機電工程署
EMSD

"NEW ENERGY NEW GENERATION" SOLAR CAR COMPETITION
SECONDARY EDUCATION DIVISION – GUIDE

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1. THE COMPETITION

1.1. Description

1.1.1. Recognising the importance of promoting solar energy applications in Hong Kong, the Environment Bureau (ENB) and the Electrical and Mechanical Services Department (EMSD) of Government of the HKSAR intend to organise a competition- **"New Energy New Generation" Solar Car Competition.**

1.1.2. Through this competition, college and high school students are encouraged to participate and to demonstrate their innovative idea on solar energy harvesting and its applications for vehicle use.

1.1.3. Participating teams of this competition will demonstrate their knowledge in efficient solar and renewable energy harvesting, energy efficient solar car design, innovative engineering, and capability to work as a team by attempting to win various awards in this Competition.

1.2. Purpose

1.2.1. The objectives of this Competition are as below:

a. To promote public awareness of renewable energy and energy efficiency;

b. To arouse tertiary student's interests in renewable energy and engineering applications; and

c. To create platform for students to demonstrate their innovative engineering capability.

1.3. Schedule

STAGE	DATE#
Entry Registration	<12th June 2015>
Team and Vehicle Information Submissions	<by End of July 2015>
Details Specifications and Drawings of the Mechanical and Electrical Systems of the Car	<by End of October 2015 >
Scrutineering	<by End of November 2015>
Competition	<January 2016>
Award Presentation	<January 2016>

#remarks:
The above schedule is tentative, subject to change if needed. Revised schedule will be announced and all participants will be informed accordingly.

1.4. Competition Guide

1.4.1. This document is prepared to provide information regarding requirements and rules applicable at all stages of the competition. All participants must read and fully comply with the requirements and rules as set out in this guide.

1.4.2. This guide comprises three chapters. "Chapter I – Introduction" provides introduction for application to the **"New Energy New Generation" Solar Car Competition.**

1.4.3. "Chapter II – Vehicle Design" lists out requirements of car body, electrical, mechanical, safety and Scrutineering of Teams' Cars.

1.4.4. "Chapter III – Competition Awards" provides information, scope, and awards of this competition.

2. ORGANISATION

2.1. Definition of Terms

2.1.1. "**Competition**" – "New Energy New Generation" Solar Car Competition.

2.1.2. "**Guide**" – "New Energy New Generation" Solar Car Competition Secondary Education Division – Guide

2.1.3. "**Organiser**" – Competition Organiser of the event as described in "Section 2.2. Organiser".

2.1.4. "**Judging Panel**" – The Competition Judging Panel will comprise professionals, representatives and stakeholders in the fields of automotive engineering, academia, professional institutes and, statutory body.

2.1.5. "**Team**" – Participating team for the competition that is formed by a group of individuals who have been accepted to participate in the Competition.

2.1.6. "**Car**" – the solar energy powered vehicle, which is designed for the competition.

2.2. Organiser

2.2.1. The Environment Bureau (ENB) and the Electrical and Mechanical Services Department (EMSD) of HKSAR Government (which they are collectively named as the Organiser) will jointly organise this **"New Energy New Generation" Solar Car Competition.** , whereas the Hong Kong Productivity Council (HKPC) will be the secretariat and technical consultant of this competition on behalf of the Organiser.

2.3. Judging Panel

2.3.1. The Organiser will invite professionals and stakeholders in the fields of automotive engineering, academia, professional institutes, and statutory body to form the judging panel.

2.3.2. The judging panel will endorse competition rule, provide expertise advices, recommendations and judgement. All resulting judgement and decisions made by the judging panel will be final.

2.4. Competition Management Team

2.4.1. The Organiser will formulate a Competition Management Team that handles the operational matters on the competition days.

2.4.2. The Competition Management Team will comprise delegates from the Organisers, HKPC, and the Judge Panel.

2.4.3. When in need of any dispute resolution, the Competition Management Team will seek advice from the Judging Panel for an impartial decision.

2.5. Contact for the Competition

2.5.1. Participating team may contact to the Organiser by the following means to the attention of Winnie WONG:

Tel:	(+852) 2788 - 5019
Email:	winniewong@hkpc.org
Address:	HKPC Building, 78 Tak Chee Avenue, Kowloon, Hong Kong

2.6. Complaint, Protest and Appeal

2.6.1. All complaints and protests for issues of concerned by participants must be lodged to the Competition Management Team for handling within 30 minutes after issues happened on the competition day.

2.6.2. In the event of any dispute, all decisions made by the Judging Panel are binding and final.

2.7. Advertising, Promotion, & Publicity

2.7.1. This Competition will be referred to as **"New Energy New Generation" Solar Car Competition** in all advertising, promotion, and publicity materials. The full name must be used.

2.7.2. By entering the Competition, all teams and team members authorise the Organiser to use their names and team materials on publicity materials (brochures, news articles, videos, photographs, etc.).

2.7.3. Participating teams are encouraged to use their own media or promotional channels to publicise appropriately their participation of the Competition. However, inappropriate publication and promotion materials for the competition event are prohibited and the owner team of that channel may be required to terminate its operation or will be subject to disqualification for the competition.

3. ENTRY REGISTRATION

3.1. Registration

3.1.1. **Eligible Applicants** – this Competition is open to all full time secondary school s in Hong Kong

3.1.2. Each school may form a maximum of *One* Team for this competition.

3.1.3. **Application Form** must be submitted to the Organiser first and later supplemented with the Team Data Sheet and the Preliminary Competition Vehicle Data Sheet (details can be found in "Section 3.3. Submissions"). A copy of the Application Form is attached in APPENDIX C of this Guide.

