



The impact of global sustainability trends on the Automotive sector and Motorsport's role in supporting the industry's adaptation to these pressures

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After graduating from Nottingham University Business School in 2011, Joey spent 4 years within the Strategy & Operating Model practice of Capgemini Consulting, advising blue-chip organisations on areas including growth strategy, operational strategy and organisational design.

Having grown up competing as a junior driver, Joey followed his passion and left corporate consulting in 2015 to pursue opportunities within the motorsport industry.

As an independent consultant, Joey then led the development of the Motorsport Industry Growth Strategy alongside the Motorsport Industry Association (MIA), before completing the full-time MBA at Cranfield.

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Executive Summary

The automotive industry currently faces a number of sustainability challenges:

Urbanisation: Increasing population density within towns and cities is both increasing the pressure on automotive manufacturers to reduce harmful pollutants and forcing a change in the nature of vehicle ownership due to increased congestion.

Climate change: As a contributor of 15% of global CO2 emissions, the automotive industry is coming under increasing pressure to reduce greenhouse emissions.

Population Growth & Resource Scarcity: The automotive industry is having to significantly reduce its utilisation of scarce resources such as energy and water as scarcity is exacerbated through rapid population growth.

What is already being done within the automotive industry?

Urbanisation: Levels of air pollutants are being tackled in the immediate term through reduction in overall fuel consumption. Shared mobility solutions such as ZipCar are also changing the automotive ownership model to suit the urban environment.

Climate Change: Alternative fuels are already entering the market place with new entrants such as Tesla and traditional manufacturers such as BMW offering electric solutions. Audi is also pioneering its own 'eFuels' which look to use renewable alternatives to power traditional internal combustion engines.

Population Growth & Resource Scarcity: BMW is leading the way in the management of resources, committing to a reduction in the use of key resources by 45% by 2020.

What is motorsport's role in a sustainable future?

Motorsport teams and suppliers provide cutting-edge capabilities that can support development of innovative solutions, and motorsport competition provides an ideal proving-ground. There is an opportunity to align motorsport to the sustainability priorities of the automotive industry through a mixture of regulation and competition-based incentivisation initiatives:

Sustainability Challenge	Motorsport Sustainability Recommendation
Urbanisation	Formally restrict motorsport emissions levels through technical regulations
Climate Change	Create 'zero emission' classes in existing multi-class categories
	Transition to a zero emission target in leading motorsport series such as Formula 1
Population Growth & Resource Scarcity	Implement a sustainability reporting framework for teams, and incentivise adherence through competition.

These recommendations will require effective collaboration between motorsport's primary stakeholders: Teams, suppliers, governing bodies (e.g. FIA) and series organisers. However, if this can be achieved there is the potential for motorsport to significantly accelerate the automotive industry's drive for sustainability.

1. The Drive for Change

The last few weeks have marked the beginning of the end for one of the longest running leaderships in professional sporting history – Bernie Ecclestone's rein at the top of Formula 1.

Having taken control of the sport 40 years ago, Ecclestone is widely regarded as having masterminded the rise of the sport from a past-time for wealthy enthusiasts to a global phenomenon embraced by 400 million fans worldwide.

The sport is now closing in on a takeover deal by US mass media giant Liberty Media that would value the sport at \$8.5bn. To put that in to perspective, Lucasfilm, the owner of both the Indiana Jones and Star Wars movie franchises, sold to Disney for *just* \$4bn in 2012.¹ At 85 years old, Ecclestone is set to finally put in motion his departure from the head of the sport, and for the first time in recent memory Formula 1 has the opportunity to significantly refocus.

The modern era of Formula 1 has become synonymous with automotive technological advancement. It continues to have the support of a number of global automotive manufacturers as a result. However, in recent years a drive for cost reduction in the sport has meant the rule book has continued to grow. Increasingly tight technical regulations have given way to incremental rather than radical innovation.

