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NATIONAL COMMUNITY SOLAR PARTNERSHIP

Community Solar Model for Water Utilities

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INTRODUCTION

Community Solar refers to a solar array located within a community where multiple customers can subscribe and receive a credit on their utility bill for their share of the power that is produced, just as if the panels were on their roof. Residents and small businesses sign up to receive energy from a certain number of panels, which can be purchased up front or as a "pay-as-you-go" subscription.[2] Community solar is expanding in all regions of the US.[3] Community solar can expand access to affordable solar energy, especially for people who live in multifamily housing and rental units, and those who do not have physical space or financial ability to place solar on their property.

Twenty states and Washington, D.C. have established policies to enable or require community solar. Of that group, 16 states and Washington, D.C., have created provisions to address low-income participation in community solar. Incentives provide added funding for projects that subscribe low-income customers; carve-outs require a certain percentage of a community solar project or program to be subscribed by low-income subscribers or low-income serving organizations.

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[2] Michigan Community Solar Alliance, https://www.micommunitysolaralliance.com/what-community-solar; Michigan, Office of Climate & Energy, Department of Environment, *Community Solar* website, with links to:

A Guide to Community Shared Solar: Utility, Private, and Nonprofit Project Development
The Solarize Guidebook: A community guide to collective purchasing of residential PV system
U.S. DOE CELICA Toolkit
https://www.michigan.gov/climateandenergy/0,4580,7-364-85453_98214_98271-521093--,00.html

[3] https://solarinyourcommunity.org/market-trends.html.

In the past community solar projects have usually involved partnerships with utilities who provide credits on electric bills for their customers who participate in community solar projects. This paper explores a new model: partnerships with water supply and waste water utilities (here in after "water utilities") that locate solar arrays on water utility property, paid for with funds or subscriptions from their customers, with credits on water supply or water treatment bills.

This paper was developed for Michigan Energy Options[4] who first posed the question whether community solar models could be adapted to drinking water and waste water utilities. This paper was prepared under a Technical Assistance grant from the National Community Solar Partnership program.[5]

Research under this grant supports the following overall conclusions:

- Water and waste water utilities in the US are a large new market for distributed solar investment.
- Community solar models can be adapted to waster utilities whose revenues are supported by water or water treatment service bills.
- Water utilities generally appear to have legal authority to provide community solar services to their customers.
- Federal and state agencies should provide a range of research and financial supports to enable water utilities to consider on-site solar generation and community solar services.

This paper is a preliminary review of the potential for community solar for water utility customers. Additional research is needed to test and pilot this concept, however, data for a prototype project suggests that community solar models are viable for water utilities and their customers. See Fact Sheet in the attached Appendix. [6]

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[4] The author of this paper thanks the following people for their ideas and insights that helped guide the development of this paper. John Kinch and Michael Larson of Michigan Energy Options; Laura Wisland, Heising Simons Foundation and formerly Union of Concerned Scientists, and Bonnifer Ballard, Executive Director, Michigan Section, American Water Works.

[5] The National Community Solar Partnership (NCSP) is an inclusive coalition of organizations working to expand access to affordable community solar to every American household by 2025. Partners join to collaborate, learn from each other, set ambitious goals, and gain technical know-how to deliver tangible benefits, like energy bill savings and job creation, to underserved communities. The Partnership builds on the successes of DOE's **Solar in Your Community Challenge**, where more than 175 teams across the country tested and validated dozens of new community solar models serving low income households and nonprofit organizations. https://solarinyourcommunity.org/news-events.html

[6] The author of this paper has many years' experience with electric utility regulation, renewable energy development and policies. He is not, however, water utility law expert. The regulations and laws governing water utility governance and finance differ from state to state. Persons considering a community solar project with a water utility should consult counsel with water utility law experience in their state before proceeding with a community solar service with a water utility.

Water Utility Industry at a Glance

Water utilities operate infrastructure critical to health and well-being of people in almost all urban, suburban and many rural communities.

There are 156,000 "public" drinking water systems in the United States, serving over 306 million people. About 70% of public water systems are privately owned. About 20% are owned by local governments (e.g., cities, counties, towns or villages).[7] There are about 15,000 waste water treatment plants in US.[8] All of these entities use electric power for a range of operations.

