FOREWORD

On behalf of the Fulton-Hickman County Economic Development Partnership assisted by the Tennessee Valley Authority and the Fulton-Hickman County Riverport, this site was submitted for evaluation for potential development as an alternative energy facility. The site was evaluated against preliminary criteria which identifies characteristics beneficial for development of a wind, solar, biomass, nuclear, or coal-to liquid (CTL)/coal-to-gas (CTG) facility. This site benefits from access to substantial water resources, flexible transportation options, and adequate contiguous land, requiring little groundwork for development.

Cover photo (2008) - Proposed development site
The Fulton County, Hickman County Economic Development Partnership, assisted by the Tennessee Valley Authority and the Hickman Fulton County Riverport, has offered the TVA Hickman Site to be evaluated as a potential energy facility. The development of an energy facility, whether for CTL/CTG, wind, nuclear, solar or biomass, must consider basic common factors which include assets like access to transportation, general topography, proximity to public access areas, and available utilities.

**GENERAL SITE CONSIDERATIONS**

**Ownership**

There are two parcels available totaling 841 acres. The parcels are currently owned by private landowners, but are under option by the Fulton County, Hickman County Economic Development Partnership. Specifically, Mr. Doyle W. George and Mr. Bart Goodman are the owners of these parcels, comprising 708 acres and 133 acres, respectively.
Size
The site consists of two adjoining parcels totaling 841 acres. Additional property with 1,159 acres may also be available, resulting in a total of 2,000 acres for site development.

Topography
The site is located in Fulton County, Kentucky (USGS Hickman Topographic Quadrangle) approximately five miles west of the intersection of KY 166 and KY 125. Two abandoned homes and an outbuilding exist on the property at present. Several light industrial operations are located to the northeast and east, and one residence is located to the west of the property along KY 94. Much of the land surrounding the proposed site is presently underdeveloped and/or used for agriculture. There are currently no zoning requirements for Fulton County.

The proposed site is flat (0-3% slope across the site) land, presently used for agricultural purposes, requiring only minimal ground work for development at approximately 300’ Above Mean Sea Level (AMSL).

Floodplain and Wetlands
According to Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps, the entire site lies outside the 100-year floodplain. The floodplain for the Mississippi River lies north of the proposed site boundaries, though there is a levee operated by the Fulton County Levee Board to the standards of the US Army Corps of Engineers (USACE) to mitigate this concern.

Mapping available from the U.S. Fish & Wildlife Service indicates that 6% to 10% of the proposed site area is classified as wetlands, mostly located along the eastern perimeter of the proposed site. There are two smaller wetland areas, one in the southwest corner of the property, and another near the center of the property. Planning and/or additional study to assure wetlands are not impacted may be necessary as part of the
development process.

Site Hazards
The proposed site is not listed in publicly available environmental databases as of January 21, 2008, nor are any sites identified within the radius searched. Two solid waste landfills were identified nearby, one of which is associated with an adjacent steel company. The neighboring steel company is also listed as a non-geocoded facility with an operating solid waste landfill.

Oil and Gas Wells
There are no oil or gas wells, or immediate gas lines running through the property that would need to be relocated associated with development. As reported by the site sponsor, a 30-pound gas pipeline, maintained by Shell, is present approximately five miles to the east of the site near the intersection of KY-166 and KY-125. The location of this pipeline was also confirmed by the National Pipeline Mapping System.
**Sensitive Areas**

The proximity of non-attainment areas and Class I Visibility Areas to the site was examined for potential impacts to air quality or limitations on a required air permit for a CTL/CTG or biomass facility. There are no Environmental Protection Agency (EPA) listed non-attainment areas with respect to air quality in the Western Kentucky region in which the proposed site is located, nor in the adjoining Tennessee or Missouri counties. Based upon information obtained from the EPA website for Class I Visible Areas, the site is located greater than 150 miles from Mammoth Cave National Park, Sipsey Wilderness (AL), and the Great Smoky Mountain National Park (TN).

