Tools for Assessing and Implementing Sustainability Plans

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EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

CATALYST COMMUNITIES

Village of Milford
EST. 1869

GRAHAM SUSTAINABILITY INSTITUTE
CENTER FOR EMPOWERING COMMUNITIES
UNIVERSITY OF MICHIGAN

TYLER SWANSON
EVER FORWARD

From Ideas to Action

How can we turn ***Action*** plans to ***Actionable*** *plans?*

Goals

ROCKFORD

NET-ZERO CO2 EMISSIONS BY 2050

Milford

10% ENERGY SAVINGS BY 2030

Challenges

Low momentum for change among city staff

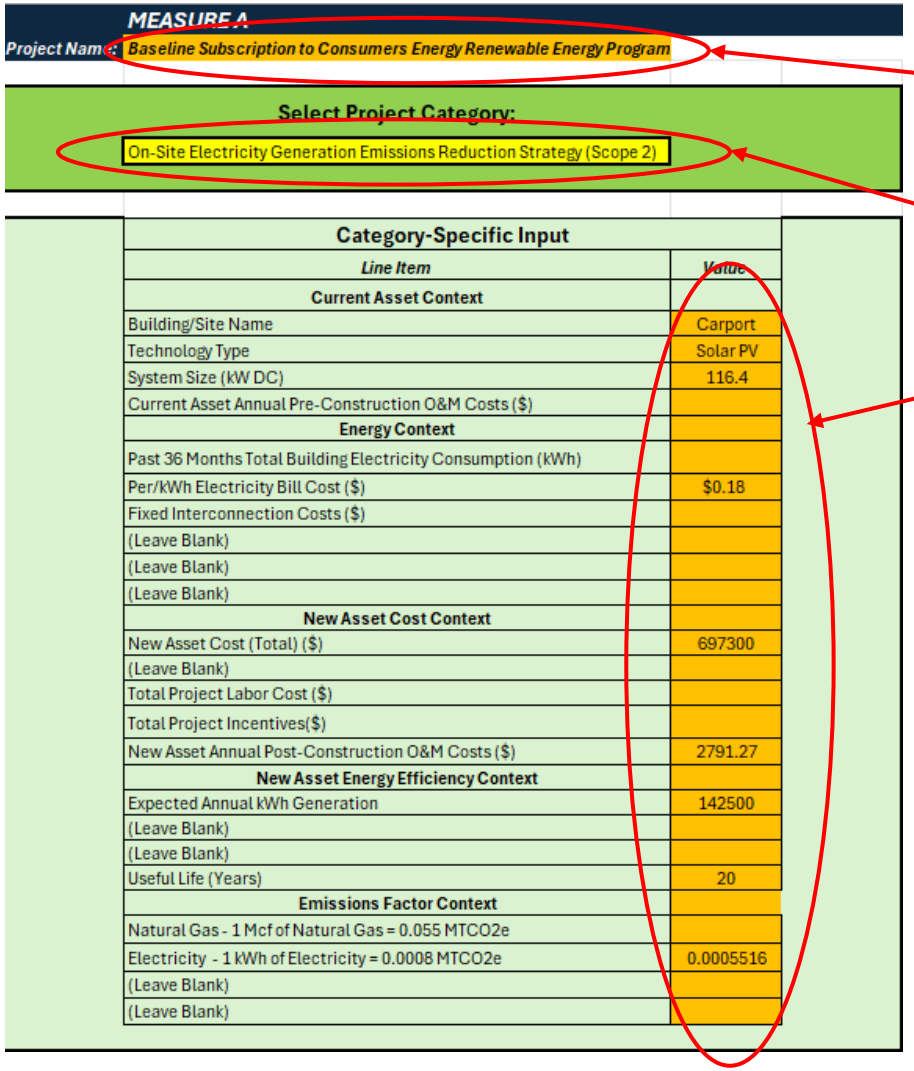
Limited staff capacity to pursue new initiatives

