

Asheville City Schools Foundation  
**2008-2009 Progress Energy “Energy Education” Grant Application**

**GUIDELINES:** The goal of Energy Education grants is to fund innovative classroom projects that increase student knowledge and awareness of energy. School employees may apply on behalf of a classroom, department or school. Requests may range from \$100 to \$2500.

**Application due in the ACS Foundation office before 4 p.m., September 12, 2008**

**Requirements:**

1. The grant applicant must be an employee of the Asheville City Schools System.
2. Grants must be submitted electronically to [kate.pett@asheville.k12.nc.us](mailto:kate.pett@asheville.k12.nc.us), and one hard copy must arrive in the ACSF office by the due date. Incomplete or late applications will not be considered.
3. Applications will be considered and awarded by the Foundation’s Allocations Committee, with award notification on September 26, 2008.
4. Recipients are expected to complete and submit an evaluation form.
5. Hard copies of completed applications should be couriered or delivered to: ACSF, 85 Mountain Street, Asheville, NC 28802.

**Date: September 12, 2008**

**Applicant’s Name:** Cindy Byron (primary coordinator)

**School:** SILSA

**Position:** Earth and Environmental Science and Senior Honor’s Environmental Science Teacher

**School Phone:** 350-2708

**Home Phone:** 828-254-0949;

**Email:** [cindy.byron@asheville.k12.nc.us](mailto:cindy.byron@asheville.k12.nc.us)

**Total Grant Request** (limit \$2,500 per grant) \$2500

**1. Project Summary:**

**a. Why is this project needed?**

As students in the Senior Honor’s Environmental Science class at the School of Inquiry and Life Sciences at Asheville, we are writing this grant proposal for the SMARTT Challenge. The SMARTT Challenge (formerly called the Electric Vehicle or EV Challenge) is a program sponsored by NC State University and NC Solar Center that engages students in a process of converting a car that runs off of gas into a car that runs off electricity. General information can be found at [www.evchallenge.org](http://www.evchallenge.org). The program involves a large diverse group of students, led by the first graduating class of SILSA and Mr. Hendley’s Metals II class at Asheville High. We need this grant so that students are able to raise upwards of \$10,000 needed to provide expenses related to the car, such as the car itself, and supplies needed to convert the car into an electric car. Money is also needed for lab materials to educate students about the physics behind electric cars. Other classes such as Algebra, English, Biology, World History and Metals II in SILSA and AHS will also be integrated into this project. Not only will this help us academically, but it will also help us with life skills such as skills in leadership, marketing, teamwork and collaboration, communication, and organization. For example, as students in Ms. Byron’s HES class we created a flyer to advertise the project and volunteered at the Southern Energy Expo to reach out for public support. We as a class have collaborated to write this grant proposal by breaking up the sections into groups, headed by group leaders. The culminating event will take place in May of 2009 where a group of students will take the car to compete with other students around the country. The SMARTT Challenge is beneficial to us as students of SILSA and Asheville High School because we are reaching out to the community and educating not only adults but students in elementary schools as well, giving us a chance to be a part of a life-changing experience and learn how this experiment could result in a change in our

society. This experiment will help us to have a major role in the future because it will reduce pollution, lessen our dependence on fossil fuels, and save Americans money because our cars will be running off of batteries instead of gas.

**b. Which standard course of study objectives will be addressed?**

- Algebra I
  - 3.03 Create linear models for sets of data to solve problems. (Students may be graphing energy saved over time by converting a vehicle to an electric vehicle.)
- Earth and Environmental Science
  - 1.02 Design and conduct scientific investigations to answer questions related to earth and environmental science. (Students will have to address how gas vs. electric cars and all topics related therein impact the environment.)
  - 1.06 Identify and evaluate a range of possible solutions to earth and environmental issues at the local, national, and global level. (Students in English and/or EES will be writing to elected officials about why they should or should not support alternative energy legislation.)
  - 2.07 Analyze the sources and impacts of society's use of energy.
    - Renewable and non-renewable sources.
    - The impact of human choices on Earth and its systems.
- Biology-
  - 5.02 Assess human population and its impact on local ecosystems and environments such as climate change (Students will investigate how our actions as a society impact our environment and the consequences to other organisms as a result of these impacts.)
- Physics- *Even though students in the physics course at AHS will not participate, Ms. Byron's and Mr. Hendley's classes will incorporate the following as part of the SMARTT Challenge Curriculum*
  - 1.02 Design and conduct scientific investigations to answer questions about the physical world.
  - **Competency Goal 8: The learner will build an understanding of static electricity and direct current electrical circuits.** (As part of the SMARTT Challenge curriculum, in Honors Environmental Science, students will address the physical operational processes of the electric car.)
- Metals-
  - 71.42 Students will practice framing, machining, design engineering, welding, soldering and other metal related techniques
- US History-
  - 5.04 Describe the changing role of government in economic and political affairs. (Students will describe the economic and political changes associated with a widespread conversion to electric vehicles.)
- World History-
  - 5.01 Use word processing to create, format, and produce classroom assignments/projects. (Students should elaborate on the global history involving the effects of gas operated cars.)
- English I-
  - Goal 2: The learner will explain meaning, describe processes, and answer research questions to inform an audience.
- English IV-
  - 2.03 Instruct an audience in how to perform specific operations or procedures by using layout and design elements to enhance presentation/product and using visuals and media to make presentations/products effective. (Students will create and instruct others on how to operate the

electric vehicle and also will create visuals to show the progress made with the SMARTT challenge.)

