

European Consumers' Attitudes & Perceptions Towards Sustainability, Environment & Alternate Powertrains

engineexpo2012



June 2012

Methodology Details

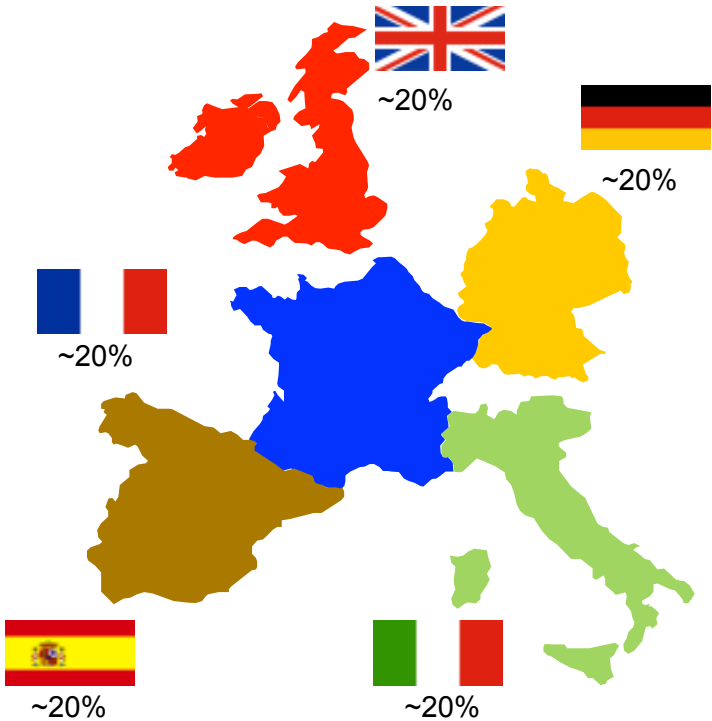
Methodology: We utilized a web-based survey methodology. Specifically, our web-based survey methodology utilizes online panels to source only qualified respondents.

Sample: We surveyed 2,150 vehicle owners in France, Germany, Italy, Spain, and United Kingdom (quotas by country were established to ensure equal representation). **Specifically, survey respondents had to be 18 years or older, be a primary driver of at least one car in the household, was an influencer or decision maker when primary car was purchased, and own a 2004 car model or newer.** Additional demographic details of the sample are below and in the following slide.

Sample Details								
	Age						Gender	
Countries	18-25	26-35	36-45	46-55	56-65	66 or older	Male	Female
France (N=419)	11%	16%	20%	17%	19%	17%	55%	45%
Germany (N=422)	15%	21%	20%	8%	13%	22%	51%	49%
Italy (N=440)	9%	24%	29%	23%	12%	4%	54%	46%
Spain (N=439)	18%	29%	33%	17%	3%	1%	55%	45%
United Kingdom (N=430)	18%	29%	33%	17%	3%	1%	49%	51%

Sample Details								
	Vehicle Segment							
Countries	Basic	Subcompact	Compact	Midsize	Large	MPV	Compact SUV	Large SUV
France (N=419)	4%	20%	24%	22%	2%	13%	8%	6%
Germany (N=422)	5%	19%	23%	19%	5%	10%	10%	9%
Italy (N=440)	7%	18%	23%	18%	5%	11%	10%	10%
Spain (N=439)	2%	25%	27%	19%	3%	13%	7%	5%
United Kingdom (N=430)	8%	19%	24%	18%	5%	10%	7%	9%

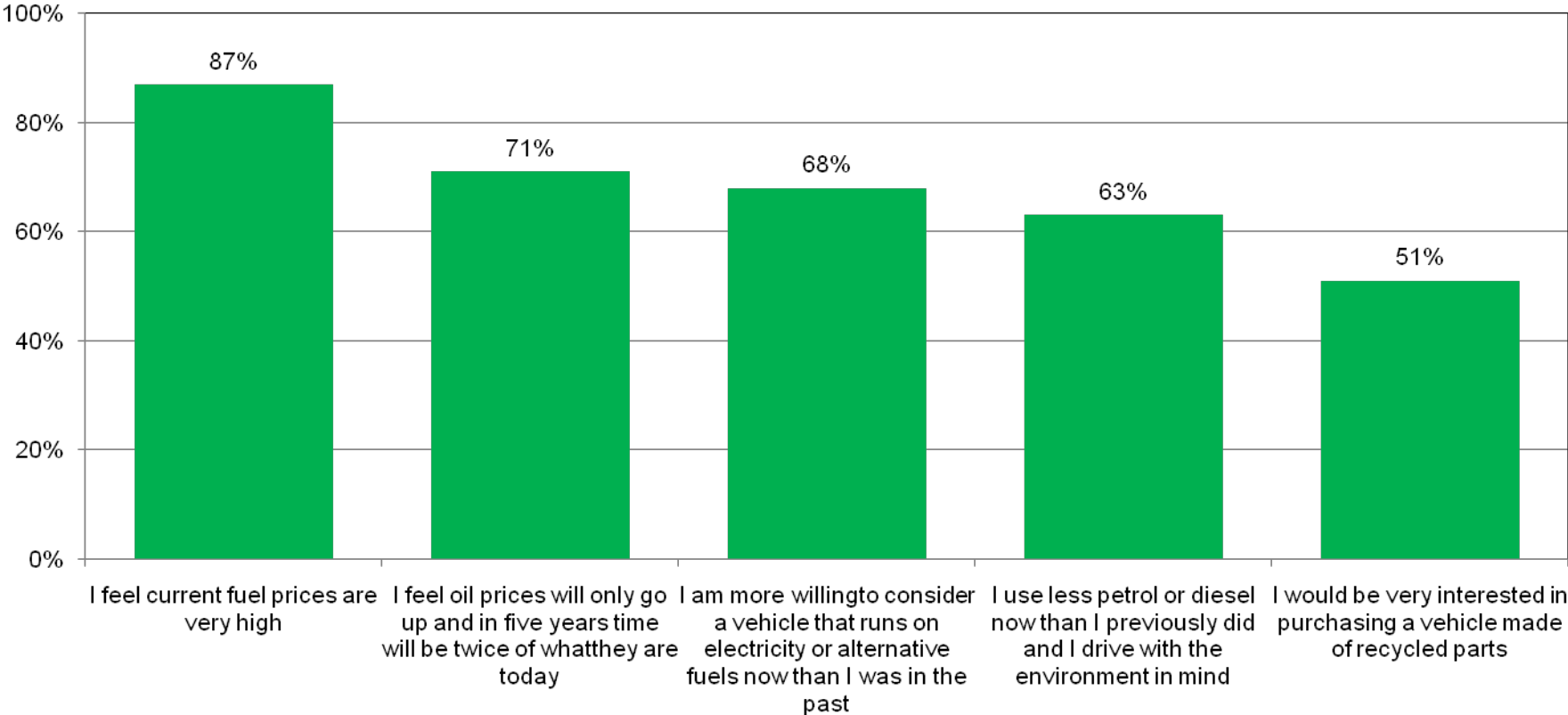
Fieldwork: We conducted the survey during November – December 2010.
Reporting notes: Percents in charts, tables, etc. may not total to 100 percent due to rounding.



Current fuel prices considered very high by respondents, and expectation that this will only go up more in future

Key Take Away: Current fuel prices are high on the minds of vehicle owners and they feel they are very high. Fuel and oil prices are the highest concerns and alternatively fuelled vehicles are perceived as possible solutions for these concerns.

