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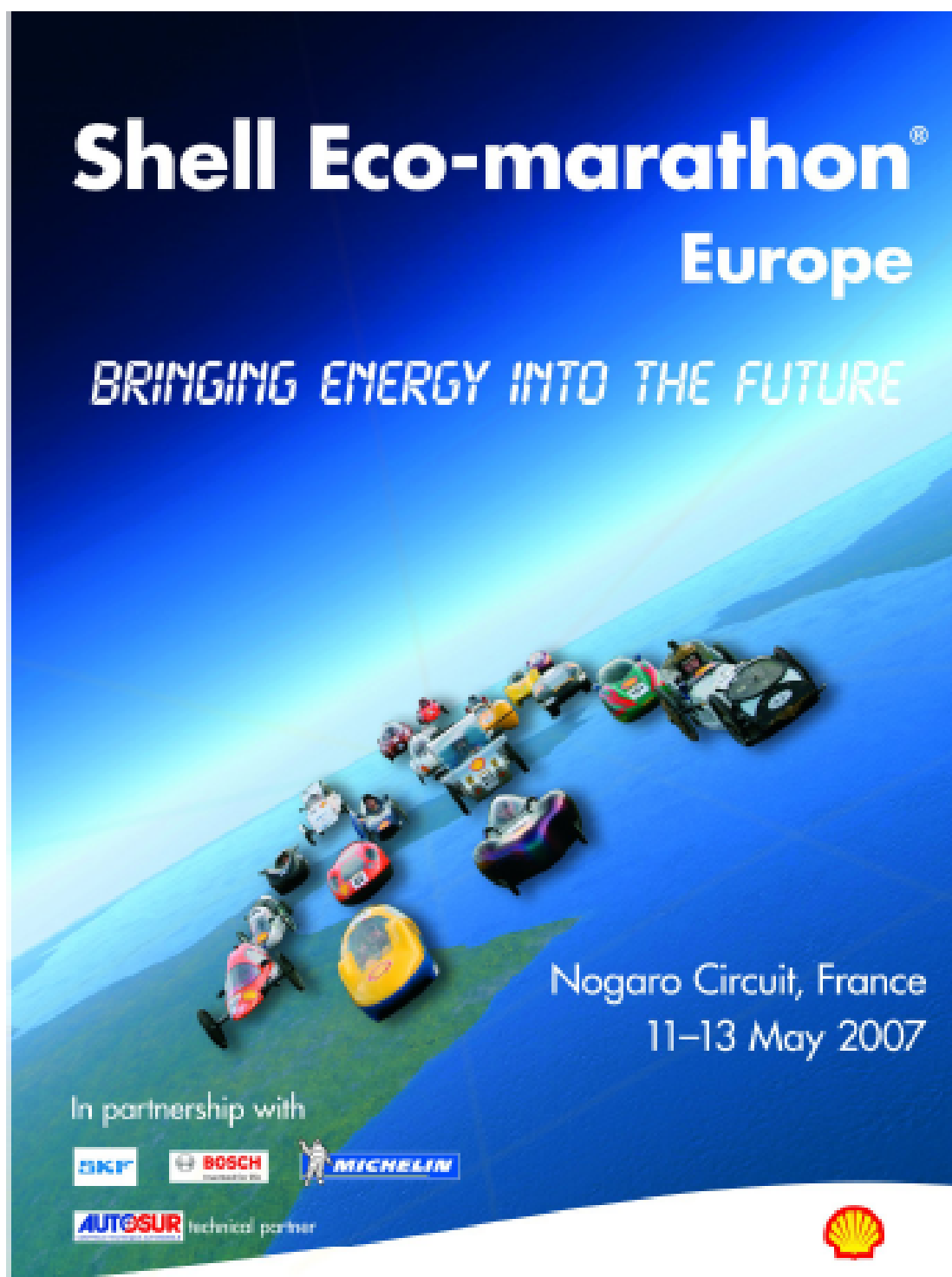
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2007 Shell Eco-marathon Rules

Shell Eco-marathon[®]

Europe

BRINGING ENERGY INTO THE FUTURE



Nogaro Circuit, France
11-13 May 2007

In partnership with



technical partner



2007 Shell Eco-marathon Rules

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General rules for all Shell Eco-marathon events in the world

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FOREWORD

Shell Eco-marathon: challenging young people to design and build energy-efficient vehicles

The Shell Eco-marathon challenges teams to drive the furthest on the least amount of energy. It is an innovative educational project bringing together the values of sustainable development, protection of the environment and individual and cultural diversity.

Participants manage a project in totality and the Shell Eco-marathon encourages integration of vehicle design, finance and construction into the curriculum, as well as demonstrating the value of multi-disciplinary teams working together with industry towards a common goal.

Shell¹ organises energy-economy competitions on a real motor racing circuit in both the US and Europe. Known as the Shell Eco-marathon, this competition is governed by the rules and regulations presented herein.

Participating teams can enter:

- The following **groups**:
 - **Prototypes**, three or four-wheel vehicles
 - **UrbanConcept**: four-wheel vehicles that are similar in appearance to regular cars and which are fit for on-road use.
- The following **categories**:
 - **Schools**: High Schools, Middle Schools or Technical Schools preparing pupils for vocational training certificates, professional certificates, O-levels, A-levels or equivalent. Drivers shall be pupils of the school in question (please attach proof of enrolment to the entry form).
 - **Universities**:
 - Educational establishments preparing students for higher education diplomas (senior technician certificates, university-level technology diploma, etc.). Drivers shall be students of the school in question (please attach proof of enrolment to the entry form).
 - Establishments of higher education awarding university-level diplomas, or student associations. Drivers shall be students of the school/university in question (please attach proof of enrolment to the entry form).
- The following **engine types** and **energy classes**:

Engine types	Energy classes
Combustion	Petrol / Gasoline
	Diesel fuel
	Alternative Petrol / Gasoline (LPG, Ethanol E85, CNG)
	Alternative Diesel (Fatty Acid Methyl Ester, Gas to Liquid, Dimethyl Ether)
Fuel cells	Hydrogen
Solar	/

The use of hybrid technology is only allowed for Urban Concept vehicles.

Each of the groups and classes is described in a special section of the Shell Eco-marathon General Rules and Regulations, which apply to all team categories.

¹ The name "Shell" is used for the sake of simplicity when referring to one or more companies of Royal Dutch/Shell plc.

Chapter I

General rules

for all Shell Eco-marathon events in the world

1 - ORGANISATION

Article 1: Acceptance

The entry forms must be sent completed, with all necessary documents to be accepted by the Organising Committee who will select teams based on quality of the proposed entry packet. All decisions by the Organising Committee regarding the acceptance of teams are final.

By the simple fact of their entry, participants accept all the provisions of the present regulations and agree to abide by all decisions made by the Shell Eco-marathon Organising Committee. Organisers reserve the right to modify any article of the present regulations. In such an event, the participants shall all be personally notified. The Organising Committee shall be solely empowered to pronounce on cases not provided for in the present regulations.

Organisers reserve the right to modify, delay or even cancel the competition in the event of unforeseen circumstances, notably poor weather conditions. No claims for compensation shall be accepted.

In participating in the Shell Eco-marathon, you recognise the right of its Organiser, Shell, and more generally the companies of the Shell Group to use, if necessary, your image for publicity or materials promoting this project.

Article 2: Entries

For each entry, a team manager, a driver and a reserve driver shall be designated.

The team manager shall be responsible for only one vehicle. He/she may be the driver for that vehicle, but only for that vehicle.

The manager shall be the team's sole official liaison with Organisers. All information shall be addressed to him/her. For the purposes of the project, he/she shall be responsible for the team and shall speak on behalf of the team and must be able to understand and speak English.

The driver shall be **13 years** of age or older on the day of the competition and shall weigh no less than **50kg**. The main driver for one vehicle shall not be the reserve driver for another vehicle.

One reserve driver may be assigned to two vehicles. However, once he/she has driven one of those vehicles (during practice or in competition), he/she may no longer drive the other vehicle.

There shall be a maximum of 1 prototype and 1 UrbanConcept vehicles accepted per educational establishment, including all associations linked to that establishment. This vehicle shall be described in a separate, fully completed entry packet.

Article 3: Track Access Conditions

During both the practice runs and the competition, all vehicles shall comply with technical and safety rules and regulations. Whenever they enter the track, the vehicle body shall be in place and shall bear all the competition numbers, partner streamers and Shell logos required by regulations. Organisers shall supply these numbers and logos upon entry confirmation.

Article 4: Identification

Logos, partner streamers and racing numbers shall be fixed to the vehicle body (in accordance with the diagram provided) such that they can be clearly read during any public presentation, in promotional films and on all photographs for team use, school use, press or promotional material.

