Fact Sheet:
The Edwardsport IGCC Proposal: A Key Step Forward to Reducing Global Coal Impacts

The Indiana Wildlife Federation and the Clean Air Task Force will seek to convince Indiana regulators to turn a proposed coal gasification power plant near Vincennes Indiana into one of the first in the nation to capture carbon dioxide and achieve near total elimination of mercury emissions. The groups see the development of the proposed IGCC facility at Edwardsport, and the inclusion of cost-effective partial carbon capture and storage, as an important step in demonstrating the viability of both the carbon capture and the geologic storage technologies. The broad application of these technologies across all coal-based power generation will be necessary protect the Earth from global warming. The groups additionally maintain that the facility can achieve near total and permanent elimination of mercury emissions for very little additional costs – thus setting an important precedent for mercury management from coal plant emissions.

The Problem With Coal Today

- Burning coal to make electricity is one of the most environmentally destructive activities on Earth, and the single largest human contribution to global warming. Coal combustion:
  - is responsible for most of the nation's sulfur dioxide emissions which, even after recent regulatory reductions, will still take 15,000 lives prematurely in the US each year by EPA's own estimate
  - contributes substantially to nitrogen oxides, which add to smog, haze, and crop and ecological damage
  - is the nation's largest single source of mercury air pollution
  - emits nearly 100 million tons of toxic wastes each year, the disposal of which is not regulated by the federal government
  - is responsible for nearly 40% of the planet's man-made emissions of CO2 that contribute to global warming

- Closer to home, Indiana's coal plants generate 96% of the electricity in the state; our coal plants are number 2 and 3 respectively in the nation for ozone-forming nitrogen oxide and soot-forming sulfur dioxide emissions, number 4 for toxic mercury emissions, and number 4 for emissions of the heating trapping carbon dioxide emissions[i]. These facilities also generate millions of tons of coal waste every year that is stored in lagoons near the power plants, where they can potentially contaminate water, soil and air[ii].

- The mining of coal has contributed to serious health, safety, and environmental problems. Coal mines have a fatality rate five times greater than then average work environment. Coal mining can seriously disrupt wildlife habitat, significantly impair water quality, and damage private property. Breaches of mine waste containment have resulted in loss of life and serious property damage.

- Despite these problems, coal based power generation is likely to be relied on for decades to come. World electric demand is now forecasted to triple by 2050, coming largely from developing countries like China and India. While greatly increased deployment of energy efficiency and renewable energy technologies will be essential, most analyses agree that this underlying global demand growth will outpace even aggressive energy efficiency and renewable energy development along with deployment of natural gas and nuclear power.[iii] As a result, global production and use of coal is expected increase worldwide[iv]. China, for

example, is adding 70,000 MW of new coal plants (the equivalent of 2.7 times Indiana's total generating capacity) *per year*, and is poised to keep that pace up for the foreseeable future[v].

- The United States generates more than 50% of its power from coal today, with many states relying on coal much more heavily. Indiana generates 96% of its power from coal today. While many options exist to improve the nation's energy portfolio, it is clear that even in the US, coal will remain a significant part of that portfolio for some time.

- All of this puts coal on a direct collision course with climate protection. Most scientific analyses agree to that limiting global warming to levels that do not radically transform the planet will require a sharp *reduction* in global CO2 emissions starting in the next decade. But projected new coal plants, if they use older technology, will by themselves *increase* world CO2 emissions by 20%. Due to the unavoidable role of coal over the next several decades, *our ability to slow global warming now depends in large part on whether and how fast we can divert world coal use to a radically cleaner technology that eliminates most of coal's carbon dioxide emissions.*

How Can We Turn the Tide?

Fortunately, most of coal's damage to earth's atmosphere can be avoided by advanced technology.

- Integrated Gasification Combined Cycle (IGCC), as proposed by Duke at Edwardsport, is a technology that substantially reduces the environmental impacts of electricity production from coal as compared to conventional coal combustion.

- Carbon Capture and Storage (CCS) is a method of storing large amounts of CO2 in deep underground geologic formations, such as deep saline aquifers and oil and gas deposits. It similar to the technology that has been used to store natural gas in these type of reservoirs in the Midwest for many decades. IGCC is a key enabling technology for CCS, because it allows for a relatively easy capture of CO2. The Intergovernmental Panel on Climate Change has stated that proper carbon capture and storage (CCS) is nearly certain to remove carbon emissions for 1,000 years or more, and can account for up to 50% of the emissions reductions that are needed to stabilize our climate[vi].

