="http://www.ecologiepremie.be">www.ecologiepremie.be</a>).</p> <p>The deductibility under corporate tax of expenses related to the use of company cars is linked to CO<sub>2</sub> emissions.</p>
BULGARIA	None
CROATIA	The first registration of a motor vehicle is subject to the payment of a special tax based on vehicle's purchase price, CO <sub>2</sub> emissions and fuel type.
CYPRUS	The registration tax and the annual road tax are based on CO <sub>2</sub> emissions.
CZECH REPUBLIC	Not CO <sub>2</sub> -based but a surcharge is levied in addition to the registration tax for vehicles not complying with at least Euro 3 emission standard.
DENMARK	<p>The annual circulation tax ("Green owners tax") is based on fuel consumption:</p> <ul style="list-style-type: none"> <li>Petrol cars: semi-annual rates vary from DKK 330 (Danish Kroner) for cars driving at least 50km per litre of fuel to DKK 11,430 for cars driving less than 4.5km per litre of fuel.</li> <li>Diesel cars: semi-annual rates vary from DKK 130 for cars driving at least 56,3km per litre of fuel to DKK 16,720 for cars driving less than 5.1km per litre of fuel.</li> <li>LNG or biogas cars: rates are the same as for diesel cars.</li> </ul>
ESTONIA	None
FINLAND	<p>The registration tax is based on CO<sub>2</sub> emissions: rates vary from 3.3% to 50%. The tax will be reduced in four steps between 2016 and 2019 for cars with CO<sub>2</sub> emissions of 141g/km or less.</p> <p>The annual circulation tax is based on CO<sub>2</sub> emissions for cars registered since 1 January 2001 (total mass up to 2,500 kg) or 1 January 2002 (total mass above 2,500 kg) respectively and for vans registered since 1 January 2008. Rates varies from €106.21 to €654.44.</p> <p>The excise duties for road traffic fuels are dependent on the energy content and CO<sub>2</sub> emissions of the fuel.</p>
FRANCE	<p>CO<sub>2</sub> based bonus-malus system (as of 1 January 2018):</p> <ul style="list-style-type: none"> <li>The malus is set from €50 (from 120 g CO<sub>2</sub>/km) to €10,500 (for 185g CO<sub>2</sub>/km or more).</li> <li>Only vehicle (passenger car or LCV) emitting 20g CO<sub>2</sub>/km or less are eligible for the bonus. The amount of the bonus is €6,000.</li> </ul> <p>An additional bonus of €200 is granted when a vehicle of at least 15 years old is scrapped. An additional scrapping scheme is in place for diesel cars registered in 2006 or before (the maximum bonus is €2,500 for emissions of 20g CO<sub>2</sub>/km or less). For passenger cars registered for the first time in France as from 1 January 2009, an annual tax is introduced according to CO<sub>2</sub> emissions.</p> <p>The company car tax is based on CO<sub>2</sub> emissions. Tax rates vary from €2 for each gram emitted between 50g/km and 100g/km to €27 for each gram emitted above 250g/km.</p>

GERMANY	The annual circulation tax for cars registered as from 1 July 2009 is based on CO <sub>2</sub> emissions. It consists of a base tax and a CO <sub>2</sub> tax. The base tax is €2 per 100cc (petrol) and €9.50 per 100cc (diesel) respectively. The CO <sub>2</sub> tax is linear at €2 per g/km emitted above 95g/km. Cars with CO <sub>2</sub> emissions below 95g/km are exempt from the CO <sub>2</sub> tax component.
GREECE	The registration tax is based on CO <sub>2</sub> emissions. The CO <sub>2</sub> emissions coefficient varies from 0.95 – for vehicles emitting up to 100g/km – to 2.00 for vehicles emitting more than 250g/km.  The annual circulation tax for cars registered after 31 October 2010 is based on CO <sub>2</sub> emissions. Rates vary from €0.90 per gram of CO <sub>2</sub> emitted (91–100g/km) to €3.72 per gram (251g/km or more). Cars with emissions up to 90g/km are exempt.
HUNGARY	Not CO <sub>2</sub> -based but the registration tax is based on environment protection classes in accordance with EU emission standards.
IRELAND	The registration tax is based on CO <sub>2</sub> emissions. Rates vary from 14% for cars with CO <sub>2</sub> emissions of up to 80g/km to 36% for cars with CO <sub>2</sub> emissions of 226g/km or more.  VAT is deductible for cars registered after 1 January 2009 with CO <sub>2</sub> emissions lower than 156g/km and which are primarily used (at least 60%) for business purposes.  The annual circulation tax for cars registered since 1 July 2008 is based on CO <sub>2</sub> emissions. Rates vary from €120 (0g/km) to €2,350 (226g/km or more).
ITALY	None
LATVIA	For passenger cars registered after 31 December 2009, road traffic tax is calculated by CO <sub>2</sub> emissions. Rates vary from €12 (51–95g/km) to €756 (more than 350g/km).
LITHUANIA	None
LUXEMBOURG	The annual circulation tax for cars registered after 1 January 2001 is based on CO <sub>2</sub> emissions. Tax rates are calculated by multiplying the CO <sub>2</sub> emissions in g/km with 0.9 for diesel cars and 0.6 for cars using other fuels respectively and with an exponential factor (0.5 below 90g/km and increased by 0.1 for each additional 10g CO <sub>2</sub> /km).
