Council of Energy Research & Education Leaders (CEREL)
2011 Annual Program Conference Agenda

CEREL 2011 Annual Conference
November 7-9, 2011
Hilton Garden Inn at SouthPointe, 1000 Corporate Drive, Canonsburg, PA 15317
Near Pittsburgh, PA airport
Co-hosted by the National Energy Technology Laboratory (NETL)

DRAFT Agenda, 9/6/2011

Day 1 – Monday, Nov. 7, 2011

8:00 am **Buses Leave Hotel for Pre-Conference Tours**

Pre-Conference Tours:

Tour 1 – Natural Gas: Marcellus Shale, Greene County, PA
(Tour 1 bus transportation courtesy of Range Resources)
The Marcellus and Utica shale units represent a major natural hydrocarbon resource that underlies the northern Appalachian basin and encompasses large parts of the New York, Pennsylvania, West Virginia and Ohio. Similar shale units distributed around the United States and the world have the potential to provide gas and hydrocarbon liquids for more than a century. Exploration and production activities were initiated in 2003 by Range Resources in Greene County, PA. We will visit production, processing and transportation facilities and if possible and drilling rig. We discuss the positive and negative impacts of application of horizontal drilling and hydrologic fracture stimulation in used in developing this energy resource.

-Or- ***Tour 2 – Waltz Mill R&D Facilities, Madison, PA***

a) **Westinghouse Nuclear**
The Westinghouse Waltz Mill Site is situated on 850 acres and currently quarters approximately 700 engineers, technicians and service support personnel. This site is the Westinghouse "Center of Excellence" for field service technology, steam generator services, PWR reactor services, rotating equipment services, nuclear plant services and training. It is also the headquarters for subsidiary WesDyne International, a global supplier of state-of-the-art inspection services for the power industry. Full size nuclear plant equipment and mockups will be visited during this tour.

b) **Alter NRG Plasma Gasification Test Facility**
Alter NRG has a plasma gasification technology developed by Westinghouse Plasma & Alter NRG that can produce syngas from a variety of feedstocks including coal, biomass,

petcoke & MSW. This test facility can gasify 48 tpd of feedstock, and has been used to conduct over 100 pilot tests on a wide variety of feedstocks.

1:00pm **Buses Return to Hotel**

1:00pm **Executive Committee Meeting**

2:00pm **Orientation for New Members & First-Time Participants**

3:00pm **Welcome & Introductions Susan Jenkins, CEREL President**

3:15pm **Overview & Goals of Meeting**

3:30pm **Plenary Panel: Regional Initiatives on Energy & the Environment**
Facilitator: Terri Marts, URS (NETL contractor for Regional University Alliance)
Speakers:

- Ken Zapinski, Allegheny Conference on Community Development
- Rick Remish, Imagine West Virginia
- Jack Ubinger, Pennsylvania Environmental Council
- Julianne Klara, NETL Coordinator for Regional University Alliance (RUA = 5 regional R&D universities: CMU, Penn State, Pitt, Va Tech & WVU)
- Michael Gerrard, Director, Columbia U. Center for Climate Law
- Jan Lauer , Director, Three Rivers Clean Energy

5:00pm **Conclude Plenary Panel**

5:30pm **Welcome Reception**

6:30pm **Networking Dinner at Hilton Garden SouthPointe**
Dinner Speaker:

- U.S. Rep. Tim Murphy (PA) – confirmed.

<u>Day 2 – Tuesday, November 8, 2011</u>

7:30am Two (2) **Buses Leave Hotel for Morgantown**

9:30am **Arrive at West Virginia University's (WVU's) National Research Center for Coal and Energy (NRCCE) in Morgantown**

9:45am **NRCCE Welcome & Introductions** – Richard Bajura, Director, NRCCE

Fossil Energy Session	**Renewable Energy Session**
Co-Chairs: Tim Carr & Tom Sarkus **Speakers**: • Steve Winberg, CONSOL • George Guthrie, NETL: US DOE's	**Chair**: Scott Sklar **Speakers**: • Scott Sklar: Solar Energy • Wind: TBD

10:00 am	Carbon Sequestration Program • Jerry Fletcher, WVU: US-China Clean Coal Program • Carl Kirby, Bucknell Univ.: Marcellus Shale Environmental Impacts	• Suzanne Hunt, The Carbon Warroom (Biomass)

11:30am **Lunch at WVU President's House (lunch courtesy of WVU)**
Introductions: WVU President James Clements

1:00pm **Buses to Afternoon Tours**

1:30pm **Site Tours**

Tour 3 -- NETL Morgantown Facilities Tour

a) NETL Overview

NETL is the cognizant national laboratory for DOE's Office of Fossil Energy. NETL is comprised of R&D laboratory facilities in Morgantown, WV, Pittsburgh, PA & Albany, OR, as well as project management offices in Houston, TX (oil & gas) & Fairbanks, AK (arctic energy). This tour will visit NETL's Morgantown site. Syngas research in Morgantown began in 1946, and today NETL's Morgantown site is situated on 137 acres of land.

