Environmental Consulting & Technology, Inc.

Landfills & Brownfields: Two of Renewable Energy's most Exciting Applications

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America's Lands Initiative, the U.S. Environmental Protection Agency (EPA) promotes the reuse of potentially contaminated properties, landfills, and mining sites for renewable energy generation.¹ The EPA notes the following benefits for siting solar photovoltaic (PV) facilities on potentially contaminated lands and municipal solid waste landfills:

- May provide an economically viable reuse for sites that may have significant cleanup costs or low real estate development demand;
- May have environmental conditions that are not well suited for commercial or residential redevelopment;
- Can be developed in place of limited open space, preserving the land as a carbon sink and/or for other ecosystem services;

- Are generally located near existing roads and energy transmission or distribution infrastructure;
- Are typically located near areas with high energy demand (e.g., large population bases);
- Are constructed with large areas of minimal grade (0-2 percent);
- Are offered at lower land costs when compared to open space;
- Can accommodate net metered or utility scale projects;
- May be adequately zoned for renewable energy;
- Can provide job opportunities in urban and rural communities;
- Can advance cleaner and more cost-effective energy technologies; and
- May reduce the environmental impacts of energy systems (e.g., reduce greenhouse gas emissions).

BACKGROUND

Closed or capped landfills have very few complementary uses, and brownfields, which by definition may be complicated by the presence or potential presence of a hazardous substance, pollutant or contaminant can require millions of dollars in remediation costs before they can be safely reoccupied. However, Silvio Marcacci, Communications Director at Energy Innovation, suggests both types of locations offer advantages for siting solar projects.²

Marcacci notes that landfills are typically elevated high above surrounding trees and buildings, offering unshaded sites capable of boosting potential solar output throughout the day, and are often already connected to the grid through methane generation operations.² Brownfields, on the other hand, are typically located at former industrial

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sites that have been cleared of aboveground structures, providing flat unshaded expanses, often in proximity to existing power lines or large potential industrial customers like warehouses or factories. In both instances, projects can capitalize on higher generation potential and existing grid infrastructure.³

Landfills and brownfields are also typically located within or close to major cities. According to Marcacci this is important because it means they can add new clean electricity generation in population centers without adding pollution and can tap the rising popularity of community solar projects. Since these locations are often considered environmental concerns, he suggests nearby residents will likely consider renewable energy a positive way to use the land, reducing public concerns compared to solar development in forested or undeveloped open spaces.2

Utilities and solar developers can also benefit from favorable project economics through specific incentives from federal and state governments eager to return landfills and brownfields to productive use. At the federal level, EPA's Brownfields Program provides grants and technical assistance to sustainably reuse contaminated property, and multiple state and local governments provide similar incentives.

OPPORTUNITIES

In 1988 there were an estimated 7,924 landfills in the U.S. By 2009, however, that number dropped to 1,908.¹

According to the EPA, the landfills that closed over the intervening years—plus portions of active landfills with closed cells—represent hundreds of thousands of acres that may be suitable for siting solar PV facilities.

That's important because these sites could help meet goals for solar generation without causing new environmental concerns. For instance, design innovations like ballasted racking systems mean panels can be secured atop landfill caps or remediated ground without disturbing hazardous materials beneath the array. Others design innovations include geosynthetic caps, which eliminate erosion issues typically associated with conventional panels due to rain and the need to mow around them.

Equally important, according to Marcacci, local governments and property owners win by returning unusable land to productive use while generating new income and property tax revenue.² Utility companies win by building profitable solar generation close to areas of high electricity demand while avoiding siting conflicts and ecological concerns. Residents win through reduced local power plant emissions and expanded access to local high-tech jobs.²

RECENT EXAMPLES

The EPA is actively tracking more than 170 renewable energy projects that are in various stages of planning, approval, or construction on contaminated or disturbed properties, including landfills.⁴ Representative examples include:

- ✓ Rochester, New York 7,800 solar panels installed atop the 7-acre Emerson Street Landfill, capable of generating up to 2.6 megawatts (MW) of electricity.
- Randolph, Plainville and East Bridgewater, Massachusetts -41,000 solar panels across three closed landfills capable of generating 13.5 MW. (Massachusetts now has about 70 such projects; these compromise more than half of solar landfill projects in the U.S.)
- ✓ Annapolis, Maryland Construction underway for a 16.8 MW solar array over an 80-acre landfill. (The park will have 54,000 solar panels and is expected to create new jobs, support local businesses, offer learning opportunities for local students,

and generate more than \$5 million for the city over the course of its 20-year lease.)