Attitudes toward the Environment
% Strongly/Somewhat Agree (N=2,150)



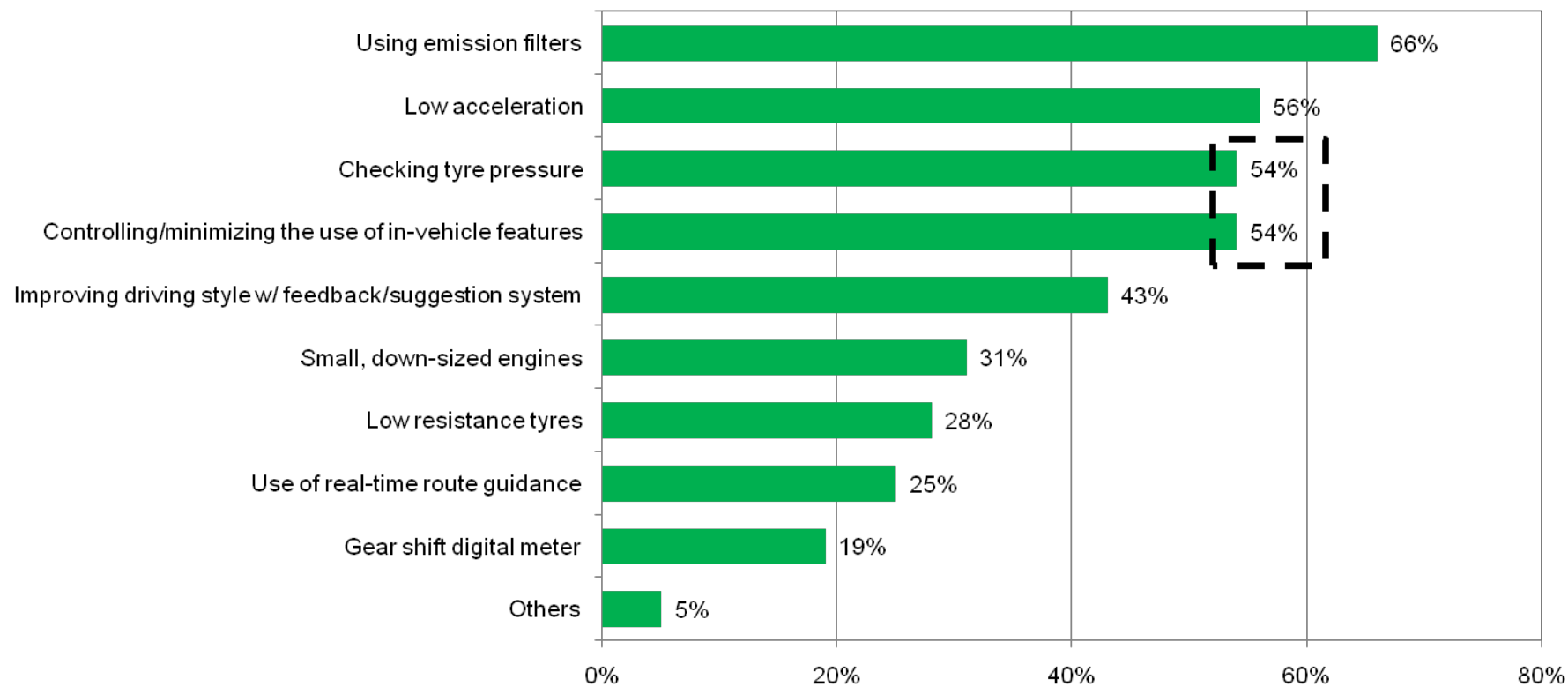
Q3. Please rate your level of agreement with the following statements.

Source: Frost & Sullivan

Most Common Associations with “Eco-driving”

Key Take Away: Emission filters and low acceleration are most commonly associated with “eco-driving.” Interestingly, vehicle owners feel controlling/minimizing the use of in-vehicle features is just as important as checking tyre pressure.

Most Common Associations with “Eco-driving”
(N=2,150)



Note: Multiple mention.

Source: Frost & Sullivan

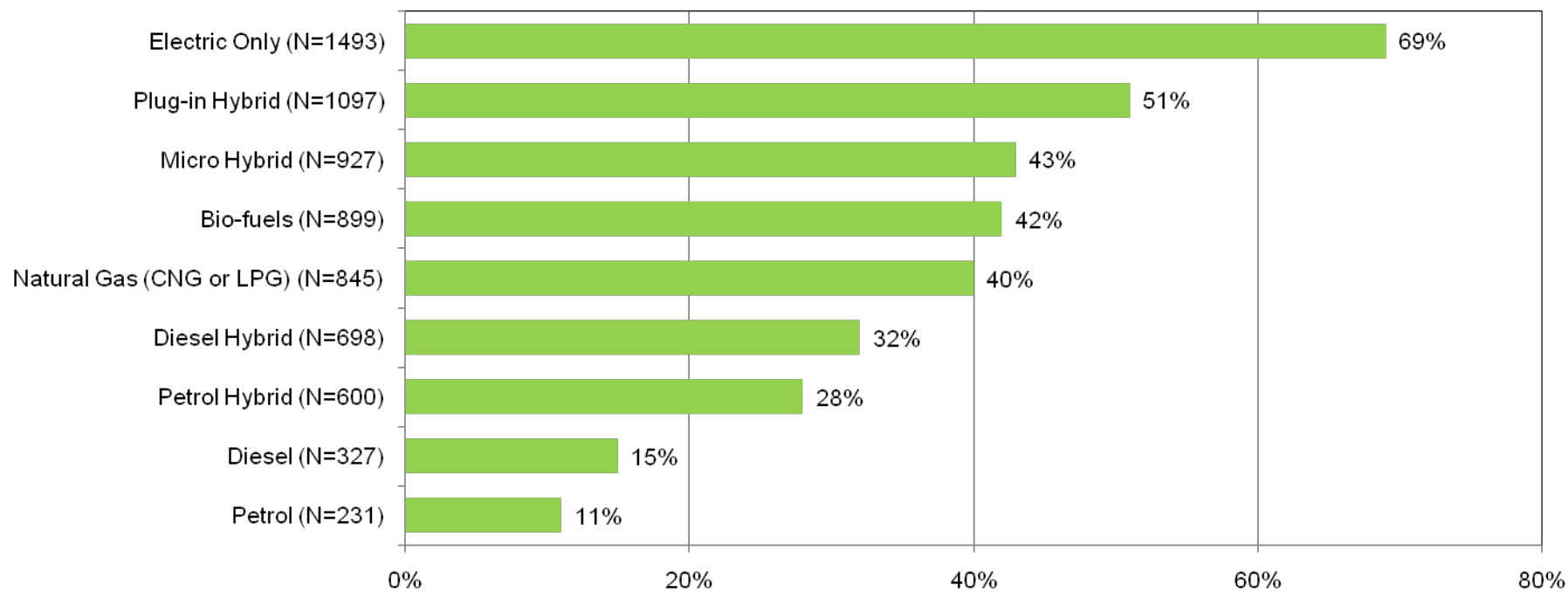
Q9. What does “eco-driving” mean to you? Select all that apply.