b) Computational Sciences & Dynamic Simulation Laboratory

Briefings will be provided on modeling and model validation for dense, reacting multiphase flows that are critical processes in fossil energy technologies. The National Laboratory consortium comprising the Carbon Capture Simulation Initiative will also be discussed. Finally, the Integrated Gasification Combined-Cycle (IGCC) Dynamic Simulation & Training Center, AVESTAR, will be presented; it is a real-time simulator of a complete IGCC system that includes pre-combustion carbon capture.

c) HyPer & Solid Oxide Fuel Cells

Solid Oxide Fuel Cells (SOFCs) feature twice the efficiency of combustion processes, yet generate half the CO_2, NO_x and SO_2. Fuel for SOFCs can be derived from many sources including coal, natural gas, biomass, biofuel, military logistics fuels, and synthetic fuels. Advanced systems include NETL's Hybrid Performance (HyPer) project, the only hardware integrated gasification/fuel cell/turbine hybrid system in the world, which leverages modeling and hardware to address challenges inherent to fuel cell hybrids.

d) High-Pressure Combustion Research Facility

With advanced cooling & materials schemes, new turbines can reach greater efficiency with efficient carbon capture through exhaust gas recirculation, or with hydrogen fuel produced from syngas. NETL is also studying combustion technology so that future gas turbines, with higher operating temperatures, will continue to have low emissions (NO_x,

CO_2, etc.) when operating at conditions of increased CO_2 or hydrogen. Learn about aerothermal & turbine blade cooling, materials and combustion simulation studies.

e) Multiphase Flow & Carbon Capture Process Laboratory
This lab is devoted to providing validation data for many of the processes connected with advanced carbon capture technologies being developed by NETL. More specifically, chemical looping studies are being conducted using advanced diagnostic techniques such as High Speed Particle Image Velocimetry, Laser Doppler Anemometry and Electrical Capacitance Volume Tomography. Also, NETL has developed two different kinds of dry CO_2 sorbents, one of which won an R&D 100 Award.

f) Geologic Sciences & Carbon Sequestration Laboratory
NETL is working to improve predictability in the contexts of storing CO_2 safely & permanently, and of accessing shale gas and methane hydrates, etc. Much emphasis is on predicting the fate and impact of fluid flow in porous media over a range of scales, from the fracture scale to the reservoir scale to the regional and national scales. A Computer-Aided Tomography (CT) system will be shown, which provides detailed data regarding flow dynamics and internal structures in cores of geologic media.

-Or- ***Tour 4 -- Coal Energy: Longview Power Plant, Patriot Coal Surface Mine & Mylan Park Mine Reclamation Site***

a) Longview Power Plant, Maidsville, WV
The Longview Power Project is a new, 695 MWe (net) power generating facility, fueled by a coal mine that is 4-miles distant. The plant is scheduled to begin commercial operation in Autumn 2011, so this is an opportunity to visit a newly operational power plant with state-of-the-art environmental control systems, including a supercritical pulverized-coal boiler, low-NOx burners and selective catalytic reduction for NOx reduction, a wet scrubber for SO_2 control & sorbent injection for acid mist removal.

b) Patriot Surface Coal Mine
We will observe an active surface coal mining operation from mining, processing, transportation to reclamation.

c) Mylan Park, Morgantown, WV
Little more than a decade ago, Mylan Park was the site of an active surface coal mine. Today, this area serves as a state-of-the-art recreational complex located on 320 acres of reclaimed property.

4:30pm **Conclude Tours; Buses Proceed to WVU Alumni Center**

5:00pm **Reception w/Open Bar**

5:30pm **Dinner at WVU Alumni Center** [Cash bar]

Speaker: Jon McBride, Captain, USN (Ret.), Former NASA Astronaut

8:00pm **Buses Return to Hotel**

9:30pm **Buses Arrive at Hotel**

Day 3 – Wednesday, November 9, 2011

8:00am **Breakfast at Hilton Garden Inn Southpointe**

8:45am **Plenary Panel: Developing (& Improving) Energy Education**
Moderator Susan Jenkins, CEREL President
Confirmed Speakers:

- John Abelson, U. Illinois
- James Glownia, Senior Technical Advisor, Office of the Deputy Director for Science Programs, US DOE

10:15am **Break**

10:30am

Nuclear Session	**Connecting Energy Supply & Demand**
Chair: Joe Kozuch, WVU **Speakers:** • Tom Weir, Director, Architectural Engineering and Engineering Alliances. Westinghouse • Paul Harden, Vice President of Nuclear Support, First Energy • Larry Foulke, Pitt	**Session** **Co-chairs:** David Ortiz, RAND & Steve Bossart NETL **Speakers:** • Steve Bossart, NETL, Grid/Infrastructure • Jay Apt, CMU • Ken Kern, NETL