Under no circumstances shall Shell logos, partner streamers or racing numbers be modified, either on the vehicle or on any other documentation. It is prohibited to cut the stickers supplied by the Organisers. Their dimensions are as follows:

- For each side and for the front of the vehicle: a Shell logo, 20 x 20cm
- For each side and for the front of the vehicle: racing numbers (stickers), with a different colour for each energy class 20 x 26cm
- For each side, on the lower part of the body: a partner streamer, 90 x 6cm

A mandatory 10cm space shall be left free on either side of the Shell logo.

Any sponsor names/logos shall be smaller than the Shell logo. The sponsor stickers must fit within a surface of 400 cm² (empty space included)

In the event of a breach of this rule, Event Organisers reserve the right to remove any sponsor logos.

Furthermore, the trademarks or logos of other energy providers, Oil companies, direct competitors of event partners, tobacco companies and alcoholic drinks producers are prohibited.

All vehicles shall be subject to Inspector approval concerning these provisions.

Article 5: Compliance

Only those vehicles that comply with the present regulations shall be allowed to participate. No vehicle shall be allowed on the track for practice or competition until the Inspectors have approved it. The decisions of Inspectors shall be final in all matters concerning the compliance of vehicle design and construction with the present regulations, namely with regard to the brake system, the power train and the fuel system. Their decisions shall be final.

Inspectors reserve the right to rescind vehicle approval upon further or more detailed checks. Inspectors shall be notified of any modifications to the vehicle after inspection. Non-compliance with this rule shall lead to vehicle disqualification.

Article 6: Timekeeping

All vehicles shall be equipped with an extra-flat electromagnetic transponder that will be fitted after vehicle inspection using adhesive tape or bolts & nuts, inside or outside the vehicle according to the vehicle's characteristics. A security deposit shall be required for this transponder. The security deposit shall be returned upon presentation of the transponder at the end of the competition.

----- PROTESTS AND DISPUTES -----

Article 7: Protests

Team Managers shall be the only persons authorised to lodge protests. Protests shall be addressed in writing to Competition Control and shall be submitted to the Competition Secretariat. Depending on their nature, said protests shall be lodged within the following times:

- Vehicles: before the end of the competition.
- Team and driver behaviour: within 10 minutes following the end of the attempt.
- Results: within 15 minutes after the results of an attempt have been posted.

Article 8: Disputes

In the event of any disputes, all decisions made by the Controllers shall be binding and final.

2 - SAFETY

Article 9: Safety Rules

Safety is an essential consideration for Shell Eco-marathon Organisers. Compliance with safe driving and sporting rules shall be mandatory for everyone's protection.

All team members shall comply with safety measures, notify safety staff about any anomalies or incidents and leave dangerous areas immediately.

All vehicles must be parked inside the pit area or directly in front of it. When off the track, vehicles shall be moved without use of the engine. They shall be pushed or pulled. Race Marshals shall notify Race Control of any breaches and of any unsafe or unsportsmanlike behaviour.

Non-compliance with regulations may lead to disqualification from the competition.

----- DRIVING REGULATIONS -----

Article 10: Driving Knowledge Test

Only the driver or the reserve driver, both duly registered, shall be authorised to drive the vehicle.

During vehicle inspection, drivers shall answer a questionnaire to test their knowledge of the driving regulations.

Article 11: Briefing and Test Lap

A briefing session shall be held by Race Control each morning before the track is opened. It is strongly recommended that managers and drivers complete a familiarisation lap aboard a Race Control vehicle. The dates and times for these test laps shall be provided at the Reception Desk and shall be posted in the track area.

Article 12: Access to the Track

Vehicles shall pass safety inspection prior to accessing the track for practice runs. A red safety inspection sticker and a blue technical inspection sticker shall be clearly affixed to the vehicle.

For practice runs, only vehicles with a safety sticker will be allowed on the track.

For the competition, only vehicles with both stickers will be allowed to compete.

Each team may have a single bicycle on the track, but only during test laps and practice runs. The cyclist shall wear a badge bearing the team's number and shall ride in the racing direction, while taking care not to disturb any of the other participants. Roller blades, push scooters and all motorised vehicles are prohibited.

Article 13: Pushing the Vehicle

On the track during the competition, the driver shall not be allowed to push his/her vehicle or to have it pushed, including to start the run or to cross the finish line. Non-compliance with this rule may lead to disqualification.

Article 14: Racing Direction

Racing shall occur in a clockwise direction.

It is forbidden to drive in reverse gear or to drive against the normal race direction; any breach of this rule shall lead to disqualification of the vehicle and of the team.

Article 15: Radio Connections

The use of hand-held walkie-talkies is forbidden in the vehicle. Use of a "hands-free" kit shall be mandatory for drivers.

Article 16: Overtaking

Drivers are requested to offer clear passage for other competitors wishing to overtake.

- The driver of the vehicle being overtaken shall use his/her rear- and side-view mirrors and shall not change course suddenly.
- The driver of the overtaking vehicle shall do so with caution and shall sound the horn if necessary. **Attention:** The driver of the overtaking vehicle shall be responsible for the safety of the manoeuvre.

Reminder: On the track, overtaking is authorised on both the right and the left, as long as the above-mentioned safety rules are followed.

Article 17: Breakdowns and Other Incidents

If a vehicle breaks down or is involved in an accident on the track, the driver shall ensure that the vehicle is removed as quickly as possible from the track and on to the inside shoulder. If the vehicle cannot continue under its own power, the driver shall wait for a Track Marshal, who will arrange for assistance. It is forbidden to carry out repairs on the track. In the event of a flat tyre, even when near the starting line, a new start shall not be granted for the attempt in question.

Article 18: Parking

Intentional stopping on the track is forbidden. However, vehicle tuning, lasting less than two minutes and performed outside the white lines, is allowed **during practice only**. If tuning lasts more than two minutes, the vehicle shall be towed back to the pit area by the safety services.

During practice runs and race attempts, the vehicle must be brought to a full stop and the handbrake applied in the event of an incident. Race Marshals will not intervene to stop any vehicles.

In the event that the handbrake of a stopped vehicle is not applied and the vehicle rolls back down a slope, the attempt shall be terminated and invalidated. The vehicle will be towed back to the pit area by the safety services.

During the competition, the following shall apply to a vehicle that comes to a full stop during a race attempt:

- **With the engine running**, the vehicle shall have 30 seconds to start moving again; after this time has elapsed, the attempt shall be terminated and invalidated. The vehicle will be towed back to the pit area by the safety services.
- **If the engine stalls and cannot be restarted within 30 seconds**, the attempt shall be terminated and invalidated. The vehicle will be towed back to the pit area by the safety services.

Article 19: Penalties

Non-compliance with the driving regulations shall result in a warning, invalidation of the attempt or disqualification of the team, depending on the gravity of the breach.

Event Organisers may exclude, disqualify or otherwise penalise any competitor who, in the judgement of the Inspectors, has gained an unfair advantage as a result of any breach of these regulations, hindrance of other participants, departure from the normal course, or any act or omission capable of misrepresenting performance, especially with regard to fuel consumption or method of propulsion.

During competition, the driver or the team manager shall be required to report to the Inspectors any movement made or attempted by means other than the vehicle's own motive power. In such an event, the attempt in question shall not be taken into account. If this type of incident is not reported, all the team's attempts shall be invalidated.

The following penalties shall be applied by Organisers for the following infractions:

- Non-use of the horn prior to overtaking.
- Non-compliance with safety or driving rules (unsafe or unwise behaviour).

1st infraction: **50 km** shall be subtracted from the distance for the attempt.

2nd infraction: **100 km** shall be subtracted from the distance for the attempt.

3rd infraction: **Team disqualification.**

The penalties shall be applied to the team's best attempt of the day on which the infraction is observed. In the event that the penalty is applied to the team's best attempt, this penalty will be taken into account during the final ranking.

----- DRIVER EQUIPMENT -----

Article 20: Driver Weight

Drivers shall weigh at least **50kg**.

Ballast shall be fitted to the vehicle in the event that this minimum weight requirement is not met. This ballast shall be provided by the team, and it shall be effectively tied down to the vehicle so that it presents absolutely no danger for the driver in the event of collision or roll-over. The driver (in racing gear) shall be weighed before and after each official attempt. A **1kg** disparity between these two weights shall be tolerated in order to take into account weight loss by dehydration.

Article 21: Visibility

The driver must have adequate direct visibility in front and on each side of the vehicle and be able to turn his or her head **90°** on each side of the longitudinal axis of the vehicle. This field of vision shall be achieved without aid of any optical devices such as mirrors, prisms, periscopes, etc. Moreover, the vehicle shall be equipped with a side-view mirror on each side of the vehicle, each with a minimum surface area of **25cm²**. The visibility provided by these mirrors, and their proper attachment, shall be subject to inspection.

