

# **Neighborhood Electric Vehicle (NEV) Competition Rules**

## **Held at the 2006 Tour de Sol's Around Town Vehicle Competition**

### **May 12-13, 2006**

#### **1. Goal**

To create a NEW, simple, affordable Tour de Sol category of student-built solar/battery electric vehicle (S/BEV) using clean renewable energy that provides educational value and competitive challenge AND offers NEV manufacturers an opportunity to showcase their vehicles and support student learning.

#### **2. Objectives for 2006**

Initiate NEW 'Around Town' Competition with 10-20 entries. Target entrants: middle and high schools, vocational schools, and NEV manufacturers.

#### **3. Registration Cost**

See registration forms.

#### **4. NEV Competition Overview**

All entrants must register for the Around Town Vehicle Competition held at the Northeast Sustainable Energy Association's Tour de Sol and meet the specifications below. All entries must be based upon factory built NEV or golf cart vehicles with standard electric drivetrains, standard batteries and all safety features and bumpers included with factory delivery. Entrants must modify their vehicles by adding installing instrumentation (Voltmeter and DC wh meter) and solar panels. Student teams must create educational display boards and computer displays of their data logging system and data collected. Entrants must charge their batteries before the event to start with a full battery charge. Entrants will meet at Saratoga Spa State Park on Friday, May 12 at the Saratoga Automobile Museum's VIP parking lot at 7:00AM to sign in. The event will run to Saturday, May 13 at 7:00PM.

**The safety of participants, passengers, program volunteers and other motorists is a primary concern of the event sponsors.** All vehicles will be inspected. Entrants will be disqualified for poor sportsmanship, deliberate interference of other contestants or unsafe driving such as intentional drafting of other vehicles, etc.

#### **5. Draft Schedule of Events**

Saratoga Spa State Park and Saratoga Automobile Museum, NY (just north of Albany)

##### **Friday, May 12, 2006**

7-8:30AM	Arrive and set up
9AM-1:00PM	Display at Tour de Sol "Student Day." 1,000 students expected
2-4:00PM	Safety and technical testing
4-6:00PM	Range event on a closed course

##### **Saturday, May 13, 2006**

8-10:00AM	Set up
10AM-3:30PM	Display at Tour de Sol at Saratoga Automobile Museum's Spring Auto Show
4-5:00PM	Visit the electric bike events
5-6:00PM	Award ceremony

#### **6. Awards**

Awards will be given in two divisions: 1) Students 2) Manufacturers

Trophies will be awarded for:

- Most renewable energy produced in 5 hours at display
- Most efficient overall – least energy /miles
- Most energy from renewable sources
- Longest distance covered in x hours
- Best data recording and displays (laptop)
- Most informative educational display
- Best team participation
- Most practical
- Most ingenious design-modification
- Best use of alternative energy
- Most FUN

## **7. Vehicle Specifications**

All entries must be based upon factory built NEV or golf cart vehicles with standard electric drivetrains and standard batteries only, including all safety features and bumpers included with factory delivery. Required modification includes solar panels and instrumentation. Following are details of the vehicle specifications:

- 7.1 Vehicle must be based upon Neighborhood Electric Vehicle (NEV) or electric golf cart chassis – propelled by non-polluting energy source (no hydrocarbon fuel or carbon emissions).
- 7.2 Modifications: suspension, motor, drivetrain, brakes, and frame must be original and unmodified. Accepted modifications include larger tires, instruments and body modifications such as fairings, artistic painting etc.
- 7.3 Vehicle Registration: Must be registered and meet state of origin NEV requirements – lights, horn, brakes.
- 7.4 Satisfies NY State neighborhood vehicle regulations.
- 7.5 Max. total vehicle weight = manufacturers specifications.
- 7.6 Battery energy/power limited to off-the-shelf batteries or smaller capacity replacements with same voltage as original stock design. There will be a special category for vehicles using NiMH or Lilon batteries, U-Caps, Fuel Cells, etc. All vehicles using advanced batteries must use a thermal management system as required by the battery manufacturer and provide manufacturer safety sheets.
- 7.7 Power Rating: The vehicle must not exceed maximum power rating of motor manufacturer. (72VDC max.– GEM power spec) Note: Most NEV's are 36, 48, or 72VDC.
- 7.8 Must have clearly labeled emergency disconnect and fire extinguisher or manufacturer supplied disconnect–timed contactor.
- 7.9 Auxiliary power source must be renewable such as solar, wind, hydrogen fuel cell, or pedal-power. Vehicle must have a min. of 100W renewable power on-board. A separate solar charging station can also be used during breaks. An automatic battery charge controller must be used to prevent battery overcharging.
- 7.10 Required Instrumentation: All vehicles must have E-meter (or WH meter) to monitor all renewable energy/power captured and all energy used by vehicle during the event. See <http://www.rc-electronics-usa.com/ammmeters/dc-amp-meter.html> for \$59 units.

