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717-361-8905

PO Box 338, Hershey, PA 17033

## AMERICA'S ALTERNATIVE ENERGY SOURCES

### Coal-to-Liquid Fuel

By Hans Gehman, Research Associate, Susquehanna Valley Center for Public Policy

#### ***Current State of Coal-to-Liquid industry***

##### **How much is used?**

Coal-to-Liquid (CTL), or “liquefied coal,” technology is not currently being used commercially in the United States.<sup>1</sup> Worldwide, production hovers around 150,000 barrels of synthetic fuel, or “synfuel,” per day.<sup>2</sup>

##### **Where?**

Currently, Sasol in South Africa operates the only commercial production facilities for converting coal to synfuel.<sup>3</sup> Sasol is being consulted for the design of the first CTL production facility in the U.S., to be located in Gilberton, Schuylkill County, Pennsylvania.<sup>4</sup>

##### **Cost?**

CTL becomes cost-effective when the price of petroleum is \$35-\$55 per barrel.<sup>5,6</sup>

##### **Who is using it?**

Currently, synfuel is produced commercially only in South Africa. In the next five to ten years, China plans to spend about \$15B on CTL infrastructure capable of producing almost 117M barrels of synfuel from 16M tons of coal each year.<sup>7</sup>

## ***Outlook for Coal-to-Liquid***

### **Pros and cons?**

The primary benefit of CTL technology is the development on U.S. energy independence. U.S. DOE estimated recoverable reserves of coal in the U.S. total over 257B tons,<sup>8</sup> about half of which is located in Montana. If Montana's reserves were converted to synfuel, it would equate to about one quarter of the oil in the entire Middle East.<sup>9</sup>

Another benefit to CTL fuel is that, unlike petroleum diesel, it emits almost no sulfur dioxide during combustion, making it cleaner-burning than even the new Federally-mandated low-sulfur diesel.<sup>10</sup>

Thirdly, during the conversion process, about 31% of the coal's energy is converted into electricity, which would reduce the demand for new coal-burning power plants.<sup>11</sup>

As with most alternative fuel sources, CTL fuels cost more to produce than do current petroleum-based fuels. In the long term, this could possibly be mitigated by economies of scale.

Unlike many other alternative energy sources, coal is not renewable. Even before reaching the limits of U.S. coal reserves, mining technology will limit the ability to extract the available coal from the earth.

### **Barriers**

Major barriers to developing this technology in the U.S. include the "Not in My Back Yard" mentality fostered by historically-based misconceptions about the coal industry. Public opposition could make it difficult to gain the local government support necessary to building the Gilberton plant.

### **Incentives**

The bulk of the funding for the Gilberton plant will come from \$450M in Federally-guaranteed loans.<sup>12</sup> The US DOE selected the Gilberton plant project to receive \$100M in grants,<sup>13</sup> representing about one-third of the Energy Department's annual Clean Coal Power Initiative funding. Additionally, the plant would be eligible for \$47M in Pennsylvania state tax credits.<sup>14</sup>

## ***Costs for Coal-to-Liquid***

### **Infrastructure**

The 5,000 barrel per day Gilberton plant is expected to cost about \$612M, or about \$112,000 per barrel of daily capacity, to build.<sup>15</sup> Larger plants, benefiting from economies of scale, would cost \$50,000 to \$70,000 per barrel of daily capacity to construct.<sup>16</sup>

## Cost per kilowatt hour

This figure is difficult to determine, as electricity is a co-product secondary to the synfuel generated by the CTL process.

## Environmental costs

Opponents of the CTL plant in Gilberton, especially “Schuylkill Taxpayers Against Pollution” (STOP)<sup>17</sup> cite air pollution, high water consumption, and toxic waste products as the major environmental costs to the project.

On the other hand, a major environmental benefit to CTL plants is the use of existing culm (waste coal) piles as feedstock, thus reducing the environmental impact of yesteryear’s mining practices.<sup>18</sup>

## Recommendations

As with any alternative energy technology, initial costs to develop the CTL industry in the U.S. would be tremendous. Still, given the volatility of the petroleum market, the difficulty of oil-centric foreign policy, and the plentiful coal reserves in the U.S., it would seem prudent to develop the CTL infrastructure. Synfuel, combined with an add-mixture of biodiesel to replace the engine lubrication formerly provided by sulfur, could fuel the lion’s share of our vehicles, and liberate U.S. foreign policy from the specter of energy-induced conflict.

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<sup>1</sup> [http://specter.senate.gov/index.cfm?FuseAction=Articles.Detail&Article\\_id=38&Month=1&Year=2003](http://specter.senate.gov/index.cfm?FuseAction=Articles.Detail&Article_id=38&Month=1&Year=2003) accessed 09/11/06

<sup>2</sup> <http://www.gasandoil.com/goc/features/fex43159.htm> accessed 09/11/06

<sup>3</sup> [http://www.sasol.com/sasol\\_internet/frontend/navigation.jsp?navid=600003&rootid=2](http://www.sasol.com/sasol_internet/frontend/navigation.jsp?navid=600003&rootid=2) accessed 09/11/06

<sup>4</sup> [http://www.ultracleanfuels.com/pdf/sasoll\\_press\\_release-041805.doc](http://www.ultracleanfuels.com/pdf/sasoll_press_release-041805.doc) accessed 09/11/06

<sup>5</sup> <http://governor.mt.gov/hottopics/faqsynthetic.asp> accessed 09/11/06

<sup>6</sup> <http://www.natchezdemocrat.com/articles/2006/07/30/business/bus21.txt> accessed 09/11/06

<sup>7</sup> [http://www.greencarcongress.com/2006/02/china\\_to\\_invest.html](http://www.greencarcongress.com/2006/02/china_to_invest.html) accessed 09/11/06

<sup>8</sup> <http://www.eia.doe.gov/cneaf/coal/page/acr/table15.html> accessed 09/11/06

<sup>9</sup> <http://governor.mt.gov/hottopics/faqsynthetic.asp> accessed 09/11/06

<sup>10</sup> <http://governor.mt.gov/hottopics/faqsynthetic.asp> accessed 09/11/06

<sup>11</sup> <http://www.eia.doe.gov/oiaf/aeo/coal.html> accessed 09/11/06

<sup>12</sup> [http://www.ultracleanfuels.com/articles/prepublican\\_082506.htm](http://www.ultracleanfuels.com/articles/prepublican_082506.htm) accessed 09/11/06

<sup>13</sup> <http://www.netl.doe.gov/technologies/publications/factsheets/project/Proj225.pdf> accessed 09/11/06

<sup>14</sup> [http://specter.senate.gov/index.cfm?FuseAction=Articles.Detail&Article\\_id=38&Month=1&Year=2003](http://specter.senate.gov/index.cfm?FuseAction=Articles.Detail&Article_id=38&Month=1&Year=2003) accessed 09/11/06

<sup>15</sup> [http://specter.senate.gov/index.cfm?FuseAction=Articles.Detail&Article\\_id=38&Month=1&Year=2003](http://specter.senate.gov/index.cfm?FuseAction=Articles.Detail&Article_id=38&Month=1&Year=2003) accessed 09/11/06

<sup>16</sup> <http://www.eia.doe.gov/oiaf/aeo/pdf/issues.pdf> accessed 09/11/06

<sup>17</sup> <http://www.ultradirtyfuels.com/> accessed 09/11/06

<sup>18</sup> <http://www.ultracleanfuels.com/html/a10.htm> accessed 09/11/06