Visibility in each of the vehicles shall be checked by an Inspector sitting in the driver's seat in order to assess on-track safety. This Inspector shall check good visibility with seven **60cm** high blocks spread out every **30°** in a half-circle, with a 5m radius in front of the vehicle. Note that the driver must be able to move his/her head in order to see any "blind spots".

All the windows should be covered with a safety film on the inside of the windows to prevent sharp splinters hurting the driver.

Article 22: Helmets

For practice and competition, drivers shall wear crash helmets that comply with local safety standards. These standards shall be indicated clearly on the exterior or interior of the helmet. Helmets worn by both the main and reserve drivers shall be subject to Inspector approval. Approval stickers shall be clearly attached to approved helmets. Bicycle, mountain climbing or other helmets are strictly forbidden.

Article 23: Driver Clothing

Drivers shall not wear any synthetic clothing. It is recommended that the drivers wear cotton undergarments. **Drivers shall, without exception, wear long-sleeved cotton coveralls.** Upon presentation of an official document during technical inspection, the driver's blood group and Rhesus factor shall be written in indelible ink on the driver's wristband. Driving barefoot or in socks is prohibited. Dancing or climbing shoes shall be permitted.

3- VEHICLE DESIGN

A - PROTOTYPE GROUP

Article 24: Vehicle Design

During vehicle design/construction and competition planning, participating teams shall pay particular attention to all aspects of safety, i.e. driver safety, the safety of other participants and spectator safety.

Vehicles shall have three or four running wheels, which under normal running conditions shall all be in continuous contact with the road. Mobile aerodynamic appendages are forbidden.

Vehicle bodies shall not include any sharp external appendages that might be dangerous to other participants. The vehicle shall not contain any sharp objects that might injure the driver during a collision.

Article 25: Dimensions

The maximum height measured at the top of the driver's compartment shall be less than 1.25 times the maximum track width between the two outermost wheels. The track width shall be at least **50cm**, measured between the midpoints where the tyres touch the ground, and at most **110cm**. The wheelbase shall be at least 1m. The maximum total vehicle width shall be **130cm**, the maximum total length shall be **350cm** and the maximum vehicle weight, without the driver, shall be **160kg**. These dimensions are aimed at ensuring sufficient stability, given the circuit layout.

Article 26: Driving Position

For safety reasons, the head-first driving position is prohibited.

Article 27: Cockpit - Ventilation

Participating teams shall note that high temperatures can be attained inside the vehicle, thus negatively affecting driver comfort. The cockpit shall therefore be properly ventilated and equipped with a sunscreen. It is recommended that drivers consume sufficient amounts of water to avoid dehydration.

Article 28: Roll Bar

Participants shall ensure that the vehicle shell and/or chassis are solid. The cockpit shall be equipped with an effective roll bar that extends in width beyond the shoulders of both authorised drivers. The roll bar shall also extend above the top of the driver's helmet in the normal driving position. This roll bar shall be capable of withstanding a 70kg static load applied to its centre without bending. Moreover, all sides of the cockpit shall be sufficient to protect the driver from possible lateral and frontal shocks. Any vehicle not equipped with the above safety features shall be subject to disqualification.

A **5cm**-thick layer of polyurethane foam with a minimum density of **28kg/m³** shall be placed on the inside wall of the front of the vehicle body in order to protect the driver's feet in the event of a collision.

Article 29: Safety Belts

The driver's seat shall be fitted with an effective safety belt having four mounting points ("child seat" type) to maintain the driver in his/her seat. The belt shall be firmly attached to the vehicle's main structure and shall be fitted with a buckle specifically designed for this purpose. Safety belt buckles and attachments shall be made of metal. The solidity of these attachments shall be evaluated during technical inspection by raising the vehicle with the driver on board using the safety harness for suspension.

Article 30: Vehicle Access

It is imperative for drivers to be able to vacate their vehicles at any time without assistance. Vehicles with closed bodywork shall be equipped with a sufficiently large opening for the cockpit. The driving position shall be designed so that emergency services can easily extract the driver from his/her vehicle, if necessary.

Said opening may be enclosed wholly or partly by means of hinged, detachable and/or folding doors, provided that a release mechanism is easily operable from inside and that the method of opening from the outside is clearly marked by a red arrow and does not require any tools.

It is forbidden to attach or to reinforce the bodywork or cockpit with adhesive tape.

The Race Marshals reserve the right to extract the driver from the vehicle by opening and/or closing that vehicle, whenever they deem this to be necessary. Any intervention by the Race Marshals shall not be subject to protest and shall not lead to any penalties for the team in question.

Article 31: Horn

Each vehicle shall be equipped with a standardised horn. The authorised horn can be purchased on the Shell Eco-marathon Website's e-shop centre. **The horn has to be powered by a battery dedicated to this effect, employing a simple electrical circuit (battery, pilot contactor, horn).**

Article 32: Clutch

Vehicles shall be equipped with a clutch system, so that they can be immobilised on the starting line without any outside assistance.

Article 33: Wheels, Axles and Wheel Hubs

All types of wheels are allowed.

Any type of wheel rim may be used. Rims must be compatible with the dimensions of the selected tyres in order to satisfy safety standards.

Teams shall take into account the fact that bicycle and motorcycle wheels are not generally designed to support substantial lateral cornering forces, such as may be found in Shell Eco-marathon vehicles at certain speeds.

The wheel axles are also of a size more appropriate for loads distributed on both sides and not in a cantilever fashion. Care should be taken to distribute loads so as avoid any deformation of wheels or their axles.

The wheels located inside the vehicle body must be isolated from the driver by a bulkhead. Any handling or manipulation of the wheels is forbidden from the moment the vehicle is at the starting line until it crosses the finish line.

Article 34: Turning Radius

The turning radius shall be sufficient to enable safe overtaking. If Race Marshals observe that the turning radius of a vehicle is insufficient, the vehicle shall be removed from the track for technical inspection.

Article 35: Vehicle Handling and Driver Position

A vehicle handling course will be set up in order to verify the following when the vehicle is in motion: turning radius, steering precision and the driver's position inside the vehicle. In particular, Inspectors shall verify that steering is precise, with no extra play, and that the roll bar extends above the driver's helmet.

Article 36: Braking

Vehicles shall be equipped with two independently activated brakes or braking devices, each including command control, command transmission (cable or hose) and an activator (calliper or shoe). These two devices may act on one wheel or on one disk. If braking is done on two wheels, the right and left brakes shall be properly balanced.

Article 36: Braking (continued)

Starting in 2008, vehicles shall be equipped with two independently activated brakes or braking devices, each including command control, command transmission (cables or hoses) and activators (callipers or shoes). One device shall act on the front wheel(s), the other on the rear wheel(s). When breaking on two wheels at the front or the rear of the vehicles, two activators have to be used (one on each wheel) commanded by only one command control. In addition, the right and left brakes must be properly balanced.

It shall be possible to activate the two systems at the same time without losing control of steering. The commands shall be perfectly ergonomic (no contortion shall be allowed for handling of the commands).

The effectiveness of the two braking devices shall be tested during vehicle inspection. The vehicle shall be placed on an incline with a 20 percent slope. The brakes shall be activated each in turn. In both cases, the vehicle shall remain perfectly immobile.

The use of a hydraulically controlled braking system is recommended. If a bicycle-type brake shoe system is used, only the V-Brake system shall be authorised.

Any vehicle, which does not scrupulously comply with this article, shall be refused access to the track.

Article 37: Additional Inspections

At any moment, Organisers may perform unannounced inspections on the vehicles.

Article 38: Exhaust System

Exhaust pipes shall under no circumstances extend beyond the rear of the vehicle body. During vehicle inspection, Inspectors shall demand the modification, or even the removal, of any equipment they consider to be a danger to the safety of other participants. Their decision shall be final.

Article 39: Sound Level

Mufflers are not mandatory. However, the sound level shall remain as low as possible.

B - URBANCONCEPT GROUP

Article 40: **Definition**

Under the name "UrbanConcept", Shell has decided to offer educational establishments an opportunity to design and build fuel-economy vehicles that are similar in appearance to normal cars and which are fit for actual on-road use. UrbanConcept vehicles shall comply with the specific regulations of the Shell Eco-marathon for this group.

Three separate runs are planned during the weekend with all UrbanConcept vehicles starting at the same time. A "stop & go" approach is currently being studied.

Article 41: **Energies**

All authorised types of energy for prototypes are permitted for UrbanConcept vehicles.

The use of hybrid technology is only allowed for the UrbanConcept Group.

Article 42: **Vehicle Design**

UrbanConcept vehicles may be built from a chassis or single shell with four load-bearing wheels. The vehicle shall have a towing ring or hook on the front so that it can be towed with a cable by another vehicle. Mobile aerodynamic appendages shall be prohibited.