- Unfortunately, despite this, neither IGCC nor CCS have been deployed together commercially at large scale and are therefore not the technology of choice in the United States, much less China and India. It is likely that building 10 or more successful projects will be necessary to ensure its widespread adoption. Edwardsport is one of about a dozen active IGCC proposals in the US

How Can Edwardsport Be a Global Model for This New Technology?

By being a successful commercial demonstration of IGCC, Edwardsport can help pave the way for adoption of this technology nationwide. In addition, IWF and CATF are urging the following additions to the Edwardsport plan:

- Adding a carbon capture and sequestration component – While ultimately this plant needs to capture at least 90% of its CO2 emissions, Duke can gain substantial experience with carbon capture and storage technology, by initially using a less expensive process to capture between

20% to 30% of the CO2 emissions[vii]. Further, the potential for enhanced oil recovery in Indiana and Illinois may provide an opportunity to offset the cost of geologic storage[viii].

- The mercury controls proposed in the project can be modified to cost-effectively capture 99% of the mercury emissions from the facility.[ix]

- Disposing of non-recycled IGCC solid wastes in lined, monitored facility.

The groups also seek to ameliorate the impact of coal mining on land, water and wildlife through:

- Expanded Duke commitment to a improved coal sourcing program with the following attributes:
  - ✔ no coal purchases from mines that practice mountain top removal
  - ✔ coal sourced from mines with superior environmental compliance records
  - ✔ ground water monitoring systems based upon comprehensive hydrogeologic assessments
  - ✔ clear action plans in case of ground water impacts
  - ✔ reclamation practices and plans, and financial assurance for their implementation
  - ✔ public outreach and participation programs,

What other aspects of the Current Edwardsport Proposal Do IWF and CATF support?

- This proposed facility is repowering an existing old, dirty coal plant. That is a model that should be applied to other old, dirty coal plants as well.

- This proposal will be using the most up to date controls for nitrogen oxide and sulfur dioxide[x], demonstrating ultra low emissions that should be applied to any new coal plant in the U.S.

- While it is possible , cost-effective, and necessary to go further, the plant's current plans to capture 95% of the facility's mercury emissions in activated carbon beds and dispose of that waste in a hazardous waste facility still exceed the best current mercury control at conventional coal plants.

- The proposed facility will produce one half of the waste generated by a similarly sized fully controlled pulverized coal plant. Further, the waste from this type of technology poses much less risk for remissions of toxics than conventional coal waste, and is much more re-useable.

Because the Edwardsport facility adds 630MW of new generation and retires a less efficient but smaller plant, it will increase greenhouse gas emissions in the short term even with initial carbon capture and storage. Accordingly, the groups will continue to work to further reduce greenhouse gas emissions from this facility, and coal plants throughout Indiana and the U.S. Both IWF and CATF support an economy wide program to achieve a 60-80% reduction of greenhouse gas emissions by 2050 - the level necessary to prevent the worst impacts of global climate change. The groups see the improved Edwardsport facility as one of many steps to create the modern, diversified energy portfolio in the Midwest necessary to meet these goals.

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[i] EPA, Acid Rain Database, 2006; EPA Toxics release Inventory, 2004.

[ii] "Laid to Waste", Clean Air Task Force, 2000, http://www.catf.us/publications/view/6

[iii] International Energy Agency, World Energy Outlook (2006); Intergovernmental Panel on Climate Change, Special Report, Emissions Scenarios (2000).
[iv] U.S. Department of Energy, Energy Information Administration, Annual Energy Outlook, 2006.
[v] Massachusetts Institute of Technology, The Future of Coal (March 2007).
[vi] Intergovernmental Panel on Climate Change, Special Report on Carbon Dioxide Capture and Storage (2005)
[vii] A 25% capture could increase the cost of electricity at a facility by 9%, with a CO2 capture cost at roughly $22 per ton. Source: Electric Power Research Institute (Holt, 2006).
[viii] Current prices for CO2 used in the Permian Basin (Texas) for oil recovery are around $19 per ton. While it is unclear what the market price for CO2 for a fully scaled up project in the Illinois Basin would be, it is likely that it could offset some of the project capture cost.
[ix] A 99% capture rate at an IGCC facility is still 1/3rd the cost of mercury controls on a conventional coal-fired power plant – costing an estimated $0.0004/kWh. Source: Parsons Infrastructure and Technology Group. Inc., "The Cost of Mercury Removal in an IGCC Plant". Final Report, prepared for the Department of Energy, September, 2002.
[x] IGCCs using the Selexol sulfur removal system and a selective catalytic reduction system emit a third of the nitrogen oxide emissions and 1/12th of the sulfur dioxide emissions of a fully controlled supercritical pulverized coal-fired power plant. Source: Wisconsin Department of Natural Resources (Elm Road Permit), Permit application by ERORA to Illinois EPA.