The Potential for Using Brownfields for Data Centers and Solar Farms

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Abstract:

There has been increased interest in expanding data centers in Michigan. This is driven primarily by the demand for data storage generated by the rapid expansion of Artificial Intelligence (AI). Additionally, the energy demands for the centers has the potential to drive up the demand for electricity. Solar farms are a cost effective way to generate electricity. Data centers and solar farms use land. Most of these projects have used farmland especially for larger projects. A potentially underutilized source of land for data centers and solar farms is brownfields. This paper analyzes the potential for using brownfields for data centers and solar farms as well as the policies in place that promote data centers and solar farms. It also discusses some of the issues related to the data center hyperscale data center in Saline Township.

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Introduction

There has been explosive growth in data centers. Nationwide there are more than 4,500 active data centers and there more than 700 currently under construction (electrichoice.com). These centers use 4.4 percent of all the electricity consumed in the U.S. (electrichoice.com). It is estimated that by 2028 between 6.7 to 12.0 percent of the electricity used in the U.S. will be used by data centers (iaei Magazine). The increased demand for electricity from these data centers and the interest in low cost renewable energy has increased the demand for solar power. Data centers and solar farms have the potential to increase the demand for land in Michigan, especially at the township and county level. This in turn has the potential to raise farmland prices and rental rates on farmland in these locations, reducing the profitability of farming and pricing farmers out of the land market.

The computing power needed to drive artificial intelligence (AI) programs has increased the demand for data centers. Analyzing both data centers and solar farms together makes sense because data centers use a lot of energy. It is estimated that the data center in Saline will use 1.4 gigawatts of electricity, equal to 25 percent of DTE's current demand for electricity. Consumers Energy is in the final negotiations with data centers that will require 1-2 gigawatts and is in advanced discussions with data centers that will require 4 to 5 gigawatts of electricity (Allnut). These additional data centers will place further demand on the electric grid and will likely require more solar farms to meet this demand. A hyperscale data center uses as much electricity as several thousand households.

One potential way to keep land in farming while meeting the needs of data centers and solar farms is to convert brownfields into land used for data centers and solar farms. A brownfield is a contaminated site that is not currently being used. It is estimated that Michigan has 24,000 contaminated sites (Guth). While many sites are located in urban areas and abandoned mines, brownfields can be found throughout the state. If a current brownfield is converted to a data center or a solar farm the level of economic activity can be maximized because there is no loss of farm sales (Miller and Knudson).

This short analysis considers some of the economic and technical considerations of data centers and solar farms and the relative attractiveness of using brownfields for these activities. Some of the policies designed to promote the use of brownfields are also considered. The hyperscale development in Saline Township provides a good case study in addressing some of the issues involved in these developments. It also points to the potential for using brownfields as a way to reduce the opposition to these facilities.

Economic and Technical Considerations

Farming is at a competitive disadvantage compared to solar farms and data centers. On a per acre basis solar farms generate more income and economic impact compared to farming (Miller and Knudson). The same is true for data centers. This allows the owners and operators of data centers and solar farms to outbid farmers for land. This in turn, increases local land prices and rents, thereby reducing local farm profitability. These facilities allow landowners to generate higher incomes that they would if they leased the land to farmers or farmed the land themselves.

Most of the existing and proposed data center sites are located in Southeast Michigan. Many existing and proposed data centers are located in Washtenaw County. There are also data centers in operation or under consideration in Wayne and Oakland County, Cass County, Monroe County, and the Grand Rapids area.

Where a data center is located is important. There have been complaints about the noise a data center produces. This has been an issue in Wisconsin and Michigan. Sound levels have in excess of 60 decibels

have been measured (Prada) which can make sleeping difficult. Brownfields located near residential areas will not be good sites for data centers which will put even more pressure on farmland.

An alternative to the use of farmland for data centers and solar farms is brownfields. Brownfields are defined as "a property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant" (EPA). Due to the cost of cleaning up these sites and the risk of finding additional pollutants many brownfields remain underutilized. It may also be difficult to find workers willing to work at a brownfield. There remains a stigma and fear attached to brownfields.