State water data was searched to determine if designated impaired streams in the area might affect discharge requirements for an energy facility. Running Slough crosses the site and, due to the control of surface drainage by the river levee, eventually drains into the Reelfoot Wildlife Management Area, a designated National Wildlife Refuge, located several miles south of the site. Running Slough is listed on the 303(d) List of Surface Waters for partial support of the warm water aquatic habitat designation because of turbidity and sedimentation from crop production. Due to the potential impact of the site to the drainage path from Running Slough, a site developer may wish to have wastewater outfalls drain into the Mississippi instead.

The Mississippi River is an adequate source for wastewater discharge, and is an adequate waterway for barge access as well. There are no public water intakes within 25 miles downstream of the site. Use designations for the Mississippi River in accordance with 401 KAR 10:026 include warm water aquatic habitat, primary contact recreation, and secondary contact recreation. The Mississippi River at this location is not on the 303(d) List of Surface Waters for impaired uses. Additional investigation to determine what permitting and processes may be necessary to utilize these water bodies industrially will be required as part of the development process.
Siting considerations for any energy facility include the presence of Threatened and Endangered (T&E) species in the area, the presence of significant cultural or historical resources in and around the project area, and proximity to public access areas and airports. There are two (2) federally listed and sixteen (16) state listed threatened or endangered species associated with the general area of the proposed site. The Interior Least Tern and the Peregrine Falcon are both listed on the Federal and State endangered species lists and have been documented as present on the Hickman Quadrangle topographic map. There are nine (9) species listed by Kentucky Fish & Wildlife (F&W) as endangered including the Alligator Gar, Bachman’s Sparrow, Crayfish (Orconectes lancifer), Double-crested Cormorant, Great Egret, King Rail, Lake Sturgeon, and the Northern Shoveler. There are seven (7) species listed by Kentucky F&W as threatened including the Bald Eagle, Blue-winged Teal, Crayfish (Procambarus viaeviridis), Hooded Merganser, Inland Silverside, Lark Sparrow, and the Southern Painted Turtle. Based on the site location, it does not appear that any critical habitat for these species exist at the proposed site. However, the undeveloped,
forested, rolling hill land to the south of the proposed site may be suitable for some of the identified species. Further investigation may be required prior to development.

There are public access areas nearby that may impact site development: the Reelfoot National Wildlife Refuge is located within 10 miles of the site and a water route of the Trail of Tears National Historic Trail is located along the Mississippi River within five miles of the site.

Listings for National Register Properties, National Register Districts, and Inventoried (potentially eligible) Sites were reviewed to determine if historic, eligible or potentially eligible sites were identified at or within 100 meters of the project area. Seven (7) previously recorded archaeological sites were identified within the project area, two of which are listed as eligible, with the remainder listed as potentially eligible. Development plans should be designed to minimize impact to these sites.

There is one airport and/or landing strip within 10 miles of the site that may have the
potential to impact potential alternative energy development. The Air Park Inn and Reelfoot State Park in Tiptonville, TN is approximately 6 miles from the site. Airport and airfield proximity raises questions with regard to potential hazards to small aviation which can be associated with processes or equipment at the proposed facilities.

**Geological Assets**

Siting considerations for a biomass or CTL/CTG process must take into account available geological assets for potential sequestration. Analysis by the Kentucky Geologic Survey (KGS) ranked the geologic assets for the site as poor. The graphic on the following page depicts geologic assets within a 15 mile radius of the site. According to this graphic, the site, which is labeled 2.19, lacks sufficient oil and gas development to provide carbon sequestration opportunities. The area within vicinity of the site also lacks sufficient shale formations (Devonian Ohio/New Albany/Chattanooga Black Shale) or deep shale coal beds. There were no shale formations or deep shale coal beds identified within 10 miles of the site or within the adjoining counties. The Knox may be considered the primary sequestration target formation; however, there is insufficient information to confirm this formation would be adequate.

