100% Renewable Energy Options Analysis

Presentation to Ann Arbor City Council

September 26, 2023

Overview of Work Session

- Scope of Analysis
- Findings from Public Survey
- Findings from Technical Energy Options Analysis
- Preliminary Thoughts
- Open Discussion

Scope of Analysis

Hired a team to:

- Create an energy options analysis that provides details about the various pathways the City could take to achieve its clean energy goals
- Conduct a traditional electric utility municipalization feasibility study
- Conduct a two-phase rate analysis for a municipal Sustainable Energy Utility

Scope of Analysis

Evaluate how well options align with:

- Achieving community-wide carbon neutrality by 2030
- The goal of powering the community with 100% renewable energy
- A^2ZERO's three principles of equity, sustainability, and transformation
- The City's adopted Energy Criteria and Principles
- The goal of achieving a just transition for workers in the fossil fuel industry

Public Survey

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STRATEGIC INSIGHTS

Ann Arbor's Energy Future

Survey of City of Ann Arbor Voters (Michigan)

Conducted 08/28/2023 through 09/05/2023

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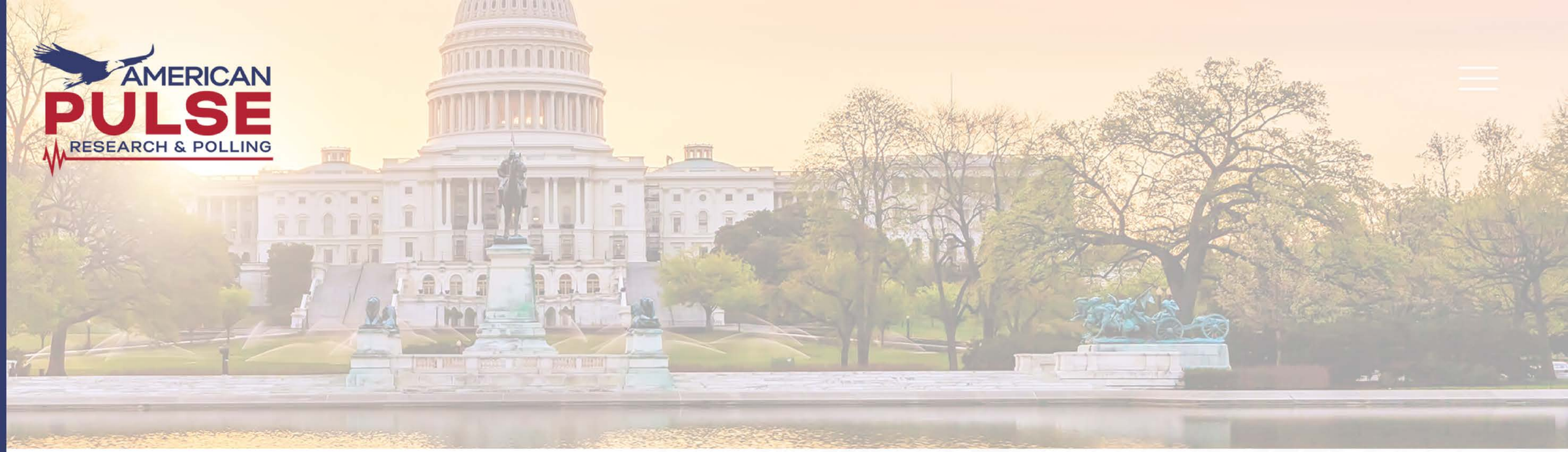
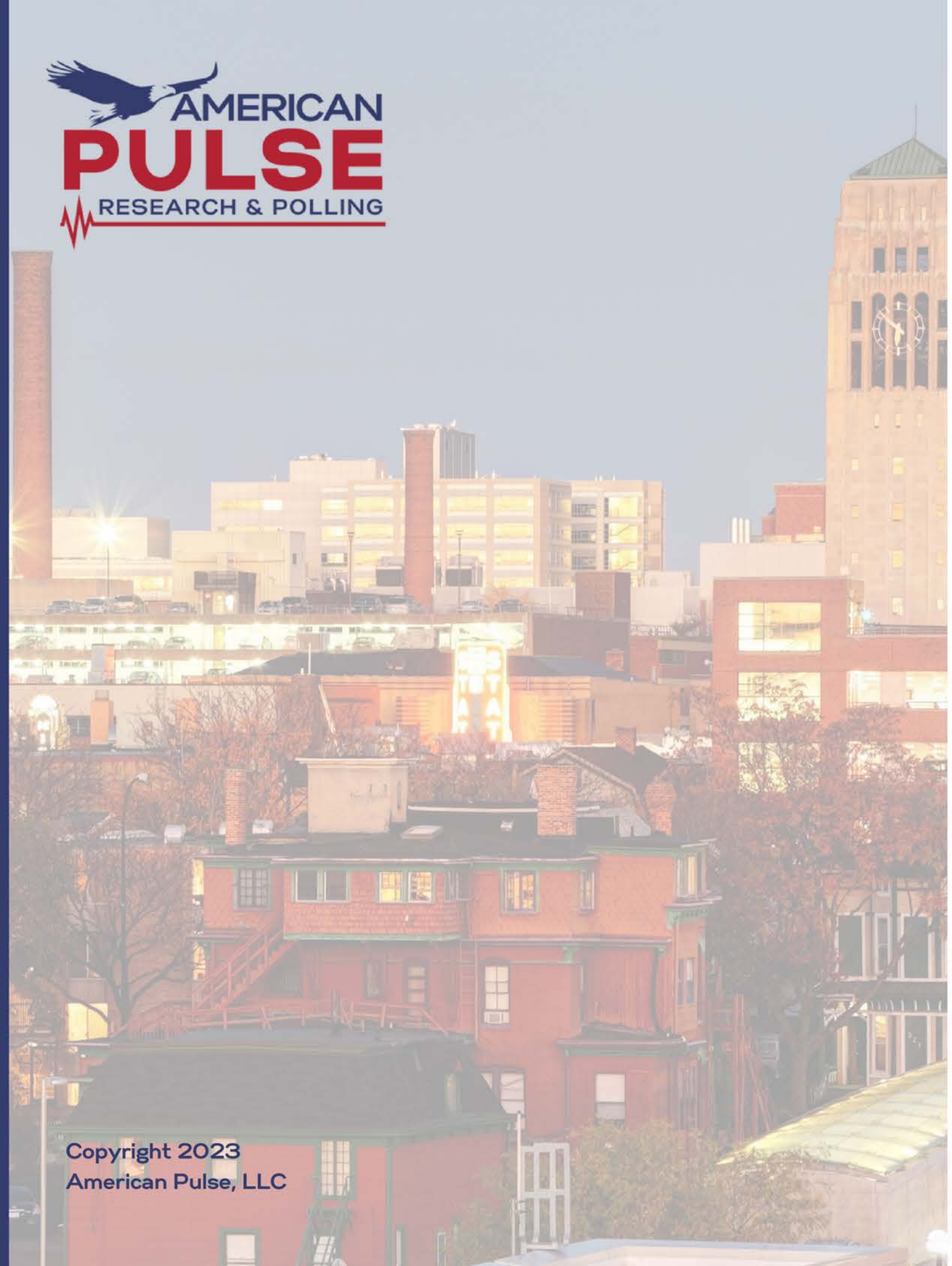


ABOUT AMERICAN PULSE, LLC

At American Pulse Research & Polling, our experienced survey research specialists use advanced methods to deliver reliable, accurate results. With decades of experience, we provide clients insightful data so they can make informed decisions and achieve success.