The change in ownership may now provide the catalyst that is required to reignite radical innovation in the sport. One crucial benefactor of this must be the automotive sector and its efforts to become a truly sustainable industry.

2. Background and Context

The automotive industry

The global automotive industry is a major contributor to the world economy. In 2015 it was estimated that global industry revenues exceeded \$3.5 trillion and are set to grow at a rate of 4.4% per annum through to 2030.²

However, as the sector seeks continued growth the drive for sustainability will become an ever increasing influencer of how the industry operates. Three

¹<http://www.forbes.com/sites/csylt/2016/10/16/how-bernie-ecclestone-steered-f1-to-make-1-billion-more-than-star-wars/2/#15168f877387>

² McKinsey&Company, *Automotive revolution – Perspective towards 2030*, January 2016

broad sustainability issues in particular are shaping the future of the industry: *Urbanisation, climate change and population growth & resource scarcity.*

Urbanisation (the increase in the proportion of people living in towns and cities) is already influencing the industry. As the population density of towns and cities increases so does the air quality impact of the associated rise in vehicle usage. The nature of vehicle usage also changes as consumers no longer require a vehicle to transport them long distances and instead seek more flexible transport for shorter commutes.

Climate change continues to be a major consideration for businesses within the automotive industry. It is estimated that the automotive industry is responsible for around 15% of global carbon emissions- around 8 billion metric tonnes a year³. The automotive industry will therefore need to accelerate efforts to reduce its environmental impact and therefore create a sustainable platform for the industry to grow.

Finally, **population growth** and its effects on **resource scarcity** will put pressure on what is already a resource intensive industry. Both the manufacturing of vehicles and fuel required for their use by consumers draws heavily on the world's finite resources. Rapid population growth and therefore increase in vehicle usage will continue to exacerbate these issues.

The need to put in place proactive sustainability efforts is well known. Within the UK 87% of businesses already have programmes in place. However, in emerging and developing economies where much of global automotive growth is predicted to take place it is less common. This figure drops to 65% for China and 49% for Brazil.⁴

The automotive industry's relationship with motorsport

Since its inception motorsport has maintained close ties to the automotive industry. Motorsport began as a primarily marketing-focused venture from automotive manufacturers. 'Race on Sunday – Sell on Monday' is a well-known phrase within the industry, eluding to motorsport's power of influence over automotive consumers. Motorsport continues to act as a platform for automotive manufacturers to demonstrate the capability of their products on a global stage.

However, in recent years motorsport has increasingly taken on an arguably more influential role. That of a test-bed for automotive technology and innovation. Competitive motor racing provides the ideal environment, and race teams the ideal capabilities, for the automotive industry to rapidly develop and test technological innovations in the harshest of environments. These innovations can then be directly applied to the vehicles they sell to everyday consumers.

³ <http://www.pwc.com/gx/en/industries/automotive/sustainability.html>

⁴ <https://www.carbontrust.com/media/227059/business-resource-crunch-infographic-carbon-trust.pdf>

Purpose of this paper

With the automotive industry being pressured to build a more sustainable future, motorsport will need to play a fundamental role in accelerating the innovation required for the industry to achieve it. This paper will therefore look to provide insight on two key topics:

1. To understand how sustainability trends are impacting the automotive sector and how manufacturers are already taking action.
2. To understand how motorsport can support the automotive sector in tackling these sustainability issues.

3. Sustainability Trends

3.1 Urbanisation

People are moving in to towns and cities at an ever increasing rate. It is estimated that by 2030 60% of the population will live in cities, 1.4 billion more than today.⁵

This movement does provide some opportunity for automotive firms. Increased economic prosperity that goes hand-in-hand with urban dwelling provides more purchasing power, and vehicles are likely to remain one of these key purchases. The global automotive market is due to produce 120 million vehicles in 2016, nearly 50% more than 2015⁶.

However, two key sustainability issues arise from urbanization – *pollution and congestion*.