12:00noon **Meeting Wrap-Up: Insights & Opportunities – Tim Carr**

12:30pm **Buses to Afternoon Tours (Box Lunches)**

1:30pm **Site Tours**

Tour 5-- CMU Green Campus Tour & Phipps Conservatory

a) Carnegie Mellon University (CMU)
Carnegie Mellon is a leader in addressing environmental issues, including global warming, alternative & clean energy sources, sustainable building design, green chemistry and environmental education. The university also has supported an aggressive green practices program since 1998. Carnegie Mellon built the first Silver LEED® rated Residence Hall in the US in 2003 and, as of 2010, has over 500,000 sq ft of LEED® Certified building space. Green roofs, advanced energy systems & advanced

water management systems are included in our LEED building systems. On this tour, we will visit several campus LEED® new construction or commercial interiors building projects and environmental research centers. Included on the tour will be the University Center Green Room, Carnegie Café, Intelligent Workplace, Hamerschlag & Doherty Hall Green Roofs, and the Gates Hillman Complex (our newest LEED new construction buildings completed in 2010).

1:30-2:45pm Carnegie Mellon Green Campus Tour
2:45-3:15pm Break/Refreshments in the CEE Conference Room (courtesy of CMU)

3:15-3:30pm Walk to Phipps Conservatory

b) Phipps Conservatory Botanical Gardens (admission courtesy of CMU)

A neighbor of Carnegie Mellon & future home of one of the world's first Living Buildings, Phipps Conservatory has evolved into an international leader in sustainable landscapes, buildings and practices, serving as a model for visitors, public gardens and institutions worldwide. Its commitment to conservation, biodiversity and sustainability is demonstrated through its earth-sheltered LEED® Silver Welcome Center, state-of-the-art Production Greenhouse, revolutionarily designed Tropical Forest Conservatory, and future net-zero energy & net-zero water Center for Sustainable Landscapes. This tour will lead you through Phipps' cultural history as one of the nation's first teaching glasshouse conservatories into a pace-setting model for advanced green building practices, sustainable development and environmental awareness.

3:30-4:30pm Phipps Conservatory Green Tour
4:30pm Bus departs for hotel & airport

-Or- ***Tour 6 -- NETL Pittsburgh and CONSOL R&D Facilities Tour***

a) NETL Welcome/Introduction

This tour will visit NETL's Pittsburgh site, which is located approximately 65 miles north of NETL's Morgantown, WV site (see Tour 3). The Pittsburgh site is part of the U.S. Government's Bruceton Research Center, which NETL shares with the National Institute of Occupational Safety & Health (NIOSH) & the Mining Safety Health Administration (MSHA). The Bruceton Research Center was established in 1910, and NETL's Pittsburgh site is situated on approximately 61 acres of land.

b) Carbon Capture

Carbon capture is generally considered to be the most expensive and technologically challenging part of CCS (Carbon Capture & Sequestration). For existing coal-fired power plants, in particular, CO_2 needs to be separated from the large volumes of nitrogen (and other gases) present in flue gases before it can be stored geologically. NETL has developed several technologies that use regenerable sorbents, novel solvents, separation membranes, and consumable reagents to produce saleable products.

c) Core Flow Lab & Sequestration

By employing direct measurement and environmentally friendly chemical tracers detectable at the parts-per-quadrillion level, NETL helps to demonstrate the integrity of geological formations for sequestration. SEQURE ^{TM}, NETL's R&D 100 Award-winning technology, combines remote sensing with advanced computational methods to map potential CO_2 leakage pathways. This technology is relevant to both carbon sequestration and oil & gas exploration/production.

d) Methane Hydrates

Gas hydrates represent a potentially vast methane resource. Yet, scientists do not fully understand the implications of methane hydrate extraction/production with respect to global carbon cycling, global climate, deep sea ecosystems and the stability of deep marine shelves. NETL is collaborating with international R&D programs, working with domestic partners in Alaska & the Gulf of Mexico, leading numerical simulations ranging from the molecular to the reservoir scales, and developing tools for field applications.

e) Surface Science & Materials

NETL scientists and engineers are developing advanced materials and manufacturing processes for materials needed in the energy field (e.g., alloys for high-temperature turbine blades, longer-life refractory linings for gasifiers, sorbents, catalysts). These efforts are assisted by modern surface science instrumentation.

f) Computational Science & Chemistry

Using a variety of state-of-the-art computer systems, NETL modelers exercise mathematical chemistry and engineering models built on first principles and/or experimental data that allow the modelers to predict physical and chemical behavior at a variety of scales from the atomic level through full plant design. The new models are robust enough to make predictions beyond current experimental methods and accelerate the R&D development cycle.

g) CONSOL R&D Facilities, Library PA (e.g., 1 MW PFBC pilot plant)

4:30pm **Buses Depart to Hotel & Airport**

5:30pm **Buses Arrive at Hilton Garden Inn Southpointe**

TBD **Executive Committee Dinner & Mini-Retreat – Rivers Club, Pittsburgh**