Part 1. Smart, Flexible, Affordable Clean Energy for Chicago

A Response to the City of Chicago's Franchise for Delivery of Electricity - Request for Information

by Blacks In Green

September 30, 2021

About BIG

- BIG: Blacks in Green™ is a non-profit organization that achieves **environmental justice, community wealth building and economic development through clean energy and climate resilience.**
- We're tackling clean energy access, pollution, poverty and climate resilience with a system changing tool we created and call **The Sustainable Square Mile Handbook™**- with a goal of closing the racial health/wealth gap in a **just energy and climate transition**.
- By teaching our communities we better understand and act to mitigate the risks of **climate crisis and realize opportunities for a new green economy and making Chicago *an equitable, affordable, and resilient clean energy metropolis for the 21st Century.***
- We believe that power-sharing collaborations that center community-voice and decision-making produce the most durable, positively impactful, and least-cost results.
- We **serve as a bridge to catalyze** communities and stakeholders in the design and development of solutions to the tough problems facing our communities.
- We are dedicated to realizing a near-term future of green, self-sustaining, mixed-income, walkable-villages where people **walk-to-work, walk-to-shop, walk-to-learn, walk-to-play** and where neighborhood dollars circulate locally to limit the sources of greenhouse emissions that are overheating our planet and pollution that destroys our health and wealth.
- The tools we use are **our 8 Principles of Green-Village-Building™ and 12 Propositions of Grannynomics,™** which we are piloting in our home community on Chicago's South Side and teaching/consulting nationally as a replicable model.
- BIG's **8 Principles operate in the realms** of wealth building through ownership, renewable energy, recycling, urban homesteading, celebration of heritage, system change organizing, green hubs for lifelong learning, and making an oasis wherever we live- by inventing, investing, manufacturing, and merchandising locally.
- We celebrate and align with The Principles of Environmental Justice, The Guiding Values and Principles of the Pachamama Alliance, the Climate Justice Alliance's People's Orientation to a Regenerative Economy, and the Jemez Principles for Democratic Organizing.
- In our process, communities of color **design, direct, represent, and benefit from the energy transition, climate adaptation and resilience, and** economic development, with success measured by access to affordable, clean energy, access to climate adaptation infrastructure resources, procedural justice and democracy, economic engagement, wealth building and community ownership and benefit, improved health status and reduced pollution and negative environmental impacts, increased household income, community education on energy and climate, access to clean, fair-wage jobs, and ownership of local businesses and land.

Acknowledgements

Blacks In Green wishes to thank the Mayor and City of Chicago for its leadership on issues of energy transition, climate change, and climate justice. We are inspired by its sector-leading and tireless work to celebrate our City, grapple with difficult problems and remain steadfast in caring for its people while making Chicago an *equitable, affordable and resilient metropolis for the 21st Century*. The City's Chief Sustainability Officer and team have been particularly open to our ideas and theory of change; we appreciate being listened to and consulted. We are grateful for the City's willingness to open the Franchise for Delivery of Electricity process to a broad range of stakeholders, including front-line and environmental justice communities, and humbled and honored to submit these observations, recommendations and conceptual proposals.

We thank LVEJO for their steadfast, enduring and creative leadership, innovation and activism in the environmental justice and climate equity space.

We recognize the people of Chicago, our Woodlawn neighbors, the people who remain resilient despite systemic injustices and those who still dare to dream and are excited for a new era of regenerative growth and healing.

Blacks In Green acknowledges the dedication of its staff, the unswerving support of its Green Power Alliance members and research and technical guidance from The DeGannes Consulting Group in the preparation of this submission in response to the City of Chicago's Franchise for Delivery of Electricity – Request for Information.

We look forward to working collaboratively with our community partners and Woodlawn residents, the City, the regulated utilities, labor unions, the industrial sector, local businesses, philanthropy, and our Green NGO-allies to "power-shift and fuel switch" to an equitable, decarbonized and vibrant future for Chicago.

Part 1. Table of Contents

Overview

Blacks In Green (BIG) thanks the Honorable Mayor of the City of Chicago and the Commissioner of the Department of Assets, Information and Services for inviting broad community and stakeholder engagement for transforming Chicago into *an equitable, affordable and resilient clean energy metropolis* of the 21st Century. We also applaud the City for its commitment to equity and environmental justice in principle and practice, and its commitment to a full, wide-ranging and transparent due diligence process as it selects pathways forward that will achieve the City's goals. BIG is pleased to present this response to the City's Franchise for Delivery of Electricity Request for Information (RFI) for your consideration.

We believe that a just and affordable energy transition is critical to successful climate adaptation and resilience. We believe that affordability and access means safety for all Chicago residents but especially for the most vulnerable and those in priority communities. Energy design solutions, whether clean technologies, business models or programming must be flexible to be accessible to Chicagoans in different types and vintages of homes and communities. Effective solutions must also be derived from active engagement with community members in decision-making roles to inform and select appropriate solutions. We have therefore submitted a design solution to inspire the adoption of building energy retrofit and decarbonization models that center affordability, health and safety, and flexible access, while integrating clean, renewable energy solutions for low- or limited-income homeowners, renters and small enterprises. BIG is located in the West Lawn/Woodlawn neighborhood of Chicago, the neighborhood of Emmet Till 's childhood home and is one of the historically Black communities that grew out of the Great Migration era. The neighborhood remains vibrant and has withstood an era of disinvestment. Its juxtaposition near both the University of Chicago to the North and the planned Obama Presidential Center and Library to the east, presents a unique opportunity to create innovative and powerful community-City-private sector and philanthropy partnerships.

BIG has presented its response in two parts. Part 1 presents our neighborhood and community-centric approach to what we see as the "design problem" for delivering affordable, safe and equitable clean energy in priority communities and presents a concept that could be implemented in the near-term, and related recommendations. Part 2 presents our analysis of what will be required to in fact *deliver* measurable justice and equity in the energy and climate transitions including new business and community engagement models, broadband access and conceptual solutions at different scales and scopes of action.

A Neighborhood Approach

Starting Where We Are

There are numerous clean and renewable technology solutions available for application in priority communities like Woodlawn. We believe that to design solutions that are most appropriate and effective, we must start with a sound understanding on the situation facing neighborhood residents – that is, we must correctly specify the design problem. Often, clean energy project proponents offer amazing technological solutions that address the *WHAT*, but too few begin with an understanding or situation assessment of the neighborhood buildings and demographics, which are so important for designing *HOW* best to deliver that technology in ways that are more likely to meet resident, homeowner, landlord and overall community needs. BIG, in collaboration with some of its **Green Power Alliance** members has developed a concept that begins with an understanding of the neighborhood and its people. While **additional feasibility studies are required ahead of implementation**, **this approach is aimed at identifying a pathway for delivering affordable, clean energy, safety and comfort, in the near-term**.

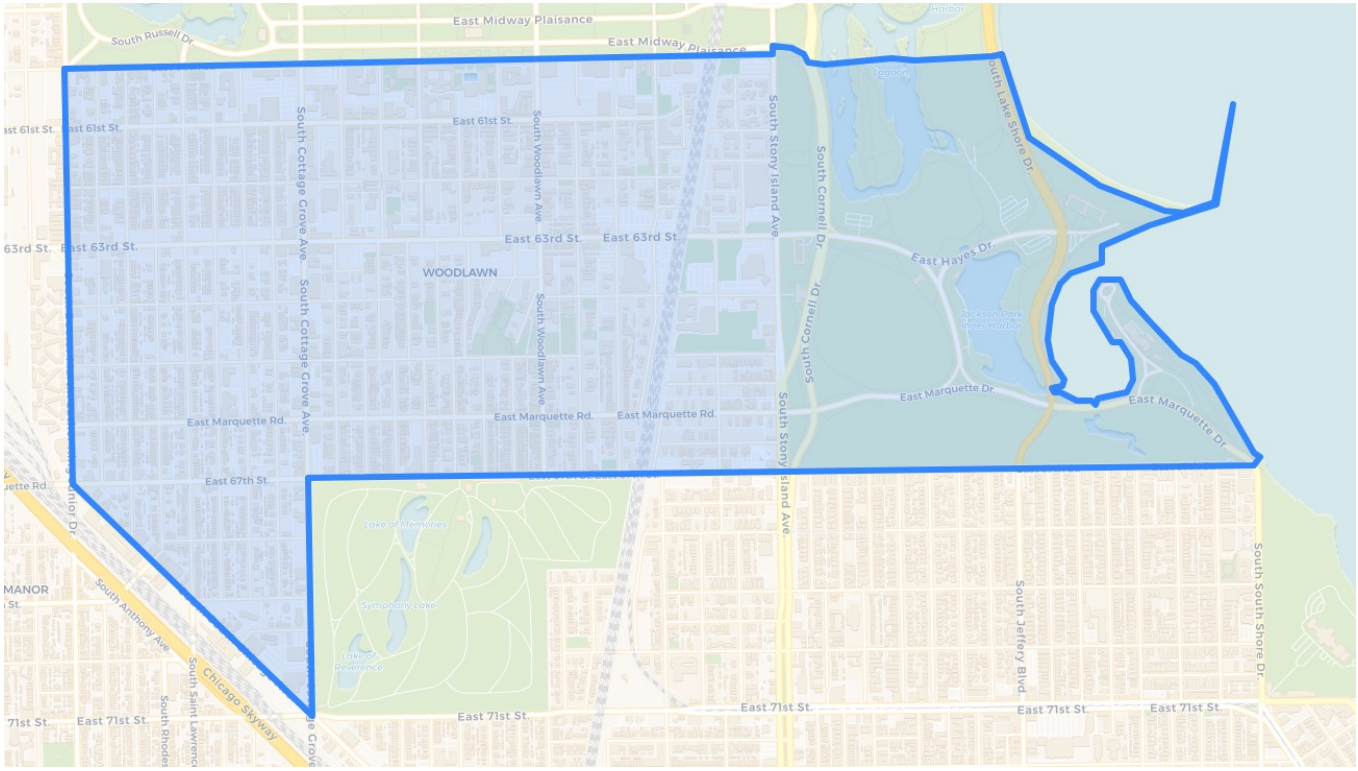
Our approach is **flexible** because it will not require a complete retrofit of existing HVAC systems in neighborhood homes in order to participate. Our concept works in homes with older cast iron furnaces, with existing air handlers, in homes that currently lack cooling systems there would be relatively low-cost approaches to providing cooling for 90+ degree days during the summer. The proposed concept is **accessible** from both technology and cost perspectives because high-efficiency air source heat pumps are currently more and more available in US markets, and there are likely utility energy efficiency programs (from ComEd, or under FEJA and CEJA) and potential manufacturer partnerships that could reduce the initial customer costs of participation in the program. Higher-efficiency heating and cooling typically lowers on-bill costs for households while providing a **greater degree of comfort and safety**. Energy-efficiency (using less energy to achieve the same task or eliminating wasted energy) and the negative watts or negawatts (Lovins September 1999) produced are almost always the least cost approach to more efficient, **greenhouse gas reducing and affordable** clean energy solutions. Since some low-income householders who are energy burdened may have simply gone without or substituted other fuels like wood-burning stoves to stay warm during the winter, their energy usage may appear to increase after an energy efficiency retrofit. In such cases, on-bill energy costs have become low enough to allow energy usage that is safe and affordable. **The system sharing and scaling elements of our proposed conceptual approach also contribute to on-bill savings and affordability for customers.**

(For Amory Lovin's groundbreaking article on negawatts, see https://rmi.org/wp-content/uploads/2017/06/RMI_Negawatt_Revolution_1990.pdf)

Woodlawn Neighborhood Context

City of Chicago, Illinois

Starting Where We Are



Woodlawn is a neighborhood within the Culture Corridor of the Obama Presidential District at the southern tip of Bronzeville, IL. Some government data sources utilized subdivide the area differently depending on their specific mandates.

Source: ChicagoCityscape.com https://www.chicagocityscape.com/maps/?place=communityarea-woodlawn

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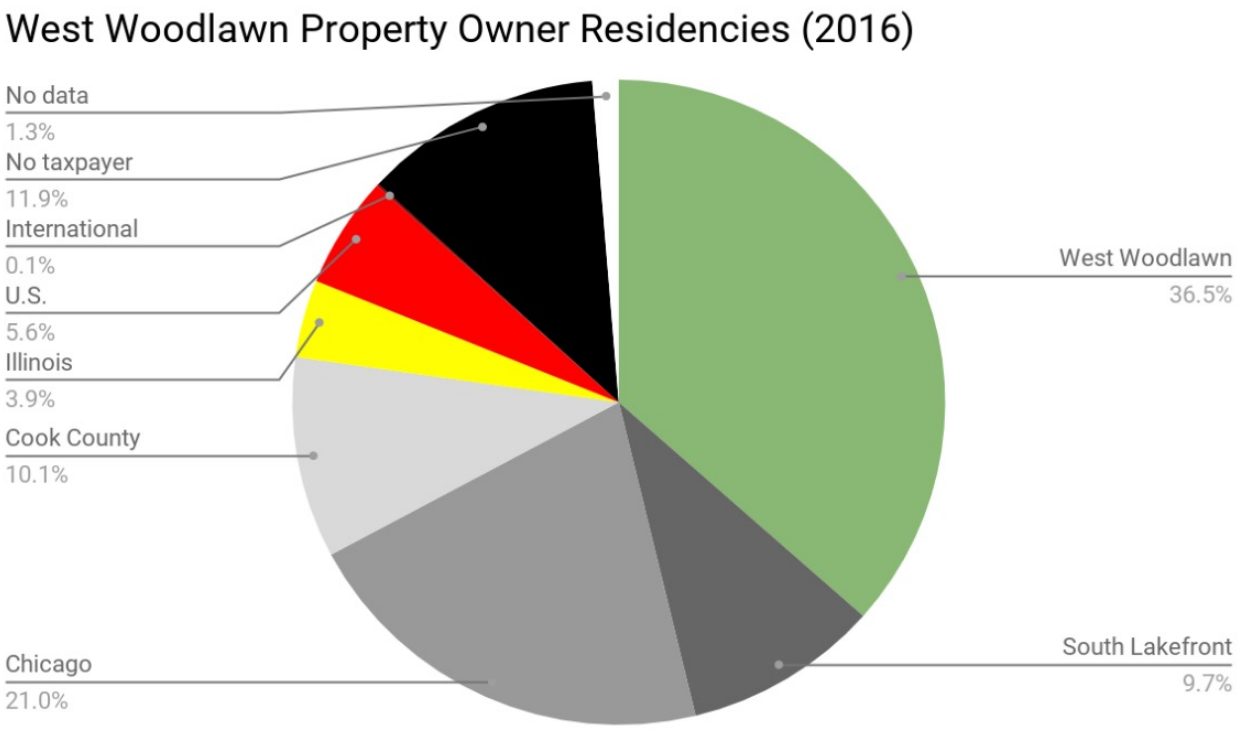
Neighborhood Context

Starting Where We Are



"A large portion of land within West Woodlawn has undergone some sort of ownership change in the past three years. [T]hat change includes a slight increase in international developers. The most intriguing point brought out by this analysis is that roughly half (50.4%) of the total properties in West Woodlawn are owned externally. This … reality could put the existing residents and businesses at risk of outside influence in the future. Only 36.5% of West Woodlawn property owners are owner-occupants. This term…describes residents who own the property they live [in]."

Source: "Who Owns West Woodlawn?" A 2013-2016 Land Ownership Study completed by Geography Dept. at DuPaul University, commissioned by BIG.

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Neighborhood Context

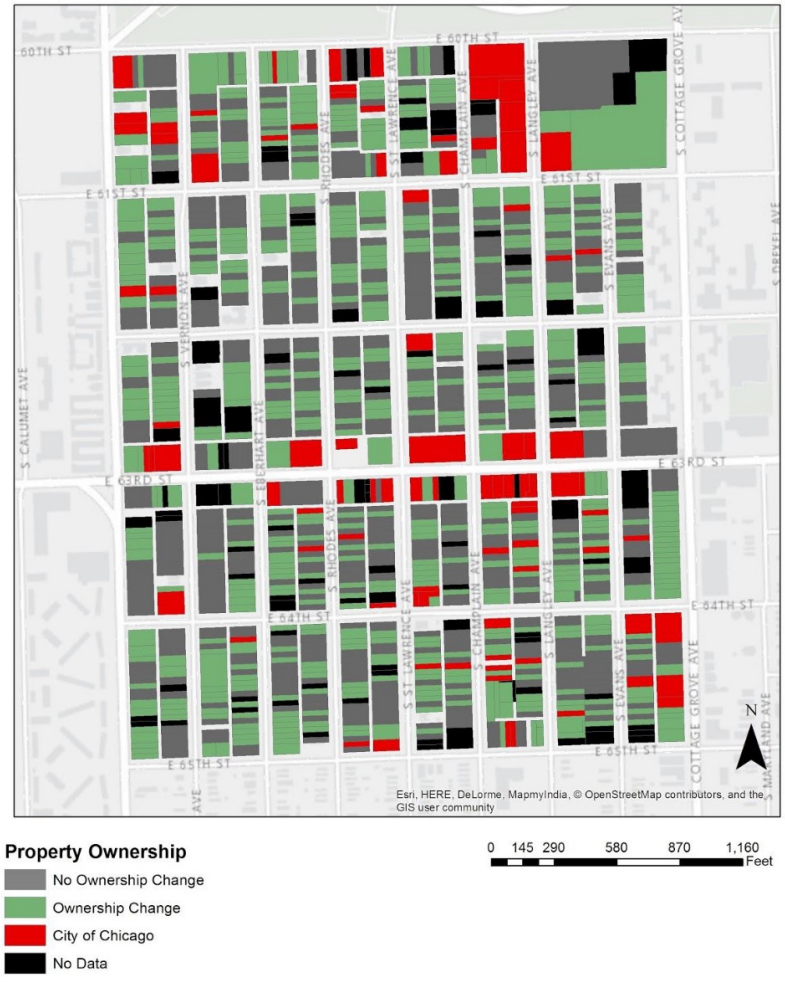
Property Ownership, Rentals & Affordable Housing

- ✓ Only 36% of West Woodlawn's residents own their homes.
- ✓ Over 50% of property owners live outside of the neighborhood.
- ✓ There is a higher percentage of renters than property owners.
- ✓ The percentage of affordable housing units in West Woodlawn is greater than that of the City of Chicago, overall.
- ✓ Non-resident property ownership increased in West Woodlawn between 2013 and 2016.
- ✓ Property values increased 23% within six months of the announcement of the Obama Presidential Library and District, nearby.

There is high potential for gentrification and displacement of the local low-income residents without proper programming and intervention as renewable energy and climate resilient pilots and projects take root.

Source: *Who Owns West Woodlawn*, A 2013-2016 Land Ownership Study completed by Geography Dept. at DuPaul University, commissioned by BIG.

