RULES OF CONTEST

Version 3.0
31 August 2017

HISTORY OF CHANGES		
Version	**Publication date**	**Changes**
1.0	20.04.2016	▪ Initial version
2.0	01.05.2017	Second version of the document ▪ Update on "Award Criteria" section ▪ Update on "Procedure" section ▪ Update on "Other conditions" section ▪ Other changes
3.0	31.08.2017	Third version of the document ▪ p. 4 extension of submission and evaluation deadlines ▪ p. 5 clarification of the application requirements regarding control software modifications ▪ p. 8 revision of thresholds calculation and scoring and the use of RDE results ▪ p. 10 clarification for the case of additional vehicles being retrofitted and presented

1. THEME: THE HORIZON PRIZE FOR THE ENGINE RETROFIT FOR CLEAN AIR

1.1 Objective pursued

The objective of the Horizon prize for the Engine Retrofit for Clean Air[1] is to spur the development of new technologies that can be applied to existing diesel engines and powertrains to reduce pollutant emissions in real driving conditions to a level comparable with that of new cars responding to the emissions legislation in force from 2017.

1.2 Expected results

European citizens in many urban areas suffer from serious health impacts due to air quality issues (around 500.000 premature deaths per year due to particles, NO_X and ozone[2]). There are more than 250 million passenger cars on the road in European Union. 41% of these have diesel engines (up to 70% of the fleet in some countries), while only about 5% of the vehicles are using alternative powertrains and fuels.[3]

The Horizon prize for the Engine Retrofit for Clean Air aims at reducing the pollution produced by the existing car fleet by spurring the development of retrofit-able technology (i.e. additional devices and/or modification) applicable to their diesel engines. The implementation of the technology should allow such retrofitted vehicles (a large part of which, being Euro 5, sold up to mid-late 2015, are relatively recent and therefore will be on the road for many years) to circulate without unduly affecting air quality.

More specifically, since such retrofitted vehicles could have much less than half of the emissions of the unmodified vehicle in real driving (in the case of NO_X), city authorities may consider measures to encourage their use to improve urban air quality. There are also incentives in the prize scoring mechanism to encourage the reduction of NOx from early Euro 6 vehicles, and of particles from older diesel vehicles and gasoline direct injection vehicles. It is expected that a successful application of clean engine retrofits will therefore improve health and life quality of European citizens.

The Prize will be awarded to the participant or team demonstrating an innovative solution delivering the lowest emission of NO_X (a generic term for the various nitrogen oxides), PN/PM (particulate matter in terms of number of particles and mass, respectively) and other pollutants under real urban driving conditions on the road as well as under standardized conditions in the laboratory, combined with acceptable fuel efficiency and costs, good driving performance and driveability, durability, maintenance and usability, safety, and noise .

2. PRIZE AMOUNT: 1.5 MILLION EUR[4]

[1] The legal basis for this prize is in the Work Programme 2016-2017, part 11 Smart, green and integrated transport, other actions 1. Horizon prize for the cleanest engine retrofit

[2] http://www.eea.europa.eu/media/newsreleases/many-europeans-still-exposed-to-air-pollution-2015/premature-deaths-attributable-to-air-pollution

[3] http://ec.europa.eu/eurostat/statistics-explained/index.php/Passenger_cars_in_the_EU

[4] In accordance with the budgetary procedure set in the Financial Regulation No 966/2012, award of a prize must be preceded by the adoption of the respective budget and the adoption of the financing Decision. Since the budget amounts are only to be foreseen in the 2017 budget they are subject to the availability of the appropriations provided for in the draft budget for 2017 after the adoption of the budget 2017 by the budgetary authority or, if the budget is not adopted, as provided for in the system of provisional twelfths.

3. DEADLINES & ADMISSIBILITY

DEADLINES[5]	
LAUNCH OF THE CONTEST The Contest is published on the Participant Portal. All detailed information is available on the Horizon Prizes website.	20 April 2016
DEADLINE FOR REGISTRATION OF INTEREST Participants register trough the Participant Portal and by sending an email to EC-ENGINE-RETROFIT-PRIZE@EC.EUROPA.EU	12 June 2017 at 17:00:00 CET[6]
CLOSING DATE FOR SUBMISSION Applicants submit the application form Part A and Part B through the Participant Portal and deliver the prototype to JRC in Ispra.	27 September 2017 at 17:00:00 CET[7]
EVALUATION The applicant submissions are evaluated against the award criteria described in this document and on the basis of verification tests performed by JRC.	October 2017 - March 2018
AWARD Announcement of the winner of the Horizon Prize of the Engine Retrofit for Clean Air	March - April 2018

Please note that if there are more than 10 eligible applications, this timetable may change due to the required verification testing. The information will be provided in due time.

Joint applications by a group of participants are admitted. In this case, the participants must appoint a 'lead participant' to represent them towards the Commission. The participants will be jointly responsible and must all fulfil and respect the conditions set out in these Rules of Contest.

Applications must be submitted by the (lead) participant via the Participant Portal 'Submission Service', accessible via the call page.

Applications must be readable, accessible and printable. Incomplete applications may be considered inadmissible if essential elements are missing (see General Annex B to the Main Work Programme).

The page-limit for Part B is 600 pages. Drawings must be annexed.

Participants are encouraged to declare their intention to participate by registering their interest via EC-ENGINE-RETROFIT-PRIZE@EC.EUROPA.EU by 12 June 2017, 17:00:00 CET8. The registration does not entail an obligation to participate.

Sample application forms, guidance documents on submission procedure and other relevant information are available as reference documents on the Participant Portal. The interested parties are advised to follow the

[5] This indicative timescale may be subject to review and update by the EC
[6] Central European Time = Brussels local time.
[7] Central European Time = Brussels local time.
[8] Central European Time = Brussels local time.

information published on the Participant Portal that should act as the primary source of information for both applicants and the public. General information about the prize is also available on the Horizon Prizes website.

Other documents, such as the testing procedures that will be applied during the verification testing, will also be available on the Participant Portal.

Submission shall consist of:

1. Application Part A and Part B to be submitted through the Participant Portal;

2. Delivery of the prototype/s to the JRC in Ispra.

The prize will be awarded to the participant demonstrating the lowest emissions of NO_X, PN/PM and other pollutants with a minimal impact on fuel efficiency of the original vehicle and performance and cost criteria as defined in the award criteria section to ensure that the proposed solution meets operational requirements.