3.1.4. **Acceptance** of the application will be considered on case-by-case basis depending on the design quality and sufficiency of information submitted by the applicant team. Applicant team will be notified of the decision regarding the application after conducting evaluation of the participating teams' submissions.

3.2. Team formation

3.2.1. For each applicant team must comprise of **Team Director, Team Manager** and **Designated Driver(s)**. Except the Team Director and Designated Driver(s), team member of the entire team must be the *current full time student* of the *same* school.

3.2.2. **Team Director** – an experienced personnel that can offer directorship and professional advice to the team, and he / she is preferably to be a staff member of the same school of the applicant team. The Organiser will only accept a Team Director from an external party if there is no suitable personnel within the same school.

3.2.3. **Team Manager** – will be the single focal point of the team who is responsible for the team management, competition application, race registration, and liaison with the Organiser of this Competition.

3.2.4. **Designated Driver(s)** – will be responsible for driving the competition vehicle of the team. The drivers must be over 18 in age and hold a valid Hong Kong Driving Licence or International Driving Permit. Eligibility criteria for Driver are detailed in "*Section 7. Safety*". The Organiser will accept full time staff as the Designated Driver if there is no suitable full time student within the same school. Two Designated Drivers can be appointed and listed in the submission of Team Data Sheet. The Team Data Sheet is detailed in section 3.3.2.

3.3. Submissions

3.3.1. Applicant teams will submit a series of documents to the Organiser at various stages of this Competition, including:

3.3.2. **Team Data Sheet**, which must be submitted by end of July 2015, must consist of the following:

a. *Name of the School;*

b. *Team member list with names, contact, home faculty & role in the team;*

c. *Team identification; and*

d. *One Team photo.*

3.3.3. **Preliminary Competition Vehicle Data Sheet**, which must be submitted by end of July 2015, must consist of preliminary Car design data, which include:

a. *Preliminary Car design data; and*

b. *Mechanical and electrical schematics drawings showing the concept of the Car.*

The Organizer will evaluate the submissions of the participating teams with the following criteria:

a. *Quality of Teams' initial submissions;*

b. *Team member capability (e.g. sufficient knowledge and engineering capability).*

The participating teams will be notified of the assessment result on whether they can enter the next stage of competition.

3.3.4. Teams must submit detail specifications and drawings of the mechanical and electrical systems of the Car to the appointed or accredited inspector by the end of October 2015.

3.3.5. Teams are required to file copies of promotional materials (if any) that were developed to publicise their participation of the Competition to the organiser.

3.3.6. Teams are required to file the finalized drawings of the competition vehicle to the organiser before the completion day.

3.4. Sponsorships

3.4.1. After Teams are accepted, the Organisers will offer a cash sponsorship (HK$150,000) to the school for each Team as a ceiling amount.

3.4.2. Teams must use the sponsorship on the development of the competition renewable vehicle and expenses in relation to the competition. Teams will have to burden any extra expenditure beyond the Sponsorship.

3.4.3. After the completion of the Competition, each Team must submit a declaration statement duly signed by the Team Director and the Team Manager, which states the lump sum amount of money spent on the competition. *Teams must return the unspent sponsorship to the Organiser if there is any.*

3.5. Insurance

3.5.1. Teams will be responsible to subscribe required insurance coverage on their own for events and issues arising for this Competition.

3.6. Withdrawals, Warning & Disqualification

3.6.1. By registering to this Competition, Teams are expected to fulfil their obligation of completing it. No withdrawals will be accepted unless Teams can demonstrate extreme difficulties in continuing the Competition. In case of withdrawal, the participating team must return all the sponsorship offered by the Organiser.

3.6.2. Non-compliance to the requirements as stipulated in this Guide is not allowed and will be warned. Repetitive non-compliance issue would be subject to disqualification of the Team for the competition.

3.6.3. All decisions made are binding and final.

CHAPTER II – VEHICLE DESIGN

4. CAR BODY

4.1. Car Dimensions

4.1.1. **Dimensions** of Car must not exceed **<3.5m>** in length, **<1.5m>** in width, and **<1.5m>** in height above the ground at any time while driving.

4.1.2. Car dimension requirements at charging condition are detailed in "*Section 9.2.4-9.2.5*" of this guide.

4.2. Configuration

4.2.1. Car must be supported by a *minimum of THREE* wheels.

4.2.2. All running wheels must be in continuous contact with the road under normal running conditions.

4.2.3. The points of contact between the tyres and road must be symmetrical about the longitudinal centreline of the Car.

4.2.4. **Speed limit** of Car will be *25km/hr*.

4.2.5. Car must not include any dangerous external appendages.

4.3. Lighting

4.3.1. Car must have *stoplights* and *hazard lights* that are clearly visible from a reasonable distance.

4.3.2. *Stoplights* must be red in colour and triggered by the braking system.

4.3.3. *Hazard lights* must be amber in colour.

4.4. Horn

4.4.1. Drivers must be able to give clear audible warning to pedestrians and other Cars.

4.4.2. The trigger of the horn must be within arm's reach of the driver in the cockpit.

4.5. Cockpit

4.5.1. Car must be single seated and the seat must be front facing.

4.5.2. **Position** – The centreline of seats must align with that of Car. Only *leg first* position will be allowed.

