In this issue...

Sustainable Coal
Carbon Capture & Storage
Advanced PC & IGCC: Coal Generation

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  - **Truck**: On-site certified scales to facilitate regional deliveries

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- State-of-the-art facilities:
  - On-site certified scales to facilitate regional deliveries
  - Direct shipment from rail or stockpile into Great Lakes vessels
  - Access to all coal basins
- Truck:
- Barge:
- Vessel:
- Rail:

Which offer optimum solid fuel blending, including simultaneous blending of up to 3 types of coal. To help you manage costs and risks.

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Gearing Up For Election Season
Tom Vorholt, ACC President

There’s no mistaking it now. We’re full on into the election season in the U.S. As this article goes to press, the two main parties are holding their conventions, nominating candidates, and getting ready for the final few months run up to the big day in November. There also are election rumblings in Canada, with the minority Conservative government and the opposition Liberals fencing over whether one of them will force an early election.

In the U.S. one of the main issues to be highlighted in the dying days of the campaign is energy – where we get it, how much it costs, what sources provide it, etc. In Canada, it appears that a key issue to be hammered out will be whether the voters will support the Liberal Party’s plan to implement their “Green-Shift” carbon tax.

Amidst all the electioneering and politicking, it is our responsibility in the energy industry (and as citizens and taxpayers) to stay informed and to play an active role in making sure the best candidate for the job is selected.

So, you need to ask yourself if you are aware what the various party platforms are. Do you know what effect a vote for Party A or Party B will have on coal suppliers, coal consumers, energy traders, the railroads, barging and the waterways, ports and terminals, and support services?

If not, it’s time that you got educated.

To get you started, we’ve listed portions of the candidates’ positions on energy issues that relate directly to coal and the energy industry. (Thank you also, to the hardworking people at CURC – www.coal.org – for preparing an excellent review of the two parties’ plans.)

More information is available on the candidates’ respective Web sites. We urge you to review their policies and platforms, be sure you’re registered, and that you vote on November 4. ◆

Candidate Web sites:
John McCain & Sarah Palin
(Republican candidates for President and Vice President) – http://www.johnmccain.com/
Barack Obama & Joe Biden
(Democratic candidates for President and Vice President) – http://www.barackobama.com/

Please see the table that outlines the candidates’ positions on energy issues on Page 5.

Note: Candidate’s positions may differ from their party’s positions.
Republican National Committee – www.mc.org/
Democratic National Committee – www.democrats.org/
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Thermal Coal Dryers
## Candidates’ positions on energy issues

<table>
<thead>
<tr>
<th>Issue</th>
<th>John McCain</th>
<th>Barack Obama</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Climate Change Plan</strong></td>
<td><strong>Climate Change Adaptation Plan</strong></td>
<td><strong>Implement economy-wide cap &amp; trade program</strong></td>
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<tr>
<td></td>
<td>• focus – adaptation as well as mitigation</td>
<td>• Reduce CO₂ emissions to 80% below 1990 levels by 2050</td>
</tr>
<tr>
<td></td>
<td>• based on national and regional scientific assessments</td>
<td>• All credits to be auctioned – no granted credits</td>
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<tr>
<td></td>
<td>• implement at local level</td>
<td>• $15 billion of auction receipts to support development of clean energy,</td>
</tr>
<tr>
<td></td>
<td>• address full range of issues: infrastructure, ecosystems, resource</td>
<td>efficiency programs, biofuels, and clean energy vehicles</td>
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<tr>
<td></td>
<td>planning, and emergency preparation</td>
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<tr>
<td><strong>Cap &amp; Trade Program</strong></td>
<td><strong>Implement cap &amp; trade program</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Include utilities, transportation fuels, commercial &amp; industrial business</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Small business excluded</td>
<td>• Reduce CO₂ emissions to 80% below 1990 levels by 2050</td>
</tr>
<tr>
<td></td>
<td>• Portion of auction proceeds redirected to reduce impacts on low-income</td>
<td>• All credits to be auctioned – no granted credits</td>
</tr>
<tr>
<td></td>
<td>• Reductions allowed via offsets will be reduced over time</td>
<td>• $15 billion of auction receipts to support development of clean energy,</td>
</tr>
<tr>
<td><strong>Greenhouse Gas reductions</strong></td>
<td>• 2012: emissions to 2005 levels</td>
<td>efficiency programs, biofuels, and clean energy vehicles</td>
</tr>
<tr>
<td></td>
<td>• 2020: emissions to 1990 levels</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 2030: 22% below 1990 levels</td>
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</tr>
<tr>
<td></td>
<td>• 2050: 60% below 1990 levels</td>
<td></td>
</tr>
<tr>
<td><strong>Clean Coal &amp; Carbon Capture &amp; Storage (CCS)</strong></td>
<td>• $2 billion annual funding for CCT</td>
<td><strong>Promote public private partnerships to develop 5 commercial scale coal-fueled plants with CCS</strong></td>
</tr>
<tr>
<td></td>
<td>• Dedicate federal resources to promote science, research, and development</td>
<td>• Incentives to promote private investment in commercial scale zero carbon coal plants</td>
</tr>
<tr>
<td><strong>Renewable Energy</strong></td>
<td>• Implement temporary tax credits to promote alternative and low carbon</td>
<td>• Incentives to promote use of CO₂ for enhanced oil recovery</td>
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<tr>
<td></td>
<td>fuels</td>
<td></td>
</tr>
<tr>
<td><strong>Utilities/Electricity Generation</strong></td>
<td>• Reduce electricity demand to 15% below DOE projections by 2020</td>
<td><strong>Upgrade the national transmission grid</strong></td>
</tr>
<tr>
<td></td>
<td>• Set demand reduction targets that utilities must meet &amp; more stringent</td>
<td>• Use SmartMeter technologies for more precise monitoring of energy consumption</td>
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<td></td>
<td>building and appliance standards</td>
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<tr>
<td></td>
<td>• Decouple utility profits from energy usage and sales</td>
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<td></td>
<td>• “Flip” the profit model for utility sector – shareholder profit to be</td>
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<td></td>
<td>based on system reliability</td>
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<td></td>
<td>• Grid Modernization Commission to aid in adoption of national Smart Grid</td>
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Janet Gellici, CAE, Chief Executive Officer, American Coal Council

“Sixty seconds of every minute every hour … around the clock … day in and day out … all America lives, moves, and works to the rhythmic pulse of electric power. It is the lifeblood that puts the colossal productive strength into U.S. Industry … that gives our nation the healthiest living standards the world has ever known. For few indeed are the present day activities of factory, mine, farm, home, and office … of your own daily routine … that are not dependent on electric power … and to a far greater extent than is generally realized.”

– Babcock & Wilcox, FORTUNE Magazine Advertisement, February 1952

It’s as true today as it was more than 50 years ago … electricity is the lifeblood of our modern society. Historically, electricity has enhanced the lives of our citizens and fostered our economic growth. In the future, our nation’s electric power needs will continue to increase to support our growing population growth and economic prosperity, to enhance our use of computerized technologies, and to advance our environmental objectives – including the development and financing of CO2 emission controls and Plug-in Hybrid Electric Vehicles (PHEVs), as detailed in this issue of American Coal.

The Energy Information Agency (EIA) forecasts U.S. electricity demand will increase by upwards of 40 percent between 2004 and 2030. While our demand for electricity continues to increase, however, our ability to meet that demand is a growing concern. In a recent poll of utility CEOs, only 53 percent of respondents indicated they were confident they’d be able to provide the needed electric power supply in their region in the next five years. In its annual Long-Term Reliability Assessment, the North American Electric Reliability Corporation (NERC) projects inadequate peak summer capacity margins in several regions of the United States as early as 2009.

So how are we planning to meet this increased demand for electricity? If our aim is reliability and sustainability, we’ll do so through a balanced portfolio of options that utilizes each fuel source in its most reliable, cost-effective and efficient application, acknowledging the inherent limitations and opportunities afforded by each.

Alternative energy sources – including wind and solar power – are promising, but will require significant commercial development before they can scale up to become a viable option. Increased demand for natural gas in power generation and industrial applications will put more pressure on gas/LNG supplies and prices in the future. Nuclear power will have a role as well, but will require transmission grid expansion and integration. And while energy efficiency, as addressed in this magazine, will be a vital component in our energy portfolio, it cannot deliver all we’ll need to satisfy our electricity demands.

The capacity required to meet our future electricity needs is simply beyond the scope of other fuels and energy conservation efforts alone. Coal is the only fuel source that can meet projected U.S. electricity demand in a timely, reliable, affordable and increasingly clean manner.

As described in later articles in American Coal, the new coal power plants being developed today – including supercritical/ultrasupercritical and Integrated Gasification Combined Cycle (IGCC) units – offer high efficiency power generation with significantly reduced CO2 and criteria emissions. They also provide us with an opportunity to begin testing commercial development and deployment of carbon capture and storage (CCS) technologies for controlling greenhouse gas emissions.

Recent initiatives by the League of Women Voters, the environmental community and government entities to curtail coal power plant developments are shortsighted and counterproductive. They endanger the economic prosperity of all Americans and the ability to steward our environmental resources.

Claude Mandil, executive director of the International Energy Agency, describes sustainable development as a “broad concept covering the way in which man’s activities impact on economic development, the environment and social well-being.” Coal is a sustainable U.S. energy resource and the imperative for clean sustainable coal is clear. ♦
In this issue, we’re examining the theme of “sustainable coal.” Many will hear that term and wonder, “How can we make coal – a fossil fuel, and non-renewable resource – sustainable?”

As it applies to the environment and our use of natural resources, past arguments have focused on the idea that it is not possible to use nonrenewable resources sustainably. When you use them, they are gone; they are irreplaceable. They continue by stating that to have a truly sustainable society, all use of nonrenewable resources must cease. Unfortunately, actually implementing that policy would mean massive disruptions in our economy, our social interactions and our environment. So that plan could not reasonably be described as a sustainable action.

Those who have done any research into the concept of sustainability will likely recognize the definition offered by the Brundtland Commission’s 1987 report “Our Common Future.” That definition states that sustainable development is “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” A reasonable reading of that definition will show that using non-renewable resources does not necessarily entail an unsustainable lifestyle. If we are not harming the ability of future generations to meet their needs, we are, by definition, “sustainable.”

In the 20+ years since that definition was offered, our understanding of sustainability’s scope has been refined and expanded. Where the term was initially applied almost religiously to environmental issues, we now recognize that there is more to sustainability than just protecting the natural environment.

Sustainable practices must also address functioning human societies and our economies. These aspects of sustainability are inextricably linked together with the environment. The three are often described as the “three legs” of a stool. Working together the three legs ensure that the stool is stable and able to be used in a variety of situations. If an unyielding focus on one leg allows another to be damaged, the stool no longer stands.

Recognizing that the concept of sustainability (social, economic, and environmental) is broader and more involved than simply forbidding the use of any nonrenewable resource, we recognize that we can “sustainably” use non-renewable resources to maintain our economy and social structures. However, we need to continue to find new ways to access those resources or to develop replacement resources before they are depleted. We also need to ensure that we use natural resources in a way that does not materially impact on the ability of future generations to choose how they will carry out their lives.

That’s using a lot of high-sounding verbiage to get to the basic idea that there’s nothing wrong with (or unsustainable in) our use of natural resources to better our lives and living conditions. We just need to make sure that we’re using those resources wisely. Looking at the past several decades of our history, it is clear that we’re succeeding.

As we have demonstrated in this magazine and in our other publications, like the Coalblog (www.clean-coal.info/blog), our environment is demonstrably cleaner than it was in the past. In fact, a recent Popular Science report described how pollutant levels at the start of the 20th Century were two to five times higher than they are now. While we increase our use of coal, our use of always-improving technologies ensures that our environment is actually getting cleaner. On that theme, two articles on IGCC and advanced PC plants in this edition of American Coal demonstrate...
how coal generation is improving its efficiency and environmental record. Another article in this edition of American Coal demonstrates the progress being made on the carbon capture and storage front. Where an environmental challenge rears its head, the coal industry addresses it and continues to provide abundant/secure and affordable energy.

The ACC has also demonstrated in one of our debates on the new current issues Web site – Opposingviews.com – that the coal industry is a job creator, which means it helps us to maintain social and economic stability. The coal industry is providing high-paying careers for well-educated and trained employees. Production rates are continually improving and employee safety rates have seen a sustained improvement, with MSHA data showing a 50 percent decrease in fatal injuries over the past two decades.

When we turn to address the issue of rising fuel costs and energy security, the coal industry again surges to the forefront, providing half of our nation’s electricity at costs of about a quarter that of natural gas. Additionally, we have shown in past issues of American Coal how the coal industry is moving forward with plans to provide affordable and clean transportation fuels for our vehicle fleet. Not content to sit back and wait for that option to be implemented, our industry is also actively supporting the development of coal-powered plug-in hybrid electric vehicles that will help to reduce the demand (and, therefore, costs) for gasoline while still providing consumers with efficient and clean transportation options.

In every sense of the word, the coal industry is providing North America – and the world – with affordable, abundant/secure, AND increasingly clean energy, electricity, transportation fuels, and transportation options. The industry continues in its historical pattern of meeting challenges head-on and, in doing so, contributes strongly to the sustainability of our economy, our social structures, and our environment.

Outdated notions of “sustainability” may question coal’s role. However, a proper understanding of sustainability shows that coal is a valuable input into our continued stability and existence. ◆

Jason Hayes, ACC Communications Director, has been invited by the editors of a new news and social content Web site – www.opposingviews.com – to join the discussion on important energy issues we are facing today.