The innovation shall be installed for testing purposes on a mass production Euro 5b C-class compact car (in the top C-class sales[9], but limited to high-volume hatchback and three volumes family car bodies). Use of the most widely sold engines for the chosen model is also required to achieve maximum impact (use of very specific engines fitted on a small number of vehicles of the chosen model is not acceptable).

No modification to the body, the chassis and the auxiliaries (except for those directly related to the engine's functioning, such as pumps and generators, which are considered part of the powertrain) of the donor vehicle is accepted, except if the need to modify them to integrate the retrofit is fully demonstrated. The vehicle should retain most of its payload carrying capability: installation of devices in the trunk or in the passenger cabin should be avoided or kept to a minimum, unless convincing demonstration that in a series production configuration it can be brought to an acceptable size of maximum 20l in the trunk and/or completely and safely installed in available spaces in the engine compartment or underbody.

The standard gearbox of the donor vehicle should be left unmodified. If more than one engine, gearbox and/or after-treatment strategy or user-selectable drive mode (i.e. eco, sport etc.) are available, verification tests can be performed in any of these modes and the worst performing will be used for scoring. It is therefore advised not to use versions of donor vehicles having multiple modes.

Engines/powertrains/cars in which the achievement of the emission reduction is due to using main propulsive energy coming from other forms of energy storage than the main fuel are not admissible: plug-in hybrids and, in general, systems using large energy storage capability beyond the main fuel will not be admissible. A limited amount of hybridisation (peak power for 30 seconds up to 20% of the ICE's engine power, maximum continuous power up to 10% of ICE's engine power and up to 0.5 kWh of additional energy storage) is instead allowed.

The use of on-board generated chemicals is allowed, unless they affect the safety or the homologation potential of the innovation. The use of additives is allowed, unless they represent a significant quantity of energy (as mentioned above, and are used mainly to increase the energy efficiency of the engine) or affect the safety or the homologation potential of the innovation. For example, use of hydrogen or another gaseous fuel stored on board (used in small quantities to enhance combustion or to regenerate the catalysts) is acceptable, while injection in larger quantities that contribute significant energy is not allowed.

For the purpose of this prize fuels are only diesel and its commercial low blends according to Annex II of the Directive 2009/30/EC of the European Parliament and of the Council of 23 April 2009. Natural gas or other fuels are not allowed.

For the purpose of this prize no access to On Board Diagnostic (OBD) data should be needed or used in testing, nor should any other way of identifying that the vehicle is being tested be installed.

Applicants shall disclose in part B of the application whether the Engine Control Unit and aftertreatment control software was modified and, if so, describe the purpose and effect of such modifications.

[9] List of models/engines: https://ec.europa.eu/research/horizonprize/pdf/retrofit/list_of_cars_retrofit.pdf

4. ELIGIBILITY

4.1 Eligibility criteria

The contest is open to all legal entities (i.e. natural or legal persons) or groups of legal entities.

Please note, however, that special rules apply for Israeli entities[10] and for Crimean legal persons and those entities from non-EU Member States that are covered by Council sanctions are not eligible to participate[11] (see General Annex C to the Main Work Programme).

Moreover, participants that have already received an EU or Euratom prize cannot receive a second prize for the same activities.

4.2 Exclusion criteria

Participants will be excluded if they (or one of them):

- are subject to an administrative sanction (i.e. exclusion)[12]
- are in one of the following situations[13]:
  - bankrupt, being wound up, having their affairs administered by the courts, entered into an arrangement with creditors, suspended business activities or subject to any other similar proceedings or procedures under national law (including persons with unlimited liability for the participant's debts)
  - declared in breach of social security or tax obligations by a final judgment or decision (including persons with unlimited liability for the participant's debts)
  - found guilty of grave professional misconduct[14] by a final judgment or decision (including persons having powers of representation, decision-making or control)
  - convicted of fraud, corruption, involvement in a criminal organisation, money laundering, terrorism-related crimes (including terrorism financing), child labour or human trafficking (including persons having powers of representation, decision-making or control)
  - shown significant deficiencies in complying with main obligations under a procurement contract, grant agreement or grant decision financed by the EU or Euratom budget (including persons having powers of representation, decision-making or control)
  - found guilty of irregularities within the meaning of Article 1(2) of Regulation No 2988/95 (including persons having powers of representation, decision-making or control)
- have misrepresented information required for participating in the contest or fail to submit such information
- were involved in the preparation of the prize documents and this entails a distortion of competition.

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[10] See Commission Guidelines on the eligibility of Israeli entities and their activities in the territories occupied by Israel since June 1967 for grants, prizes and financial instruments funded by the EU from 2014 onwards (OJ C 205 of 19.7.2013, pp. 9-11).

[11] For the list of persons, groups and entities subject to EU financial sanctions, see https://eeas.europa.eu/topics/common-foreign-security-policy-cfsp_en

[12] See Articles 131(4) and 106(1) Financial Regulation

[13] See Articles 138(2) and 106(1), 107 of the Regulation (EU, Euratom) No 966/2012 of the European Parliament and of the Council of 25 October 2012 on the financial rules applicable to the general budget of the Union and repealing Council Regulation (EC, Euratom) No 1605/2002 (OJ L 218, 26.10.2012, p.1)

[14] Professional misconduct includes: violation of ethical standards of the profession, wrongful conduct with impact on professional credibility, false declarations/misrepresentation of information, participation in a cartel or other agreement distorting competition, violation of IPR, attempting to influence decision-making processes or obtain confidential information from public authorities to gain an advantage.

5. AWARD CRITERIA

The prize will be awarded to the application that, in the opinion of the jury and according to verification measurements, demonstrates a solution that best addresses the following criteria:

a) Levels of NO_X and NO_2 emissions

b) Levels of PN and PM emissions

c) Levels of hydrocarbons emissions

d) Levels of emissions of other pollutants

e) Fuel consumption

f) Performance and driveability

g) Acquisition and running costs

h) Noise and Safety

i) Durability, maintenance and usability

The following section details the criteria and the test specifications that need to be met by participants when submitting the application, as well as the quantified metrics, the scoring method and the weighting process.

5.1. Thresholds

Before submitting the application participants have to install the technology on a donor vehicle, which therefore becomes the prototype vehicle and undergoes the initial testing. Results of this testing have to be reported in the Part B of the application form submitted through the Participant Portal.

The chassis dynamometer parameters shall be selected based on the UNECE Regulation 83 coefficients using the empty weight of the donor vehicle minus any replaced or removed components plus 100 kg plus the retrofit weight (for the post retrofit tests).