Changes in West Woodlawn Property Ownership, 2013-2016

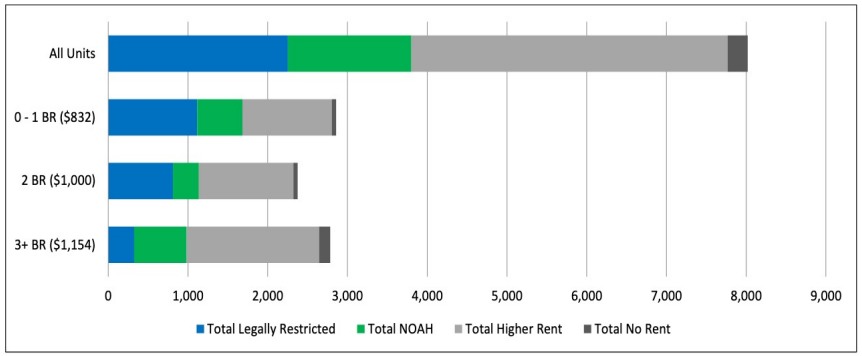


Neighborhood Context – Affordable Rental Housing

Starting Where We Are

Area: WOODLAWN

Affordability Level: 60% AMI

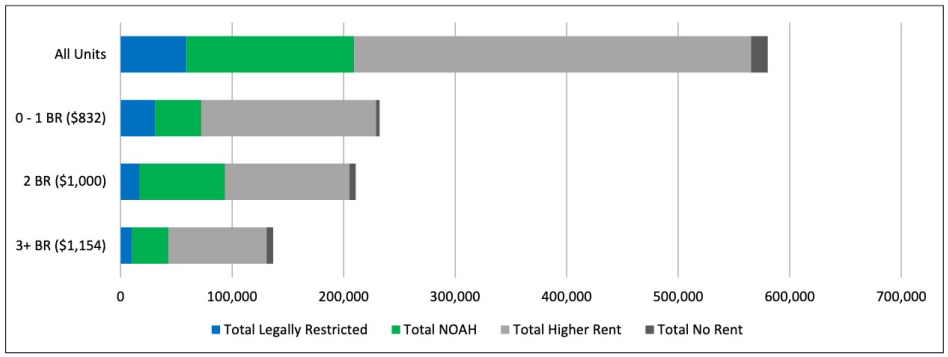


Number of Bedrooms (60% AMI HUD Rent Limit $)	Total Units	Total Affordable	Total Legally Restricted	Total NOAH	Total Higher Rent	Total No Rent	% Affordable	% Legally Restricted	% NOAH
3+ BR ($1,154)	2,785	982	324	658	1,663	140	35%	12%	24%
2 BR ($1,000)	2,375	1,137	812	325	1,184	54	48%	34%	14%
0 - 1 BR ($832)	2,859	1,682	1,115	567	1,121	56	59%	39%	20%
All Units	8,019	3,801	2,251	1,550	3,968	250	47%	28%	19%

Source: US Census Bureau, HUD, IHDA, CHA, SB Friedman Development Advisors

Area: CITY OF CHICAGO

Affordability Level: 60% AMI



Number of Bedrooms (60% AMI HUD Rent Limit $)	Total Units	Total Affordable	Total Legally Restricted	Total NOAH	Total Higher Rent	Total No Rent	% Affordable	% Legally Restricted	% NOAH
3+ BR ($1,154)	136,895	43,258	10,607	32,651	87,642	5,995	32%	8%	24%
2 BR ($1,000)	210,935	93,772	17,308	76,464	111,495	5,668	44%	8%	36%
0 - 1 BR ($832)	232,372	72,397	31,354	41,043	156,601	3,374	31%	13%	18%
All Units	580,202	209,427	59,269	150,158	355,738	15,037	36%	10%	26%

Source: US Census Bureau, HUD, IHDA, CHA, SB Friedman Development Advisors

Source: City of Chicago Department of Planning and Development, Citywide Affordable Rental Housing Analysis. See: https://www.chicago.gov/city/en/depts/dcd/supp_info/citywide-affordable-rental-housing-aalysis.html

Woodlawn Household Income

Starting Where We Are

Household Income, 2015-2019

	Woodlawn		City of Chicago		CMAP Region	
	Count	Percent	Count	Percent	Count	Percent
Less than $25,000	4,596	49.5	259,714	24.3	529,858	17.0
$25,000 to $49,999	1,815	19.5	212,433	19.9	567,834	18.2
$50,000 to $74,999	1,102	11.9	160,900	15.1	490,586	15.7
$75,000 to $99,999	744	8.0	119,199	11.2	395,676	12.7
$100,000 to $149,999	635	6.8	146,765	13.8	533,771	17.1
$150,000 and Over	402	4.3	167,818	15.7	605,605	19.4
Median Income	$25,450		$58,247		$73,572	
Per Capita Income*	$19,493		$37,103		$39,058	

Source: 2015-2019 American Community Survey five-year estimates.

Universe: Occupied housing units
*Universe: Total population

Almost half of Woodlawn households earn less than $25k/year, compared to 24.3% for the City and 17% for the Chicago Metropolitan region. Median income in Woodlawn is $25,450/year compared to $58,247 and $73,572 for the City and Region, respectively.

Source: Statistical Atlas https://statisticalatlas.com/neighborhood/Illinois/Chicago/West-Woodlawn/Household-Income#figure/median-household-income-by-race

Housing Costs and Household Income

Starting Where We Are

Housing Costs as a Percentage of Household Income*, 2015-2019

	Woodlawn		City of Chicago		CMAP Region	
	Count	Percent	Count	Percent	Count	Percent
Less than $20,000	3,229	37.1	174,171	16.9	346,898	11.4
Less than 20 Percent	84	1.0	5,287	0.5	8,867	0.3
20 to 29 Percent	341	3.9	15,140	1.5	25,618	0.8
30 Percent or More	2,803	32.2	153,744	15.0	312,413	10.3
$20,000 to $49,999	2,494	28.6	264,323	25.7	684,002	22.5
Less than 20 Percent	218	2.5	29,670	2.9	77,326	2.5
20 to 29 Percent	513	5.9	57,150	5.6	145,913	4.8
30 Percent or More	1,763	20.2	177,503	17.3	460,763	15.1
$50,000 to $74,999	1,148	13.2	159,009	15.5	485,439	15.9
Less than 20 Percent	511	5.9	48,662	4.7	151,167	5.0
20 to 29 Percent	328	3.8	58,869	5.7	173,246	5.7
30 Percent or More	309	3.5	51,478	5.0	161,026	5.3
$75,000 or More	1,843	21.2	430,779	41.9	1,527,241	50.2
Less than 20 Percent	1,289	14.8	289,651	28.2	1,022,835	33.6
20 to 29 Percent	458	5.3	107,968	10.5	382,768	12.6
30 Percent or More	96	1.1	33,160	3.2	121,638	4.0

Source: 2015-2019 American Community Survey five-year estimates. Universe: Occupied housing units

*Excludes households with zero/negative income, and renting households paying no cash rent.

32% of Woodlawn households earning less than $20K/year pay more than 30% of their incomes for housing costs. 20% of those households earning $20k- to just under $50k, annually pay more than 30% of their incomes for housing. These residents are some of the residents most likely to be facing housing poverty. It should be noted that these numbers exclude households with zero or negative income. Energy poverty is likely to exacerbate the situation for many of these households. Residents in these households are most likely to be at risk and should be prioritized for energy equity programs and incentives. BIG has therefore, proposed a concept that is accessible now, flexible and very likely to improve on-bill affordability and access.

Source: Chicago Metropolitan Agency for Planning, Woodlawn Community Data Snapshot, Chicago Community Area Series, August 2021 Release.

Age Distribution

Starting Where We Are

Age Cohorts, 2015-2019

	Woodlawn		City of Chicago		CMAP Region	
	Count	Percent	Count	Percent	Count	Percent
Under 5	1,499	6.6	171,323	6.3	518,065	6.1
5 to 19	5,137	22.7	462,093	17.1	1,644,152	19.4
20 to 34	5,554	24.5	739,281	27.3	1,794,152	21.1
35 to 49	3,865	17.1	546,045	20.2	1,701,494	20.1
50 to 64	3,896	17.2	453,823	16.7	1,635,766	19.3
65 to 74	1,794	7.9	195,049	7.2	691,947	8.2
75 to 84	635	2.8	100,949	3.7	346,833	4.1
85 and Over	275	1.2	40,971	1.5	150,858	1.8
Median Age	32.3		34.6		37.5	

Source: 2015-2019 American Community Survey five-year estimates. Universe: Total population

It is notable that Woodlawn has a larger population of youth, ages 5 to 19 as a percent of its total population compared to both the City and Metropolitan Region. The second largest age cohort as a percentage of total population is young adults, ages 20 - 34. It is therefore, important that affordable and clean energy projects are designed to educate and train local youth for jobs in these fields and in the neighborhood. BIG's Sustainable Square Mile envisions a neighborhood where residents can walk to work.

Source: Chicago Metropolitan Agency for Planning, Woodlawn Community Data Snapshot, Chicago Community Area Series, August 2021 Release.

Race & Ethnicity Characteristics

Starting Where We Are

Race and Ethnicity, 2015-2019

	Woodlawn		City of Chicago		CMAP Region	
	Count	Percent	Count	Percent	Count	Percent
White (Non-Hispanic)	1,815	8.0	901,769	33.3	4,331,282	51.1
Hispanic or Latino (of Any Race)	810	3.6	780,167	28.8	1,952,500	23.0
Black (Non-Hispanic)	18,634	82.3	790,893	29.2	1,406,500	16.6
Asian (Non-Hispanic)	836	3.7	177,195	6.5	610,365	7.2
Other/Multiple Races (Non-Hispanic)	560	2.5	59,510	2.2	182,620	2.2

Source: 2015-2019 American Community Survey five-year estimates. Universe: Total population

A larger percentage of Woodlawn residents identify as Black or Afro-American compared to the City and Region. The neighborhood has smaller percentages of residents who identify as Hispanic/Latinx and Asian, compared to the City and Metro Region but a slightly higher proportion of residents who identify as being of multiple races.

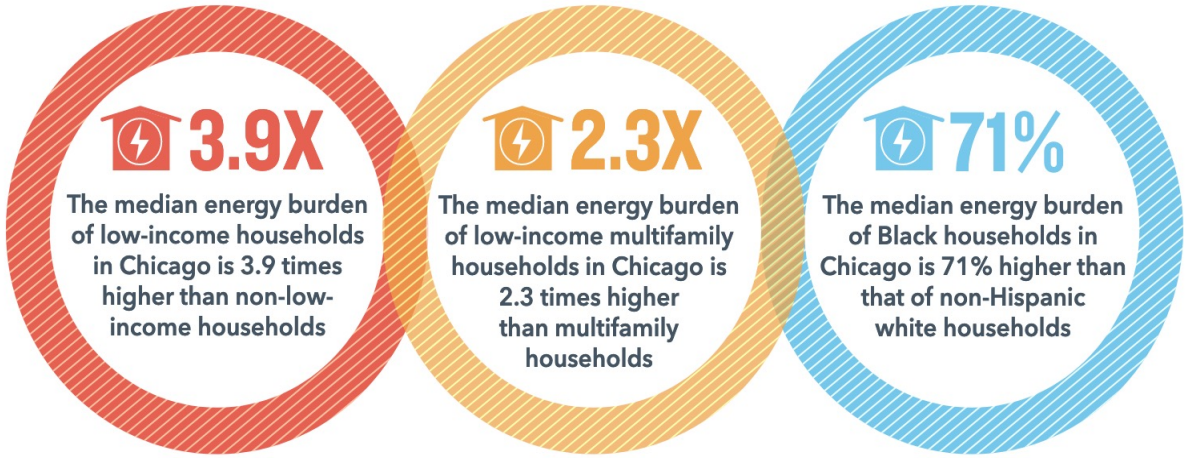
Source: Chicago Metropolitan Agency for Planning, Woodlawn Community Data Snapshot, Chicago Community Area Series, August 2021 Release.

Making the Case

- ✓ High Energy Burden Prevalence in Chicago
- ✓ Utility Disconnections & Extreme Economic Stress
- ✓ The Role of Limited Access to Affordable Energy Options (.e.g., Solar)
- ✓ Available Technical and Economic Energy Efficiency Potential in ComEd's Service Territory
- ✓ Broad Technical Support for High Efficiency Air Source Heat Pumps

Energy Burden Prevalence in Chicago

Energy Burdens: Affordability = Safety, Comfort, Life



"[O]utdated electric circuits; the crowding for warmth in cramped quarters. Blocked exits become death traps. Failed smoke detectors become silent killers."

Source: https://www.bettergov.org/news/greising-since-2014-at-least-61-people-died-in-buildings-with-fire-safety-dangers-known-to-city/

ACEEE
American Council for an Energy-Efficient Economy

aceee.org

Source: ACEEE, Energy Burdens in Chicago. https://www.aceee.org/sites/default/files/pdfs/aceee-01_energy_burden_-_chicago.pdf

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Utility Disconnections & Extreme Economic Stress

Consequences of Inadequate Access to Affordable Energy

Tufts University researchers "[use[d] monthly zip code-level data on electricity disconnections in Illinois to document the socioeconomic correlates of **extreme economic distress among 5 million customers**. In 2018–2019, **customers in Black and Hispanic zip codes were about 4 times more likely to be disconnected for non-payment, 2–3 times more likely to be on deferred payment plans, and 70% more likely to participate in utility-based low-income assistance programs**, controlling for zip code distributions of income and other demographic characteristics. **During the COVID-19 pandemic, there has been a ninefold expansion in low-income assistance to pay utility bills, but disconnections were double and deferred payment plans triple their historical averages in October 2020.** Disconnection notices were served to 2.5% of commercial and industrial accounts, and 3.4% of residential accounts each month in late 2020. About 20% of all accounts were charged late fees. **The odds for each of these measures were multiples higher in minority zip codes." (Emphasis added.)**

Source: Cicala, Steve, "The Incidence of Extreme Economic Stress: Evidence from Utility Disconnections", Journal of Public Economics 200 (2021) 104461. http://www.stevecicala.com/papers/disconnections/disconnections.pdf

"According to a University of Illinois – Chicago study, "cold weather accounts for almost all temperature-related deaths."

"Adults older than age 65 and Black people were almost twice as likely to be hospitalized due to temperature-related injuries."

Source: https://today.uic.edu/cold-weather-accounts-for-almost-all-temperature-related-deaths
Referring to a paper by: Lee Friedman, Chibuzor Abasilim, Rosalinda Fitts and Michelle Wueste from UIC are co-authors on the paper.

Not Enough Access to Affordable Energy Options

At-risk Customers Have Poor Access to Affordable, Clean Energy due to Distributional Disparities

A study by University of Michigan Professor, Tony Reames found that: "higher rooftop potential existed in some [Low- and Moderate-Income] LMI communities; higher rooftop potential did not necessarily translate to higher rooftop penetration, especially if higher potential was in LMI communities; and beyond income, other socioeconomic and demographic characteristics such as race/ethnicity, limited English proficiency, age of housing stock, and internet access were associated with rooftop penetration." This study also showed that LMI and high-income PV rooftop adopters are very similar "fitting pro-environmental profiles, drawn to novel technologies, and motivated to adopt solar in order to save money."

The barriers to access according to the study are linked to variables beyond income, such as race/ethnicity, education, limited English proficiency, age, housing stock, Internet access, and political ideology." Disparities were not only found across the cities included in the study but within communities in each of the cities. **Rooftop solar equity programs must address these barriers and demonstrate performance metrics for each barrier to generate effective change and meaningful results for priority communities.**

The study showed that the City of Chicago had the lowest LMI penetration rates of the 4 cities studied. The City of Chicago and U.S. Department of Energy have made key in-roads, and programs such as Solar Chicago and Solar for All aim to reduce barriers to LMI access to solar but there is still a great need and tremendous opportunity realize LMI solar potential to benefit priority communities in the short-term.

Source: Reames, Tony G. "Distributional disparities in residential rooftop solar potential and penetration in four cities in the United States." Energy Research & Social Science Vol. 69, November 2020. https://www.sciencedirect.com/science/article/abs/pii/S2214629620301870?via%3Dihub

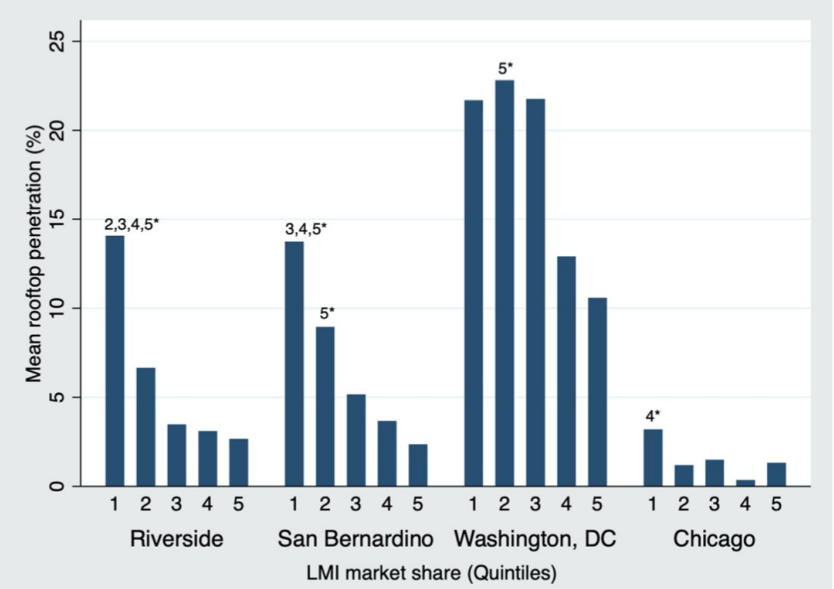

Fig. 2. Distribution of mean rooftop solar penetration across census tracts categorized by LMI market share quintiles for each city, where 1 = lowest LMI market share quintile and 5 = highest LMI market share quintile. These quintiles correspond with those in Fig. 1. Numbers above bar indicate groups with statistically significant differences based on Bonferroni multiple-comparison test, $p < 0.05$.

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Paying More for Lack of Access to Solar?

The Most At-risk Customers May Be Paying More Than Their Fair Share for Energy

Recent studies performed in states with Net Energy Metering rules have identified that these programs often create an unintended cost-shift or cross-subsidy.

"[C] consumers without rooftop solar, including renters and residents of multifamily dwellings who are more likely to be lower-income, essentially subsidize owners of rooftop solar systems. This is because the fixed costs of producing electricity are allocated to a smaller and smaller group of people as customers add rooftop solar. A bill analysis put that cost shift at about $3 billion in 2020, projected to be $3.4 billion this year [2021, in California].

"It's entirely unfair that under net energy metering working class families and families of color who have not have the same access to rooftop solar have actually had to foot the bill for this industry and pay higher energy bills…." Legislators in CA have authored a bill (AB 1139) to address the problem. The CA Public Utilities Commission's (CPUC) ongoing NEM 3.0 proceeding aims to address the issue directly. "This inequitable cost shift on to non-solar customers is only expected to continue and increase if we do not make changes to the system."

Although some proponents in the solar industry have denied the cost-shift exist and have characterized it as a tactic to block competition from the solar sector, the shift is nevertheless well documented, at least in CA where the CPUC ordered a study to be completed by an independent expert.

"One synthesis of estimates conducted in or around 2015 found that net metering cost shifts range from $444 to $1,752 per net metering customer per year." (Congressional Research Service NEM Brief, 2019 & Alexander et al 2016.)

Sources: https://www.newsdata.com/california_energy_markets/bottom_lines/california-rooftop-solar-policies-due-for-possible-big-change-under-legislation/article_5613537c-aec6-11eb-8be6-87462172c47c.html See also, https://sgp.fas.org/crs/misc/R46010.pdf, and Barbara Alexander, Ashley Brown, and Ahmad Faruqui, "Rethinking Rationale for Net Metering: Quantifying Subsidy from Non-Solar to Solar Customers," Public Utilities Fortnightly, October 2016. Congressional Research Service, "Net Metering: In Brief, November 14, 2019, State Government Leadership Foundation, Net Metering in the States: A 2020 Update, December 17, 2020, NREL on Net Metering, https://www.nrel.gov/state-local-tribal/basics-net-metering.html, and University of California Berkeley, HAAS Energy Institute Blog, Can Net Metering Reform Fix the Rooftop Solar Cost Shift? January 25, 2021.

Paying More for Lack of Access to Solar?

The Most At-risk Customers May Be Paying More Than Their Fair Share for Energy

WHAT IS NEM & HOW DOES IT WORKS IN ILLINOIS?

"Net metering is a way to capture the energy used and produced by a renewable energy generator located at a home or small business. Homeowners and small business owners who have a solar power system or a wind turbine can use net metering to offset their traditional utility costs while using cleaner energy.

The Illinois net metering program began April 1, 2008. Commonwealth Edison, the Ameren Illinois Utilities, and MidAmerican Energy Company must now offer customers credits on their electric bills for electricity generated by renewable energy systems. Under Illinois rules, eligible renewable generators of 40 kW or less receive a one-to-one retail rate credit. These customers will be compensated for excess electricity generated by their renewable energy systems at the same rate that they pay when buying electricity from their utility. These credits will be carried over month-to-month, with the annual period running from May to April, or November to October, at the customer's discretion. Customers with eligible renewable generators between 40 kW and 2 MW will receive credits equal to the utility's avoided cost for their excess generation. However, customers who are "time of use" customers are compensated at time-of-use rates."

Source: https://illinoisattorneygeneral.gov/environment/netmetering.html

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Paying More for Lack of Access to Solar?

The Most At-risk Customers May Be Paying More Than Their Fair Share for Energy

The Natural Resources Defense Council (NRDC) has acknowledged the problem of "very high levels of cost shift" and has stated that rooftop solar must "grow sustainably." According to NRDC, CA's "current NEM policy (NEM 2.0) is not sustainable because it overcompensates NEM customers, creating a cost burden to non-NEM customers. Money to pay for electricity generated by rooftop solar panels come from those customers who don't have rooftop solar. To the extent these payments are higher than the value of solar electricity, non-NEM customers pay more expensive energy bills and NEM customers get over-subsidized."