He was asked to debate two questions:
1. Should the US Build More Coal-Fired Power Plants?
2. Is Nuclear Power America’s Best Energy Alternative?

The site’s editors have informed us that they had more than 100,000 visitors in their first five business days of activity. The site has also been featured in major media outlets like WashingtonPost.com, CNet.com, TechCrunch, and Webware. OpposingViews.com is clearly an excellent method of getting the good word about coal-fueled energy out to the public.

We invite and encourage you, our members, to head over to Opposing Views and add your two cents to the comments and discussion. Your information might help sway opinion on these key issues.
Memberships

Join the 170 companies that recognize the importance of belonging to an Association that serves as the pre-eminent business voice of the American coal industry and advocates for coal as an economic, abundant/secure and environmentally sound fuel source.

The American Coal Council (ACC) is an alliance of coal, utility, trading, transportation, terminal and coal support service companies, advocating a non-adversarial, partnering approach to business.

The ACC facilitates the lawful exchange of ideas and information regarding the American coal industry. It serves as an essential resource for companies that mine, sell, trade, transport or consume American coal. The ACC also serves as a resource for those wishing to expand or enhance business relationships in North American and international coal markets.

Membership benefits include educational programming and technical seminars, advocacy support, broad-based networking, Web site, electronic and printed membership directory inclusion, newsletter and members-only electronic updates, database resources, policy input, referrals and discounts on events and industry publications.

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2008 – October 6-8, 2008 – Williamsburg, VA
2009 – October 12-14, 2009 – Las Vegas, NV

Coal Trading Conference
2009 – December 7-8, 2009 – New York, NY

Fuel Flexibility Conference
February 2009 – Charlotte, NC

Spring Coal Forum
March 9-11, 2009 – Tampa, FL

For additional information visit www.clean-coal.info or call 202-756-4540
**Vision Statement**

The American Coal Council (ACC) strives to serve as the pre-eminent business voice of the American coal industry.

**Mission Statement**

The American Coal Council (ACC) is dedicated to advancing the development and utilization of coal as an economic, abundant/secure and environmentally sound fuel source. The Association promotes the lawful exchange of ideas and information regarding the coal industry. It serves as an essential resource for companies that mine, sell, trade, transport, or consume coal.

The ACC provides educational programs, advocacy support, peer-to-peer networking forums and market intelligence that allow members to advance their marketing and management capabilities.

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National Coal Council: Sustainable Coal

By Robert Beck, National Coal Council

Over the past five years, the National Coal Council (NCC) has submitted a series of reports to the Secretary of Energy delineating how the United States can use coal to solve some of our most pressing energy needs regarding electricity, liquid fuel and natural gas. In 2004, the Council produced Opportunities to Expedite the Construction of New Coal-Based Power Plants. This report emphasized:

1. The importance of streamlining the permitting process to meet increasing demand for electricity.
2. The strategic importance of integrated gasification combined cycle technology.
3. The crucial need for continued research and development and technology demonstration projects—especially relating to clean coal technologies.

In 2006, the Council submitted Coal: America’s Energy Future and stressed five fundamental points:

1. Coal is America’s greatest energy resource.
2. Energy demand will continue to grow over the foreseeable decades.
3. Coal is the only domestic fuel with the flexibility and reserve base to meet that demand.
4. Coal conversion to electricity, liquid fuels and substitute natural gas would significantly increase supply and stabilize energy prices, as well.
5. Coal conversion would reinvigorate the industrial core of America, creating over 1.4 million new jobs and increasing the Gross Domestic Product (GDP) by at least $3 trillion.

In 2007, the NCC built on the previous reports by completing Technologies to Reduce or Capture and Store Carbon Dioxide Emissions. That analysis presented a systematic suite of technologies to manage carbon dioxide (CO₂) emissions and pave the way for future generations, as well as coal gasification and liquefaction.

On Oct. 12, 2007, the Secretary requested the National Coal Council conduct an additional study to “focus on several technological options to increase coal use consistent with the environmental goals of the country.” Pursuant to this request, the NCC submitted their latest report, The Urgency of Sustainable Coal to Secretary Bodman in May 2008. Significant energy-related events have occurred in the past several years that have far reaching implications for the United States and for the central role coal will play in the world’s future. The present 2008 report follows the Secretary’s directive and refines and extends the findings and recommendations in the earlier reports, particularly with regard to:

1. Carbon management technologies.
2. Legal and regulatory issues related to carbon capture, transport and storage.
3. Hybrid electric vehicles.
4. In-situ coal gasification.
5. Converting coal to liquid fuel (CTL) and substitute natural gas (SNG).

Coal is an essential part of the world’s energy future and recent developments remind us that much of the world remains behind the energy eight ball. The urgency is reflected in gasoline prices having gone above $4 per gallon in the summer of 2008, families struggling to pay for essential needs, and more than 2 billion people around the world that still do not have electricity.

As a nation that is projected to import 62 percent of its liquid fuel and 17 percent of its natural gas by 2015, the United States has an unremitting vested interest in the unfolding of the global energy drama. To set the conceptual framework of how the United States’ coal and technology fit into the global picture, the newest Council report is based upon ten fundamental premises:

1. Global demand for energy, particularly electricity, is growing at an unprecedented rate that will continue for decades.
2. Over 75 percent of the new demand for energy will come from non-OECD nations, especially from the Middle East, China, India and other parts of Asia as they seek to modernize.
3. Fossil fuels provide about 85 percent of the world’s energy and, according to the Energy Information Administration (EIA), in 2030 that figure will be still be about 85 percent—oil (32 percent), coal (28 percent) and natural gas (24 percent).
4. Systematically optimistic forecasts of energy production and prices have dimmed our understanding of the energy supply problems facing the world.
5. There is increasing evidence that oil and natural gas production will not keep pace with global demand.
6. Coal is irreplaceable as the cornerstone fuel of the future based on its strengths of supply, availability, versatility, affordability and emerging receptivity to carbon capture.
7. Coal-based generation is on the rise as over 660,000 megawatts of new coal power stations are planned or under construction.
8. Coal conversion to liquid fuels and SNG can alleviate emerging shortfalls in conventional production.

9. Clean coal technologies are continually evolving and allow for the consumption of more coal with greatly reduced criteria emissions.

10. Carbon Capture and Storage (CCS) will open up the full range of coal’s potential contribution to energy supply constraints across the world.

Our nation has a unique opportunity to advance clean energy solutions from coal that will alleviate energy poverty and address concerns about climate change. In its report, the Council recommends the greater use of coal to provide electricity, substitute natural gas and liquid transportation fuels as the solution.

According to the findings of this report:

1. Since March of 2006, oil prices have risen from $56 per barrel to $85 per barrel in January of 2008, and more recently approached $150 per barrel. This dramatic increase has significantly slowed economic growth.

2. Liquefied natural gas (LNG) is $12 to $18 per thousand cubic feet (mcf) in many parts of the world as rising demand from Asia and Europe has dramatically reduced U.S. import expectations. These international delivered prices for LNG will set the cash Henry Hub price in the U.S. since we must import LNG in order to meet our nation’s current and growing natural gas needs.

3. Oil production has stagnated as even more of the world’s top ten producers, including China, Mexico, Norway, Russia and the United States face depleting reserves.

4. Costs to produce energy have risen dramatically due to escalating prices for steel, raw materials, labor, equipment, transportation and energy, itself.

The United States must come to grips with the reality that, like many of the countries mentioned above, we are a growing nation with increasing electricity requirements:

- The population is growing by about three million people per year and will exceed 365 million by 2030 – an increase of 75 million in only three decades.
- The economy is expanding: The GDP will rise from $11 trillion in 2006 to over $20 trillion in 2030 – an 82 percent increase.
- Advances in electro-technologies will place substantial demands upon the electricity infrastructure as increased precision and reliability become even more crucial to productivity.

The implications of these demographic, economic and technological trends for America’s electricity supply system are reflected in EIA’s projections of electricity demand through 2030:

![Figure ES.2. The Rising Tide of Electricity Demand in the U.S.](image)
The EIA has projected that at least 230,000 megawatts of new generation capacity will be needed by 2030 and that about 100,000 megawatts (43 percent) will be coal based.

The series of NCC reports over the past five years provides a systematic technical and regulatory pathway to cleanly and efficiently realize the full potential of our domestic coal resources.

Along with the recommendations on increasing production of coal-to-liquid transportation fuels and coal-to-substitute natural gas, the study also recommends:

1. An advanced portfolio of technology options for the electric power industry.
2. Greater research and development on coal-based electricity generation and carbon capture and storage (CCS) technologies.
3. Incentives to deploy advanced coal-based electricity technologies coordinated with plug-in hybrid and electric vehicles.
4. Congressional funding for large CCS demonstration projects in multiple regions using multiple technologies, and transferring technologies to emerging nations such as China and India.
5. Government funding and public-private partnerships to accelerate the commercialization of clean coal technologies.

The Council also identified a number of conclusions and developed a suite of proposed policy, fiscal and legislative recommendations to address these conclusions. The implementation of these proposals would strengthen the nation’s energy security and accelerate the research, development and deployment of technologies to manage carbon dioxide emissions.

Demand for energy is growing around the world; energy prices are skyrocketing, as supplies grow increasingly short. By relying on coal – our most abundant, secure, and affordable energy resource – we can ensure a reliable supply of inexpensive domestic energy and avoid the economic and geopolitical issues associated with importing energy from (often-unfriendly) regimes. By pressing our technological advantages, we can also ensure that our inexpensive and abundant coal-fueled energy is a clean, efficient, and low carbon option. As the NCC has demonstrated in its suite of publications, coal is the fuel of the future for the United States, North America, and the world.

Robert Beck is the executive director of the National Coal Council. The full report “The Urgency of Sustainable Coal” can be found on the Council’s web page at www.nationalcoalcouncil.org

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Is Carbon Capture and Storage (CCS) Needed?

How can we make it happen sooner?

By The U.S. Carbon Sequestration Council

Global energy demand will continue to grow rapidly

The world is currently experiencing a combination of both rapid growth in per capita energy use and growth in global population. This translates to very rapid growth in overall global energy demand. The U.S. Department of Energy’s Energy Information Administration (DOE/EIA) projects a 60 percent increase in world energy use by 2030. As the global population continues to grow beyond 2030, energy demand will continue to grow through the mid-century and well beyond.

Energy is needed for all facets of our global civilization. It is needed to grow, harvest and transport our food. It is needed to improve our health; to power our medical diagnostic equipment and medical research tools. It is needed to build housing. It is needed to transport our people and to communicate with each other. It is needed to heat our homes and to power our modern world. Electricity is needed to give us light, to power our appliances, to power our televisions and computers, and to enable all of the work saving gadgets that we own. In order to meet these fundamental needs, we will need ever more energy, especially in the emerging economies of the world. This again translates to a very rapid growth in global energy demand, especially the demand for electricity. In the United States alone, electricity demand is expected to double by mid-century. Overseas, China already uses twice as much coal as the U.S., and China alone is adding electrical capacity equivalent to the entire U.S. coal-fired fleet every four years. The International Monetary Fund reports projections of 500 million new cars in China by 2050. This projected growth in energy use will lead to increases in CO2 emissions. In 2004, CO2 emissions by developed nations (OECD member countries) and developing countries were about equal. The DOE/EIA projects that by 2030, developed country emissions will increase by 30 percent, while developing countries will double their emissions. The challenge before us is large. The International Energy Agency (IEA) has called for a global “Energy Revolution.”

No single energy resource is capable of meeting the growing global energy demand

The large growth in global energy demand can only be met by relying on all of our energy resources. No single energy resource can meet such requirements. If we are to avoid energy shortages, we need to greatly expand our use of fossil fuels, nuclear energy, renewables and conservation. Such rapid global energy growth puts great pressure on the environment, on the economy, and on energy security, requiring creative technology solutions.

The IEA report cites nine supply-side technologies and eight demand-reducing technologies that are all needed to meet its stated energy goals. Demand side technologies include fossil systems with Carbon Capture and Storage (CCS), improved nuclear power plants, and all types of renewable energy. CCS tops the list. IEA states, “CCS development is critical to reducing CO2 emissions.” In its scenario to reduce green house gas (GHG) emissions by half by 2050, CCS technology is the largest single contributor to the needed reductions.

Other organizations have also recognized the need for CCS technologies. The IEA, the IEA Greenhouse Gas R&D Program (IEA GHG), the U.S. Environmental Protection Agency (EPA), the DOE/EIA, the World Coal Institute, the United Nations’ Framework Convention on Climate Change (UNFCCC), the Kyoto Protocol on Climate Change
(KP), the Intergovernmental Panel on Climate Change (IPCC), the European Commission (EC), the U.S. Pew Centre on Global Climate Change, and others have endorsed CCS technology. The World Wildlife Fund (WWF) cites CCS as one of six key solutions to global warming. According to the 2005 IPCC Special Report on Carbon Capture and Storage, CCS is a critical GHG mitigation technology that can contribute up to 55 percent of the cumulative global mitigation effort. The report further notes that:

“In most scenario studies, the role of CCS in mitigation portfolios increases over the course of the century and the inclusion of CCS in a mitigation portfolio is found to reduce the costs of stabilizing CO₂ concentrations by 30% or more.”

“The IPCC Third Assessment Report indicates that no single technology option will provide all of the emission reductions needed to achieve stabilization, but a portfolio of mitigation measures will be needed.”

“Most scenarios project that the supply of primary energy will continue to be dominated by fossil fuels until at least the middle of the century … most models also indicate that known technological options could achieve a broad range of atmospheric stabilization levels but that implementation would require socioeconomic and institutional changes. In this context, the availability of CCS in the portfolio of options could facilitate achieving stabilization goals.”