- 7.11 Must be able to stop in 35 feet from 25 mph.
- 7.12 Vehicle driver must have valid driver license.
- 7.13 Must have a minimum of one driver and one navigator.
- 7.14 Top vehicle speed must not exceed 25 mph, per NEV regulations.
- 7.15 Must pass tech scrutinizing and safety inspection of brakes, horn, emergency disconnect, suspension and lights, etc.
- 7.16 Student teams must also create:
  - 7.16.1 A three-panel educational display (science fair format) about your vehicle, your team and the viability of NEVs.
  - 7.16.2 A display (laptop with power point or animated graphics etc.) demonstrating the data collected with their data logger, and students' understanding of the collected data and its analysis during the testing period.

### **8. Competition Scoring and Awards**

The competition will involve technical testing, a two-hour range event, and for student teams, an assessment of their educational display boards and computer displays of their data logging system and data collected. Points will be given as noted below. Trophies will be given based on points earned.

#### **8.1 Tech Testing: 50 points**

- 10 Safety & specs check
- 20 Braking
- 20 Handling (cone test)

#### **8.2 For All Student Teams: 50 points**

- 20 Three-panel educational display
- 15 Display of data logging and analysis
- 15 Understanding of data analysis

#### **8.4 Range Event: 50 points**

- 50 NEVs will run on a specified course. The vehicles will start with a full charge. This "range" event will demonstrate the full range of the vehicle. The vehicle may stop and exchange drivers, navigator, or other passengers; however, each vehicle must have a navigator in addition to the driver. The range event will be 2 hours long.

### **9. Safety and Technical Testing Forms**

- 9.1 Safety specs check (available in April)
- 9.2 Braking & handling (available in April)
- 9.3 Data logging display to include but not limited to Powerpoint Presentation, Excel spread sheet, graphical analysis, available at the display table (Available in April)
- 9.4 Educational Display Board (see next page)

## 9.4 Educational Display Board

The overall goal of the display boards is to improve communications to the general public.

### Content/Theme

Teams should chose ONE of the following as the main focus/theme of the board:

- A. What you feel is special about your vehicle and your team (the history of the project—when it started, how many people involved, what you learned, etc.)
- B. How the viewing audience can benefit from the development of your technology (you may want to cover environmental, economic and societal benefits)
- C. The workings of the technology used in your vehicle and/or overall vehicle design goals, technology used, challenges during design and construction, and success in meeting your goals.
- D. The availability of your vehicle today, or how your technology (or this type of vehicle) may be used by the general public.
- E. Information that would help promote the adoption of or further develop of your technology or type of vehicle.
- F. Information about the renewability or sustainability of your propulsion energy and/or your vehicle.

### Rating

Judges should judge each team on a scale between 0 to 10 (higher is better) for the overall effectiveness of the board, or the talk for the theme chosen by the team

Theme \_\_\_\_\_

What	Score
Is it neat and easy to read?	
Is it informative and easy to understand?	
Does it use a well-balanced variety of communication techniques, such as text, photographs, diagrams, charts, graphs or others?	
Does the display provide the team spokesperson with a visual aid for presenting the vehicle to the general public?	
Does the display use demonstration models or "hands-on" activities to help the audience understand the technology /vehicle type and how it can be used in society?	
Does the display encourage viewers to ask about the project, (the technology, process, educational benefits, availability, etc.)?	
Does it appeal to a wide age range of people (elementary students to adult)?	
<b>Raw Score</b>	
<b>Score: Raw Score divided by 70 for a score of between 0 and 10</b>	

Comments: \_\_\_\_\_

APPROVED (Inspector) \_\_\_\_\_