Emissions Contribution Perception : Diesel perceived in Europe to be more emission friendly than Gasoline

Key Take Away: Electric only cars are viewed as producing the least emissions. Diesel rated above gasoline

Among those who rated emission levels a “4” or “5”

Opinion of Engine Type and Emissions Level



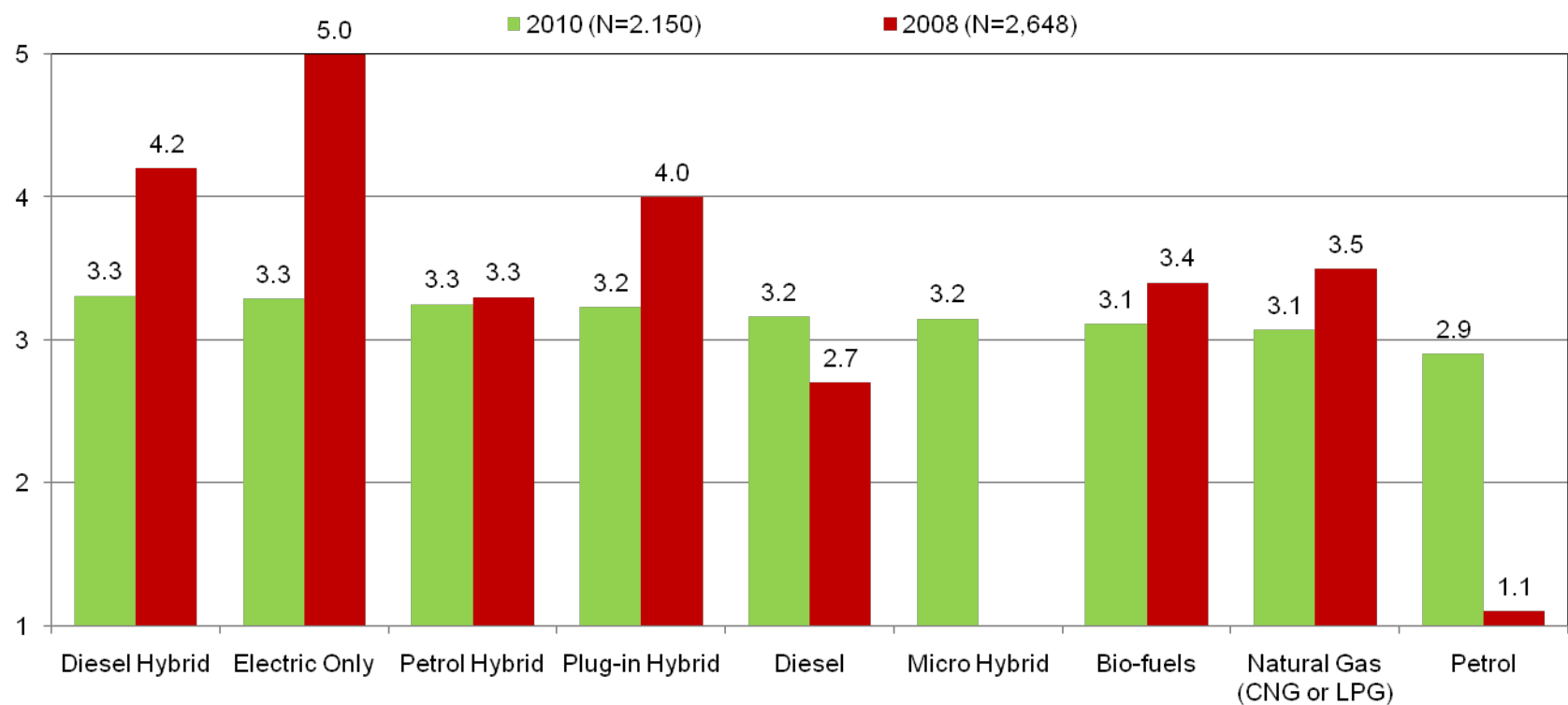
Source: Frost & Sullivan

Q40. Please rate the following car engine types based on your opinion of their emissions levels, using a 1-to-5 anchored scale, where 1 represents worst for the environment - highest emissions levels and 5 represents best for the environment – lowest emissions levels.?

Fuel Efficiency Perception– After EVs, diesels are perceived most fuel efficient

Key Take Away: Compared to 2006, European car owners are more inclined to rate all engine types similarly for fuel efficiency. While in 2006, electric only engines were most highly rated for perceived efficiency, now they are rated similarly even close to petrol engine cars.

Beliefs Toward Engine Types and Their Fuel Efficiency
Mean Scores (1-to-5 Scale, Low Fuel Efficiency-to-High Fuel Efficiency)



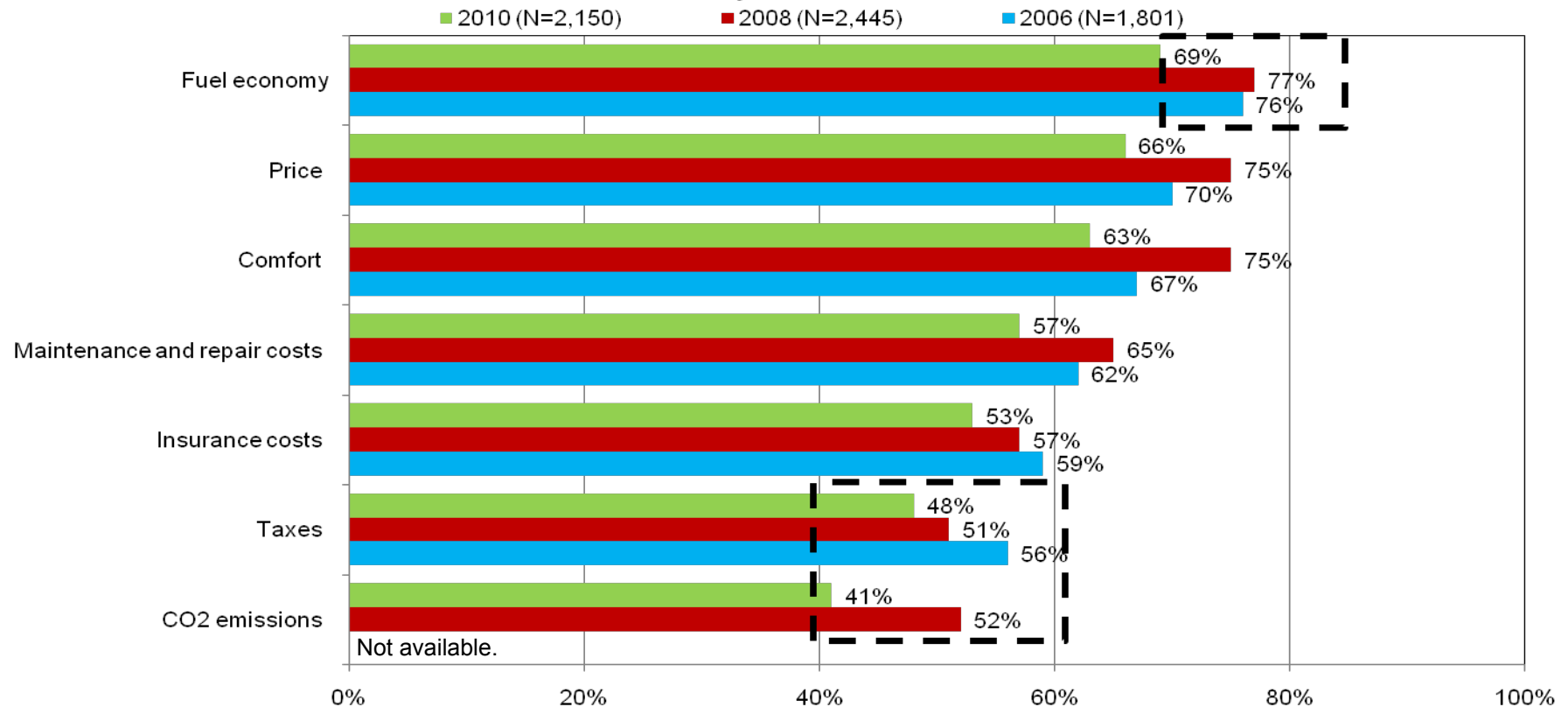
Source: Frost & Sullivan

Q39. Please rate the following car engine types based on your opinion of their fuel efficiency, using a 1-to-5 anchored scale, where 1 represents low fuel efficiency and 5 represents high fuel efficiency?