MALTA	The registration tax is calculated as follow: sum of a percentage value (depending on CO <sub>2</sub> emissions) multiplied by the CO <sub>2</sub> emissions value (in g/km) multiplied by the registration value (RV) of the vehicle, plus the indicated percentage value multiplied by the length (in mm) multiplied by the registration value (RV) of the vehicle.  The annual circulation tax is based on CO <sub>2</sub> emissions and vehicle's age. During the first five years, the tax only depends on CO <sub>2</sub> emissions and varies from €100 for a car emitting up to 100g/km to €180 for a car emitting between 150g/km and 180g/km.
NETHERLANDS	The registration tax ( <i>Belasting Personenauto's Motorrijwiel</i> or <i>BPM</i> ) is calculated based on CO <sub>2</sub> emissions. Rates vary from €2 (between 1 and 73g CO <sub>2</sub> /km) to €458 (for 163g CO <sub>2</sub> /km and more). Cars with zero CO <sub>2</sub> emissions are exempt. As of 1 January 2018, a fixed BPM surcharge of €356 is applicable for all new passenger cars sold that have CO <sub>2</sub> emissions of 1g/km or more. Furthermore, a diesel surcharge is applicable to vehicles with CO <sub>2</sub> emissions of more than 63g/km (€87.38 in 2018).  As of 1 January 2016, the rates of road tax (ACT) are established based on CO <sub>2</sub> emissions, Gross Vehicle Weight, fuel type and region (province).  The company car tax is based on CO <sub>2</sub> emissions (if private use exceeds 500km per year). Rates vary from 4% of the vehicle's catalogue value (for cars emitting 0g CO <sub>2</sub> /km) to 22% (for all the other cars).
POLAND	None
PORTUGAL	The registration tax is based on engine capacity and CO <sub>2</sub> emissions. Rates are calculated as follows: <ul style="list-style-type: none"> <li>• Lowest rates: petrol cars emitting less than 100g/km pay € [(4.18 x CO<sub>2</sub>) – 386.00]; diesel cars emitting less than 80g/km pay € [(5.22 x CO<sub>2</sub>) – 396.88]</li> <li>• Highest rates: petrol cars emitting more than 195g CO<sub>2</sub>/km pay € [(185.91 x CO<sub>2</sub>) – 30,183.74]; diesel cars emitting more than 160g pay € [(242.65 x CO<sub>2</sub>) – 30,235.96].</li> </ul> The annual circulation tax for cars registered after 1 July 2007 is based on CO <sub>2</sub> emissions and cylinder capacity.

ROMANIA	<p>A three-year fleet renewal scheme was launched in May 2017. It includes a scrappage program and incentive bonuses as follows:</p> <ul style="list-style-type: none"> <li>• A scrappage bonus of €1,500 is granted for scrapping a vehicle older than eight years and for the acquisition of a new vehicle with CO<sub>2</sub> emissions lower than 130g/km.</li> <li>• A scrappage bonus of €1,500 as well as an Eco-bonus of €250 (total €1,750) are granted for scrapping a vehicle older than eight years and for the acquisition of a new vehicle with CO<sub>2</sub> emissions lower than 98g/km.</li> <li>• A subvention of €10,000 is granted for the purchase of a new pure electric vehicle to which €1,500 can be added for scrapping a vehicle older than eight years.</li> <li>• A subvention of €4,500 is granted for the purchase of a new hybrid vehicle.</li> </ul>
SLOVAKIA	Not CO <sub>2</sub> -based but highway fees for the use of specified sections of motorways and expressways are based on Euro emission classes.
SLOVENIA	The registration tax is based on price and CO <sub>2</sub> emissions. Rates vary from 0.5% (petrol) and 1% (diesel) respectively for cars emitting up to 110g CO <sub>2</sub> /km to 28% (petrol) and 31% (diesel) respectively for cars emitting more than 250g CO <sub>2</sub> /km.
SPAIN	<p>The Special Tax (<i>IEDMT, Impuesto Especial sobre Determinados Medios de Transporte</i>) applied on the first registration is based on CO<sub>2</sub> emissions. Rates vary from 4.75% (121-159g/km) to 14.75% (200g/km and more).</p> <p>In 2016 a reduction in the payment of the company car tax apply to Euro 6 vehicle emitting less than 120g CO<sub>2</sub>/km, as well as to alternative powertrain cars.</p>
SWEDEN	<p>A new bonus-malus system for incentives and taxation of light vehicles (cars and light trucks/buses) will be introduced from 1 July 2018. New vehicle registered will receive a bonus up to maximum SEK 60,000 depending on CO<sub>2</sub> emission.</p> <p>The annual circulation tax is based on CO<sub>2</sub> emissions for both cars and trucks. Under the new bonus-malus system introduced, new cars and light trucks/buses registered from 1 July 2018 will pay a higher annual road tax (malus) the first three years based on CO<sub>2</sub> emissions.</p>
UNITED KINGDOM	<p>The annual circulation tax for cars registered after March 2001 is based on CO<sub>2</sub> emissions. For standard cars rates range from £0 (up to 100g/km) to £535 (above 255g/km). Additionally, a first-year rate of registration applies since 1 April 2010. Rates vary from £10 (from 1 to 50g/km) to £2,000 (more than 255g CO<sub>2</sub>/km). Alternative fuel cars receive a £10 discount on the paid rates.</p> <p>The individual's company car tax liability is set according to the CO<sub>2</sub> emissions ratings (g/km) of the car and its fuel type.</p>