"Unfortunately, those customers that adopt solar also tend to be disproportionally wealthy."
https://fixthecostshift.com/nrdc-says-solar-industrys-nem-proposals-result-in-very-high-levels-of-cost-shift/

Sources: https://www.nrdc.org/experts/mohit-chhabra/californias-nem-30-must-grow-rooftop-solar-sustainably
Mohit Chhabra & Julia de Lamare, California's NEM 3.0 Must Grow Rooftop Solar Sustainably. NRDC Expert Blog July 27, 2021. See also Bobby McDonald, President and CEO, Black Chamber of Orange County, CA. "State's Rooftop Solar Program Imposes Unfair Cost Burdens on Communities of Color," July 1, 2012.
https://lasentinel.net/states-rooftop-solar-program-imposes-unfair-cost-burdens-on-communities-of-color.html

See generally: Natural Regulatory Research Institute, "Review of State Net Energy Metering and Successor Rate Designs,"
https://pubs.naruc.org/pub/A107102C-92E5-776D-4114-9148841DE66B/

BIG remains a strong proponent of rooftop solar and other renewable energy technologies that can deliver affordable clean energy to communities and we insist on policies and business models that adhere to equity and justice principles.

There is a need to evaluate whether a cost shift is occurring under the Illinois NEM framework and if so, to determine the extent of the cross-subsidy and catalyze immediate efforts to find equitable solutions.

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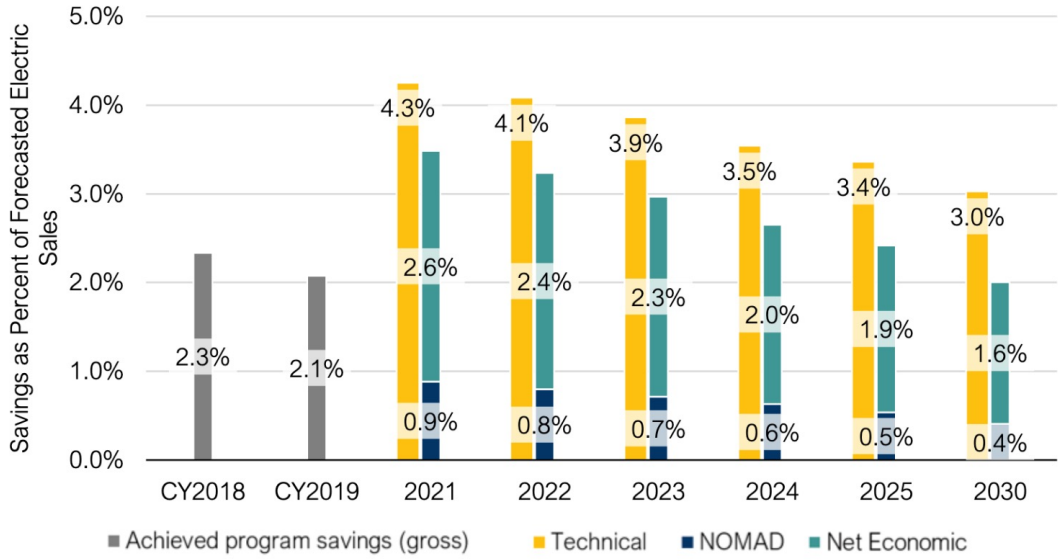
ComEd's Energy Efficiency Potential Study

There is Significant Unrealized Technical and Economic Potential for Energy Efficiency Improvements

Figure E-1 Cross-Sector Energy Efficiency Savings as Percent of Annual Electric Sales



Technical Potential – all theoretically possible energy savings stemming from the applied measures. Technical potential is assessed by combining measure and market characterizations to determine the maximum amount of savings possible for each measure-market combination without any constraints such as cost-effectiveness screening, market barriers, or customer economics.

Economic Potential – subset of the technical potential that only includes measures that pass cost-effectiveness screening.

NOMAD – Naturally-Occurring Market Adoption, based on adoption curves and customer economics in a scenario without program incentives or enabling strategies.

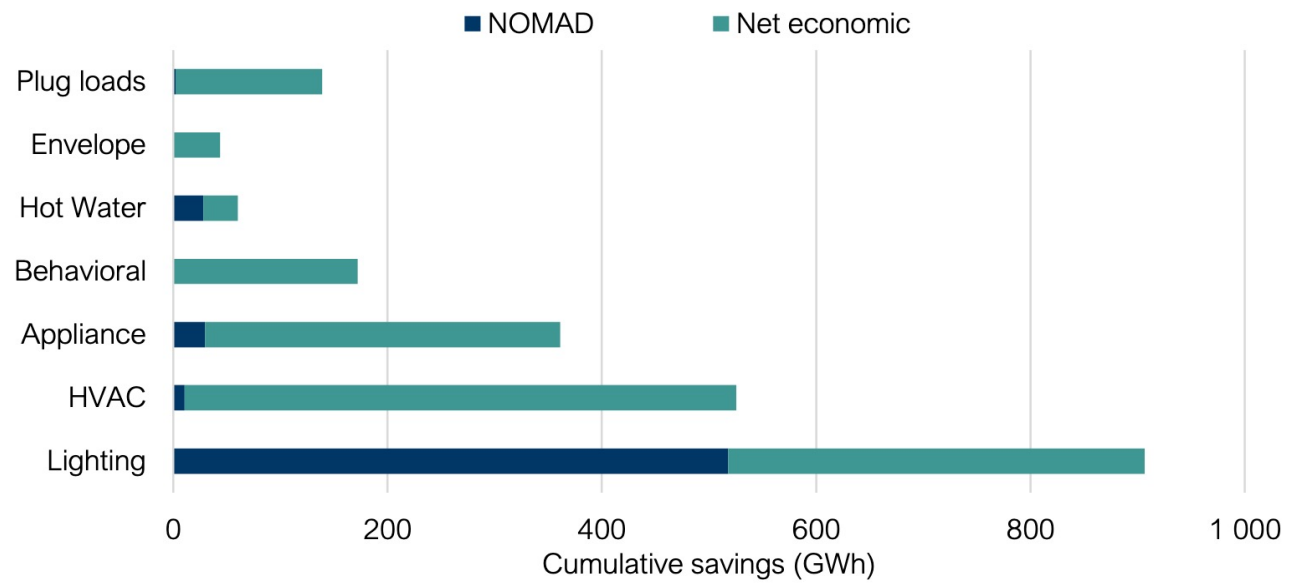
Source: Commonwealth Edison, Energy Efficiency Potential Study: A Comprehensive Assessment of 2021-2030 Net Economic Opportunities, Volume 1: Results. Prepared by Dunsky Energy Consulting and Itron.

Source:

ComEd's Energy Efficiency Potential Study

There is Significant Technical and Economic Potential for Residential Savings from Heating Ventilation and Air Conditioning and Other Energy Efficiency Improvements – Even Excluding Income-Eligible Households

Figure E-2 Residential Savings, Cumulative in 2025 (Excluding Income-Eligible)



Technical Potential – all theoretically possible energy savings stemming from the applied measures. Technical potential is assessed by combining measure and market characterizations to determine the maximum amount of savings possible for each measure-market combination without any constraints such as cost-effectiveness screening, market barriers, or customer economics.

Economic Potential – subset of the technical potential that only includes measures that pass cost-effectiveness screening.

NOMAD – Naturally-Occurring Market Adoption, based on adoption curves and customer economics in a scenario without program incentives or enabling strategies.

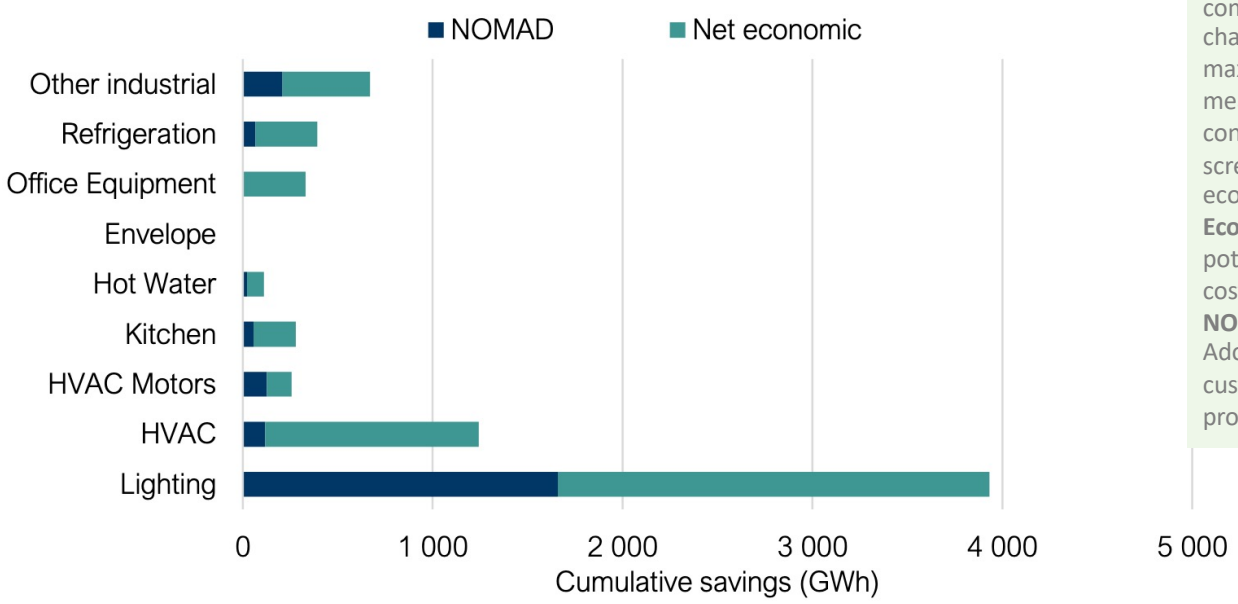
Source: Commonwealth Edison, Energy Efficiency Potential Study: A Comprehensive Assessment of 2021-2030 Net Economic Opportunities, Volume 1: Results. Prepared by Dunsky Energy Consulting and Itron.

ComEd's Energy Efficiency Potential Study

There is Substantial Potential for Commercial & Industrial Savings from Heating Ventilation and Air Conditioning Energy Efficiency Improvements.

The naturally-occurring (NOMAD) and net economic potential by end-use, as determined from the cumulative potential in 2025, are presented for the non-residential sector in Figure E-3.

Figure E-3 Non-residential Net Economic Savings, Cumulative in 2025



Technical Potential – all theoretically possible energy savings stemming from the applied measures. Technical potential is assessed by combining measure and market characterizations to determine the maximum amount of savings possible for each measure-market combination without any constraints such as cost-effectiveness screening, market barriers, or customer economics.

Economic Potential – subset of the technical potential that only includes measures that pass cost-effectiveness screening.

NOMAD – Naturally-Occurring Market Adoption, based on adoption curves and customer economics in a scenario without program incentives or enabling strategies.

Source: Commonwealth Edison, Energy Efficiency Potential Study: A Comprehensive Assessment of 2021-2030 Net Economic Opportunities, Volume 1: Results. Prepared by Dunsky Energy Consulting and Itron.

ComEd's Energy Efficiency Potential Study

A Key Observation from ComEd's EE Potential Study

"While fuel-switching is not included in the study's scope, multiple heat pump measures are modeled in order to account for both the opportunity related to adding a standard-efficiency heat pump to replace electric resistance heating in homes, and the selection of a higher-efficiency model whenever a household chooses to replace or add a heat pump. ***Even if the current penetration of electric heating is low in ComEd's service territory, heat pump savings remain a significant opportunity, especially when incorporating mini-split ductless heat pumps***." (Emphasis added.)

Source: Commonwealth Edison, Energy Efficiency Potential Study: A Comprehensive Assessment of 2021-2030 Net Economic Opportunities, Volume 1: Results. Prepared by Dunsky Energy Consulting and Itron.

Other Information on Air Source Heat Pump Energy Efficiency Potential

MA Clean Energy Center Incentive Program for Whole Home Heat Pumps

- ✓ "The primary lesson learned is that whole-home heat pumps are a feasible solution, not only for new construction, but also for retrofitting existing buildings, including older homes."

✓Case Studies:

1880s Salem House (Ducted)
1930s Boston House (Mix of Ductless & Ducted)
1940s Medford Case Study (Ducted)
1980s Bedford Case Study (Ducted)
New Construction Northampton Case Study (Ductless)

Source: Meg Howard, Program Director, MA Clean Energy Center (MassCEC) Pilot Showcases Success of Whole Home Heat Pumps, September 13, 2021. https://www.masscec.com/blog/2021/09/13/masscec-pilot-showcases-success-whole-home-heat-pumps#Case_Studies

US Dept. of Energy

"An air-source heat pump [ASHP] can provide efficient heating and cooling for your home. When properly installed, an air-source heat pump can deliver up to three times more heat energy to a home than the electrical energy it consumes. This is possible because a heat pump transfers heat rather than converting it from a fuel like combustion heating systems.

"[A] study by the Northeast Energy Efficiency Partnerships found that when units designed specifically for colder regions were installed in the Northeast and Mid-Atlantic regions, the annual savings are around 3,000 kWh (or $459) when compared to electric resistance heaters, and 6,200 kWh (or $948) when compared to oil systems. When displacing oil (i.e., the oil system remains, but operates less frequently), the average annual savings are nearly 3,000 kWh (or about $300)."

Heat pumps "have an added advantage in that they can make use of any heat source, including solar energy, geothermal hot water, or other heat sources. They are also amenable to zoned systems, in which different parts of the house are kept at different temperatures."

Source: DOE Energy Saver Air Source Heat Pumps webpages. See, https://www.energy.gov/energysaver/air-source-heat-pumps

Other Information on ASHP E.E. Potential

MN Department of Commerce Cold Climate Air Source Heat Pump Study

"Advancements in technology for Air Source Heat Pumps (ASHPs) create the potential for substantial energy efficiency gains in cold climate states such as Minnesota. Due to improvements in such areas as refrigerants and variable speed drives, the new cold-climate ASHPs can function at temperatures of 0 degrees Fahrenheit or below and can save 60 to 80% of space heating fuel use or more. The new advanced cold-climate ASHPs provide an opportunity for significant energy and dollar savings for Minnesota households, and for the state economy."

Source: "Cold Climate Air Source Heat Pump", Conservation Applied Research and Development (CARD) Report Prepared for Minnesota Department of Commerce, Division of Energy Resources, November 2017.

A Scalable Model: A High-Efficiency Air Source Heat Pump Solution

- ✓ BIG's model starts with development of a flexible, accessible, high-efficiency air source heat pump solution and is well supported by both the urgent, unmet energy-related health, safety, comfort and affordability needs of Woodlawn and other Chicago households.
- ✓ The solution is scalable – can be used traditionally as a single building solution or grouped to serve as a shared heating and cooling system for clusters of homes, duplexes, multifamily buildings, neighborhood blocks or integrated into a larger neighborhood microgrid network.
- ✓ The approach is at the conceptual stage and the proposal below is designed to be illustrative.
- ✓ Further study is required to determine the correct balance of systems, other technical requirements, and costs.

A Scalable Model

Initial Approach

- ✓ Group multiple single-family homes (SFR) or Chicago two-flats (duplexes) together to ***share energy heating and cooling system across buildings.***
- ✓ The group of buildings ***share a large air source heat pump.***
- ✓ Each residential unit has a water source heat pump and a domestic hot water tank.
- ✓ There is flexibility to add a large shared thermal storage tank allowing ***more efficient energy sharing. Need*** to evaluate to determine benefit .
- ✓ Possibly add an "anchor" non-residential building to ***balance out heating and cooling*** use.
- ✓ Possibly add electric ***boiler for peak days*** (depending on building loads and air-source heat pump used).

Technical Approach

- ✓ **Heating**
  - ✓ Air-source heat pump provides low temperature hot (80ºF) water
  - ✓ Residential unit water source heat pumps provide the additional heat required (130-180ºF)
- ✓ **Cooling**
  - ✓ Air-source heat pump provides chilled water
  - ✓ Residential or nit water source heat pumps further lower temperature
  - ✓ Unit domestic hot water tanks receive "waste heat" from cooling

(A further study is required to determine the correct balance of systems.)

Single Family (SFR) and Two-Flats

Preliminary Approach

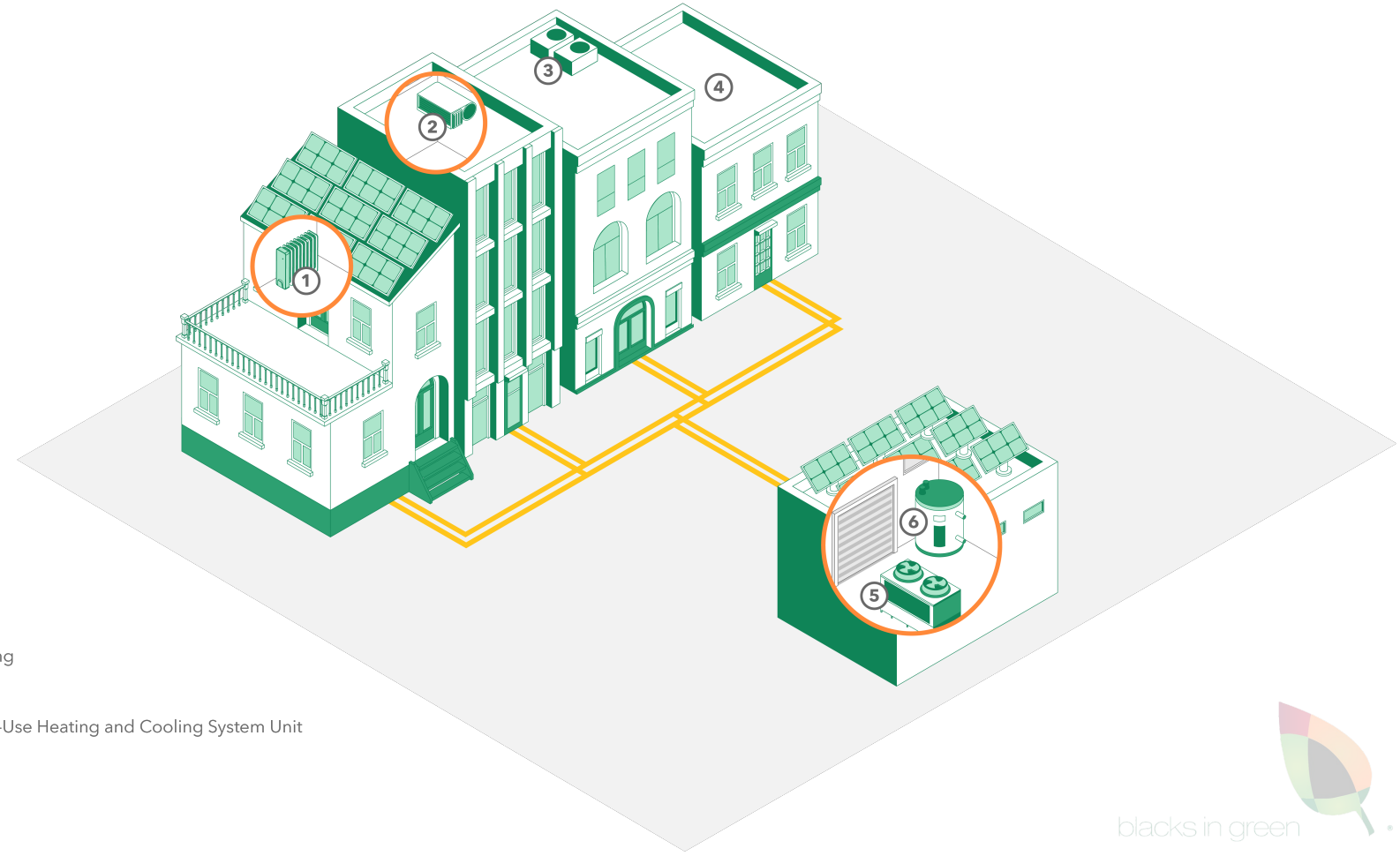
- ✓ Group multiple SFR or duplexes together to ***share energy across buildings.***
- ✓ The group of buildings ***share a large air source heat pump.***
- ✓ Each unit has a water source heat pump and a domestic hot water tank.
- ✓ Possibly add a large shared thermal storage tank allowing ***more efficient energy sharing-Need*** to evaluate to determine benefit .
- ✓ Possibly add an "anchor" non-residential building to ***balance out heating and cooling*** use.
- ✓ Possibly add electric ***boiler for peak days*** (depending on building loads and air-source heat pump used).

Technical Approach

- ✓ **Heating**
  - ✓ Air-source heat pump provides low temperature hot (80ºF) water
  - ✓ Unit Water source heat pumps provide the additional heat required (130-180ºF)
- ✓ **Cooling**
  - ✓ Air-source heat pump provides chilled water
  - ✓ Unit water source heat pumps further lower temperature
  - ✓ Unit domestic hot water tanks receive "waste heat" from cooling
  - ✓ The system is design to integrate with future energy sources and systems, including ground source heating and cooling and/or solar PV generation.

(Further study required to determine correct balance of systems.)