**CCS is key to any global energy strategy**

Petroleum, coal, and natural gas rank first, second, and third, respectively, in global energy production, and are expected to remain so for the foreseeable future. The use of fossil fuels will continue to generate CO₂. There simply is no alternative to using these fuels to meet our basic needs – whether for electricity generation, for manufacturing processes, for meeting our residential needs, or for transportation (including for petroleum refining, hydrogen production, and meeting plug-in power electricity needs). Hence, if we are to reduce GHG emissions significantly, there is no alternative to successful development and deployment of CCS technologies.

**Steps to accelerate development and deployment of CCS technology**

Current CCS technologies use a combination of known and emerging technologies and processes. Known storage technologies generally rely on our 25 years of experience injecting CO₂ into depleted oil fields for enhanced oil recovery (EOR). Emerging CO₂ storage approaches include the injection of CO₂ into very deep saline geological formations and a variety of other geologies, and are needed on a much larger scale than is the practice for EOR. Action in four areas will accelerate the development and deployment of CCS technology:

**Adopt near-term financial incentives for “first generation” CCS systems.** Various groups have agreed that we need the experience provided only by actually operating commercial-scale power plants equipped with CCS, even if the CCS technology is not the “ultimate” version of CCS.

**Continue RD&D.** To achieve broad commercial deployment of CCS, CO₂
capture costs must be reduced from current levels. This can only happen via continued research, development and demonstration of improved CO₂ capture technology. The Coal Utilization Research Council (CURC) concluded, “although there is reasonable confidence in the viability of CO₂ storage, substantial financial, institutional, regulatory and technical challenges still remain. To overcome these challenges, an array of small, intermediate, and large scale CO₂ injection field tests are needed (and some are now under way) in diverse geologies to adequately validate this technology.” We have both government and private sector technology roadmaps that show the path from our current technology suite to the knowledge base needed for broad commercial deployment of CCS.

**Establish rules for CCS injection.** The Interstate Oil and Gas Compact Commission (IOGCC), in an effort to assist in this matter, issued a report to provide a state or province (Canadian) considering adoption of a legal and regulatory framework for the storage of CO₂ in geologic media, the resources needed to develop rules that meet the unique requirements of that particular state or province. On a somewhat different path, the U.S. EPA is planning to propose federal injection regulations by the end of June 2008, although promulgation of those rules could require several years.

**Provide for long-term liabilities.** For CCS to be effective, it must contain stored CO₂ for hundreds of years or longer. Careful monitoring and remediation of any leakage that occurs will be necessary, especially in the early decades of a CCS project. Generally, this initial period can be addressed by the project owner. However, the need to assure storage integrity for centuries is beyond the ability of a project owner, or even traditional insurance mechanisms. A new system for providing such assurance must be created. A number of proposals have been offered by informed groups. If a new, pragmatic system for dealing with these long-term liabilities is not developed quickly, CCS projects will be unable to obtain corporate commitments or financing.

**In summary**

CCS is an emerging technology that is essential to the achievement of most long-range GHG reduction goals. Current CCS technologies use a combination of known and emerging technologies and processes. Much work remains before we will be ready to broadly deploy this technology, but we have a wealth of information from knowledgeable public and private sector organizations on what needs to be done. As part of its mission to be an information resource for decision makers and the general public on CCS technology, the USCSC will draw from this body of knowledge, as well as the expertise of its own membership, and publish additional materials in the future, further discussing the remaining barriers to such broad commercial deployment.

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Plug-in Hybrid Electric Vehicles: One more argument for coal

By Jason Hayes, American Coal Council

Since the first Model Ts began rolling off Henry Ford's production lines, Americans have had a special love affair with their cars.

To the average American, a car is a means of expressing their freedom and it often becomes an extension of their personality. For example, a well-to-do, suburban doctor or lawyer may be seen driving an SUV or a BMW. A teenage boy will almost always want something sleek and fast (whether they get it is another matter). A middle-aged “soccer mom” likely drives a minivan and a big, 4x4 pickup will likely be owned by someone working in industrial trades.

Of course those rules aren’t hard and fast. However, the generalization is clear on any North American highway today. To the North American way of thinking, a car is a right of passage and represents the ability to move about freely. In many ways, it represents the American lifestyle.

Because of that inherent link between cars and the American psyche, it is not surprising to see that as we do more to address the potential impacts of our actions on the environment, a growing segment of car buyers is demanding the option of more efficient vehicles.

The issue

Federal Highway Administration (FHA) reports that rapidly rising gas prices resulted in a 3.7 percent decrease in total miles traveled in May 2008 (compared with May 2007). Despite the decline, American drivers still clocked a total of 254.7 billion miles in that month. Drivers in the United States drove over 3 trillion miles in 2007.

Currently, those miles are almost all traveled in traditional internal combustion vehicles (ICV). EPA data indicates that the average passenger car uses 581 gallons of gasoline each year. Over the same time period, that car releases 575 pounds of carbon monoxide (CO), 38.2 pounds of oxides of nitrogen (NOX), and 11,450 pounds – 5.7 tons – of carbon dioxide (CO2). The U.S. Bureau of Transportation Statistics reports that approximately 250 million vehicles were registered in 2006 and that another 3.7 million cars are added every year. So, very rough numbers show that American automobiles will release 1.5 billion tons of CO2 in 2008.

We are concerned about the environmental impacts of our decisions. However, we’re unlikely (or unable) to abandon the utility and versatility our vehicles provide, so we’ll need to find another method of reducing our transportation-related emissions.

More efficient cars are a natural place to start looking. Enter the PHEV.

Electric vehicles and hybrids

There are three basic types of electric or hybrid-electric vehicles currently available: 1) Electric Vehicles (also called battery electric vehicles or BEV); 2) Hybrid Electric Vehicles (HEV); and 3) Plug-in Hybrid Electric Vehicles (PHEV).

BEVs are vehicles that have batteries in place of a gasoline fuel tank and electric motors in place of a combustion engine. Pushing down on the “gas pedal” increases the flow of electricity to the motors from the battery and makes the car move faster. Typically, BEVs are plugged into 220 volt sockets (like those used for a dryer) to allow for rapid charging. This can constrain their utility, as limited charging infrastructure makes it difficult to recharge their batteries. These types of vehicles also typically have “regenerative braking” systems that use the energy of the moving vehicle to help recharge the vehicle’s batteries during stops.

HEVs – often shortened to “hybrids” – are vehicles, like the Toyota Prius and Honda Insight, which blend a smaller, more fuel-efficient gasoline engine with a small group of batteries and electric motors. In most hybrids, the electric portion of the system provides additional torque and power to the wheels, aiding the gas engine in moving the vehicle and allowing it to travel further on a single
tank of gasoline. Although they do not have the ability to plug in to a wall outlet to recharge the batteries, hybrids can use regenerative braking systems and the power of the gasoline engine to recharge the vehicle’s batteries.

PHEVs are viewed by many electric vehicle advocates as a kind of “improved” or souped-up hybrid. PHEVs use a basic HEV system, but add bigger battery packs, a charging system, and plug (which allows the car to be plugged into a regular wall outlet). With larger batteries and the ability to charge the car from a standard 110 volt wall outlet, the car can operate in electric-only mode for longer periods of time and can be readily recharged anywhere a plug exists. Most PHEVs on the road today have a range of 20 to 60 miles (32 to 96 km) in electric mode. When their batteries are depleted, the car shifts into a hybrid state, operating just like an HEV.

Why use PHEVs?

The average American automobile is driven around 12,000 miles (19,300 km) per year. The majority of those miles are driven in short increments of less than 30 miles at a time – driving to work, to the local store, to a nearby restaurant, etc. A joint, Electric Power Research Institute (EPRI)/Natural Resource Defense Council (NRDC) report titled, Environmental Assessment of Plug-In Hybrid Electric Vehicles1 indicated that PHEVs have 66 percent utility factor (i.e., 66 percent of all miles are driven in electric only mode). Therefore, almost 8,000 annual miles would be driven in electric mode and 4,000 would be in hybrid-electric mode. That same study indicated that the average fuel cost of electric only driving amounts to $0.045/mile, which would equate to PHEV owners enjoying a $450 saving over HEV drivers and $1000 over ICV drivers.

But what about CO2 from coal?

Initial reports from environmental groups worried that increased use of electric power would result in more emissions from generation stations – especially coal-fueled stations. However, the EPRI/NRDC report noted above has effectively put that concern to bed by showing that even when recharged, using older, less-efficient coal-fueled power plants, PHEV vehicles outperform ICV and at least match HEV vehicles when it comes to overall emissions.2

The report demonstrated that if PHEVs were recharged using high levels of carbon-intensive electricity generation and low levels of PHEV market penetration, annual U.S. CO2 emissions related to vehicle travel would be reduced by over 176 million tons (160 million metric tonnes). That reduction jumped to over 661 million tons (600 million metric tonnes) per year as PHEV market penetration moved to a “high” rating and electric sector CO2 intensity moved to a “low” rating.

Those statistics bode well for PHEVs because, unlike ICV cars, which tend to be most efficient when they’re new, PHEVs will actually improve their emissions ratings over time. As new generation technologies, like carbon capture and storage (CCS), integrated gasification combined cycle (IGCC), and (ultra) super critical coal-based generation replace older plants, emissions related to charging PHEVs will decrease even more.3
Is there enough generation capacity?

Another concern that has been raised regarding PHEV use is that when millions of people plug in their cars, we could experience generation shortfalls as already strained utilities become overloaded. However, various studies indicate that as much as 40 percent of American generation capacity is idled during the evening hours — ostensibly the time when the majority of a sleeping population would be charging their vehicle’s batteries. According to Plug-In Hybrids: the Cars that will Recharge America, the excess capacity — the unused generation capacity available when a utility powers down during periods of lower demand (e.g., at night) — available in 2000 was sufficient to accommodate over 80 million PHEVs.1 The EPRI study mirrored this finding, noting that replacing 60 percent of all light- and medium-duty ICVs by 2050 would only increase electricity demand by 7.8 percent. Essentially, North America could begin and progress through a substantial buildup of PHEVs without impacting on current capacity demands.

What infrastructure needs?

Another benefit of pursuing PHEVs is that the “refueling” infrastructure for these vehicles is already in place. The vast majority of homes and businesses in North America are already wired for electricity. Additionally, since most vehicles would be charged in evening hours, during periods of relatively low electricity demand, there would not be any need for large-scale construction of new electrical transmission facilities. This stands in marked contrast to other fueling options like hydrogen or biofuels, both of which would require new refueling stations and infrastructure, or more land dedicated to crop production.

Coal is a secure and DOMESTIC fuel resource

When the improved environmental record of using coal as a transportation fuel is matched with the fact that North American coal reserves currently hold more energy than all of the oil energy in the Middle East, the attractiveness of electric-powered PHEVs grows.

According to the National Coal Council study The Urgency of Sustainable Coal, “A PHEV charged with coal-based electricity displaces petroleum (two-thirds … imported) with domestic coal as a transportation fuel. Replacing ~60 percent of the light- and medium-duty vehicles with PHEV miles by 2050 would reduce petroleum consumption by 3.7 million barrels per day.”5

Energy Information Administration (EIA) statistics indicate that in July 2008, the U.S. demand for refined gasoline was almost 9.3 million barrels per day. Therefore, the inherent economic and social stability gained by relying on domestically produced transportation fuel over fuels from geopolitical hot spots and areas that may be funding anti-western terror activities should be obvious to the vast majority of readers.

Conclusion

PHEVs bring the combined benefits of decreasing overall emissions and greenhouse gas concerns, decreased fuel costs, improved energy security, and the economic and social benefits associated with developing our domestic resource base.

PHEVs still face challenges in that they are not currently commercially available and may not be produced by the major car companies before 2010. They also are expected to cost several thousand dollars more than ICVs or HEVs when they become available to the public. Those costs would mean consumers might not realize overall savings from reduced fuel costs for between three to ten years, depending on fuel and electricity costs. Furthermore, while battery technologies are rapidly advancing and hybrid advocates claim there are commercially available and affordable solutions, there are still some concerns being voiced by automakers over charge times and the stability/longevity of batteries.

There’s no escaping the raised eyebrows and quizzical looks that inevitably arise when the coal industry suggests that hybrids might be one answer to our combined concerns over energy security, rising gas prices, and environmental challenges. Traditionally one of the touchstone concepts of the strongly anti-coal environmental movement, these green vehicles often are mistaken as being contrary to the interests of coal producers. However, when viewed from an outsider’s perspective, the reality is that the two interests co-exist quite nicely.

Jason Hayes is communications director for the American Coal Council (www.clean-coal.info).

1 The joint EPRI & NRDC study was published in July 2007 and is available online at the EPRI Web site (www.epri.com).
2 The findings of this joint study are made all the more interesting when one recognizes that they directly contradict a 2006 NRDC news release that plainly stated using PHEVs “could simply shift emissions of global warming pollution from tailpipes to electric power plants.”
3 See the articles on IGCC and advanced PC/super critical coal plants in this issue to learn how newer technologies are reducing emissions from coal-based electricity.
4 pg. 116 in Plug-In Hybrids. Also see the review of this book in this edition of American Coal
5 This report is available on the NCC Web site at: http://www.nationalcoalcouncil.org/Documents/NCC_REPORT_2008.pdf
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Review of: Plug-in Hybrids: The cars that will recharge America
By: Sherry Boschert
Review by: Jason Hayes, M.E. Des.
Communications Director, American Coal Council

With gas prices hovering somewhere between $3.50 and $4.50 a gallon over the past several months, strained budgets are making for strange bedfellows.