**c. What methods and materials will you use?**

There are many materials that are vital for our team to complete the EV Challenge to successfully convert a gasoline powered vehicle into an electric powered vehicle.

**Materials needed:**

**FOR PHYSICS LABS:**

- 34 Screw Base bulbs 1.5v-volt max
- 10 2 D-Cell Battery Holder
- 40 Flexible Alligator Lead Wire
- 10 Volt meters 0-10v
- 10 DC Milliammeters 0-200mA
- 10 DC Ammeters 0-5 A
- 10 Spring Binding Knife Switches
- 10 Alkaline Batteries-D

**FOR VEHICLE CONVERSION**

- The following items were obtained from the website: [http://www.evadc.org/build\\_costs.html](http://www.evadc.org/build_costs.html)
  - Advanced DC 8" motor
  - Adaptor plate and hub
  - Motor mount
  - Curtis-PMC1221B motor controller
  - Throttle controller
  - Main contactor
  - Main circuit breaker
  - DC/DC Converter
  - Voltmeter
  - Ammeter
  - Onboard battery charger
  - Charger interlock relay
  - 50 ft 2/0 welding cable
  - Cable lugs
  - Shrink tubing

- 120 volt battery box fan
- Wiring diagrams
- Vacuum brake system
- Heating system
- Electric wire and connectors
- 16 6-volt batteries, US Battery @ \$42.00 each
- Goodyear Invicta low rolling resistance tires @ \$60.00 each
- New wheels
- New clutch
- Air shocks
- "Convert It" Manual
- Hardware
- Battery box plywood
- Tools and supplies
- Paint and supplies
- Angle iron
- Welding services
- Flywheel resurfacing

## **Methods**

### 1. Physics Labs:

Students in Ms. Byron's Senior Honors Environmental and Mr. Hendley's Metals II classes will be conducting a series of physics labs to learn about the foundations of electricity, namely simple circuits, series and parallel circuits, conductors and insulators, electric currents and magnetism, measuring voltage and resistance in series and parallel circuits.

### 2. Vehicle acquisition, conversion and competition:

The aforementioned students will be responsible for acquiring funds needed to purchase a vehicle, and do the conversion which will be done primarily in Mr. Hendley's class as well as after school (where it will offered in an extracurricular club open to any student interested in AHS and SILSA). In order to complete our project of converting a regular gasoline vehicle to an electric powered vehicle an EV Kit is essential. It contains many vital tools used to construct an electric vehicle. Such as fuses, batteries (Trojan AGM lead acid), controller, a contractor, a potentiometer, an AC/ DC converter, vacuum pump, and an Anderson disconnect. These tools make the vehicle run and replace parts in a regular gasoline vehicle that are not needed for an electric vehicle. A selected group of

students will compete in a national competition in Raleigh, NC in May of 2009 in autocross events (where they race the car), range events (where they drive the car as far as it will go on one charge), a trouble-shooting event (where students will have to solve a given wiring problem), an oral presentation and website design. More information can be found on <http://www.rtpnet.org/ev/schools/highschool/rules/index.html>.

3. School Initiatives:

Students in SILSA’s Earth and Environmental Science, Senior Honors Environmental Science, English I and IV, Biology, World History, US History, and AHS Metals II class will be participating throughout the year in School Initiatives. Students in these classes will participate in school initiatives such as the following which was obtained from a portion of the competition’s rubric. Information below is a portion of the SMARTT Challenge rubric that was obtained from the following website: [http://www.rtpnet.org/ev/schools/highschool/forms/2007-2008%20SMARTT%20Initiative%20Activity%20Form\\_rev.doc](http://www.rtpnet.org/ev/schools/highschool/forms/2007-2008%20SMARTT%20Initiative%20Activity%20Form_rev.doc)

|   |
|---|
| As an entire class assignment, have students create posters entitled “The Need For Alternative Fuel Vehicles.” Hang the posters throughout the school. <u>Send at least one of the posters to SMARTT Challenge personnel</u> at the address shown on page 1.  |
| Prepare a brochure about The Need For Alternative Fuel Vehicles. <u>Send a sample brochure to SMARTT Challenge personnel.</u>   |
| As an entire class assignment, students prepare a one-page essay entitled "How Alternative Fuel Vehicles Can Help Our Environment and Save Energy." <u>Send three best essays along with this form.</u>   |
| Develop and present a skit about the environmental benefits of EVs. Present this skit to a local community group, elementary, or middle school.   |
| Prepare and present a presentation to a local government or civic organization describing your school’s SMARTT Challenge program and how it benefits your school.   |
| Write a letter to an elected state official explaining the benefits of alternative fuel vehicles and how the SMARTT Challenge is preparing you to make positive changes in the future. <u>Send a copy of each letter to the SMARTT Challenge at the address shown on page 1, or you may send an electronic copy of the article to <a href="mailto:evchallenge@nc.rr.com">evchallenge@nc.rr.com</a>.</u> Score 5 points for each letter. |
| Have a student-written article printed in the local community newspaper that explains how alternative fuel vehicles address transportation issues facing us today and in the future.  |

