Brownfield Case Study

Farmer's Branch, TX

Source: Google Earth

Aerial view of the Farmer's Branch closed landfill solar site

PROJECT SUMMARY

The US Department of Energy estimates more than 10 million acres of land will be necessary to scale solar energy production by 2050.[1] Current forecasting suggests that 80% of that acreage could be sited on agricultural lands.[2] Even as many of these decisions are made at the local government level (municipalities were responsible for 79% of solar development projects through 2019), energy itself is often destined for a state's grid system, rarely powering the same place it is sourced.

Municipalities interested in supporting solar farms have increasingly been turning to brownfields -- in particular, landfills. US brightfield projects have historically been concentrated in the northeast: nearly 75% of utility-scale landfill redevelopment took place in Massachusets, Connecticut, New Jer-sey, and New York. Texas, however, has the greatest potential, with 2,134 EPA-identified sites, hosting a theoretical 27.3 GW of capacity and generating 41.4 TWH annually. 300, 297 jobs might follow.[3]

The following case study explores the precedent set by Farmer's Branch, TX, which aims to power all city-run buildings with energy from a solar farm. It brings brownfields into a conversation of resilience, renewables, and energy independence, asking what it looks like to have "infill" close a gap between energy supply and energy demand.

QUICK FACTS

Location
Farmer's Branch, TX

Project type
Brownfield to Brightfield

Site size
22.943 acres

Land uses
Solar Farm

Keywords/special features
Landfills, Solar Energy, Grid Resilience

Website
https://www.farmersbranchtx.gov/1297/Solar-Farm-Project

Project address
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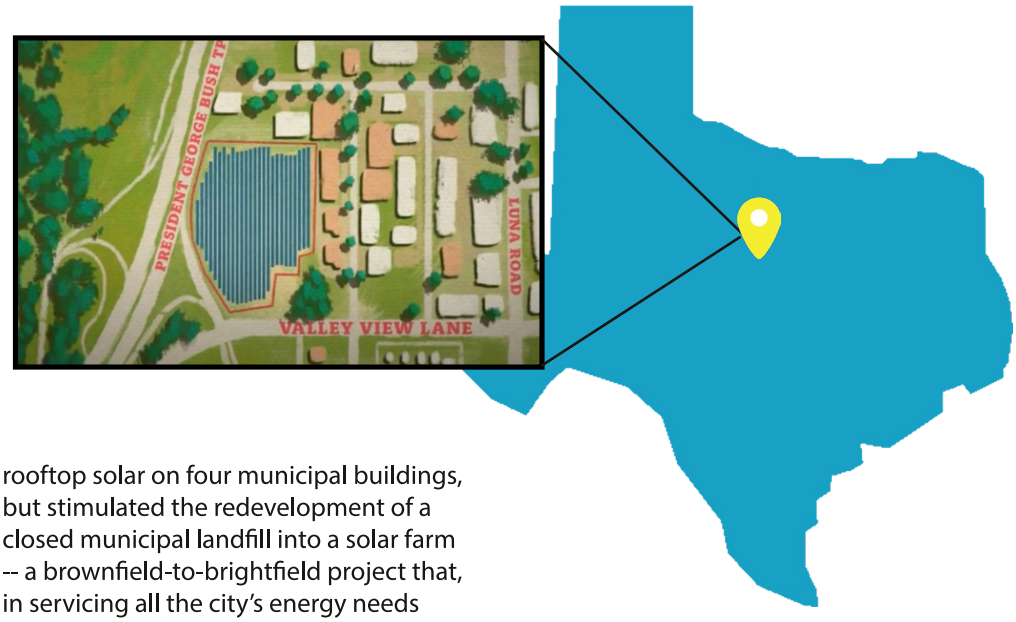
Toronto Metropolitan University

FARMER'S BRANCH

Farmer's Branch is a community of 36,000 located northwest of Dallas, TX.[4] An inner-ring suburb, the city is connected to the Dallas Area rapid transit system and bordered by two interstate highways. It has 28 parks, including a brownfield former train depot converted into a historical landmark and green space. [5]



Situated in central Texas, Farmer's Branch is a few hundred miles from one of the world's largest oil fields, the Permian Basin. Responsible for nearly half of all US oil production, the basin joins oil terminals on the Gulf of Mexico to make Texas by far the largest fossil fuel-producing state in the country. Nevertheless, one hundred miles closer to Farmer's Branch than the Permian Basin is the state's largest wind farm, Roscoe Wind Farm in Sweetwater, TX.[6]

Texas is the largest wind producer in the country, largely stemming from major energy investments in the early 2000s, including a $7-billion transmission project connecting wind in the west to cities in east. Most of Texas's renewable power is generated in the west and then transmitted to population centers in the east, including Farmer's Branch.