SFR and Two-Flats



1. Cast Iron Radiator Unit
2. New Fan Coil for Heating and Cooling
3. Existing Air Handler Unit
4. Can Accommodate any Type of End-Use Heating and Cooling System Unit
5. Air Source Heat Pumps
6. Thermal Storage

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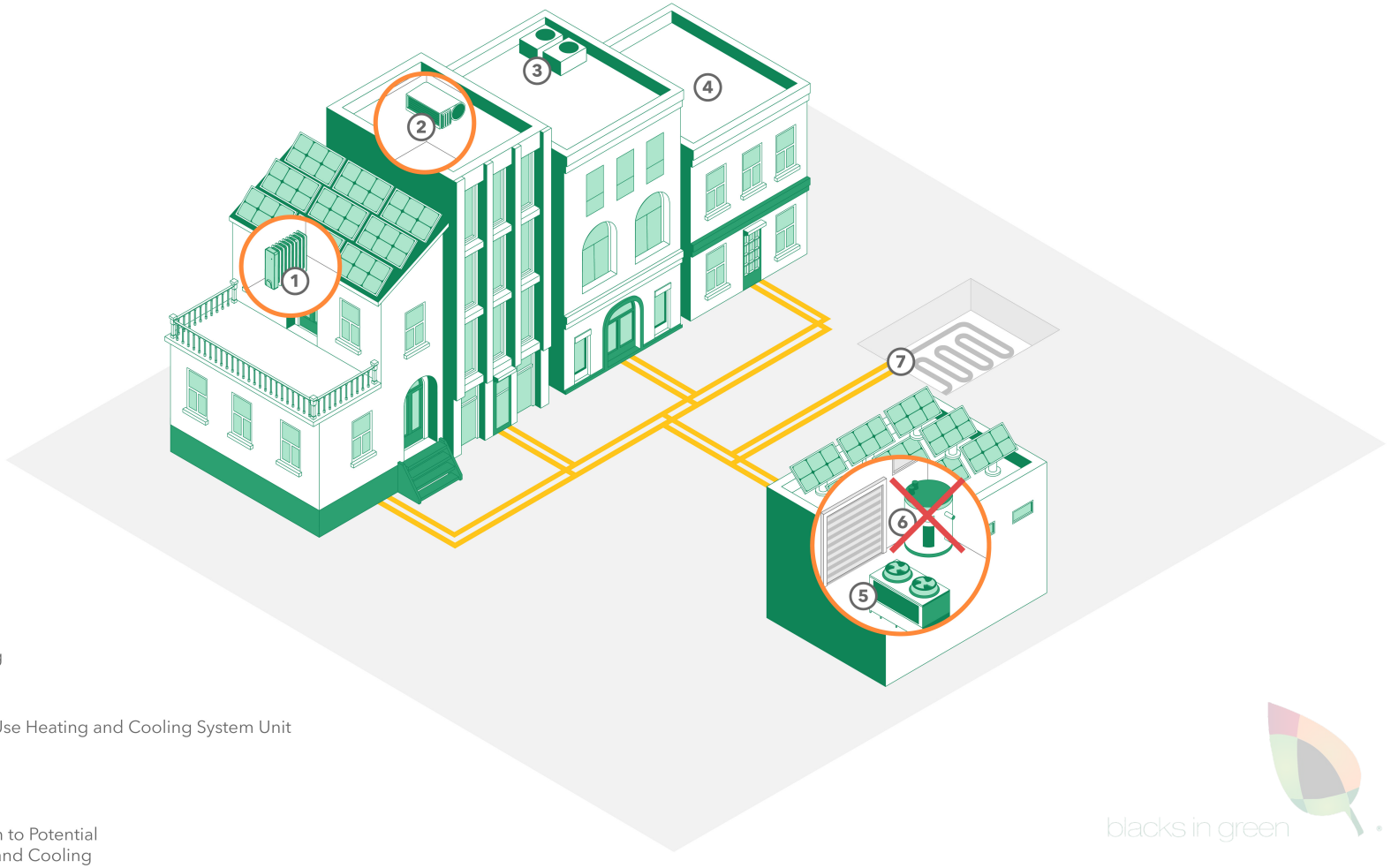
SFR and Two-Flats



1. Cast Iron Radiator Unit
2. New Fan Coil for Heating and Cooling
3. Existing Air Handler Unit
4. Can Accommodate any Type of End-Use Heating and Cooling System Unit
5. Air Source Heat Pumps
6. ~~Thermal Storage~~
7. Flexible System for Future Connection to Potential Ground-source Geothermal Heating and Cooling

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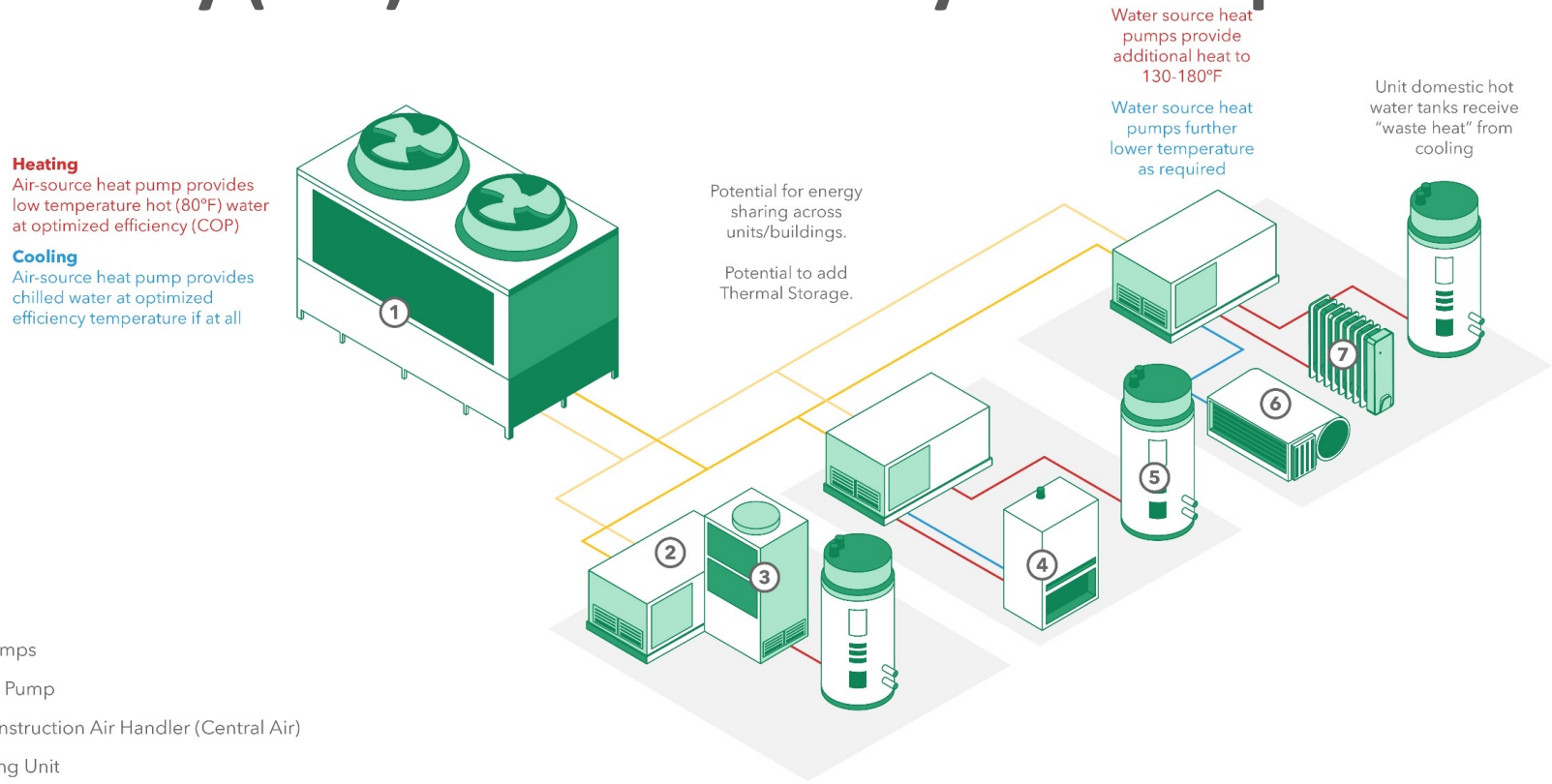
Single Family (SFR) and Two-Flats System Map



1. Air Source Heat Pumps
2. Water Source Heat Pump
3. Retrofit or New Construction Air Handler (Central Air)
4. Existing Air Handling Unit
5. Domestic Hot Water Heater
6. Retrofit Fan Coil Unit
7. Cast Iron Radiator

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Multi-use: House As Garden

Preliminary Approach

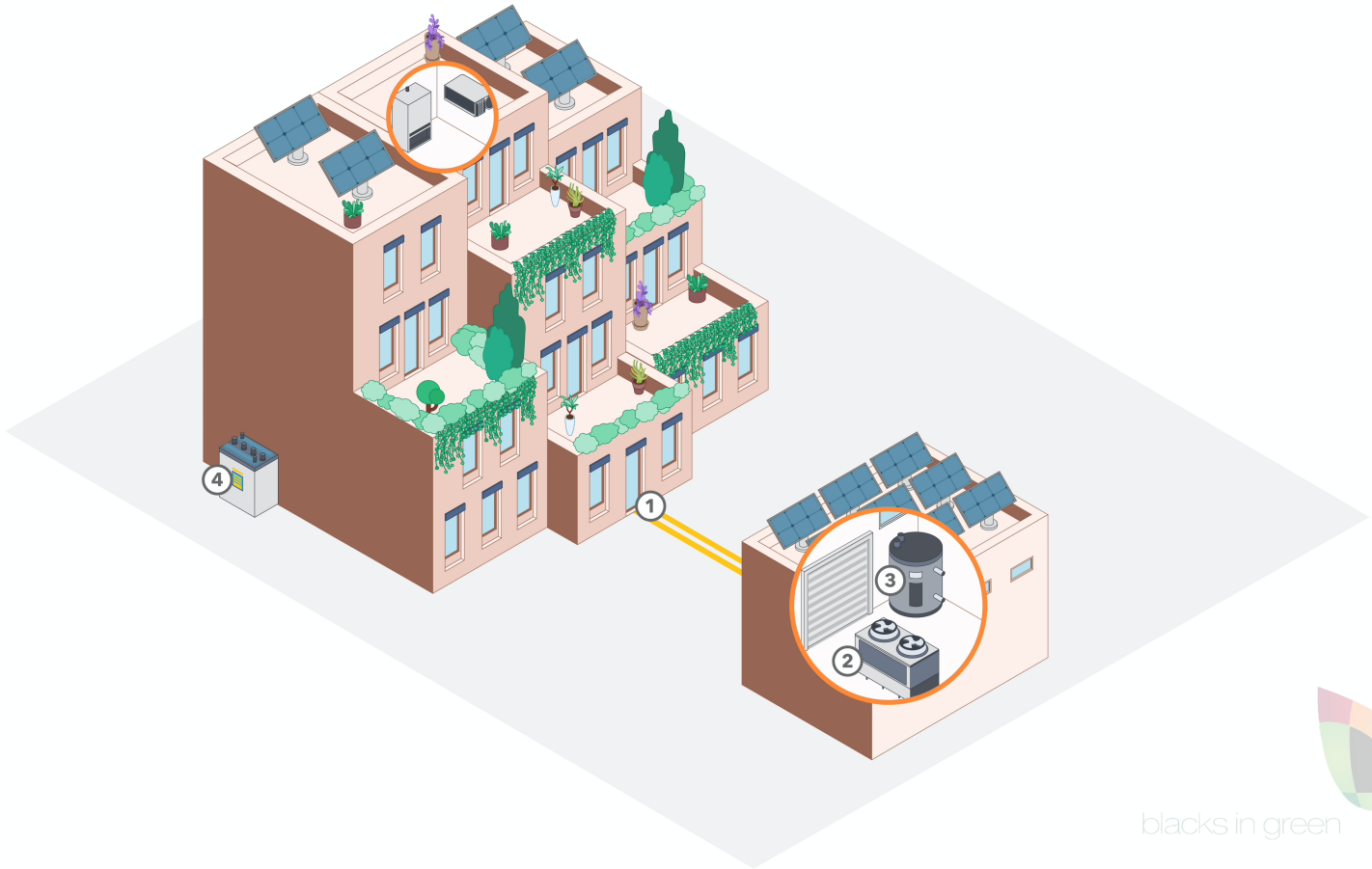
- ✓ A single multi-family building **shares an air source heat pump**, scalable depending on number of units**.**
- ✓ Each unit has a water source heat pump, **connected to larger system allowing "sharing" of energy.**
- ✓ Building scale domestic hot-water tank (accepts building waste heat).
- ✓ Use non-residential mixed-use space to **balance out heating and cooling use**.
- ✓ Possibly add thermal storage to **share loads to different times of day or between uses**.
- ✓ Possibly add cooling tower for **more efficient cooling** (may already be present)

Technical Approach

- ✓ **Heating**
  - ✓ Air-source heat pump provides low temperature hot (80ºF) water
  - ✓ Unit Water source heat pumps provide the additional heat required (130-180ºF)
  - ✓ Alternately use a heat recovery chiller to provide heat
  - ✓ "Back-up" electric boiler can be added as necessary
- ✓ **Cooling**
  - ✓ Air-source heat pump provides chilled water
  - ✓ Cooling tower provide more efficient cooling
  - ✓ Unit water source heat pumps further lower temperature
  - ✓ Unit domestic hot water tanks receive "waste heat" from cooling

(Further study required to determine correct balance of systems.)

House as A Garden



1. House As Garden
2. Air Source Heat Pumps
3. Thermal Storage
4. Battery Storage

blacks in green

House as A Garden

1. House As Garden
2. Air Source Heat Pumps
3. ~~Thermal Storage~~
4. Battery Storage
5. Flexible System for Future Connection to Potential Ground-source Geothermal Heating and Cooling

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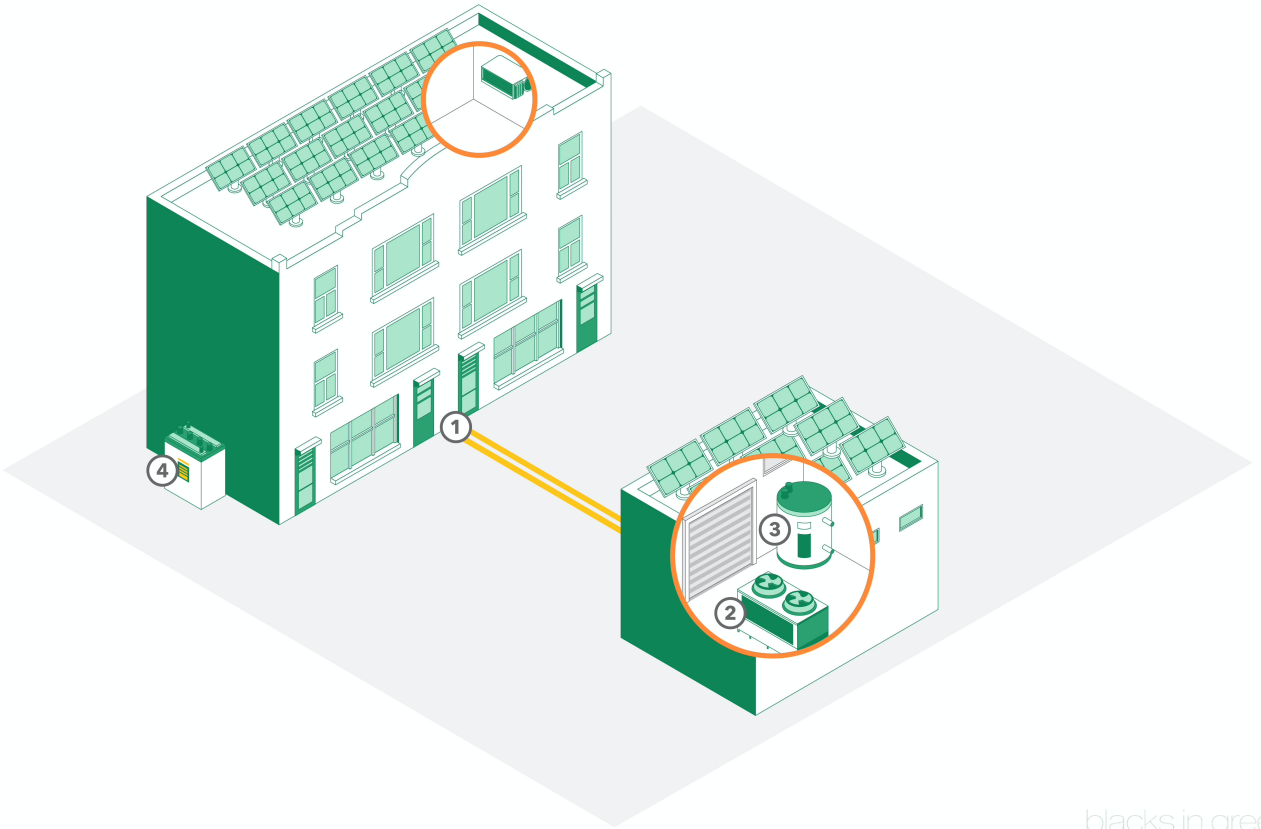
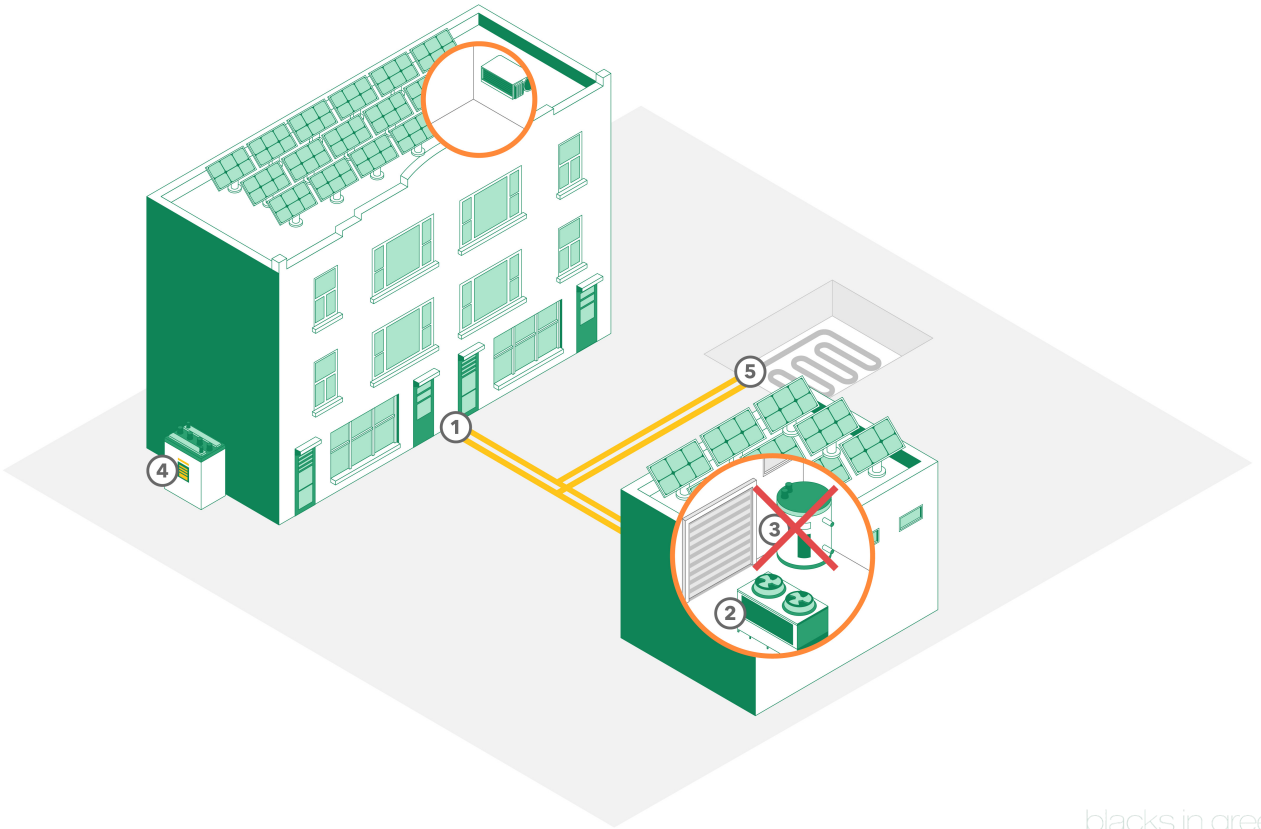
Mixed-use Building – Green Living Room