4.5.3. **Ventilation** – Driver must receive outside air directed to his face while driving.

4.5.4. **Seatbelts** – Driver must be secured with a minimum of 3-point seat belt while driving. The belt must be securely attached to the mainframe of the Car and complies with *Schedule 2 Approved Seat Belts and Approved Anchorage Points of CAP 374F Road Traffic (Safety Equipment) Regulations*. A copy of the related document can be found in APPENDIX B of this Guide.

4.6. Visibility

4.6.1. In normal driving position, driver's eyes height must be above *700mm* above the ground.

4.6.2. **Forward Visibility** – Driver at normal driving position must be able to see a point *on the ground* and a point *2m high above the ground* at a distance 8m in front of the vehicle.

4.6.3. **Side Visibility** – Driver at normal driving position must be able to see *90degree* to the side.

4.6.4. **Rear Visibility** – Car must be equipped with a rear viewing system that allow driver to see 15m behind the Car up to *30degrees* off the centre.

4.7. Vehicle Access

4.7.1. Any driver must be able to exit the Car unassisted within 15 seconds.

4.7.2. Car may have door(s) that can be secured and released from both inside and outside of the Car.

4.8. Car Markings

4.8.1. Teams must reserve space on the exterior of their Car for Car Markings as required in this section. All markings should be on the both sides of their Cars and clearly visible from a 3m distance at a viewing height of 1.8m above ground.

4.8.2. **Team Identification** – Teams must clearly show their assigned Team Identification.

4.8.3. **School** – Teams must clearly show the logo or full name of their school.

4.8.4. In general, Teams are not allowed to affix any other Car Markings on their Car. If there are forbidden marking been found on any Car, responsible teams may be required to remove it and failure to do so will result in disqualification.

5. MECHANICAL

5.1. Construction

5.1.1. The chassis or the structural skin of the vehicle must have adequate dimension and strength to protect the driver in the case of collision or rollovers.

5.1.2. A solid floor and frame must be installed to prevent the driver from contacting the ground.

5.1.3. The driver compartment and the electrical and mechanical compartment (e.g. that containing the motor, battery, etc.) must be separated by a bulkhead lined with fire resistant material without any gap.

5.1.4. The wheels and the associated moving parts must be shielded with bulkhead to avoid accidental contact by the driver.

5.1.5. There must NOT be any sharp point or edge in both the interior and the exterior of the vehicle.

5.1.6. The vehicle body cover must be with enough rigidity such that no part is prone to deform due to wind while the vehicle is in motion.

5.1.7. The drivetrain, energy storage, as well as energy conversion units must be confined by the vehicle body cover, however, such confinement should be easy to open for inspection.

5.1.8. Windows must be made of safe materials that do not shatter into sharp shards.

5.1.9. The vehicle must be equipped with a towing hard point at the structural framework.

5.1.10. Secure mounting point for ballast should be arranged to securely mount ballast to make up for driver payload (refer to Section 7.2.2). The Team should take into account the effect of the ballast on the centre of gravity and the loading distribution on the front and rear axles when arranging the mounting point.

5.1.11. All objects in the vehicle must be securely mounted.

5.2. Brakes

5.2.1. Two independently triggered braking systems commanded by one single command unit, e.g. a foot pedal, must be installed onto the vehicle.

5.2.2. If a brake lever is used, the brake lever must be able to be operated without requiring the driver to take any hand off the steering wheel.

5.2.3. Each braking system must NOT act on only one side of wheels.

5.2.4. Parking brake must also be installed onto the vehicle.

5.2.5. The stopping power of the brakes must be adequate to keep the vehicle immobile on a 20% slope.

5.3. Steering

5.3.1. The turn radius must be no more than 10m.

5.3.2. The steering command unit must be a rotary steering wheel.

5.3.3. If electric steering is used, the vehicle must be able to revert automatically to a straightforward position when the driver releases the steering wheel or an electrical failure occurs.

5.4. Tires

5.4.1. The tires selected must be made of rubber.

5.4.2. The dimensions of the selected tires must be compatible with the rims.

5.5. Roll Bar

5.5.1. At least one roll bar that extends at least 5cm around the driver's helmet and beyond the driver's shoulder must be installed onto the vehicle chassis.

5.5.2. The yield strength of the roll bar must be able to withstand a static load of 70kg in any direction without deform.

6. ELECTRICAL

6.1. Warning and Colour Coding

6.1.1. Harnesses with nominal operating voltage over 50VDC (Direct Current Voltage) or 50VAC RMS (Alternative Current Voltage, Root Mean Square), or maximum operating voltage over 60VDC or 60VAC RMS must be visually identified with a permanent orange harness covering material.

6.1.2. The routing of harnesses with nominal operating voltage over 50VDC or VAC RMS is highly recommended to be kept separated from other low voltage harnesses.

6.1.3. All electrical enclosures, junction boxes, etc. containing harnesses, or components with nominal operating voltage over 50VDC or VAC RMS must have high voltage warning labels on the enclosure.

6.2. Insulation and Fusing

6.2.1. All electrical harnesses must be insulated to the thermal and mechanical stress that the harnesses are exposed to.

6.2.2. All electrical appliances must be properly fused to the operating conditions of the appliance.

6.3. Energy Source

6.3.1. All energy used in the vehicle must originate from solar energy directly captured by the on-board device installed in the vehicle.

6.3.2. The energy use by the vehicle must NOT lead to any gaseous emission to the environment.

6.3.3. Solar energy must be the only energy source.

6.3.4. Off-board generated fuel is NOT allowed to be added to or used by the vehicle regardless of the energy source for generation.