Factors Influencing Engine Selection for Next Car : Fuel economy top of mind, and CO2 importance has dropped over the years

Key Take Away: Fuel economy continues to be the most important factor when choosing an engine for their next car purchase, despite that the influence has dropped since 2008. Of notable mention, taxes have recently become more important than CO₂ emissions since 2008.

Factors that Influence Engine Selection
% Very Influential

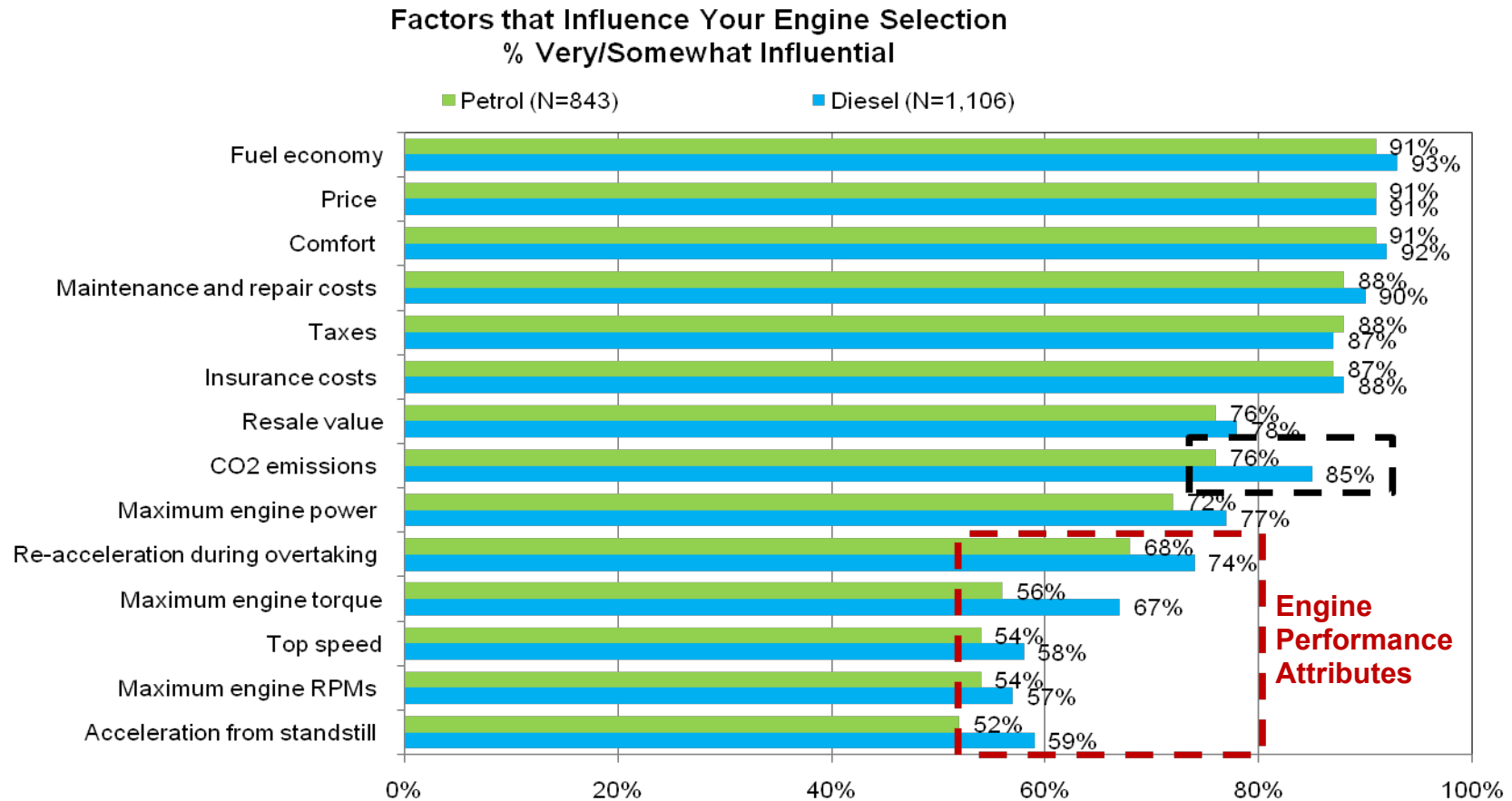


Q23. To what extent will each of the following factors influence your engine selection for your next vehicle purchase?

Source: Frost & Sullivan

Factors Influencing Engine Selection for Next Car (Diesel vs gasoline analysis) : 'CO2' and 'Performance' of much more importance to diesel buyers vs gasoline

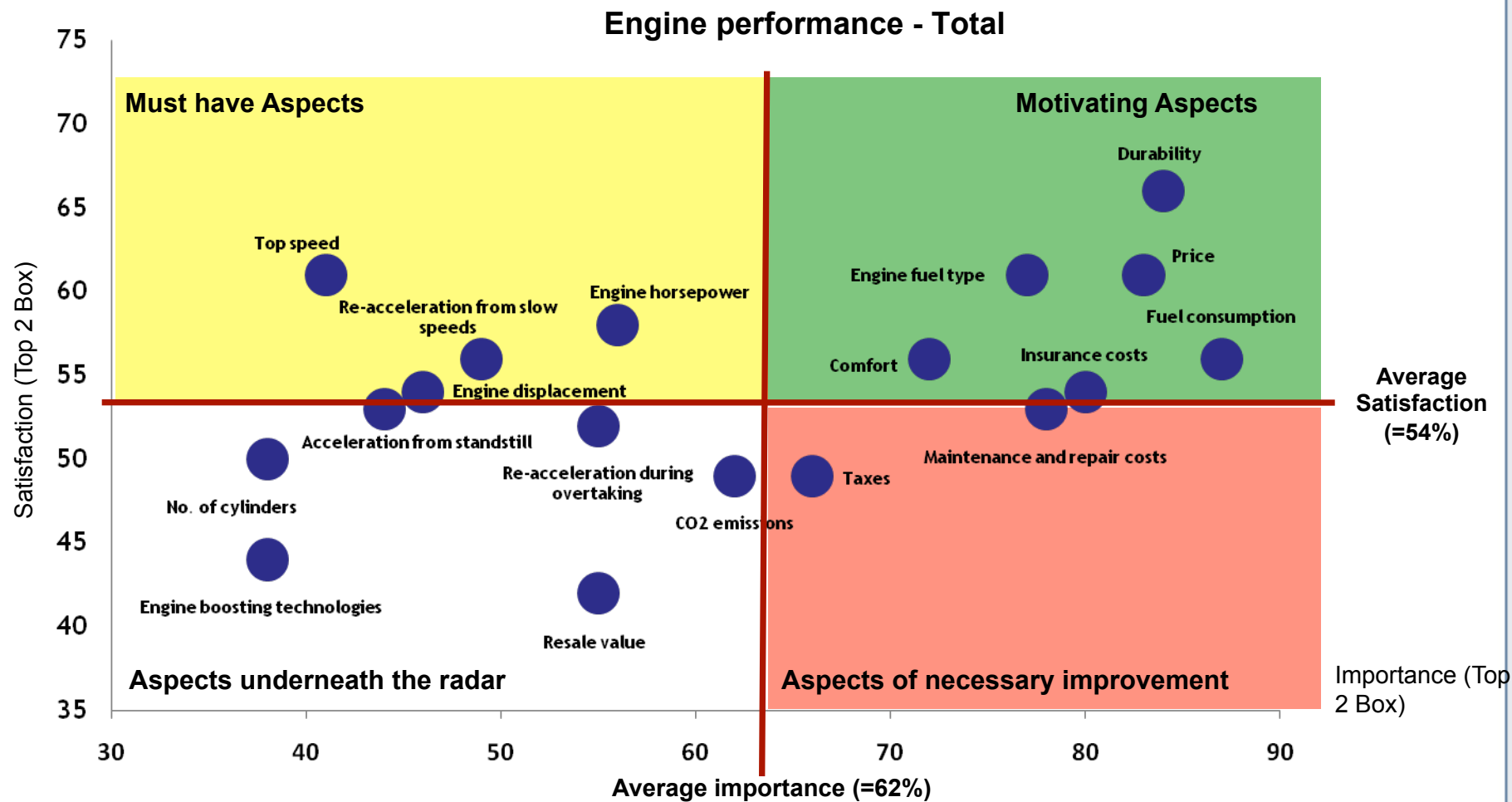
Key Take Away: CO₂ emissions is significantly of greater influence for engine selection for diesel owners over petrol owners. Also, as would be expected given general under-performance of diesel cars in comparison to petrol cars, engine "performance" attributes are more important among diesel owners.