1. Mixed-use building
2. Air Source Heat Pumps
3. Thermal Storage
4. Battery Storage

blacks in green

Mixed-use Building – Green Living Room



1. Mixed-use building
2. Air Source Heat Pumps
3. ~~Thermal Storage~~
4. Battery Storage
5. Flexible System for Future Connection to Potential Ground-source Geothermal Heating and Cooling

blacks in green

Neighborhood Block

Preliminary Approach

- ✓ **Bank of air source heat pumps**, scalable depending on number of units and load
- ✓ Heat recovery chillers provide **supplemental heating and cooling** at block/neighborhood level
- ✓ Could replace Heat recovery chillers with water source heat pumps at unit/single family etc. as cost efficient
- ✓ Domestic hot water provided by unit/building level water source heat pumps
- ✓ Use non-residential mixed-use space to **balance out heating and cooling use**
- ✓ Thermal storage to **share loads to different times of day or between uses**
- ✓ Cooling tower(s) for **more efficient cooling**

Technical Approach

✓ Heating

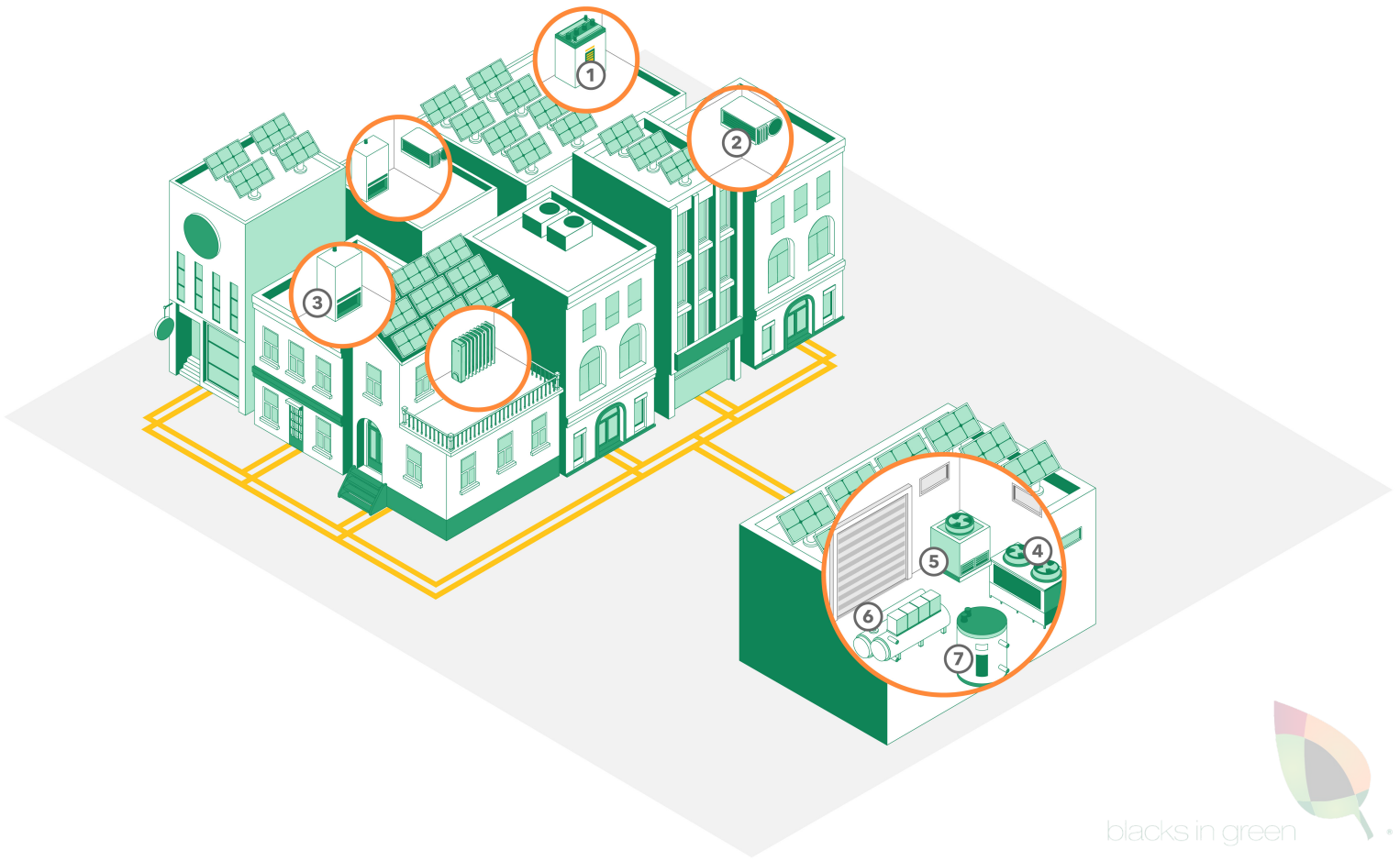
- ✓ Air-source heat pump provides low temperature hot (80ºF) water
- ✓ Unit Water source heat pumps provide the additional heat required (130-180ºF)
- ✓ "Back-up" electric boiler can be added as necessary

✓ Cooling

- ✓ Air-source heat pump provides chilled water (42-65ºF)
- ✓ Cooling tower provide more efficient cooling to supplement air-source heat pump
- ✓ Unit water source heat pumps provide target temperature
- ✓ Unit/building domestic hot water tanks receive "waste heat" from cooling

(Further study required to determine correct balance of systems.)

Neighborhood Block



1. Battery Storage
2. Fan Coil
3. Air Handler
4. Air Source Heat Pumps
5. Cooling Tower
6. Heat Recovery Chillers
7. Thermal Storage

blacks in green

Neighborhood Block

1. Battery Storage
2. Fan Coil
3. Air Handler
4. Air Source Heat Pumps
5. Cooling Tower
6. Heat Recovery Chillers
7. ~~Thermal Storage~~
8. Flexible System for Future Connection to Potential Ground-source Geothermal Heating and Cooling

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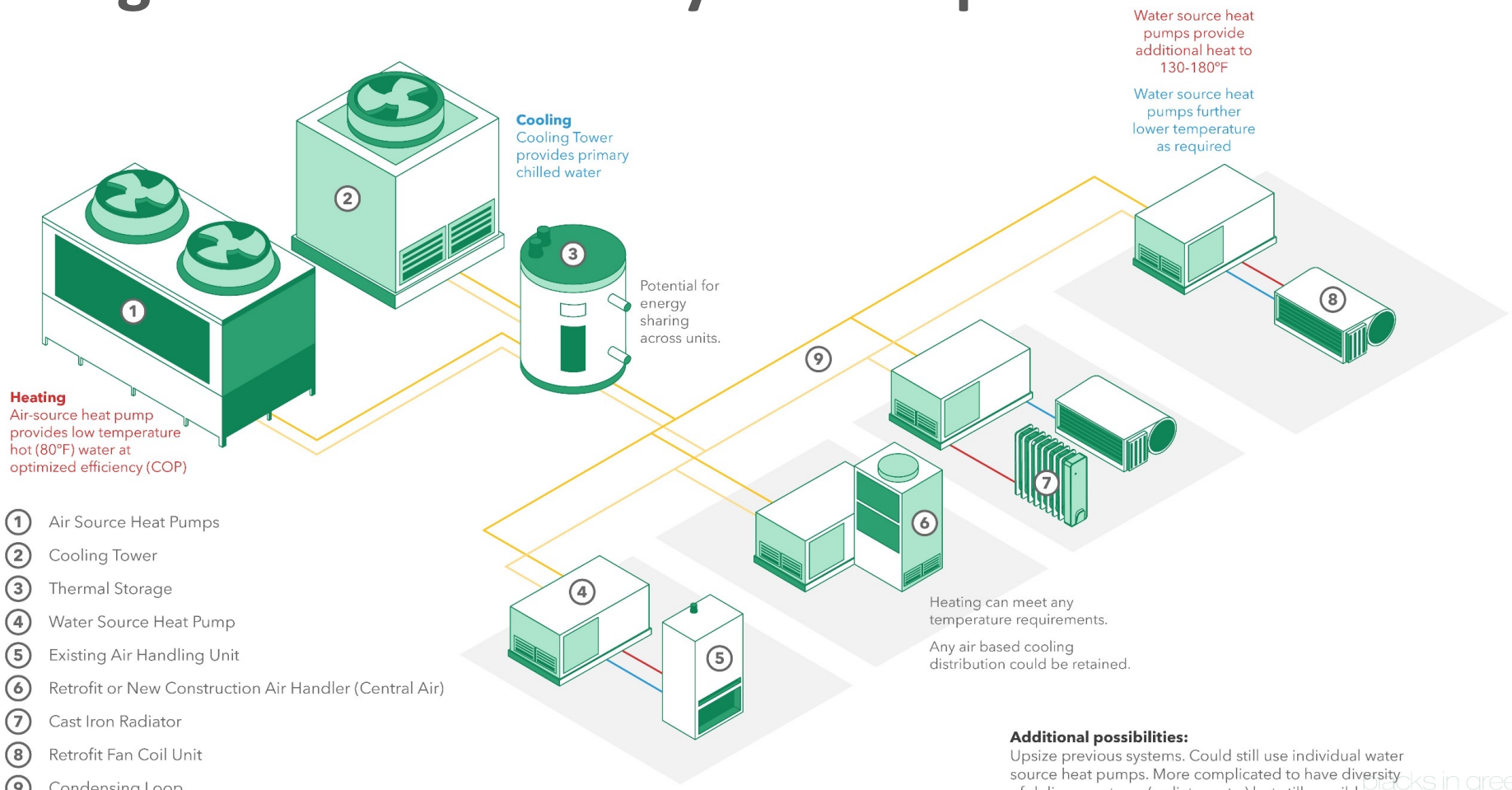
Neighborhood Block – System Map



Additional possibilities:
Upsize previous systems. Could still use individual water source heat pumps. More complicated to have diversity of delivery systems (radiators etc.) but still possible.

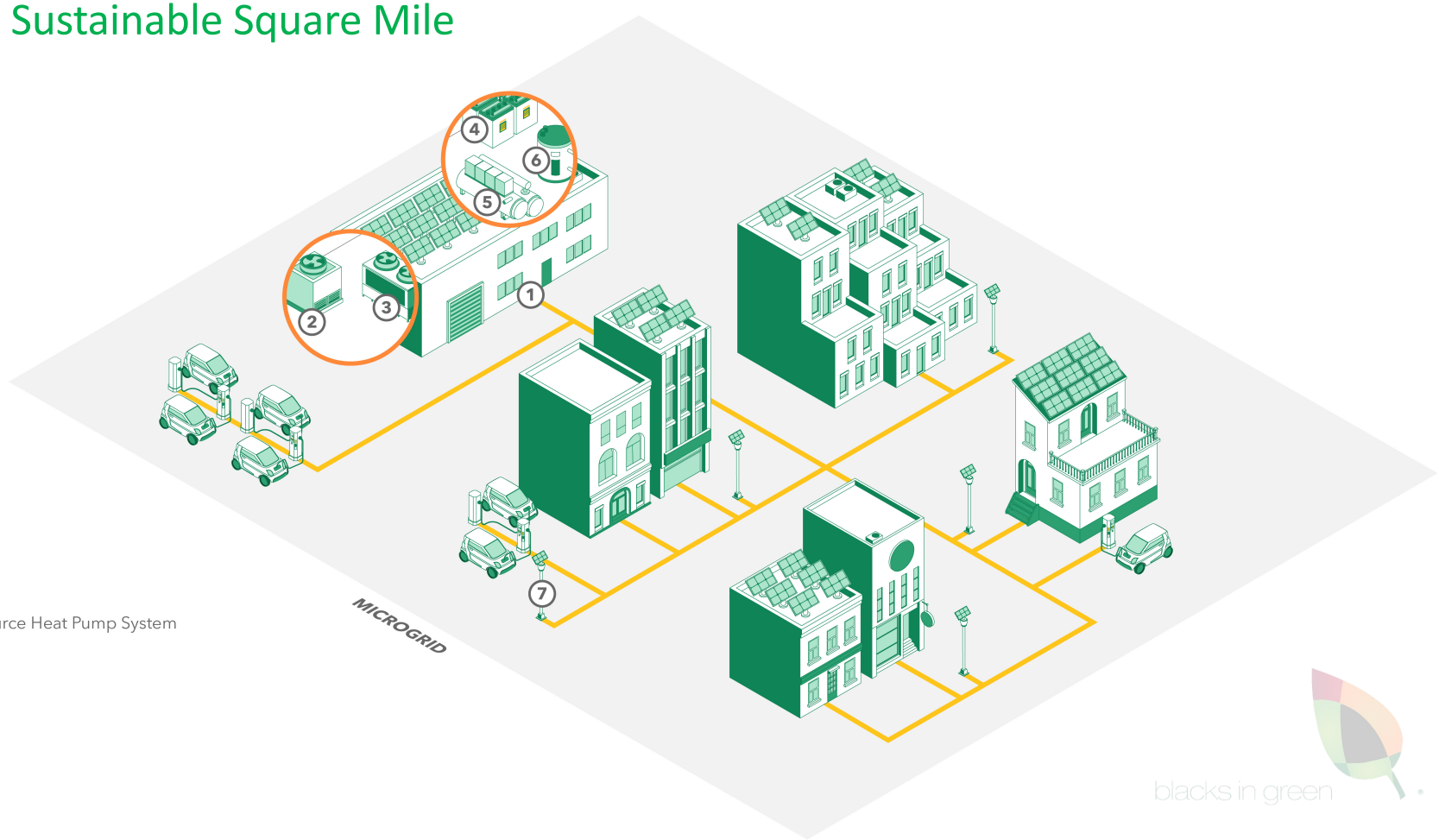
Integrated Microgrid w/ Neighborhood Heating & Cooling

Approach

- ✓ **Locate** Heating, Cooling, Neighborhood scale Batteries and possibly transformer in current unused lot
- ✓ Battery cooling **provides heat** to Air-source heat pumps
- ✓ **Cover the Neighborhood Heating and Cooling plant** with large PV array, including EV Charging Parking
- ✓ Central installation of large equipment **lowers infrastructure cost**
- ✓ **PV covered charging stations** (shading in summer, snow protection in winter)
- ✓ **Centralizes Air-source heat pump noise** (vs. individual air-source heat pumps)
- ✓ Provides for **high resiliency** at neighborhood scale
- ✓ Could **use other lots** for ground source heat pumps/park/garden space

Integrated Microgrid w/ Neighborhood Heating & Cooling

Concept for a Sustainable Square Mile



1. Microgrid Controller
2. Cooling Tower
3. Neighborhood Scale Air Source Heat Pump System
4. Energy Storage
5. Heat Recovery Chillers
6. Thermal Storage
7. Micro Solar Panel

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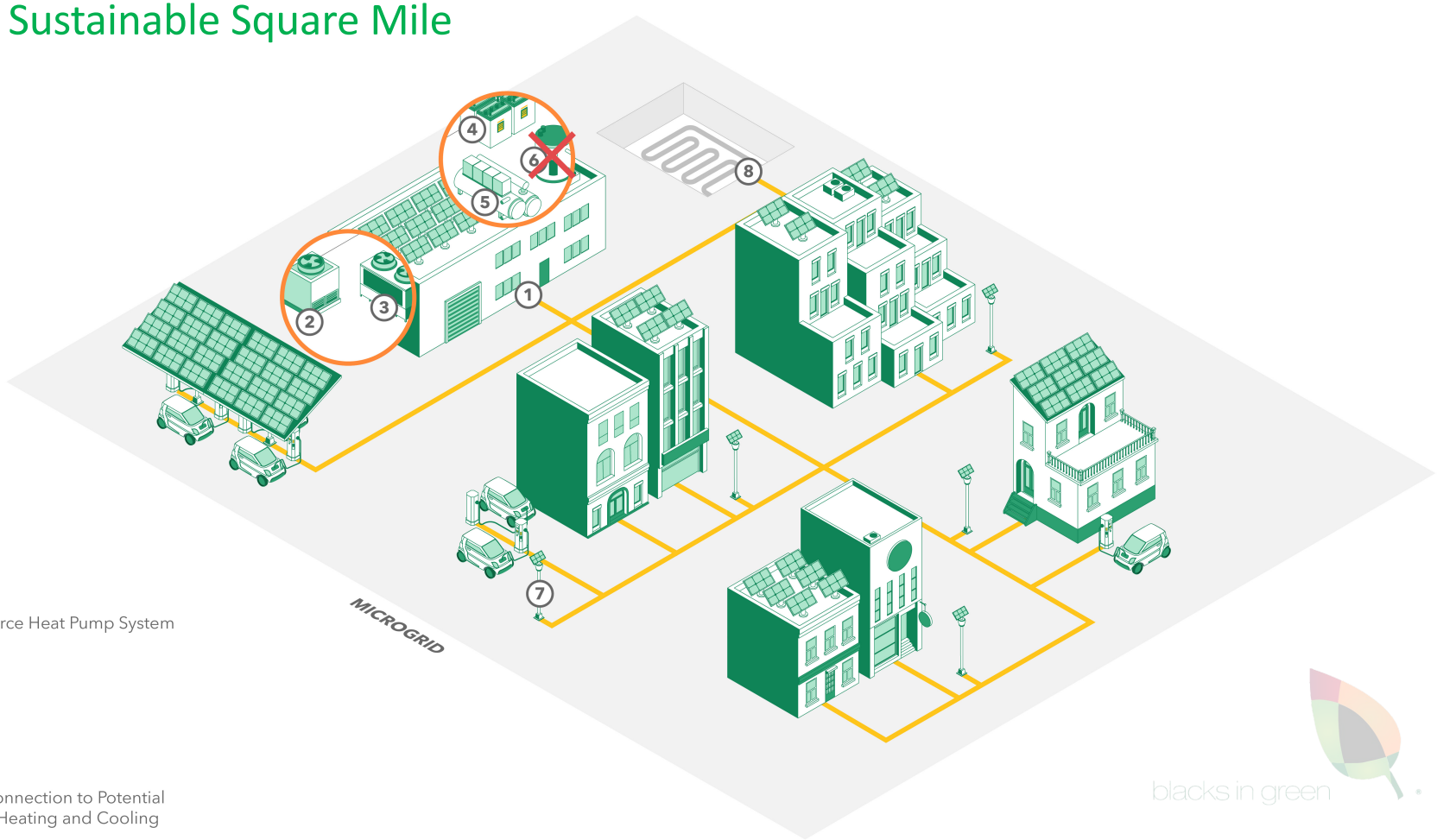
Integrated Microgrid w/ Neighborhood Heating & Cooling

Concept for a Sustainable Square Mile



1. Microgrid Controller
2. Cooling Tower
3. Neighborhood Scale Air Source Heat Pump System
4. Energy Storage
5. Heat Recovery Chillers
6. ~~Thermal Storage~~
7. Micro Solar Panel
8. Flexible System for Future Connection to Potential Ground-source Geothermal Heating and Cooling

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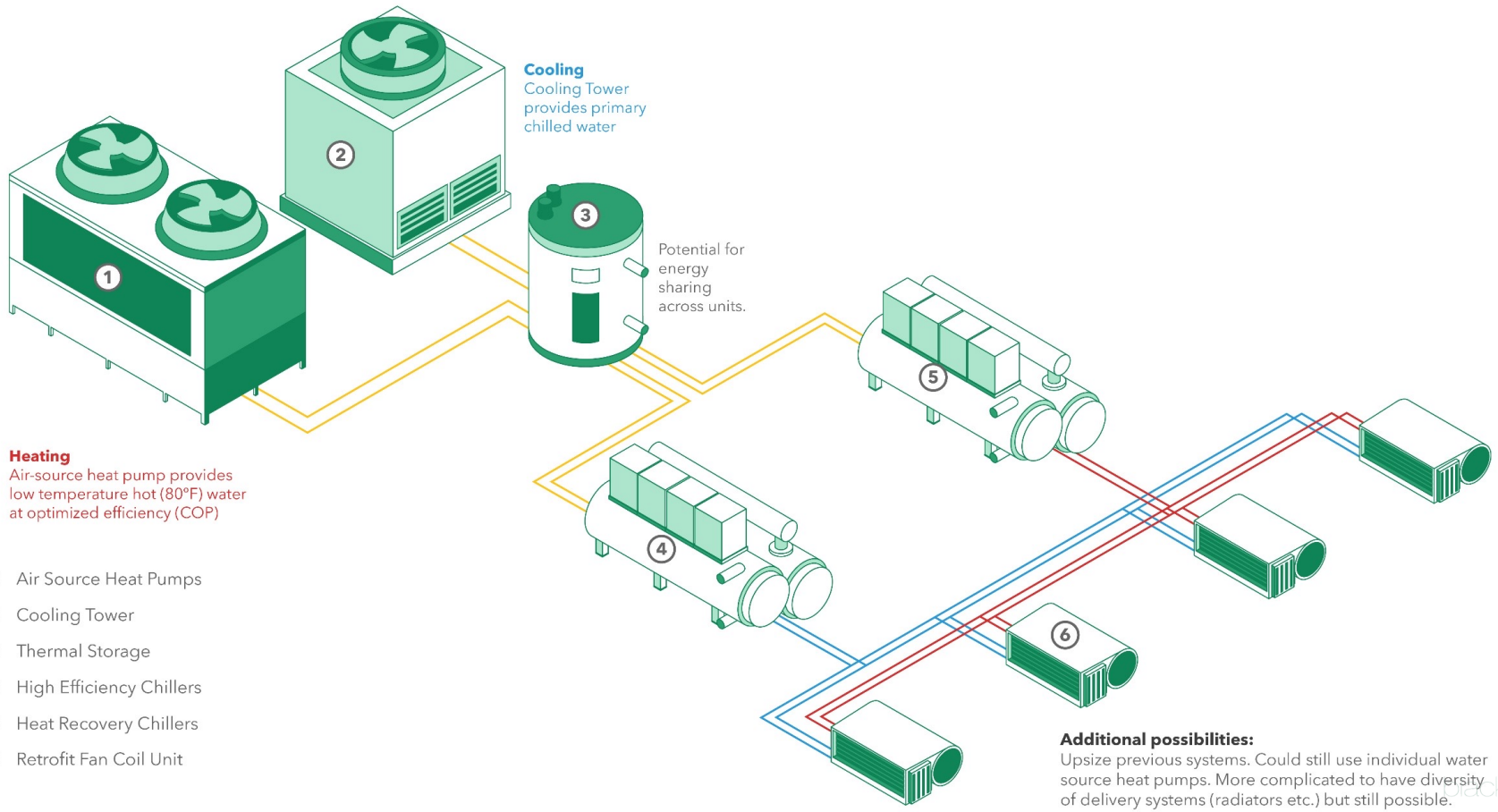
Integrated Microgrid – System Concept Map