Gas, electricity, energy security, our automobiles, and the environment; in both our world and this book, they’re all linked. In Plug-in Hybrids, Boschert follows a few of the people who are working to address energy shortages and rising fuel prices through the early adoption of electric vehicles (EV), hybrid electric vehicles (HEV), and plug-in hybrid electric vehicles (PHEV).

The book opens with Chelsea Sexton weeping over the untimely “death” of her friend. It was through her connection with this friend that Sexton had found employment, met her husband, and now had a young son. More than that, we learn as we read that Sexton’s contact with this friend had set the tone for much of her life interest. Now Sexton, an “automotive insider,” was responsible for giving the eulogy at her friend’s funeral service. But this was no ordinary funeral service, and Sexton’s friend wasn’t flesh and blood. Her friend was her car and the movement that it represented.

Sexton had worked as part of the General Motors (GM) engineering and marketing teams that created the EV1 – GM’s first foray into the electric vehicle world and their initial answer to the issue of improving automotive efficiency and decreasing emissions. It was a full, battery only, EV and managed to gain the respect of many across the nation. In the end, however, GM canceled (or at least delayed) their EV car program and demanded that the cars be returned. Thus the funeral service, as Sexton and others said goodbye to their work and their friend.

Through this personal look into the lives of the people in the hybrid and EV movement, Boschert has created an effective medium to promote interest in EVs and PHEVs. Throughout the book, she takes a look at the lives and work of others in the hybrid community, including:

• Felix Kramer and his geek-powered “tech squad.” This group of technically oriented hackers managed to create the first PHEVs by modifying early models of the Toyota Prius. They added charging ports and larger batteries and, in doing so, pushed the little car to achieve miles per gallon (mpg) ratings of 100+. Her review of Kramer’s work expects that the big car companies will expand on what the tech squad achieved, allowing the manufacture of millions of PHEVs in the near future.

• Marc Geller, a political and grassroots activist who helped lead the protests Boschert claims “shamed” automakers into stopping their program to recall and crush EVs.

• R. James Woolsey, former director of the CIA and foreign policy advisor to the Carter, Reagan, H.W. Bush, and Clinton administrations. (Woolsey is also currently working as an advisor to the McCain-Palin campaign.) Woolsey is rightly described in the book as someone who never fit neatly into the traditional right/left political...
divide. Hawkish in the foreign policy realm and liberal leaning in economic and social issues, his work has focused on the need to reduce American demand for foreign energy supplies. As Boschert shows, he embraced the PHEV concept as an excellent means of partially achieving that goal.

Boschert has done an excellent job of showing how the PHEV community has managed to blur traditional lines of partisan beliefs and bring together people and schools of thought that are typically cast as mortal enemies. Along the way she also provides enough information on the inner workings of PHEVs, EVs, and HEVs to allow the reader to confidently enter the policy discussions surrounding the issue.

Although the book is a good introduction to the PHEV world and the people involved, it does have some weaknesses. Key among them is the near constant allusions to a conspiracy theory style motivation behind the cancellations of the early EV projects.

The reader comes away from the book feeling manipulated into disliking car manufacturers. Boschert’s writing treats the management of major automakers in the same light as the mustache-twisting cartoon villains of Saturday morning cartoons rather than providing any serious insight into the economic and social reasoning for their decisions. Where those reasons are alluded to, they are immediately quashed with green rhetoric and conspiracy theory style arguments.

Boschert’s arguments against the auto manufacturers fail on the simple fact that automakers are in their business to make money. If they could make money-selling EVs, they would; it needn’t be any more complex than that. Additionally, Boschert’s own research, current HEVs, and developing PHEVs models demonstrate that automakers are responding to market pressures and developing hybrid-electric options as battery capabilities, government regulation, and safety and liability issues are addressed.

Despite these weaknesses, Boschert has created a useful tool for those interested in looking into the world of hybrid vehicles. Giving us glimpses into the lives and motivations of the people who helped make those vehicles a reality, only helped to make her book more accessible to the average person.
The Low Down on Cutting Down:
Energy Efficiency Initiatives

By Janet Gellici, CAE, American Coal Council

Energy efficiency is increasingly heralded as the “first fuel” – the lowest hanging fruit alternative available for quickly meeting our energy conservation, cost savings and emissions control objectives.

Electricity conservation efforts are not new. The oil disruptions and ensuing price pressures in the 1970s and early 1980s prompted utilities to develop programs and services to help residential, commercial and industrial customers use electricity more wisely. What is new is the more compelling and urgent nature of incentives to advance energy efficiency measures in today’s marketplace. Prominent drivers include:

• Sustained, high energy prices.
• Projections of power generation and transportation fuel shortfalls.
• The need for increased investment in energy infrastructure fueled by demand growth.
• Development of new efficiency-enabling technologies.
• Environmental concerns.

It’s the latter factor – the drive to reduce criteria emissions (SO₂, NOₓ, & Hg) and greenhouse gas (GHG) emissions, especially CO₂ – that has garnered the most public and policy attention, as evidenced by the many recent reports on the topic. Representative of these are reports from the following groups:

• Coal Utilization Research Council (CURC)
Forecasts that application of cost-effective technologies to improve power plant efficiency could immediately reduce CO₂ emissions by more than 100 million tons annually.

• McKinsey & Company report for The Conference Board
Improving energy efficiency in building and Demand Response Programs provides evidence of more than 90 programs offered by utilities to improve energy efficiency and reduce energy use. These programs have helped to save almost 797 billion kilowatt-hours of electricity between 1989 and 2005 – enough to power almost 74 million homes for a year.

• World Energy Council Report
Efficiency improvements could result in large CO₂ emissions reductions. If the entire world were to achieve the energy efficiency for thermal power generation of the EU (40 percent average), 1.3 gigatonnes of CO₂ would have been avoided in 2006.

The average annual efficiency of the existing U.S. electricity generating fleet is 32 percent, with roughly half of all kWh produced coming from the more than 350 GW of installed coal plant capacity. A cost effective and readily available option to reduce CO₂ emissions per unit of electricity generated is to increase a generating plant’s efficiency, so that less coal is burned per MWh generated. New coal generation utilizing advanced pulverized coal combustion – in supercritical and ultra-supercritical steam cycle units – or integrated (coal) gasification combined cycle (IGCC) units holds significant promise in terms of curtailing emissions. These units can achieve thermal efficiency levels ranging from 36 percent to 48 percent (National Coal Council).

Efforts to advance the development of these new coal plants that would help us meet our economic and environmental objectives continue, despite significant and misguided efforts to curtail their construction. In the meantime, and contrary to prevailing misconceptions, our nation’s utilities are undertaking significant initiatives to advance energy efficiency. The Edison Electric Institute’s (EEI) 45-page summation of Efficiency and Demand Response Programs provides evidence of more than 90 programs offered by utilities to improve energy efficiency and reduce energy use. These programs have helped to save almost 797 billion kilowatt-hours of electricity between 1989 and 2005 – enough to power almost 74 million homes for a year.

Can and should more be done? Absolutely! But efforts are underway and utilities, along with federal, state and local governments, are finding ways to deliver energy efficiency while maintaining viable generation businesses. EEI’s August 2007 report, Making a Business of Energy Efficiency: Sustainable Business Models for Utilities, details the challenges and opportunities for advancing energy efficient utilities.

• Conventional Regulatory Incentives – utilizing regulatory mechanisms that have been historically adopted to promote energy efficiency, including various means to assist in addressing the “throughput issue,” i.e., recovering energy efficiency program costs and providing a positive shareholder incentive.
• Performance Models – in which utilities share savings arising from implementation of energy efficiency initiatives.
• Energy Services Models – in which utilities and affiliates directly sell services to customers on a fee-for-service basis, allowing utility shareholders to profit from the provision of these services.

The EEI study concludes that:
• The most durable and sustainable business models require significant change in either the regulatory framework or the utility’s orientation to service delivery – while the amount of change...
What is new is the more compelling and urgent nature of incentives to advance energy efficiency measures in today’s marketplace.

is not to be underestimated, circumstances indicate that these changes are more feasible today than previously.

• There are transition paths to the more durable models; they need not be implemented in a single leap, but rather through an orderly transition.
• Perhaps the central question is, Can a utility engage in energy efficiency lines of business and make money doing so? The results of this project clearly point to a simple answer: Yes.

To fully appreciate and utilize these energy efficiency initiatives, we’ll need to better quantify the investment opportunity they represent for utilities. Those efforts also are underway, most recently by the American Council for an Energy-Efficient Economy (ACEEE), which in May 2008 released a report on The Size of the U.S. Energy Efficiency Market: Generating a More Complete Picture. The report seeks to quantify the size and scope of current investments in energy efficiency technologies, both in terms of dollars invested and labor employed.

The study addresses the question of, “How big is energy efficiency in the U.S.?” It notes that since 1970, energy efficiency has met about three-fourths of the demand for new energy-related services while conventional energy supply has provided only one-fourth. The report concludes that although efficiency is a proven resource, it remains underdeveloped and can make an even larger contribution toward stabilizing energy prices and reducing greenhouse gas emissions.

As part of its effort to advance energy efficiency, ACEEE is developing a new Internet resource for state policymakers and energy efficiency advocates that provides an online database of energy efficiency policies in the states, searchable by state or by policy. The database covers appliance standards, building codes, clean distributed generation policies, tax incentives, vehicles, policies and a host of utility-related energy efficiency information.

Another measure being endorsed by many utilities is a National Action Plan for Energy Efficiency. Initiated in the fall of 2005, the Plan is an ongoing private-public partnership focused on creating a sustainable, aggressive national commitment to energy efficiency through the collaborative efforts of gas and electric utilities, utility regulators and other organizations. Facilitated by the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy (DOE), the group’s National Action Plan for Energy Efficiency Vision for 2025 (November 2007), provides recommendations for helping states and utilities overcome policy, regulatory and other barriers that limit investment in energy efficiency. Included among the 10 implementation goals outlined in July 2008 are:

• Establish Cost-Effective Energy Efficiency as a High-Priority Resource
• Develop Processes to Align Utilities’ Incentives Equally for Efficiency and Supply Resources
• Develop State Policies to Ensure Robust Energy Efficiency Practices
• Align Customer Pricing and Incentives to Encourage Investment in Energy Efficiency
• Implement State of the Art Efficiency Information Sharing and Delivery Systems
• Implement Advanced Technologies

In addition, here’s just a small sampling of what some ACC member utilities are doing to advance energy efficiency:

**Dominion Virginia Power** – Energy Conservation Efforts – [www.dom.com](http://www.dom.com)

Among its numerous efficiency initiatives, Dominion is offering instant discounts for 1.4 million compact fluorescent light (CFL) bulbs throughout its Virginia service area. Working with Home Depot and Honeywell, Dominion is providing a $1.50 discount on single and $3 on multi-packs of Energy Star qualified CFLs. Based on EPA’s CFL calculator, if all 1.4 million CFLs were to replace 60-Watt incandescent bulbs, consumers would save an estimated $75 million and reduce CO₂ emissions by nearly 425,000 tons – the equivalent of removing 70,000 cars from the road for one year.


Think! Energy means getting students in the Citizens Gas and Indianapolis Power & Light service territories to “think!” about energy, “talk!” about energy and “take action!” about our energy for the future. Students are encouraged to conserve energy resources by using energy more efficiently at home and at school through this program developed in concert with the National Energy Foundation (NEF). Think! Energy will be providing approximately 2,500 Indianapolis Public School students and 100 teachers with hands-on training at their own schools and with high quality energy efficiency technologies to take home and install. Participating students and teachers will receive a collection of NEF instructional materials, including teacher guides and posters. All educational materials used in the program will be correlated to Indiana science and social studies academic standards.

**PPL Electric Utilities** – [www.pplelectric.com](http://www.pplelectric.com)

PPL earned the Utility Planning Network’s 2007 award for Best Metering Data Integration Initiative, awarded in recognition of a utility’s use of electric meter data to benefit customers. PPL’s efforts to install advanced metering technology is designed to help homes and businesses better manage their electricity use, and will allow the utility to provide new rate options to customers by 2010. The company’s meter data management system enables it to track, store and manage hourly electricity-use information from all of its automated meters. The system, developed by Nexus Energy Software, was added in late 2006 and is the largest operational system of its kind in North America.

**Progress Energy** – [www.savethewatts.com](http://www.savethewatts.com)

In 2007, Progress developed an innovative customer education campaign – Save the Watts – to build customer awareness of and participation in energy efficiency.
programs offered by the company. The highly interactive campaign features a dynamic Web site, as well as print and broadcast advertising. The campaign’s “Save the Watts Guy” offers a variety of tips to help customers save energy and money. Progress reports that the campaign has significantly increased consumer interest in the company’s energy efficiency programs.

**Xcel Energy – www.xcelenergy.com**

In October 2008, Xcel is launching its SmartGridCity™ Smart Grid system to provide environmental, financial and operational benefits for the residents and businesses of Boulder, Colorado. The SmartGridCity™ initiative is designed to provide customers with up-to-the-minute information about their energy costs and provide them with the choice, based on price or based on green power, as to when and what kind of energy they’re going to use; creating the ability to charge plug-in hybrid vehicles with wind or solar power and then putting that power back into the grid.