It has recently been revealed that many vehicles have on-board software that may limit the effectiveness of the pollution-reduction devices depending on several parameters (temperature, pressure, engine rpm etc.) or detects parameters that show that the car is being tested on the bench and alter engine behaviour consequently. This software can be different depending on the chosen donor vehicle and therefore its influence on emissions performance cannot be foreseen.

Some of the rules of this contest have been already designed to avoid that such systems can affect test results, but given the mounting evidence of a growing number of parameters being used for such purpose, bench testing methodologies such as those used for initial testing cannot completely exclude the possibility that some parameter could still be altering emissions performance in such measurements.

Participants are therefore invited to verify their submission in real driving conditions at least for NOx emissions (for instance with some available low cost analysers, possibly by doing comparisons before/after installation of the retrofit) in order to ensure that their solution actually reduces emissions to the prescribed minimum levels and is not just showing reduced emissions on the test bench because of such software. Such tests are not compulsory but, if performed, results can be added to the submission. Verification testing at JRC will in any case attempt to exclude such situations to the best possible extent.

Should the chosen donor vehicle be the object of a recall campaign (even if voluntary) that allows to remove the above-mentioned limitations, as announced by some manufacturers, the donor vehicle should have these modifications installed prior to initial testing of both base emissions and the prototype.

Table 1 outlines the thresholds which must be met by the prototype in initial testing in order to be admissible for participation in the contest.

CRITERIA	THRESHOLDS
a) Maximum NO_X emissions	180 mg/km
b) Maximum PN and PM emissions	6×10^{11} particles per km for PN, 4.5 mg/km for PM
c) Maximum HC emissions	230 mg/km for $HC+NO_X$
d) Emissions of other pollutants	500 mg/km for CO
e) Fuel consumption variation	+ 10%

Table 1: Threshold table for initial testing

The polluting emissions and fuel consumption of Table 1 shall be measured on all the three test cycles mentioned in part B of the application template (NEDC, WLTC, CADC) at the specified test conditions. The average of these results will be used to verify compliance with the thresholds and for allocating scores. Alternatively, the participants may submit RDE test results to demonstrate compliance with the thresholds.

The other criteria specified hereafter (such as RDE tests or other pollutants) can be measured by participants and test results provided with the documentation, but their availability, although advised, is not mandatory.

None of the flexibilities mentioned in the "Supporting Analysis regarding Test Procedure Flexibilities and Technology Deployment for Review of the Light Duty Vehicle CO_2 regulations" report[15] should be applied in initial testing, and in general no setting or modification that would not be commonly used by a normal customer for normal operation should be adopted in any testing or driving condition: for instance, the vehicle should have installed commercially available certified tyres (inflated with air at the pressure suggested by the manufacturer) providing good driveability, normal wheel angles, standard lubricants, connected and working alternator etc.

In initial testing prior to submission participants are allowed to use any commercially available type of diesel fuel and any standard lubricant indicated in the user manual by European automotive OEMs.

The same criteria will be used for pollutants as Not-To-Exceed values for real urban driving tests (including under specific conditions, such as cold start and regenerations, with a conformity factor = 1.2).

Verification testing at JRC will be performed using the fuel in the car tank, and/or a standard market fuel available near JRC.

Lubricants for verification testing shall be the ones provided in the prototype by the applicant, and should be clearly identified in the submission papers in case a need for replenishing emerges during testing.

Should any unjustified modification be applied to enhance energy efficiency, the jury at its discretion can attribute a score of zero to the submission in all criteria or, if easily measurable or assessable, deduct the energy efficiency improvement thus obtained from the achieved emissions performance.

[15] http://ec.europa.eu/clima/policies/transport/vehicles/cars/docs/report_2012_en.pdf

5.2. Assessment grid for the award criteria

The key metrics that will be used for the assessment to determine the winner are set out below. Performance will be scored using the grids indicated for each criterion. An application shall at least meet a threshold score of 1 on all criteria.

Award criteria

The award criteria will be evaluated based on the information provided in the application, and on JRC verification results where relevant.

a) Levels of NO_X and NO_2 emissions

NO_X emission level refers to the levels of NO_X emissions by the prototype measured on chassis dyno and verified using portable emission measurement systems in real urban driving conditions where applicable. Intermediate values are listed to incentivize advancements towards low-cost systems that can meet the ultimate target of 60 mg NO_X/km. The conformity factor for NOx and NO_2 in RDE verification testing will be 1.2 of the threshold.

NO_X EMISSIONS	SCORE
> 180 mg/km	0
> 150 ≤ 180 mg/km	1
> 120 ≤ 150 mg/km	2
> 90 ≤ 120 mg/km	3
> 60 ≤ 90 mg/km	4
≤ 60 mg/km	5

Table 2: NO_X emissions levels criterion

ABSOLUTE NO_X REDUCTION	SCORE
< 100 mg/km	0
≥ 100 < 250 mg/km	1
≥ 250 < 350 mg/km	2
≥ 350 < 450 mg/km	3
≥ 550 < 450 mg/km	4
> 550 mg/ km	5

Table 3: Absolute NO_X reduction criterion

A mark will also be attributed to the absolute reduction in NO_X emissions (emissions of the donor vehicle minus those of the prototype), and the average of the two marks used for scoring. This intends to avoid cherry-picking of vehicles that are already close to compliance (also due to recalls or other modifications by the OEM), and therefore would not benefit from a retrofit, and vice versa the effectiveness of the retrofit when applied to other, more polluting, vehicles would not be proven.

NO_2 emission levels refer to the amount of NO_2 measured on chassis dyno and verified using portable emission

measurement systems in real urban driving conditions. Since this is the pollutant regulated in air quality laws, and since some technologies can generate artificially high NO_2/NO_x ratios, specific targets are given. For this reason, a multiplier of 1.5 would be applied to the NO_X score if the NO_2/NO_X ratio is lower than 35% and NO_2 is lower than 60 mg/km. A weight of 0.5 will be applied instead if the NO_2/NO_X ratio is higher than 60% and NO_2 is higher than 100 mg/km. This allows taking into account the behaviours of different after-treatment systems.

The proposed technology should also have a strong potential to be successfully incorporated into other diesel vehicles beyond the demonstrated one. To widen the impact of the prize, should it be deemed feasible by the participants, applicability of the proposed innovation to additional Euro classes of vehicles would be an important additional benefit.