METHODOLOGY

Survey of Likely Voters in the City of Ann Arbor, Michigan

- Conducted 08/28/2023 through 09/05/2023
- N=**412**
- Margin of Error at 95% Confidence Interval: **+/- 4.8%**
- Survey Type: Hybrid / Multimodal
- Mode Counts:
  - Live Answer: 222
  - Online Panel: 97
  - Text-to-Web (TTW): 93
- Weighting Applied:
  - Age, Gender, Race/Ethnicity, and Zipcode

THE BIG PICTURE

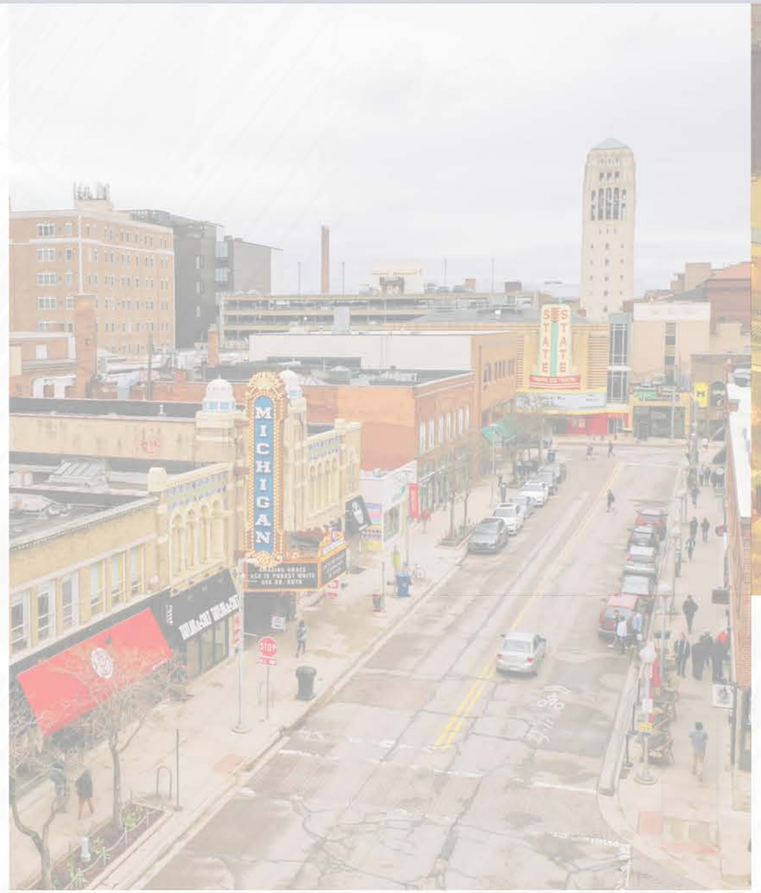
"That we don't lose energy and I don't want our property tax to pay for it"
— Retired Caucasian Female, 70+, Who Is A High School Grad, And Generally Supportive of the 2030 Goal

The Ann Arbor Energy Future survey offers insight into Ann Arbor voters':

- Perspectives on the City's 2030 Renewable Energy Goal
- Priorities for Energy Initiatives
- Responses to policy options in their own words

Overall, the survey reveals that while Ann Arbor residents are generally supportive of the City's 2030 renewable energy goal, they place a high priority on resilience, reliability, and cost.

Following are Big Picture strategic insights gleaned from this survey…

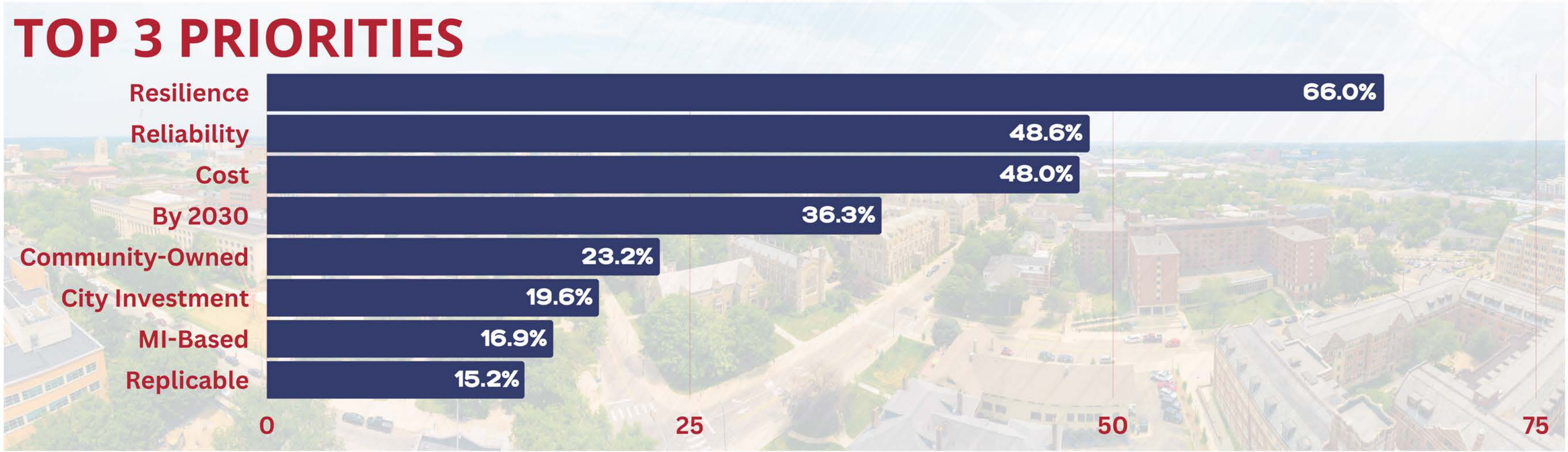


STRATEGIC INSIGHT #1

RESILIENCE, RELIABILITY, & COST ARE PARAMOUNT

Respondents make their priorities clear, emphasizing resilience, reliability, and cost.

Particularly noteworthy is that resilience ranks highest among all demographics, as indicated by 66% of respondents prioritizing this characteristic across all question types.



STRATEGIC INSIGHT #1 (continued)

RESILIENCE, RELIABILITY, & COST ARE PARAMOUNT

OVERALL RESIDENT PRIORITIES

Resilience

- Ranked #1 across all demographics
- 66% selected it as a top-3 priority
- ‘Being able to withstand a storm’ was Top Verbatim Answer

Reliability

- Overall #2 priority among residents
- 48.6% selected it as a top-3 priority
- "Withstanding routine disturbances" was #2 Verbatim Answer

