# TITLE:

# *PROJECT COAL TO ELECTICITY*


**PRINCIPAL INVESTIGATORS:**

Barbara F. Altizer
Executive Director
Eastern Coal Council

Marsha R. Presley
Eastern Coal Council

Amy Osborne
Area Extension Agent
Mined Land Restoration & Development
Powell River Project Research & Education Center

Carl Zipper
Powell River Project Research & Education Center

**PROPOSAL SUMMARY:**

Provide teachers a week long field experience to improve their understanding of a variety of environmental and economic issues relating to coal extraction, preparation, transportation, and utilization. Also, to introduce them to actual reclamation, acquaint them with the reclamation of surface mine sites for a variety of post-mining land use options and educate them about reclamation practices.

Presentations are directed toward the development of lesson plans encompassing the Standards of Learning for teachers whose responsibilities include Virginia Studies, natural resources in grades 3, 4, 5, and 6, Civics & Economics, or Earth Science. Our program has exceeded the borders of Virginia into surrounding states such as Maryland, Pennsylvania, West Virginia, Tennessee, Kentucky and North Carolina. Due to this expansion, we will re-evaluate the standards of learning to a national base instead of the Virginia base standards.

**FUNDING:**
Requested from PRP: $5,000
Matching/in-kind support (estimated): $50,000

**SCOPE OF WORK**

**INTRODUCTION**: *Project Coal to Electricity* is a holistic approach to the environmental, Economic and social issues surrounding coal mining, utilization, and reclamation. This fits well with the mission of the Powell River Project as an educational program to enhance the coalfield region from both a local and statewide viewpoint. As outlined in the schedule section below in this proposal, this program is designed to provide teachers with the most up-to-date information about the relationship between coal and electricity, the environment, and post-mining land use opportunities. Participants in the 2012 session indicated a desire to participate because:

- To gain information on IGCC – coal fuel technology – mining technology.
- I can show pictures and video, provide hands on materials and explain the mining process with first-hand experience.
- I wanted to learn more about coal and SW Virginia.
- I teach about coal as a natural resource & I've always wanted to see a coalmine.
- Teach SOLs on non-renewable & renewable resources;
- We teach energy, conservation, & renewable resources.
- Extreme curiosity about the whole process and interested in visiting SW VA.
- Wanted to go to a coal mine and power plant.

**OBJECTIVES**: To improve the teachers' ability, either through expanding existing lesson plans or creating new lesson plans, to inform students about coal as a resource and the issues associated with its utilization. Improvements in society's understanding about the impact of coal on Virginia's economy now and in the future, and the associated environmental issues, should result in more informed involvement in public debates about coal and electricity. Eastern Coal Council Participants of the July 8 to July 14, 2012 program stated they will incorporate the information gained during this program into lesson plans, adapt material to existing lesson plans and use material to create new lesson plans. As a result of attending this program, each participant stated that '**To A Great Extent'** this program will aid students to increase their understanding of the impact of coal on the Virginia economy. Also, as a result of this program, '**To A Great Extent'** students will increase their understanding of the coal industry's future impact on the economy, and/or Virginia economy.

Participants stated they will incorporate the information gained during this program regarding teaching by placing more emphasis on coal as an energy source and the (positive) environmental aspects plus information about coal formation, processing and technology. This program was beneficial to each participant to enhance their personal understanding of coal as an energy source and with a greater understanding, interest and enthusiasm which will impact the delivery in the classroom. The participating teachers gained the ability to implement grade level Standards of Learning (SOL's) with coalfield examples as a result of participating in the program.

This program will result in students gaining a better understanding of the world around them; coal can be used to teach local, state and global marketing. Teachers have a better understanding of power generation and relation of coal and gas to the energy industry and can better relate this information to their students. Information for the need of skills and technology allows introduction of coal into career choices such as engineering and biology. A direct result of this program is that students will be gaining a better understanding of the role energy plays in this country's economy. Utilizing the information gained from this program, a relationship that coal plays in county, state and even global economics can be better explained.

**METHODS AND PROCEDURES**: Provide participants with a combination of field experiences and informal discussion opportunities to gain first-hand observation and understanding of the complex issues involved with the process of the program theme, from coal to electricity.