Another geologic consideration is the proximity to faults that may impact the development of a nuclear, biomass, or CTL/CTG facility. Based on mapping from the KGS, seismic risk at the proposed site is high. According to U. S. Geologic Survey mapping, the primary New Madrid fault is located less than 10 miles west and south of the site.
Utilities

A right of way currently exists for a 15kV transmission line approximately 200 yards from the site supplied by Hickman-Fulton Rural Electric Cooperative Corporation (a TVA distributor). The city sewer line extends to the junction of Highway 94 and Bypass 1099 which is located at the proposed site boundary, though a lift/pump station would be required to access this line. The City of Hickman maintains a 6-inch water line with access nearby, for which a right of way is currently in place. Finally, a dual stage sewage lagoon is located 800 feet to the northeast of the site which may potentially be available to support operations at the proposed site. There are large quantity natural gas pipelines located approximately 5 miles east of the site. Broadband internet access is available within a mile of the proposed site.

Transportation

Road access is essential for any large industrial facility and particularly so for an energy facility that brings in its fuel or trucks out its product. The site is located approximately 18-miles from the Julian Carroll Parkway (I-69), which is a paved four-lane road. Two two-lane roads (KY 1099 and KY 94) run north/northeast parallel and immediately to the site. Weight restrictions on roads and bridges leading from I-69 to the site are 62,000 pounds, capable of supporting coal transport by truck.
Although transportation is not a significant siting consideration for a solar, nuclear or wind facility, biomass and CTL/CTG facilities will require several transportation options due to the substantial feedstock required for these technologies. This site benefits from easy transportation access by rail, road, and barge. The Tenn-Kenn short line rail is located on site with multiple rail company access, presently capable of 70 pounds per yard rail, but area economic development officials are in the process of negotiating with state and federal officials to upgrade this to 115 per yard rail.

The Hickman-Fulton County Riverport on the Mississippi River is located approximately 2,600-feet from the site. The Hickman-Fulton Riverport claims to be the most northern quiet water port on the Mississippi that does not freeze over in the winter. Harbor services, as well as a Coast Guard facility, are located nearby. The Riverport serves substantial grain silos which are located adjacent to the site and are served through conveyor systems. Other products managed at the Riverport include fertilizer and urea, which could be a potential product to be developed from coal gasification at the site.
Transmission

Any energy facility will require access to electric transmission points. A right of way currently exists for a 15kV transmission line approximately 200 yards from the site supplied by Hickman-Fulton Rural Electric Cooperative Corporation (a TVA distributor). A 69kV line should be an adequate capacity to carry generated power from a solar facility in Kentucky. A nuclear, biomass, wind or CTL/CTG facility would require access to larger electric transmission points. Electrical transmission mapping reviewed indicates that a 161kV line intersects with the 69kV line which feeds the Hickman area approximately 3 miles east of Hickman. The 69 kV line provided by Hickman RECC services the neighboring steel company. If this location is confirmed, this would be the nearest suitable connection point for access to adequate power supply as well as for transmission of excess power back to the grid. The next closest suitable transmission connection point is a 161kV line located in Fulton, Kentucky 18 to 20 miles distant.
site sponsor reports that TVA has committed to provide whatever level of power or transmission will be required to support the site.

Natural gas is used as a feedstock and fuel in CTL/CTG and for some biomass facilities, making access to a supply important. Additionally, if the facility makes synthetic natural gas, access to a transmission pipeline will be important in getting products to market. Large gas transmission lines noted as Marathon, Trunkline and Equilon lines are located approximately 5 to 6 miles east of the site, running in a north-south direction. According to the site sponsor, there is a 30-pound gas pipeline maintained by Shell that is located approximately five miles to the east of the site near the intersection of KY-166 and KY-125.