Cost

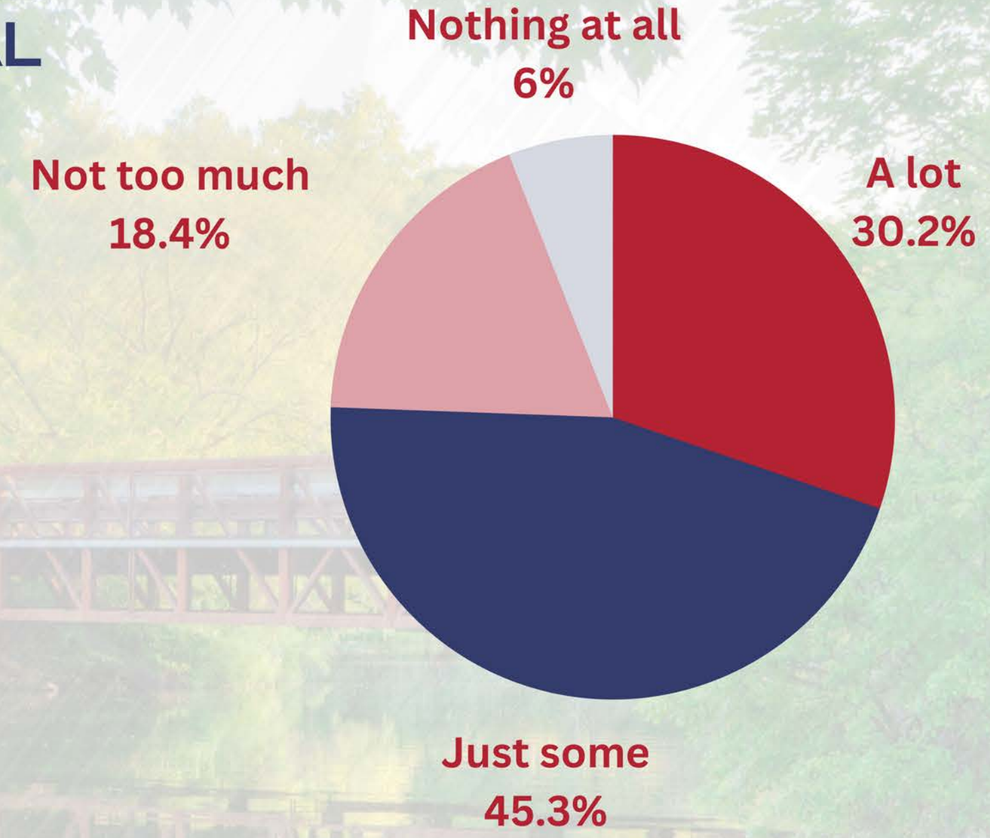
- Overall close #3 priority
- 48% selected it as a top-3 priority
- “Energy Cost” was #3 Verbatim Answer

STRATEGIC INSIGHT #2

THERE'S HIGH PUBLIC AWARENESS OF THE 100% RENEWABLE ENERGY GOAL

A robust 75.5% of respondents are aware of Ann Arbor's goal to transition to 100% renewable energy.

- **Only 6% reported having no knowledge of this initiative**
- **30.2% said they had heard "A lot" about it**



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STRATEGIC INSIGHT #3

RESIDENTS GENERALLY SUPPORT 2030 GOAL

WANT 100% RENEWABLE ENERGY BY 2030 OR EARLIER

Residents generally support the goal to achieve 100% Renewable Energy by 2030.

Before being given a timeline or reminded of the 2030 goal, nearly 60% of respondents favored achieving 100% renewable energy by 2030 or earlier.

- **59.8%** desire 100% renewable energy by 2030 or earlier
- **62.6%** find achieving the 2030 goal important

When asked specifically about the 2030 goal, 62.6% of respondents said it was important to achieve with ⅓ saying it was ‘Extremely Important’.

"As soon as possible. 2030 feels aggressively achievable."

— Caucasian Male, 30-39, with a Bachelor’s Degree,
Answer to #3 who says his #1 priority is Transition to Renewables

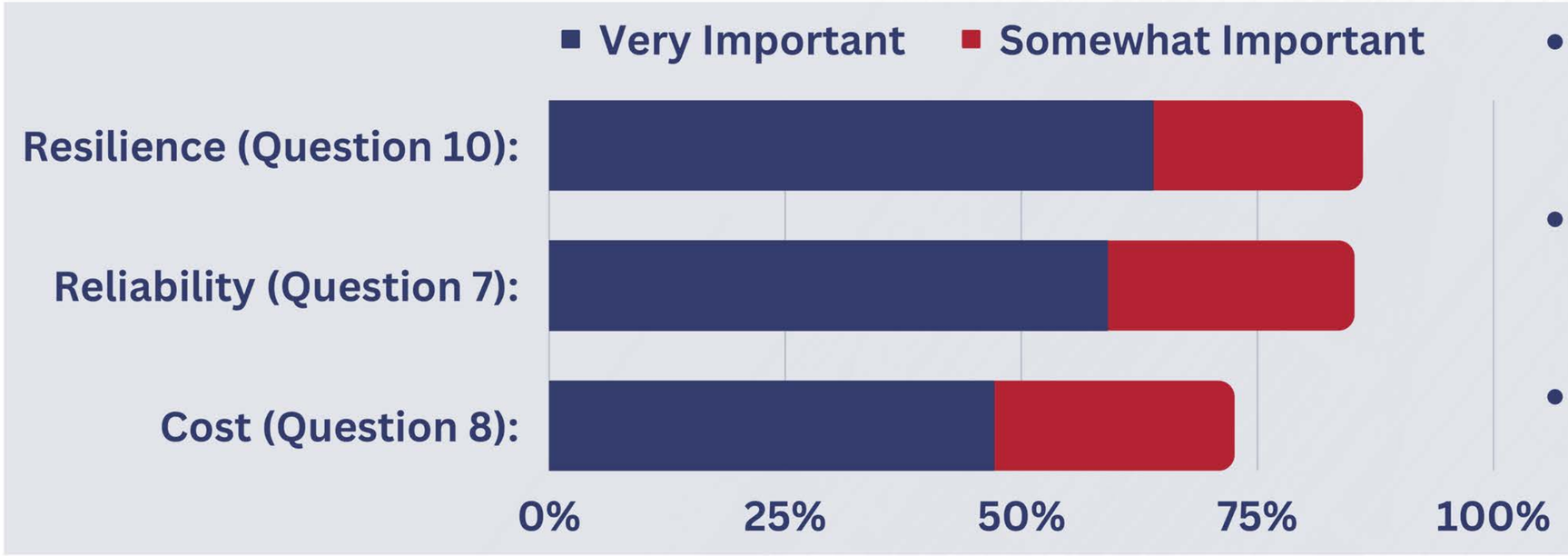
STRATEGIC INSIGHT #4

CONSENSUS ON ALL CRITERIA, BUT INTENSITY FAVORS THREE

Most respondents find all energy options important, but resilience, reliability, and cost stand out as top priorities. We measure the "intensity" of these priorities by the percentage of people who rate them as "very important."

Any option rated "very important" by over 40% of respondents indicates strong conviction or emotional investment in the issue.

Intensity reveals not just the important issues but also the strength of respondents' feelings about them.



- **RESILIENCE (QUESTION 10):**
  - **86.1% Total Important**
  - **63.9% Very Important**
- **RELIABILITY (QUESTION 7):**
  - **85.2% Total Important**
  - **59.1% Very Important**
- **COST (QUESTION 8):**
  - **72.5% Total Important**
  - **47.1% Very Important**

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"Just keep it affordable – the cost of living is quite high in the city."
— African-American Male, 40-49, who makes over $150k,
Answer to #14 who says his #1 priority is Resilience

STRATEGIC INSIGHT #5

IGNORE COST & AFFORDABILITY AT YOUR OWN PERIL

Ignoring concerns about cost and affordability is not an option with residents.

Our data indicate that, especially for low-income groups, cost is a major concern, almost equalling that of resilience and reliability

- The **Prioritization Question Series (Questions 12, 13, and 14)** at the end of the survey shows that cost is just as important or more important than reliability and even rivals resilience among some demographic groups.
- There is an undercurrent of respondents looking for and suggesting some kind of assistance for themselves or others to move to renewable energy sources.