Wastewater treatment plants can be the largest electricity consumer in a municipality, with electricity purchases comprising as much as 40% of the total operating costs for wastewater plants.[9] According to the United States EPA (LINK), as much as 4% of all energy use in the United States goes to public drinking water and wastewater services. California Water and Wastewater Special Districts alone spend more than $11 billion per year on electricity. As a controllable operating expenditure, energy use is a sweet spot for cost reduction.[10]

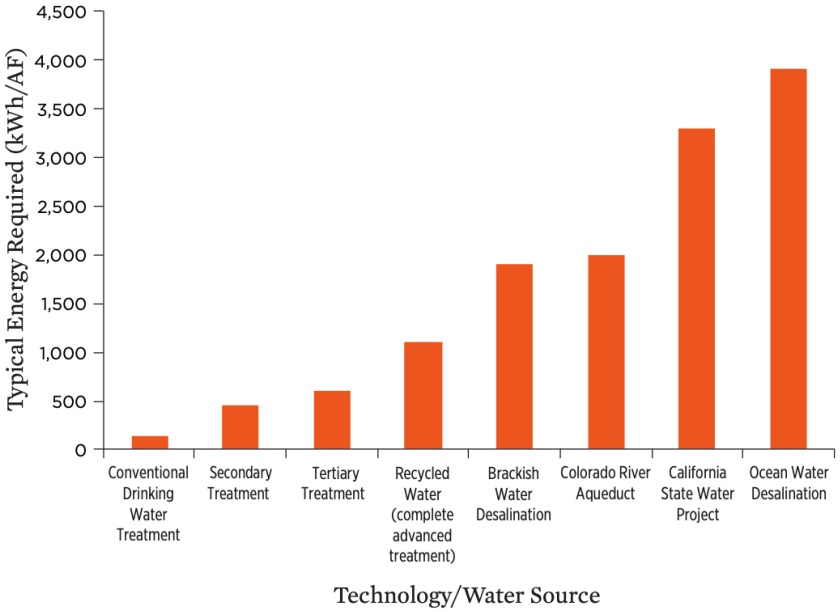
[7] David Denig-Chjakroff, National Regulatory Research Institute, *The Water Industry at a Glance*, April 2008. https://pubs.naruc.org/pub/FA864488-D93A-C11B-0B41-8977DC1C1611 See also, USEPA, https://www.epa.gov/aboutepa/about-office-water.

[8] "Municipal wastewater treatment systems in the U.S. consume a total of approximately 30 billion kWh annually, and their operations are typically the largest energy users in a community. … [That] energy use is expected to increase by up to 20 percent in the coming decades due to more stringent water quality standards and growing water demand based on population growth. Reducing energy usage in these facilities can yield significant environmental, economic, and social benefits for local communities. https://betterbuildingssolutioncenter.energy.gov/sites/default/files/attachments/SWIFt_Results_Sheet_FINAL.pdf

[9] Producing and delivering safe drinking water is a power-intensive operation, involving extensive use of pumps and treatment systems. Generating electricity, in turn uses large quantities of water, primarily for cooling. Consequently, reducing water use reduces demand for electricity, and reducing electric demand in turn reduces use of water. For water utilities operating in drought sensitive regions, solar makes sense from multiple perspectives.

[10] https://solarbuildermag.com/news/benefits-solar-water-plants/ (2015).

FIGURE 1. Electricity Requirements for Different Water Treatment Processes



The energy footprint of water supplies can vary greatly. A key consideration for new water supply alternatives is the amount of energy required to obtain, treat, and deliver potable water. In California, the most energy-intensive water supplies include large interbasin water transfers through the Colorado River Aqueduct and State Water Project and ocean water desalination.

SOURCE: RAUCHER AND TCHOBANOGLOUS 2014.

Water utilities often have significant amount of land,[11] rooftop and reservoir[12] surface space under their control which can be used to site solar generation. Water utilities often provide a wide range of non-water services to their communities. These services can include water and open space conservation services, recreation, community benefit programs and others.

There is huge diversity among water utilities in size, energy requirements, revenues, customer bases and governance and financial structures.[13] Roughly 85 percent of all water and wastewater systems are publicly owned and operated by municipalities and most are small; more than 80 percent of community water systems and publicly owned treatment works serve populations of less than 3,300.