**Water Supply**

Available water supply is a critical project component for the development of a CTL/CTG, biomass or nuclear facility. Running Slough is located on the northern border of the site and the Mississippi River is located within one half mile north. Running Slough is part of the Pond Slough Watershed, which has the HUC 11 of 08010202330. Running Slough has a mean annual flow of 5.43 MGD and flows into Reelfoot Lake. The low-flow 7Q₂ for Running Slough is 0.52 million gallons per day (MGD) and the 7Q₁₀ is 0.45 MGD. The low-flow 7Q₂ is the lowest mean flow during seven consecutive days over a two year period. The low-flow 7Q₁₀ is the lowest mean flow during seven consecutive days over a ten-year period. According to these flow rates, the Running Slough will not provide a dependable source of cooling water.

The close proximity of the Mississippi River provides an adequate alternative to Running Slough for water withdrawal and wastewater discharge for this site. The Mississippi is also an adequate waterway for barge access. United States Army Corp of Engineer (1995), computed flow data for the Mississippi River at Hickman, KY reported an annual mean flow of 5.4 billion gallons per day. This is more than adequate to meet the minimum 3.8 MGD requirement for a biomass or CTL/CTG facility, and 11.52 MGD requirement for a nuclear facility. There are no public water intakes within 25 miles
downstream of the site. Use designations for Mississippi River in accordance with 401 KAR 10:026 include warm water aquatic habitat, primary contact recreation, and secondary contact recreation. The section of the Mississippi River near this location is not on the 303(d) List of Surface Waters for impaired uses.

**Workforce Availability**

Development of a CTL/CTG, biomass, or nuclear facility would require access to an adequate supply of construction and skilled labor. The labor market identified by the Kentucky Cabinet for Economic Development for the proposed site includes five Kentucky counties and three more bordering counties in Tennessee with more than 60,000 in the civilian labor force. The Tennessee Department of Labor and Workforce Development and the Missouri Economic and Research Information Center indicate that that some portion of an additional 35,000+ workforce in other counties may be available to provide labor in the area of the proposed site.

Source: [www.thinkkentucky.com](http://www.thinkkentucky.com)
Civilian Labor Force

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<th>Fulton County</th>
<th>Labor Market Area</th>
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<tr>
<td>Civilian Labor Force</td>
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<td>Unemployment Rate %)</td>
<td>7.6 7.8</td>
<td>6.3 7.4</td>
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Source: U.S. Department of Labor, Bureau or Labor Statistics

**Other General Characteristics**

The proximity to military sites was reviewed in order to consider the potential impact of an energy facility to military training routes or long range radar. Based upon information produced by the Federal Aviation Administration’s Department of Defense Screening Tool, the proposed site is greater than 5-miles from any military site or long range radar.

Atmospheric extremes, such as tornadoes, are capable of structurally damaging a facility and must be considered particularly during siting for a solar, nuclear, or wind facility. Based upon Federal Emergency Management Agency mapping, the site is at a relatively high risk for tornado activity.

**Technology Specific Considerations**

**CTL/CTG**

In addition to the common factors described above for energy site development, unique factors specific to a particular technology must be considered. For a CTL/CTG facility, access to coal resources is important. The proposed site is not located in or adjacent to a coal producing Kentucky county. However, the site’s location on the Mississippi River allows it to access large quantities of coal transported through this route daily by barge. There is also a coal supplier located in Calvert City, Kentucky that could provide coal via rail, road and barge.

**Solar**

Adequate solar radiation is critical to the successful generation of solar power. A successful site should be relatively free from land cover, and not within a mile...
of a corporate city boundary. The TVA Hickman site has an average direct normal solar radiation of 4.09 KWh/m²/day and an annual solar radiation for two-axis flat plates of 6.41 KWh/m²/day. Based upon this average solar radiation, too much cloud cover and haze is present to be effective as a large scale facility. The proposed site is flat (0-3% slope across the site) land, presently used for agricultural purposes and will require only minimal ground work for development. However, depending upon solar panel placement, the wooded property to the south of the site may present light obstruction. Solar installations in large mass can be a visual distraction to local communities and this site is located approximately one mile southwest of Hickman, Kentucky.