6.4. Energy Storage

6.4.1. Any energy storage device, including fuel cell stack, must not exceed a nominal voltage of 48VDC and a maximum voltage of 60VDC.

6.4.2. Energy storage device must be a single unit with only two terminals.

6.4.3. The energy storage device, including fuel cell stack, must be installed outside of the driver's compartment.

6.4.4. A fuse of correct rating must be installed within 15cm inline distance from the positive terminal energy storage device, including fuel cell stack.

6.4.5. An easily accessible manual power switch must also be installed at the positive terminal of the energy storage device, including fuel cell, to isolate the said device physically.

6.4.6. No more than one propulsion energy storage device and one accessory energy storage device are allowed on-board the vehicle.

6.4.7. All the power for the powertrain and its cooling function must come from the propulsion energy storage device, but not from the accessory energy storage device by any means.

6.4.8. The positive and negative terminals of the propulsion energy storage device, including fuel cell stack, must be isolated from the accessory electric system and from the vehicle ground.

6.4.9. The propulsion energy storage device and any lithium-based-battery (regardless of the purpose for propulsion or accessory power), including fuel cell, must be equipped with protective measures to automatically and physically isolate the said device in the event of overvoltage, overcurrent, short-circuit, thermal overload and other abnormal operation of the said device without the need for power other than from the said device.

6.4.10. The accessory electric system must be negatively grounded.

6.4.11. The non-lithium-based accessory energy storage device (e.g. Lead-acid battery) must be equipped with protective measures to automatically and physically isolate the said device in the event of overcurrent, short-circuit, and other abnormal operation of the said device without the need for power other than from the said device.

6.5. Battery Management System

6.5.1. The battery management system is optional but vehicle should has provision tailored for the battery chemistry and able to perform cell balancing to maintain uniformity among the cells., The battery management system, if adopted, must be powered by the battery being monitored but not by any external power source.

6.6. Emergency Switches

6.6.1. Two easily accessible emergency switches that can physically isolate the energy storage and the motor controller simultaneously at the positive terminals must be mounted in the driver compartment and on the permanent part of the exterior of the vehicle (i.e. not on the removable part of the vehicle body).

6.6.2. The locations of emergency switches must be with clear indications

6.7. Joulemeter

6.7.1. Joulemeters with nominal rating at 60A and surge rating at 100A will be provided for the participant to connect to the propulsion energy storage device (e.g. battery array), accessory energy storage device (if any) and all renewable energy harvesting system(s).

6.7.2. Each of the input and output harnesses of the propulsion energy storage device (e.g. battery array), accessory energy storage (if any), and all renewable energy harvesting system(s) must be connected with Joulemeter with connectors.

6.7.3. All the Joulemeters must be contained by a transparent enclosure with ingress protection of IP54 or above and mounted on the vehicle's exterior where the screen of the Joulemeter can be easily readable. The Organizer will seal the lid / opening of the enclosure to ensure the Joulemeter is free from interference.

6.7.4. In case the specification of the harness has nominal current over or surge rating over the ratings of the Joulemeter, more than one Joulemeter will be provided for the participant to connect to the propulsion energy storage device in a parallel circuit arrangement.

7. SAFETY

7.1. Briefing

7.1.1. A briefing session will be held before the competition in the field. The briefing session aims to provide information to Team regarding the driving safety and the event arrangement.

7.1.2. Participation of Team Manager and Designated Drivers of each Team is compulsory. Absent from the briefing session will result in disqualification.

7.2. Driver Requirement & Protection Equipment

7.2.1. **Driving License** – Driver must be above the age of 18 and a holder of valid Hong Kong driving license issued by the Transport Department, Government of HKSAR or a valid International Driving Licence.

7.2.2. **Driver Payload** – The total driver payload to the vehicle must at least have *70kg*, which includes the weight of the driver with the gears (shoes, clothes and helmet) and additional load (if necessary). If the total weight of the driver with gears is less than 70kg, solid ballast that serves solely for addition of weight has to be securely mounted inside the vehicle to meet the driver payload requirement. The ballast must be free from sharp point or edge and should be provided by the Team. The Team should also ensure the ballast is detachable, as both the driver with full gear and the ballast (if necessary) will be weighed before the competition start.

7.2.3. **Helmets** – Driver must wear a helmet when driving. The helmet must meet the regulation of Hong Kong legislation "*Schedule 1 Approved Protective Helmets of Cap374F Road Traffic (Safety Equipment) Regulations*". A copy of the related document can be found in APPENDIX A of this Guide.

7.2.4. **Shoes & Clothing** – Participants must wear close-toe shoes and comfortable *flame resistant* clothing. No scarf or any fluttering clothes that may be caught in the wheels is allowed. Flame resistant team uniforms are highly recommended.

7.2.5. **Seatbelt** – Car must be equipped with a minimum of *three -point lap and shoulder belt* that is attached securely to a structural component of the Car and complies with *Schedule 2 Approved Seat Belts and Approved Anchorage Points of CAP 374F Road Traffic (Safety Equipment) Regulations*. A copy of the related document can be found in APPENDIX B of this Guide.

7.3. Access to Track

7.3.1. Car must pass the Scrutineering to access the track. Team must carry a signed certificate as proof.

7.3.2. All spectators are forbidden from the track.

7.3.3. Participants can only cross or enter the track under the supervision of the Organiser.

7.3.4. Teams will be given opportunity to inspect the track before any field competition. Organiser will contact Team Manager for detailed arrangement.