[11] Water Resource Foundation, *Opportunities and Barriers for Renewable and DER Development at Water and Wastewater Utilities,*
2019 https://www.waterrf.org/research/projects/opportunities-and-barriers-renewable-and-distributed-energy-resource-development.

[12] See, https://deeply.thenewhumanitarian.org/water/articles/2017/08/17/floating-solar-power-a-new-frontier-for-green-leaning-water-utilities.

[13] In Wisconsin, there are approximately 575 municipally-owned water utilities, 81 electric utilities, 1 gas utility, and 600 wastewater utilities. All public utilities in Wisconsin, except wastewater utilities, are regulated by the Public Service Commission (PSC). In most other states, municipal utilities are regulated by the local unit of government itself, and not by a state commission.

Many water utilities face financial difficulties in meeting capital costs to maintain safe and reliable service.[14] Like other sectors, water has an aging infrastructure that requires massive reinvestment to upgrade pipes, mains, pumps and other equipment. Many assets are nearing or beyond their expected lifespan, leading to roughly 240,000 water main breaks, and between 23,000 and 75,000 sanitary sewage overflows per year in the United States. The estimated investment gap ranges from about $400 billion to nearly $1 trillion, just to maintain current levels of service. For example, a report of the 21st Century Infrastructure Commission (2017), Michigan currently "has an $800 million annual gap in water and sewer infrastructure needs."

This financial stress was intensified in 2020-2021 during the Covid Pandemic which resulted in widespread unemployment and commercial facility closures. These factors tended to reduce revenues and greatly increase bill payment arrearage.[15] This suggests that many water utilities are looking for new ways to pay for infrastructure that can lower operating costs and increase resilience against increasing frequent and severe weather events that interrupt electric power supply.

Uninterrupted power is critical to safely deliver water services. A story in the San Francisco Chronicle provides a glimpse at what happens at a water utility when the power goes out, an increasingly common occurrence due to wildfire, storms and other climate related weather events.

> While most urban areas have enough backup power to cover the huge energy demands of water and sanitation service, some rural communities do not. Many utilities were scrambling to get generators in place as well as stockpile fuel to run their backup power equipment….. The Tuolumne district serves many small, far-flung communities that rely on pump stations to deliver water. Some have no backup power because utility rates would never cover the cost….. "We'll try to bring mobiles in, but we don't have enough mobile generators for all those locations," Pattison said. "Remember, this is a rural area. We have customers that are very remote and all over the place."[16]

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[14] See, https://www.greentechmedia.com/articles/read/water-utility-turns-to-dr-and-efficiency-performance-contract-to-save-500m ("Water utilities spend about 30 percent of their total operating budget on energy, and yet have little to no available capital to upgrade systems in order to save money.")

[15] "A survey by the California state water board earlier this year found at least 1.6 million households were behind on water bill payments due to the pandemic, with debt totaling at least $1bn. At least 25 small and medium-sized water utilities – 1% of the total – were at imminent risk of going under." The Guardian, *California Households owe $1 bn in water bills as affordability crisis worsens, https://www.theguardian.com/us-news/2021/jan/19/california-water-bills-affordability-debt-crisis*, January 19, 2021. See also, *A Looming Crisis for Local U.S. Water Systems?* February 19, 2021, https://www.nationalacademies.org/news/2021/02/a-looming-crisis-for-local-u-s-water-systems?utm_source=NASEM+News+and+Publications&utm_campaign=d896705adb-What%27s_New_2021_02_22&utm_medium=email&utm_term=0_96101de015-d896705adb-103955281&goal=0_96101de015-d896705adb-103955281&mc_cid=d896705adb&mc_eid=274d55dba3