Wind

The most critical component for a successful wind facility is adequate and consistent wind speed. In order to generate enough power to be a utility class facility, a mean
average wind speed at 60 meters of 5.6 meters per second (m/s) or greater is required. Information obtained from AWS Truewind, indicates that the average wind speed at 60 meters for the site is 5.32 m/s. Without adequate wind speed, other factors, such as foundational concerns, potential visual impacts, telecommunication interference, impacts to birds and bats, as well as operational concerns such as ice shedding, noise, blade drop and throw, and flicker are moot. Wind speed measurements to accurately assess the available resource at any potential development site would be required prior to final planning.

**Biomass**

An adequate feedstock supply environment includes available crop residues, animal manure, forest residues from former silviculture or clearing, primary and secondary mill residues, urban residues (i.e., wood scraps from local business such as TVA Hickman – Fulton County
lumberyards), landfill gas, domestic wastewater, or switchgrass. Information obtained from the National Renewable Energy Laboratory indicates that the total biomass available within Fulton County is 85,285 tonnes/year. The total biomass resources in Fulton and its surrounding Counties is 1,012,356 tonnes/year. These supplies are expected to provide an adequate feedstock source, and rank some of the highest availability in the State. Regardless, an analysis of the potential in the area to grow feedstock specifically for a biomass facility should also be part of the planning process.

**Nuclear**

A limiting factor to the development of a nuclear facility is available water supply. A minimum of 8,000 gallons per minute or 11.5 MGD of water is required to meet basic facility needs. The site is located 1/2-mile from the Mississippi River. According to data provided by the USACE, the flow data for the Mississippi River at Hickman, KY through the year 1995 is an annual mean flow of 5.4 billion gallons per day. This is more than adequate to meet the dependable water resource volume required for nuclear facilities.

Safety issues associated with nuclear facilities include ensuring an adequate controlled buffer zone of at least 2,000’ radius around the facility and an effective emergency plan. These aspects mean that the best location for a nuclear facility is a rural, or undeveloped site. Based upon an aerial photograph with delineated site boundaries provided by the site sponsor, it does not appear that the placement of a reactor on the property at any feasible location would allow for a 2,000’ radius from properties either located outside of its boundary or personnel placement locations on the property. A developer should investigate increasing the size of the available acreage to obtain an appropriate exclusion area.

The emergency plan should take into account egress limitations that could potentially impede emergency efforts. Slight impediments to egress are present within 1/2 mile of the site. However, since this is not a densely populated area, major congestion is not likely. Densely populated areas (25,000 persons or more) are greater than 50 miles
from the site; however, the town of Hickman is located a mile to the northeast.

Atmospheric considerations can be important for a nuclear facility to avoid the possibility for interaction of the nuclear cooling system plume with a plume containing noxious or toxic substances from a nearby facility. Information obtained from EPA’s Envirofacts and Enviromapper databases suggests that there are six facilities that produce or release air pollutants within the area and many of these facilities are located in Hickman, KY, which is just over a mile from the site. Further investigation may be necessary. The seismic rating for this site may preclude the development of a nuclear energy facility at this location.

**SUITABILITY**

In summary, the TVA Hickman Site may be a viable site for a potential alternative energy facility, particularly a CTL/CTG facility. The site scored a total of 958 points, representing 80% of the total available points for a CTL/CTG facility. The site offers a large acreage in an area suitable for development with good road access, adequate water supply, and access to rail, road, and barge for transportation needs. This site could also be considered a viable location for a biomass facility based on available resources in the area. This site scored a total of 941 points, representing 75% of the total available points for biomass criteria. The workforce in the area appears to be adequate to support a facility. Extra effort may be needed to address any potential impacts to public access areas, such as the Reelfoot National Wildlife Refuge, the Trail of Tears National Historic Trail, and documented T&E species within the County.

Due to a low average mean wind speed, this location is not a viable location for a utility scale wind facility. Additionally, available solar radiation at the site is too low to produce a significant source of energy for a utility solar facility alone, with a site score of 423 points, representing 46% of the total available points. The site scored a total of 491 points for a potential nuclear facility, representing 51% of the total available points.