**American Coal Council – E3 Award for Achievements in Energy Efficiency**

The ACC is doing its part to advance energy efficiency through the recognition of those companies that are moving beyond regulatory requirements to serve as energy sector leaders in implementing innovative, efficient and clean technologies. This ACC award, to be presented for the first time in March 2009, will acknowledge companies that have found new, creative and useful methods to curtail energy demand, reduce overall emissions and improve their environmental records in the process. For more information, visit the ACC web site at http://www.clean-coal.info/awardprog

**Resources**

- Alliance to Save Energy – http://www.ase.org/
- Coal Utilization Research Council (CURC) – www.coal.org
- Edison Electric Institute (EEI) – www.eei.org
- National Coal Council – www.nationalcoalcouncil.org
- “The Urgency of Sustainable Coal” – May 2008
- “Technologies to Reduce or Capture and Store Carbon Dioxide Emissions” – June 2007
- “Coal: America’s Energy Future” – March 2006
- U.S. Environmental Protection Agency & U.S. Department of Energy
  - National Action Plan for Energy Efficiency
- World Energy Council – www.worldenergy.org

The devil is in the details and many issues remain to be resolved. However, energy efficiency initiatives are a promising option that will help us to conserve energy, contain costs and address environmental concerns.

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Janet Gellici, CAE is chief executive officer of the American Coal Council (www.clean-coal.info).
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INVITATION!
American Coal Council E³ Energy Awards Program
Nominations Now Being Accepted
Empower – Educate – Encourage

The American Coal Council (ACC) is pleased to announce its updated and expanded awards program – The E³ Energy Awards – recognizing excellence in efforts to empower, educate and encourage coal industry achievements.

The ACC E³ Energy Awards program has been revised to focus more on the energy that drives our nation and the people that make our industry a success. The program has a new name, a new look, and new, redesigned categories that acknowledge and celebrate the hard work and diligence of this industry.

The awards program was originally established in 2005 as a means of recognizing North American companies, foundations, associations and individuals across the coal industry that have played a significant role in empowering their local communities, advanced energy-based education and public information programs, and encouraged others in the industry to do and accomplish more.

Worldwide demand for energy continues to grow at the same time as governments and the public are calling for compliance with strict new environmental guidelines. It is, therefore, imperative that the coal industry works to educate the public on coal’s foundational role in meeting our energy needs.

Coal is an economic, abundant/secure and environmentally sound fuel source. The ACC E³ Energy Awards program recognizes and rewards the coal suppliers, coal consuming utilities, industrial coal users, transportation companies, foundations, and industry associations that are making a concerted effort to convey this message to policy makers, the public, the media, students, and employees. It also acknowledges the efforts of those demonstrating the broader value of the coal industry by playing an active role in their communities.

CALL FOR ENTRIES

1. Advancement of Education and Public Information
2. Public Service and Community Development
3. Achievements in Energy Efficiency
4. Career Development Award
5. Industry Advocacy Leadership (“The Industry Cheerleader Award”)

Our Esteemed Judges
• Ray Dykes, President, PR PLUS Communications
• Tom Vorholt, ACC President (2008)
• TBA

PROGRAM RULES & ADMINISTRATION

1. Awards will be given to any person, organization or corporation that is:
   • Sponsoring the responsible dissemination of balanced and factually correct information regarding coal or coal-based energy.
   • Improving the role and representation of energy in educational curricula/training programs across North America.
   • Playing an active role in the development or fostering of community spirit/involvement.
   • Taking a uniquely effective personal role in the betterment, expansion, and/or development of their organization or the North American coal industry and/or related shipping/service industries.

2. Nominees are required to have a substantial, direct involvement in the coal industry and/or related shipping/service industries.

3. All entries will be judged solely on the basis of documents submitted with the initial entry and for activities carried out in the award year (i.e. 2008).

4. One winner will be awarded in each category. At their discretion, however, judges may elect not to grant awards, to share the award between greater than one nominee in any category and/or may elect to name honorable mention recipients in any categories.

5. Awards will be conferred at the ACC Excellence Awards Luncheon on Tuesday, March 10, 2009 in Tampa, Florida in conjunction with the ACC’s 2009 Spring Coal Forum.

ELIGIBILITY

To nominate your company/association or another company/association for an ACC Excellence Award, please indicate the award(s) for which you are applying on the entry form. You may enter in as many award categories as you wish.

All nominations must include a fully completed official ACC entry form – downloadable at http://www.clean-coal.info/awardprog. We will begin accepting entries for the 2008 program on October 1, 2008. All entries must be received at the ACC’s office by January 12, 2009. No extensions will be granted.

Submissions should include one (1) original application form, with supporting material and four (4) high-quality copies (color or black and white). This makes a total of five (5) copies for each submission package. Please note that our judging panel is
distributed across North America and cannot “share” entries. Therefore, submissions with less than one original and four copies in the submission package will be deemed incomplete and may not be reviewed by judges. Submissions should be on standard letter size paper (8 ½” x 11”). Each submission should also include one high-quality photograph or digital copy of the nominee’s company logo (in .eps, .tiff, .jpg, or .gif format).

Entrants may submit supporting materials with applications, including videos, pamphlets, color photographs/copies, materials, or other documents related to the application. Please note that supporting materials must also be provided for each of the judge’s copies.

Digital copies of the entry and/or supporting material - in addition to the original and four (4) hard copies - may also be included with the submission and should be on a CD/DVD/USB memory stick, or e-mailed to Jason@clean-coal.info (submission via ftp is also possible - contact the ACC if you wish to use this option). If sending a copy by e-mail, please ensure that the subject line and information in the body of the e-mail refer to the ACC E3 Awards Program. Please note that logos and photographs may be used in publicity and awards documentation at the discretion of the American Coal Council. Digital submissions must be in Adobe Acrobat’s (.pdf) format, Microsoft Word (.doc) format, OpenOffice.org (.odt) format, or as noted above for graphics/logos.

All nominations and supporting documents will be considered confidential and will only be used by the American Coal Council and the judging panel. All nominations, supporting documents, other media and items included with the submission become the property of the American Coal Council and will not be returned.

Please send nominations and supporting materials to:

Jason Hayes, Communications Director
The American Coal Council
2820 N Pinal Ave. PMB #110
Casa Grande, AZ 85222
Ph: 602.769.3872
E-mail: jason@clean-coal.info

Award categories

Advancement of Education and Public Information

News of dwindling energy supplies, rising prices, and stories of severe environmental impacts caused by energy use are repeatedly emblazoned in today’s electronic and print media. It has become increasingly difficult for the average citizen to discern between accurate information and hype when they form opinions or make choices regarding energy.

Given the amount and detail of information available, as well as the growing marketing budgets and influence of anti-coal groups, many in the public are understandably misinformed about coal’s role in our nation’s energy supply. It is, therefore, increasingly important that the industry work to proactively provide the public with easy to understand, bias-balanced, and accurate information on the costs, benefits, and environmental aspects of coal-fueled energy.

In this category, judges will consider the willingness and ability of the nominee to produce educational or promotional material and media that presents accurate and concise information on the coal industry. Judges will consider the ability of the material and media to advance the message that coal is an economic, abundant/secure, and environmentally sound fuel source. This award recognizes the company or individual that produced the most effective and memorable educational program or message within the past year.

Judging Criteria
• Quality and accuracy of information
• Clarity of communication
• Ease of understanding
• Creativity and memorableness
• Production values / use of technology
• Ability to reach and influence intended audience
• Effectiveness in advancing the development and utilization of coal as an economic, abundant and environmentally sound fuel source.

Public Service and Community Development

As members of their communities and also as a matter of basic business survival, companies and their employees are typically active in helping to develop and improve their communities. However, through their willingness to participate in and fund local development and enhancement projects a certain few organizations play an enhanced or special role in their communities and regions.

Judges will consider the role that an organization plays in enhancing the community (communities) in which it operates. Judges will also consider the role played by management and the extent of employee involvement in the process. This award recognizes the role of a corporation in bettering their local communities through direct involvement in community organizations and projects.

Judging Criteria
• An organization-wide award
• Level of employee participation and commitment
• Management participation/buy-in/encouragement
• Degree of usefulness to public or community
• Timeliness of service

Achievements in Energy Efficiency

The coal industry has its work cut out for it when developing and implementing efficiency programs. Unfortunately, historical emissions issues and an outdated “Dickensian” concept of coal as necessarily dirty have colored the public’s perception of coal
use. To address that perception, coal companies not only have to move beyond meeting regulatory requirements, they need to be energy sector leaders in implementing innovative, efficient, and clean technologies.

Some companies are trailblazers on the efficiency front and are able to find new, creative, and useful methods of cutting their demands for energy, reducing overall emissions, and improving their environmental record. In doing so, they set an example and provide tried and tested methods to better efficiency and environmental records for others in the industry.

Judges will consider the role that an organization plays in developing creative efficiency programs that help to reduce demand for energy and the emissions associated with energy use. Judges will also consider the company’s ability to promote efficient operations throughout the industry, the role played by management, and the extent of employee involvement in the process.

**Judging Criteria**
- Ability to implement effective efficiency programs that reduce energy demands and decrease emissions
- Ability to address and move beyond regulatory requirements and/or public expectations (“trend-setting” factor)
- Ability to meet their environmental challenge in an economically efficient manner
- Innovation
- Level of employee participation and commitment
- Management participation/buy-in/encouragement

**Career Development**

The coal industry – including mining, utility, transportation, ports & terminals, and allied service industries – is facing an employment crunch.

With the average age of employees in the coal industry nearing 50 years old, many in the industry are winding down their careers. In fact, by 2011, fully one-third to one-half of coal industry employees could retire.

Those statistics mean the industry needs new people. Many companies are stepping up to the plate to encourage a new generation of engineers, technicians, geologists, environmental scientists, miners, and a host of other industry employees to fill the void being left by retiring members. These companies are developing innovative means of retaining mature employees as trainers and mentors; they are helping colleges and universities to develop new programs, grants, and funding opportunities; they are doing the on-the-ground work of finding and training the next generation of our industry.

Judges will consider the role that an organization plays in developing new opportunities or training programs that are specifically aimed at employee retention and/or the hiring and training of new coal industry employees. Judges will also consider the company’s ability to better employee options and personal development opportunities, as well as the role played by management and the extent of employee involvement in the process.

**Industry Advocacy Leadership (“The Industry Cheerleader Award”)**

Every industry has a person that acts as a leader and tireless cheerleader.

It takes an unusual level of dedication, initiative and ability, but this person manages to make the industry a better place for everyone around him/her. S/he might be a CEO that spurs his/her organization beyond simple economic success to establish it as an industry leader. Or, s/he may be that dedicated employee who helps motivate an organization through his/her hard work and by personal example.

Regardless of their position in a company, these industry leaders and cheerleaders are still looked up to as providing an example of both vision and productivity that encourages more from their contemporaries. They are seen as the “go to” person for information, advice, and direction when others need it. This award will recognize individual(s) who provide a positive, proactive example to their co-workers and the coal industry at large.

**Judging Criteria**
- An individual award
- Ethical history
- Vision
- Involvement in the industry
- Productivity
- Leadership
- Involvement in advocacy for the industry
Please complete this entry form in full and return to the American Coal Council, on or before January 12, 2009.

Attention: Jason Hayes, Communications Director
American Coal Council
re: E³ Awards Nomination
2820 N. Pinal Ave., PMB 110 Casa Grande, AZ 85222
jason@clean-coal.info

Contact Details of Nominee:

Mr./Mrs./Ms./Miss/Other

Name (First, M.I., Last)

Title

Company

City / State-Province / Country / Zip or Postal Code

Tel / Fax / Cell

E-mail

URL for company web site

Nomination Category:

☐ Advancement of Education and Public Information
☐ Public Service and Community Development

☐ Achievements in Energy Efficiency
☐ Career Development

☐ Industry Advocacy Leadership ("The Industry Cheerleader Award")

Summary of Entry:
Please provide a short summary of your entry. Entrants must provide a separate entry sheet and summary for each category, if they intend to apply for more than one category.

January 12, 2009.
In this issue...

Sustainable Coal
Carbon Capture & Storage
Advanced PC & IGCC
Coal Generation

Meeting human needs while conserving the environment
Seeking Relationships

WANTED: LT COMMITMENTS


Honest and caring SWF 32
enjoys spots, movies, dancing,
Seeking S/DWM, 32-40, same
est. for long term relationship.

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Immediate Past President
Keith Drohan
Senior Market Originator
Dominion Energy (2007-2009)

At Large
Tom Vorholt (2007-2009)
ACC President 2008

Vision Statement
The American Coal Council (ACC) strives to serve as the pre-eminent business voice of the American coal industry.

Mission Statement
The American Coal Council (ACC) is dedicated to advancing the development and utilization of coal as an economic, abundant/secure and environmentally sound fuel source. The Association promotes the lawful exchange of ideas and information regarding the coal industry. It serves as an essential resource for companies that mine, sell, trade, transport, or consume coal. The ACC provides educational programs, advocacy support, peer-to-peer networking forums and market intelligence that allow members to advance their marketing and management capabilities.

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2008/2009 Event Dates

Coal Market Strategies
2008 – October 6-8, 2008 – Williamsburg, VA
2009 – October 12-14, 2009 – Las Vegas, NV

Coal Trading Conference
2009 – December 7-8, 2009 – New York, NY

Fuel Flexibility Conference
February 2009 – Charlotte, NC

Spring Coal Forum
March 9-11, 2009 – Tampa, FL

For additional information visit www.clean-coal.info or call 202-756-4540

Membership Coupon

Join the 170 companies that recognize the importance of belonging to an Association that serves as the pre-eminent business voice of the American coal industry and advocates for coal as an economic, abundant/secure and environmentally sound fuel source.

The American Coal Council (ACC) is an alliance of coal, utility, trading, transportation, terminal and coal support service companies, advocating a non-adversarial, partnering approach to business.

