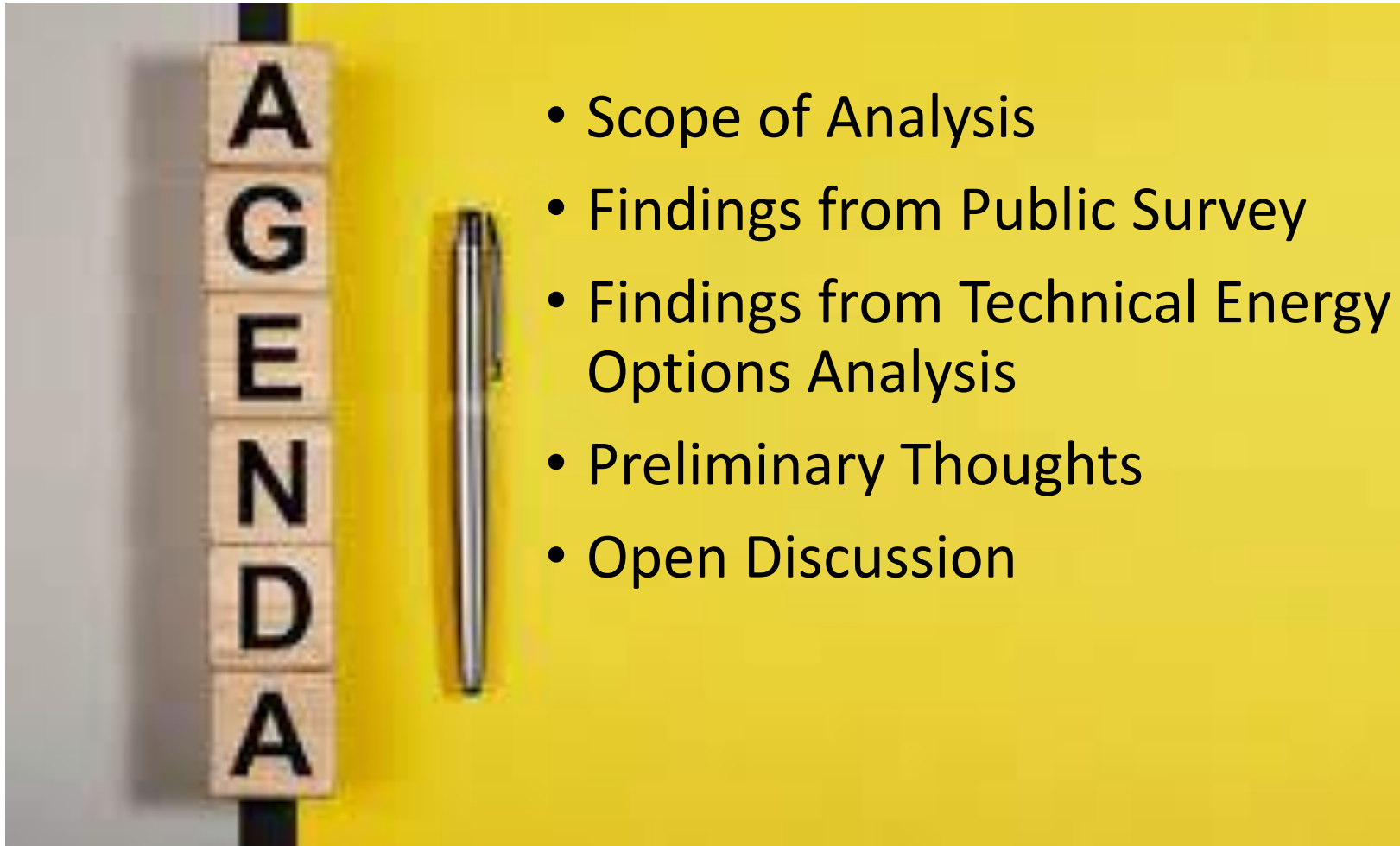


100% Renewable Energy Options Analysis

Presentation to Ann Arbor City Council

September 26, 2023

Overview of Work Session



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
- A²ZERO'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