Nonetheless, brownfields have several desirable characteristics. They generally have easy access to infrastructure such as electricity connection, water, sewer, and roads. It appears that converting brownfields to data centers and solar farms is preferred by the public to converting farmland (Guth). The economic impact of using brownfields for data centers or solar farms is likely to be greater than using farmland because the value of lost farm production would not have to be subtracted to assess the actual economic impact.

One issue with brownfields is that permitting may be more difficult than using greenfields such as farmland. Testing of the land may also have to be undertaken. This is true for solar farms and data centers. Ground screws are becoming the standard for solar farms especially on difficult soils and land (Ludt), these screws are 5 to 8 feet long (Harris) and would impact the soil which may be contaminated. Nonetheless, solar farms require less remediation of brownfield sites (MSU, UM) and would be a better fit than a data center.

Solar farms can be used to produce electricity, livestock, and some vegetables and berries; this is known as agrivoltaics (Florentino). Most of the current systems could be used to graze sheep and goats. The owner of the solar farm could benefit from land that is used to graze livestock, because weed control is less of an issue (Florentino). However, to maximize the value of the livestock, pasture crops will have to be planted before the solar panels are installed (Gould). If the solar panels are constructed on taller posts cattle could be grazed on the solar farm. The panels have the added advantage of providing shade to cattle in the summer. Cattle have more potential because the market for sheep products is smaller than beef. Crops that are shade tolerant have the highest likelihood of being successful. The supports have to be high enough to allow workers and equipment to operate.

Farmland is attractive to solar farm developers for a number of reasons. Farmland is generally flat and has direct access to sunlight. Also, drainage is often not a problem (MSU, UM). The fact that is located in rural areas has made it comparatively easy to develop compared to building solar farms in urban areas.

As previously noted, on a per acre basis, solar farms and data centers generate more value than farming. One reason for this is the farm sector is facing difficulty. Higher input costs and lower prices for some commodities are placing stress on farm incomes. Export markets have also become more uncertain. As long as the farm sector faces these problems there will be pressure to sell land to data center and solar farm developers. Consistent narrow or negative profit margins in agriculture will encourage converting land to other uses.

Policies

In 2024, Michigan received a $129 million grant from the EPA for utility scale renewable energy projects on brownfields (MSU, UM). In order to use a brownfield an environmental assessment must be conducted. The Michigan Department of the Environment, Great Lakes, and Energy is using $77.6 million to facilitate the cleanup of brownfields (Busse). Developers of brownfields can also qualify for Tax Increment

Financing (TIF), which allows developers to recapture the taxes assessed as a result of the increased value of the land (Guth). However, most brownfields are too small for large efficient solar farms (MSU, UM).

However, in 2023 Senate Bill 277 was enacted into law as Public Act (PA) 230. This act allows land enrolled in PA 116 to be used for solar farms, provided that the land is planted with groundcover that promotes pollinators, and the land has to be maintained so it can be used for agriculture once the solar facility is decommissioned (HFA). Originally, PA 116 of 1974 was enacted to preserve farmland by allowing farmers to enroll their land in the program in exchange for property tax relief. In exchange for the lower property taxes, enrolled land could not be developed. PA 116 essentially allowed a farmer to lease development rights to the state in exchange for lower taxes.

The state has also passed a tax credit bill for data centers (Allnutt). However, repeal of these credits is currently under consideration. The owners of the Saline data center have requested a 50 percent reduction in real and individual property taxes. This abatement would last 12 years. When economic development programs are compared, the additional cost of developing a brownfield may make developing farmland the more attractive option.