Developing A Toolbox

Rockford and Milford Requested ***four*** deliverables

- A financial and carbon analysis (FCA) tool that would calculate the net implementation cost, present value, break-even point, MtCO2e avoided, and cost per MtCO2e avoided
- A step-by-step process document that guides readers through the process of identifying, assessing, and implementing a new sustainability project
- Templates that will help city staff communicate information about potential sustainability projects to elected officials and residents
- A pilot project that will help both municipalities build momentum toward bigger sustainability goals

FCA Tool Inputs



MEASURE A

Project Name: Baseline Subscription to Consumers Energy Renewable Energy Program

Select Project Category:

On-Site Electricity Generation Emissions Reduction Strategy (Scope 2)

Category-Specific Input	
Line Item	*Value*
Current Asset Context	
Building/Site Name	Carport
Technology Type	Solar PV
System Size (kW DC)	116.4
Current Asset Annual Pre-Construction O&M Costs ($)	
Energy Context	
Past 36 Months Total Building Electricity Consumption (kWh)	
Per/kWh Electricity Bill Cost ($)	$0.18
Fixed Interconnection Costs ($)	
(Leave Blank)	
(Leave Blank)	
(Leave Blank)	
New Asset Cost Context	
New Asset Cost (Total) ($)	697300
(Leave Blank)	
Total Project Labor Cost ($)	
Total Project Incentives($)	
New Asset Annual Post-Construction O&M Costs ($)	2791.27
New Asset Energy Efficiency Context	
Expected Annual kWh Generation	142500
(Leave Blank)	
(Leave Blank)	
Useful Life (Years)	20
Emissions Factor Context	
Natural Gas - 1 Mcf of Natural Gas = 0.055 MTCO2e	
Electricity - 1 kWh of Electricity = 0.0008 MTCO2e	0.0005516
(Leave Blank)	
(Leave Blank)	

1. Name the project

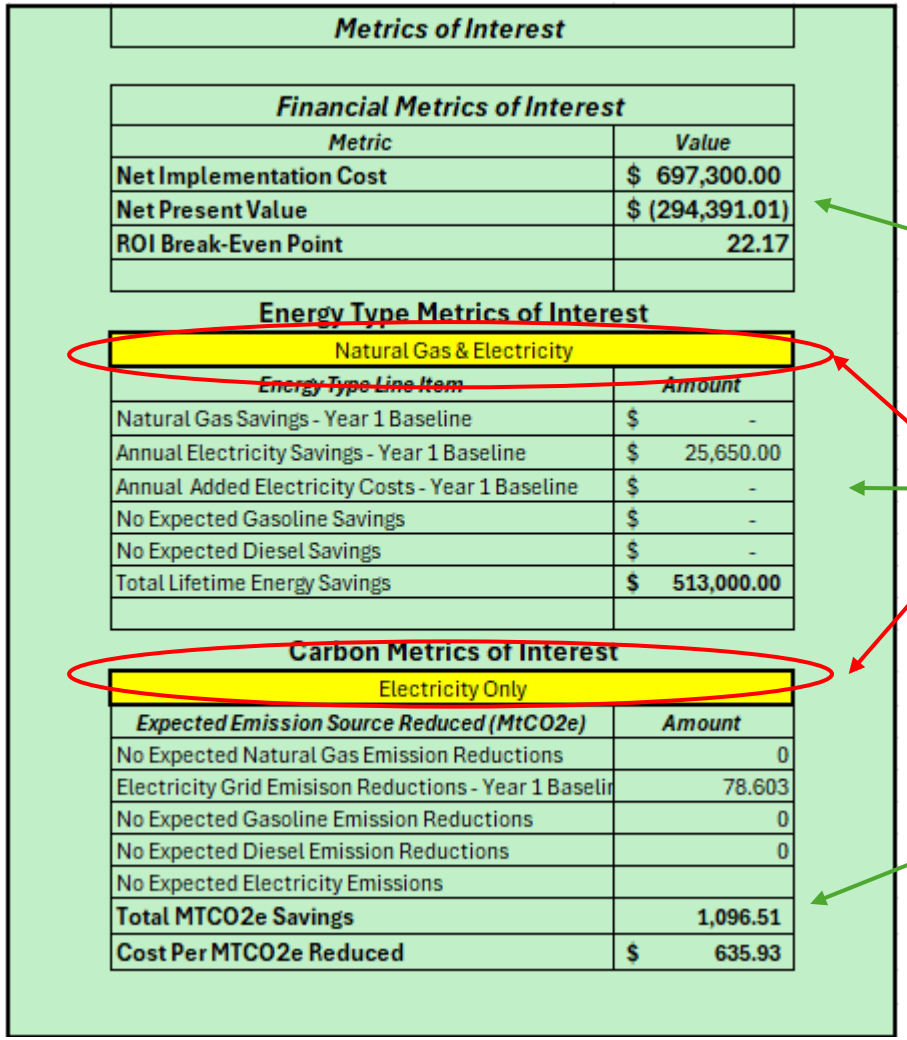
2. Select the type of emissions reduction strategy you are pursuing