This program will result in students gaining a better understanding of the world around them; coal can be used to teach local, state and global marketing. Teachers have a better understanding of power generation and relation of coal and gas to the energy industry and can better relate this

information to their students. Information for the need of skills and technology allows introduction of coal into career choices such as engineering and biology. A direct result of this program is that students will be gaining a better understanding of the role energy plays in this country's economy. Utilizing the information gained from this program, a relationship that coal plays in county, state and even global economics can be better explained.

A few comments for the staff included: Barbara, Marsha, Amy and Norman were great hosts, very organized and all were very professional. Barbara and Marsha did this nicely. Barbara and Marsha, you guys are awesome and I have the upmost respect for both of you." A participant comment noted "They were extremely professional while still being fun. Both were smiling, knowledgeable and very helpful."

Each site visit, each speaker and each evening activity was favorable with all participants, as each would not change anything and each would like to return for a Coal to Electricity advanced or second year program. "The days were long and the material all new and fast but overall opinion is to not change anything in the program."

Suggestions or thoughts as to how we might improve the program were to add a second year a "coal 202". As stated, "So much information and experience could only be improved by a second opportunity to absorb more." Several participants stated "The days were long and the material all new and fast but overall opinion is to not change anything in the program."

In summary, every visit was well chosen to cover the entire topic of coal to energy. The planning, support and execution of this program was exceptional. Every facet had its place in the overall program.

The SOL standards were assessed by a board of teachers that had previously been in the program and instructors from Virginia Tech. Teachers that go through the program fill out an assessment for the program and Virginia Tech Instructors evaluate the programs instruction to the SOL's. This program augments and supports 4th, 5th, 6$^{th}$ grade, and Earth Science Virginia Standards of Learning relating to non-renewable resources - rock, coal, and natural gas. There is also ample opportunity to discuss issues relating to two of Virginia's natural resources - forests and water. Coal - America's most abundant fuel is used to produce more than 50% of our electricity. Teachers attain materials and samples to use in classroom activities, "Show and Tell" materials and a means of incorporating energy resources unit into curriculum. Sharing knowledge and materials with co-workers so they will be better equipped to teach about coal as an energy source, they also gain knowledge on the coal industry and better equipped to teach it in depth. In depth teaching of the coal industry in Earth Science and some topics of environmental Biology relating to coal and gas production were low priorities in curriculum, attendees state they intend to increase knowledge, analyze, use critical thinking skills as it pertains to future energy sources

as opposed to coal and gas as a relates to economic and political factors. Of all the publication efforts the Eastern Coal Council does, this is probably our most important and time intensive project.

**BENEFITS**: This program provides teachers an opportunity to experience the process of coal extraction, preparation and utilization in the production of electricity. Also, the reclamation of surface mines for a variety of post-mining land use options. Comments received from participants in the program indicated the following benefits were derived:

- Will be able to show and describe the various techniques of the production of coal and the uses of coal.
- I have a new found love for coal and its uses. I also have a new love for this southwest region of VA.
- New information. My perspective has changed regarding energy, production & jobs.
- I will incorporate more about coal in several different units, as SOLs will allow for time. My principal is really pushing for higher SOL scores.
- Better presentation of material due to increase in knowledge of coal & the energy process. Use hand-outs to supplement textbooks.
- Greater knowledge of topic for enrichment as well as stronger understanding of SOL material.
- I will be able to give my students accurate and an abundant amount of information that I previously was unaware.

By educating our public and private school educators, we reach an audience of 10 students (in a special needs classroom) to an average of 150 students in a semester or a year depending on grade. This year we had over 30 participants from all grade levels. All participants indicated their ability to implement grade level Standards of Learning with SW VA coalfield examples improved as a result of participating in the program. In addition, they believed this would result in students gaining a better understanding of the world around them than would be the case if this program were not offered for the following reasons:

- I cannot thank all of you enough for this amazing experience! I felt privileged to have had this opportunity and cannot wait to talk to my peers about attending as well as sharing my knowledge with my students.
- I understand much better, so I would pass this new knowledge on to my students.
- This program will help my students to identify the location of coal deposits, its uses, processes, present day & future applications. Great for SOLs.
- This will help my students understand their state and a very important natural resource – coal.