Technical Energy Options Report

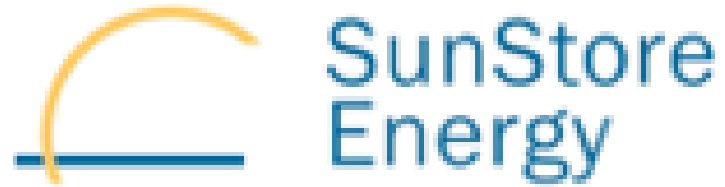
100% Renewable Energy Options Analysis Technical Report



CITY OF ANN ARBOR
100% RENEWABLE ENERGY
OPTIONS ANALYSIS

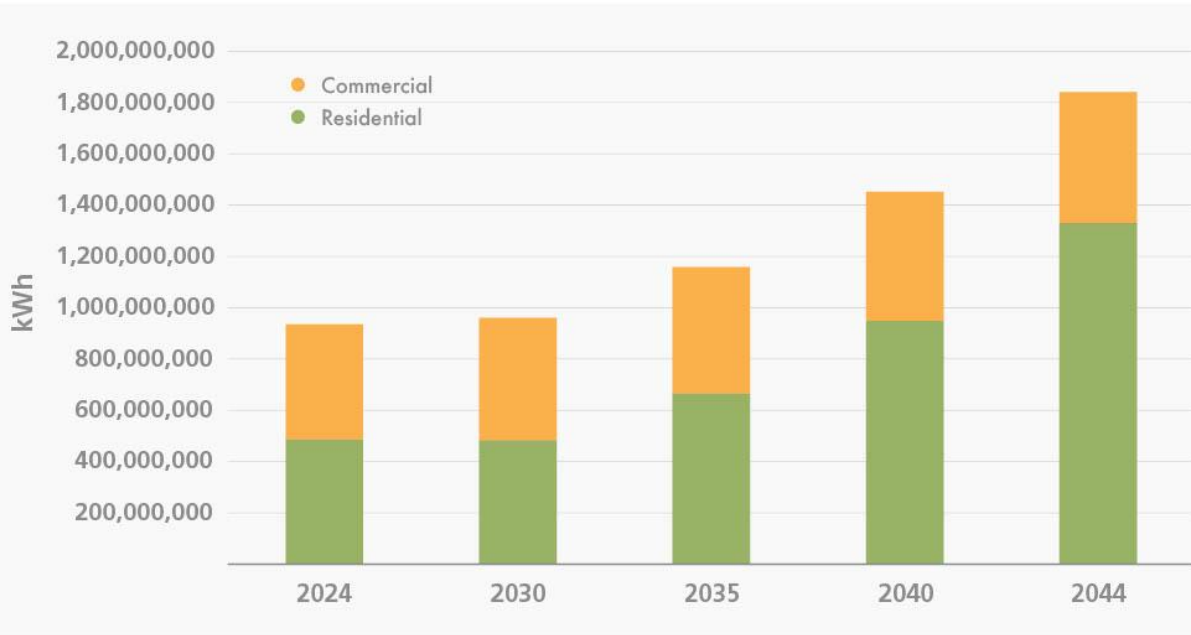
September, 2023

Project Team



Ann Arbor Energy Profile

ANN ARBOR RESIDENTIAL & COMMERCIAL ELECTRIC LOADS 2024-2044