7.4. Communication

7.4.1. Car must have means of *two-way*, *hands-free* telecommunication kit that allow Driver and Teams members to communicate when necessary.

7.4.2. Use of mobile phones is permitted.

7.5. Overtaking

7.5.1. Driver of overtaking Car must sound their horn to signify the Car in front. He should also pass with caution and be responsible for the safety of the manoeuvre.

7.5.2. Drivers must provide clear passage for other Cars wishing to overtake. He must not change course suddenly but prioritise the prevention of collisions.

7.6. Incidents Handling

7.6.1. Driver should not make intentional stops during the competitions unless the Competition Management Team requires it.

7.6.2. When stopping, be it accidental or intentional, Driver must drive the Car to the side of the track and lit the hazard light as far as he could.

7.6.3. In an emergency, Driver must exit the Car and wait *outside of* the track for Competition Management Team's instruction.

7.6.4. In general, no repair will be allowed and stopping Car will be considered to have given up.

7.7. Off-Track Vehicle Movements

7.7.1. Use of the Car outside of the track will not be allowed, unless it is authorised and supervised by the Competition Management Team.

7.7.2. When Car is off-track, Teams must push or pull the Car as they move it into and out of the required impound by the Competition Management Team.

8. SCRUTINEERING

8.1. Participation

8.1.1. The team representative, personnel in charge of technical matter, and all drivers must be present at the Scrutineering.

8.1.2. The drivers must be able to suit in full gear on the spot during the Scrutineering upon request.

8.2. Time & Location

8.2.1. The Scrutineering will be carried out around two months before the start of the competition in the field.

8.2.2. The teams will be informed about the Scrutineering location at a later stage and the teams must arrange logistics on their own.

8.3. Scope

8.3.1. All the requirements as stipulated in the guide related to the driver and the vehicle will be inspected.

8.3.2. The inspector appointed or accredited by the Organizer will lead the Scrutineering and, upon request by the inspector, the team must be able to demonstrate to the inspector that the driver and the vehicle fully comply with the requirements with their own equipment. If it deems necessary, the inspectors may countercheck with other equipment and the result found by the inspector should prevail.

8.4. Acceptance and Rejection

8.4.1. If the drivers and the vehicle are accepted, any change in the drivers, his or her gear, or the vehicle must undergo Scrutineering again by the organizer. The team should notify the organizer as early as possible in the event of the need for re-Scrutineering.

8.4.2. If the vehicle is rejected, the team will be given time to amend in order to comply with the requirements and will be allowed to undergo Scrutineering again.

8.4.3. The last round of re-Scrutineering will be conducted no later than one week before the start of the competition in the field.

8.4.4. Team that fails to be accepted is not qualified for the competition in the field.

CHAPTER III – COMPETITION AWARDS

9. RENEWABLE ENERGY CAPTURE & CONVERSION EFFICIENCY AWARD

9.1. Objective

9.1.1. This award aims to encourage teams to design efficient renewable energy harvesting system that optimises energy capture, conversion, and storage in the Car

9.2. Scope

9.2.1. Teams to select suitable renewable energy harvesting system using solar panel on-board of the competition vehicle which would be the only energy source. For detailed rules regarding energy sources, Teams should refer to the "*Section 6.3. Energy Source*".

9.2.2. The renewable energy harvesting system must be built on-board of the competition vehicle and the overall vehicle size at vehicle running condition should not exceed the size limitation of the competition vehicle as stipulated in "*Section 4.1. Car Dimensions*". There is no limitation for the overall size of the renewable energy harvesting system at vehicle standstill condition, however, the Car has to harvest a minimum energy level of 300 Wh. Car that not meets the minimum energy harvest level will not be qualified to the Energy Efficient Design Award competition.

9.2.3. The competition vehicle must be made ready and parked at the competition venue on the competition day. Teams will charge their vehicle for a fixed period.

9.2.4. Car may extend its harvesting system beyond the Car size limit as stipulated in this guide provided that the extension only supported by the wheels only and do not need extra support. In other words, the wheels are the sole supporting points to the Car under *all* circumstances at charging stage.

9.2.5. Car must carry *all* components (including extensions) throughout the Competition. Teams must not detach or attach any part from or to the Car after passing the Scrutineering.

9.2.6. The energy charged to the battery storage system of the vehicle will be measured to determine the winner.

9.2.7. Only solar energy is allowed for this challenge.

9.2.8. **Time of charging** will be around six hours in the competition day.

9.2.9. **Competition venue** will be at Hong Kong Science Park, where maintenance and work place will be designated for Teams to carry out maintenance when necessary.

9.3. Criteria for Award

9.3.1. The energy harvested and stored of the competition vehicle will be monitored and recorded by the Competition Management Team immediately *periodically* at the beginning, during, and at the end of the competition.

9.3.2. Joulemeter(s) will be used to determine the energy harvested and stored, as described in "*Section6.7. Joulemeter*". The energy stored is defined as the net energy influx into all energy storage device(s), i.e. propulsion energy storage device and accessory energy storage device (if any).

9.3.3. The charged energy will be deemed to be less than or, at best, equal to the capacity of the energy storage system.

9.3.4. Team with the most energy stored from renewable energy sources will be the Winner.

9.3.5. In the case where more the one Teams have attained the same winning amount of energy stored, *charging rate* (i.e. the time needed for the Teams to attain that energy level) will be used to determine the ultimate winner.