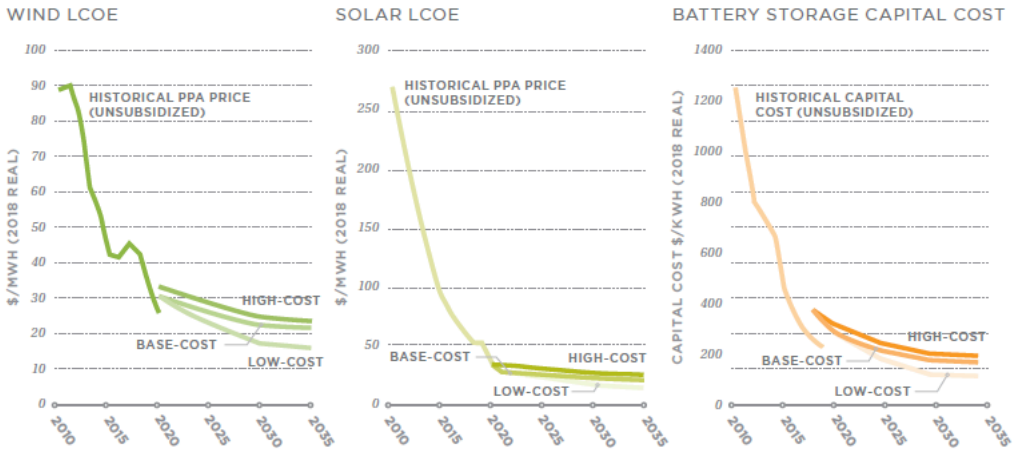
[16] Kurtis Alexander San Francisco Chronicle *When the power goes out, so does the water in some places,* Oct. 9, 2019. See also, *Power Resilience, Guide for water and wastewater utilities,* June 2019 https://www.epa.gov/sites/production/files/2016-03/documents/160212-powerresilienceguide508.pdf

In the NY metropolitan area, Superstorm Sandy in 2012 knocked out electricity over a widespread area and prevented some treatment plants from functioning at all.

There are many examples of successful water utility-based PV systems in the US,[17] but solar power at water utilities remains relatively rare in the US outside of California.[18] We found no examples of water utilities engaging in community solar models.[19]

What Has Changed?

The cost of solar and wind generation and battery shortages has dropped precipitously in recent years.[20]



These radically lower costs mean that renewable generation, including distributed renewables, are economically beneficial across wider and wider parts of the US. For example, successful pairing of solar generation with water utility operations has occurred recently in Michigan and other northern states. See attached Case Studies in Appendix.

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[17] Dozens of water utilities and districts across the United States have embraced the cost-saving benefits of solar power over the past few years. Commissioned installations include the 7.5 MW solar power plant at the Lake Pleasant water treatment plant in Phoenix; a pair of solar systems operating for the Rancho California Water District; the E.M. Johnson plant in Raleigh, N.C.; and a ground-mounted array at the Gresham, Ore., wastewater facility. In each case, the customer expects to offset a sizeable percentage of its annual power usage, enjoy millions of dollars in energy savings over the lifetime of the system and significantly reduce its carbon footprint.

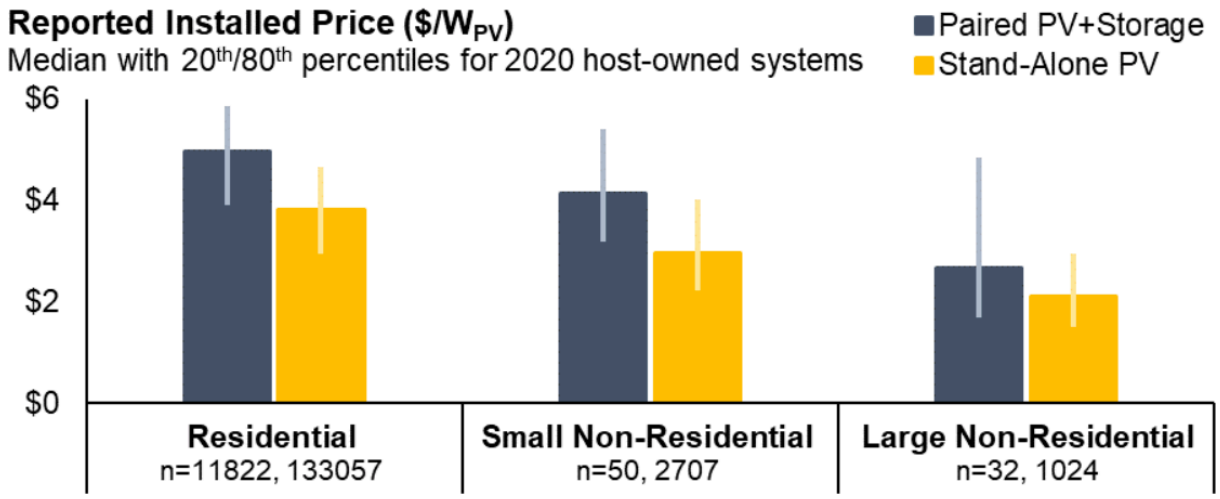
[18] A.Strazzabosco, S.J.Kenway, P.A.Lant, *Solar PV adoption in wastewater treatment plants: A review of practice in California*
https://www.sciencedirect.com/science/article/pii/S0301479719310461,
https://doi.org/10.1016/j.jenvman.2019.109337