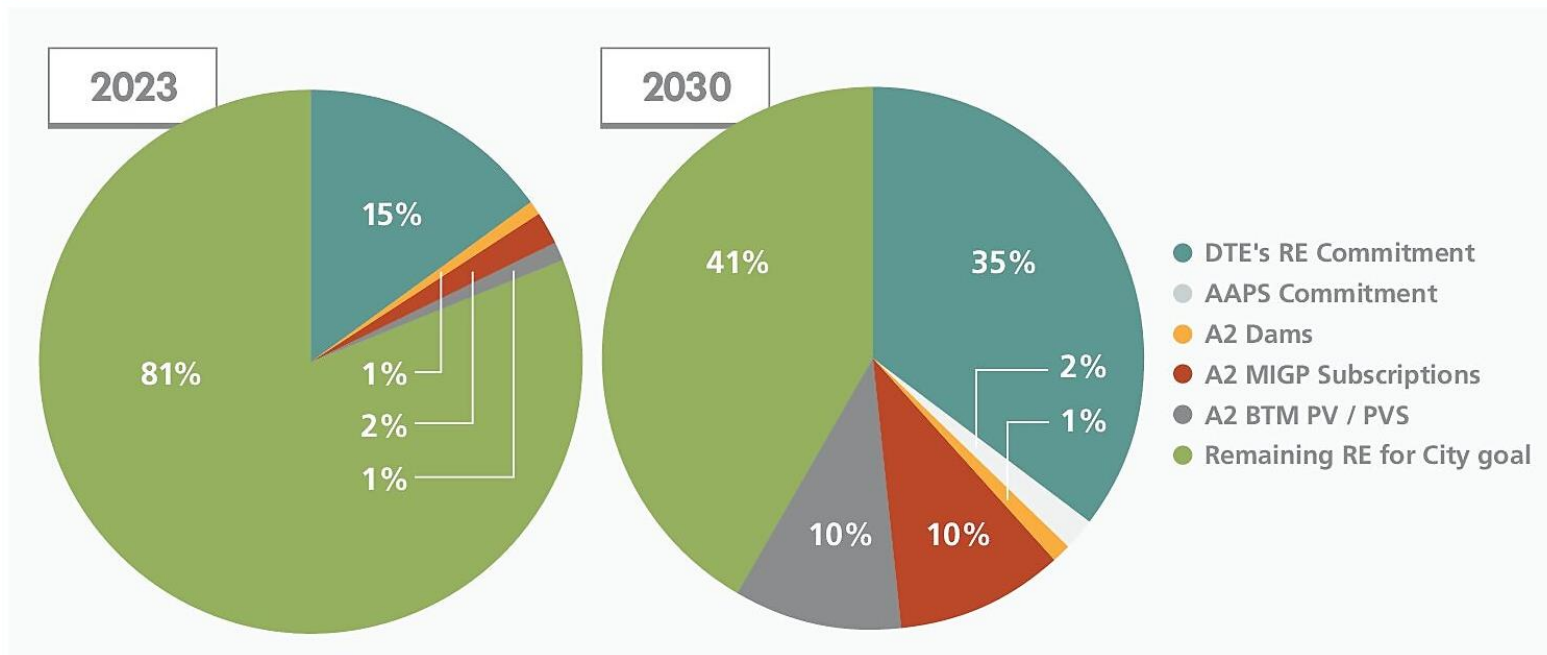


- Near future electric loads will change slowly with electrification growth offset by efficiency improvements.
- Longer-term electric loads will grow significantly due to electrification of transportation and buildings.
- Seasonal patterns will shift from summer to winter peaks