Those Making Under $75k

Top 3 Concerns

- **Resilience 56.3%**
- **Cost 50.3%**
- **Reliability 42.6%**

Non-White Population

Top 3 Concerns

- **Resilience 64.0%**
- **Cost 50.8%**
- **Reliability 43.9%**

Those Under 40

Top 3 Concerns

- **Resilience 66.4%**
- **Cost 51.8%**
- **Reliability 49.8%**

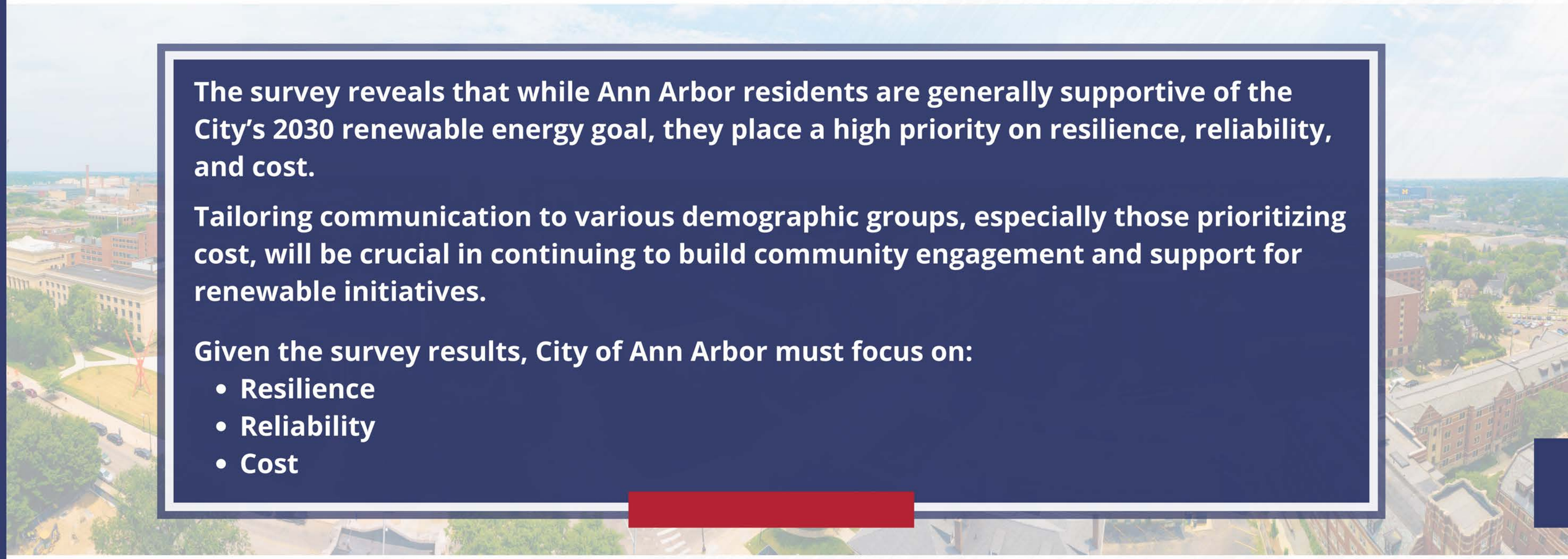
RESIDENTS IN THEIR OWN WORDS

We took the opportunity to ask several Open-Ended Questions and record residents' Verbatim Responses to better understand their key concerns, priorities, and opinions. Here are some representative comments:

- **MAINTAINING POWER DURING AND AFTER AN EXTREME EVENT: (66.0%)**
  - **"Power remains after big events"**
  - **"Pushing toward responsive with weather related events when the power goes out"**
  - **"Anything related to resiliency would be my priority"**
- **IMPROVING RELIABILITY DURING ROUTINE DISTURBANCES: (48.6%)**
  - **"Allowing for continued power during disturbances"**
  - **"Stable power access"**
  - **"The outages are bad so just having power"**
- **ENSURING ENERGY COSTS ARE AT LEAST THE SAME COST AS TODAY: (48.0%)**
  - **"I think keeping costs low, or the same as what we pay now"**
  - **"Everything making sure people can afford energy"**
  - **"I hope that we still have the same cost"**

THE BOTTOMLINE

FOCUSING ON RESILIENCE, RELIABILITY, & COST ARE KEY TO THE SUCCESS OF THE 2030 GOAL



The survey reveals that while Ann Arbor residents are generally supportive of the City's 2030 renewable energy goal, they place a high priority on resilience, reliability, and cost.

Tailoring communication to various demographic groups, especially those prioritizing cost, will be crucial in continuing to build community engagement and support for renewable initiatives.

Given the survey results, City of Ann Arbor must focus on:

- Resilience
- Reliability
- Cost

THANK YOU

We would like to extend our heartfelt gratitude and thanks to the City of Ann Arbor for granting us the opportunity to conduct this crucial survey.

Your partnership and support have been invaluable in gaining insights into the perspectives and priorities of the residents of Ann Arbor.

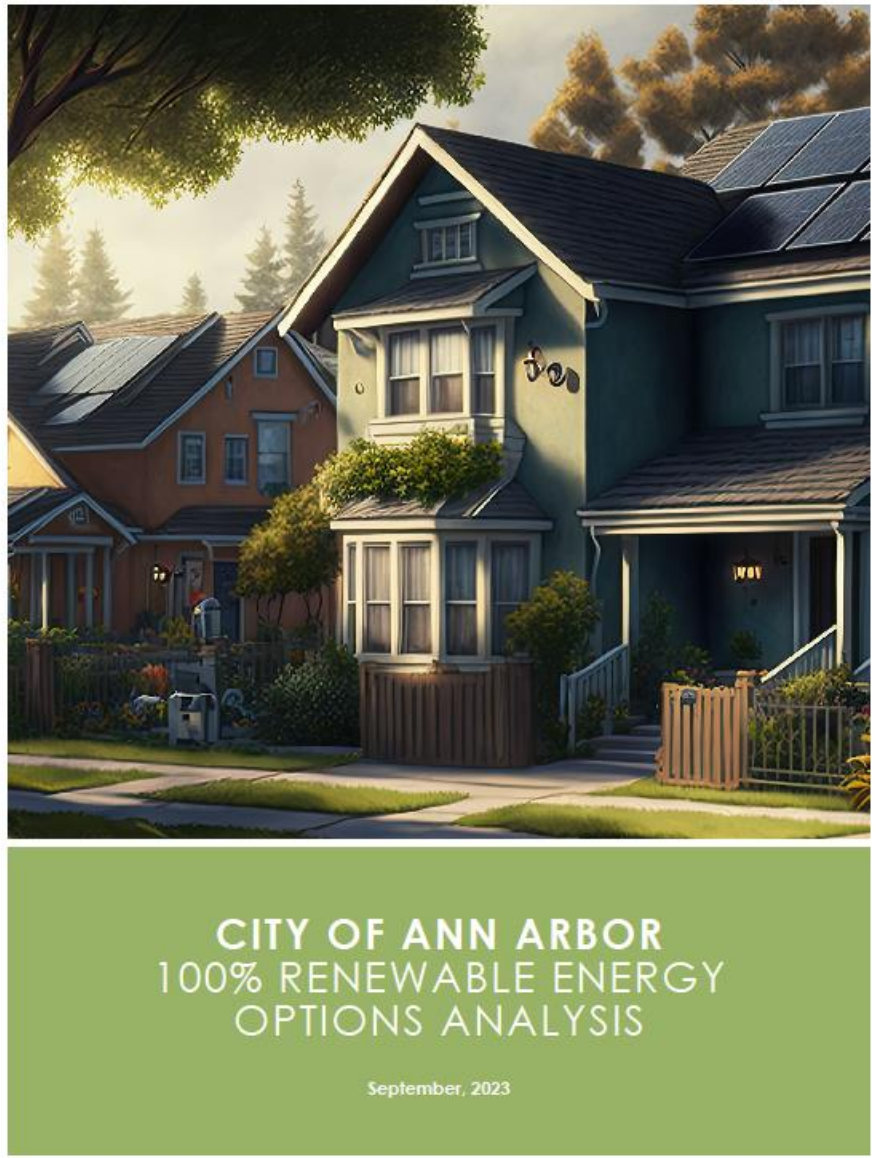
Your willingness to collaborate has allowed us to uncover valuable insights that will undoubtedly inform and guide the city's future.