Pollution: Increased population densities in cities have seen incidences of critical pollution levels rise. Beijing issued two pollution ‘red alerts’ in 2015⁷ which enforce temporary restrictions on vehicle use, factories and construction work. More recently, Mexico City temporarily ordered 1.1 million vehicles off the road in an immediate attempt to control levels of harmful pollutants.

Automotive Challenge 1: There will be increasing pressure on automotive manufacturers to ***rapidly decrease their vehicles’ contribution to air pollutants***

Congestion: As urbanization increases and inner-city congestion builds, the need for consumers to have the long-distance capability of their own vehicle declines. Consumers are already moving away from driving. In 2010, 69.5% of 19 year olds in the U.S. had a driver’s license, compared to 87.3% in 1983.⁸

⁵ *How to make a city great*, McKinsey & Company, 2013

⁶ IHS Automotive, Light Vehicle Sales Forecasts, 2016

⁷ <http://www.bbc.co.uk/news/world-asia-china-35129258>

⁸ <http://www.bloomberg.com/news/articles/2014-02-24/woes-of-megacity-driving-signals-dawn-of-peak-car-era>

The use of vehicles is becoming an increasingly service-based proposition instead of an ownership-led model. Global car sharing is now growing at double the rate of new car sales⁹, as shared mobility becomes increasingly appealing in crowded environments.

Automotive Challenge 2: Urbanisation's affect on consumers' preferred modes of transport and ownership models will also force the automotive industry to ***change its ownership model to suit urban living.***

3.2 Climate change

Failure to mitigate against and adapt to climate change has been named as the risk of the largest impact to the world by the World Economic Forum.¹⁰ As a large contributor of carbon emissions the automotive industry is one of the sectors that are held to account by the Kyoto Protocol – an international treaty to reduce greenhouse gases. This is now heavily influencing automotive emissions regulations. For example, the most recent European emissions regulation, Euro 6 Emissions Standards, commit manufacturers to reducing emissions by 30% by 2020.

Automotive Challenge 3: Manufacturers will need to ***accelerate their exploitation of sustainable fuels*** in order to meet increasingly stringent emissions regulations.

However, influencing the supply-side is only one issue of tackling vehicles' impact on the environment. There is also a need to create a consumer demand for low-emissions vehicles.

Automotive Challenge 4: Manufacturers will also need to focus on ***building consumer demand for sustainability.***

3.3 Population Growth and Resource scarcity

Population growth is a significant future challenge to the global economy. Between now and 2050 the global population is expected to increase from 6.9 billion to 9 billion.¹¹

This rapid increase in population will mean a need for 50% more energy, 40% more water and 35% more food by 2030¹² all with falling cultivated land per person.

⁹ Innovative Mobility Car Sharing Outlook, University of California Berkley, 2013

¹⁰ The Global Risks Report 2016, World Economic Forum, 2016

¹¹ World Business Council for Sustainable Development, Vision 2050: The new agenda for business

¹² National Intelligence Council: Global Trends 2030: Alternative Worlds

The automotive industry is a major draw on the world's resources. Transportation, of which the automotive industry plays a major role is accountable for 20% of the world's total energy use¹³. The industry also uses water intensively throughout the manufacturing process. It is estimated that producing a car uses 39,000 gallons of water.¹⁴

Automotive Challenge 5:The industry must seek sustainable *reduction in resource usage throughout the full life-cycle of automotive products*

4. What is already being done within the automotive sector?

We have been able to identify five fundamental challenges faced by the sustainable automotive manufacturers of the future:

Sustainability Theme	Automotive Sustainability Challenge
Urbanisation	1) Rapidly decrease contribution to air pollutants
	2) Change of ownership model to suit urban living
Climate Change	3) Accelerated exploitation of sustainable fuels
	4) Building of consumer demand for sustainability
Population Growth & Resource Scarcity	5) Reduction of resource usage throughout the full life-cycle of automotive products

Automotive manufacturers are already putting in place initiatives to improve the sustainability of the industry across each of these areas.