Article 43: **Dimensions**

- The total vehicle height shall be between **100cm** and **130cm**.
- The total vehicle width shall be between **120cm** and **130cm**.
- The total vehicle length shall be between **220cm** and **350cm**.
- The track width shall be at least **100cm** for the front axle and **80cm** for the rear axle
- The wheelbase shall be at least **120cm**.
- The driver's compartment shall have a minimum height of **88cm** and a minimum width of **70cm** at the driver's shoulders.
- The ground clearance shall be at least **10cm**.
- The maximum vehicle weight (excluding the driver) shall be **160kg**.

Article 44: **Vehicle Body**

- The body shall cover all mechanical parts, whether the vehicle is viewed from the front, the rear, the sides or from above. When seen from above, the body shall cover the wheels.
- It is prohibited to use a commercial vehicle body (e.g. mini-car).
- The vehicle shall be equipped with a side door enabling easy access; this door shall be easy to open from both the inside and the outside of the vehicle.
- The vehicle shall have a roof.
- A windscreen is mandatory.
- Space shall be reserved for a suitcase-like object with dimensions of **40 x 50 x 20cm** (LxWxH).
- The vehicle must not have any sharp edges on its exterior.
- A towing hook or ring is mandatory on the front of the vehicle; it must resist a traction force of **200kg**.

Article 45: **Shell/Chassis Solidity**

Participants shall ensure that the vehicle shell and/or chassis are solid. The cockpit shall be equipped with an effective roll bar that extends in width beyond the shoulders of both authorised drivers. The roll bar shall extend **5cm** above the top of the driver's helmet in the normal driving position. This roll bar shall be capable of withstanding a **70-kg** static load applied to its centre without bending. Moreover, all sides of the compartment shall be sufficient to protect the driver from possible lateral and frontal shocks. Any vehicle not equipped with the above safety features shall be subject to disqualification.

A **5cm-thick** layer of polyurethane foam with a minimum density of **28kg/m³** shall be placed on the inside wall of the front of the vehicle body in order to protect the driver's feet in the event of a collision.

Article 46: Safety Belts

The driver's seat shall be fitted with an effective safety belt having four mounting points ("child seat" type) to maintain the driver in his/her seat. The belt shall be firmly attached to the vehicle's main structure and shall be fitted with a buckle specifically designed for this purpose. Safety belt buckles and attachments shall be made of metal.

Article 47: Vehicle Access

It is imperative for drivers to be able to vacate their vehicles at any time without assistance.

The door opening may be enclosed wholly or partly by means of hinged, detachable and/or folding doors, provided that a release mechanism is easily operable from inside and that the method of opening from the outside is clearly marked by a red arrow and does not require any tools.

It is forbidden to attach or to reinforce the bodywork or cockpit with adhesive tape.

The Race Marshals reserve the right to extract the driver from the vehicle by opening and/or closing that vehicle, whenever they deem this to be necessary. Any intervention by the Race Marshals shall not be subject to protest and shall not lead to any penalties for the team in question.

Article 48: Steering

Vehicle steering shall be controlled by means of a steering wheel. It shall be precise, with no extra play. The maximum turning diameter shall be **12m**.

Article 49: Wheels

The rims shall be **16 or 17 inches** in diameter.

The wheels located inside the vehicle body must be made inaccessible to the driver by a bulkhead. Any handling or manipulation of the wheels is forbidden from the moment the vehicle arrives at the starting line until it crosses the finish line.

Teams shall take into account the fact that bicycle and motorcycle wheels are not generally designed to support substantial lateral cornering forces, such as may be found in Shell Eco-marathon vehicles at certain speeds.

The wheel axles are also of a size more appropriate for loads distributed on both sides and not in a cantilever fashion. Care should be taken to distribute loads so as avoid any deformation of wheels or their axles.

Article 50: Tyres

All tyre types shall be allowed. The tyre tread (surface in contact with the ground) shall have a minimum width of **90mm**.

Article 51: Lighting

The vehicle shall have an EEC approved lighting system in proper working order for automobile road use, including:

- Two front headlights
- Two front blinkers
- Two combined red blinker/stop lights in the rear

The centre of each headlight beam shall be located at least **30cm** to each side of the longitudinal axis of the vehicle.

Article 52: Horn

Each vehicle shall be equipped with a standardised horn. The authorised horn can be purchased on the Shell Eco-marathon Website's e-shop centre. **The horn has to be powered by a battery dedicated to this effect, employing a simple electrical circuit (battery, pilot contactor, horn).**

Article 53: Vehicle Handling and Driver Position

A vehicle handling course will be set up in order to verify the following when the vehicle is in motion: turning radius, steering precision and the driver's position inside the vehicle. In particular, Inspectors shall verify that the roll bar extends above the driver's helmet.

Article 54: Braking

The vehicle shall be equipped with a four-disc hydraulic brake system, with a pedal control which has a minimum surface area of **5 x 5cm**.

The brakes shall act independently on the front and rear axles or in an X pattern (i.e. right front wheel with left rear wheel, and left front wheel with right rear wheel).

A single master cylinder may be used, provided that it has a dual circuit (two pistons and dual tank).

Article 54: Braking (continued)

The effectiveness of the braking system shall be tested during vehicle inspection for both drivers. For testing purposes, the vehicle must remain immobile when it is placed on a 20 percent incline with the main brake in place. Moreover, a dynamic inspection shall be performed on the vehicle handling course.

Race Inspectors shall check the brakes again just prior to the start. The vehicle shall be placed on an incline a few metres before the starting line.

Article 55: Clutch

Vehicles shall be equipped with a clutch system, so that they can be immobilised on the starting line without any outside assistance.

Article 56: Exhaust System

Exhaust pipes shall under no circumstances extend beyond the rear of the vehicle body. During vehicle inspection, Inspectors shall demand the modification, or even the removal, of any equipment they consider to be a danger for the safety of other participants. Their decision shall be final.

Article 57: Sound Level

The sound level for an UrbanConcept vehicle shall not exceed 90 dB when measured 4m away from the vehicle.

4 - ENERGY SOURCES

Article 58: General

The vehicles may only use the following fuel or energy types:

- Shell Unleaded 95 (EU) / Shell Plus 89 (US) Petrol/Gasoline
- Shell Diesel
- Liquefied Petroleum gas (LPG)
- CNG (Compressed Natural Gas)
- Shell Gas To Liquid (Diesel)
- Fatty Acid Methyl Ester (FAME)
- Ethanol E85 (85% of Ethanol with 15% gasoline/petrol)
- Hydrogen
- Dimethyl Ether
- Solar Power

Results will be expressed in kilometres per litre (i.e. theoretical distance covered) corrected to a temperature of **15°C**.

Regardless of the fuel or energy type used, the ranking shall be determined from the equivalent consumption of Shell Unleaded 95/Shell Plus 89 Petrol/Gasoline. This calculation shall be performed using the net calorific value (NCV), which represents the quantity of energy released per unit mass or volume of fuel during complete combustion yielding steam and carbon dioxide.

The NCV values (mass basis) for different fuels are given in the table below. The NCV values (vol.) at **15°C** are calculated on the day of competition by multiplying the mass-based NCV by the fuel density at 15°C.

For example, if a distance of **1,000km** is covered with one litre of Shell Diesel, whose corresponding energy is **35,663kJ** (if we assume a fuel density of **0.83716kg/l** at **15°C**), this represents **0.0280km** covered per kJ. Since the energy from one litre of Shell Unleaded 95/Shell Plus 89 Petrol/Gasoline is **32,010kJ** (if we assume a fuel density of **0.74616kg/l** at **15°C**), this corresponds to a corrected distance of **896km** (rounded to the nearest unit). The final result for a vehicle having covered **1,000km** with one litre of diesel fuel (at the reference temperature of **15°C**) will thus be **896km** for the equivalent of **1 litre** of Shell Unleaded 95/Shell Plus 89 Petrol/Gasoline (also at the reference temperature of **15°C**).

Fuel	NCV by mass (kJ/kg)
Shell Unleaded 95 (EU)	42,900
LPG (Gepel)	46,000
Shell Diesel	42,600
Fatty Acid Methyl Ester	37,700
Gas to Liquid Diesel	44,000
CNG	46,610
Dimethyl ether	28,430
Ethanol E85	29,000
Hydrogen	119,930

Article 59: Authorised Fuels

With the exception of Solar and Dimethyl ether powered vehicles, only the fuels listed in Article 58, as provided to the participants by Organisers during the event, shall be authorised.

The vehicles will be ranked in terms of their fuel consumption.

Supplies adequate for practice and competition shall be available from the officials in charge of measuring fuel consumption (Fuel Marshals).