We are truly grateful for the opportunity to contribute to this important cause and look forward to continuing our collaborative efforts in creating a stronger future for the community.

Thank you for entrusting us with this endeavor.

Technical Energy Options Report

100% Renewable Energy Options Analysis Technical Report



Project Team

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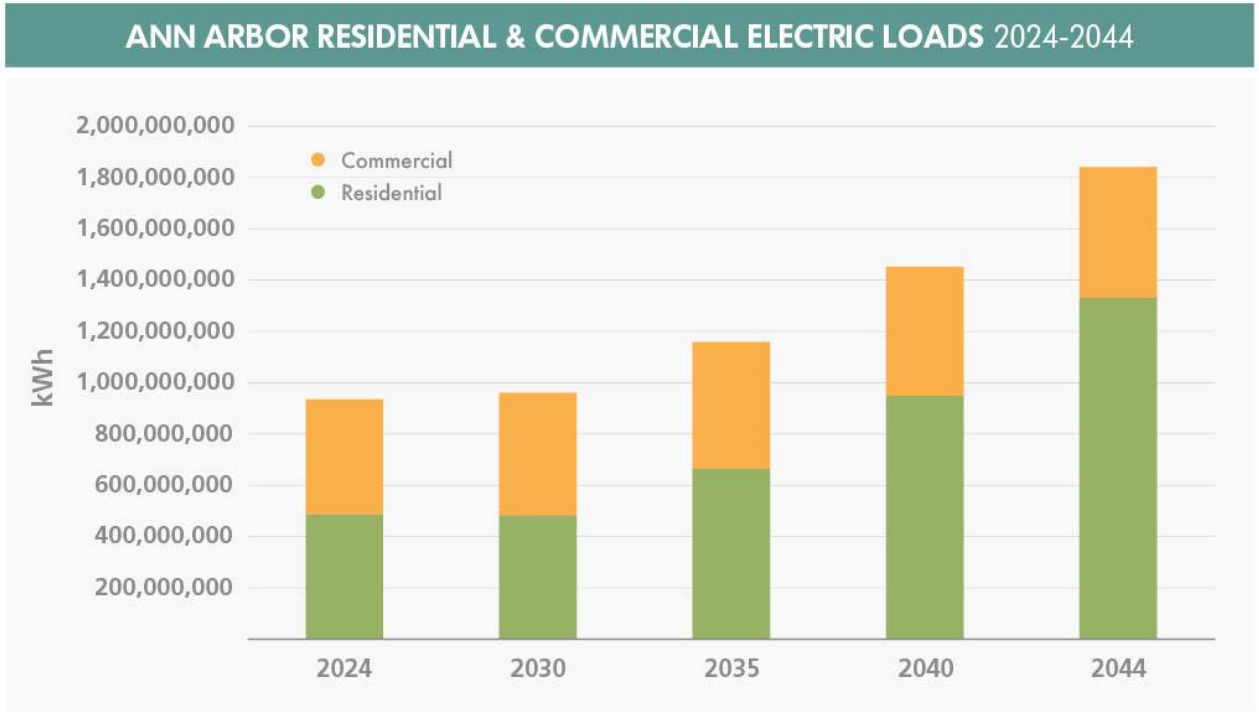
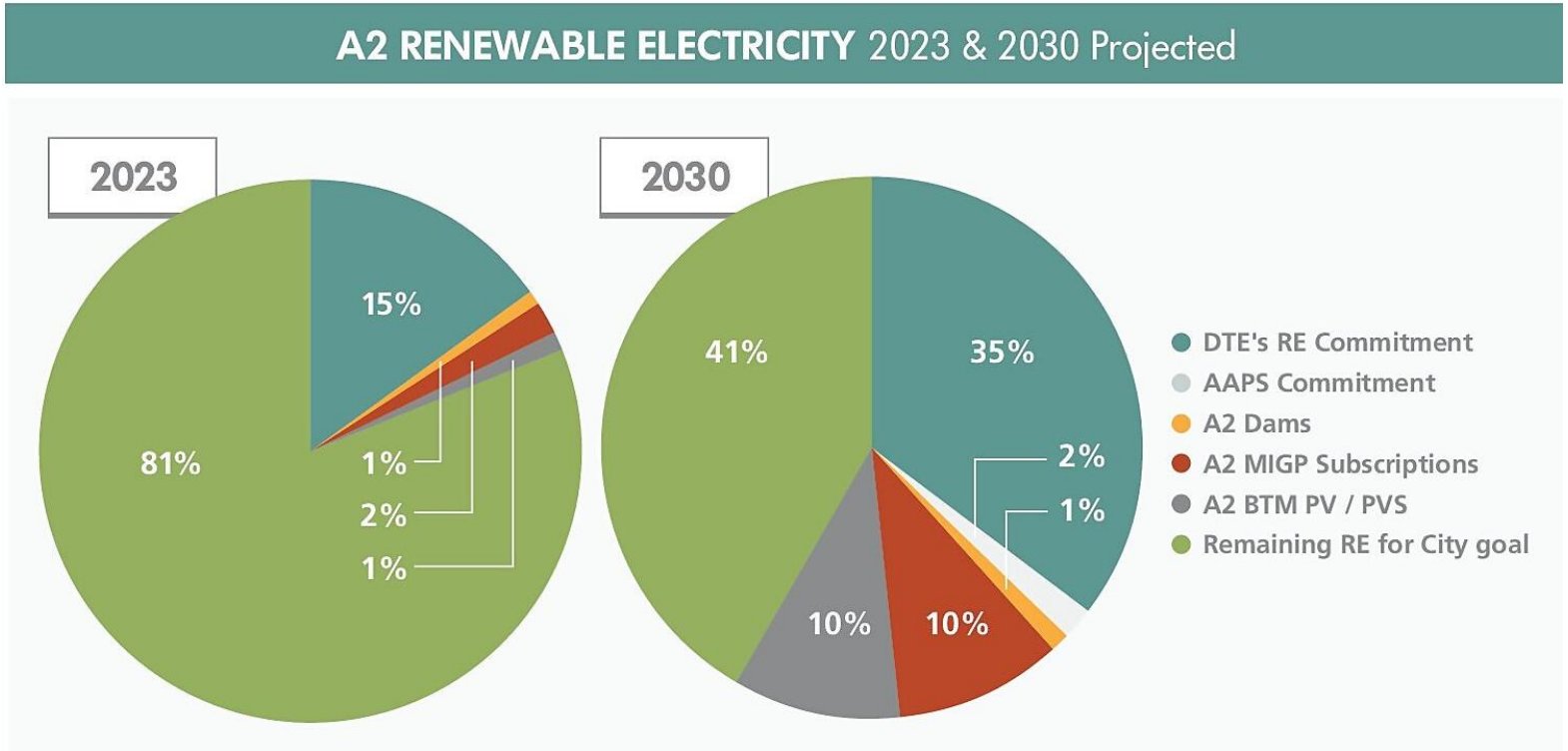
Ann Arbor Energy Profile



- Near future electric loads will change slowly with electrification growth offset by efficiency improvements.
- Longer-term electric loads will grow significantly due to electrification of transportation and buildings.
- Seasonal patterns will shift from summer to winter peaks

Ann Arbor Energy Profile



- Renewable share of Ann Arbor's power supply will increase due to DTE plans and current Ann Arbor initiatives, but will not reach 100%, without further interventions.