3. Input requested line items (as able)

4. Specify modeling assumptions

Adjustable Variables	
Variable	*Value*
Discount Rate (%):	3%
Project Lifespan (Years):	20
Annual Per/Mcf Natural Gas Price Escalation	3%
Annual Per/kWh Electricity Price Escalation	4%
Annual Per/Gal Diesel Price Escalation	3%
Annual Per/Gal Gasoline Price Escalation	3%
Social Cost of Carbon	$ 198.00
Grid Decarbonization rate	0.04

FCA Tool Calculations



Metrics of Interest

Financial Metrics of Interest

Metric	Value
Net Implementation Cost	$ 697,300.00
Net Present Value	$ (294,391.01)
ROI Break-Even Point	22.17

Energy Type Metrics of Interest

Natural Gas & Electricity

Energy Type Line Item	Amount
Natural Gas Savings - Year 1 Baseline	$ -
Annual Electricity Savings - Year 1 Baseline	$ 25,650.00
Annual Added Electricity Costs - Year 1 Baseline	$ -
No Expected Gasoline Savings	$ -
No Expected Diesel Savings	$ -
Total Lifetime Energy Savings	$ 513,000.00

Carbon Metrics of Interest

Electricity Only

Expected Emission Source Reduced (MtCO2e)	Amount
No Expected Natural Gas Emission Reductions	0
Electricity Grid Emisison Reductions - Year 1 Baselir	78.603
No Expected Gasoline Emission Reductions	0
No Expected Diesel Emission Reductions	0
No Expected Electricity Emissions	
Total MTCO2e Savings	**1,096.51**
Cost Per MTCO2e Reduced	**$ 635.93**