Ann Arbor Energy Profile

A2 RENEWABLE ELECTRICITY 2023 & 2030 Projected

- 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

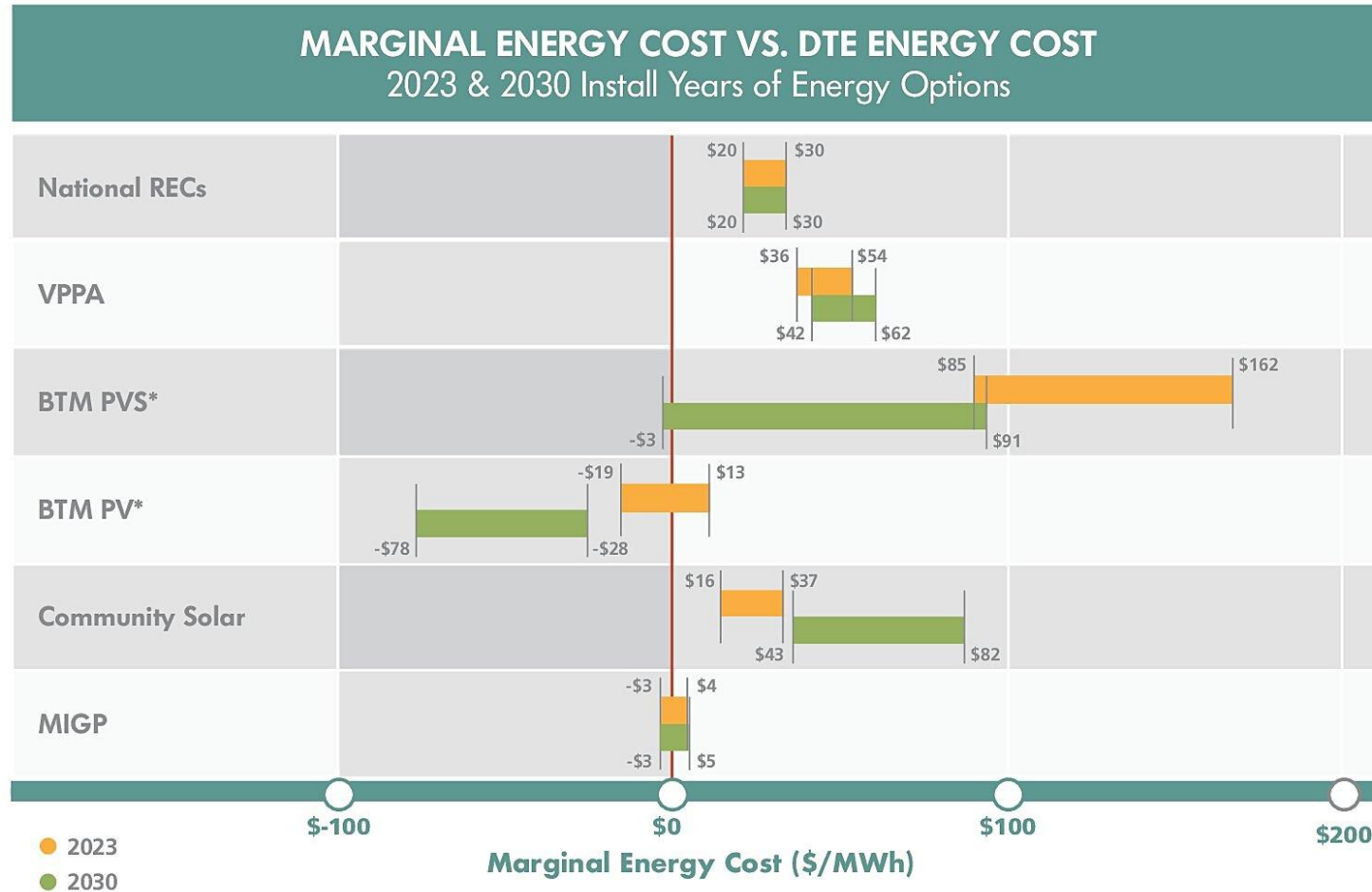
Energy Options

- To summarize options, we scored each on each of the A²ZERO criteria and principles.

ALIGNMENT OF ENERGY OPTIONS with A ² ZERO 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 A ² ZERO 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