10. ENERGY EFFICIENT DESIGN AWARD

10.1. Objective

10.1.1. This award aims to encourage teams to design and fabricate an energy efficient solar energy vehicle that exhibits high-energy utilization rate in terms of distance travel by achieving excellence in, but not limited to, aerodynamic, mechanical, and electrical designs etc.

10.2. Scope

10.2.1. Teams are required to drive their Car for 6 laps (around 3 kilometres in total) within the time limit of 15 minutes at the competition track.

10.2.2. Car design must comply with all requirements in "Chapter III – Vehicle Design" and pass the Scrutineering as described in "*Section 8. Scrutineering*".

10.2.3. Teams that cannot complete the drive within the time limit of 15 minutes will be disqualified.

10.2.4. Venue for this challenge will be Hong Kong Science Park.

10.2.5. Car Configuration

a. *Car body and engineering aspects must be inspected before the competition. Before each Car's attempt, a final Scrutineering by the Competition Management Team will determine if the Car is ready or not.*

b. *The Team shall use solar energy to charge the on-board battery. To win this award, on-board battery of the competing Car should be pre-charged to a level that it could power the Car to complete the challenge.*

10.2.6. Car motor must run *solely on battery power* during the drive. No manual assistant should be required to start, stop or mobilize the Car. Other than this, Car must comply with the rules in "*Section 6.3. Energy Source*".

10.3. Criteria for Award

10.3.1. The energy used in the drive will be measured and evaluated by the Competition Management Team immediately after the end of the attempt.

10.3.2. Joulemeter(s) will be used to determine the energy used in the Teams' attempt, as described in in "*Section 6.7. Joulemeter*". The energy used is defined as net energy output from all energy storage device(s), i.e. propulsion energy storage device and accessory energy storage device (if any) plus the net energy output of all energy harvest device(s) and associated modules.

10.3.3. The result of each team will be recorded in the form of distance per kWh (km/kWh). This will be calculated from the net energy use as read from the Joulemeter, before and after the drive.

10.3.4. Team that can complete the drive with the least amount of energy use per distance travelled will be the Winner.

11. INNOVATIVE DESIGN AWARD

11.1. Objective

11.1.1. This award aims to encourage teams to incorporate innovative ideas in constructing their Cars.

11.2. Scope

11.2.1. Teams will introduce innovative elements in designing their Cars. Teams are expected to introduce new ideas, new technologies, or new design approach in order to win this award.

11.2.2. Car design must comply with all requirements in "Chapter III – Vehicle Design" and pass the Scrutineering as described in "*Section 8. Scrutineering*".

11.2.3. To allow the Judging Panel to have better assess Cars' design, Teams are recommended to include a section (no more than *TWO* pages) in their *Car Specification Report* that describes the innovative elements in the Teams Car plus photographs, diagrams or animation where appropriate.

11.3. Criteria for Award

11.3.1. Cars will be assessed in accordance with:

a. *Aesthetic appeal; and*

b. *Engineering innovation*

11.3.2. All information on Car design and specifications to be submitted by the Teams will be assessed by the Judging Panel to determine the Winner.

12. THE BEST TEAM SPIRIT AWARD

12.1. Objective

12.1.1. This award aims to praise the team that demonstrate exceptional team spirit throughout the competition.

12.2. Scope

12.2.1. Teams are expected to devote themselves to the Competition.

12.2.2. Their dedications are demonstrated in their passion and excitement, attention to details, and initiatives to publicise the Competition and their participation.

12.2.3. Teams may make use of creative media (visual art, social media, etc.) to promote the competition and their participation. Their team spirit will be demonstrated through these promotional materials.

12.3. Criteria for Award

12.3.1. The Teams will be assessed in accordance with:

a. *the performance of all Team members' cooperation on the competition days, and the result of the Team's promotion campaign; and*

b. *the performance of the Team's cheer team on the competition days.*

12.3.2. The Team that demonstrates best team spirit throughout the Competition will be determined by the Judging Panel as the Winner.

13. OVERALL AWARD

13.1. Objective

13.1.1. This award aims to praise the team that demonstrates overall excellence throughout the Renewable Energy Capture & Conversion Efficiency Award, Energy Efficient Design Award, Innovative Design Award, and the Best Team Spirit Awards respectively.

13.2. Scope

13.2.1. Teams are expected to devote themselves to the Renewable Energy Capture & Conversion Efficiency Award, Energy Efficient Design Award, Innovative Design Award, and the Best Team Spirit Award respectively throughout the Competition to achieve overall excellence.

13.3. Criteria for Award

13.3.1. The Teams will be assessed in accordance with their result in others awards based on the following weighting factors:

Awards	Weighting Factor
● Renewable Energy Capture & Conversion Efficiency Award	3
● Energy Efficient Design Award	3
● Innovative Design Award	3
● The Best Team Spirit Award	1

13.3.2. There will be one Overall Award in each divisions (i.e. one Overall Award in Tertiary Education Division and one Overall Award in Secondary Education Division). Teams will be assessed based on the ranks of performance in all fours awards in their division. The weight rank will be calculated as summation of the weighted rank for each award (i.e. $\sum$ (award rank x weighting factor) of all awards). The team with lowest weighted rank number will be the winner.

13.3.1. The Team that demonstrates best overall excellence throughout the Competition will be determined by the Judging Panel as the Winner. In the event of identical score, the Judging Panel's decision shall prevail.