The ACC facilitates the lawful exchange of ideas and information regarding the American coal industry. It serves as an essential resource for companies that mine, sell, trade, transport or consume American coal. The ACC also serves as a resource for those wishing to expand or enhance business relationships in North American and international coal markets.

2008/2009 Event Dates
Analytical & Sampling

Standard Laboratories, Inc.
1880 North Loop Ave.
Casper, WY 82601
307-234-9957
Fax: 307-234-8013
www.standardlabs.com
Contact: Steve Miladinovich Jr.
rrdlabs@vcm.com

SGS Minerals Services
1919 South Highland Ave., Suite 210-B
Lombard, IL 60148
630-953-9360
Fax: 630-953-9306
www.us.sgs.com/minerals
Contact: David Smercina,
Senior Vice President Energy Minerals
dave.smercina@sgs.com

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425-278-2407
Fax: 860-622-3467
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Coal: an abundant energy resource

Coal Reserves

America is often referred to as the “Saudi Arabia of coal.” The United States has the largest supply of coal reserves in the world. According to the BP Statistical Review of World Energy, over 29% of total world coal reserves exist in the U.S. BP and Energy Information Administration (EIA) data indicates that the U.S. has over 264 billion short tons of recoverable reserves; enough to last for approximately 234 years at current use levels. Coal is used in almost every state to generate electricity and forecasts indicate that coal will continue to provide the majority of American electricity for the foreseeable future.

Coal Supply Regions

Electricity Generation

Coal currently supplies 50% of all American electricity. The next largest source is nuclear (20%), followed by natural gas (19%) and hydroelectric (7%).

Coal has historically played a significant role in providing American electricity, due to its abundance, its affordability and its rapidly improving environmental record as more efficient technology is used in combustion and for emissions control.
Comparing Energy Sources

According to the National Mining Association (NMA), coal accounts for one-third (1/3) of all primary energy production. Over the past 30 years, as energy demand has skyrocketed, coal use has increased by 195%.

Currently, nine out of every ten tons of coal produced in the U.S. is used in electricity generation. Coal is also used in the production of chemicals, cement, paper, ceramics, a variety of metal products and even food preservatives and artificial sweeteners.

Coal is the nation's most abundant fossil fuel.

* Coal economically recoverable reserves: 264 billion short tons / 234 years (Demonstrated reserve base: 491 billion short tons)

* Oil Reserves: 29.4 billion barrels / 11.7 years

* Natural Gas Reserves: 211.1 trillion cubic feet / 10.9 years

Source: 2007 data from BP Statistical Review of World Energy. BP & EIA data are not identical. "Years" refers to years reserves will last at current production levels.

What to Expect

The Energy Information Administration (EIA) forecasts that coal production and use will continue to grow at a steady rate in the short-term. Expected demand in the U.S. will remain at well over 1 billion short tons per year beyond 2030.

Longer-term, coal is expected to provide more than half (54%) of U.S. electricity through 2030. During that time, production and use are projected to rise at 1% per year. Coal prices will remain stable to 2030 with slight increases forecast in the west and slight decreases in the east. Regional factors, shipping, mining productivity, capital expenditures, planning, environmental and regulatory compliance costs will drive cost considerations.

2008 EIA reports describe an additional 37 gigawatts of currently progressing coal-fueled generation projects. A further 42 gigawatts of coal-fueled projects have been announced or are in the early stages of development.
Currently U.S. energy policy and the public debate over “clean coal” center on next generation power plants and transportation fuels. They focus on the effect that energy production, generation, and use will have on greenhouse gases. While these are important to consider for future development, opportunities currently exist to generate economically viable and environmentally attractive electricity from coal, using pre-combustion clean coal technologies.

There are a number of processes in operation and under development that clean coal before it is burned. These pre-combustion clean coal technologies produce products that result in lower sulfur dioxide (SO₂), nitrogen oxide (NOₓ), mercury (Hg) and, to a lesser-known extent, carbon dioxide (CO₂) emissions at plants that burn them.

The environmental benefits of pre-combustion technologies can be enhanced if other combustion (oxy-coal combustion) or post-combustion technologies (fabric filters, electrostatic precipitation, scrubbers, etc.) are also used.
Pre-combustion technologies include

**COAL PREPARATION ~ COAL UPGRADING ~ COAL TREATMENT**

**Coal Preparation Technologies**
This is the most widely used method of pre-combustion treatment available today and involves cleaning the coal before combustion.

Cleaning coal in this manner removes ash prior to combustion, resulting in decreased SO$_2$ and Hg emissions during combustion. Washing also allows coal-fueled boilers to operate more efficiently as there are fewer impurities and other chemicals that can decrease heat and combustion rates. A more efficient combustion process will reduce NO$_x$ and CO$_2$ emissions.

Cleaning technologies also encourage the use and recycling of other “waste” coals that might have been previously abandoned because of lower Btu values and higher levels of impurities, rock, or dirt.

**Coal Upgrading Technologies**
Coal upgrading technologies increase the Btu content of a lower-ranked coal by removing water (dewatering or drying). This moisture removal is accomplished through the use of four different technologies – three thermal and one non-thermal.

There are four techniques used to dry coal during the upgrading process:
- **Direct heat** (saturated steam)
- **Indirect heat** (waste heat or re-circulated exhaust gas)
- **Briquetting** (heat and pressure)
- **Electromagnetic energy** (similar to that used in a microwave)

Dewatering and upgrading help to reduce emissions. Sulfur and Hg are reduced with water removal. NO$_x$ emissions are reduced as higher Btu values result in a more complete combustion. The increased fuel and boiler efficiency realized when burning upgraded coal leads to lower CO$_2$ emissions per kilowatt hour generated.

**Coal Treatment Technologies**
Coal treatment technologies use additives to alter the coal’s combustion characteristics. These technologies generally use latex, metallic or mineral reagents or sorbents to change the way the coal burns. These technologies can capture sulfur and Hg in solid byproducts from the generating process rather than allowing them to be emitted in power plant exhaust gases. In addition, combustion efficiency improvements result in lower NO$_x$ and CO$_2$ emissions per kilowatt hour generated.
**Benefits of Using Pre-combustion**

Recent studies conducted by EPRI (Electric Power Research Institute) and CURC (Coal Utilization Research Council) indicate that for each 1% increase in combustion efficiency there is a 2.5% reduction in CO2 emissions from power plants.

When improvements in efficiency and reductions in emissions from pre-combustion technologies are combined with other clean coal technologies (combustion and post-combustion), the environmental and cost benefits are manifold.

Pre-combustion technologies represent an excellent opportunity to use coal – our most abundant/secure and affordable energy resource – in an environmentally sound manner. By applying these technologies along with combustion and post-combustion stage technologies our coal use will help to power us well into the future.

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The Greens’ Love-Hate Relationship with Energy: Lessons to be learned

By Jason Hayes, American Coal Council

Where do they really stand?

Effective due diligence involves getting to know the people with whom you plan to partner. Before you sign a contract or send that joint press release, you spend time researching the person or organization with which you’ll be collaborating. If due diligence efforts yield evidence that a potential partner is trustworthy, you move ahead with the plan. On the other hand, if evidence suggests your prospective partner might not have the same interests or end goals as you, red flags start waving and it’s time to take a second look.

Given the continued attempts by environmental groups to shut down energy development, the energy industry is likely seeing more of those red flags waving these days. Despite many examples of good faith efforts by the energy industry to collaborate with green groups on points of common interest, we increasingly see some of those groups saying one thing in their dealings with industry to further energy development projects, and then saying another and working against the development of generation capacity in other areas.

In some cases, by participating in these industry-green partnerships, some in the energy industry have engaged in attacks on other energy sectors. For example, the Clean & Safe Energy (CASEnergy) Coalition, which includes environmental groups, as well as nuclear power developers, has relied on Greenpeace co-founder Patrick Moore as its spokesperson in their attacks on coal. In an April 2006 Washington Post editorial, Moore recognized past green resistance to nuclear power, called for a change of heart on the part of greens, and pushed for their support for nuclear. In the same article, he attacked coal-based CO₂ emissions, while ominously referring to “possible disasters” and “catastrophic climate change.” Rather than acknowledging that our most effective means of meeting growing energy demands in an affordable and clean manner is to rely on technological advances and a diverse suite of energy options, CASEnergy has actively worked to diminish other generation options in pursuit of nuclear energy development.

For many in the environmental community, concerns with a particular energy resource are not just centered on lessening environmental impacts. If that were the case, environmental groups would be actively supporting industry’s efforts to reduce emissions with new technology. However, that support has not appeared.

Hydroelectric dams produce significant amounts of carbon dioxide and methane, and in some cases produce more of these greenhouse gases than power plants running on fossil fuels.” – Éric Duchemin, consultant for the Intergovernmental Panel on Climate Change (IPCC)
A few examples will help to demonstrate how many green groups are reflexively resisting development of clean energy options.

Tenaska Inc. is an Omaha-based energy company that has proposed to build a new, supercritical coal-fueled power plant in Texas. The planned Trailblazer Energy Center will have post-combustion CO$_2$ capture technologies allowing for the capture of up to 90 percent of the plant’s CO$_2$ emissions, which will be used in local enhanced oil recovery operations. When completed and running, less than 1 million tons of the Center’s annual seven million tons of CO$_2$ emissions would be released to the atmosphere.

Sadly, however, many environmental groups are refusing to recognize the economic, social, and environmental benefits of the project. One critic – Mark Kresowik of the Sierra Club – described the project as “just terrible.” Instead of supporting and applauding the project’s efforts to reduce emissions, he complained that not enough was being done to support renewable energy.

Expanding renewable energy is a laudable goal. Even with regard to this energy resource, however, the environmental community seems divided on the issue as efforts to develop renewable energy options, like hydroelectric, have also come under attack.

The green image of hydropower as a benign alternative to fossil fuels is false, says Éric Duchemin, a consultant for the Intergovernmental Panel on Climate Change (IPCC). “Everyone thinks hydro is very clean, but this is not the case,” he says.

“Hydroelectric dams produce significant amounts of carbon dioxide and methane, and in some cases produce more of these greenhouse gases than power plants running on fossil fuels.” 1

Wind generation has also been disparaged by some environmental groups.

Greek environmental groups urged the government on Monday not to grant licenses for wind power parks on two Aegean islands, claiming they would damage the environment and affect income from tourism. 2

And,

A plan to anchor 170 towering wind turbines five miles off the coast of Cape Cod has created some unusual foes.

On one side is the Humane Society, the International Fund for Animal Welfare, the International Wildlife Coalition and environmental lawyer Robert F. Kennedy Jr., among others. On the other side are groups that might normally be considered allies, including the Natural Resources Defense Council, the Union of Concerned Scientists and Greenpeace.

They’re clashing over a power source that defenders say will offer bountiful clean energy to the region, but opponents say will blight the view off the Massachusetts cape, kill birds and harm fishing and tourism. 3

Returning to the nuclear industry, the environmental movement has had a historical distaste for nuclear energy – Moore’s past contemporaries in Greenpeace describe it thusly:

Greenpeace has always fought – and will continue to fight – vigorously against nuclear power because it is an unacceptable risk to the environment and to humanity. The only solution is to halt the expansion of all nuclear power, and for the shutdown of existing plants. 4

Moore and some other environmentalists recognize the need to expand our generation capacity so we can meet future demand – in Moore’s case, through the development of nuclear power. Others, however, who once supported nuclear as a “green” alternative, are now turning on their industry partners. JunkScience.com founder, Steven Milloy describes this situation in a recent article, where he states that the nuclear power industry was now getting a “knife in the back” after having “played footsie with the ‘greens’ on global warming.” 5

Green advocates, such as Amory Lovins, chairman and chief scientist of the Rocky Mountain Institute, have started promoting the notion that by continuing to use nuclear energy, society is actually intensifying global warming. In an article prepared for publication in the November 2008 edition of the journal Ambio, Lovins describes nuclear as:

... grossly uncompetitive, unneeded, and obsolete – so hopelessly uneconomic that one needn’t debate whether it’s clean and safe; it weakens electric reliability and national security; and it worsens climate change compared with devoting the same money and time to more effective options. 6

Milloy’s assessment suggests that the recent focus on nuclear as a prospective solution to the climate change issue has shocked green groups and solidified their resolve to see it forced to the policy back burner. In response, mainstream environmental groups are stepping up their anti-nuclear attacks.

In their Nuclear Facts fact sheet, the Natural Resource Defense Council
Nuclear power is “so hopelessly uneconomic that one needn’t debate whether it’s clean and safe.” – Amory Lovins, chairman and chief scientist of the Rocky Mountain Institute

(NRDC) makes the statement that, “expanding nuclear power is not a sound strategy for diversifying America’s energy portfolio and reducing global warming pollution.” In the same fact sheet, they echo Lovin’s claim that monies spent on nuclear energy programs “displace … funding” that might otherwise go to renewables, thereby worsening climate change. As Milloy notes, the Maryland PIRG presented a similar argument, stating that renewables will avoid carbon emissions, as well as the “downsides of nuclear.” Environmental Defense flatly charged that their concerns over “safety, security, waste, and proliferation” issues ensured they “cannot support an expansion of nuclear” power. The World Resources Institute for its part argued that regardless of the costs or benefits of nuclear energy “most communities do not want nuclear plants nearby.”

Interestingly, NRDC, Environmental Defense, and World Resource Institute are all members of the United States Climate Action Partnership (USCAP) and were involved in the drafting of that group’s blueprint document “A Call For Action.” The USCAP Web site describes that document as being the result of a “year-long collaboration” between members and lists nuclear as technology that helps to reduce GHG emissions. The green groups’ documented opposition to nuclear power appears to contradict their “collaboration” in the USCAP initiative.