Q23. To what extent will each of the following factors influence your engine selection for your next vehicle purchase?

Source: Frost & Sullivan

Engine performance - Importance and Satisfaction (Total) for B segment; 'Maintenance and repair costs' is an aspect respondents require improvement in



N=941

Q8. And how important are the following engine attributes in your decision making when buying a B-segment car (i.e. Ford Fiesta, VW Polo, Renault Clio size vehicles)?; Q10. How satisfied are you with engine performance aspects of your current vehicle?

Preferred Ranges of Carbon Dioxide (CO₂) Emissions are Up to 90-110

Key Take Away: The largest proportions of each country are willing to accept 90-110gm/km of carbon dioxide. The exception is

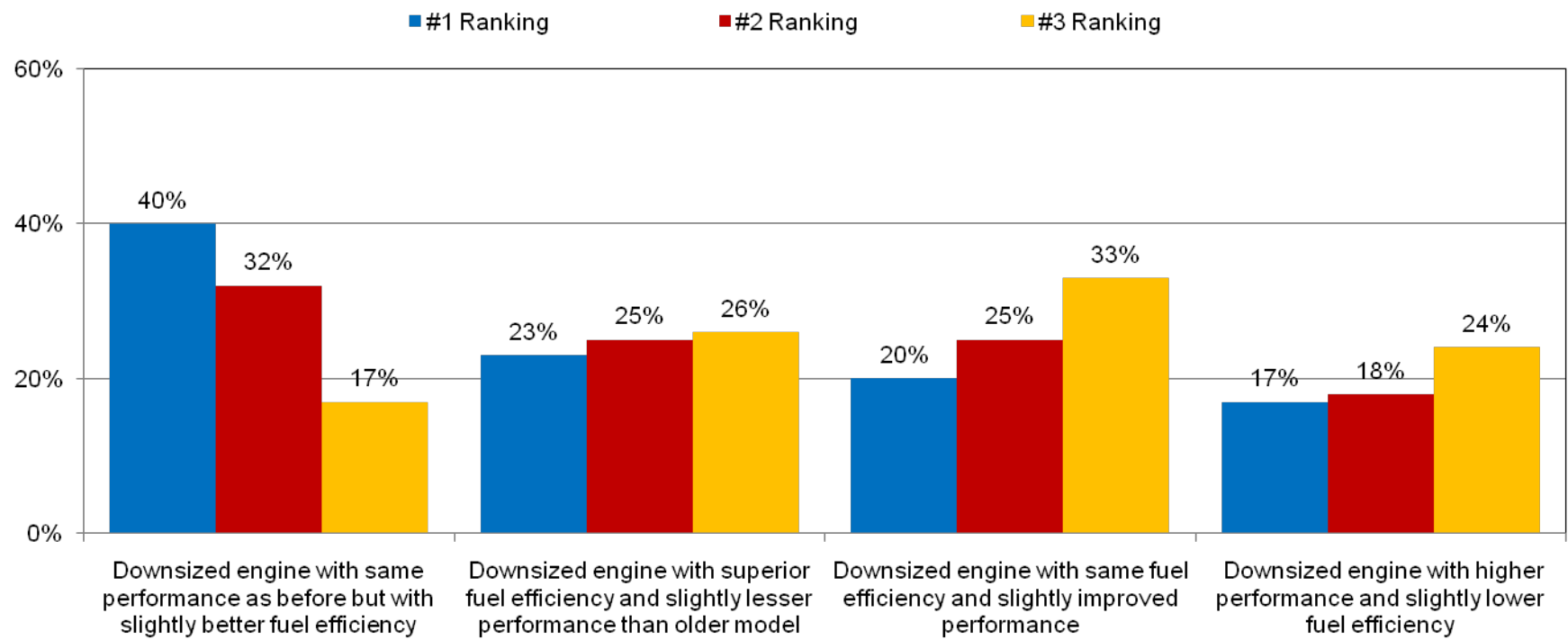
Key Take Away: The largest proportions of each country are willing to accept 90-110gm/km of carbon dioxide. The exception is

	France (N=419)	Germany (N=422)	UK (N=430)	Spain (N=439)	Italy (N=440)
0 gm/km	4%	6%	5%	10%	8%
0-60 gm/km	10%	6%	7%	12%	10%
60-90 gm/km	19%	15%	12%	21%	15%
90-110 gm/km	26%	23%	18%	22%	19%
110-130 gm/km	17%	17%	19%	12%	17%
130-160 gm/km	4%	13%	12%	8%	9%
160-200 gm/km	1%	2%	4%	2%	4%
200-250 gm/km	0%	1%	1%	1%	1%

Downsizing widely accepted, some even willing to compromise on performance to have better fuel efficiency

Key Take Away: The largest proportion of car owners prefer a smaller engine with the same performance and slightly better fuel efficiency. A significant proportion is willing to sacrifice performance for fuel efficiency.

Preferred Method of Engine Downsizing Involving Reduction in Displacement
(N=1,482)