- End of Guide -

APPENDIX A
CAP 374F SCHEDULE 1.
APPROVED PROTECTIVE HELMETS

Chapter:	374F	**ROAD TRAFFIC (SAFETY EQUIPMENT) REGULATIONS**	Gazette Number	Version Date
		Empowering section		30/06/1997

(Cap 374 section 10)

[25 August 1984] *L.N. 302 of 1984*

(Originally L.N. 291 of 1983)

Part:	I	**CITATION AND INTERPRETATION**		30/06/1997

(Extract)

Schedule:	1	**APPROVED PROTECTIVE HELMETS**	L.N. 65 of 2005	30/06/2005

[regulation 2]
(L.N. 148 of 2002)

1. Protective helmets bearing a marking applied by the manufacturer indicating compliance with the specifications contained in-

(a) British Standard 2495;
(b) (Repealed L.N. 65 of 2005)
(c) Australian Standard E 33-1968;
(d) American National Standards Institute Z90.1-1966, Z90.1-1970 and Z90.1-1971;
(e) Institute Belge De Normalization BENOR NBN 626;
(f) Deutsche Normen DIN 4848;
(g) French National Standard AFNOR NFS 72-301;
(h) Dutch National Institute for Road Vehicles TNO;
(i) (Repealed L.N. 65 of 2005)
(j) Safety Helmet Council of America (SHCA) Certification;
(k) British Standard 5361; (L.N. 65 of 2005)
(l) British Standard 6658:1985; (L.N. 65 of 2005)
(m) Japanese Industrial Standard JIS T 8133:1970-2000 for full type protective helmets for drivers and passengers of motorcycle; (L.N. 65 of 2005)
(n) Australian Standard AS 1698-1988; (L.N. 65 of 2005)
(o) Federal Motor Vehicle Safety Standard No. 218 of Federal Regulations Vol. 38 No. 160 of USA dated 20 August 1973 including all revisions of that standard made before the date* this subparagraph comes into operation; (L.N. 65 of 2005)
(p) ECE Regulation No. 22 made by the Economic Commission for Europe dated 1 June 1972 (E/ECE/324-E/ECE/TRANS/505/Rev.1/Add. 021) including all revisions of that regulation made before the date* this subparagraph comes into operation; (L.N. 65 of 2005)
(q) Snell Memorial Foundation. Standard for Protective Headgear 1970-2005. (L.N. 65 of 2005)

2. Protective helmets of a type approved by the Commissioner and specified by him by notice in the Gazette, bearing a marking determined by him indicating that the type of helmet has been accepted as capable of affording to persons riding motor cycles a degree of protection from injury equal to or greater than that provided by protective helmets of the types specified in paragraph 1. (L.N. 65 of 2005)

Note:
*** Commencement date: 30 June 2005.**

APPENDIX B
CAP 374F SCHEDULE 2.
APPROVED SEAT BELTS AND APPROVED ANCHORAGE POINTS

Schedule:	2	**APPROVED SEAT BELTS AND APPROVED ANCHORAGE POINTS**	L.N. 65 of 2005	30/06/2005

[regulation 2]
(L.N. 148 of 2002)

PART I

Approved Seat Belts

1. Seat belts in respect of which either the seat belt assembly or the vehicle to which it is attached is permanently marked by the manufacturer of the belt or vehicle with the specification number, mark or symbol indicating compliance with any of the following-

(a) British Standard for Seat Belt Assemblies for motor vehicles BS 3254: 1960 and BS 3254, including Part 1: 1988 Specification for restraining devices for adults; and BS 3254, including Part 2: 1991 Specification for restraining devices for children;

(b) British Standard Specification for Passive Seat Belt Systems BS AU 160a and BS AU 183: 1989; and BS AU 157a, BS AU 185, BS AU 186, BS AU 186a, BS AU 202 and BS AU 202a for child restraint system;

(c) ECE Regulation No. 16 made by the Economic Commission for Europe dated 7 May 1973 including all Revisions for Seat Belt made before the date this paragraph comes into operation; and ECE Regulation No. 44 made by the Economic Commission for Europe dated 1 February 1981 including all Revisions for restraining devices for children made before the date this paragraph comes into operation;

(d) Australian Standards for Seat Belt Assemblies for motor vehicles E35-1965, E35, Part I-1970 and E35, Part II-1970 (including retractors), including modification authorized by Australian Design Rules No. 4, 4A, 4B and 4C; AS 2596-1995 and 2596-1983, including modifications complying with Australian Design Rule No. 4; and AS 1754-1995 for restraining devices for children;

(e) New Zealand Specification for Seat Belt Assemblies for motor vehicles NZS 1662: 1969 and NZS 5401; and NZS 5411 for restraining devices for children;

(f) Federal Motor Vehicle Safety Standard (USA) No. 209 for Seat Belt; and No. 213 for restraining devices for children; (L.N. 65 of 2005)

(g) Japanese Industrial Standard JIS D4604: 1969 (three-point belts only) and D4604: 1988; and JIS D0401: 1990 and JIS D0401: 1996 for restraining devices for children; (L.N. 65 of 2005)

(h) Australian Design Rule 4/03 approved in Road Vehicle (National Standards) Determination No. 2 of 1997 (Australia) including all revisions of that rule made before the date# this subparagraph comes into operation; (L.N. 65 of 2005)