It appears that green groups are willing to ally themselves with industry if they can use that alliance to push for stricter environmental restrictions and taxes on energy. Outside of the influence of that alliance, however, they appear to remain committed to curtailing energy development, regardless of the fuel source.

This consistent resistance to energy development – be it wind, hydro, nuclear, and coal – demonstrates where many green groups stand. They appear to be more focused on stopping development rather than on protecting the environment.

The diverging interests of industry and environmental groups mean that a close and comfortable working relationship may never be possible. However, the two groups will remain linked because of the fact that all forms of energy production have some impact on the environment and environmental agendas will only move forward so long as we maintain a strong and functioning economy.

The costs and benefits associated with partnering with environmental groups must be carefully weighed. Genuine partnerships may provide a valuable option for addressing our energy, economic and environmental needs. There are significant lessons to be learned, however, from the recent initiatives and activities that suggest many green groups are working at cross-purposes to the energy industry, as well as working to pit industry sectors against each other. ♦

Jason Hayes is communications director for the American Coal Council (www.clean-coal.info).

4 Greenpeace International, “End the Nuclear Age” – http://www.greenpeace.org/international/campaigns/nuclear
5 “Nuclear’s Wake Up Call” August 14, 2008 - http://junkscience.com/ByTheJunkman/20080814.html
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Fraser Institute Mining Survey: A first step in due diligence work

By Fred McMahon, The Fraser Institute

The Fraser Institute’s Annual Survey of Mining Companies and all the data we can publicly release are available for free download on our Web site. So, instead of telling you what you can get for free and in more detail elsewhere, I’ll tell you what the survey is about and give you some tips on using it.

The survey has gained a reputation for helping miners determine the political risk of jurisdictions worldwide. So far this year it has generated over 400 news stories from Chile to Colorado.

Among many other things, this year’s survey would tell miners that native land claims are a concern in three important coal mining states – Colorado, Montana, and Wyoming – but not nearly as great a concern and risk as in most Canadian provinces. Miners find a more favorable tax regime in Montana than in the other two states, but are less worried about labor regulations and employment agreements in Colorado than in Montana and Wyoming.

Unfortunately, these are the only big coal mining states in the survey, though we are looking at ways to expand the survey. The survey also contains information on jurisdictions around the world that can be useful to coal miners.

The survey asks mining companies about the attractiveness of 68 jurisdictions on all continents except Antarctica. This year, 372 companies responded, representing $1.48 billion in exploration spending in 2007 or 14.8 percent of global spending, according to Metals Economics Group.

The survey asks questions on 13 specific policy areas:

• Uncertainty concerning the administration, interpretation, and enforcement of existing regulations.
• Environmental regulations.
• Regulatory duplication and inconsistencies (including federal/provincial or federal/state and interdepartmental overlap).

• Taxation regime (including personal, corporate, payroll, capital taxes, and the complexity associated with tax compliance).
• Uncertainty concerning native land claims.
• Uncertainty concerning which areas will be protected as wilderness or parks.
• Infrastructure.
• Socioeconomic agreements.
• Political stability.
• Labor regulation/employment agreements.
• Geological database (including quality and scale of maps and ease of access to information).
• Security (from terrorism, banditry, guerrilla movements, etc.).
• Availability of labor/skills.

The survey also asks two overview questions, the second of which is, in effect, about a jurisdiction’s pure mineral potential under “best practices”:

• Current mineral potential – assuming current regulations/land use restrictions.
• Current mineral potential – assuming no land use restrictions and industry “best practices.”

For all questions, miners are asked to respond on a five-point scale: 1 – encourages exploration investment; 2 – not a deterrent to exploration investment; 3 – mild deterrent to exploration investment; 4 – strong deterrent to exploration investment; and 5 – would not pursue exploration investment in this region due to this factor.

Figure 1 is a composite index measuring the attractiveness of all policy in the 13 policy areas examined with 100 the top possible positive score, and zero the most negative possible score.

We survey mining companies because it is the best and often only way to get reliable information on regulatory environments. The attitude of regulators, bureaucrats, and politicians often is more important
The survey creates transparency about mining policy, and thus provides the public with accountability about mining policy. That, in itself, can create a push to better policy.

than the regulations in the books, so you can’t simply read the books.

Instead, the folks who best know how the regulatory regime actually works are the miners who deal with it everyday. We ask miners to respond only about those jurisdictions with which they are familiar.

But it won’t do to simply ask miners. The survey began over a decade ago under a mining-hostile government in British Columbia. Then executive director of the Fraser Institute, Michael Walker discovered miners were afraid to speak openly about the desperate situation in the industry for fear of retribution from a government that was happy to politicize the economy. Thus, the survey provides guaranteed anonymity to respondents.

All this points to another use of the survey: The survey creates transparency about mining policy, and thus provides the public with accountability about mining policy. That, in itself, can create a push to better policy. Moreover, while some officials are simply anti-mining, some governments just don’t understand the impact of their policies and processes. The survey reveals the impact and shows governments where improvements are required.

The survey is global, but it has its biggest impact in Canada. Each year around release time, I get calls from mining ministries across Canada trying to get a heads up on their score and, more importantly, where they have policy weaknesses and what improvements are possible.

It is no coincidence that Canada’s scores have consistently improved relative to the rest of the world since the survey got public traction in Canada. We are working hard, and having great success increasing the profile of the survey internationally.

Aside from creating transparency and accountability, the survey is a good starting point for miners considering a new project or investment. It provides an early warning of where to look for problems and to focus due diligence.

It can also reveal surprises that you might otherwise miss. While Nunavut is not a coal producing area, it provides a useful example. If you talk to the Nunavut government, you’ll find correctly that all native land claims have been resolved, so you might think our survey, which shows problems with land claims, is a bit screwy. Actually, the survey warns you to look more closely.

Land claims have been settled, but a cumbersome process, including multiple stakeholders, has been set up to regulate and approve exploration and development in these areas. In other words, claims have been resolved, but not the problems associated with them.

Another tip in reading the survey is to be sensitive to the minority experience. Some companies report negative responses to highly ranked jurisdictions, while others report positive responses to negatively ranked jurisdictions.

The first tells you to be aware of hidden
traps even in the best jurisdictions; the second tells you that at least some companies have found ways to navigate through difficult situations. This can be highlighted by quoting one survey respondent, an exploration company consultant.

“Venezuela is the best: No royalties, best rocks, low taxes, low labor and fuel costs, most loose environmental regulations … We got our permits to explore in 6 days! [On the other hand], Canada [has the] highest level of expropriation, nationalization and forced mine closure … Canada is the worst!”

Few would agree, but at least someone has found a way to navigate around obstacles in Venezuela, so maybe others can too.

With most jurisdictions, the responses are either overwhelmingly favorable or overwhelmingly negative (though even here, as the above quote shows, you might find some folks who have had good experiences).

The rarer situation, where the opinions are closely divided, shows that miners either have to put work into understanding the system to avoid the difficulties some have experienced or that different parts of the jurisdiction may offer differing levels of regulatory problems.

For instance, in Montana, 11 percent of respondents say they would not invest there due to regulatory uncertainty, while 11 percent say lack of regulatory uncertainty is a positive inducement to invest.

With these hints in mind, and the very clear message the survey sends for some jurisdictions, miners will find the survey a useful tool in beginning their due diligence work.

Please visit the Fraser Institute’s Website and see our work on mining: www.fraserinstitute.org/researchandpublications/researchtopics/mining.htm

While there, you might also want to look at our work on risk and regulation, an important topic area for miners: www.fraserinstitute.org/researchandpublications/researchtopics/riskandregulation.htm

Fred McMahon is the coordinator of the Fraser Institute’s Annual Survey of Mining Companies. He directs the Institute’s newly established Global Centre for Mining Studies (www.fraserinstitute.org).
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Governments around the world face difficult decisions on the future direction of their energy systems and whoever leads the new administration in the United States will have to balance a number of different energy priorities. Europe also is grappling with these issues, and a number of recent developments have highlighted the difficulties involved in finding a balanced approach to meet the disparate and frequently competing priorities for European energy policy.

Like many regions, European energy policy seeks to address a series of priorities, including the secure supply of energy, maintaining access to affordable and economically competitive energy services, and reducing greenhouse gas emissions. This concept has been captured in calls for Europe to develop a “secure, competitive, and sustainable” energy system.

Finding a solution to any of Europe’s energy priorities would be relatively simple, but trying to find a sustainable solution that addresses all three, simultaneously, is much more complex.

Europe currently uses coal to generate around 30 percent of its electricity. The European Commission has publicly stated that coal has a key role to play in the European energy mix and is vital for the EU’s security of supply and economic competitiveness. However, Europe also has very publicly assumed a “leadership” position on climate change, agreeing to unilaterally cut its emissions 20 percent by 2020, and further offering to extend this to a 30 percent cut if other developed countries take on similar targets in any new international climate change agreement. Thus, the future for coal in Europe is predicated on the deployment of carbon capture and geological storage (CCS) to enable the future use of coal to be compatible with Europe’s climate change ambitions.

Concerns over energy security in Europe have traditionally centered around northern Europe’s dependence on Russian natural gas. The recent dispute between Russia and the Ukraine, coupled with a perception of increased resource nationalization in Russia, has led to questions about whether Russia can be considered a reliable energy partner. However, further south, fears are building over the reliance of a number of European countries — including Spain, France and Italy — on gas imported from Algeria. Spain, which sources 37 percent of its gas from Algeria,
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is currently in a dispute with its North African neighbor with similarities to those in northern Europe. Such disputes include access to gas distribution in Spain, gas pricing, and the cancellation of contracts for Spanish energy companies operating in Algeria. Whatever the wrongs and rights of such disputes – and all parties feel they have legitimate grievances – it does bring into sharp relief the reality that security of supply is far from a nebulous concept. Energy security is very much at the forefront of the European energy debate.

Couple concerns over security of supply with the recent rocketing of oil and gas prices, predictions from Gazprom that oil prices could rise to $250 a barrel next year (and the resulting impact that this will have on energy costs and the competitiveness of European business), and you would be right to think that this bodes well for the future of coal generation in Europe.

In many regards, it would appear that coal has a strong future at the heart of the European energy mix. The Commission must be commended for appreciating that the development of clean coal technology – especially carbon capture and storage – is critical to meeting its goals, and the Commission is making strides to make what it terms “sustainable coal” a reality.

The European Council committed last year to establishing a network of 10 to 12 commercial-scale power plants with CCS by 2015 in order to fully validate CCS technologies and allow them to be commercialized by 2020. To enable this, the Commission recently released a draft CCS Directive that will establish the framework and conditions for CCS operations in Europe. They also developed a Strategic Energy Technology Plan to accelerate the development and implementation of CCS and initiated a CCS research program.

As many countries around the world are discovering, one of the biggest hurdles facing the development of CCS is funding the first projects. CCS technology is expensive and governments are balking at the costs of these projects. However, it seems here that a solution may be in hand. Both the Norwegian and British governments have agreed to financially support CCS demonstration projects in their respective countries, although this still leaves Europe some way short of the 10 to 12 plants it wants. However, the revision to the European Union’s Emission Trading Scheme (EU ETS) that’s in the process of
If these investments are not made and Europe witnesses blackouts or rapidly rising levels of energy poverty, then the political will to tackle climate change also may weaken.


Ameren Energy Fuels & Services Company (AFS) provides a full range of fuel-related and business development services to the Ameren group of companies. AFS also provides assistance to some unaffiliated business, assisting with specific fuels, ash management and emission related issues.

AFS procures over 40 million tons of coal from the Powder River and Illinois Basins for use in the Ameren generation fleet. In addition to procurement, AFS provides transportation services related to negotiation and administration of rail, barge and truck contracts, as well as the management of over 5000 system railcars.

Management and marketing of coal river terminals on the Mississippi River is another area of expertise for AFS. AFS has the ability to provide blending and rail to water trans-loading services for both in-house and third party users.

Combustion by-product services for beneficial use such as flowable fill projects as well as ash disposal options are additional services provided by the AFS team.

AFS provides all procurement of natural gas on both the wholesale and retail level to over 925,000 customers in the Ameren UE, Ameren Energy Generating Company, Ameren CILCO and AmerenIP territories.

Market research is an additional function of AFS, providing senior management as well as plant operations with the necessary information required to keep on top of the ever-changing fuel and transportation markets.

The Business Development group of AFS is also responsible for activities related to renewable energy resources and the development of “green generation projects.”

BNSF Railway is proud to join with the American Coal Council in working to advance the development and utilization of coal as an economic, abundant and environmentally sound fuel source.

Growth depends in part on transportation capacity, and BNSF has a proven track record of leadership in providing that capacity. Over the past three years, BNSF has committed more than $1.22 billion for coal capacity expansion.

The 100 miles of new railroad we built between Gillette and Orin, Wyo., in the 1970s helped develop what has become the nation’s most important domestic energy source for generating electricity. That 100-mile line has grown to almost 400 miles of track, and the expansion continues.

As our nation’s demand for an environmentally friendly, domestic energy source continues to grow, BNSF is delivering more coal than ever. BNSF has set annual coal tonnage records for each of the past four years.

With our investments in capacity, and with the expertise of the BNSF team, we’re prepared to handle even more American coal in the future.
At the turn of the century, Edmonton, Alberta-based EPCOR Utilities proposed supercritical boiler technology for a new power plant as a way to balance the need for more generation in the province against a growing environmental public awareness.