In 2018, Farmer's Branch became one of the few municipalities of its size to employ a full-time sustainability officer, Alex Pharmakis. Since then, Farmer's Branch has demonstrated interest in integrating environmental planning into its city management and growth. Among a handful of policies, the city's 2020 Solar Feasibility study not only led to the installation of rooftop solar on four municipal buildings, but stimulated the redevelopment of a closed municipal landfill into a solar farm -- a brownfield-to-brightfield project that, in servicing all the city's energy needs within its municipal boundaries, is expected in Fall 2024 to be a first-of-its-kind in Texas. [7]

The only brightfield precedent in the state is the 224-acre Sunnyside Solar Farm in Houston, forecast to be the largest brightfiled in the United States.[8]

There has been some knowledge-exchange between Houston and Farmer's Branch, with Farmer's Branch ultimately in 2021 hiring the same turnkey solar developer, BQ Energy. [9]

BQ Energy, a New York-based engineering firm, formed in 2002 specifically to develop wind on brownfield sites. Six years later they extended into the solar market, specializing in community landfills. They advertise a working relationship with the EPA and state regulators as among their services provided.[10]

Since Farmer's Branch settled the contract, word has spread: Waco and El Paso have contacted Farmer's Branch for copies of the Request for Proposal (RFP) -- even as Farmer's Branch hopes to model this brightfield practice for smaller municipalities in particular.

SITE CHARACTERISTICS

The 23-acre municipal landfill at 1399 Valley View Lane was closed and capped in 1987. [11] Despite its prime real estate location along the President George Bush Turnpike, the landfill's redevelopment potential was limited by a 35 million-dollar price tag for waste removal and remediation. [12] At twelve square miles, Farmer's Branch also has limited land to redevelop, and therefore has reason to incentivize infill development and creative reuse -- including reuse of three other closed landfills.

The area surrounding the site includes the 8-lane turnpike to the east, industrial uses to the north, and mixed institutional and residential to south and west. Where in Dallas redevelopment of a landfill encountered public resistance due to the fact that the landfill had regained forestation, Valley View not only retained landfill landscaping (mowed grass), but associations with a neighboring waste-drop off center for recycling, bulk trash, and electronics.

Source: AES Energy, https://www.aes.com/belleville-landfill-project

Image of the city's water tower

BROWNFIELDS TO BRIGHTFIELDS

The physical condition of landfills offers opportunity in the form of good sun exposure due to lack of vegetation, as well as connection to existing infrastructure (electric distribution, access roads).[13] There are some constraints like protecting the integrity of the landfill's cap.

Following a 1991 EPA regulation formalizing how landfills need to be closed, landfills share certain characteristics, including a geomembrane with 3 feet of soil atop a layer of permeable clay.[14] According to AES clean energy development manager Joshua Mayer, solar developers assess potential landfill sites according to the following criteria:

• 10-15+ years since the closure date. The 10-15+ year window allows for organic matter to settle and for the release of methane gasses. A settlement study is conducted to verify that the composition of the site is appropriately stabilized.

• A slope of between 2-5%, though exceptions can be made up to 10%. Pyramidal designs are becoming more popular for water runoff, which could forecast challenges for landfill redevelopment 10-15 years from now.

• The cap must meet a certain capacity, tested by qualified engineers during a weight-bearing study.

•Surveyors analyze the existing infrastructure, including methane gas piping networks and leachate piping networks, to determine where and how to site the solar farm.

Even among eligible sites, landfills tend to require certain types of panels that can be less cost effective in the long-run. Solar panels tend to have two standard designs: fixed-tilt (cheapest, stationed south) and tracking (25-30% more productive than stationary, mobile east-west). Solar on landfills tends to be limited to the surface, since the steel posts required for tracking risk penetrating the landfill cap. Not only is the cost of concrete for the ballast blocks more expensive, electric cables need to be stored above the ground (where they'd normally be buried), also resulting in a higher cost.[15]

SUNNYSIDE. Bean v. Southwestern Waste Management Corporation (1979) was the country's first civil rights lawsuit aginst environmental racism, filed against a proposed landfill in Harris County that was ruled to "affect the entire nature of the community, its land values, its tax base, its aesthetics, the health and safety of its inhabitants, and the operation of Smiley High School, located only 1,700 feet from the site."[27]