Specify fuel metrics of interest

All calculations are automated based on inputs

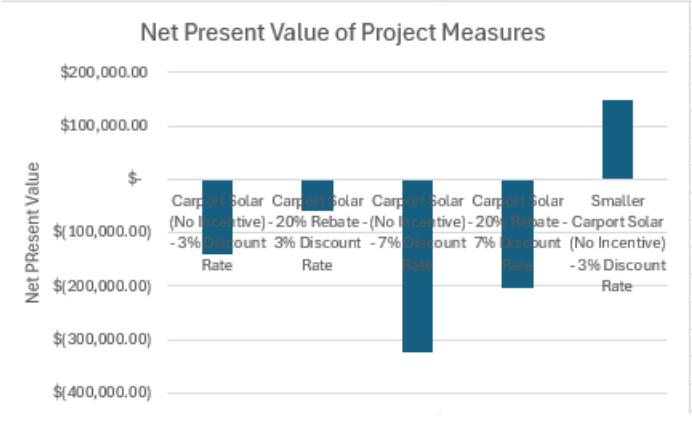
FCA Tool Outputs

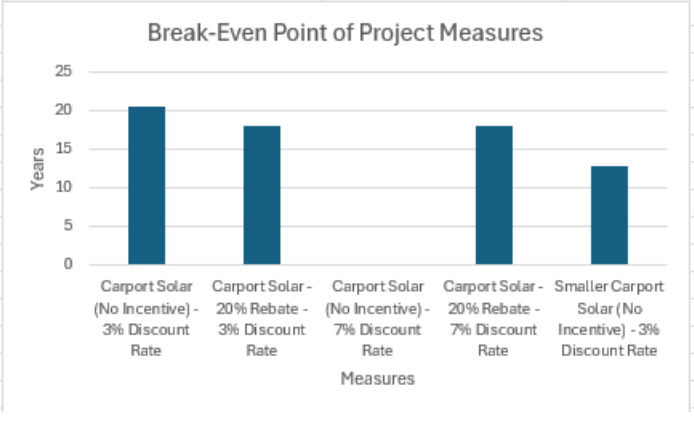
Measure Comparisons Sheet

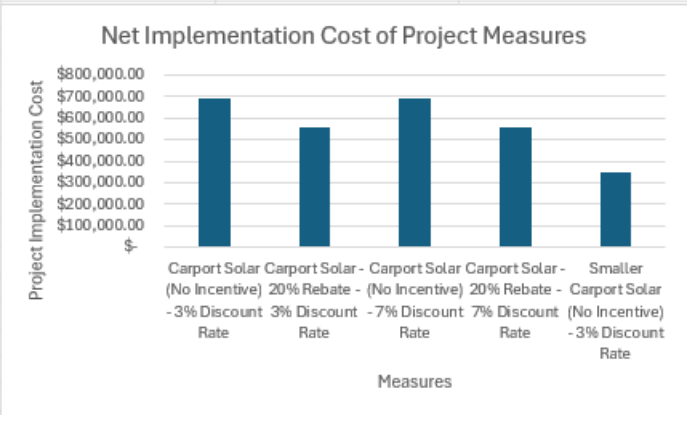
Measu	Project Category	Project Name	Subject of Measurement	Net Implementation Co	Net Present Value	ROI Break-Even Poir	Lifetime MtCO2e Saving	Cost per MtCO2e Reduce	Notes
Measure A	On-Site Electricity Generation Emissions Reduction S	Carport Solar (No Incentive) - 3% Disc	Carport	$ 690,000.00	$ (139,043.14)	20.6287299	1590.293063	$ 433.88	
Measure B	On-Site Electricity Generation Emissions Reduction S	Carport Solar - 20% Rebate - 3% Disco	Carport	$ 560,000.00	$ (60,137.62)	18.04473293	0	$ 1,590.29	
Measure C	On-Site Electricity Generation Emissions Reduction S	Carport Solar (No Incentive) - 7% Disc	Carport	$ 690,000.00	$ (325,273.68)	Never	0	$ 1,590.29	
Measure D	On-Site Electricity Generation Emissions Reduction S	Carport Solar - 20% Rebate - 7% Disco	Carport	$ 560,000.00	$ (203,778.35)	18.04473293	0	$ 1,590.29	
Measure E	On-Site Electricity Generation Emissions Reduction S	Smaller Carport Solar (No Incentive) - 3	Carport	$ 345,000.00	$ 148,600.25	12.86620536	0	$ 1,590.29	

- The calculations are summarized on a “Comparison” sheet.
- The current tool is built to accommodate up to five comparisons at once.

- The “Comparisons” sheet auto-populates tables comparing projects’ performance across variables of interest.







FCA Tool User Manual

Table of Contents

A Note on Generative AI Use in Tool Development .....
About The Creator .....
1. Why Was This Tool Created? .....
2. What Does This Tool Do? .....
2.1 General Tool Function .....
2.2. The 'BACKEND' Sheet .....
2.3. The 'MEASURE' Sheets .....
2.4. The 'COMPARISON' Sheet .....
2.5. Revising for Future Analysis .....
Section 2.5 Table 1: Revising the Backend sheet .....
Section 2.5 Table 2: Revising the Measure sheets .....
Section 2.5 Table 3: Revising the Comparison sheet .....
2.6. Data Sources and Assumptions .....
2.7. Limitations .....
Appendix .....
Appendix Table 1 - "Categories" Table Inputs .....
Appendix Table 2 - "Categories" Table Input Explanations .....
Appendix Table 3 - "Energy_Type" Table Inputs .....
Appendix Table 4 - "Energy-Type" Table Input Explanations .....
Appendix Table 5 - "Emissions" Table Inputs .....
Appendix Table 6 - "Emissions" Table Input Explanations .....