Pros and Cons of Air-Source Water Source Heat Pumps

Cons

- ✓ Generally, air-source heat pumps are an inefficient at very low and very high temperatures depending on the unit
- ✓ Two-systems required to meet all space heating temperatures (this is true for all heat pumps including ground source)
- ✓ Air-source heat pumps are not currently built in the same sizes as typical chillers and boilers
- ✓ Mechanical yards possible in the neighborhood—noisier at the cooling towers and air-source heat pump locations
- ✓ Air-source heat pumps require more electricity than ground source heat pumps
- ✓ Cascading heat pumps loses some of the individual unit's efficiency
- ✓ Relatively new approach and technology

Pros

- ✓ First cost is generally lower than other multibuilding all-electric options except electric resistance
- ✓ System is scalable
- ✓ No large initial "sunk costs" required for future scalability (e.g., a ground source heating and cooling loop)
- ✓ Modular system allows for flexibility by unit, building, and owner
- ✓ No possible impact on groundwater or permanent ground temperature changes
- ✓ Heating distribution "agnostic". Can work with cast iron radiators, fan coils, air handlers, furnace retrofits. Reduces the need for costly retrofits
- ✓ Facilitates addition of cooling system with fan coils or similar
- ✓ "Neighborhood" heating and cooling plants provide local training opportunities for residents
- ✓ As the 2018 Chicago Greenhouse Gas Inventory prepared by AECOM demonstrated, residential buildings account for some 27% of emissions. Energy efficiency or saved energy is still the lowest cost resources and this proposal would likely reduce GHG at a key source at relatively low cost.

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Models for Shared ASHP Heating & Cooling

Proposed Models for Shared ASHP

BIG is currently exploring business models that may work for the shared heating and cooling service/s we have conceptualized. Some initial options include the following behind the meter approaches:

- ✓ Initially apply to buildings owned by BIG
- ✓ Work with landlords of larger multifamily properties
- ✓ Explore development of a Neighborhood Heat & Cooling Association
- ✓ BIG also plans to explore a neighborhood scale, dispatchable AHSP system as part of an integrated microgrid, at a later phase of the project. This may not be a behind the meter option. Further study and consultation with ComEd and other system planning experts is required.

*DNV_ETO_Financing_the_Energy_Transition_2021_Digital_Singles.pdf

Next Steps

Feasibility Studies & Modeling

BIG is interested in partnering with the City and ComEd to explore:

1) Opportunities for data sharing 2) Support for completion of a life-cycle cost analysis, load modeling and on-bill cost analysis to inform further development of BIG's shared Air Source Heat Pump pilot. Such feasibility studies must be completed to refine and phase the proposal and to explore capital stacking of available utility and non-utility funding sources for implementation. These studies will provide data on the actual conditions in homes in the Woodlawn Sustainable Square Mile.

We see this concept proposal as a low-hanging fruit opportunity to accelerate efforts to deliver clean, affordable energy solutions to our neighbors. It is also a viable no regrets option.

A Note on Process for Realizing Just & Equitable Solutions

BIG and its Green Power Alliance members are engaged in decarbonization efforts in Illinois and the Mid-west region. Stakeholders from a broad cross-section of the clean energy sector have engaged with us to explore collaborations and offer a wide variety of technological solutions to energy transition and climate change. They include research institutions, energy efficient appliance manufacturers, clean energy developers, renewable energy associations, and environmental non-governmental organizations. These engagements have informed our understanding of some of the technological solutions available for responding to the urgent needs facing residents in our immediate community of Woodlawn. They have also led us to a very clear understanding of the need to center community, to create an enabling environments for community voices to be brought into decision-making about solutions being proposed for our communities. It is also imperative that stakeholders are required to adhere to performance metrics for equity and that these must be baked into the policies, business models and implementation plans considered by the City, State, federal government and other actors. It is clear that only a just transition will be affordable,* and there is an urgent need for standards around how equity and climate justice are conceptualized and delivered, and by whom?

*DNV_ETO_Financing_the_Energy_Transition_2021_Digital_Singles.pdf

Key Recommendations

Solutions Likely to Work

- ***Ensure that all contractors or entities proposing clean, renewable or affordability programs in priority community households address building safety conditions, where present.*** These include asbestos, poor ventilation, leaky or drafty building envelopes, water other building systems that are in disrepair that are affected during an energy retrofit and could present a safety risk to occupants. At minimum, these issues should be identified, reported to the owner, project proponent or appropriate agency, and the retrofit cost determined prior to the commencement of any pilot or program.

- ***Prioritize whole house retrofits or at minimum, address the building envelope***. These are foundational to the installation of subsequent renewable energy and affordability, or distributed generation, smart grid measures.

- ***Require that project developers perform bill analyses for all clean and affordable energy projects proposed for priority communities.***

- ***The project details*** (what it is, how it works, who pays for upgrades, appliances, other behind -the-meter or in home/building expenses, who pays for energy infrastructure costs beyond the meter, impacts on customer bills, timelines for completion, neighborhood impacts like noise and duration during construction, etc.) ***must be presented to priorities early in the project conceptualization stage so that they can understand what is being proposed and have a meaningful say in whether it proceeds, how it is implemented and what the benefits will be, if any for the community as a whole.***

- ***Develop affordable, clean energy and retrofit programming for residents/households who are just outside of federal poverty level but still energy burdened and/or housing poor. We discourage the use of on bill loan programs without properly review for the long-term impacts on customer bills, energy burdens and wealth-building.***

Key Recommendations

Proposed Actions & Requests

- **Energy equity funding**, funds already gathered in electricity rates and shareholder funds **should be allocated to increase the economic feasibility for the utility to pursue the maximum technically feasible energy efficiency measures. Funding should also be used to offset the on-bill impact of energy efficiency retrofit investments for customers**, especially those who are income qualified or whose households are in priority communities.

- All **equity-related funding, whether federal, state (CEJA), or local should be managed by a single entity or hub to ensure transparency, accountability for equity performance metrics, and to avoid duplication of efforts** resulting from siloed implementation of affordable and clean energy initiatives, programming, and the like.

- ComEd's **income qualified programs, energy efficiency and shut-off programs and practices should be audite**d as a condition to the renewal of its franchise with the City.

- ComEd should **complete a detailed Needs Assessment Study of medium and low-income households in its service territory** in order to ensure that it has the appropriate baseline data to inform its program and service offerings, especially to climate and housing vulnerable, and energy burdened households.

- ComEd should be required to **benchmark its energy efficiency and other income eligible programs against the best practices of other large utilities across the country**, if it has not already done so and adopt best practices that will improve its equity performance.

- ComEd should also be required to **benchmark and subsequently update its programming and practices to cultivate doing business with small, women-owned, POC-owned, or Native American businesses**.

Key Recommendations

Proposed Actions & Requests

- ComEd should **provide bulk data needed to support energy affordability and clean energy access projects, such as costs to retrofit different vintages of homes, while protecting consumer privacy.**

- ComEd should be required to **provide the City and customers with data on where system upgrades (e.g., services, feeders, substations) will be needed** by neighborhood block to enable greater penetration of rooftop or community solar, EVs or battery storage, **and at what likely cost to ratepayers?** The Company should also provide the City with the dates on which the engineered useful lives of the given equipment expired or will expire and **provide explanation of why these system upgrades were not completed on schedule.**

- **ComEd should streamline its interconnection process to enable more collaborative and timely support for the development of microgrid and climate resilience centers, especially in climate vulnerable and priority communities.**

- **ComEd should perform a study to determine the extent to which there is a cost-shift between customers participating in the NEM program and those who do not with specific emphasis on quantifying the amount of any cost-shift on Low- and Moderate-Income customers in its service territory. This study should be required as a condition in the City's renewed franchise agreement with ComEd. The cost-shift must be completed by a neutral set of experts and must be completed within one year of execution of the new franchise agreement.**

- **ComEd should also develop Key Performance Indicators for equity and environmental justice (separately from DEI) with executive and board level line-of-sight and and annual public reporting.**

End Part 1

Part 2. JUST PATHWAYS TO AFFORDABLE, ACCESSIBLE, FLEXIBLE CLEAN POWER & CLIMATE RESILIENCE

A Response to the City of Chicago's Franchise for Delivery of Electricity - Request for Information

by Blacks In Green

September 30, 2021

Our Theory of Change

1. **Urgency –** The ***utility debt-death spiral*** is not an understatement for some Chicago residents who are both housing and energy poor and climate vulnerable. The 2021 Climate Action Plan for the Chicago Region notes that ***we are in the decisive decade*** and that urgent and effective climate mitigation is imperative to avoid impacts that already in our view unmanageable for the most vulnerable.

2. **Causes - "The urgent issue is not just that there are environmental perils coming, but rather that the climate crisis was built off of generations of inequity…. If people don't recognize that it's a crisis of justice, as well as a crisis of the environment, then they're going to continue to propose these problematic solutions."** Professor Kyle Whyte, Member of the Potawatomi Nation, Member of the White House Environmental Justice Advisory Council, and Professor of Environmental Justice. "To Solve the Climate Crisis, We Must First Repair Our Relationships," *Grist*, September 8, 2021.

3. **We need clean technologies but technology alone is simply insufficient.**

Renewable Technologies are Necessary but Not Sufficient

At a time when renewable energy generation resources are becoming less expensive than ever, there are still many people in Chicago who are energy burdened, and unsafe. Many are unable to afford their energy bills in the winter and some perish because they attempt to stay warm by resorting to using woodstoves in home settings that are unsafe. As we saw in 1995, 735 Chicagoans, many elderly residents perished because they had homes with inadequate access to cooling as temperatures spiked at 115 degrees Fahrenheit. Each year extreme temperatures due to a changing climate, and the urban heat island effect and "heat dome" that occur due to Chicago's humid climate claimed another 114 lives in 1999 of Chicagoans. While no Chicagoans should be subject to these conditions, the sad reality is that those in lower-income households and people of color are more likely to experience these conditions. These problems have been studied and well-documented by researchers at local universities, non-profits, think tanks and the City itself, which has made substantial progress in the intervening years but in the context of a rapidly changing climate there is more to be done. As a July 2020 Scientific American article on the topic stated:

"Today, Chicago is a model for other cities facing extreme heat, in part for its preparedness protocols, special training for first responders and outreach to vulnerable populations."

As reflected in our recommendations, BIG supports and plans to build upon the City's proactive efforts to stem the tide of climate-related deaths in communities, especially communities like Woodlawn where primarily low-income, black and brown residents are more likely to be concentrated. Due to a series of historical facts and present-day practices, we have less equal access to not only the technological solutions but the institutional and business practices and processes that are so key to realizing justice and equity. There is even greater urgency today as climate change continues unabated, presenting a real climate and existential threat to the most vulnerable Chicagoans and eventually to others across the City and region. We must do more sooner, and we need to ensure that we are allocating the resources in a way that effectively, in fact achieve all three of the inextricably linked goals of safety, affordability and climate adaptation and resilience. The sobering July 2021, Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), noted that Global surface temperatures will continue to increase until at least the mid-century under all emissions scenarios considered. Global warming of 1.5°C and 2.0°C will be exceeded during the 21st century unless deep reductions in CO_2 and other greenhouse gas emissions occur in the coming decades. Chicago was one of the earliest cities to develop a climate action plan some twelve years ago and was among the Rockefeller Resilient 100 Cities. **Twelve years ago, Chicago's Climate Action Plan estimated that the City could see an increase in the number of 90+ degree days from 15 days per year to between 35 and 56 days /year.** The latest Climate Action Plan for the Chicago region, published in 2021 stated that the Chicago region has experienced warming temperatures at a faster rate than the globe as a whole. **The 2021 Climate Action plan projections under the higher (GHG) emissions scenario would mean two to three months per year of days with temperatures in excess of 90 degrees Fahrenheit.** As the City of Chicago re-evaluates its electric energy franchise agreement, issues of customer safety, energy affordability, climate change, environmental justice and equity are central. We are concerned that more of our neighbors could die from extreme heat or cold simply because they cannot afford to pay for energy. We believe that this is unacceptable and we have proposed a flexible solution in Part 1 that can be implemented in the short-term.

Community Decision-Making Access, Policy & New Business Models

4. Equity must come from institutional arrangements and new business models

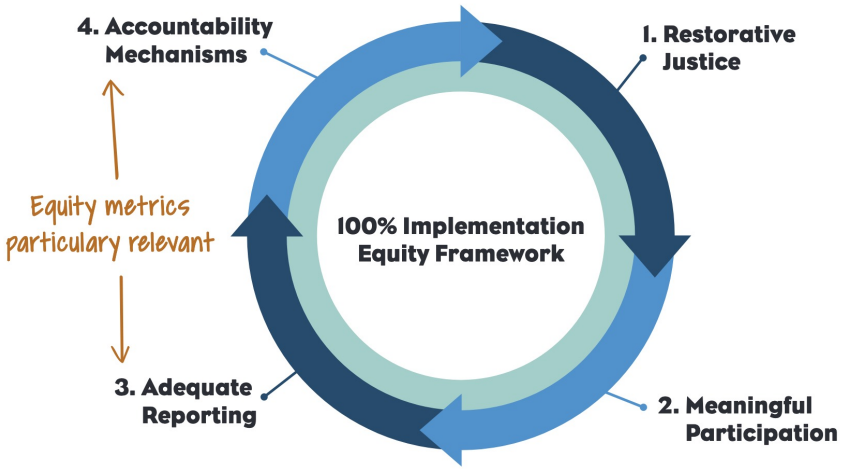
5. Just transition requires meaningful engagement of front-line communities

6. For communities to bring their community knowledge and community assets to bear, technical information must be made accessible by project proponents and partners.

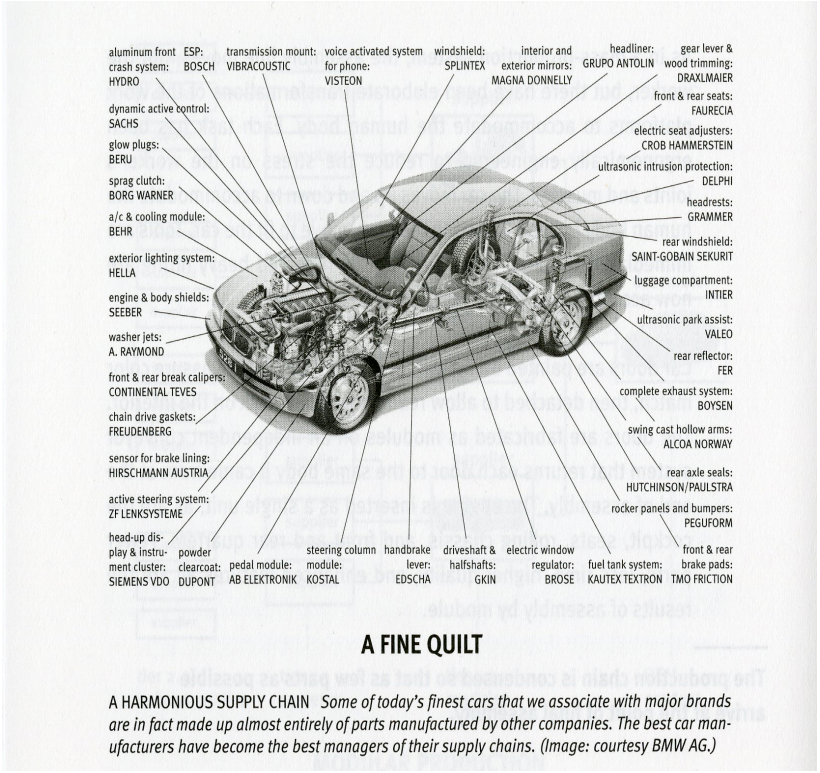
An Integrated Approach & Accountability Framework Are Needed

Resources to Consider

We offer the following models for the City's consideration and reference. Staff may already be familiar with some of these models we nevertheless reference some key resources here:



Source: Initiative for Energy Justice, "Justice in 100 Metrics: Tools for Measuring 100 % Renewable Energy Policy Implementation." January 2021. https://iejusa.org/wpcontent/uploads/2021/03/Justice-in-100-Metrics-2021.pdf



Source: The Integrative Design Guide to Green Building: Redefining the Practice of Sustainability

Many Alternative Models Exist

Starting with Models from the Integrated Design of Green Buildings

Borrowing learnings from the building and materials sciences and trades, in our approach to energy and climate transition, many of us are still stuck in the mode of the master controller mindset, which is still appropriate in very specific scenarios such as managing a disaster or military exercises or the operational aspects of running mechanical systems. This approach assumes that the master controller has full information and fully comprehends the design problems including risks and opportunities. It also does not acknowledge power and information asymmetries amongst stakeholders. According to the authors:

"This conventional process creates buildings that are no more than the sum of their parts and sometimes less…through this process we often face redundancies, unnecessary costs, and a great deal of wasted time and effort."

Given the urgency of this decisive decade of action, and the risks and consequences of failing to meet the targets for both affordability and carbon, we risk everything by adhering to this approach. It will likely waste precious time, create unproductive redundancies and waste precious time and limited financial and other key resources. Most importantly it is unlikely to produce the just transition path which is the only affordable, Paris-compliant path.

Source: Stephen Keiran & James Timberlake. Refabricating Architecture. McGraw Hill Companies, 2004.