[19] One report from 2013 very briefly mentions the potential to use water bill credits to support community solar projects, but none of the case studies in the report include this model. In one case, a solar array was located on waste water utility property, but the bill credits were arranged with customers of an affiliated electric utility. See, *A Guidebook for Community Solar, Programs in Michigan Communities*, 2013
https://www.michigan.gov/documents/mdcd/Michigan_Community_Solar_Guidebook_437888_7.pdf

[20] See, 2035Report, *Plummeting Solar, Wind, And Battery Costs Can Accelerate Our Clean Electricity Future,* page 11-14, available at https://www.2035report.com/electricity/.

Renewable generation is no longer just a resource for in windy Midwest or sunny Southwest regions. In our experience, many people who plan and operate electric utilities are not taking these cost reductions into account in planning and investment decisions. This is likely to be even more true for water utility managers who historically would have had no reason to track such cost trends. Similarly, due to historically high prices, water and waste water utilities will tend to discount potential for solar/battery microgrid applications to provide back-up power and to reduce overall electricity costs. Today the situation is vastly changed. By integrating solar generation into water utility operations managers and significantly reduce the overall energy demand, become energy self-sufficient and, in some cases, energy positive.[21]

Another trend that affects water utility manager attitudes toward renewable generation is the increasingly frequent interruption of electric power supply due to extreme weather events. These events have occurred in all regions of the US in recent years. PV systems can provide resiliency in grid emergencies, providing at least some capacity for operations during the day time; in combination with storage and demand response systems solar can provide both full resiliency and ability to gain new revenues from interruptible service, and other grid services in some parts of the US. A report by Lawrence Berkeley laboratory suggests that adding storage to large nonresidential PV systems does not, on average increase cost substantially, but that prices vary widely.[22]



[21] *Solar PV adoption in wastewater treatment plants: A review of practice in California*, Journal of Environmental Management Vol 248, October 2019, https://www.sciencedirect.com/science/article/pii/S0301479719310461; https://www.altenergymag.com/article/2020/01/heres-how-renewable-energy-benefits-the-wastewater-industry/32592. See also, L. Lovely, *Microgrids Power Wasterwater Treatment Plants, WaterWorld,* January 24, 2019, https://www.waterworld.com/home/article/14071013/microgrids-power-wastewater-treatment-plants

[22] Lawrence Berkeley Laboratory*, Behind the Meter Solar+Storage: Market data and trends*, July 2021, https://emp.lbl.gov/publications/behind-meter-solarstorage-market-data

Water utilities typically rely on diesel generators to supply power when the electric grid goes down. But diesel fuel is very expensive, its supply can be interrupted by storms and other emergencies, and diesel generators emit large amounts of toxic air pollution in the community.

Here are some reasons why the time is ripe for water and waste water utilities to adopt on-site solar technology and consider community solar financial models.

- Many water utilities face rising electric power costs and increasingly volatile prices.
- Many water utilities have difficulty raising capital for ordinary system costs.
- Many water utilities, particularly small and mid-sized systems have suffered revenue losses during the Covid-19 epidemic, due to bill arrearages, lower water use in businesses and industry, making it more difficulty to take on new debt.[23]
- Community solar can be structured so that wealthier customers fund solar projects that put downward pressure on water bills for every customer, including low income customers (equity issue).
- Solar systems can be added to water utility facilities without up-front capital costs, through 3rd party ownership and PPAs business models, but these models reduce the financial benefit to the water utility and overall community relative to community solar models.
- Drinking water and waste water systems are responsible for 45 million tons of greenhouse gases to the atmosphere annually.[24] Many local governments have adopted GHG reduction goals or are under pressure from consumer and citizen groups to reduce climate impacts. A community solar program is one way to address these concerns at low or zero cost to the water utility budget.