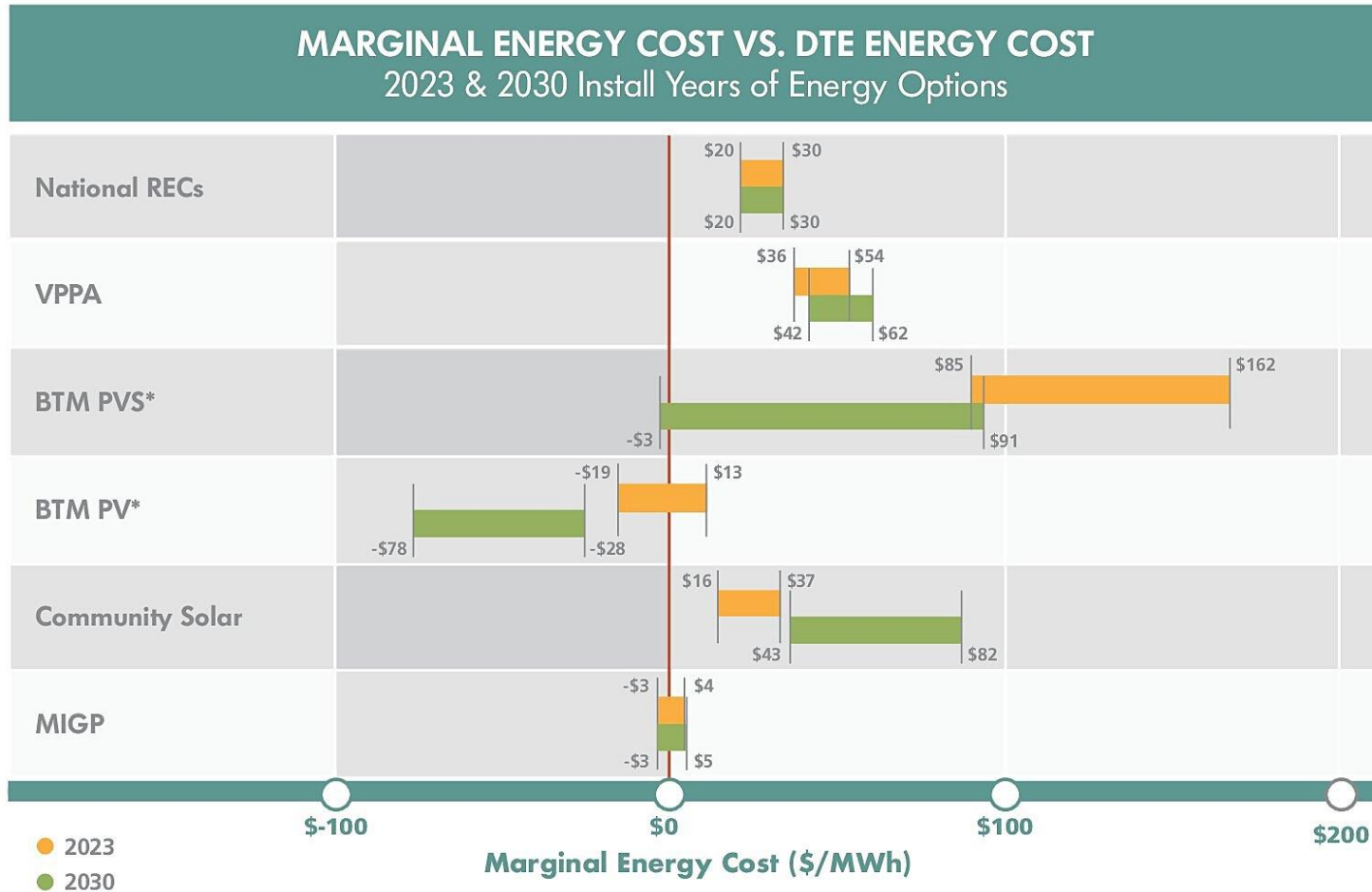
Energy Options



*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

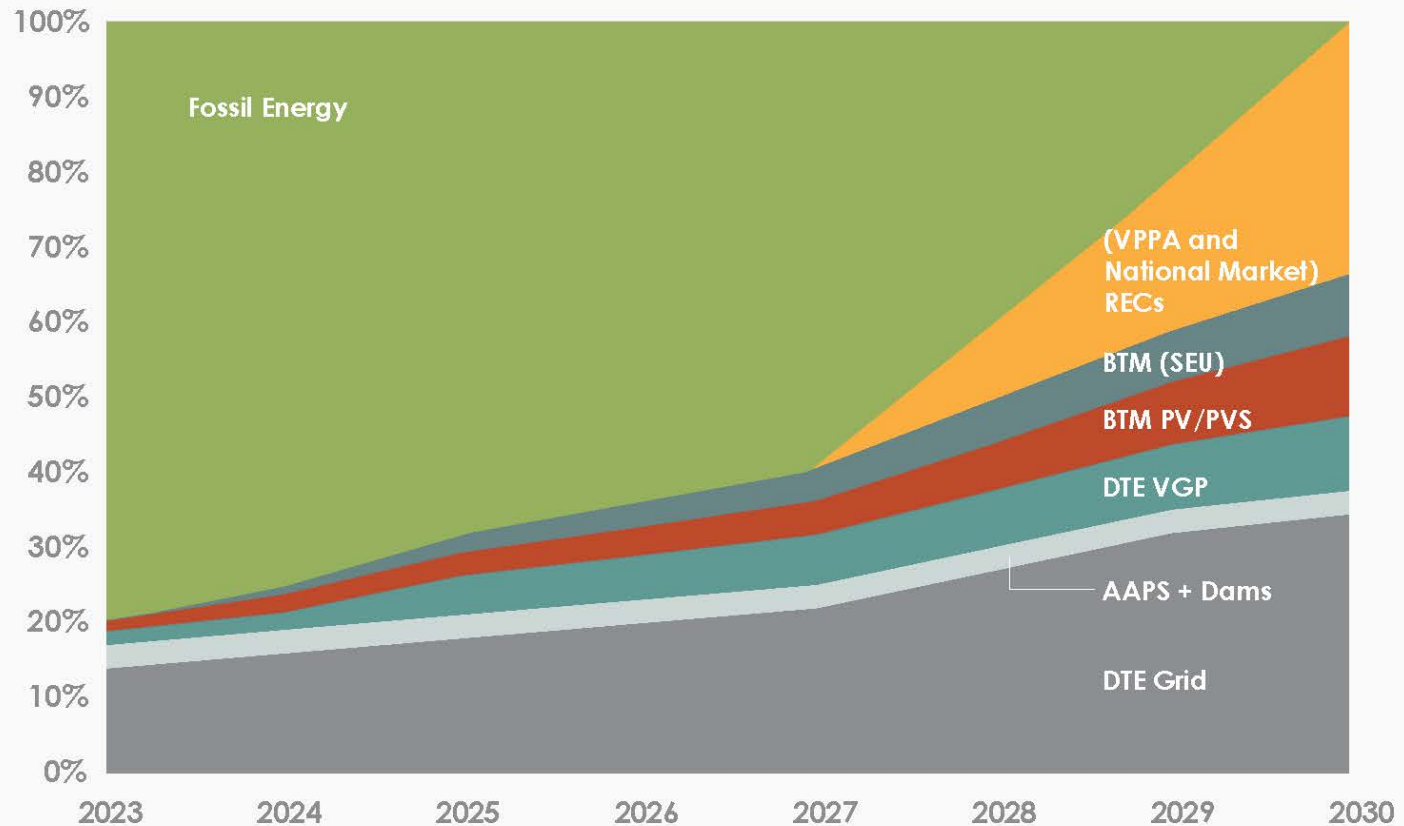


*PV/PVS is range of rooftop small commercial and residential

- 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

RENEWABLE ENERGY GROWTH 2023-2030 (SEU and DTE+ Scenario)



- 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 residents continue to take service from DTE, but Ann Arbor takes steps to achieve 100% renewable electricity credits.
- Sustainable Energy Utility with DTE+ : Ann Arbor creates an SEU to accelerate solar development within the City but all customers are served by DTE as well and Ann Arbor takes additional steps to achieve 100% renewable electricity credits.
- Ann Arbor Municipal Electric Utility: Ann Arbor takes possession of all 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			
SEU DEPLOYMENT DETAILS	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
1 st Finance Structure	100% Debt	100% Debt	10-yr PPA (TPO)
2 nd 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	–	\$67/month	\$67/month

- 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.

* 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 the economic impact of the state policies we modeled.

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

*** This is not a complete DTE electricity bill, it is a reference energy portion of the total bill based on typical customer usage.