Applicability of the technology (in addition to the mandatory Euro 5 demonstrator) to early Euro 6 vehicles demonstrating NO_x RDE compliance with legal Euro 6 RDE limits and conformity factors entering into force in 2017 (conformity factor = 2.1, i.e. 168 mg/km in real driving) and NO2 ratio below 40% would be rewarded by multiplying the final score in the NOx criteria for the Euro 5b submission (including the NO_2 multiplier) by 1.5 if all required data and the retrofitted Euro 6 vehicle are submitted to JRC. Other emissions at points b)-d) will be checked based on Euro 6 limits to verify that the technology does not make them significantly worse, in which case the multiplier will not be applied. Also in this case, to avoid cherry-picking, in case the donor vehicle is already closer than 100 mg/km to the target in CADC results and in RDE verification testing, no multiplier can be applied.

b) Levels of PN and PM emissions

Emissions will be measured in terms of particle mass collected on a filter which shall be below 4.5 mg/km. If this condition is satisfied, the PN value will be used for scoring otherwise the score for this criterion will be zero. The proposed limit values are normally easily achievable by a wall flow filter which is currently the best available technology. This device is normally applied to Euro 5b vehicles, and therefore the limit could be challenging only if another technology is proposed to replace the standard filter.

The particles taken into account will be any solid particles (carbonaceous and metal or other chemical species resulting from additives or other installed devices) larger than 23 nm. However, particles below 23 nm shall be checked, and any technology that could determine compliance by significantly shifting the particle size distribution below the 23 nm threshold will lead to a 0 score in the criteria. The conformity factor for PN in RDE verification testing will be 1.5 of the threshold

NUMBER OF PARTICLES (>23 NM) PER KM	SCORE
$> 6x10^{11}$ per km	0
$> 1x10^{11} \leq 6x10^{11}$ per km	1
$> 5x10^{10} \leq 1x10^{11}$ per km	2
$> 1x10^{10} \leq 5x10^{10}$ per km	3
$> 5x10^{9} \leq 1x10^{10}$ per km	4
$\leq 5x10^{9}$ per km	5

Table 4: Number of particles per km criterion

The capability to apply the technology also to C class vehicles without a particle trap for which a PN standard is or will be applicable (Euro 4 or Euro 5a diesel vehicles or any Gasoline Direct Injection vehicles in addition to the mandatory Euro 5b demonstrator) is a benefit for the environment. It will be rewarded by doubling the points in the PN criteria for the diesel Euro 5b submission if all required data and the retrofitted vehicle for which particles reduction is demonstrated are submitted to JRC. In this case of course gasoline is allowed as a fuel if a GDI vehicle is presented, and other emissions at points a), c) and d) will be checked based on gasoline Euro 5 limits to verify that the technology does not make them significantly worse, in which case the multiplier will not be applied. A market fuel will be used for testing. To allow a full assessment of the technology, emissions during regeneration and their frequency should be reported.

c) Levels of hydrocarbons emissions

Hydrocarbons (HC) emission levels refer to the quantity of total unburned hydrocarbons also measured on chassis dyno and verified using portable emission measurement systems in real urban driving conditions where applicable. Since the Euro 5-6 diesel legislation mandates a value for HC + NOx, limits for this criterion are expressed in the same way to ensure that the vehicle can at least maintain the Euro 5 certification. These pollutants are important for air quality because they include known carcinogens and contribute to ozone and secondary particles.

HC + NO_X EMISSIONS	SCORE
> 230 mg/km	0
> 210 ≤ 230 mg/km	1
> 190 ≤ 210 mg/km	2
> 150 ≤ 190 mg/km	3
> 100 ≤ 150 mg/km	4
≤ 100 mg/km	5

Table 5: HC + NO_X Emissions Levels criterion

d) Levels of emissions of other pollutants

Carbon monoxide (CO) is a pollutant regulated in the Euro 5 legislation, and its level is verified to ensure that the vehicle can at least maintain the Euro 5 certification. It is normally emitted during combustion and is poisonous as it inhibits oxygen exchange in the lungs.

Other pollutants, currently unregulated by European Legislation (NH_3, N_2O), will be measured in verification testing (they do not need to be measured in initial testing since some test laboratories might not have the needed instruments, if available test results can however be included in the submission).

NH_3 (commonly known as ammonia) can be emitted both during combustion and as an effect of improperly-controlled reactions in ammonia-based catalysts. The maximum accepted emission level is 60 mg/km.

N_2O (commonly known as laughing gas) can be emitted both during combustion and as an effect of secondary reactions in catalysts, particularly in cold conditions. It is assessed for its high global warming potential (300) and the maximum accepted emission level is 40 mg/km, equivalent to 12g/km CO_2.

Other chemical species not explicitly listed under this criteria, which might derive from additives, catalysts etc. will be also assessed and the score for this criteria might be zero if there are indications of severe potential health risks (applying if needed the precautionary principle) and insufficient measures are taken to deal with such emissions (according to the description provided by the participants, lack of awareness of the issue will not be an acceptable excuse).

CO EMISSIONS	SCORE
> 500 mg/km	0
> 400 ≤ 500 mg/km	1
> 300 ≤ 400 mg/km	2
> 200 ≤ 300 mg/km	3
> 100 ≤ 200 mg/km	4
≤ 100 mg/km	5

Table 6: Emissions of CO criterion

The score for this criterion is constituted by the CO score from the table above. Other pollutants will influence the score by setting it to zero if the threshold value indicated above is exceeded or if other chemical species are detected in dangerous quantities. The conformity factor for other pollutants in RDE verification testing will be 1.5 of the threshold

e) Fuel consumption

The effect of the innovation on fuel consumption will be assessed on a mix of standard cycles (tested on the bench and reproduced for verification in real driving to exclude to the best possible extent defeat devices and the use of flexibilities) and will be expressed as percent variation on consumptions in litres per 100 kilometre (l/100 km). Limited hybridisation is accepted, therefore if present, energy stored in the battery used over the tests will be discounted from the energy efficiency calculation. If a start stop system is present, its effect on emission and energy efficiency will be taken into account in a similar way.

FUEL CONSUMPTION	SCORE
more than 10% worse	0
10% to 5% worse	1
5% to 0% worse	2
0% to 3% better	3
3% to 10% better	4
more than 10% better	5

Table 7: Fuel consumption criterion

The provided baseline fuel consumption performance of the unmodified vehicle can be checked in verification tests at JRC by removing the retrofit or by testing a similar unmodified vehicle. Participants should foresee a way to remove the innovation for testing purposes and provide information on how to do it and alternative, unmodified components if needed to maintain the full functionality of the vehicle. Should there be any reason for which this would not be possible, a way to simulate a disabled system, for instance by modelling of the effects that cannot be disabled, shall be provided.

f) Performance and Driveability

Donor vehicle performance, in particular the capacity to accelerate, should not be overly penalised by the innovation in order not to affect safety and market acceptance. Apart from the objective measurements defined below, good refinement (no unacceptable torque discontinuities, response lag etc.) will be subjectively assessed

and scored by a professional tester during verification tests. Acceleration tests might be performed on the chassis dyno.