More examples of the School Initiatives can be found on the website:

[http://www.rtpnet.org/ev/schools/highschool/forms/2007-2008%20SMARTT%20Initiative%20Activity%20Form\\_rev.doc](http://www.rtpnet.org/ev/schools/highschool/forms/2007-2008%20SMARTT%20Initiative%20Activity%20Form_rev.doc)

**d. Which students will be served and how many?**

Our goal with this project is to not only serve our class but our peers within Asheville High and members of our community. We will combine our efforts with a Metals II class and other classes within SILSA. There are approximately 18 students in Mr. Hendley’s Metals II class, 18 in Ms. Byron’s SILSA Honor’s Environmental Science class and Mrs. Sessions’s SILSA English IV class (the latter two classes are comprised of the same groups of students) about an addition 150 students in the entirety of SILSA who will be helping us out. Together we will leave a legacy that will be looked upon by people of higher education as well as classes to follow us. For many of the students wishing to attend a college or university this project is a stepping stone enabling them to graduate high school with experience in group leadership and organization. This project will also be used by many as their topic

for the seniors exit project. This topic will not only help them graduate but also teach others about the fuel efficiency crisis our planet is in. With this extra help from community volunteers, other classes, and teachers our goal will be reached much easier, but life lessons like teamwork and time management will be essential. We will have assistance from Mr., Hendley's Metals II class, 10<sup>th</sup> and 11<sup>th</sup> grade biology, Senior Honors Environmental Science, Algebra I, 9<sup>th</sup> grade Word History and English I and IV. Each group will bring their own contributions and we will create one cohesive project to teach others.

e. **How will you measure the success of this program**

There are many factors to consider when talking about success. Luckily for us success can be easily reached. Success could be measured by the effect we have on our school and community, or it could be as simple as completing the transformation of the car. The transformation can be easily judged by using the rubrics given to us or by self, teacher, or student assessments. By finishing the necessary EV Challenge Rubric by early March, 2009, the program will be considered very successful. Unfortunately our amount of success in our community is much harder to judge. We hope to teach our peers and the community about the green lifestyle and some of the possible solutions that can become main stream and help free our country from its dependence on foreign oil. We will have portfolios that we will work on in English IV and Honors Environmental Science that will document our progress, events, and ideas. But the best way to measure our success in this part of our project is to see in years to come if our lessons affect the choices made in our community.

The picture below is SILSA's first graduating class of which a majority is enrolled in Ms. Byron's Honor's Environmental Science Class. The picture was used as a part of a poster the students created for the Southern Energy and Environment Exposition held at the NC Ag Center in August 2008 to educate the public about the program and solicit support.



2. **Please provide a brief timeline.**

- ***Oct 2008-May 2009: Submit monthly report of initiative activities to SMARTT Challenge***
- Sept.-Oct.: Physics experiments (October 2008-May 2009)
- Sept. 5th: Have grant written, turned into Byron
- Sept. 12th: Grant due to ACSF

The following dates refer to submission of items to SMARTT Challenge

- Sept 30th: Submit application to SMARTT Challenge
- Nov 30th: Have vehicle to begin conversions
- Dec 28th: Remove engine, muffler, gas tank and radiator
- Dec 31st: Send letter of appreciation for support provided through SMARTT Challenge to state officials
- Dec 31st: Write and send letter to Larry Shirley
- Jan 15th: Receive electric motor and controller
- Jan 30th: Notify SMARTT Challenge officials
- Feb 15th: Receive the batteries
- Feb 29th: Install electric motor
- March 28th: Drive vehicle on its own power at 25 mph

- April 7th: Sign, date and mail the completed form (pg 1)
- May 16 & 17: Final event in Raleigh, North Carolina

NOTE: The dates above are from the 2007-2008 competition. SMARTT Challenge has not updated it's website with this year's dates.

3. **Budget: Please use the table below to detail the budget for this proposal.**

| <b>Date</b>                      | <b>Activities</b>  | <b>Expenses</b>  | <b># of participants</b>                               |
|----------------------------------|--|--|--|
| October through May 2009         | Physics labs   | \$1228.00  | 36 (this year; potentially many more in years to come) |
| September through May 2009       | Vehicle, vehicle conversion and school initiatives                                       | \$7926.00  | 200 (potentially many more in years to come)           |
| May 15 and 16 <sup>th</sup> 2009 | Hotel/Food/Gas expenses for 8 students and 2 adults to travel to competition in May 2009 | \$1738.00<br>(\$1200 for hotel, \$250 for gas, \$288 for food) | 10   |

\_\_\_\_\_

Applicant Signature

\_\_\_\_\_

Date

**I have reviewed this request, support it and affirm that school/system monies are unavailable.**

\_\_\_\_\_

Signature of Principal/Administrator

\_\_\_\_\_

Date