The Sunnyside landfill, sited in a predominantly black neighborhood also in Harris County, now serves as a brownfield-to-brightfield example in Texas intended to channel energy investment in a way that is reparitive to a community it once harmed. Some low-income neighbors will be eligable for discounted power rates, and a portion of the farm is dedicated as community solar.[28]

Rendering of Sunnyside Solar, Houston, TX

THE LEARNING CURVE

Before assessment of the land, the city commissioned an electric utility to do an interconnection study to assess whether the components at this site were suitable to absorb that amount of power, or if there would need to be upgrades to the transformers and other equipment. [16]

The landfill development was subject to Texas Administrative Code 330 Subchapter T: Permitting Standards for Owners and Operators of Commercial Industrial Nonhazardous Waste Landfill Facilities. An addition of solar panels to the surface of the landfill therefore requires approval from the Texas Commission for Environmental Quality (TCEQ), specifically form 20787 (Authorization to Disturb Final Cover Over Closed Municipal Solid Waste Landfill for Non-Enclosed Structure), primarily to guarantee no disturbances to the integrity of the cap. [17]

The City of Farmer's Branch specifically selected a service provider that had already gone through the process

as part of the Sunnyside Project in Houston, BQ Energy.[18] Sunnyside was the first time TCEQ had issued a post-closure use approval of this kind, which required BQ Energy to submit a full work plan, including the facility design and methods of construction. Sunnywide also involved a city review of electrical and civil design aspects to ensure code complaince, as well as analysis of community impacts, including hours of operation, control noise, and traffic flow. [19] With the first precedent set by Sunnyside, Pharmakis says Farmer's Branch's project has been able to be more turnkey, stepping in after what Pharmakis says was a "process as much as a learning curve for the regulator as it was for the developer."[20]

"A CONVOLUTED WAY TO GET AN ELECTRICITY CONTRACT"[21]

In February 2021, a winter storm caused widespread failures in the state's power grid, which mostly relied on natural gas.[22] In the short-term, that was nearly a week of power outages across the state. In the long-term, utility rates have continued to rise as energy companies fill profit gaps.

Timing worked in Farmer's Branch favor: the city had, just months prior, entered into a long-term purchase agreement, locking-in 20 years of stable electricity generated from the site. The attractive electricity cost continues to be a main selling point of the project, including in presentations to city leaders and in bilingual public press materials.[23]

Because Farmer's Branch has entered into a land-lease with BQ Energy in order to supply the electricity, the financing of the project was covered sufficiently enough that the city did not seek any additional funding from federal brightfield sources like the EPA's RePower initiative. From the finance department, city officials viewed the project favorably because they liked that the rate was fixed for 20 years, especially in a market that can otherwise be viable. Pharmakis wonders what would have happened if they had tried to enter into a contract after the 2021 freeze. [24]

OUTPUT

The Valley View project is expected to power all the city's buildings, street lights, parking lot lights, stop lights, and, in the future, batteries.
In total, 12.5 million kilowatt hours per year will be generated.[25] Valley View is a case of a brownfield being bundled into a larger sustainability action plan, where Pharmakis says once the solar farm is online, he can make the financial case in favor of, for example, electric vehicles. That helps, Pharmakis says, with the "chicken-and-the-egg" paradox with chargers and vehicles.

"Once we've put the infrastructure in place, made the initial investment, every vehicle we'll be evaluating for an electric alternative."[26] For every EV, there will be higher demand on the grid. It's unique to approach this from within city limits: to be thinking locally about what energy means down the road.

INTER-CONNECTION

To be 100% renewable, a city does not technically have to add any energy to the grid. Through Renewable Energy Certificates (RECS), a city in Texas can enter into a power purchase agreement with a wind farm in West Texas to meet its sustainability goals. On top of transmission loss resulting from hundreds of miles between energy producers and the population centers they're destined for, credits raise a question of not just how municipalities can address a responsibility to sustainability, but own it.

As solar energy increasingly becomes a preferred way for both public and private entities to fulfill climate commitments, Farmer's Branch offers an alternative to a model that otherwise relies heavily on outsourcing 'efficiency' from elsewhere.

Where brownfields have encouraged municipalities to assess their properties and draw attention back to the center, is it possible for them to light up energy the same way?

The Valley View landfill with an image of a solar panel.

Endnotes

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