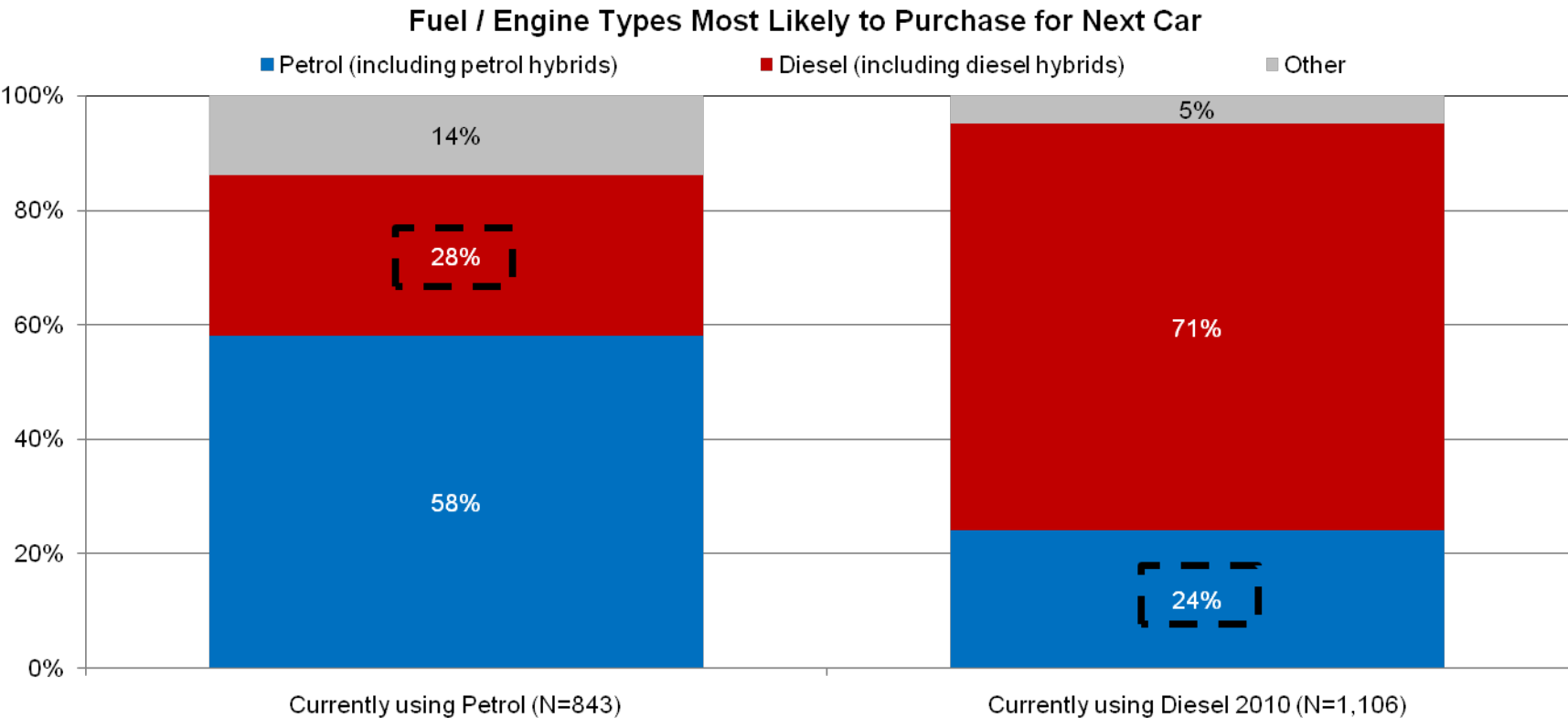


Source: Frost & Sullivan

Q25. Engine downsizing involves reduction in displacement, coupled with the addition of a technology like a turbocharger or supercharger to compensate loss of power output due to downsizing. Please rank your order of preference, where a #1 ranking is your most preferred option, a #2 ranking is your second preferred option, etc.

switch to diesel suggesting diesel share to continue to rise in future.

Key Take Away: Overall, current petrol car owners are more inclined to switch to other alternative fuel cars than diesel owners. However, diesel owners are most likely to purchase another diesel car.



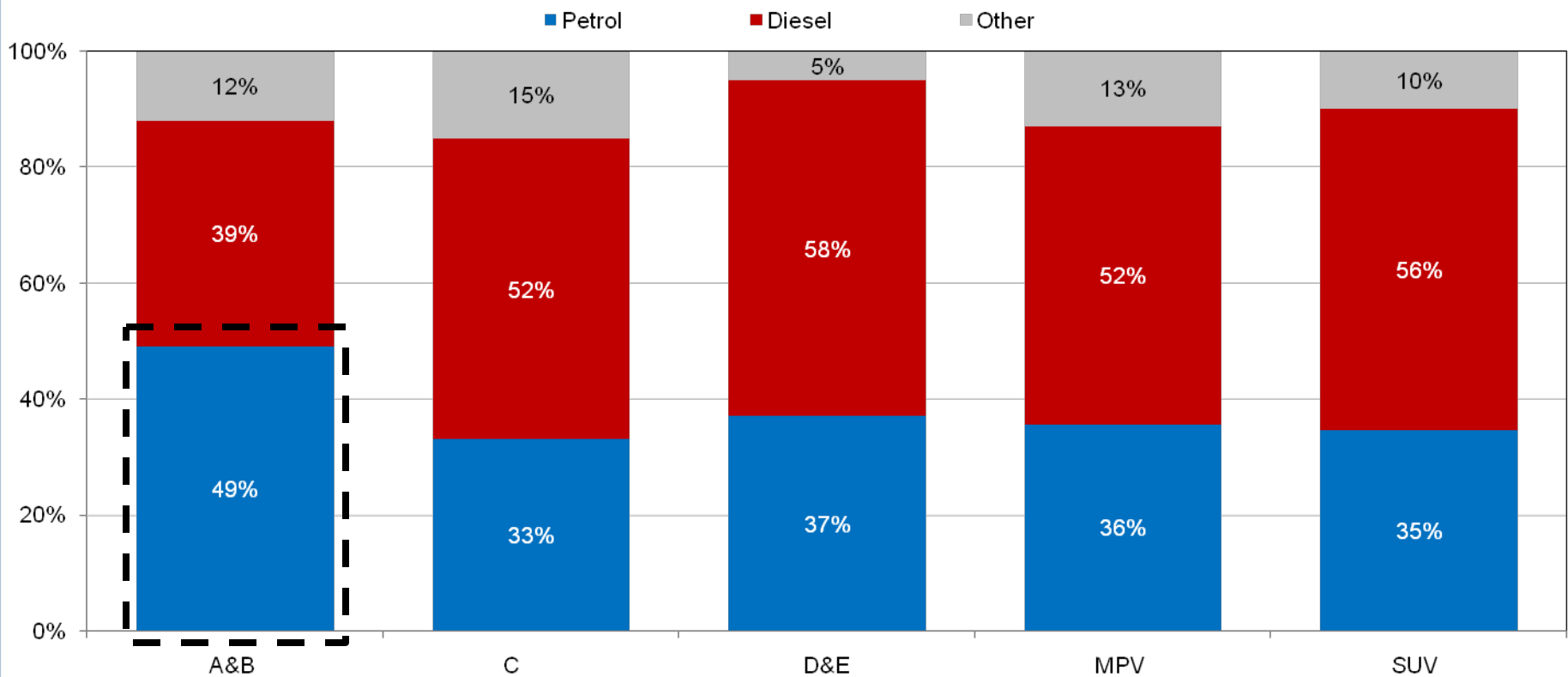
Source: Frost & Sullivan

Q27. Please rate how likely you are to consider the following fuel/engine types for your next car purchase?

Fuel / Engine Types Most Likely to Purchase for Next Car: By Car Segment – A&B prefer to stick with Petrol

Key Take Away: A&B car owners show higher interest in petrol while the rest of the segments prefer diesel.

Fuel / Engine Types Most Likely to Purchase for Next Car:
By Car Segment (N=2,150)

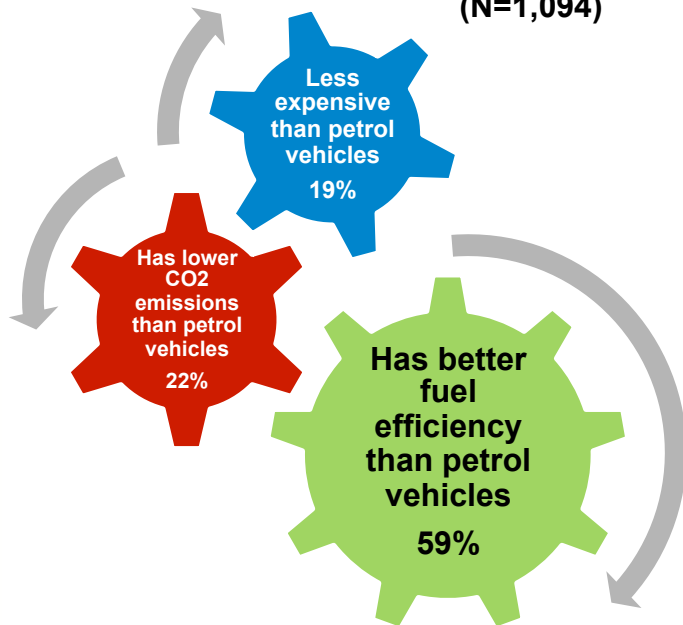


Q27. Please rate how likely you are to consider the following fuel/engine types for your next car purchase?