As a response to the opposition to hyperscale data centers, the Michigan Senate has introduced a number of bills. Among other things, the bills would limit the amount of water a data center can use and require hyperscale data centers to enter into long term agreements with utilities, and power the data centers with 90 percent renewable energy. If passed, this would increase the demand for solar energy and solar farms. Additional bills would limit local officials' ability to enter into nondisclosure agreements, and require a data center to enter into a community benefit agreement (Hermani)

Given the amount of electricity used by data centers the Michigan Public Service Commission (MPSC) will play a significant role in ensuring electric rates to not rise for households. The MPSC can require data centers to pay a higher rate than others. Also, there is some excess capacity in electricity generation that could be used to enhance the efficiency of the electric grid in Michigan. Nonetheless, data centers will increase the demand for electricity and increase the production of electricity. Solar will likely be the feedstock of choice for this additional electricity generation.

The Saline Township Board voted against the data center in Saline. The township eventually had to allow the data center because there was a lack of zoning in the township. This is an important point for agriculture. In order to control how land is used, local units of government will need to have zoning and master plans in place in order to block solar farms and data centers or to be able to dictate where they can be located. These local ordinances cannot be exclusionary. This may also be necessary for agrivoltaic projects (Gould). Enacting zoning after a project has been announced is not likely to be effective in stopping the facility from being constructed.

PA 235 of 2023 requires utilities to source 50 percent of their electricity from renewable sources by 2030 and 60 percent by 2035 (MSU, UM). Solar is increasingly the lowest cost source of renewable electricity. PA 233 of 2023, gives developers of solar farms the ability to bypass local zoning and obtain land use approval directly from the MPSC. Local zoning could still be needed if the local zoning is not stricter than the state standard and the project lies entirely within a city or village (MSU, UM). Also, projects that are smaller than 50 megawatts require local approval (MSU, UM).

PA 108 of 2023 allows solar facilities to pay conceivably lower taxes on industrial personal property. The taxes are set at $7,000 per Megawatt annually for 20 years; if the facility is located on a brownfield the payment is only $2,000 (MSU, UM).

The Saline Site

There are three sizes of data centers a small, medium, and a hyperscale. A small facility consumes 1 to 5 megawatts, a medium facility consumes 5 to 20 megawatts, and a hyperscale facility uses from 20 to more than 100 megawatts; this translates to the electricity used by 15,000 to 75,000 homes (IAEA Magazine). The facility in Saline is an example of a hyperscale site. It will be used by Oracle and OpenAI (Ulcinaite, Dale). Hyperscale sites have the most impact on farmland. They may become more common because they likely exhibit economies of scale, reducing the cost of computing.

Including the equipment in the data center, the total cost of the facility is now approximately $43 billion. The site will hold three buildings each exceeding 500,000 square feet. It is estimated that the facility will employ 2,500 temporary jobs during the construction of the facility, and 450 jobs at the data center once it is completed (Eberbach). In addition to tax revenues $14 million is set aside for the local fire department, a farmland preservation trust, and a community investment fund. An additional $10 million will be spent on the Saline Recreation Center (Eberbach).

Oracle has asked for a 50 percent reduction in real and movable property taxes for 12 years through an Industrial Facilities Exemption Certificate. While there is strong local opposition to the tax reduction, the township may be forced to approve the tax reduction (Eberbach). Again, this points to the importance of local governments having a plan already in place when these ventures are considered.

Conclusion

Data centers will increase the demand for electricity. This in turn will increase the demand for solar farms. Many of these facilities are located on land that used to be for farming. There are incentives in place that provide tax incentives to greenfield projects. Given the current difficulties the farm sector faces, there will be more pressure to develop farmland. There is increasing interest in allowing solar farms to graze livestock and grow crops. In most cases sheep and goats, but there is also increased interest in grazing cattle.

An alternative to using farmland for data centers and solar farms is to use brownfields. Brownfields have several advantages to farmland. They often located in areas that already have easy access to the electric grid as well as water and sewer service. Given increasing local opposition to using farmland for these facilities brownfields might become a preferred option for data centers and solar farms.

There are several policies in place to promote the use of brownfields for development, but there still appears to be a stigma attached to them. This is probably a bigger issue for data centers than solar farms, but the amount of soil that is disturbed during construction might make developing brownfields prohibitably expensive. Solar farms and data centers will put upward pressure on farmland prices in those parts of the state where these facilities are located. This is particularly true in Southeast Michigan where most of these facilities are under consideration.

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