No additives may be added to the fuel. Only the power derived from the combustion of the fuel in the presence of air alone within the engine system may be used for forward propulsion, with the exception of any natural influences such as wind and gradient. No other material that could serve as engine fuel may be used at any time during the competition.

Article 60: Authorised Lubricants

Only the following lubricants, provided to the participants by the Event Organisers, may be used:

- Shell Helix Ultra for gasoline (petrol) or LPG engines
- Shell Helix Diesel Ultra for Diesel engines.

Adding friction modifiers is prohibited.

An oil sample shall be taken from the top three vehicles in the ranking. These samples will be analysed just after the competition.

Any presence of suspicious substances in the oil may lead to disqualification at the Organising Committee's discretion.

The only exception is that competitors may use a two-stroke fuel supplied by Event Organisers and consisting of a mixture with two or four percent of high-performance synthetic oil (Shell Advance Racing X 2-Stroke). This lubricant will be supplied on the practice day. This addition shall be considered as fuel consumed by the engine.

Article 61: Propulsion

For vehicles in the "Combustion Engine" class, forward propulsion shall be achieved exclusively by a combustion engine. The type or design of said engine is not restricted, except as concerns conformity with the present regulations.

Event Organisers reserve the right to verify engine compliance during the two days prior to the competition. After inspection by Race Inspectors, a mark shall be used to confirm that the vehicle present at the starting line is equipped with the inspected engine. If a team decides to change engines after inspection, the team shall notify the Race Inspectors, who shall perform a new inspection. Unannounced inspections may be performed following the competition.

The use of hybrid technology is only allowed for Urban Concept vehicles.

Article 62: Emergency Stops

An emergency shutdown mechanism, accessible from the exterior, shall be installed on all vehicles. **A red arrow at least 10cm long and 3cm wide shall be positioned on the vehicle body to indicate clearly the position of this emergency shutdown mechanism from the exterior.**

Article 63: Make-Up Fuels

For all type of energy classes, stored electrical or pneumatic energy not replaced during the competition by the engine or the fuel cell may be used only for the self-starter, the ignition and injection system, the instrumentation and metering units. Any other use shall require the written consent of the Event Organisers.

Auxiliary energy sources (chemical, latent energy from phase changes, etc.) are not permitted.

If the engine temperature is regulated, said regulation shall be limited to the use of pure, unpressurised water as coolant. The external regulation temperature of the engine (for engines thus equipped) shall be limited to **100°C**.

It is forbidden to use a battery-powered electrical pump to ensure oil circulation in the engine. However, the use of such a pump shall be tolerated if it runs only when the engine is shut down or being started in idle.

Article 64: On-Board Battery

For 2007, the total number of batteries in the vehicle shall not exceed two (with the exception of the battery used for the horn). For 2008, only one battery will be allowed. All additional sources of electricity (with the exception of hydrogen fuel cells), will be forbidden.

To restrict unauthorised conversion of the electrical energy supplied by the vehicle's battery into mechanical energy (for combustion engines and fuel cells), entrants are requested to provide the main characteristics of the battery in their technical documentation: maximum voltage that can be supplied, capacity in ampere-hours (i.e. the quantity of electricity that the battery can theoretically provide when new), dimensions and weight.

On the basis of the statistical results obtained from all entrants, the Event Organisers reserve the right to request additional information from teams using high-capacity batteries. The Organisers also reserve the right to verify the information provided in the technical documentation.

For hydrogen vehicles, only a super-capacitor will be permitted. If a team does not wish to use a super-capacitor, then a battery will be used at the starting line to start the vehicle, and will then be detached from the vehicle. If a super-capacitor is used, the electricity stored in this battery will be measured with a voltmeter before and after of each attempt. The voltage registered after the attempt must be at least equal to the first reading. In the case that the voltmeter registers a lower reading, then the battery shall be re-filled until it is equal to the voltage registered before the attempt. The total hydrogen consumption will then be measured.

For Urban Concept vehicles using hybrid technology, the use of a Super-Capacitor to store recovered electricity is strongly recommended (the storing of recovered electricity being permitted for hybrid vehicles). The same procedure as described in the previous paragraph will be used to check the quantity of electricity stored in the super-capacitor battery before and after the competition. If a team chooses to use an electrical battery, it must be emptied before each attempt.

The battery inspection shall be performed using light indicators (light bulb 21 W, 12 or 24 V) as a function of the battery, in association with a voltmeter, which must show a significant drop in voltage when the bulbs are connected to the battery.

The Organisers reserve the right to request of the teams, which achieved the highest performances, the installation of one or two joulemeters intended to measure the quantity of electricity consumed by the battery (ies). This electricity consumption will be then converted into an equivalent consumption of Shell Unleaded 95 Petrol/Gasoline and added to the engine consumption. This calculation shall be performed using the net calorific value for this fuel, i.e. 42,900 kJ/kg.

All details regarding the supply and the installation of the joulemeters will be provided to the concerned teams when their candidacy is accepted.

Article 65: Starter

Competitors shall provide the Event Organisers with a precise description and diagram of the vehicle's electrical circuitry.

An electric self-starter may be used during the competition, provided that it can operate only when the ignition and fuel systems are functioning normally. It must be clearly established that the starter is never capable of providing any forward propulsive force to the vehicle. **A red indicator light equivalent in luminosity to a car brake light shall be installed on the rear of the vehicle and shall be clearly visible from both sides of the track in order to signal any restarting of the vehicle (electrical interlock).**

In the event that Track Marshals report the repeated or intensive use of the self-starter by a team, the Organisers reserve the right to order an immediate inspection of the vehicle. If any non-compliance is observed, one of the following penalties shall be applied:

- Invalidation of the attempt during which the violation was observed;
- Invalidation of all the team's attempts for the day in question;
- Disqualification of the team.

Article 66: Ventilation of the Fuel System

The whole fuel system, from the tank to the engine, shall be placed in a compartment completely separated from the cockpit.

Article 67: Replacement of Major Parts

After passing the technical inspection, any replacement of major engine components shall be subject to approval from Race Inspectors.

Article 68: Engine Protection

A permanent, rigid separation (bulkhead) shall be mounted between the engine compartment and the cockpit, preventing any manual access to the engine compartment by the driver.

Article 69: Fire Extinguisher

Each vehicle shall be fitted with a fire extinguisher (ABC or BC type) in perfect working order. All drivers shall be trained in the use of said fire extinguisher. This extinguisher shall have a minimum capacity of **1kg** and shall have a certificate of validity bearing the manufacturer's number, the date of manufacture, and the expiry date. It shall be full, attached to the cockpit and placed within the driver's reach. A demonstration of proper extinguisher access in the driving position shall be required during vehicle inspection.

Article 70: Fuel System

The participants shall provide a **description** and a **precise diagram** of the fuel supply system from the tank to engine intake. This system shall be translucent and designed in such a way that it can be completely drained and refilled before the competition.

The fuel system shall not include any additional elements, such as valves, monitors, gauges, etc., between the tank and the engine intake system (nozzle, carburettor or pump), apart from a filter (transparent) or, in the case of a diesel engine, a cut-off solenoid valve. Any fuel system including a float chamber (carburettor) must be fitted with a valve enabling Inspectors to partially drain the chamber and to ensure that the fuel level goes down in the tank.

Similarly, the air intake manifolds shall not contain any fuel or blowby gas* when the vehicle is on the starting line prior to departure. Blowby gas shall not be recycled during the competition.

The entire fuel system shall be made inaccessible to the driver by means of a bulkhead, through which only the instruments may pass. The fuel system shall be easily accessible for inspection and measurements.

Attention: fuel is a volatile product. Therefore, it is recommended to avoid any increase in fuel system temperature, which would lead to the formation of vapour lock. Conversely, cooling or refrigeration of the fuel below ambient temperature is prohibited.

* **Blowby gas:** gas inside the engine (in particular, oil vapours, unburnt gas or gas in the combustion chamber that has not been evacuated in the exhaust). This gas is usually recovered at the intake manifold. This is known as blowby gas recirculation.

Article 71: Fuel Tanks (Combustion engine with the exception of LPG/CNG/DME/Hydrogen)

The fuel tank shall remain visible at all times from the outside of the vehicle. **The vehicle shall be equipped with only one fuel tank.**

Tank capacities: Prototype group: 30, 100 or 250cc.
 UrbanConcept group: 30, 100, 250 or 350cc.

It is permitted to pressurise the tank, in order to feed the engine, only under the following conditions:

- The tank has a capacity of 30, 100 or 350cc and bears a clearly visible stamp proving its "APAVE"* certification compliance.
- Pressurisation is done by means of a compressed air bottle fitted with a safety valve set to 5 bars maximum. This bottle shall be translucent. It shall include a standard valve as used for car tyres in order to enable verification/control of the pressure setting for the safety valve.