Almost nine years have passed and that supercritical plant – in its third year of operation – is still Canada’s cleanest, most advanced coal-fuelled electricity plant.

Alberta – Canada’s version of Texas – is blessed with excess hydrocarbon resources. As a result, the province’s economy has been on an energy-fuelled economic roll. Since the good times turned to boom times in the late 1990s, more and more labour and resources have migrated to the province, putting increased pressure on an already stressed power grid.

In 2000, EPCOR President and CEO Don Lowry announced the launch of a regulatory application for a third generator at the Genesee coal-fuelled power plant, about 80 km west of Edmonton.

“In December 2000, EPCOR announced its intent to adopt the best available, commercially-proven technology and to raise the bar, both in terms of environmental standards as well as public consultation, for our Genesee Phase 3 project,” Lowry said in January 2002 when regulatory approval for the $695-million G3 project came through.

“We believe we have succeeded on both fronts,” Lowry continued. “Genesee Phase 3 represents the most advanced coal-combustion power generation facility ever to be built in Canada. This new generating station will be equipped with a combination of technologies that will enable EPCOR to meet or exceed all applicable regulatory requirements.”

Then, in May 2002, EPCOR announced a Memorandum of Understanding (MOU) for TransAlta Corporation of Calgary to purchase a 50 percent stake in G3. The MOU included a commitment to jointly develop Keephills 3, a proposed supercritical unit at TransAlta’s Keephills station, located on the same coal seam as Genesee.

On time and on budget, the 450-MW Genesee 3 was declared operational in March 2005, providing enough electricity to power a city of 350,000. In addition to the supercritical boiler, G3 included $90 million in emissions scrubbing equipment.

In a supercritical boiler, higher temperatures and steam pressures together with a high-efficiency steam turbine, create a more efficient process for converting thermal energy into electricity. The process burns less coal per megawatt hour of electrical energy than the conventional sub-critical process, thereby reducing emissions. Steam temperature for G3 is 566°C (1051°F) compared to 540°C (1004°F) for the other two Genesee plants. Less burning and less coal add up to less carbon dioxide (CO2) emissions. CO2 emissions are 18 percent lower than the average Alberta coal plant.

Genesee 3 produces about half of the nitrogen oxide emissions compared to plants with sub-critical coal-fuelled technology, thanks to low-NOx burners.

A bag house, which operates the same way as a home vacuum, helps prevent 99.8 percent of fine particulates from reaching the atmosphere. Exhaust is sucked through the house where particulates collect in 11,000 bags. This process controls emissions to below 0.06 tonne/h.

Sulphur dioxide (SO2) emissions are cut significantly below provincial standards. Efficiencies created through supercritical technology directly transfer into a reduction of SO2, however, EPCOR also added a Flue Gas Desulphurization (FGD) process. Genesee’s FGD uses a spray dryer absorber, which through a chemical reaction results in considerable SO2 reduction.

Overall, smog-related emissions at Genesee 3 are 70 percent lower than older plants.
Genesee 3 could not have been built without community support. EPCOR's Public Consultation process is based on working with and listening to stakeholders to incorporate their feedback into project designs, construction phases and operations.

When the G3 project first surfaced, EPCOR had already been in the Genesee community for over 20 years and had established some long-term working relationships with neighbors. Under provincial regulation, EPCOR was required to communicate to people within an 800-metre radius of the proposed facility. EPCOR goes beyond the required distance, to ensure the company is considered part of the community – rather than just operating in the community.

The Genesee Public Advisory Committee (GPAC) provided input about the construction and operation of the project, along with representatives from the neighboring coal mine, the local county and the provincial environmental department, Alberta Environment. GPAC evolved into the present day Genesee Community Advisory Task Group.

Many aspects of a project design can be adapted to reduce impact. One of EPCOR's goals in early phases of consultation is to find out what is important to stakeholders and to incorporate their priorities and values into the project design and environmental assessment.

G3 stakeholder communication included one-on-one interviews by an independent research firm; bimonthly newsletters from the plant manager; regularly scheduled meetings and presentations; participation in community events such as pumpkin festivals or Canada Day celebrations; school programs; and community donations and sponsorships. Importantly, the communications program included a commitment to keep stakeholders informed about operations through open houses, written and verbal notices of major operations such as a transformer installation or a dragline crossing the highway. Regular noise monitoring ensures Genesee is within specified levels. Also, EPCOR provided neighbors with a phone contact for questions and concerns.

The EPCOR Community Advisory Task Group (E-CATG) was formed to represent residents living within a 25-kilometre radius of the Genesee Generating Station. The E-CATG is facilitated by Decision Partners, an independent company. After each E-CATG meeting, summaries are distributed to the community and are available on the EPCOR Web site.

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G3 was the largest single generation unit ever added to Alberta’s power grid, and its construction site was one of the largest and busiest in Alberta. At peak construction, 2,100 people worked on the project. Over the 36-month construction period, 42 different contractors and 16 unions worked together and by September 2004, G3 marked two million person-hours of work without a lost time injury.

Moving on the success of Genesee 3, EPCOR along with partner TransAlta is in the middle of building the 495-megawatt supercritical Keephills 3 coal-fired generating plant. Keephills 3 is located adjacent to the existing TransAlta Keephills power plant, which can be seen from the Genesee rooftop. EPCOR is responsible for construction. Upon completion, TransAlta will operate the facility. EPCOR and TransAlta will independently dispatch and market their share of the unit’s electrical output.

Work to prepare the Keephills 3 site for construction began in February 2007. Construction is expected to take four years with commissioning scheduled for 2011. The capital cost of the project, including mine capital, is expected to be approximately $1.6 billion and is anticipated to result in a peak workforce of up to 1,000 people.

EPCOR’s pursuit of new technology development doesn’t end at Keephills. The utility is poised to move into front-end engineering design (FEED) on a potential integrated gasification combined cycle (IGCC) project. With $33 million in funding from the provincial government, federal government and EPCOR itself, the FEED project will look at details including an early cost estimate (now guessed at between $3 and $5 billion.)

Once the FEED project is complete, EPCOR will look for partners because the company cannot meet the cost on its own. However, the IGCC proposal carries benefits beyond low-emissions generation. The project could dovetail with Carbon Capture and Storage (CCS) initiatives in Alberta. Captured carbon dioxide at Genesee could be used for enhanced oil recovery – that is, pumping it into old wells to raise the depleted pressure and, thereby, increase oil output.

Tim LeRiche is senior adviser, corporate relations at EPCOR Utilities, Inc. (www.epcor.ca).
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The Role of Coal Gasification in a Carbon Constrained World

By David Rosenberg, General Electric

The generation of electricity from coal has evolved since the industrial revolution from small-scale, inefficient and uncontrolled boilers operating at near saturation conditions to large combustion furnaces operating at ultra-supercritical steam conditions and capturing a large portion of pollutants prior to releasing the flue gases into the atmosphere. Today, coal-based electricity generation represents nearly 40 percent of global power generation; that number likely will grow since coal represents the largest source of fossil energy reserves. Even with strong encouragement of renewable and other low carbon energy technologies, fossil fuels may still provide half of the world’s energy supply in 2050.1

The public, regulators, and governments have responded by implementing or considering emission limits to restrict or limit growing concentrations of carbon dioxide (CO₂) in the atmosphere.

Considerable discussion about climate change mitigation has identified Carbon Capture and Storage (CCS) as a potential solution, as it captures CO₂, that would otherwise be emitted from fossil fueled power stations. As a consequence of this debate, it has been widely accepted that power production from coal must realize improvements – beyond incremental efficiency gains achievable with conventional coal-fueled generation technology – to significantly reduce CO₂ emissions in the near term.

Gasification Enables Carbon Capture

Gasification is fundamentally different than conventional combustion. It is appropriately viewed as a coal refining process that removes pollutants prior to combustion. Within this context, coal gasification and associated fuel process treatment provide commercially proven mechanisms needed to separate carbon components on a “pre-combustion” basis, leaving a hydrogen-rich fuel that’s available for either electricity generation or for distribution within a hydrogen infrastructure.

Carbon separation technologies have been used in industrial operations to convert partially oxidized fuels into hydrogen or ammonia, where CO₂ is merely a byproduct. Also called gasification, this partial oxidation process has an advantage: low-grade fuels can be turned into high-grade hydrocarbons as unwanted pollutants are separated from the process gas streams and captured.

General Electric (GE) believes that pre-combustion carbon capture and gas cleanup of this type offers substantial advantages over pulverized coal technology with respect to capturing pollutants such as particulates, sulfur and mercury, as well as the capture and removal of CO₂. We also believe that it is a technology that can be readily deployed today.

The environmental benefits of coal gasification-based CCS are comparable to the benefits of renewable energy technologies. The higher cost associated with pre-combustion CCS should be, and in some cases already is, incentivized.

IGCC: Commercially Proven

Integrated Gasification Combined Cycle (IGCC) uses this proven gasification technology and can be considered a critical technology in our response to global climate change. It represents the current state-of-the-art available technology to integrate energy production from coal together with CCS. IGCC marries chemical process and power technology to meet customer requirements of cost, availability, operational and fuel flexibility. IGCC can operate on a multi-fuel basis and facilitate the use of coal to produce valuable products beyond electricity generation.

In 1984, the Cool Water Coal Gasification Program demonstrated the technical feasibility of IGCC. Beginning with Cool Water, gasification and syngas turbines have benefited from significant advancements and a wealth of lessons learned from the demonstrations. Turbines have evolved to provide increased output, efficiency, reduced NOX and capability for integration with the process plant. Process design has incorporated experience from utility, refinery, polygeneration and gasification for chemical production.

The Tampa Electric Polk project, partially funded by the U.S. Department of Energy under the Clean Coal Technology Demonstration Program, demonstrated the commercial feasibility of IGCC. The Tampa Electric Station is a 250 MW net, coal-fired IGCC based on a GE oxyfired gasification system with full heat recovery, and a GE 107FA-combined cycle system. The Polk plant has been operating...
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at commercial scale in Florida since 1996 and is the lowest variable cost of production in the Tampa Electric Company grid today.

GE’s experience in commercial IGCC spans 14 plants and over 3 GW of electrical power generation. Today’s commercial IGCC offerings build on the success of these early projects to include expanded systems integration, as well as continuing advancements in both syngas turbines and process technology. Duke Energy is using GE technology for its carbon-capture-ready 630 MW IGCC plant currently under construction at Edwardsport, Ind.

IGCC: Ready for Carbon Capture

The high pressure IGCC gasification process provides the mechanism to effectively capture key pollutants such as particulates, sulfur and mercury, while also capturing and removing carbon dioxide, prior to combustion. Pre-combustion capture is more economical than capturing these pollutants in a “post-combustion” high volume and low concentration flue gas. The net combination of treating only the synthesis gas and pressure gives IGCC a 300/1 advantage in treatment volume compared to post-combustion capture. IGCC further benefits from a depth of existing experience of gasification in chemical applications that are already extracting carbon from syngas – combined with turbine experience with high hydrogen fuels (50 percent to 95 percent) in process plant and IGCC applications. Based on economics, IGCC is expected to be the primary approach used for carbon capture for coal-based power generation now and in the future.

In addition to other environmental benefits, IGCC plants require far less water than conventional coal plants do. IGCC produces useful byproducts such as elemental sulfur or sulfuric acid for beneficial industrial use, such as fertilizer production and vitreous slag, for construction use. Multiple studies comparing today’s available and prospective CCS technologies have concluded that pre-combustion capture is more economical than post-combustion capture with associated treatment of flue gases. In addition, energy producers have frequently pointed out the requirement for funding mechanisms to provide predictable long-term financial support for CCS projects.

To further strengthen carbon capture capabilities, GE formed a marketing alliance with Schlumberger Carbon Services in May 2008. The agreement aligns GE’s experience in IGCC systems with proven carbon capture capabilities and Schlumberger’s geologic storage expertise and capabilities for site selection, characterization and qualification. This is a first-of-its-kind arrangement between leaders in IGCC technology and CO₂ storage to accelerate the commercial development and deployment of cleaner coal power.

How Do We Continue Coal Build?

There is no “silver bullet” for solving climate change. Achieving the significant reductions in carbon emissions being contemplated for policy goals will require an array of technologies: renewables, efficiency, nuclear, natural gas and IGCC. A consensus of studies of currently proposed U.S. climate change legislation concludes that coal with carbon capture and storage is a key component for achieving these reductions. For the previously cited reasons, GE is confident that IGCC with carbon capture is ready – it can be engineered with confidence and commercially
offered today. The big questions are when, how much capture, and what will be the requirements for integrating a power plant with a sequestration facility?

Taking action based on reasonable assumptions while keeping options open is a proactive, risk-balanced approach. With IGCC, carbon capture is ready for deployment. Deployment of these plants concurrent with large-scale CCS demonstration projects is the quick and sure pathway to reducing the cost of CCS. Building plants that meet strict quantified requirements for being “carbon capture ready,” can move coal forward in the face of uncertainty. Unfortunately, the term “carbon capture ready” has suffered from misuse. A prime example of this is the “trust me” claim that simply leaving space for future addition of poorly defined carbon capture hardware qualifies a plant as being carbon capture ready. This misuse has been noticed by opponents of coal. We believe that criteria that constitute a litmus test for the denotation of being carbon capture ready, must be adopted.

However, capturing carbon is only a piece of the CCS puzzle. GE believes that the lack of a clear regulatory framework and policy, as well as a clear value for carbon in the U.S. and around the world, is limiting the advancement of coal with carbon capture and sequestration. This is our industry’s challenge and what we need to focus our efforts on if we are to extract coal from its carbon penalty box.

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