Scope of Authority to Offer Community Solar Services Governance discussion

When considering a proposal to offer Community Solar services, water utility managers will ask, "do we have authority to do this – would we be exceeding our powers as a utility?" Keyes & Fox researched whether the governance structure and powers of water utilities typically would allow it to offer a community solar serviced to its customers and to provide bill credits to their customers who voluntarily contribute capital toward a solar system on water utility property. We did not have resources under this TA grant to do a complete survey of state water utility governance models, to assess whether water utilities have authority to offer community solar services. But we did look at governance structures from two states (MI and CA) to provide a sense of what is typical.

The following are several general observations:

[23] "… The United States faces a water infrastructure funding gap of hundreds of billions of dollars, which impacts all utilities – but especially small utilities – and can cause compliance challenges that impact the reputation of the sector as a whole." https://www.nacwa.org/docs/default-source/conferences-events/2018-ulc/nacwa-utility-governance-document-(002)v3.pdf?sfvrsn=2

[24] https://www.epa.gov/sites/default/files/2017-04/documents/water_utility_heat_pump_brochure_508.pdf,

- Water utilities appear to have wide discretion to structure contracting and procurement,
- Solar generating facilities and community solar services are similar to a wide range of community benefits that water utilities often provide, including:
    - preferences for local hiring, small businesses, and minority- or woman-owned businesses,[25]
    - provide land or staff to support community recreation
    - preserve land or waters for open space, wildlife protection
    - provide space for a community public art

A community solar service seems consistent with these kinds of activities, particularly where the community solar model provides benefits to the utility customer base.

Statutory Authority

In many states have enacted statutes prescribing the way in which water utilities are formed and governed. Typically, these laws give broad authority to water utilities in regard to the scope of activities authorized.[26] For example, The following are excerpts from Michigan law regarding powers of water utilities:

> MUNICIPAL SEWAGE AND WATER SUPPLY SYSTEMS - Act 233 of 1955[27]
>
> § 124.284

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[25] See, e.g. San Francisco Public Utilities Commission, Community Benefits Policy, https://sfwater.org/modules/showdocument.aspx?documentid=3676).

[26] See, http://www.waterencyclopedia.com/La-Mi/Legislation-State-and-Local-Water.html#ixzz6suRUS442

> Legislatures commonly used two different approaches to create these new agencies. One method was to pass general legislation outlining procedures communities had to follow to create and set the boundaries for a specific type of agency, the agencies' duties and powers, and funding mechanisms. Legislatures could create special-purpose, multi-county or regional water agencies. Regardless of how they were created, many of these agencies have overlapping jurisdictions: some possess broad powers, whereas others are limited to a single purpose.

[27] http://www.legislature.mi.gov/(S(lu4ruynwoisuynxd2n5f205v))/mileg.aspx?page=getObject&objectName=mcl-Act-233-of-1955. Other examples include the following from the state of Maryland and Wisconsin:

> PUBLIC UTILITIES
>
> § 7-105 - Water companies – Powers Universal Citation: MD Pub Util Code § 7-105 (2013)
>
> (a) A water company incorporated in the State has the powers necessary for the purposes for which it is incorporated and may:
>
> (2) The governing body of the municipal corporation or county may adopt reasonable regulations for the …. operations of a water company.

The authority of water utilities in Wisconsin is described as follows:

> The broadest authority for the management and governance of municipal utility operations derives from statutory home rule. This is an extremely broad grant of authority with respect to the management and control of "the public service" through regulation, license, tax levy, appropriation, and "other necessary or convenient means."
>
> https://www.lwm-info.org/DocumentCenter/View/3824/Public-Utilities-356-Municipal-Utilities-Governance-Options-and-Responsibilities

Authority as municipal authority and public body corporate; powers generally.

Sec. 4 (1) An authority shall be a municipal authority and shall be a public body corporate with power to sue and be sued in any court of this state. It shall possess all the powers necessary to carry out the purposes of its incorporation and those incident thereto. Including: Adopt and promulgate rules and regulations for the use of any project constructed by it under the provisions of this act.

(h) Acquire, hold, and dispose of real and personal property in the exercise of its powers and the performance of its duties under this act.
(Emphasis added).