**Article 71: Fuel Tanks (Combustion engine with the exception of LPG/CNG/DME/Hydrogen)
(continued)**

- Said pressurisation is done in the starting area by means of a pump. The driver shall not modify the pressure during the competition.
- It must be possible to set the fuel supply system to atmospheric pressure for measurement of the fuel level. The vehicles shall be equipped with a pressure gauge. Normal running pressure shall be clearly indicated by a mark on the gauge. The fuel tank cap, whether it is leak proof or not (drilled), shall be in place at all times during official attempts.

All the hoses of the fuel supply system shall be made of semi-rigid and translucent materials of the Rilsan type. They shall be mailed to the teams by the Organisers. This rule shall apply to all participants, whether they use a pressurised fuel tank or not.

* **APAVE:** This organisation tests fuel tanks and attests to their capacity to withstand a pressure of 5 bar.

Article 72: LPG Cartridge

The LPG cartridge shall be visible at all times from the outside of the vehicle.
A standard LPG cartridge containing approximately **230g** of LPG(plus fittings) is required by competition rules and cannot be modified.

Each LPG fuel set shall be filled exclusively by Race Control.

- A cartridge.
- A standard valve to select use of LPG in the liquid or gas phase.
- A safety valve set to **1,500 KPa (15 bar)** that discharges LPG outside the vehicle and towards the ground.
- An automatic (solenoid) valve. This solenoid valve shall enable isolation of the cartridge from the fuel system. This valve must be closed when the engine stalls, even if the ignition is still on. A timer is allowed.

The electric installation associated with the LPG fuel circuit shall be protected with a fuse. The components of this installation shall not be exposed to friction or to shocks, particularly the cartridge.

For safety reasons, the cartridges shall at no time reach a temperature of **50°C**. The layout of the exhaust system as well as the choice of cartridge placement shall take this requirement into account.

The entire fuel system shall be made inaccessible to the driver by means of a bulkhead, through which only the instruments may pass. The fuel system shall be easily accessible for inspection and measurements.

At the start of the race, the system between the solenoid valve and the engine shall be purged. This system shall be pressurised by the competitor's cartridge, after weighing.

At the end of the race, it shall be possible to drain the hoses between the solenoid valve and the engine.

It is forbidden to pressurise the LPG cartridge.

Hoses transporting LPG shall be LPG-compatible (proof of compatibility shall be required).

- Hoses carrying **gaseous LPG** at a pressure greater than **120 KPa (1.2 bar)** shall resist a pressure twice the maximum operating pressure (proof shall be required). They shall be equipped with threaded fittings.
- Hoses carrying **liquid LPG** shall resist a pressure of **3,000 KPa (30 bar)**.

Under no circumstances shall hoses with a pressure greater than 5 KPa (0.05 bar) pass through the cockpit.

Article 72: LPG Cartridge (continued)

For Liquid Injection Systems:

A fuel tank (built in accordance with good manufacturing practices) may be used with an integrated or external pump.

The entire system may be tested under nitrogen pressure **at 3,000 KPa (30 bar)** during the technical inspection (in all cases, proof of testing shall be required). To enable testing, the safety valve will be replaced by a plug.

The total system volume shall be limited to **1 litre**. It shall not be filled past 80%. A standard filling connection shall be provided.

Note: In this case, a safety valve set to 1,800 KPa (18 bar) shall be allowed, instead of 1,500 KPa (15 bar).

A filling station with LPG cartridges shall be used to fill the tank during the Shell Eco-marathon.

An LPG sample shall be taken from the systems using a refillable tank. An LPG analysis may be conducted at the end of the race upon request from Shell Eco-marathon Organisers (chromatography, pressure, etc.).

Article 73: Hydrogen for Fuel Cells (FC)

○ Cartridge, Cylinder, Filling

The technical documentation provided by FC-powered vehicles in the entry packet shall specify whether the vehicle uses a metal hydride cartridge, known hereafter as a cartridge, or a compressed hydrogen cylinder, referred to hereafter as a cylinder.

For prototypes, the maximum size allowed for hydrogen cylinder is the B04. (0,4 L of hydrogen @ 200 bars maximum). Only one bottle in the vehicle is allowed. For Urban Concept vehicles, the maximum size allowed for hydrogen cylinder is the B1 model (1 L of hydrogen @ 200 bars maximum). Only one bottle is permitted per vehicle.

Cylinders and cartridges shall be filled under the supervision of Race Inspectors. Participants shall not be authorised to keep cylinders in storage. Upon arriving at the circuit, team managers shall contact the Race Inspectors, who shall organise the filling of hydrogen cylinders.

○ Solenoid valve

FC-powered vehicles shall be equipped with a solenoid emergency shutdown valve for the hydrogen supply. The valve must be closed in the absence of electricity.

This valve shall be located directly adjacent to the pressure adjustment valve .

To command this valve:

- **A push button shall be located on the outside of the vehicle beside the cockpit in order to cut off the fuel supply in case of an emergency. . A red arrow at least 10cm long and 3cm wide shall be positioned on the vehicle body to clearly indicate the placement of this valve from the exterior.**
- **An other push button shall be located in front of the pilot.**
- **A hydrogen detector installed near the ventilation point in the cockpit shall cause to activate the automatic shut-off of the hydrogen supply in case of gas detection. The type, sensitivity and threshold level of the hydrogen detector will be indicated in the technical documentation provided prior to the competition.**

These three features will be tested during the safety check and before each attempt. To avoid damage the fuel cell, the tests will be carried out without a hydrogen supply. The closure of the valve will be checked to insure it is in working or not.

Article 73: Hydrogen for Fuel Cells (continued)

○ Ventilation

All FC-powered vehicles shall have a ventilation window with a minimum surface area of 5cm² at the highest point in the hydrogen processing compartment. If the shape of the vehicle shell enables hydrogen accumulation at or near the top of the cockpit, other 5cm² openings shall be included in these areas.

○ Pipes and connection

When pressurised hydrogen cylinders are used, the pressure adjustment valve has to be attached directly to the bottle. The pipes used in the hydrogen circuit shall be made of stainless steel with threaded fittings or Teflon with threaded fittings.

○ Measurements and Equivalencies

To determine the quantity of hydrogen consumed, each vehicle will be equipped with a mass flow meter. The mass flowmeter can be purchased on the Shell Eco-marathon website's e-shop centre. The volume of hydrogen gas consumed will be posted in normal litres. The results will be expressed in kilometres per litre of Shell Unleaded 95 Petrol/Gasoline (theoretical distance covered), at a temperature of 15°C.

The use of non-replaced oxygen or compressed air reserves shall not be authorised.

Article 74: Solar-Powered Vehicles

Competition:

- All vehicles shall gather in the designated area next to the starting line.
- Vehicles shall come to the starting line with their batteries uncharged.
- The battery inspection shall be performed using light indicators (light bulb 21 W, 12 or 24 V) as a function of the battery, in association with a voltmeter, which must show a significant drop in voltage when the bulbs are connected to the battery.
- Vehicles will be equipped with a joulemeter, which will be set to zero by the Inspectors.
- Vehicles shall be left in the sun for **30 minutes** under the supervision of Inspectors in order to charge the batteries solely by means of the solar panels.
- At the end of the charging period, the vehicles will have access to the track to start their performance run in the same distance and time conditions as other vehicles.
- At the finish line, the joulemeter reading shall be read by Race Marshals and then the joulemeter shall be removed from the vehicle.
- **The ranking shall be determined as a function of energy consumption measured by the joulemeter.**

Chapter II

Specific Rules for the Shell Eco-marathon in Europe

In 2007, the European Shell Eco-marathon final event will be held from **10 to 13 May** on the Nogaro Motor Circuit in the Gers region of France (South West).

Because of the increasing number of participating teams and in order to ensure that each establishment has the chance to be represented in the European Shell Eco-marathon, the number of vehicles per establishment shall be limit to a maximum of 2: 1 prototype and 1 UrbanConcept.

Associations could be allowed only if they register a team under the name of the establishment with which they are affiliated, with the condition that at least one of the 2 drivers is a student or pupil of the establishment.

The Organising Committee shall decide on which candidates to accept.

1 - GENERAL

Article 75: Definition

The participating teams must complete seven laps of the Nogaro Motor Circuit in the normal racing direction.

Minimum speed: For their attempt to be validated, teams shall complete the seven laps at a minimum average speed of 30 km/h. The maximum time allowed shall be 50 minutes 34 seconds to complete the 25.272-km course (seven laps of 3.636 km, minus the distance between the start and finish lines).

Administrative checks/Competitor reception:

Wednesday 3:00pm to 7:00pm, Thursday and Friday 8:00am to 7:00pm
Saturday 8:30am to 6:30pm and Sunday 8:30am to 6pm.