Energy Options

- We evaluated numerous other options that we ruled out as unacceptable or impractical for various reasons.
- Options reviewed include:
  - Behind the Meter Solar or Solar + Storage
  - Community Solar
  - Power Purchase Agreements (Traditional and Virtual)
  - National Renewable Energy Credits
  - Virtual Power Reduction Agreements
  - DTE Mi Green Power Program

Energy Options

- To summarize options, we scored each option on each of the A²ZERO Energy Criteria and Principles.

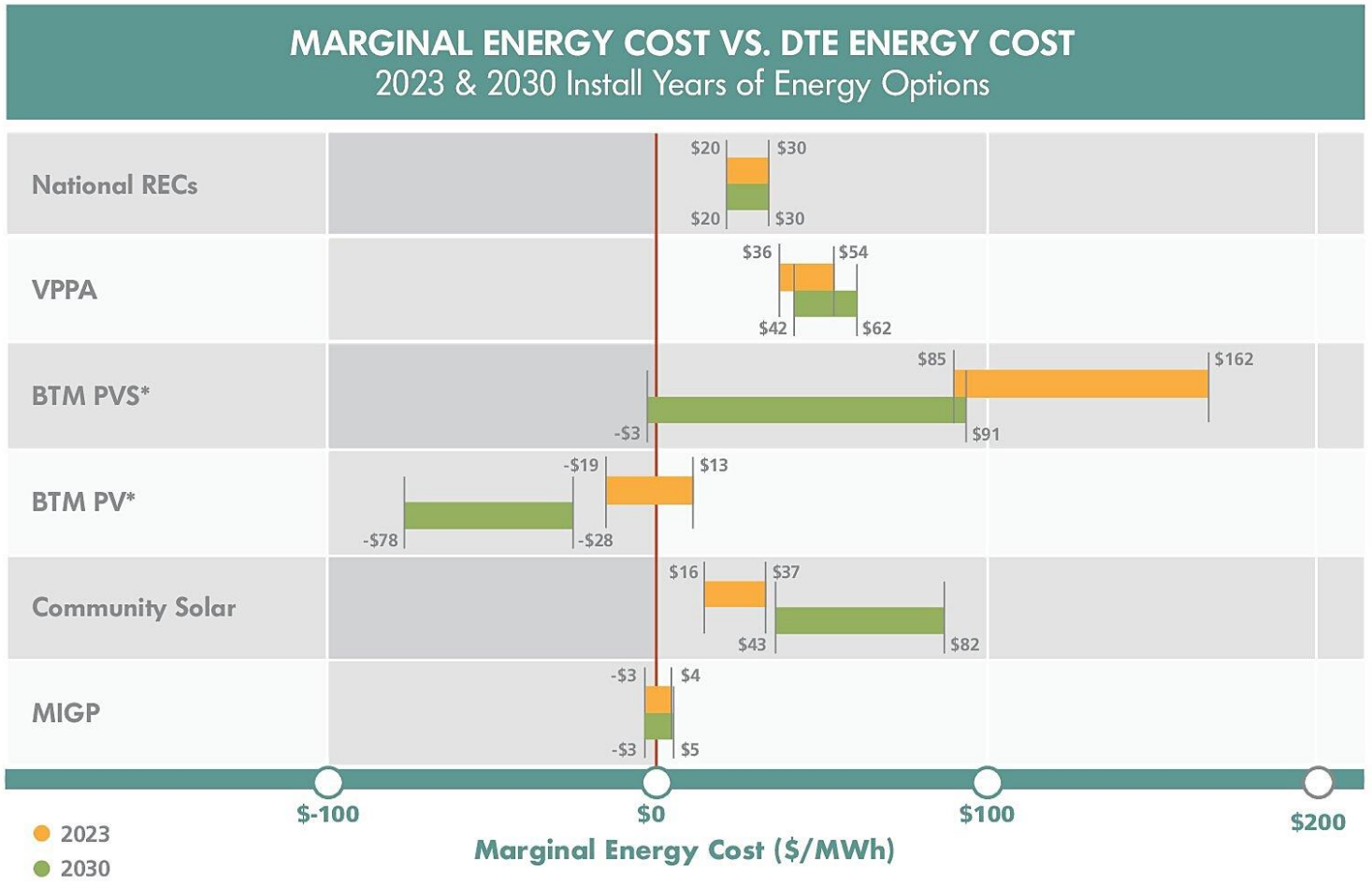
ALIGNMENT OF ENERGY OPTIONS with A²ZERO Energy Criteria

CRITERION	MI GREEN POWER	(V)PPAs	NATIONAL RECs	COMMUNITY SOLAR	BTM PV& PVS	VPRA
Reduce GHG	YES	YES	YES	YES	YES	YES
Additionality	YES	YES	YES	YES	YES	YES
Equity & Justice	GOOD	FAIR	POOR	POOR	FAIR	EXCELLENT

ALIGNMENT OF ENERGY OPTIONS with A²ZERO Energy Principles

PRINCIPLE	MI GREEN POWER	(V)PPAs	NATIONAL RECS	COMMUNITY SOLAR	BTM PV& PVS	VPRA
Enhance Resilience	POOR	POOR	POOR	FAIR	GOOD	FAIR
Start Local	FAIR	FAIR	POOR	GOOD	EXCELLENT	GOOD
Speed	FAIR	EXCELLENT	EXCELLENT	POOR	GOOD	POOR
Scalable & Transferable	GOOD	EXCELLENT	EXCELLENT	EXCELLENT	EXCELLENT	FAIR
Cost Effective	EXCELLENT	POOR	POOR	POOR	EXCELLENT	POOR