THE GENERAL LAW VILLAGE ACT (EXCERPT)
Act 3 of 1895
71.7 Water works; ordinances.

Sec. 7. The council may enact such ordinances, and adopt such resolutions, as may be necessary for the care, protection, preservation, and control of the water works, and all the fixtures, appurtenances, apparatus, buildings, and machinery connected therewith or belonging thereto, and to carry into effect the provisions of this chapter, and the powers herein conferred in respect to the construction, management and control of such water works. (Emphasis added.)

Michigan State Constitution
§ 22 Charters, resolutions, ordinances; enumeration of powers. Under general laws the electors of each city and village shall have the power and authority to frame, adopt and amend its charter, and to amend an existing charter of the city or village heretofore granted or enacted by the legislature for the government of the city or village. Each such city and village shall have power to adopt resolutions and ordinances relating to its municipal concerns, property and government, subject to the constitution and law. No enumeration of powers granted to cities and villages in this constitution shall limit or restrict the general grant of authority conferred by this section.

§ 34 Construction of constitution and law concerning counties, townships, cities, villages. The provisions of this constitution and law concerning counties, townships, cities and villages shall be liberally construed in their favor. Powers granted to counties and townships by this constitution and by law shall include those fairly implied and not prohibited by this constitution.

In California, the state Legislative Analyst's office discussed water utility powers as follows:[28]

[28] California Legislative Analyst's Office, Water Special Districts: A Look at Governance and Public Participation, March 2002. https://lao.ca.gov/2002/water_districts/Special_Water_Districts.html.

> There are hundreds of water special districts in California, with a great diversity of purposes, governance structures, and financing mechanisms. Some districts are responsible for one type of specific duty, while others provide a wide range of public services. Some are governed by a county board of supervisors or city council while others have their governing boards directly elected by the public.
>
> Water districts in California provide a diverse range of services—using a variety of financing means and governance structures.
>
> Many of these statutory authorizations allow districts to provide more than one of the three designated water services (water delivery, sanitation, or flood control). Lighting, recreation and park, and street services are the most common nonwater activities performed by the state's water districts.

The development of on-site solar to provide power to water utility operations is clearly part of routine operations, just as other means of supplying power are routinely exercised by water utilities (e.g. methane production and recovery for use in producing electric power).

Similarly, solar power has potential, especially in combination with battery storage to ensure reliable service and to respond to weather and grid emergencies. Actions to improve reliability of water service is clearly within the authority of water utilities.

> AWWA Policy Statement on Electric Power Reliability For Public Water Supply And Wastewater Utilities
>
> AWWA believes that every water and wastewater utility should set uninterrupted service as a high priority operating goal and include potential service interruptions in its risk assessment and resiliency plan. Avoiding extended interruptions in water service is essential for fire safety, sustaining local economies, maintaining public trust, and protecting public health and the environment.
>
> To provide uninterrupted service, water and wastewater systems require an acceptable level of electric power reliability. Every utility is unique with respect to its vulnerability to electric supply disruption and must undertake a critical assessment of the issue based on specific local conditions. For some utilities, even a small electric service outage can have significant consequences. Redundancy of supply or backup generating capacity tends to mitigate the risk.

For these reasons it seems unlikely that a water utility considering community solar would face challenges that such projects go beyond the utilities' authority under state law. It is possible that local utility articles of incorporation or charter could narrowly prescribe the powers of the entity, narrower than allowed by state law. In this case however, articles of incorporation or charters can be amended to resolve such a constraint.

Nevertheless, a first step in developing a community solar project is to review applicable statues and utility governance documents to ensure there are no specific restrictions to the power of water utilities that might prevent a community solar service.

Community solar as a form of community stewardship
Another strong indicator that community solar is firmly within the scope of water utility authority is the long tradition and role of water utilities in community stewardship. In researching this question, we found several documents that appear to support a broad role for water utilities as community steward.