Vehicle inspections: Thursday 9:00am to 7:00pm and Friday 8am to 5:30pm.

Practice runs: Thursday 11:00am to 7:00pm and Friday 9am to 6:00pm.

Competition: **Friday 6:30pm to 7:30pm and Saturday 8:30am to 7:30pm and Sunday 8:30am to 3pm.**

Prototype's teams shall be limited to four official attempts: no more than three on Saturday and no more than two on Sunday. The best result shall be retained for classification.

UrbanConcept:

Three separate races are planned during the weekend with all UrbanConcept vehicles starting at the same time. A "stop & go" approach is currently being studied.

Friday

6:00pm All UrbanConcept vehicles lined up on starting grid
 6:30pm Official launch of the Shell Eco-marathon
 with the 1st UrbanConcept race
 7:30pm Track closed

Saturday

4:40pm Starting grid area closed for prototypes.
 The teams already on the starting grid will be able to complete their attempt.
 5:10pm Last departure for prototypes.
 6:00pm Last arrival for prototypes.
 6:00pm All UrbanConcept vehicles lined up on starting grid
 6:30pm Start of the 2nd UrbanConcept race
 7:30pm Track closed

Sunday

8:00am All UrbanConcept vehicles lined up on starting grid
 8:30am 3rd UrbanConcept run
 9:30am End of the last UrbanConcept run and opening the track
 to the prototypes vehicles
 1:30pm Starting grid area closed.
 The teams already on the starting grid will be able to complete their attempt.
 2:10pm Last departure for Day 2 of the Shell Eco-marathon.
 3:00pm Last arrival – Track closed.
 3:30pm Posting of results.

A Group photo and a Grand Parade are planned for the weekend. Times will be communicated before the event in the Participants' handbook.

Article 76: Deposit

Upon arrival at the motor circuit, the team manager shall present his/her identification and two cheques or money orders to serve as a security deposit:

- **€450 for the transponder,**
- **€450 for the joulemeter (solar vehicles only)**
- **€150 for the electrical connections and accessories.**

Please make cheques or money orders payable to CDP.

Article 77: Entry Packet

The **entry packet** will be considered only if it is fully completed in either French or English: i.e. all forms filled in and all diagrams provided. This packet must be postmarked **no later than Friday, 1st of December 2006** and it should be addressed either to the Shell Eco-marathon Organising Committee:

Société des Pétroles Shell
 Shell Eco-marathon – Participant Relations
 307, rue d'Estienne d'Orves
 92708 Colombes Cedex
 Tel: + 33 (0)1 57 60 64 92
 Fax: + 33 (0)1 57 60 68 67

For any other information, please contact Participant Relations by email:
shell-eco.marathon@shell.com

The entry packet is available in October 2006 in French and in English on the official Shell Eco-marathon website: **www.shell.com/eco-marathon**

The Organising Committee will then meet to examine all the entry packets. They will select 200. The other applicants will be placed on a waiting list to replace any teams that drop out. All Organising Committee decisions shall be **final**. Organisers reserve the right to accept or refuse any applicant.

Entry confirmation and vehicle number will be sent by mail to each team in early 2007 along with the registration forms for the special awards. The final list of entries will be posted on the website: **www.shell.com/eco-marathon**. Teams on the waiting list will also be notified.

Article 78: Ordering Fuel Tanks (Gasoline and Diesel)

Standard fuel tanks shall be obtained from Organisers. These tanks are mandatory and shall not be modified.

Prototype group: 30, 100 or 250cc.

UrbanConcept group: 30, 100, 250 or 350cc.

They must be ordered by Internet at the official Shell Eco-marathon website: www.shell.com/eco-marathon. Tanks shall be invoiced at cost. To allow for shipping, orders must be received by 1 April 2007. After this date, fuel tanks may be purchased at the race circuit itself.

Article 79: Safety: Social Responsibility and Good Neighbour Policy

In the interest of neighbourliness and respect for others, noise levels shall be kept to a minimum between 11pm and 7am at the campground. Team managers shall be responsible for enforcing this regulation, which is in the best interests of all participants.

Each team is also responsible for the upkeep of its immediate environment, including waste management. As such, the Organisers have put in place a sorted waste collection system at the motor circuit. To save both energy and natural resources, please remember to sort your waste and to put it in the appropriate containers and bins.

Article 80: Insurance

In conformity with legal requirements applicable to motoring events, Société des Pétroles Shell has taken out:

- an insurance policy covering the liability of organisers, drivers and teams. The policy covers any physical injury for which the organisers or competitors may be held liable. For insurance purposes, competitors are considered as third parties to each other.
- An automotive insurance policy covering the participants' liability for any physical damages that they might cause during the Shell Eco-marathon and the practice runs. This policy shall also cover damages to the vehicles up to € 2,000 for 1 collision-or fire-related damage, with a deductible of € 1,000.

Other damages are not covered by this insurance policy, notably as concerns theft or other damage occurring to team vehicles, cars and/or equipment in the pits or in other areas of the motor circuit.

The insurance policy shall cover only the period of the practice sessions and the competition.

Shell shall not be held liable in the event of unauthorised use of the track outside the regularly scheduled hours for practice and competition.

Article 81: Damages Not Covered by Event Organisers

Any damage caused by competitors to circuit facilities and surroundings and/or to Shell Eco-marathon facilities shall be charged to the teams having caused said damage. Upon check-in, a cheque for €150 shall be left with Organisers as a security deposit. This cheque shall be returned at the end of the competition upon presentation of the electrical circuitry and accessories (see Article 76).

Article 82: Radio Connections

Radio communication between the vehicle and the pit area shall be permitted, provided that French law is respected and that the Organiser's radio network is not disturbed. Please note the proximity of the Nogaro airport. Only officially approved radio equipment shall be allowed. Shell shall not be held liable for any incidents caused by the use of non-approved radio equipment (see article N° 15 of the first chapter).

2 - COMPETITION

Article 83: Starting Order for Prototype Group

On the Saturday and Sunday mornings, teams shall depart from the starting grid on a "first come, first served" basis.

Article 84: Starting Procedure for Prototype Group

- The first start shall occur at 8:30am on both Saturday and Sunday.
- Drivers shall wait until the starting line is clear before starting their attempt. They shall wait for a signal from the flag bearer (green flag) before entering the track.
- At the starting line, two or more vehicles may start simultaneously. Vehicles shall be at a full stop and shall receive no outside assistance during starting. Any pushing of the vehicle is prohibited.
- The vehicle may be accompanied by a maximum of two persons with ID badges (not including the driver). Once the vehicle has left the starting line, all team members shall leave the starting area with their equipment.

Article 85: Fuel Consumption Checks

• Before the start:

Competitors shall proceed to the starting line with the fuel system completely drained. Inspectors shall fill the fuel tank in the starting area.

In the case of **LPG-powered** vehicles, an LPG cartridge shall be fitted to the vehicle after weighing.

In the case of the top-ranked **gasoline-powered** vehicles, fuel consumption shall be measured with a precision balance. The fuel system shall be filled by a Technical Inspector, and then the system, the fuel tank and the injector shall be weighed on the precision balance.

The fuel system (tank, hose and injector) shall be compact and easily dismantled in order to facilitate weighing. Before approving reinstallation of the duly weighed fuel system, Technical Inspectors shall verify that the engine is the one that was inspected and validated by the Head Inspector. They shall also ensure that gasoline is not present in the air intake.

In the case of **fuel cell-powered** vehicles using a flow meter to measure consumption, a Technical Inspector shall reset the flow meter to zero.

• At the finish line:

Competitors shall refrain from any work on their vehicles prior to inspection of the vehicle by Inspectors. Inspectors/marshals are the only persons authorised to fill or top-up the tank.

A maximum of two persons per team (with ID badges) may be present at the finish line for the measurements.

For vehicles using a fuel that is in the liquid state at atmospheric pressure (petrol, diesel fuel, fatty acid methyl ester-type biofuel, ethanol, etc.), the quantity of fuel needed to refill the fuel tank shall be the basis for calculating fuel consumption. This volume shall be corrected for temperature variations. The volume consumed shall be measured at the reference temperature of 15°C.

For top-ranked gasoline vehicles, a Technical Inspector shall be present during disassembly of the fuel system and during its transport to the weighing room, where he/she shall perform the weighing. After reinstallation of the duly weighed fuel system, the starter shall be verified by the Technical Inspector to ensure that the clutch setting has not been tampered with since the technical inspection. The Head Inspector may also request that the vehicle be brought to an enclosed area so that further inspection can be conducted prior to posting of the results.

For LPG-powered vehicles, the cartridge shall be removed and weighed by an Inspector.