- I will definitely change the way I teach the uses of coal and really stress the restoration portion of the coal mining process because that has never been a part of the curriculum. I have always taught that coal was a dirty form of energy and that it left the land looking very scared and not very pretty. I now know better and will have to adapt my activities and hands on materials I use to teach the unit.
- With all of the information I have collected the students will understand how coal in their area benefits everyone. It will also help them understand the new technologies and careers involved.
- There is no better experience then being in the field where it is happening & talking to the experts. This information & experience is invaluable to preparing to teach lessons in this subject area.
- My student's perspective on coal and its importance as a natural resource will change because mine has changed. I have a much better understanding of the mining process, its economic impact on our state, and the community impact coal has on the county of Wise. Many of my misconceptions have been cleared. This knowledge will be passed on to my students giving them a better understanding of the coal mining industry and its importance.

**SCHEDULE**: A draft of the program for the 2012 session, July 8-14, as follows:

**Virginia Tech's Powell River Project Research & Education Center**
**&**
**Eastern Coal Council**
**Present**
**PROJECT COAL TO ELECTRICITY**

***"Coal + Power Plants + Technologies = Clean, Dependable Power"***

## 2012 Project Coal to Electricity AGENDA

| | |
|---|---|
| SUNDAY-July 8 | |
| 2:p.m. to 5:30p.m. | Check-In: Martha Randolph Hall, UVA-Wise |
| 6:00 p.m. | Dinner: Hunter J. Smith Dining Commons |
| | Guest Speaker: **John Craynon**, Virginia Tech (clean coal technologies) |
| MONDAY- July 9 | |
| 7:00 a.m. | Breakfast: Hunter J. Smith Dining Commons |
| 7:30 a.m. | TRANSPORATION: BUS Will Arrive In Front Of Martha Randolph Hall |
| 7:45 a.m. | Depart for Field Trip (Bus provided Monday – Friday for all field trips) |
| 8:00 a.m. | **Anthony "Tony" Scales**, PG and author traveling with group |
| | Local geologic structure and its impact on history & coal mining |
| | **Dr. Carl Zipper**, Powell River Project Research & Education Center (Post-mining land use opportunities for economic development) |
| 12:00 Noon | Lunch: PRP-R&EC |
| 1:30 p.m. | **Mike Thomas & Eddie Clapp**, Red River Coal Co, surface mining operation |
| 5:30 p.m. | Dinner: (cook out) at PRP-R&EC -- Provided by Alpha Natural Resources |
| | Guest Speaker: **Mike Abbott**, Virginia Department Mines Minerals & Energy (Regulatory agencies and the laws) |
| TUESDAY- July 10 | |
| 7:00 a.m. | Breakfast: Hunter J. Smith Dining Commons |
| 7:30 a.m. | TRANSPORATION: BUS Will Arrive In Front Of Martha Randolph Hall |
| 7:45 a.m. | Depart for Field Trip |

| | |
|---|---|
| 8:00 a.m. | Underground Coal Mine – Deep Mine 41 |
| 12 Noon | Lunch at Mine Site |
| 12:30 p.m. | McClure River Preparation Plant |
| 3:30 p.m. | Depart for Norfolk Southern Facility |
| 4:00 p.m. | Tour Norfolk Southern Yard Facility - located at 4300 Fleming Road in Andover, VA. |
| 4:35 p.m. | Depart for UVA @ Wise |
| 5:00 p.m. | Free time to prepare for dinner |
| 6:00 p.m. | BUS Will Depart for MountainRose Vineyard |
| 6:15 p.m. | Tour MountainRose Vineyard, Inc (Reclaimed Mine Site) |
| | Wine Tasting & Dinner at Vineyard |
| 7:30 p.m. | Guest Speaker: Guest Speaker: **C.S. "Dutch" Tubman**, Norfolk Southern Corporation (Transportation and its role in generating electricity) |

WEDNESDAY- July 11

| | |
|---|---|
| 7:00 a.m. | Breakfast: Hunter J. Smith Dining Commons |
| 7:45 a.m. | TRANSPORATION: BUS Will Arrive In Front Of Martha Randolph Hall |
| 8:00 a.m. | Depart for Field Trip |
| 9:00 a.m. | Dominion Energy's Virginia City Coal Fired Power Plant |
| | **Herbert Wheary** and **Greg Edwards**, Dominion Speakers and Tour of Facility |
| 12:00 Noon | Lunch at Dominion |
| 12:30 p.m. | Depart for Virginia DMME, Big Stone Gap, VA |
| 1:30 p.m. | Virginia Department Mines, Minerals, & Energy |
| 4:30 p.m. | Depart for UVA @ Wise |
| 6:30 p.m. | Guest Speaker: **Danny Quesenberry**, CONSOL Energy (Mine Safety & Rescue and Pre-training for underground visit) |
| 7:00 p.m. | Dinner: Hunter J. Smith Dining Commons |
| 7:45 p.m. | Guest Speaker: Mike Miller, Marshall Miller & Associates (Utica and Marcellus Shale) |