Weight for the initial testing of the original car should be recorded and the same weight plus the retrofit and an amount of weight due to the PEMS and ballast will be added to have an equivalent load in PEMS tests for all participants.

PERFORMANCE AND DRIVEABILITY	
DIFFERENCE IN ACCELERATION FROM 0-100 KM/H	**SCORE**
>20% worse	0
≤ 20% to 10% worse	1
≤ 10% to 5% worse	2
≤ 5% worse to no change in acceleration	3
no change in acceleration to 5% better	4
> than 5% better acceleration than the donor vehicle	5
DIFFERENCE IN ACCELERATION FROM 80-120 KM/H[16]	**SCORE**
>20% worse	0
≤ 20% to 10% worse	1
≤ 10% to 5% worse	2
≤ 5% worse to no change in acceleration	3
no change in acceleration to 5% better	4
> than 5% better acceleration than the donor vehicle	5
DRIVEABILITY	**SCORE**
Insufficient	0
Sufficient	1
Fair	2
Good	3
Very good	4
Outstanding	5

Table 8: Performance and Driveability criterion

The average of the three scores will be used as a single value in the final ranking.

[16] In 5th gear with a 5 gear gearbox, or last gear but one if the gearbox has more than 5 gears.

g) Acquisition and running costs

Acquisition and running costs are defined as the combined sum of the cost of the retrofit system, its installation, plus changes in running costs induced by the retrofit (calculated over 100.000 km), be it additional periodic maintenance to refill consumables (if this has to be done by authorised personnel) or use of consumables (for example AdBlue® or other reagent/additive costs, increases or savings in fuel consumption being already assessed separately) or unscheduled costs deriving from durability issues (see criterion below). Applicants will be expected to provide sufficient information on manufacturing costs for all components and consumables, projected manpower required to retrofit the vehicle and any required additional maintenance manpower deriving from the retrofit. For such calculations, a standard manpower cost of 50€/hr shall be used. Participants shall also demonstrate that the solution can be installed by a mechanic without requiring specialist training.

ACQUISITION AND RUNNING COSTS	SCORE
> €2000	0
> €1500 ≤ €2000	1
> €1000 ≤ €1500	2
> €750 ≤ €1000	3
> €500 ≤ €750	4
≤ €500	5

Table 9: Acquisition and running cost criterion

h) Noise and Safety

Given the need to use the vehicle on public roads, and the considerable impact noise suppression devices can have on performance, fuel consumption and weight, the prototype vehicle will have to be fitted with an adequate noise suppression system capable of ensuring legal compliance.

Applicants must also be able to convincingly demonstrate that the prototype does not in any way compromise the safety of the vehicle or engine, and that it complies with the relevant European safety regulations and standards, in order to be drivable on the road for RDE testing.

A safety assessment for the proposed solution will be done by the jury, and any questions will be raised at the hearings. Should the applicant be unable to clarify the situation, the solution might be excluded, as this could stop the testing of the vehicle on public roads by JRC.

The criterion assesses globally if the vehicle is fit for testing and if the solution can be viable for market application.

NOISE AND SAFETY	SCORE
Insufficient	0
Sufficient	1

Table 10: Noise and safety criterion

i) Durability maintenance and usability

Information on the technology and expected life of specific components that might represent a risk for durability in terms of maintenance, physical damage/wear and of performance degradation (for instance for catalysts) shall be provided and this information will be assessed based on the provided material and any resulting replacement cost considered in the cost criterion above. If the life of the components exceeds 100.000 km, no additional cost will be added for their replacement as this would be of a similar order of magnitude to the normal life of the original components on the vehicle after a few years of use.

The innovation will also be assessed for any specific practical aspect that could impact the user experience and require interventions which are not normally required by current technology, be it while driving, maintenance or in other use situations. Such actions and costs should be described and provided and will be considered in the total cost above if applicable.

The score for these criteria will globally assess the convenience of the solution for the end user, separate from the cost aspects which will be assessed in the specific criteria above.

DURABILITY, MAINTENANCE AND USABILITY	SCORE
Insufficient	0
Sufficient	1
Fair	2
Good	3
Very good	4
Outstanding	5

Table 11: Durability, maintenance and usability criterion

5.3. Scoring and weighting

Each of the criteria is assigned a number of points connected to the indicated ranges. Applications must receive at least the minimum score of 1 for each category as set out in Table 1 and pass the RDE test with the prescribed conformity factor.

If the results for any of the technical criteria for different applications differ by less than the measurement error range[17], then for the final ranking those applications will be considered tied for that category and given the higher of the two scores.

A score weighting will be used to weight the criteria to be used in ranking the submissions, thus highlighting the importance of each criteria.

[17] To be defined for each relevant criterion in the measurement methodology annex, to be published on the Prizes websites

CRITERIA	SCORE WEIGHTING
a) Levels of NO_X emissions	3
b) Levels of PN/PM emissions	2
c) Levels of hydrocarbons emissions	1
d) Levels of emissions of other pollutants	1
e) Fuel consumption	2
f) Performance and Driveability	1
g) Acquisition and running costs	3
h) Noise and Safety	1
i) Durability, maintenance and usability	1

Table 12: Score weighting

For applications with the same score, the jury will determine a priority order according to the following approach: (1) the application with the highest score for NO_X will be ranked higher, (2) should this not be sufficient to break the tie, the same approach will be applied in turn for PN, cost, fuel consumption, HC and CO and other pollutants until the tie is broken. Should this still not be sufficient, (3) the individual emissions in the above mentioned criteria will be looked at, and the submission with the lowest absolute value will win (i.e.; if the score for NOx is 5 for both submissions, but one emits 55mg, and the other 40mg, the second wins). If two applications still tie for the first rank, (4) the price will be divided and awarded to both.

The EC reserves the right to modify these criteria and these Rules of Contest in response to emerging market or technology developments.

6. DOCUMENTS

The mandatory supporting documents are set out in the application form.

Participants may be asked at a later stage for further documents (at hearings or for legal entity validation, bank account validation, ethics review, declaration of honour on exclusion grounds etc.).