In the case of fuel cell-powered vehicles using a flow meter to measure consumption, an Inspector shall read the value displayed on the meter.

Article 86: End of Competition

The competition for prototypes vehicles shall end at **6:00pm on Saturday** and **at 3pm on Sunday**. Any runs ending after those times shall be considered as invalid and the fuel consumption shall not be measured.

No prototype vehicle shall be allowed to enter the starting grid after 4:40pm on Saturday or after 1:30pm on Sunday. Race Controllers reserve the right to modify these times in the event of vehicle back-up in the starting area.

Article 87: Results

A list showing the best valid performance of each team will be posted at the end of each competition day* at Participant Reception. The best result for the two days will be retained for the final ranking. Results will be expressed in kilometres per litre (i.e. theoretical distance covered) corrected to a temperature of 15°C.

* Intermediate results shall not be considered official.

3 - TROPHIES, PRIZES AND AWARDS

Article 88: Award Presentation

The trophies shall be presented to the winning teams after the competition. Prize money shall be paid by cheque and shall be sent by mail during the month following the competition.

The following prizes shall be awarded:

Article 89: Grand Prizes & Prizes

	Prototypes		UrbanConcept (UC)	
Per engine type				
Combustion ⁽¹⁾	Shell Eco-marathon Grand Prize	First Prize: € 1,500 Second Prize: € 1,000 Third Prize: € 800	Michelin Grand Prize	€ 1,500
Fuel Cells ⁽²⁾	Shell Hydrogen Grand Prize	First Prize: €1,500 Second Prize: € 1,000 Third Prize: € 800	Shell Hydrogen Grand Prize	€ 1,500
“Climate-friendly” ⁽³⁾	Grand Prize	€800	Grand Prize	€ 800
Per energy class				
	Gasoline/Petrol prize	€ 800	Gasoline/Petrol UC Prize	€ 800
	Diesel prize	€ 800	Diesel UC Prize	€ 800
	Alternative Gasoline /Petrol Prize	€ 800	Alternative Gasoline/Petrol UC Prize	€ 800
	Alternative Diesel Prize	€ 800	Alternative Diesel UC Prize	€ 800
	Solar Prize	€ 800	Solar UC Prize	€ 800
Educational Level ⁽⁴⁾	Schools: €800			
	Universities: €800			

(1) Shell Eco-marathon GRAND PRIZE – Combustion Engines - Prototypes

This Grand Prize will be awarded to the “Combustion” vehicle that posts the best fuel economy figure, regardless of the energy source used.

(2) Shell Eco-marathon GRAND PRIZE – Fuel Cells – Prototypes

This Grand Prize will be awarded to the “Fuel Cell” vehicle that posts the best fuel economy figure, regardless of the energy source used.

(3) “CLIMATE-FRIENDLY” GRAND PRIZE

This award recognises the team that creates the lowest level of CO₂ emissions “from the well to the wheel”, i.e. the sum of emissions “from the well to the fuel tank” and “from the fuel tank to the wheel”. **This award is not open for solar vehicles.**

The minimum greenhouse gas emission prize will be awarded to the team with the lowest level of CO₂ emissions “from the well to the wheel”, i.e. the sum of emissions “from the well to the fuel tank” and “from the fuel tank to the wheel”.

The CO₂ emissions “from the well to the fuel tank” will be calculated by using international studies, such as LBST-Shell-GM and IFP, as references.

These CO₂ emissions take into account the production, transport and distribution of the different energy sources used.

The CO₂ emissions “from the fuel tank to the wheel” will be calculated from the energy consumption measured at the end of each valid race attempt, corrected to 15°C.

Table of **Total Greenhouse Gas Emissions** from Well to Wheel:

Total quantity of greenhouse gas emissions (or gram-equivalents of CO₂) from the combustion of 1 MJ of fuel

	Total GHG g-CO ₂ / MJ	Source
Shell Unleaded 95	86.5	Average for European refineries
Shell Diesel	83	Average for European refineries
LPG (Gepel)	78.3	Average for European refineries
CNG	70.7	EU-NG mix
Compressed hydrogen	207	EU-mix electrolysis
E85	56.7	European beet sugar
Gas to Liquid	86.8	-
Fatty Acid Methyl Ester	42.5	European Rape Seed Methyl Ester
DME	88.2	Natural gas

A questionnaire about CO₂ emissions will be included in the entry packets that will be made available in **October 2006** on the website www.shell.com/eco-marathon. Please note that it is imperative to fill in and return this questionnaire in order to validate your entry.

(4) PRIZES FOR EACH EDUCATIONAL LEVEL:

These prizes are awarded to the first team in each educational level, regardless of the vehicle group or energy class.

Article 90: **SPECIAL AWARDS**

Participating teams may also elect to compete for one or more special awards:

Eco-Design (1), Safety (2), Technical Innovation (3), Design (4), Communication (5) and Social/Hospitality (6).

Registration for special awards shall correspond to a specific project in a chosen area, and as such the special award questionnaires 1, 2, 3, 4, 5 and 6 will be sent out to participating teams in **early January 2007**.

Teams may register for the special awards by completing and returning the corresponding questionnaires (to be sent out in early January 2007) as well as a complete dossier for the Communications, Design, Eco-Design, Technical Innovation and Safety awards, before **31 March 2007**.

Eco-Design Award

A special Eco-Design Award is proposed to entrants. This trophy will recognise the team that has designed and built its vehicle in the most environmentally friendly manner, through its choice of materials, their recyclability, waste management, etc.

€800 and a trophy

The duly completed questionnaire and dossier must be returned before **31 March 2007**.

Safety Award

First Prize:	€800	}	
Second Prize:	€400	}	and a trophy
Third Prize:	€250	}	

Awarded by a panel of specialists and professionals from the Autosur automobile inspection network, this prize recognises the three teams having made the most extensive efforts to comply with the safety regulations set forth in the present document.

The questionnaire and dossier explaining how the team has integrated safety concerns into vehicle design and construction must be submitted before **31 March 2007**. The judges will meet in April in order to make a preliminary selection of teams. Only the selected teams will receive a visit from the judges in the pit area. Those teams are requested to have a team member present in the pit area at all times from Friday afternoon to noon on Sunday.

Technical Innovation Award

First Prize:	€800	}	
Second Prize:	€400	}	and a trophy
Third Prize:	€250	}	

This award is presented by a panel of professionals to the top three teams demonstrating outstanding initiative and technical ingenuity along with optimal use of new materials in the drive train, chassis, instrumentation and tyres.

The questionnaire and dossier explaining the innovation concept, the team's approach, etc. must be submitted before **31 March 2007**. The judges will meet in April in order to make a preliminary selection of teams. Only the selected teams will receive a visit from the judges in the pit area. Those teams are requested to have a team member present in the pit area at all times from Friday afternoon to noon on Sunday.

Design Award

First Prize:	€800	}	
Second Prize:	€400	}	and a trophy
Third Prize:	€250	}	

Awarded by a panel of professionals, this category recognises innovative design research in terms of ergonomics, aesthetics, choice of materials and technical feasibility. The originality and overall coherence of the design are also taken into

account. The term “design” includes: vehicle structure, driving position, the engine, steering, suspension, braking, etc.

The questionnaire and dossier explaining the team’s design approach, the basis for their research and photos of the vehicle (front, rear and side views) must be submitted before **31 March 2007**. The judges will meet in April in order to make a preliminary selection of teams. Only the selected teams will receive a visit from the judges in the pit area. Those teams are requested to have a team member present in the pit area at all times from Friday afternoon to noon on Sunday.

Attention: Vehicles that have already won Design prizes in previous years are no longer eligible for the Design Award, except if significant modifications have been made to the construction of the vehicle and its body.

Communications Award

First Prize:	€800	}	
Second Prize:	€400	}	and a trophy
Third Prize:	€250	}	

Awarded by a panel of professionals, this category recognises three teams who have made outstanding communications efforts concerning the Shell Eco-Marathon. All actions throughout the year are taken into account: participation at trade shows, creation of a website and all other activities that successfully promote the competition, its name, its founding principle, its educational aspects, etc. in the team’s country of origin.

The questionnaire and dossier presenting all of the team’s communications actions and their results must be submitted before **31 March 2007**. The judges will meet in April in order to make a preliminary selection of teams. Only the selected teams will receive a visit from the judges in the pit area. Those teams are requested to have a team member present in the pit area at all times from Friday afternoon to noon on Sunday.

Social/Hospitality Award

First Prize:	€500	}	
Second Prize:	€200	}	and a trophy
Third Prize:	€100	}	

This prize shall be awarded by Organisers to the team that organises the best social/hospitality activities at the Nogaro circuit. A well-documented and well-illustrated entry dossier must be submitted by **30 April 2007**.