THURSDAY- July 12

| | |
|---|---|
| 6:30 a.m. | Breakfast: Hunter J. Smith Dining Commons |
| 7:00 a.m. | TRANSPORATION: BUS Will Arrive In Front Of Martha Randolph Hall |
| 7:15 a.m. | Depart for Buchanan County |
| | **Anthony "Tony" Scales**, PG and author traveling with |
| 8:30 a.m. | CNX Gas Tour (Coalbed Methane Gas), Claypool Hill, VA |
| 9:40 a.m. | Depart for CONSOL Energy |
| 10:00 a.m. | Consol Energy Buchanan Mine (longwall operation) |
| 2:00 p.m. | Lunch: Buchanan Mine office |
| 2:45 p.m. | Depart for SunCoke offices |
| 3:00 p.m. | **Crystal Bazyk**, Air Compliance Manager, Virginia Department Environmental Quality - Air Quality Standards for DEQ, SunCoke Training Center |
| 3:30 p.m. | **Bob Weaver**, SunCoke |
| 4:00 p.m. | Tour Coke Ovens |
| 5:10 p.m. | Depart for Breaks Interstate Park via Southern Gap (Reclaimed Mine Site) |
| | Visit Breaks Tri-State Overlook (other overlooks if time permits) |
| 7:30 p.m. | Dinner. Guest Speaker: **The Honorable Phillip Puckett**, Virginia Senate. (Commonwealth's role in legislation) |

FRIDAY- July 13

| | |
|---|---|
| 7:00 a.m. | Breakfast: Hunter J. Smith Dining Commons |
| 7:30 a.m. | TRANSPORATION: BUS Will Arrive In Front Of Martha Randolph Hall |
| 8:00 a.m. | Depart for Joy Global, Duffield, VA |
| 8:50 a.m. | Tour Joy Global Facility, Duffield, VA |
| 10:30 a.m. | Depart for Eastman Chemical Company's Coal Gasification Plant, Kingsport, TN |
| 11:05 a.m. | Tour Eastman Chemical Company's Coal Gasification Plant |
| 12:15 p.m. | Lunch: Eastman facility |
| 12:35 p.m. | Depart for Natural Tunnel |
| 1:05 p.m. | Natural Tunnel Tour |

| | |
|---|---|
| | **Anthony "Tony" Scales**, PG and author will direct tour |
| | The tour will be an outdoor adventure setting; it will involve moderate difficulty, about a quarter mile of flat trail walking and then WADING IN THE CREEK, and then return. So everybody would have wet feet. Participants will need to bring a change of shoes, and for safety's sake, a change of clothes. Need to allow 2 hours for the whole trip, to be safe. Those not wishing to go can ride the chairlift, may visit the gift shop, hike some of the trails, etc. |
| 4:00 p.m. | Depart for UVA@Wise |
| 4:45 p.m. | Free time to prepare for dinner |
| 5:30 p.m. | Will Depart for Big Stone Gap, VA |
| 6:00 p.m. | Dinner, John Fox Jr. House, Big Stone Gap |
| 8:00 p.m. | Outdoor Drama -- Trail of the Lonesome Pine |
| SATURDAY-14th | |
| 8:00 a.m. | Breakfast: Hunter J. Smith Dining Commons |
| 9:00 a.m. | Discussion/evaluation of program with teachers |
| | Professional Development Certificates presented |
| 10:00 a.m. | Depart for home |

**DELIVERABLES**: A post evaluation of the program by the participants was conducted and this summary will be submitted for inclusion in the Powell River Project Reports 2012.

**FUNDING**:

Powell River Project funds - $7,500

<u>Matching/in-kind support (estimated):</u>
Alpha Natural Resources - $10,000
Appalachian Power - $1,000
Consol Energy - $10,000
DMME - $5,000
Dominion Energy - $10,000
Eastman Chemical Company - $5,000
Eastern Coal Council - $10,000
Jewell Smokeless - $10,000
Joy Mining Machinery - $5,000
Norfolk Southern Corp - $2,500
Oliver Coal Sales - $1000
Red River Coal - $10,000