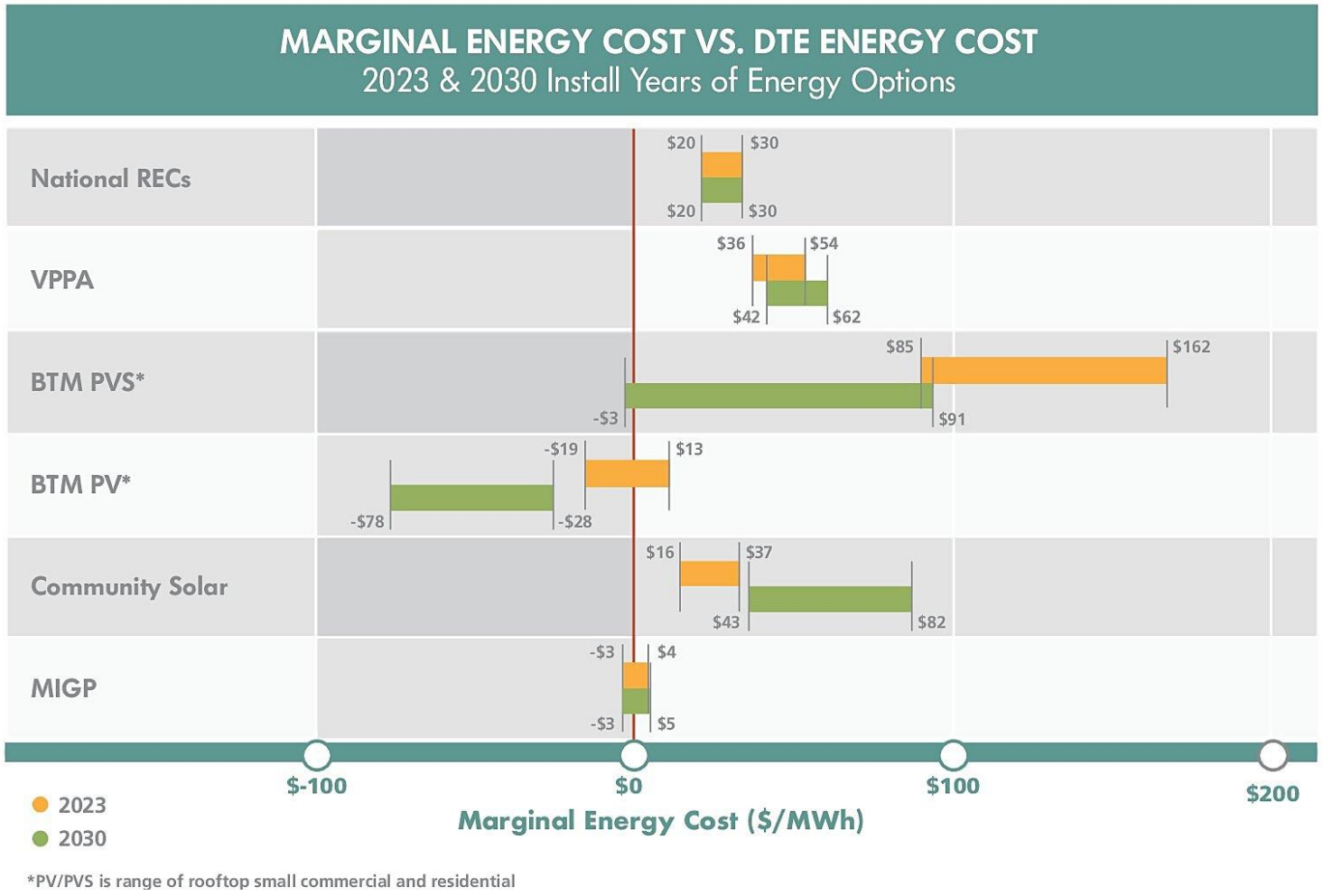
Energy Options



*PV/PVS is range of rooftop small commercial and residential

- We assessed temporal availability of various options.
- Some options only become available by creating a municipal utility
- Some options become unavailable upon creating a municipal utility

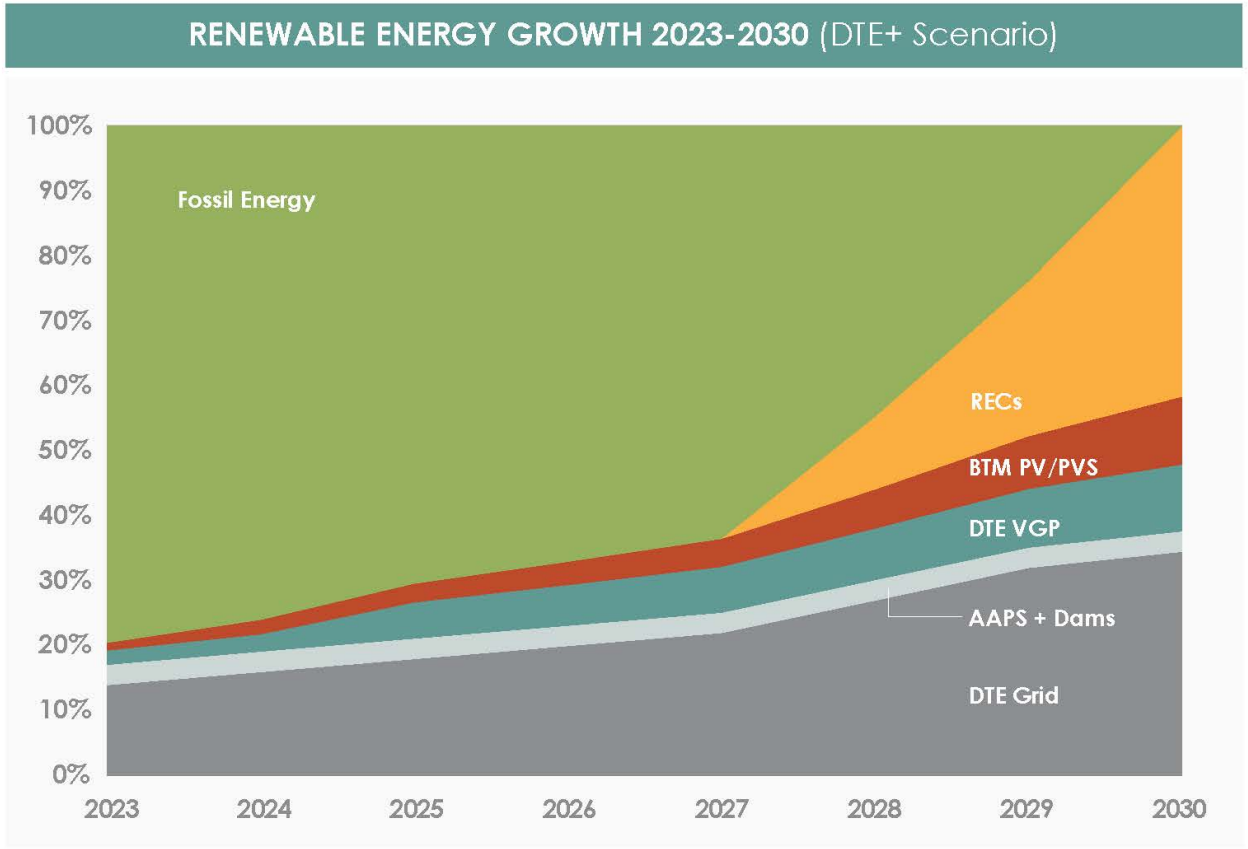
Energy Options



*PV/PVS is range of rooftop small commercial and residential

- Costs of each energy option were projected from various perspectives. Incremental costs to the assumed payer are shown here based on 2023 and projected 2030 conditions.

Renewable Energy Scenarios



- Feasible 100% renewable resource portfolios were developed and evaluated for phase-in requirements and costs.

Renewable Energy Scenarios

2030 100% RE Three Energy Options Scenarios			
RE Option Load Share	DTE+	SEU & DTE+	SEU & DTE+ & Community Solar
DTE Grid, AAPS, Dams	38%	38%	38%
DTE MIGP	9%	9%	9%
DTE MIGP (City)	2%	2%	2%
BTM PV / PVS	10%	10%	10%
Additional BTM (SEU)	0%	8%	8%
Community Solar	0%	0%	6%
RECs (VPPA, National RECs)	42%	34%	27%
Total	100%	100%	100%

- In the context of continuing service from DTE, creating an SEU and/or community solar materially changes the potential 100% renewable energy portfolio.