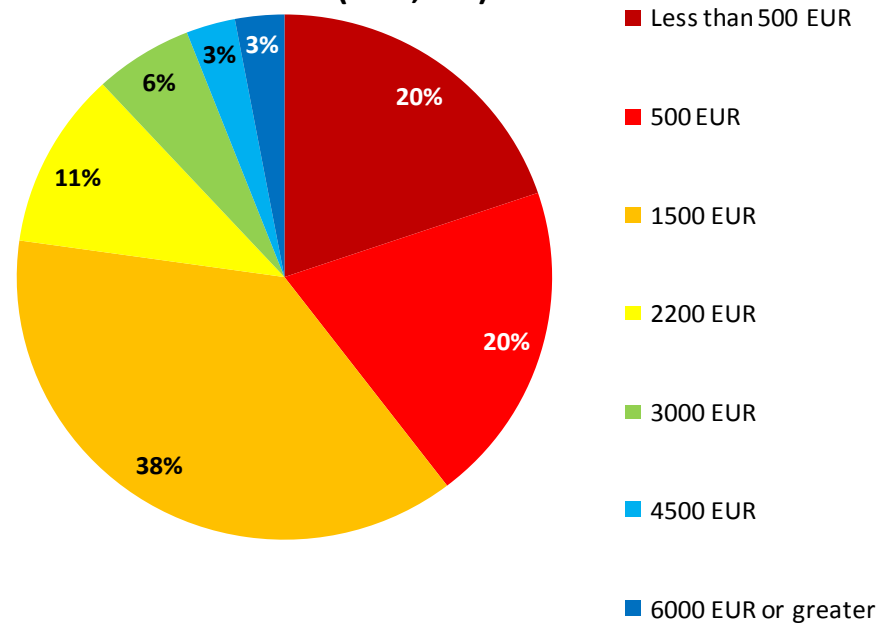
Source: Frost & Sullivan

Reasons for Considering Purchase of a Diesel Vehicle and Willingness to Pay : 2 out of 3 respondents willing pay premium of upto €2,200 for diesel

Reasons for Considering Purchase of a Diesel Vehicle (N=1,094)



Premium Willing to Pay For Diesel Engine Vehicle (N=1,094)



Q30. Which of the following best describes why you are likely to consider purchasing a diesel vehicle?

Q31. How much premium are you willing to pay for a diesel engine vehicle?

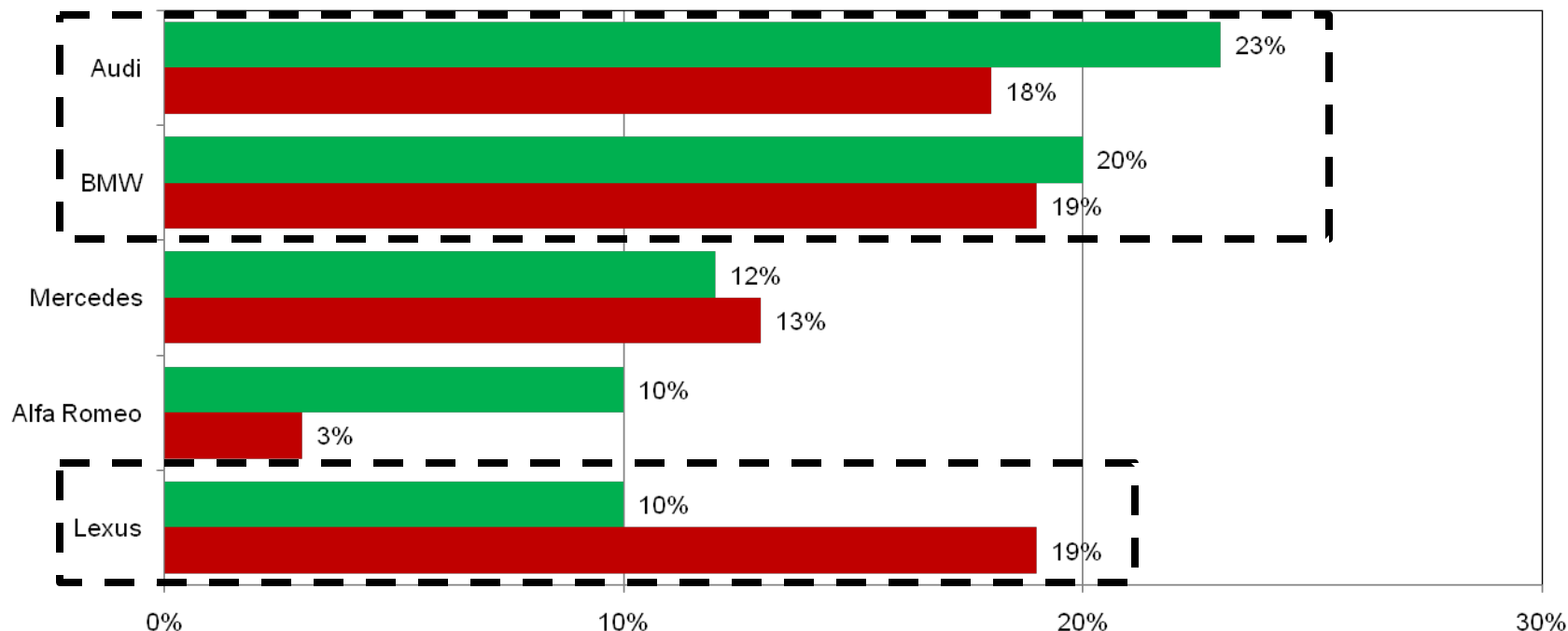
General Automotive Perceptions and Branding

Top-Five Premium Manufacturers for Fuel Efficient Vehicles : Audi perceived to have improved more over BMW in last 2 years

Key Take Away: Consistent with previous years data, the two top premium manufacturers for fuel efficient vehicles are Audi and BMW. Surprisingly, Lexus is perceived to be less fuel efficient compared with the 2008 results.

Top-Five Premium Manufacturers for Fuel Efficient Vehicles

■ 2010 (N=2,150) ■ 2008 (N=2,648)



Note: Top-five brands selected from number-one ranking only.