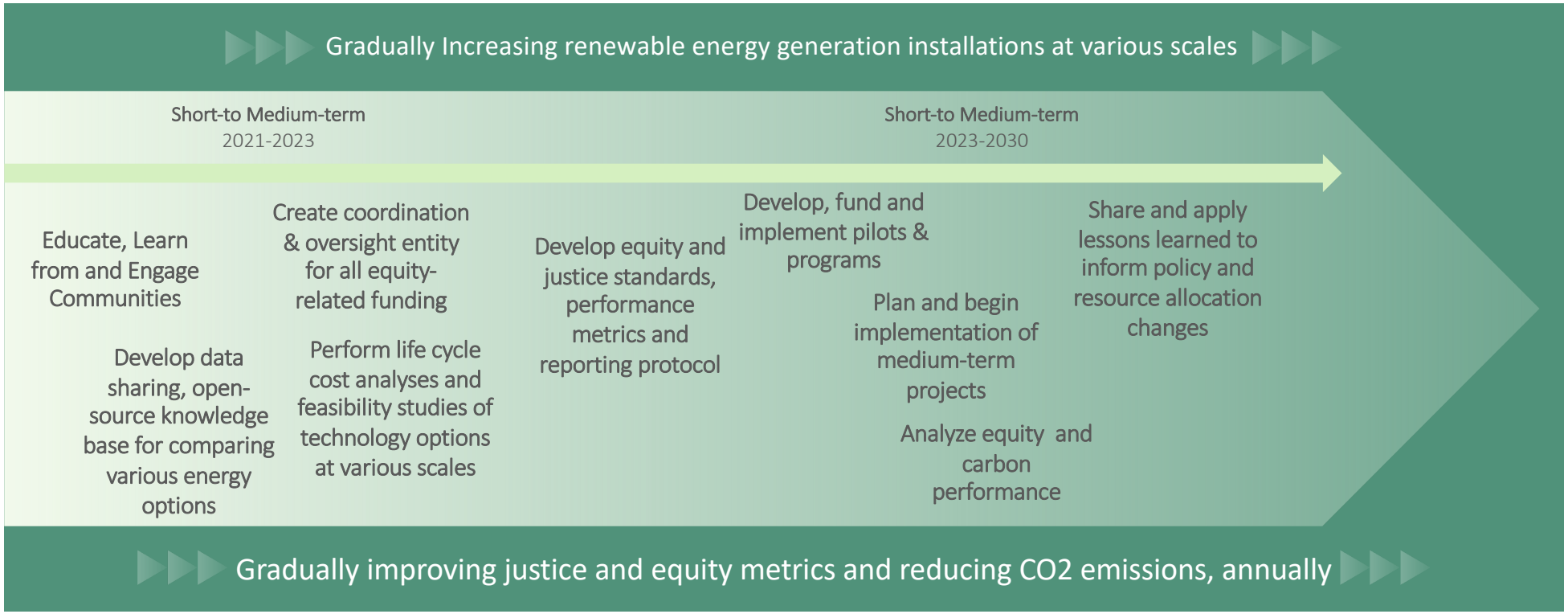
Other Community-Centric Models

Resources to Consider

- The California Community Air Protection Program developed to implement Assembly Bill 617 includes a People's Blueprint that may be adaptable for use in the Chicago context. The People's Blueprint "reflects the lessons learned from the first four years of AB 617 Community Air Protection Program implementation. It addresses topics that community representatives have identified needing improvement to establish effective partnerships and achieve results defined in AB 617." The AB617 process also included valuable lessons about how to work with communities on decision-making around very technical issues.
- The Low Carbon Hub in Oxfordshire, South England represents another potentially useful case study and business model.
- It is also through the community-centric, power-sharing models provided in the examples above that creative solutions to problems can be derived, and community benefits negotiated, including critical equity measures such as workforce education and training opportunities.
- Transparency, trust building, and the availability of resources to enable community stakeholders to meaningfully participate (childcare, transportation, meals at after work meetings, stipends for participation, etc.) are key to the success of these models.

Sources: People's Blueprint: https://ww2.arb.ca.gov/sites/default/files/2021-09/PBP%20Writers%20Group%20Draft%20for%20CARB%202021.09.08_acc.pdf
Oxfordshire Low Carbon Hub: https://www.lowcarbonhub.org/

Actions to Support an Equitable, Affordable and Resilient Chicago of the 21st Century



Equity & the Generation Mix

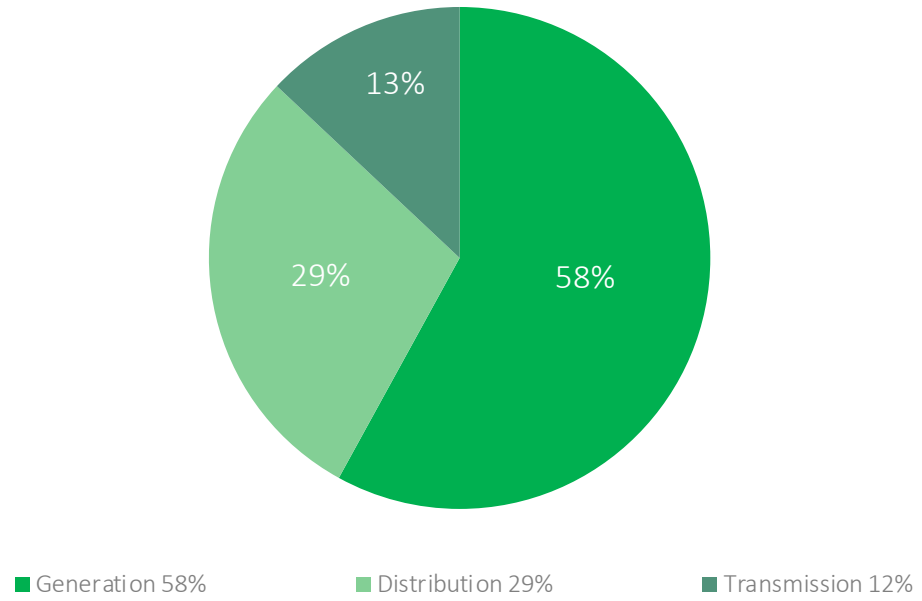
7. The affordable, accelerated, Paris Accord-compliant transition scenario is the one that is just, according to DNV ETO's recent Financing The Energy Transition, Energy Transition Outlook 2021.

8. Generation costs typically comprise the largest (58%) of 3 components that go into the price of electricity and are declining. The decline in utility-scale solar and wind costs have made these two renewable sources the least-cost options in the energy generation portfolio. At a time when clean power generation sources have become so inexpensive, why are customers still paying for a costly, polluting, and climate-forcing (i.e., a greenhouse gas producing) energy mix? How can Commonwealth Edison and the City realize those savings by transforming the generation mix of Chicago's electricity service?

9. How can we ensure that those savings are passed onto Chicago's customers on their energy bills, especially those who are most energy burdened?

Major Components of US Price of Electricity

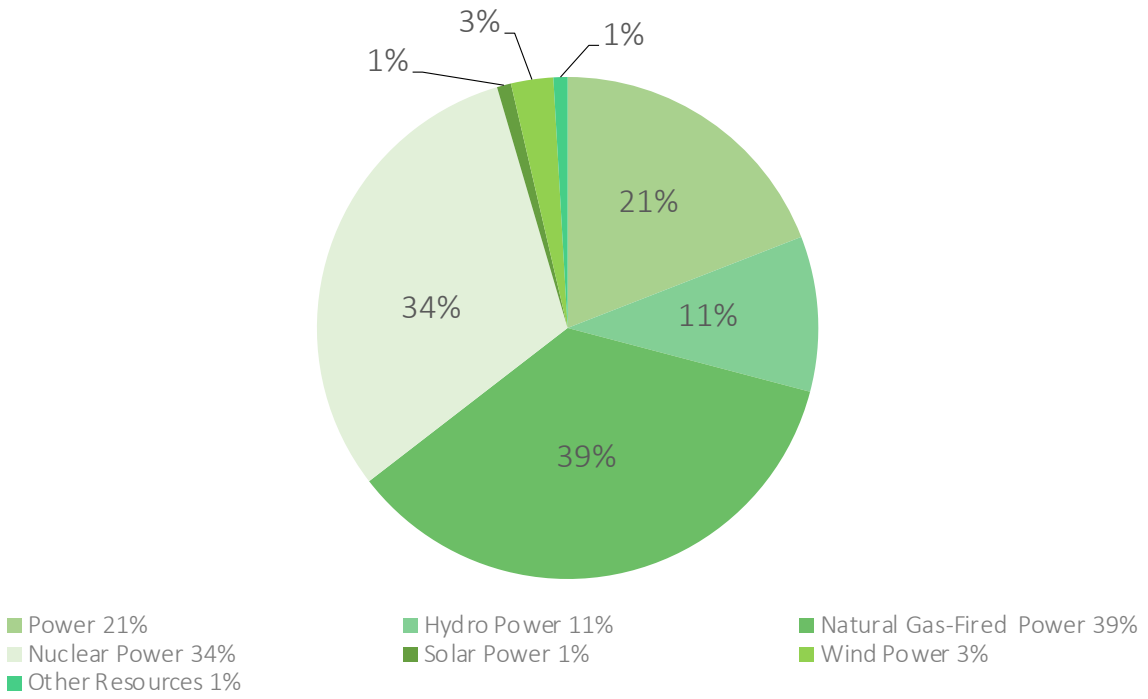
Electricity Price Components



Source: *US Energy information Administration, Annual Energy Outlook 2020, January 2020*

ComEd Sources of Electricity

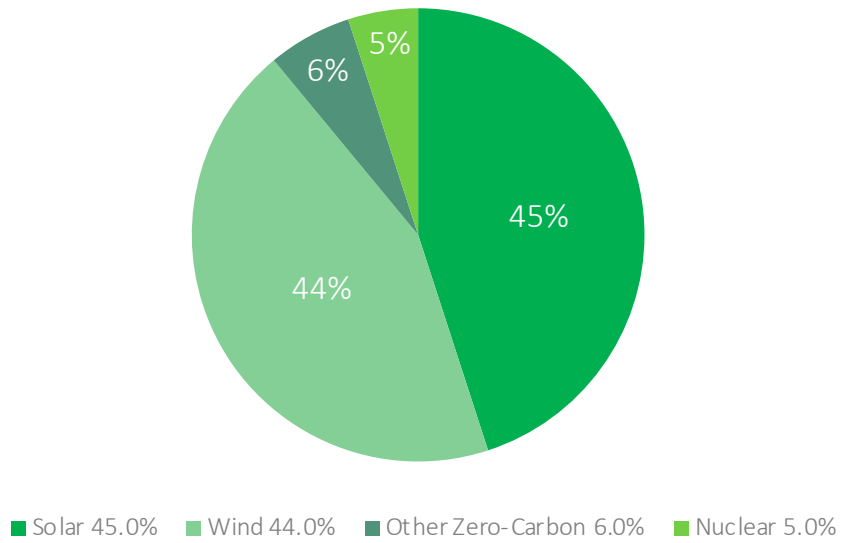
Sources of Electricity for the 12 months ending March 31, 2021



Source: *Commonwealth Edison's Environmental Disclosure Report.*

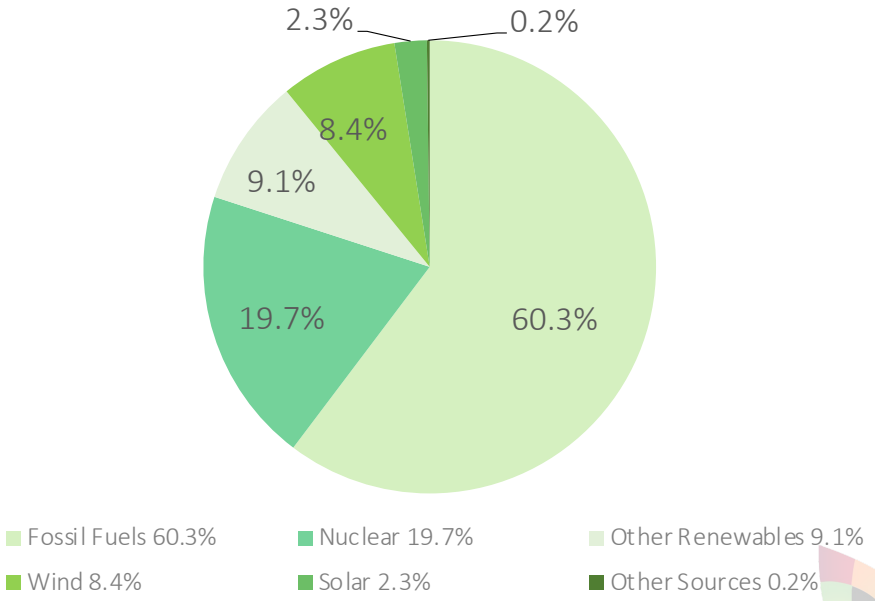
Projected and Current US Sources of Energy

2050 Projection Sources of Electricity



Source: *US Department of Energy "Solar: Futures Study"*

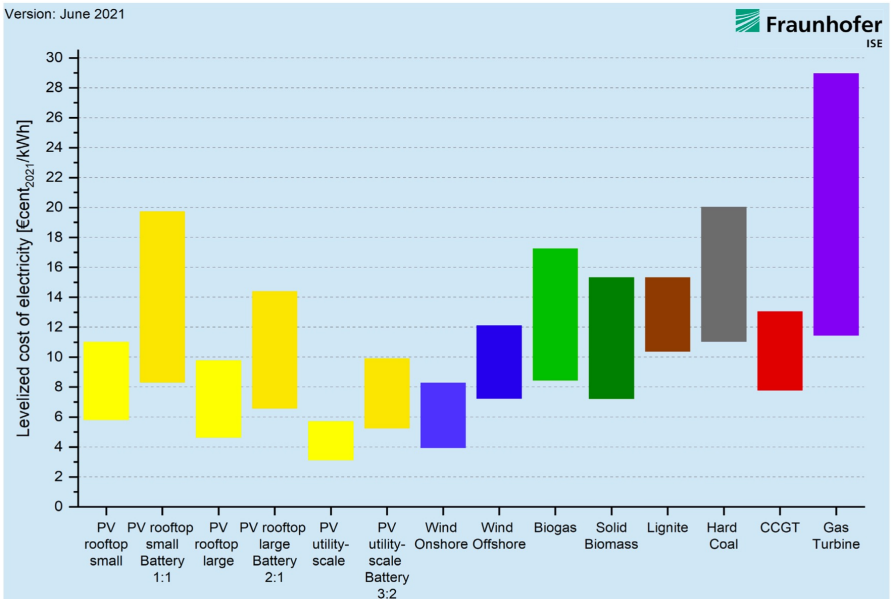
US Energy Sources



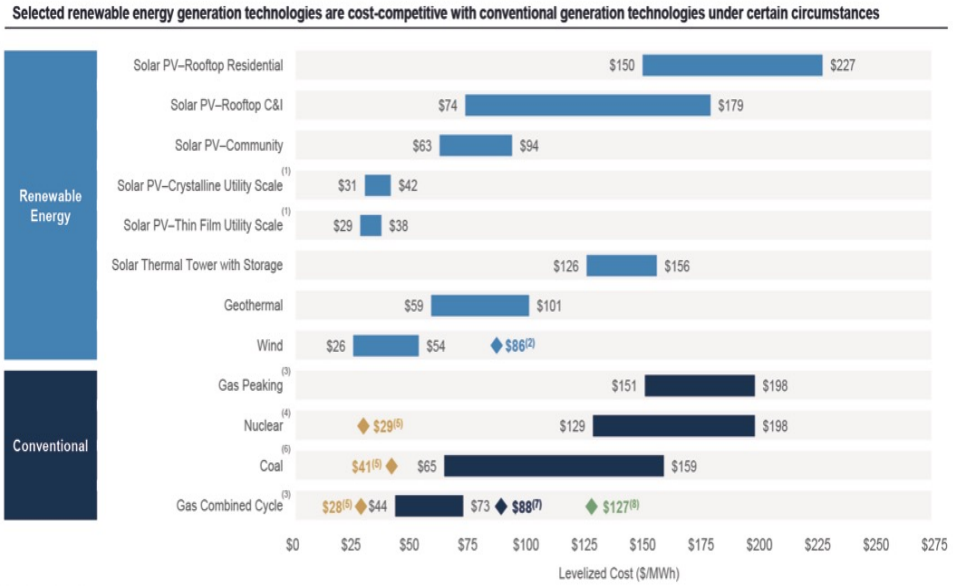
Source: *US Energy Information Administration, Feb 2021 Preliminary Data*

Levelized Cost of Energy Generation Resources

LCOE of renewable energy technologies and conventional power plants at locations in Germany in 2021



LAZARD LEVELIZED COST OF ENERGY ANALYSIS — VERSION 14.0 – Oct. 2020



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Levelized Energy Costs & Affordable Energy Access in Chicago

The critical metric is the Levelized Cost of Energy, also referred to as the Levelized Cost of electricity or the Levelized energy cost (LEC), **a measurement used to assess and compare alternative methods of energy production**. The LCOE of an energy-generating asset is the average total cost of building and operating the plant per unit of total electricity generated over an assumed lifetime. The decline in utility-scale solar and wind cost have made these two renewable sources the least-cost options in the energy generation portfolio. The June 2021 Fraunhofer Institute for Solar Energy Systems' Levelized Cost of Energy study, see above figure, compared the levelized cost of electricity of renewable energy technologies for electricity generation with conventional power plants. The future cost ratio between the different power generation technologies was also compared for the years 2030 and 2040. For the cost development of renewables, cost development based on technology-specific learning rates (LR) and market scenarios are used.

Chicago's Energy

The electricity utility, its associated components, and high-speed, low-latency broadband, will be central to the decarbonization program. The Federal Government is targeting a 100% reduction in grid emissions by 2035. The *Solar Futures Study* focuses on scenarios achieving 95% decarbonization by 2035 and 100% decarbonization by 2050. The transition will require new infrastructure to support the move from the incumbent franchisee (ComEd's) energy portfolio. The Illinois Clean Jobs Coalition noted that as Illinois moves towards achieving 100% renewable energy by 2050, the transition will:

• Deploy more than 40 million solar panels and 2,500 wind turbines across Illinois by 2030, generating more than $30 billion in new infrastructure in the state. Tapping into the falling cost of wind and solar, lowering costs for consumers;

• Expand Solar for All and ensure people have access to solar in their community;

• Expand goals for Energy Efficiency, on the electric and gas side, to lower costs; and

• Direct utilities to evaluate lower-cost alternatives to infrastructure modernization.

Similarly, the US Department of Energy indicated that in scaling up the development and deployment of the clean energy technologies of the future, DOE will help put Americans to work in construction, skilled trades, and in the engineering fields required to build the new clean energy infrastructure and economy, while making sure that every American worker and community can benefit from—and see their future in—clean energy solutions. The **DOE's new Office of Energy Jobs** will lead the effort to create more union jobs that pay family-sustaining wages, including career ladders so that every American has access to a middle-class career with health care, retirement benefits, and worker protections. The transition to a clean, long-term renewable energy infrastructure will require large-scale electrification of buildings, heating and cooling systems, transportation systems, and industry. The increasing use of electric vehicles will require a reliable network of charging facilities.

Two initiatives from the Federal and State levels could profoundly impact Chicago's ability to favorably contribute to the country's decarbonization initiative. These are:

• the $3.5 trillion budget plan; and

• the Climate and Equitable Jobs Act (CEJA).

The $3.5 trillion budget plan, if passed, includes a provision known as the Clean Electricity Payment Program, which would use payments and penalties to encourage utilities to increase the share of electricity they sell from carbon-free sources each year. If it works as hoped, the legislation would ensure that the power sector generates 80% of its electricity from sources like wind, solar, and nuclear plants by 2030, cutting more than a billion tons of annual greenhouse gas emissions.

Federal & State Opportunities for Affordable Energy Access

The Clean Electricity Payment Program is a twist on a clean electricity standard, a regulation numerous states have implemented that requires utilities to reach certain levels of clean electricity by specific years. The proposal mainly opts for payments and penalties over binding mandates because that could enable it to pass under a legislative process known as budget reconciliation, which requires only a simple majority of votes in the Senate.

On 9 September 2021, the Illinois State Senate passed the Climate and Equitable Jobs Act, which prioritizes disadvantaged communities. CEJA aims to double the State's investment in renewable energy, with a target of 40 percent renewable energy by 2030 and includes a new equity block in the State's Renewable Portfolio Standard. The State's community solar programs (Adjustable Block and Solar for All) would increase to $50 million a year. Investments in renewable energy would total around $10 billion. CEJA commits $78 million a year over the next decade to expanding electric vehicle access with 45 percent of the benefits going to environmental justice and economically disadvantaged communities.

Initial Plan Accomplishments

As of 20 April 2020, according to the Illinois Power Agency, the Long-Term Renewable Resources Procurement Plan has had some accomplishments.

Since the approval of the Initial Plan by the Commission on April 3, 2018, the Agency has completed the following implementation activities:

- First Subsequent Forward Procurement (1.980 million RECs annually from new utility-scale wind projects . October 2018)

- Photovoltaic (PV) Forward Procurement (2 million RECs annually from new utility-scale solar projects. November 2018)

- Brownfield Site Photovoltaic Procurement (Met statutory target of 40,000 RECs annually from new brownfield site photovoltaic projects. July 2019)

- Adjustable Block Program opened for Approved Vendor registration on November 1, 2018, and for project applications on January 30, 2019.

- Illinois Solar for All Program opened for Approved Vendor registration on February 19, 2019, for project applications for the 2018-2019 program year on May 15, 2019, and for the 2019- 20 program year on September 4, 2019.

- Second Subsequent Forward Procurement (1 million RECs annually from new utility-scale wind projects. Conducted in December 2019). No projects were selected in this procurement.

- Community Renewable Generation Procurement (50,000 RECs annually over 15 years from community renewable generation projects that are not photovoltaic. Conducted December 2019). No projects were selected in this procurement.

- Low-Income Community Solar Pilot Procurement ($20 million budget for 15-year REC delivery contracts. Conducted December 2019).