¹³<https://www.eia.gov/tools/faqs/faq.cfm?id=447&t=3>

¹⁴<http://www.automotiveworld.com/analysis/water-water-everywhere-vehicle-manufacturing/>

4.1 Urbanisation

Automotive Challenge 1: Rapidly decrease contribution to air pollutants

BMW, the sectoral leader of sustainability practices¹⁵, have been focusing heavily on reducing CO2 emissions. One way it does this is through reducing overall fuel consumption through what it calls 'Efficient Dynamics Technologies'. These include engine and gearbox efficiencies as well as aerodynamic drag reduction.

Automotive Challenge 2: Change of ownership model to suit urban living

Urbanisation may be changing consumers preferred ownership models, but this provides a significant revenue opportunity for traditional manufacturers.

Dedicated car sharing offerings are already in the market such as Zipcar. However, automotive manufacturers are beginning to utilise the opportunity. BMW have already entered a joint venture with rental company Sixt to take advantage of the rise of shared mobility and have launched DriveNow. Audi is also trialing its similar 'Audi unite' initiative in Stockholm.

4.2 Climate Change

Automotive Challenge 3: Accelerated exploitation of sustainable fuels

Many vehicle manufacturers are now looking to electric as a future power source of vehicles. All-electric new entrants such as Tesla are already gaining traction. Established manufacturers who have historically relied on the fossil-fuel powered internal combustion engine are now also investing heavily in electric. BMW again lead the way having already successfully launched the i3 and i8 models with a plan in place to launch a further four plug-in / hybrid models through 2015 and 2016.

Despite growth of sales, electric cars still only accounted for 0.1% cars by the end of 2015, leaving a huge volume of fuel burning vehicles on the world's roads.

Audi are now focused on tackling this through the development of its eFuels which uses electricity from renewable sources (such as wind, solar and hydropower) and using it to produce water via a process called reversible electrolysis.

Automotive Challenge 4: Building consumer demand for sustainability

Consumer demand for sustainability from automotive manufacturers is still mixed. In its most recent sustainability report, BMW recognized contradictions between its consumer expectations of sustainability and their individual

¹⁵ Dow Jones Sustainability Index, 2016

preferences.¹⁶In a recent study it was also found that only 47% of adults in the UK believe individual efforts to minimise climate change are worthwhile.¹⁷

Government subsidies for adoption of electric vehicles such as those in the UK and the rise of fashionable new entrants such as Tesla are beginning to help alternative fuelled vehicles penetrate the market. However, it is clear that consumer demand remains a significant challenge in driving long-term sustainability across the industry.

4.3 Population Growth & Resource Scarcity

Automotive Challenge 5: Reduction in resource usage throughout the full life-cycle of automotive products.

Water has been a major focus in the strive to reduce automotive's use of resources. In 2000, Ford launched its Global Water Management initiative and in the decade that followed reduced its water usage by 62%. McLaren is also a pioneer within the industry with its use of 'ecology lakes' at its headquarters in Woking which use a closed loop system to cool high temperature manufacturing equipment.

BMW have committed to reducing its consumption of a range of key resources (energy, water, waste and solvents) by 45% by 2020. Much of this will be achieved through Life Cycle Engineering of its products. This includes both the use of recycled materials in initial production as well as end-of-life vehicle recovery through its dedicated recycling and disassembly centre.

5. How can the motorsport industry support the drive for sustainability?

Motorsport is well placed to provide a platform for rapid development and prototyping of innovative solutions that can be subsequently leveraged by the automotive industry in the drive for a sustainable future.

5.1 Urbanisation

Automotive Challenge 1: *Rapidly decrease contribution to air pollutants*

In recent years certain motorsport categories have progressed in reducing levels of harmful emissions. From the start of 2014 Formula 1 teams were required to use 1.6 litre turbocharged engines in place of the 2.4 litre V8 engine used for the preceding 8 years. This led to a 35% reduction in fuel use with negligible effect of power output and associated reductions in emissions¹⁸.