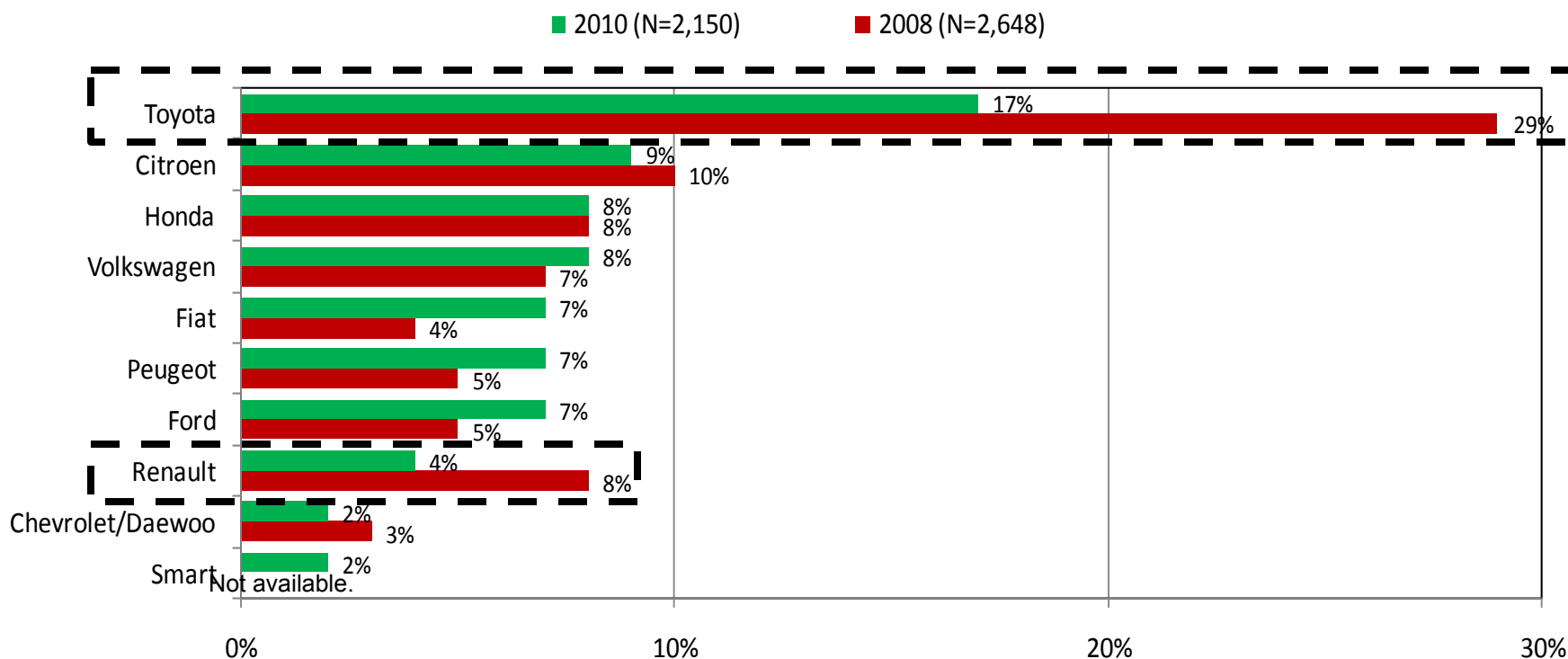
Source: Frost & Sullivan

Q62. From the following list, please rank the top-three premium vehicle manufacturers that you think are most dedicated to delivering **fuel efficient vehicles**?

Top-Ten Volume Manufacturers for Fuel Efficient Vehicles : Toyota is loosing its crown

Key Take Away: Although Toyota is still perceived as the top volume manufacturer for fuel efficient vehicles, the gap between Toyota and the runner-up is significantly smaller than in 2008. Surprisingly, the perception of Renault as being a fuel efficient vehicle has significantly decreased.

Top-Ten Volume Manufacturers for Fuel Efficient Vehicles



Note: Top-ten brands selected from number-one ranking only.

Source: Frost & Sullivan

Q63. From the following list, please rank the top-three volume vehicle manufacturers that you think are most dedicated to delivering fuel efficient vehicles?

To understand consumers' perceptions towards Powertrain technologies, Eco Driving and willingness to pay for technologies based on fuel price changes.



European Consumers' Attitudes & Perceptions Towards Downsized Engines and Advanced Engine Technologies

2012

2012 Powertrain VOC Study : Understand Customers' Understanding & Interest in Downsized Engines & Advanced Engine Technologies

Powertrain Technologies and Engine Trends



- What are the key trends in terms of change of powertrain and engine technologies?
- Awareness and understanding of core powertrain technologies and trends (downsizing, turbocharging, variable valvetrain, exhaust after-treatment technologies, exhaust energy recovery, engine configuration, hybridisation)
- Ranking of vehicle types based on emissions levels, performance , willingness to purchase etc.

Interest in Powertrain Technologies



- Likelihood of purchasing vehicles with latest Powertrain technologies (GDI, VVT, downsized + boosted engines)
- Engine layout and performance characteristics (in-line vs. V engines, # of cylinders, power & torque characteristics)
- Likelihood of purchasing Flex-fuel engines (CNG, LPG, high bio-fuel compatible vehicles) and Hybrids

Desirability and Willingness to Pay



- Likelihood of considering alternative fuel/engine types for next car purchase
- Likelihood of considering purchasing a downsized engine if it can deliver improved fuel economy and the same performance as a traditional larger engine
- Willingness to pay extra for alternative powertrains compared to conventional engines
- Willingness to pay for low CO2 emission vehicles – trade-off between fuel efficiency and outright engine performance

2012 Powertrain VOC Study : Understand Customers' Understanding & Interest in Downsized Engines & Advanced Engine Technologies

Vehicle Satisfaction & Brand Perceptions



- Environmentally friendliness / 'green' rating of engines and powertrain – OEM brands in Europe perceived as offering low CO2 emission models and vehicles
- Perceptions of OEMs offering advanced powertrain technologies ahead of mandatory regulations and compliance
- What vehicle brand in Europe is seen as offering performance oriented engines and powertrain?

Sensitivity to fuel prices and future purchasing behaviour



- To understand the tradeoff between engine performance and fuel-efficiency at different fuel price-points
- To determine switching behaviour, if any, from one fuel to another based on fuel pricing
- Measure consumer satisfaction with their actual vs. rated fuel efficiency on current vehicles – to determine importance of sticker km/litre value during new vehicle purchase

Eco Driving – features and characteristics



- What does "Eco Driving" mean for drivers? – impact on powertrain and engine technologies
- Understanding of features and aids within the vehicle that rate the driving characteristics of the driver and provide feedback
- Preference for Eco Driving visual indicators – placement of indicators, level of information displayed, suggestions for improving driving characteristics
- Importance of Eco Driving features and aids during next vehicle purchase – impact on Powertrain technologies

Methodology – Primary research

- The study is based on a sample of **2625 interviews** across 5 **regions** and **6 vehicle segments**
- Use of **web-based surveys** with graphic explanation of new technologies/features
- Target audience: **Consumers who have leased or bought a new vehicle in past 3 years**
- **Conjoint Analysis:** This analysis will derive a predictive model for the willingness to pay for incremental gains in driving experience indicators associated with engine attributes and powertrain technologies (i.e., maximum power, maximum speed, acceleration, fuel economy, emissions levels and engine technologies)
- **Multivariate Analysis:** This analysis will quantify the perceived link between performance indicators and actual powertrain attributes and establish the relative meaningfulness of specific powertrain technologies.

Sample Size / Segment per country	Small and Basic	Compact	Medium and Executive	MPV	SUV Small	SUV Big	Total
France	125	125	125	50	50	50	525
Germany	125	125	125	50	50	50	525
UK	125	125	125	50	50	50	525
Italy	125	125	125	50	50	50	525
Russia	125	125	125	50	50	50	525
Total	625	625	625	250	250	250	2625

* Sample sizes provide 3% significance at total level, 5% significance level for aggregate analysis and 10% significance level country Vs segment level analysis

F R O S T & S U L L I V A N

Kaushik Madhavan
Global Program Manager Powertrain

 +91 44 6681 4120

 +91 44 2431 4264

 kaushik.madhavan@frost.com