**** Units are kWh for illustrative purposes. We recommend monthly capacity payments.

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%

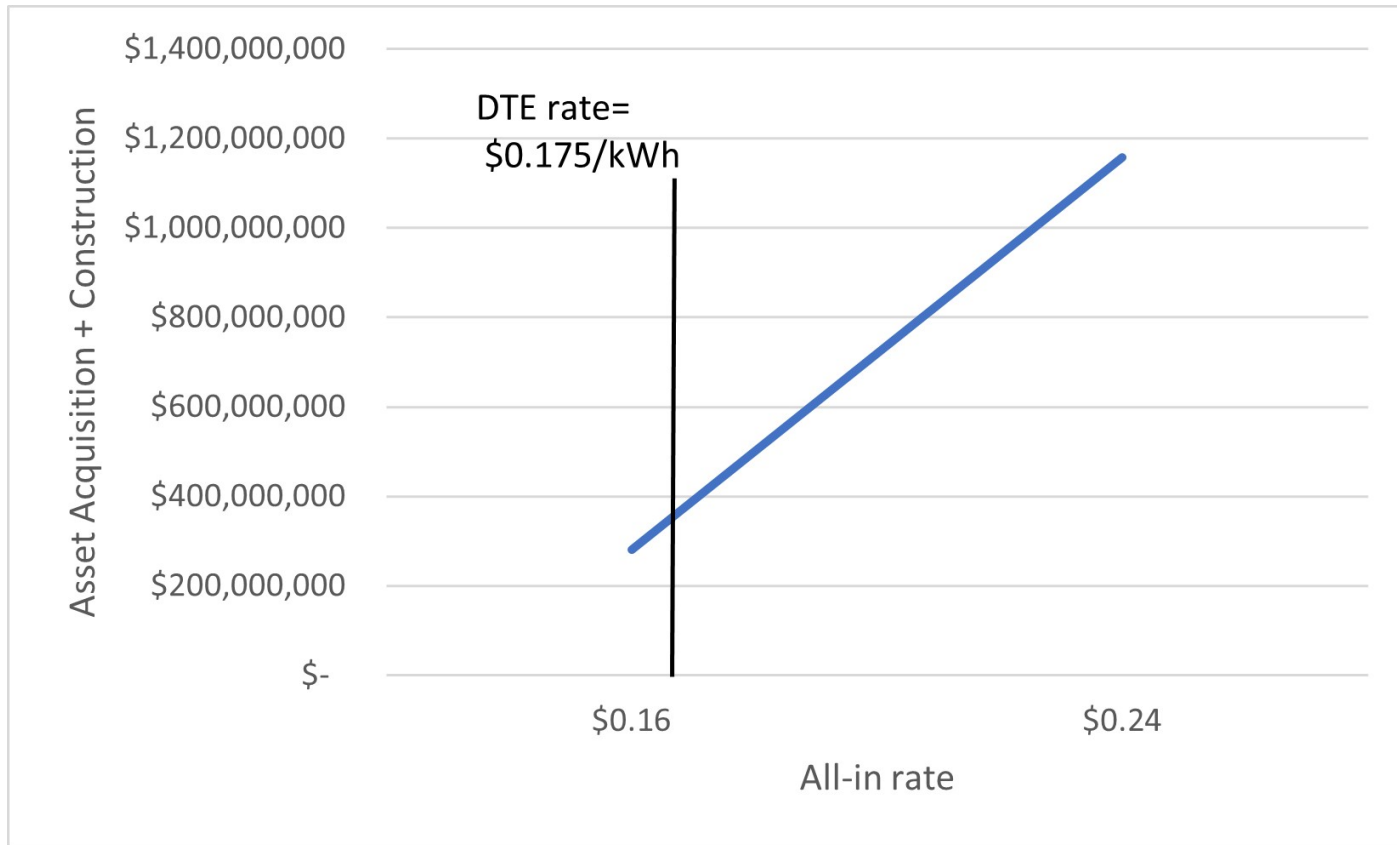
- Phase 1 financial analysis of a potential MEU are uncertain, primarily because the legal standard for compensating DTE will be litigated with few precedents and competing theories.

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.






Municipal Utility



- MEU Year 1 rate is competitive with DTE rate only in low-cost DTE asset acquisition scenario. Reliability improvements and legal/startup costs would drive MEU rate even higher.

Evaluation of Structural Options

ALIGNMENT OF ORGANIZATIONAL STRUCTURES with A ² ZERO 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 A ² ZERO 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