Motorsport Opportunity: There is an opportunity for motorsport series to more formally restrict emissions outputs within technical regulations. Emission

¹⁶ BMW Sustainability Report, 2015

¹⁷ <http://www.theguardian.com/sustainable-business/motivates-consumers-environmental-ethical-decisions>

¹⁸ https://www.formula1.com/content/fom-website/en/championship/inside-f1/understanding-f1-racing/Energy_Recovery_Systems.html

reducing innovations born out of such regulations could then be transferred for wider use within the automotive industry.

5.2 Climate change

Automotive Challenge 3: Accelerated exploitation of sustainable fuels

Motorsport has already begun to pioneer racing with alternative power sources. Formula E, the world's first all-electric racing series, is gaining significant support. Renault, Audi, Citroen and Jaguar all field teams in the current championship year, with both BMW¹⁹ and Mercedes²⁰ eyeing up future involvement. GT racing has also more recently seen a move towards electric with the proposed emission-free Electric GT Championship planned for 2017 in association with Tesla. However, there is significantly more that could be one to encourage adoption of alternative fuels throughout more traditional categories and championships.

Motorsport Opportunities: There is an opportunity to enforce adoption of alternative fuels in motorsport in both the short and medium term:

Short-term: Create 'zero emissions' classes in multi-class categories such as established GT and endurance championships. This would accelerate the R&D of existing alternative power sources.

Medium-term: Transition to a zero emissions target in leading motorsport series including Formula 1 and World Endurance Championship to encourage alternative fuel adoption within motorsport. Subsequent innovations could then be harnessed by automotive manufacturers.

Automotive Challenge 4: Building of consumer demand for sustainability

The accelerated adoption of alternative fuels in motorsport through the initiatives discussed above would provide a platform for automotive manufacturers to demonstrate the high-performance capabilities of their alternatively fuelled vehicles.

Motorsport Opportunity: Automotive manufacturers could leverage increased use of alternative fuels in motorsport competition through marketing activity to build consumer demand for sustainable fuel sources.

5.3 Population Growth & Resource scarcity

Automotive Challenges 5: Reduction of resource usage throughout the full life-cycle of automotive products

Reduction in the resource intensive nature of motorsport could be facilitated by a holistic approach to the management of resource usage within motorsport teams.

¹⁹<http://www.fiaformulae.com/en/news/2016/september/bmw-announces-andretti-tie-in/>

²⁰<http://www.fiaformulae.com/en/news/2016/october/mercedes-takes-option-on-season-five-entry/>

The UK's Society for Motor Manufacturers and Traders (SMMT) already use a range of key performance indicators (KPIs) to monitor the sustainability of the UK automotive industry(see appendix 8.1). This offers a clear blueprint for the type of industry reporting required to reduce resource use.

Motorsport Opportunity: Competitive motorsport series could incorporate performance against a set of resource utilization metrics as part of the points system of any championship. By enforcing sustainability through competition, motorsport organisations would be incentivised to develop innovative methods of reducing resource usage that could then be leveraged by the wider automotive industry.

6. Conclusion

Motorsport competition provides an ideal platform to support the automotive industry's drive towards a sustainable future. Motorsport teams and suppliers provide a pool of cutting-edge capabilities that are well placed to support development of innovative solutions, and motorsport competition provides an ideal proving ground for new technologies.

Through a mixture of regulation and competition-based incentivisation, there is an opportunity to align motorsport with the sustainability priorities of the automotive industry that it seeks to serve.

To take advantage of the opportunities explored in this paper there will need to be significant collaboration between motorsport's primary stakeholders: Teams, suppliers, governing bodies such as the FIA and series organisers. With the change in ownership imminent, now may be the perfect opportunity to bring these stakeholders to enact change.