7. PROCEDURE

Any individual, legal entity or team (consortia among several individuals or legal entities) willing to participate should register for the contest as soon as possible, but at the latest by 12 June 2017.

In case of consortia one lead applicant has to be selected to act as the main contact. Only the lead applicant will be able to submit the application in the system.

The submission on the Participant Portal must be performed by completing Part A and Part B of the submission forms and these shall report all required information on the proposed technology as well as the initial test results indicated in Part B for both the unmodified donor vehicle and the prototype, including emissions on the three prescribed test cycles performed at a certified laboratory prior to submission. For the submission to be eligible, results of these tests shall be below the thresholds indicated in Table 1.

The technology has therefore to be developed and installed on the donor vehicle already well in advance of the submission deadline, to allow for mandatory initial testing according to the conditions specified in Part B of the submission forms.

By 27 September 2017 17:00:00 CET participants have to submit the application through the Participant Portal and deliver the prototype/s (i.e. the donor vehicle/s with the installed innovation which has already been tested

by the applicants, with no modifications) to the JRC in Ispra.

Joint Research Centre's labs address:

European Commission
Joint Research Centre
Institute for Energy and Transport
Via E. Fermi 2749,
I-21027 Ispra (VA)
Italy
Email: EC-ENGINE-PRIZE-SUBMISSION-JRC@EC.EUROPA.EU

Before delivering the prototype, detailed arrangements should be taken by 12 June 2017 by writing an email to the functional mailbox above.

Participants are allowed to submit more than one solution/concept if they wish so but each one must be registered under a separate application.

If multiple vehicles of different Euro standards are modified with the retrofit technology (as mentioned under the NOx and PM/PN criteria), they all have to be delivered to JRC but only one prize submission shall be made on the Participant Portal. The submission application form and annexes shall be completed for the main vehicle only. Relevant documents (description, test results, specifications etc.) regarding additional vehicles retrofitted with the same technology shall be submitted under "other documents". The main submission/retrofitted car shall as well contain the reference on additional cars being submitted in the first page of application.

All applications will pass to jury review. The jury evaluation is planned to take place between October 2017 and March 2018.

The jury will evaluate all eligible applications against the award criteria as described in section 5 of this document. The role of the expert jury, with support from JRC where appropriate, will be to assess the application against the award criteria, as well as evaluate the accuracy and robustness of the provided data and assessments, and mark them accordingly.

In order to be able to better evaluate and compare applications, applicants may be invited to hearings to provide explanations to any consequential questions by the jury. The Commission may decide to submit the applicant prototype for verification testing at JRC, which can include chassis dynamometer and Real Driving Emissions tests as well as performance, noise, safety and any other roadworthiness verification checks.

Since RDE testing will take place in winter, the vehicles should be provided with winter tyres (or with both summer and winter tyres if the former have been used for initial testing). In order to check for possible defeat devices, chassis dyno tests in JRC will be conducted at different temperatures and with the vehicle on a 4-wheel-drive bench.

In case the proposed solution uses any consumable other than lubricants and fuel, the participants should deliver with the vehicle a quantity sufficient for 1000 km of driving. Any instructions on the use and any warning on the handling of the consumables should also be provided.

The Commission and the JRC will not take any responsibility in case of any problems deriving from incomplete or missing instructions on the operation of the vehicle and the technology.

On the basis of the evaluation, the Commission will decide on the award of the prize.

All participants will be informed on the outcome of their application, namely the ranking of their submission.

8. OTHER CONDITIONS

8.1 Payment arrangements

The prize money will be paid to the (lead) participant in one instalment after the award ceremony by bank transfer, provided all the requested documents have been submitted.

The EC reserves the right not to award the prize fund should the jury deem that no applicant has met all the criteria for the prize.

The EC will only award the prize if the jury consider an application or applications to have met or exceeded the challenge. Should no submission reach the minimum targets and therefore the prize cannot be awarded, however, the Commission reserves the right to select up to three top ranking applications (if they are particularly promising or sufficiently close to the targets) for the attribution of an Acknowledgment of quality of the application to encourage further development.

Winners of the Competition are encouraged to use the prize money to implement their ideas and make it benefit their project and its target group, but no strict condition is set as regards the use of the funds. Winners are responsible for payment of taxes and charges applicable when using the prize money.

8.2 Publicity — Promoting the prize — Visibility of EU funding

8.2.1 Publicity by the winner(s)

The winner(s) must promote the action and its results, by providing targeted information to multiple audiences (including the media and the public) in a strategic and effective manner.

Unless the Commission requests or agrees otherwise or unless it is impossible, any communication activity related to the action (including in electronic form, via social media, etc.) must:

a) display the EU emblem and

b) include the following text:

"This action has been awarded the Horizon Prize for the Engine Retrofit for Clean Air from the European Union's Horizon 2020 research and innovation programme".

When displayed together with another logo, the EU emblem must have appropriate prominence.

For the purposes of its obligations, the winner(s) may use the EU emblem without first obtaining approval from the Commission.

This does not, however, give it the right to exclusive use.

Moreover, they may not appropriate the EU emblem or any similar trademark or logo, either by registration or by any other means

8.2.2 Publicity by the Commission

The Commission may use, for its communication and publicising activities, information relating to the action, documents notably summaries for publication and deliverables as well as any other material, such as pictures or audio-visual material that it receives from the participants including in electronic form). If the right of use is subject to rights of a third party (including personnel of a participant), the participant must ensure that it has obtained any necessary approval from the third party concerned.

The Commission will publish the name of the winner(s), their origin, the amount of the prize and its nature and purpose— unless the winner has requested to waive this publication (because disclosure risks threatening its security and safety or harm its commercial interest). The Commission may publish similar information about the other participants under the same conditions.

Photos and videos taken by the Commission either in preparation of the award ceremony or during the award ceremony or other events related to the Prize (such as testing, hearings, brokering and communication events, etc.) are the sole property of the Commission and might be used for its communication and publicising activities, while respecting Intellectual Property rights.

8.3 Dissemination and exploitation of results

The winner(s) must comply with the obligations set out in Title III of the Rules for Participation Regulation No 1290/2013[18] and the following additional exploitation obligations:

Intellectual Property Rights relating to the results will remain with the winner and the winner must exploit the results. If a winner fails to commercially exploit the results within 3 years after the award of the prize, it must – upon request – grant a royalty-free licence s to any third party established in the EU Member States or Associated Countries to commercially exploit the results

The winner must provide any information requested by the Commission regarding the dissemination and exploitation of the results.

