



Harris Group Inc.

Site Selection for Bio-Energy Projects

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Abstract

This paper describes factors in selecting a site for construction of a bio-energy facility. This general approach assumes that a marketing study has been completed to identify a specific area or areas that the facility would be best located.

Most criteria for the selection of an industrial site can be broken into three distinct categories: site attributes, regulations, and community support. The categories "site attributes" and "regulations" are, in a general sense, self-explanatory. By "community support," we mean the policies and willingness of the local, state, and even federal government and of the area's citizens to support your project.

A lot of this only requires common sense and is something that you can accomplish mostly on your own. However, you can benefit from an engineer when evaluating the attributes of particular sites and in estimating the site development costs.

Community Support

You will find a huge variation in enthusiasm for your project depending upon the location. Sparsely populated areas with declining employment will generally be more supportive than larger towns and cities, which may be against industrial development for a variety of reasons. With government and community support behind your project, it is the difference between having help and facing indifference or, worse, hindrance. It is this intangible support that will make the entire process of permitting, building, and operating your plant easier.

Once the site selection is narrowed to a few promising locations, it is essential to have a representative from your company meet with community leaders and government representatives to describe your project and its impact, both positive and negative, will have on the community. The objective is to establish a trusting relationship as a basis for both you and the community resolve differences and to gain support for your project.

Subsidies often may be available as incentives to locate your facility in a specific area. These subsidies can range from low-interest loans and grants to infrastructure improvements and tax incentives. The state's Economic Development Council is good starting point to find out about these incentives.

Regulations

Most of the site-specific regulation issues you will address can be determined by meeting with the appropriate people at the City or County, depending upon which has jurisdiction over your project. Some permits, such as air quality, may be issued by the state or even the federal government. It is best to make an appointment so that the right people will be present when you meet with these agencies. Be prepared to describe your project so that they can understand the issues and identify the permits that will be required. This is also a good time to get an idea of the process for the permit application and approval as well as typical approval times.

Sites often have specific zoning restrictions affecting the general use, the height of buildings, setbacks from property lines, maximum lot coverage, and other restrictions. It is important to understand how these restrictions will affect your project. While it is possible to get a zoning variance, it is not a sure process and it takes time. Building codes also place restrictions on the quantity of flammable liquids or hazardous materials and establish setbacks distances to property lines. It is important to learn the governing building code so that the building code restrictions can be researched if needed. Building permits are not obtained at this stage.

Permitting can be very difficult and, if not done correctly, can result in delays. We will discuss permitting in more detail in a future paper.

Site Attributes

Transportation options should be evaluated. The site should be located close to improved roads capable of handling the increased volume to and from your plant to avoid road improvement costs. Location adjacent to rail service and frequency of the rail service also is very important if it is included in your transportation plan. Rail costs about \$1,000,000 per mile without right-of-way acquisition costs or significant site-preparation work for the rail bed. Reliance on barge or ship transportation requires year-round navigable water and suitable dock and material transfer systems. Proximity to a major airport to ease travel costs and time may even be a consideration.

The proposed site should be carefully evaluated to verify that it is large enough to accommodate the current project plus any planned expansions. Areas that are not buildable should be identified; these could be required setbacks from the property lines, wetlands, unstable slopes, and so on. Depending upon the location of these unbuildable areas, they could result in inefficient layout and increase project

construction and operating costs. Irregularly shaped properties should generally be avoided as they may not allow efficient layouts, may increase project construction costs, and may hinder future development.

The topography of the site should also be evaluated. Flat or gently sloping sites are usually the most economical for construction: however, there are some processes that can benefit from gravity flow, and in these cases, sites with steeper slopes should not be overlooked. Check the drainage patterns and any concentrated storm water flow that enters or leaves the property. Determine how storm water discharge will be handled. Make sure that the site is located above any identified flood plains.

It is also prudent to determine whether or not the site has had any previous use that could lead to contamination or abandoned utilities and foundations that are not visible. Contaminated soil or ground water could delay construction and involve considerable expense to mitigate. The current owner may certify that the site is clean, but this may not provide a remedy if the contamination is not discovered until construction starts. Checking with the state, county, or city should provide you with information if the site has been previously identified as contaminated.

Proximity to necessary utilities also needs to be determined. Power, gas, water, telecommunications and data transmission, and sanitary sewers should all be available in the necessary capacities.

If required by your project, waste disposal options should be investigated. Is there a sanitary sewer nearby that can accept liquid process wastes of the type and quantity anticipated? Is there a landfill that can accept your solid waste? What are the costs of obtaining these services, or, if they aren't available, what is the cost to provide them on site?

You will want to man your facility with as many local people as possible; this will be one of the main reasons that the community will support your project. You should consider the size and skill level of the available labor pool.

The proximity of adequate support services such as fire, emergency, and medical facilities should not be overlooked. If these services are not available within a reasonable distance, provisions will need to be made in terms of training, staffing, facilities, and equipment.

There are also certain environmental factors that should be considered. Hot summer and cold winter temperatures can affect process efficiency and operator productivity. Snow, cloudy weather, and rain can impact transportation and operations. Hurricanes, tornadoes, floods, and earthquakes can seriously damage your facility.

It is also advisable to consult with a geotechnical engineer who has experience in the area. A preliminary geotechnical report can provide useful information about the suitability of the site. They may detect potential wetlands and areas of instability or other unsuitable conditions by doing a simple walk of the site. The geotechnical engineer also may be able to offer information about expected foundation requirements - whether spread footings will be adequate or whether considerably more expensive piling or some other type of deep foundation may be necessary. These foundation recommendations may be based on general knowledge of the area or some relatively inexpensive test pits.

Comparison Methodology

One way to rank sites is to develop a spread sheet with the site evaluation factors listed in the first column and each site in succeeding columns. The upper part of the spread sheet should deal with the factors discussed above. A ranking system can be devised weighting various factors. Even if you aren't interested in a quantitative approach, this exercise is worthwhile to clarify the attributes of each site.

The lower part of the spread sheet can be devoted to costs for each site including purchase costs, site development costs, and credits for incentives. It is usually beneficial to have an experienced engineer help evaluate the site development costs.

Summary

A thorough evaluation of potential sites can make a significant difference in the success of your project. Considering the factors discussed in this paper will help you with that selection.

Despite this selection methodology, we recognize that there are sometimes driving forces that will result in very few possible sites being available. In these situations considering the factors mentioned in this paper will help you determine some of your development and operating costs.

About the Author:

Bob McNiesh has more than 34 years of design and project management experience across the United States. The diverse projects on which Bob has worked have given him extensive multidiscipline experience in the process industries, marine, bulk material handling, and industrial projects. Responsibilities for typical projects include design, specifications, cost estimating, scheduling, project management and construction management as well as feasibility studies and technical/analytical report writing.

About Harris Group's Renewable Fuels and Chemicals Unit:

Harris Group provides full-service engineering and consulting services in the production of energy and chemicals from renewable feedstocks through sustainable technologies. Our experience encompasses developing processes that convert industrial, agricultural and municipal biomass feedstocks into ethanol, biodiesel, renewable diesel and gasoline, biogas (methane), commodity chemicals, and other saleable products and byproducts.

About Harris Group Inc.:

Harris Group provides consulting, process expertise, and multidiscipline engineering and design in 13 distinct marketplaces. We help our customers select and implement capital and maintenance projects that improve their competitive positions. With eleven offices in the U.S. and a sister company, AO Harris Group International, in St. Petersburg, Russia, we serve customers worldwide.

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