FINDING SUITABLE OPPORTUNITIES

Using screening criteria developed in collaboration with the National Renewable Energy Laboratory (NREL), EPA has also pre-screened more than 80,000 brownfields and municipal solid waste landfills covering 15 million acres across the country for suitability as renewable energy generation facilities, including utilityscale solar. The EPA completed the screening in August 2018 and maps depicting the locations of these EPA tracked sites and their potential for supporting renewable energy generation can be found at https://www.epa.gov/re-powering.

- The maps enable users to view screening results for various renewable energy technologies at each site.
- The corresponding database can be searched by a number of attributes including state, acreage, renewable energy capacity, distance to nearest urban center, and more.
- Site-specific screening reports are available for each property.



A QUICK LOOK AT GEORGIA

Georgia, like many southern states, is fortunate to have large, open landscapes and an abundance of sunshine, both of which are prime factors to create thriving solar energy programs. According to Bright Spaces,



a Georgia-based solar development program, federal and state entities have acknowledged this rich opportunity for residential, commercial, and industrial solar development, and have offered solar benefits, including tax incentives for commercial solar systems and utility power purchase agreements to make renewable energy systems more affordable in Georgia.⁵ Ultimately, they say the goal is to drive long-term renewable energy investments to make solar more sustainable, and capped landfills and brownfields each offer advantages for siting thus far hidden from many participants in the renewable energy market.



In the state of Georgia, it is reported that:

- 221 landfills are closed.
- 1,121 operating inactive landfills are in closure.
- 31 landfills are due to reach capacity by 2025.6

Notably, EPA has pre-screened 542 of these sites, and estimates their cumulative PV capacity at over 10,000 MW.⁷

As far as incentives are concerned, Georgia has also demonstrated its eagerness to leverage federal grants and technical assistance to help return landfills and brownfields to productive use. For example, a \$5 million solar energy cover project at the Hickory Ridge Landfill located outside Atlanta was financed in part by a \$2 million federal grant via Georgia Environmental Finance Authority.

Coupled with utility programs like Georgia Power's Renewable Energy Development Initiative, these types of incentives seek to increase the utility provider's procurement of renewable energy by removing much of the risk typically associated with a solar-energy capital investment.



At state-owned Jekyll Island, Atlantabased Cherry Street Energy operates a new 4-acre solar array on the site of a former construction landfill. It's one of two former landfill sites in coastal Georgia that have been converted for use as solar farms. The other sits at the entrance to Dulany Industries' multiuse industrial complex called SeaPoint in Savannah. Both sell their electricity to Georgia Power, which distributes it via the grid.⁸

OTHER INCENTIVES

Aside from energy investment tax credits and the tax code, which offers significant incentives for investment in renewable energy projects in the form of accelerated depreciation, a number of new financial incentives have recently been finalized at the federal level to help facilitate the repurposing of brownfield sites; especially where the re-purposed use might involve renewable energy. Chief among these were those created under the 2017 Tax Cuts and Jobs Act involving "Opportunity Zones" and the 2018 Brownfields Utilization, Investment, and Local Development Act (the BUILD Act).

Opportunity Zones - In early 2018, the U.S. Department of the Treasury and the Internal Revenue Service designated Opportunity Zones in all 50 states, including 260 census tracts in the State of Georgia. Scattered across 83 counties, investors can realize substantial tax benefits if they invest capital into these zones, including the ability to defer recognition of capital gains earned through qualified opportunity funds (QOFs) investment vehicles that are set up as either a partnership or corporation for investing in property located in an opportunity zone. (Opportunity funds allow investors to defer federal taxes on any recent capital gains until December 31, 2026, reduce that tax





payment by up to 15 percent, and pay as little as zero taxes on potential profits from an opportunity fund if the investment is held for 10 years.) While a significant majority of QOFs formed to date have focused on real estate development, QOFs targeting investments in infrastructure projects, including electric generating and storage facilities present compelling opportunities for renewable energy developers and investors throughout Georgia and the nation.⁹

The BUILD Act - Signed in March 2018, the BUILD Act contains preferences for two categories of projects within the Environmental Protection Agency's (EPA's) Brownfield Assessment, Cleanup and Revolving Loan Fund programwaterfront sites and projects that contemplate clean energy generation or energy efficiency improvement. Ostensibly, what the BUILD Act provides is funding for clean energy projects on lands where such projects might not otherwise occur because of uncertainties and preconceived assumptions of risk.10