8.4 Processing of personal data

8.4.1. Processing of personal data by the Commission

Any personal data will be processed by the Commission under Regulation No 45/2001[19] and accordance with the Participant Portal privacy notice(s).

All finalist(s) and winner(s) consent that the Commission publishes the following information:

a) name

b) Member State of origin (address or NUTS 2 region)

c) their activities in relation to the award of the prize (via the summary for publication they provided)

d) prize amount

in whatever form and medium.

8.4.2. Processing of personal data by the participants

The participants must process personal data in compliance with applicable EU and national law on data protection (including authorisations or notification requirements).

8.5 Ethics

The activities must be carried out in compliance with:

a) ethical principles (including the highest standards of research integrity — as set out, for instance, in the European Code of Conduct for Research Integrity[20]— and including, in particular, avoiding fabrication, falsification, plagiarism or other research misconduct) and

b) applicable international, EU and national law.

[18] Regulation (EU) No 1290/2013 of the European Parliament and of the Council of 11 December 2013 laying down the rules for participation and dissemination in "regulation (EU) No 1290/2013 of the European Parliament and of the Council 020)" (OJ L 347, 20.12.2013 p.81).

[19] Regulation (EC) No 45/2001 of the European Parliament and of the Council of 18 December 2000 on the protection of individuals with regard to the processing of personal data by the Community institutions and bodies and on the free movement of such data

[20] The European Code of Conduct for Research Integrity of ALLEA (All European Academies) and ESF (European Science Foundation) of March 2011.

No prize will be awarded for activities carried out outside the EU, if they are prohibited in all Member States.

The participants must ensure that the activities have an exclusive focus on civil applications.

The participants must ensure that the activities do not:

a) aim at human cloning for reproductive purposes

b) intend to modify the genetic heritage of human beings which could make such changes heritable (with the exception of research relating to cancer treatment of the gonads) or

c) intend to create human embryos solely for the purpose of research or for the purpose of stem cell procurement, including by means of somatic cell nuclear transfer.

Research activities involving human embryonic stem cells (hESC) are moreover subject to the conditions set out in the Statement of the Commission related to research activities involving human embryonic stem cells.

The participants must respect the highest standards of research integrity — as set out, for instance, in the European Code of Conduct for Research Integrity[21].

For more information and best practice, see the Online Manual, the sample 'proposal template' for prizes and the guidance How to complete your ethics self-assessment.

8.6. Security

The activities must be carried out in compliance with Commission Decision 2015/444, i.e. security-sensitive information must be **EU-classified**, if its unauthorised disclosure could adversely impact the interests of the EU or of one (or more) of its Member States. Applications that are too security-sensitive cannot be awarded a prize.

For more information and best practice, see the Guidance — Guidelines for the classification of information in research projects, the Guidance — Guidelines for the handling of classified information in EU research projects, the Guidance note — Potential misuse of research results and the Guidance note — Research involving dual use items.

8.7. Conflict of interests

The participants must take all measures to prevent any situation where the impartial and objective award of the prize is compromised for reasons involving economic interest, political or national affinity, family or emotional ties or any other shared interest ('conflict of interests').

They must inform the Commission without delay of any situation constituting or likely to lead to a conflict of interests and immediately take all the necessary steps to rectify this situation.

The Commission may verify that the measures taken are appropriate and may require additional measures to be taken by a specified deadline.

8.8. Liability for damages

The Commission shall not be held liable for any damage caused or sustained by any of the participants, including any damage caused to third parties as a consequence of or during the implementation of the activities related to the contest.

[21] European Code of Conduct for Research Integrity of ALLEA (All European Academies) and ESF (European Science Foundation) of March 2011

The Commission cannot be held liable for any damage caused to the participants or to third parties as a consequence of the award or implementation of the prize, including for gross negligence.

Applicants participate in the contest at their own risk and costs. The applicants should obtain liability insurance, or satisfactorily demonstrate financial responsibility, during the period of the competition, including during transport to and from JRC at Ispra, accidents during testing due to faulty instructions, design or manufacturing of the prototype.

8.9. Checks, audits and investigations

The Commission, the European Anti-Fraud Office (OLAF) and the European Court of Auditors may carry out checks, audits and investigations in relation to the prize.

8.10. Withdrawal of the prize — Recovery of undue amounts

The Commission may withdraw the prize after its award and recover all payments made, if it finds out that:

a) false information or fraud or corruption was used to obtain it

b) a winner was not eligible or should have been excluded

c) a winner is in serious breach of its obligations under these Rules of Contest

8.11. Administrative sanctions

If a participant has committed irregularities or fraud or has made false declarations, the Commission may also:

a) exclude the participants from all future contracts, grants and contests financed from the EU or Euratom budget for a maximum of five years (or 10 years in case of repetition) and/or

b) impose a financial penalty between 2% and 10% of the value of the prize (or between 4% and 20% in case of repetition).

8.12. Cancellation of the contest

The Commission may cancel the contest or decide not to award a prize — without any obligation to compensate participants —, if:

a) the objective of the contest has already been achieved

b) no applications are received

c) the jury does not find a winner or

d) the winner is not eligible or must be excluded.

8.13 Complaints

Complaints against decisions negatively affecting the rights of a participant can be brought before the General Court — or, on appeal, the Court of Justice of the European Union — under Article 263 of the Treaty on the Functioning of the EU (TFEU).

9. CONTACT

For more information, please see the prize website.

In case of questions, please contact EC-ENGINE-RETROFIT-PRIZE@EC.EUROPA.EU

10. DEFINITIONS

In the context of the Horizon prize for the Engine retrofit for clean air the following specifications and definitions shall apply:

TERMS	SPECIFICATIONS AND DEFINITONS
C-class vehicle	A compact car similar in size to a Volkswagen Golf, Renault Megane, Peugeot 308, Fiat 500L, Opel Astra, Ford Focus etc. covering a large part of the European market and therefore providing a large impact, since their engines are normally also applied to vehicles in lower and higher categories.
Chassis dyno	A chassis dynamometer consists of a platform with a pair of rollers, a braking or power absorption system, and software. The dynamometer simulates the vehicle resistance as function of the vehicle speed using as inputs the vehicle mass and 2 (or 3) constants of a parabolic equation (road load coefficients).
Common Artemis Driving Cycles (CADC)	A suite of chassis dynamometer test cycles developed in the ARTEMIS EU Project and deemed to be a realistic representation of driving behaviour in different conditions (urban, extra-urban, motorway). In the motorway cycle, the high speed variant going up to 150 km/h might be used.
Conformity factor (CF)	A multiplier, applied to the chassis dyno-based limits in Euro regulations that takes into account measurement errors of the portable instruments with respect to those installed on the chassis dyno. For the purpose of this prize CF equals 1.2 for NOx and 1.5 for other pollutants.
Diesel engine	An engine where the combustion of a fuel, (normally a fossil fuel or a blend with biofuels in low percentages) occurs by compression with an oxidiser (usually air) in a combustion chamber that is an integral part of the working fluid flow circuit. In a diesel engine the expansion of the high temperature and high pressure gasses produced by combustion, apply direct force to some component of the engine.
Donor vehicle	A C-class compact vehicle on which the innovation shall be installed to demonstrate its performance under real driving conditions on the road as well as under standardized conditions in the laboratory. Modifications to the donor vehicle other than for installing the innovation are not allowed, but a maximum volume of 20l of trunk space can be taken in the donor vehicle for the purpose of installing the device.
Euro 5/Euro 6	Limits for pollutant emissions of new vehicles sold in the EU member states after 2009 and 2014 respectively according to REGULATION (EC) No 715/2007 of the European Parliament and of the Council and Commission Regulation (EU) No 459/2012.
Fuel and lubricants	Fluids which are used in a conventional engine to provide energy and reduce friction respectively. For the purpose of this prize diesel and its commercial low blends according to Annex II of Directive 2009/30/EC of the European Parliament and of the Council of 23 April 2009 can be used for the diesel based vehicles. In case the consortium decides to apply the innovation to control particles in a Gasoline Direct Injection engine vehicle, gasoline and its commercial low blends according to the same legislation will also be used. In initial testing participants are allowed to use any commercially available type of diesel fuel and any standard lubricant indicated in the user manual by European automotive OEMS. Final testing at JRC will be performed using the fuel in the car tank, and/or a standard market fuel available there. Lubricants for final testing shall be the ones provided in the submitted engine by the applicant, and should be clearly identified in the submission papers in case a need for

	replenishing emerges during testing.
Fuel efficiency	Fuel efficiency is the volume of fuel consumed per 100 km of driving distance [l/100 km], measured on the road or chassis dynamometer.
Initial testing	The testing which is required to accompany a submission. For the purpose of this prize, this applies both to the modified donor vehicle, to establish a baseline, and to the retrofitted prototype. It has to be performed prior to submission on a chassis dyno by a certified laboratory (ISO 9001, ISO 17025 or equivalent) on behalf of applicants and according to the requirements defined hereafter. All costs should be covered by the applicants.
NEDC	The New European Driving Cycle (NEDC) is the chassis dynamometer test cycle used to determination of polluting and CO_2 emissions and fuel consumption from light-duty vehicles for type approval purposes. For the purpose of this prize, however, it will be performed at a lower temperature than in the standard certification test.
Not-to-exceed (NTE)	NTE is the limit that should not be exceeded by the pollutant emissions of a vehicle measured according to a Real Driving Emissions procedure.
NO_X	A generic term for a mixture of nitrogen monoxides NO and NO_2 (nitrogen dioxide). They are produced from the reaction of atmospheric nitrogen and oxygen during combustion at high temperatures.
On Board diagnostic (OBD)	A vehicle's self-diagnostic and reporting capability. Early versions of OBD would simply illuminate a malfunction indicator light or "idiot light" if a problem was detected but would not provide any information as to the nature of the problem. Modern OBD implementations use a standardized digital communications port to provide real-time data which allow one to rapidly identify and remedy malfunctions within the vehicle. For the purpose of this prize, no access to OBD data should be needed or used in testing.
PN/PM	Particulate matter refers to very small pieces of solid or liquid matter emitted by a combustion engine. At present, vehicle emission regulations are based on gravimetric filter measurements for particulate matter mass (PM), and optical counting of solid particles >23 nm diameter for particle number (PN). Additional particles are formed in the air by NO_X and VOC emissions (including those emitted by combustion engines). Together they are suspended in the atmosphere and contribute to atmospheric aerosol, a term which refers to the particulate/air mixture. To ensure that particle targets are achieved by reducing the number of particles and not by shifting them to a smaller size, below the detection threshold of the counting methodology, for the purpose of this prize the reference technology is the wall flow particle filter which is assumed to be installed unless an innovative device or combustion system is proposed. In this case its efficiency shall be demonstrated by the applicant to be the same or better than the reference technology.
Portable emission measurement systems (PEMS)	Essentially a lightweight and transportable 'laboratory' that measures tailpipe emissions of vehicles during real-world operation on the road.
Powertrain	The complex of components capable of providing motive power to a car, including the engine, its auxiliary components (pumps, starter etc.) an after-treatment system and a mechanical transmission system. Hybridisation (i.e. the coupling with other forms of energy to provide propulsive power) is allowed only for systems that do not require modifications to the gearbox and with a limit of 20% on the peak power and 10% on maximum continuous power of the electric machine with respect to the maximum power of the ICE and with a storage based either on a normal lead-acid 12V battery or

	an additional one not having more than 0.5kWh of energy storage capacity.
Prototype vehicle	The donor vehicle after installing the working prototype of the innovative technology.
Real driving emissions	Test procedure reflecting emissions measured on the road through the use of portable emission measurement systems (PEMS). For information purposes, a definition of these procedures under this prize will be provided shortly on the Prize website.
Retrofit	Measures taken in the manufacturing industry to allow new or updated parts to be fitted to old or outdated assemblies in order to improve performance and durability and/or decrease costs. In the case of this prize, such parts will aim at reducing the emissions of the existing car engine to which it's applied.
Verification testing	The testing performed at JRC in Ispra (Italy) that will include both chassis dyno and real driving tests. Costs for transport to and from JRC shall be borne by the participants, while testing costs will be taken up by JRC.
WLTP	The worldwide harmonized light vehicles test procedure (abbreviated WLTP) includes a new chassis dynamometer test cycle (WLTC) for the determination of emissions and fuel consumption from light-duty vehicles. In 2017 it will replace the European NEDC procedure for type approval testing of light-duty vehicles. For the purpose of this prize, however, it will be performed at the mass of the Regulation 83 and a lower temperature than in the standard certification test.
Working prototype	Presents the final design, aesthetics, materials and functionality of the intended submission. The construction of a fully working full-scale prototype is the ultimate proof of concept demonstrating its functionality.