(i) (i) Technical Standard for Seat Belt Assemblies made by the Minister of Land, Infrastructure and Transport of Japan in Attachment 32 to Announcement No. 619 of 15 July 2002; and
(ii) Seat Belt Assembly Test Procedure (TRIAS) 31-1994 made by the Minister of Land, Infrastructure and Transport of Japan in Circular of Koshin No. 453 of 24 August 1971,
including all revisions of that standard and test procedure made before the date# this subparagraph comes into operation; (L.N. 65 of 2005)

(j) Directive 77/541/EEC issued by the European Economic Community dated 28 June 1977 including all revisions of that directive made before the date# this subparagraph comes into operation. (L.N. 65 of 2005)

2. Seat belts of a type approved by the Commissioner and specified by him by notice in the Gazette, bearing a marking determined by the Commissioner indicating that the type of seat belt has been accepted as capable of affording to persons in a motor vehicle a degree of protection from injury equal to or greater than that provided by seat belts of the types specified in paragraph 1.

(L.N. 114 of 1998)

PART II

Approved Anchorage Points for Vehicles other than Goods Vehicles and Public Light Buses Registered on or after Specified Date

(L.N. 37 of 1989; L.N. 148 of 2002)

(a) British Standard for Seat Belt Anchorage Points-B.S. AU48:1965;
(b) British Standard for Seat Belt Anchorage Points B.S. AU48a;
(c) Japanese Standard JASO-6602;
(d) Federal Motor Vehicle Safety Standard (USA) No. 210;
(e) E.C.E. Regulation No. 14, including Revision 1, made by the Economic Commission for Europe dated 30 January 1970 and published by the United Nations;
(f) Australian Design Rule 5A or 5B;
(g) Directive 76/115/EEC, as amended by 82/318/EEC, issued by the European Economic Community; (L.N. 37 of 1989)
(h) Technical Standard for Seat Belt Anchorages and Type Approval Test Procedures (TRIAS) 37-1987made by the Minister of Land, Infrastructure and Transport of Japan for motor vehicle in Circular of Jisha No. 899 of 1 October 1983 and Circular of Koshin No. 453 of 24 August 1971 including all revisions of that standard and test procedures made before the date* this paragraph comes into operation. (L.N. 148 of 2002; L.N. 65 of 2005)

(L.N. 148 of 2002)

PART III

Seats with Integral Seat Belt Anchorages for Vehicles other than Public Light Buses Registered on or after Specified Date

(L.N. 148 of 2002)

(a) British Standard for seats with Integral Seat Belt Anchorages B.S. AU140:1967
(b) British Standard for seats with Integral Seat Belt Anchorages B.S. AU140a
(c) E.C.E. Regulation No. 14, including Revision 1, made by the Economic Commission for Europe dated 30 January 1970 and published by the United Nations;
(d) Australian Design Rule 5A or 5B;
(e) (i) Technical Standard for Seats and Seat Anchorages and Type Approval Test Procedures (TRIAS) 35-1975; and

(ii) Technical Standard for Seat Belt Anchorages and Type Approval Test Procedures (TRIAS) 37-1987,

made by the Minister of Land, Infrastructure and Transport of Japan for motor vehicle in Circular of Jisha No. 899 of 1 October 1983 and Circular of Koshin No. 453 of 24 August 1971 including all revisions of those standards and test procedures made before the date* this paragraph comes into operation. (L.N. 148 of 2002; L.N. 65 of 2005)

(L.N. 148 of 2002)

APPENDIX C
APPLICATION FORM

"NEW ENERGY NEW GENERATION" SOLAR CAR COMPETITION
APPLICATION FORM

Official use:
T_____
S_____

1. Competition Category

☐ Tertiary Education ☐ Secondary Education *Tick as appropriate*

2. Details of Applicant

Name of Institution
(English) _____ (Chinese 中文) _____

Name of Department (if applicable)
(English) _____ (Chinese 中文) _____

Name of the Team
(English) _____ (Chinese 中文) _____

Correspondence Address
_____

_____

(i) Name of Team Director

(English) _____ (Chinese 中文) _____

Position _____ E-mail _____

Telephone No. _____ Fax No. _____

(ii) Name of Team Manager

(English) _____ (Chinese 中文) _____

Position _____ E-mail _____

Telephone No. _____ Fax No. _____

3. General Declarations

I / We declare that all information and documents provided in this Application are true, accurate and complete and I / We undertake that all information and documents to be provided in the assessment process will be true, accurate and complete.

I / We confirm I / We have read and agree to abide by ALL the Rules as set out in the "New Energy New Generation" Solar Car Competition Guide.

I / We agree that the organizer and co-organizer may disclose any of the information and documents provided or to be provided by me/us to any third party as far as it is necessary to properly conduct the assessment process.

I / We agree that the organizer and co-organizer may disclose or publish the name of my / our application(s) on the list of awardees.

I / We hereby expressly unconditionally and absolutely waive all my / our rights of claims against **the Environment Bureau (ENB) of Government of the HKSAR, the Electrical and Mechanical Services Department (EMSD) of Government of the HKSAR, Hong Kong Productivity Council (HKPC) and the Judging Panel**. This provision shall survive after withdrawal from the scheme.

4. Return of Application Form

Please return the completed application form to Environmental Management Division, Hong Kong Productivity Council (email: winniewong@hkpc.org or fax: 2788 5608) on or before 12 June 2015. For enquiry, please contact 2788 5019 (Ms. Wong).

Authorised Person Signature _____ Stamp _____

Name _____ Date _____

Position _____

** The authorized person should be the department head or the dean of the tertiary education institution or the principal of the secondary school.*