The AWWA 2019 Guide to Community stewardship appears to recognize the general authority of water utilities to provide a wide range of community services, beyond water supply or waste water treatment. [29] It states:

> Community stewardship is the practice of leveraging the utility's assets and operations to benefit the larger community, lessen negative impacts from utility activities, and provide service equitably across the service area.
>
> Across the country, utilities are looking for creative ways to embody the community stewardship role by helping everyone to have access to clean water, ensuring water service is affordable, investing in local businesses and providing community benefits.
>
> In particular, the [Effective Utility Management] (EUM) framework includes the community stewardship role under community sustainability which promotes the following attributes:
>
> - Efficiently uses water and energy resources, promotes economic vitality, and engenders overall community improvement.
> - Uses operations to enhance natural environment.
> - Maintains and enhances ecological and community sustainability including pollution prevention, watershed and source water protection.
> - Partner with other utilities, agencies, community organizations and philanthropies to leverage utility investments to benefit the community. The utility can leverage its role as an institutional anchor to build local partnerships and programs that benefit the community beyond the utility's water service delivery role

Recommendations

- US DOE should consider funding an education and training program directed toward small and midsized water utilities which provides tools, advice and community solar business models tailored to the water utility industry. This will help create a new channel for distributed solar industry. For example, agency guidance could elaborate on

[29] https://www.awwa.org/Portals/0/AWWA/Communications/AWaterUtilityManagersGuidetoCommunityStewardship.pdf

the model described in the appendix to this paper, to provide a more detailed financial benefit model, with options for sharing benefits between subscribers, non-participating customers

- US DOE should modify its wastewater and water supply utility "toolkits" guidance documents and assessment tools to add information and recommendations on how to adopt solar generation as part of broader system energy efficiency improvements.[30]
    - The agency could also establish a Water-Energy Industry Sector Task Force to drive integration and coordination.[31]
- USEPA's Water Programs should review and amend its guidelines on water and wastewater utility operations to add solar and community solar guidance documents and development modules.
- Foundations and non-profit organizations can supplement the agency activities described above. For example, many smaller water utilities lack staff to take on new projects. Local and regional NGO's can help the water utility undertake the needed research and engage with community members on the idea of community solar services.
- States, with assistance from federal agencies, should collect data on water utilities' energy use, demand profiles and storage applications, to help identify opportunities to integrate solar into operations, perhaps as part of effort to help water systems adapt to climate changes.
- Federal and state agencies should use this report and fact sheet to open dialogue with water utility trade associations to assess interest, offer training and refine the model.

[30] There is very little literature on solar and water utilities. Most of what exists is dated. There was a flurry of research and publications by USEPA and DOE in the 2015-2016 period, but that faded away in subsequent years. Many federal agency guidance documents on energy management at water supply and waste water facilities do not mention solar as an option, partly because many of them were published before the recent reduction in distributed solar energy costs; or they refer to solar options only briefly in the context of energy efficiency briefing papers. (see, https://betterbuildingssolutioncenter.energy.gov/sites/default/files/attachments/SWIFt_Results_Sheet_FINAL.pdf; https://www.energy.gov/sites/prod/files/2018/03/f49/WIP_ESPCGuide_Wastewater_FINAL.pd).

[31] A Water Research Foundation report describes the typically poor interactions between electric and water utilities, which can pose problems for onsite generation at water utilities. As of 2015 a Union of Concerned Scientist report noted that, "Currently, there is no agency officially tasked with looking across the water sector to determine the most cost-effective and beneficial ways to reduce global warming emissions and rely on cleaner sources of electricity." This problem persists today.
See, *Water Research foundation, A Distributed Renewable Energy Opportunities & Policy Workshop*, 2021, https://www.waterrf.org/system/files/resource/2021-03/DRPT-5062_0.pdf; https://www.ucsusa.org/sites/default/files/attach/2015/04/clean-energy-opportunities-in-california-water-sector.pdf; *UCS, Clean Energy Opportunities in California's Water Sector,* April 2015, https://www.ucsusa.org/sites/default/files/attach/2015/04/clean-energy-opportunities-in-california-water-sector.pdf .

CONCLUSION

Community solar is a viable mechanism for water utilities to raise capital for operations, reduce power costs and to provide a new service to its members. Due to recent price reductions, solar is an economic option for water utilities in all parts of the continental US, Hawaii and parts of Alaska. Community solar business models provide a means to add solar generation to utility operations without incurring new debt, which may be attractive for utilities whose access to capital is weakened by effects of the Covid-14 epidemic. Federal and state agencies can play an important role to educate and train water utilities on community solar.

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