COMPLEX CHALLENGES/PRACTICAL SOLUTIONS

Regardless of which state you are operating in, Cody Boteler of Industry Dive suggests the question of placing PV facilities on closed landfills and brownfield sites comes down to a simple equation — can you make enough money selling electricity back to the grid to make up for the cost of development and maintenance?11 At ECT, we believe that a PV solar installation makes for a creative way to reuse much of the nation's capped, aged landfills. Due to the current cost of PV solar installations and federal tax incentives, endless opportunities exist, in both the private and public sector, to turn landfills into bright spaces of renewable energy. And our opinion is not exclusive to landfills. Any owner of under-performing land assets or

buildings with large amounts of roof space can benefit.

<u>References</u>:

- U.S. Environmental Protection Agency and the National Renewable Energy Laboratory. (2013, February). Best Practices for Siting Solar Photovoltaics on Municipal Solid Waste Landfills. Retrieved from: https://www.epa.gov/sites/produ ction/files/2015-03/documents/best_practices_siting_solar_photovoltaic_final.pdf
- Marcacci, Silvio. (2017, August 10). Solar Brightfields: Gigawatts Of Clean Energy Potential On America's Landfills And Brownfields. Forbes. Retrieved from:

https://www.forbes.com/sites/en ergyinnovation/2017/08/10/solar -brightfields-gigawatts-of-cleanenergy-potential-on-americaslandfills-andbrownfields/#5eeb3fe76f54

- 3. The Energy Innovation Channel. (2017, August 23). 3,000 Gigawatts Of Solar Brightfield Potential On America's Landfills And Brownfields. Retrieved from: <u>https://www.energycentral.com/c</u> /ec/3000-gigawatts-solar-<u>brightfield-potential-americaslandfills-and-brownfields</u>
- U.S. EPA. (2018, June). RE-Powering America's Land Initiative: Project Tracking Matrix. Retrieved from: <u>https://www.epa.gov/sites/produ</u> <u>ction/files/2018-</u> 06/documents/re_tracking_matrix _508_061318.pdf
- Georgia Renewable Energy Programs and Solar Tax Incentives. Bright Spaces. Retrieved from: <u>http://brightspacessolar.com/tax-</u> incentives/
- Moreland, Don. Install Solar Panels On Landfills in Georgia. Bright Spaces. Retrieved from: <u>http://brightspacessolar.com/sola</u> <u>r-panels-on-landfills-in-georgia/</u>

- U.S. EPA. Retrieved from: <u>https://www.epa.gov/sites/produ</u> <u>ction/files/2018-11/solarpv.xlsx</u>
- Landers, Mary. (2019, June 9). On Jekyll Island, a former landfill produces clean energy. Savannah Now. Retrieved from: <u>https://www.savannahnow.com/</u> <u>news/20190609/on-jekyll-island-</u> <u>former-landfill-produces-clean-</u> <u>energy</u>
- King & Spalding. (2019, June 24) Investments in Renewable and Conventional Power Projects in Qualified Opportunity Zones. JDSUPRA. Retrieved from: <u>https://www.jdsupra.com/legalne</u> ws/investments-in-renewable-and-22066/?MessageRunDetailID=42 1282675&PostID=6374760&utm medium=email&utm_source=rasa io
- 10. Florian, Marc. (2018, November). BUILD Act calls attention to Renewable Energy Siting Opportunities. Retrieved from: <u>https://www.ectinc.com/wpcontent/uploads/2019/05/Build-Act-Environmental-Consulting-And-Technology-Inc.pdf</u>
- Boteler, Cody. (2017, December 5). Are capped landfills and solar panels a natural match? Waste Dive. Retrieved from: <u>https://www.wastedive.com/news</u>/capped-landfills-solar-panelsenergy/512115/

ABOUT ECT

It requires specialized technical skills and proven experience to site and permit a renewable energy project at a brownfield site. ECT has supported the domestic and international energy sectors for three decades, serving as an expert resource for power generation facilities that have delivered more than 55,000 MW of new power over the past 10 years alone. ECT services within the energy sector span five key practice areas, including: air quality, natural resource management and permitting, performance assurance and compliance, site assessment and remediation, and water resources.