If such collaboration can be facilitated, motorsport competition and the businesses that work within it can be leveraged to accelerate the automotive industry's drive towards a sustainable future.

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8. Appendices

8.1 SMMT Automotive Industry Sustainability KPIs

SUMMARY: KEY PERFORMANCE INDICATORS (KPIs)

			2000	2013	2014	% change 2014 on 2013		% change 2014 on 2000	
AS	Number of signatories		17	23	25	8.7%	↑	47.1%	↑
Economic performance									
WI	Automotive manufacturing sector turnover **	[£ billion]	42.1	65.2	69.5	6.6%	↑	65.1%	↑
	Expenditure on Business R&D **	[£ billion]	0.9	2.1	2.4	16.5%	↑	177.8%	↑
	Total number of cars and CVs produced	[million]	1.8	1.6	1.6	0.1%	↑	-11.9%	↓
	Total new car and CV registrations	[million]	2.5	2.6	2.8	9.5%	↑	13.0%	↑
AS	Signatories' combined turnover	[£ billion]	21.0	65.2	67.8	4.0%	↑	222.9%	↑
	Total number of vehicles produced	[million]	1.6	1.6	1.6	0.5%	↑	0.6%	↑
Environmental performance									
Production inputs									
AS	Total combined energy use	[GWh]	7,013	4,773	4,274	-10.4%	↓	-39.1%	↓
VMs	Energy used per vehicle produced	[MWh/unit]	3.9	2.2	2.0	-7.5%	↓	-48.1%	↓
AS	Total combined water use	[000m ³]	9,620	6,072	5,425	-10.7%	↓	-43.6%	↓
VMs	Water use per vehicle produced	[m ³ /unit]	5.3	2.9	2.7	-6.2%	↓	-49.1%	↓
Material outputs									
AS	Total combined CO ₂ equivalents	[tonnes]	2,182,926	1,449,651	1,448,999	-0.0%	↓	-33.6%	↓
	CO ₂ equivalents per vehicle produced	[tonnes/unit]	1.1	0.7	0.7	-5.0%	↓	-40.2%	↓
VMs	Volatile Organic Compounds emissions (cars)	[g/m ²]	55.0	37.1	35.3	-4.8%	↓	-35.7%	↓
	Volatile Organic Compounds emissions (vans)	[g/m ²]	59.0	54.5	47.6	-12.6%	↓	-19.2%	↓
AS	Total combined waste to landfill	[tonnes]	80,399	8,407	6,194	-26.3%	↓	-92.3%	↓
VMs	Waste to landfill per vehicle produced	[kg/unit]	40.3	3.8	3.1	-19.8%	↓	-92.4%	↓
Vehicle use									
AC	Average new car CO ₂ emissions	[g/km]	181.0	128.3	124.6	-2.9%	↓	-31.2%	↓
Social performance									
WI	Number of jobs dependent on the sector **		907,000	772,000	799,000	3.5%	↑	-11.9%	↓
	Combined number of employees		100,036	85,281	86,971	2.0%	↑	-13.1%	↓
AS	Number of lost-time incidents per 1000 employees*		13.4	3.0	2.2	-28.8%	↓	-83.9%	↓
	Number of training days per employee*		3.8	2.5	3.3	35.2%	↑	-11.9%	↓

AC - All car registrations in the UK; AS - All signatories; CO₂ - Carbon dioxide; CV - Commercial vehicles; VMs - UK vehicle manufacturer signatories; WI - Whole industry data. GWh - Gigawatt hours; MWh - Megawatt hours.

The 2013 data has been adjusted to take into account the change in signatories and enable year-on-year comparison. The absolute values for 2000 are not directly comparable to the 2014 data, given changes in the signatories over this period.

*When the 2000 value is unknown, the first available figure is given. **Sector turnover, R&D and jobs dependent on the sector are compiled from several official government sources using SMMT analysis, 2013 and 2014 figures are estimates/projections.