There is substantial opportunity to modify ComEd's energy mix to include more solar at varying levels; at utility-scale, in community solar projects, and roof-top solar. To better enable implementation of CEJA mandates and those likely to result from implementation of the Federal infrastructure budget plans, it will be imperative that ComEd and other regulated utilities identify with community stakeholders in priority communities and elsewhere, the business models, programming, procurement processes, tariffs and fee structures that need to be updated, revised or sunset to create an effective enabling environment for just and equitable decarbonization of the generation mix, allowing more distributed solutions to enable climate and grid resilience. This effort would also include working with the Illinois Commerce Commission (ICC), the City, and Legislature to create policies, legal pathways, business models, frameworks, and programming to further green the generation mix, thereby reducing the **60% currently provided by fossil fuel resources.**

Clean Energy & Affordable Energy Access are Feasible

Given that 2050 projected sources of electricity, and the possible fund through Federal and State funding, it is expected that there will be an increased mix of solar and wind technologies. Funding should lead to integrated distributed community networks. A detailed analysis is needed to determine locations for brownfield and greenfield projects.

Photovoltaic/Solar

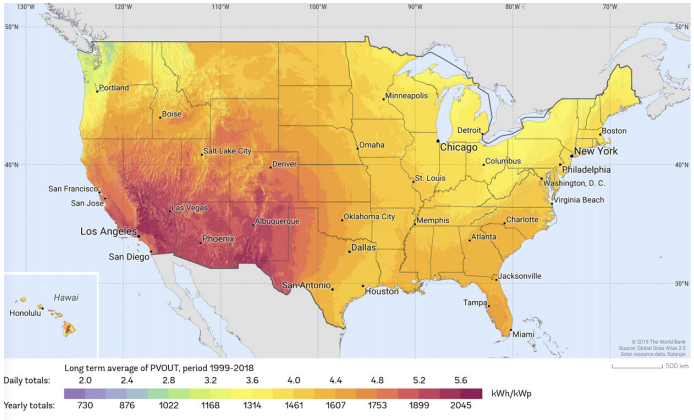
An aerial view of Chicago shows an extensive potential for rooftop solar. The solar sub-sector should be an integration of:

- Agri-Voltaic (in farming areas);
- Micro-grids;
- Community solar;
- Utility post mounted panels;
- Utility-scale; and
- Rooftop systems

Chicago has an average of 2565 hours of sunlight per year (of a possible 4383) with an average of 7:01 hours of sunlight per day and has 84 clear days. It is sunny 58.5% of daylight hours. The above data points should be field verified or confirmed with local institutions, who have current numbers. Although the City's initial Municipalization Study discouraged that strategy due to system severance coats and the need for more expensive engineering studies, we concur with the study's consulting team that there are many alternative options available to the City and its residents for meeting its climate and equity related goals, including:

1) Development of a City-wide building decarbonization strategy;
2) Powering buildings owned by the City with renewable energy by 2025;
3) Ensuring that all buildings are supplied with renewable energy by 2035; and
4) Converting public buses to an all-electric fleet by 2
2040.

Case Study: Cutting Edge Capital's Equitable Community Solar - Ownership Strategies for WOEIP.



Map of US Photovoltaic Power Potential

Source: *globalsolaratlas.info*

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Alternative Solutions for Solar at Different Scales

1. Landfill-based Community Solar
2. Big Box Community Rooftop Solar
3. City-wide Utility Pole Solar Array Program

Community Solar at Different Scales

Alternative Community Solar Solutions

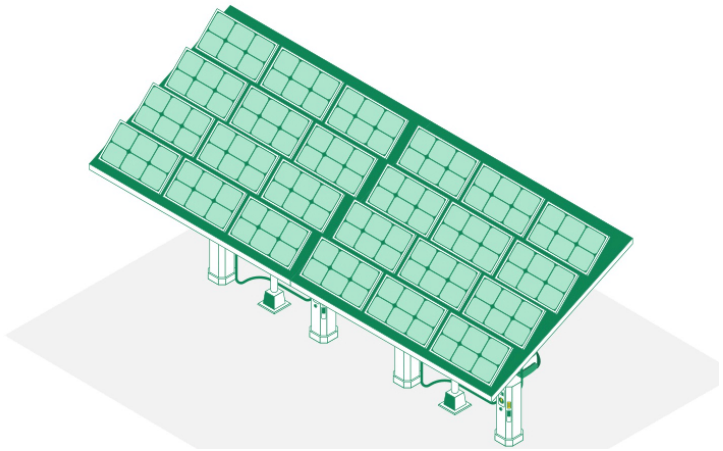
In addition to the air source heat pump concept described in Part 1. We offer the following suggestions for the City's consideration:

Landfill Based Community Solar at City Landfills

I. If there is full support of local front-line community leaders, work with the US EPA Region V, the relevant City Departments and the companies managing the closed or soon to be closed landfills within the City-limits to develop community solar projects on the landfills. Our understanding is that land for community solar projects within the City limits, is scarce so landfills may present an opportunity for developing such projects. It will be imperative that local, fence line community leaders and residents agree and are directly engaged in making decisions for a potential landfill, community solar project and that a feasibility study is completed. As landfills produce methane, there are likely safety elements that would require appropriate attention throughout the project. If these landfill solar projects are determined to be feasible from regulatory, community, political and cost perspectives, one benefit could be that the solar produced is used to supply affordable, clean energy to the nearby priority community households. There are excellent case studies for and a "how to" guide available from the Massachusetts Department of Energy Resources and US EPA. NREL has also developed a best practices guide for siting solar PV at municipal landfill sites.

Big Box Community Rooftop Solar

II. The City and communities could also negotiate with big box stores or warehouse and logistics building owners to develop rooftop solar that could be partially deployed to serve nearby communities. These approaches are also being explored by other environmental justice communities, such as the West Oakland Environmental Indicators Project in Oakland, CA. There appears to be rooftop space available at the various buildings at O'Hare International and may be an excellent opportunity for rooftop photo-voltaic networks. A notable case study is Stop-N-Shop's 2008 decision to install rooftop PV arrays at 365 stores in the Northeast.



PSE&G – NJ Solar Panel Mounted on Utility Pole. Photo by: R. J. Franklin

Utility Pole with Solar PV Array

In July 2009, the New Jersey Board of Public Utilities approved a $200 million contract between PSE&G and Petra Solar in which the solar company agreed to install over 200,000 200W, 5.4 feet by 3.25 feet, photovoltaic panels on existing utility poles throughout New Jersey and to tie into the State's electrical grid, Figure 3. The panels have smart grid communication tools built-in and leverage the AT&T wireless network. Additionally, each panel has an inverter, which converts the panel's direct current (DC) voltage to alternating current (AC). A 40-megawatt solar farm usually requires about 170 acres. PSE&G chose locations such as brownfields that might otherwise be unusable, or the roofs of buildings, as well as space above parking garages. This way, this combination did not require purchases of additional land or the need to take valuable land away from other projects. The project created 100 green jobs. It is estimated that the City of Chicago has roughly 250k poles. **The City's Municipalization Study indicated an average delivery rate of $0.00892/kWh for street-lights, which comprise 1% of the City's electrical load. A feasibility study should be conducted to assess the viability of this program option in meeting the City's renewable energy targets.**

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Alternative Solutions for Solar at Different Scales

1. Broadband Access & Equity

High-speed Internet Access is Necessary for Climate & Energy Equity

The *Distributional Disparities in Residential Rooftop Solar Adoption* study completed by Professor Tony Reames found that lack of access to the Internet was a significant barrier to adoption for low-and moderate- income households.

In 2016, the United Nations declared that it considers the Internet to be a human right. Specifically, an addition was made to Article 19 of the Universal Declaration of Human Rights (UDHR), Section 32 adds "The promotion, protection, and enjoyment of human rights on the Internet" and another 15 recommendations that cover the rights of those who work in and rely on internet access. It also applies to women, girls, and those heavily impacted by the digital divide. Three recommendations, as it pertains to social equity are:

•Expressing concern that many forms of digital divides remain between and within countries and between men and women, boys and girls, and recognizing the need to close them,

• Emphasizing that access to information on the Internet facilitates vast opportunities for affordable and inclusive education globally, thereby being an important tool to facilitate the promotion of the right to education while underlining the need to address digital literacy and the digital divide, as it affects the enjoyment of the right to education; and

• Affirms also the importance of applying a comprehensive human rights-based approach in providing and in expanding access to the Internet and requests all States to make efforts to bridge the many forms of digital divides.

The term broadband refers to high-speed Internet access. Today's broadband provides:

• high-speed data transmission;

• access to the highest quality internet services, such as videoconferencing for telehealth, that require large amounts of data transmission; and

• constant access.

Broadband services benefits include, but are not limited to:

•Increasing socio-economic growth and development;

• Bringing telemedicine to the home or designated centers;

• Facilitating remote learning;

• Efficiencies in all sectors of an economy;

• Increasing the reach of modern education to rural and economically disadvantaged areas;

• Reducing the need for travel and the inherent pollution;

• Saving time; Fostering new business and employment opportunities; and

• Monitoring various aspects of utilities grids/systems.

Broadband access is facilitated via fiber-optic links, hybrid fiber coaxial, wireless – mobile technologies (4G, 5G, microwave, and Satellite). Universal broadband connectivity is a critical criterion for any country or State.

Sources:

John Horrigan, Ph.D. Brian Whitacre, Ph.D. Oklahoma State University Colin Rhinesmith, Ph.D. Simmons University "Universal Broadband in Illinois: Studying the Costs of Providing Free and Affordable Service for All Residents", 20 December 2020

"Smart Grid for a Smart Chicago, Retrieved September 10, 2021, from https://www.chicago.gov/city/en/progs/env/smart-grid-for-a-smart-chicago.html

High-speed Internet Access & Energy Equity

Investing in a modernized smart grid in Chicago will help residents receive more reliable, affordable, and sustainable electricity.

Reliability

1. More reliable electricity delivery with fewer power outages and quicker restoration of electricity after outages;

2. Improved safety and security with a better-prepared system to respond to emergencies such as severe weather and security threats; and

3. More efficient transmission of electricity with data intelligence for smarter matching of supply to demand.

Affordability

1. Operational savings-including no more estimated billing and no more meter readers-that will be fully passed on to ComEd customers.

2. Money-saving opportunities with new pricing options such as ComEd's Peak-Time Savings and ComEd's Hourly Pricing program.

3. More control over your energy use with improved access to your energy usage information

4. Less energy waste (it costs more to produce energy during the peak hours of the day). Reduction in peak time use with the smart grid will help lower electricity rates -- shift customer use to save money.

5. Lower operating costs with increased efficiency will create savings on electric bills.

Sustainability

1. Empowered consumers who can reduce energy use when costs to people and the environment are high.

2. Reduced peak time demand, which will lessen the need to build new power plants and keep electricity costs low.

3. Increased opportunity for clean, renewable energy systems and electric vehicles, to be integrated with increased grid flexibility.

4. Opportunity for customer-owned power generation systems, including renewable energy systems in local communities -- such as solar panels on homes and schools.

5. Job creation and job training in the growing smart grid industry.

6. Innovation and development of new products and services for consumers to more easily manage their energy, such as smart appliances and thermostats.

7. More efficient electricity delivery and use will promote a healthy and resilient Chicago

8. Improved infrastructure will help Chicago maintain its global competitiveness.

To further ComEd's efficiency and secure its operations, consideration should be given to using Everything as a Service (XaaS) Cloud Services for the company's IT systems and operations. Beyond the derived efficiencies and the Cloud's modern enhanced security, ComEd will also have a modern Business Continuity / Disaster Recovery platform.

The ICC should use the focused aggregated data, which protects individual customer privacy, generated through the smart meters to ensure that the franchisee is providing cost-based services that are affordable and reliable.

The Internet of Things

Deploying Internet of Things (IoT) sensors and devices require low latency connectivity. Hence, it is incumbent on policymakers to adopt a new definition for broadband, at least 150Mhps download and 50Mbps download. The benefits of IoT in the public sector and other service-related environments are similarly wide-ranging. For example, government-owned utilities can use IoT-based applications to notify their users of mass outages and even smaller interruptions of water, power, or sewer services. IoT applications can collect data concerning the scope of an outage and deploy resources to help utilities recover from outages with greater speed. Given the ongoing breaches of companies' information technology (IT) networks, increasing the security of the city's electrical grid, a critical infrastructure, must be a central imperative. As such, the franchisee should consider moving its services to the cloud. The cloud services platform should have advanced Zero Trust (ZT) security at the application layer and a modern next-generation firewall at the physical layer. Of course, these technological opportunities will only be effective if all customers, especially those in priority communities have proper access high-speed Internet services.

Technologies for Climate & Energy Equity Require New Models

It is well established that there are many barriers to the diffusion of distributed energy resource solutions, especially in low-income communities. As a result, there is a dire need to put resources into the development of innovative business models, especially designed to meet the needs of low-income, low-access and/or climate vulnerable customers and communities. To achieve this outcome, BIG believes that it is imperative that the design of new models must start with and be shaped by understanding the barriers to access and the specific needs of the given community. By "needs" we mean a collection of critical factors that may be translatable into metrics. We believe that the City of Chicago should work with the State, ICC and Com Ed to create the enabling environment for climate resilience in its service territory by creating programs, incentives and tariffs that better enable autonomous power microgrids capable of operating with the utility and capable of safely "islanding" (that is, connecting or disconnecting) from the utility's grid. We believe that this approach promotes neighborhood resilience and enables better management of the City's carbon budget.

The fact that despite the rapid and immense technological innovation and progress in the energy and climate sectors, we still have extreme and deadly energy poverty in Chicago, despite the lower cost of renewable energy generation, points to the importance of getting the policy and institutional frameworks and business models for implementing climate equity and climate resilience right.

In the case of the City of Chicago and the State of Illinois, the worst-case scenario is that we will use federal infrastructure (if approved) and CEJA funds to pay for a series of siloed experiments that deliver neither carbon reductions nor equity and climate justice. Transparency and accountability are imperative to our success as is the setting of clear standards standards for what constitutes climate justice, who is authorized and has the appropriate expertise to define metrics and speak on equity, and who shall evaluate justice and equity for major energy and climate adaptation and resilience projects funded with taxpayer money or otherwise.

What we must avoid, at all costs is a war of all against all for the available funding and the scenario where priority communities are simply treated as add-ons to other agendas rather than engaged as true partners in the design and implementation of solutions. Indeed, community benefits can only be derived from models that center the community's early engagement in decision-making. Models developed across the country show the necessity of educating communities so that we can meaningfully participate in decisions and bring our necessary knowledge and place-specific expertise to bear.

It is important that qualified EJ and climate equity experts both at the neighborhood and community levels and trained EJ professionals who have experience and expertise speak on equity and justice. Such experience would come from people living in community, living in the conditions that we aim to redress and/or people with a degree in environmental justice. There is an urgent need to discern qualifications which qualifications should count. It is also not enough to bring a black and brown person to the table in lieu of such qualifications. Representational equity has a long track record with Diversity and Inclusion programs in mainstream organizations and they have not always achieved the stated goals, for well-understood organizational reasons, such as occupying a low power role in the organization or occupying a role without or with limited resources or limited executive sponsorship and line of sight. **We must find models that create effective power-sharing.**

APPENDIX

Appendix I. Abbreviations and Acronyms

Abbreviations and Acronyms

ASHP	*Air Source Heat Pump*
AC	*Air Source Heat Pump*
BYOD	*Bring Your Own Device*
C	*Celsius*
C&I	*Commercial and industrial*
CEJA	*Climate and Equitable Jobs Act*
CEO	*Chief Executive Officer*
CO2	*Carbon dioxide*
ComEd	*Commonwealth Edison*
DC	*Direct Current*
DOE	*US Department of Energy*
EJ	*Environmental Justice*
EPA	*US Environmental Protection Agency*
ETC	*Electronic toll collection*
ETL	*Electronic toll lane*
FEJA	*Future Energy Jobs Act*
GHG	*Greenhouse Gas*
HAWT	*Horizontal Articulated Wind Turbine*
ICC	*Illinois Commercial Commission*
ICT	*Information and Communications Technology*
IDB	*Inter-American Development Bank*
IoT	*Internet of Things*

Abbreviations and Acronyms

IPCC	*Intergovernmental Panel on Climate Change*
IT	*Information Technology*
ITC	*Investment Tax Credit*
KW	*Kilowatts*
KWh	*Kilowatts-hours*
LAC	*Latin America and the Caribbean*
LCOE	*Levelized Cost of Energy*
LCOS	*Levelized Cost of Storage*
LEC	*Levelized energy cost*
LEO	*Low Earth Orbit*
LR	*Learning Rates*
M&E	*Monitoring and Evaluation*
Mbps	*Megabits per second*
MW	*Megawatt*
MWh	*Megawatt hours*
NGFW	*Next-Generation Firewall*
PPP	*Public-Private Partnership*
PV	*Photovoltaic*
RFP	*Request for Proposals*
RPS	*Renewable Portfolio Standard*
SDG	*Sustainable Development Goal*
SDG	*Sustainable Development Goal*

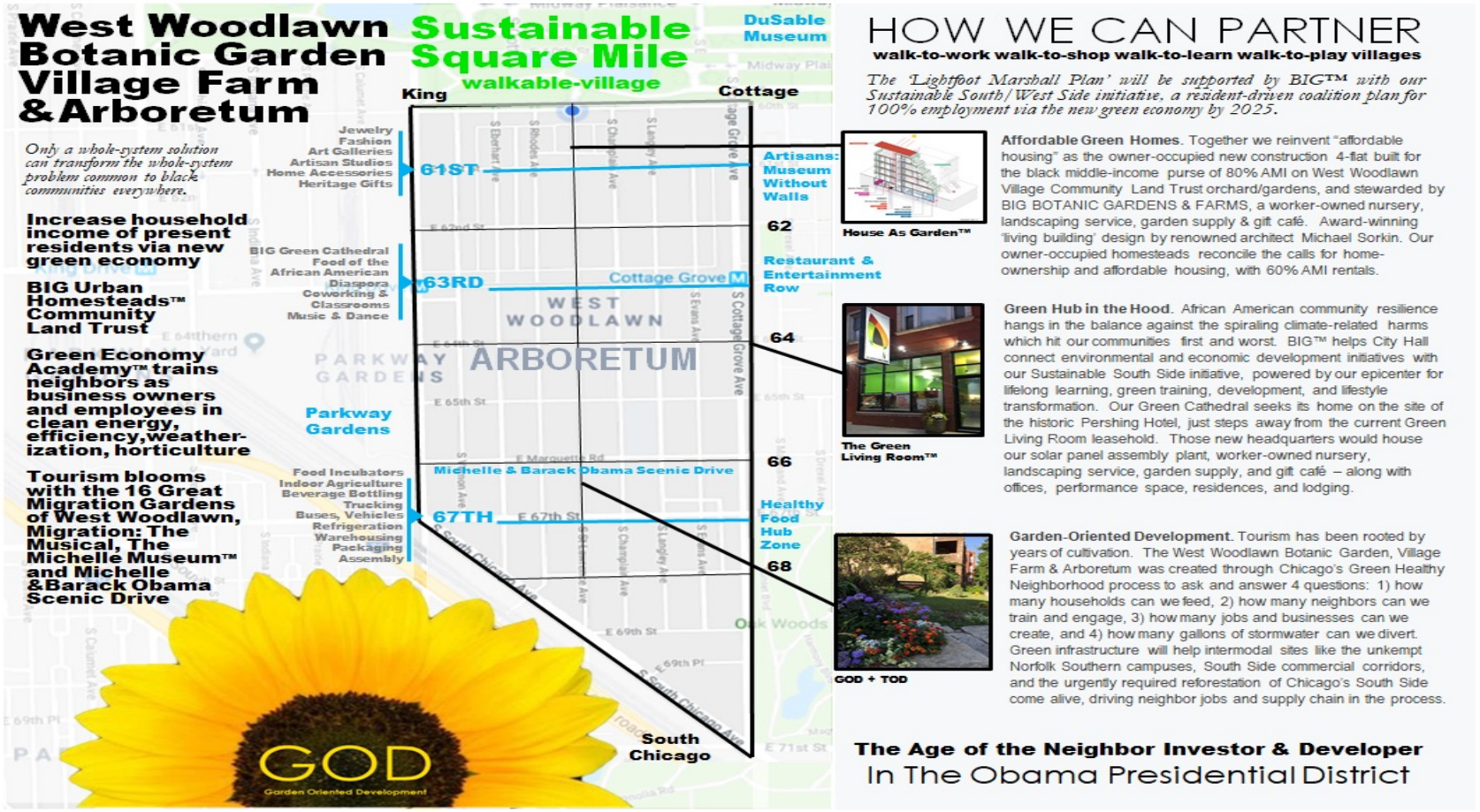
Abbreviations and Acronyms

SDG	*Sustainable Development Goal*
SMCD	*Smart Meter Connected Devices*
SREC	*Solar Renewable Energy Credit*
VAWT	*Vertical Articulated Wind Turbine*
XaaS	*Anything as a Service*
ZT	*Zero-Trust*
ZTA	*Zero-Trust Architecture*

Appendix II. BIG Sustainable Square Mile Vision

Sustainable Square Mile – A Vision

Our Evolving Sustainable Square Mile



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More About Blacks in Green™
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Thank You!