Renewable Energy Scenarios

City Costs for Three Energy Options Scenarios			
City Cost Categories ($000s)	DTE+	SEU & DTE+	SEU & DTE+ & Community Solar
2030 CITY COSTS			
City Costs	$17,890	$24,679	$22,431
Recoverable Costs	$2,327	$12,145	$12,145
Non-Recoverable Costs	$15,563	$12,534	$10,285
2023-2029 CUMULATIVE CITY COSTS			
City Costs	$17,728	$49,098	$48,021
Recoverable Costs	$5,745	$38,787	$38,787
Non-Recoverable Costs	$11,983	$10,311	$9,234

- Different portfolios under different institutional arrangements have different city financial requirements.

Utility Structure Options

- DTE: Ann Arbor customers continue to take service from DTE.
- SEU: Ann Arbor creates a supplemental Sustainable Energy Utility to accelerate solar development within the City.
- Ann Arbor Municipal Electric Utility (MEU): Ann Arbor takes possession of most DTE electrical distribution within the City and becomes the load-serving entity for all customers within the City except University of Michigan.

SEU Projections and Rates

SEU DEPLOYMENT Three Example Scenarios			
Subscriber Count*	1,250 Subscribers	6,250 Subscribers	12,500 Subscribers
Portfolio Capacity (MW)	10	50	100
PV-Only Capacity (MW)	10	25	50
PVS Capacity (MW)	–	25	50
Overnight Cost ($000)	$ 24,900	$ 151,900	$358,980
1st Finance Structure	100% Debt	100% Debt	10-yr PPA (TPO)
2nd Finance Structure	–	–	Year 10 – 100% Debt
SEU Debt Obligations ($000)	$ 24,900	$ 151,900	$233,000
Deployment Year(s)	2024-2027	2027-2030	2025**
PV-Only Starting PPA Rate	$0.125/kWh	$0.135/kWh	$0.128/kWh
(i) PVS Starting PPA Rate	–	$0.258/kWh	$0.246/kWh
Or (ii) PVS Capacity Payments	–	$82/month	$82/month

* The subscriber count is based on a generalized 8 kW-dc per subscriber. The subscriber count would be higher with residential subscribers that have smaller loads or lower with commercial subscribers' that have larger loads. In addition to the information in the above table, our analysis finds that the IRA expands and amplifies the economic impact of the state policies we modeled.

** 2025 is reference pricing year and deployment would require many years.

- To succeed, the SEU must be cost-competitive with private solar leases. It can be.
- Storage cannot be paid for by avoided energy costs, but provides the customer resilience value
- City financing requirements for the SEU are substantial and can be debt or provided by an equity partner solar developer.

Municipal Utility

YEAR 1 MEU FINANCIAL OUTCOMES Low & High End Estimates		
Item	Low End Estimate	High End Estimate
Total Annual Sales (kWh)	939,751,000	939,751,000
Ann Arbor MEU Average Rate ($/kWh)	$0.1585	$0.2417
Total Ann Arbor MEU Revenue	$148,993,000	$227,158,000
MEU Power Supply Costs ($)	$78,000,000	$78,000,000
DTE Average Rate in Ann Arbor ($/kWh)	$0.1748	$0.1748
Total DTE Revenue in Ann Arbor	$164,269,000	$164,269,000
DTE in Ann Arbor Power Supply Costs ($)	$85,000,000	$85,000,000
Difference between Ann Arbor MEU and DTE Revenue (Savings)	($15,276,000)	$62,890,000
% Difference	(9%)	38%

- Phase 1 financial analysis of a potential MEU is uncertain, primarily because the legal standard for compensating DTE will be litigated with few precedents and competing theories.

Municipal Utility

YEAR 20 MEU FINANCIAL OUTCOMES Low & High End Estimates		
Item	Low End Estimate	High End Estimate
Total Annual Sales (kWh)	1,745,666,000	1,745,666,000
Ann Arbor MEU Average Rate ($/kWh)	$0.1921	$0.2345
Total Ann Arbor MEU Revenue	$354,068,000	$432,234,000
MEU Power Supply Costs ($)	$215,000,000	$215,000,000
DTE Average Rate in Ann Arbor ($/kWh)	$0.2261	$0.2261
Total DTE Revenue in Ann Arbor	$416,769,000	$416,769,000
DTE in Ann Arbor Power Supply Costs ($)	$133,000,000	$133,000,000
Difference between Ann Arbor MEU and DTE Revenue (Savings)	($62,701,000)	$15,464,000
% Difference	(15%)	4%

- Over time, as financed payments to DTE are amortized, the municipal rates become more favorable. But, these projections do not include investments that Ann Arbor could choose to make to increase reliability.

Evaluation of Structural Options

ALIGNMENT OF ORGANIZATIONAL STRUCTURES with A²ZERO Energy Criteria

CRITERION	DTE	SEU	MEU (>2030)	
Reduce GHG	YES	YES	YES	
Additionality	YES	YES	YES	
Equity & Justice	GOOD	EXCELLENT	POOR	FAIR

ALIGNMENT OF ORGANIZATIONAL STRUCTURES with A²ZERO Energy Principles

PRINCIPLE	DTE	SEU	MEU (>2030)	
Enhance Resilience	POOR	FAIR	POOR	
Start Local	FAIR	EXCELLENT	FAIR	
Speed	GOOD	FAIR	POOR	
Scalable & Transferable	EXCELLENT	GOOD	FAIR	
Cost Effective	FAIR	EXCELLENT	POOR	FAIR

- Speed and transferability of renewable acquisition favor working with DTE.
- SEU brings A²ZERO values to the portfolio that are otherwise limited.
- MEU is likely to be very slow and not transferable. Other A²ZERO criteria are determined by MEU policies, but could be constrained if MEU is expensive.

Recommendations

- Fulfill 100% renewable electricity by “topping off” with national renewable energy credits
- Pursue SEU to accelerate solar development and resilience within the City of Ann Arbor
- Competitively procure high-quality RECs through virtual PPAs, which can include DTE VGP programs.
- Decouple consideration of municipalization from pursuit of 100% renewable electricity, but if interested in pursuing municipalization, acquire renewables that are convertible to municipal utility use.

Next Steps

- RFPs for Renewable Energy Credits
  - Initiate in 2024 for high-quality RECs
  - Initiate in 2028 for national RECs
- Decide whether to pursue Sustainable Energy Utility
  - Decide financial approach
  - Hire utility manager
  - Create Sustainable Energy Utility
- Decide whether to pursue municipalization
  - Phase 2 Study
  - Retain law firm

Preliminary Thoughts

Preliminary Thoughts

General

- Staff need more time to process results and associated models
- Our goals are achievable and all utility structures present pathways to **long-term** success
- Behind the meter solar and storage needs to be expanded
- Resilience, reliability, and costs should be centered in decision making

Specific

- Study did not look at costs to improve reliability – if considering an MEU, must understand those costs
- Rate-basing energy storage is complicated. Consider alternative ways to deploy energy storage
- Consider “sunshot” initiative to deploy significant quantities of behind the meter solar and storage … fast
- Significant challenges, uncertainties, and risks with MEU

Discussion