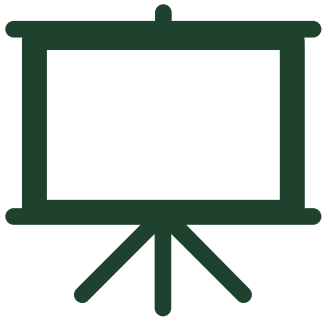
The FCA tool is accompanied by a technical manual that explains the functions of all aspects of the tool both in summary and in depth!

Process Tool Contents

The process document discusses...

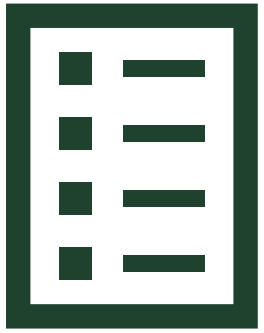
- How to determine relevant actors
- Tips on identifying financial incentives and assessing financial viability
- Measurement approaches for assessing the necessity of upgrades
- When to check ordinances and secure council approval
- Approaches for implementing a resilient sustainability process

Communications Tools



Shareable Presentations

Creating a presentation on the benefits of Rockford's potential participation in Consumers Energy's Renewable Energy Program



Policy Memoranda

Creating a policy memo advising Milford to adopt a council resolution requiring energy benchmarking

Pilot Program

City of Rockford

Enrolling in Renewable Energy Program

- Use FCA tool to assess financial viability and emissions reductions
- Use communication tool to explain benefits to City Council

Village of Milford

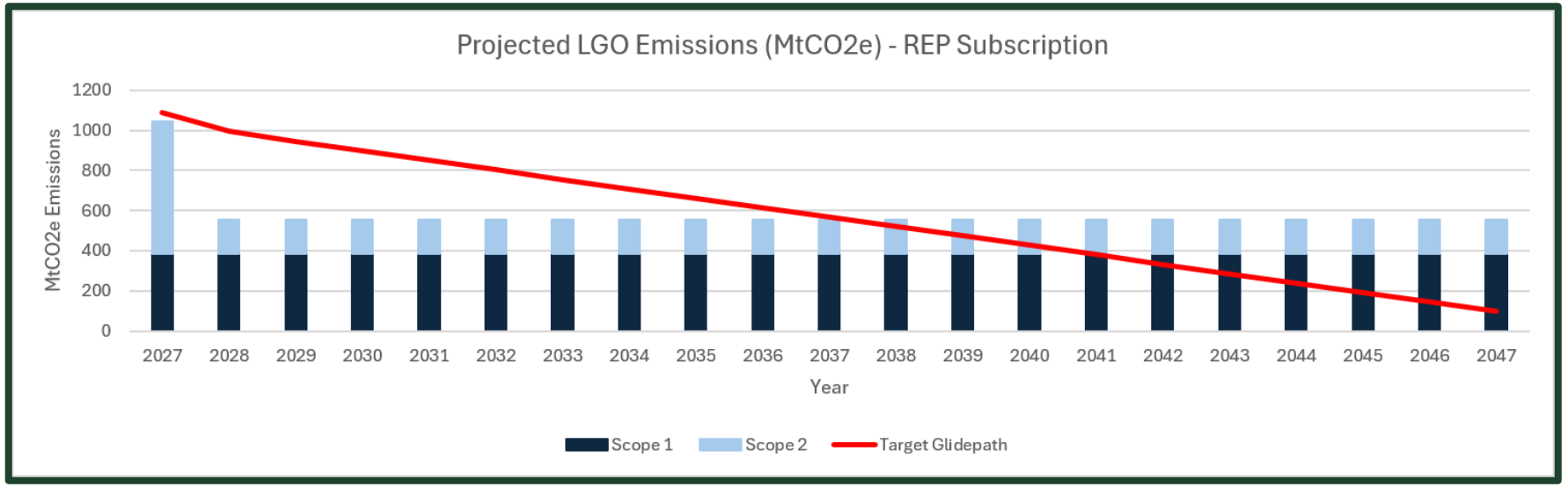
Benchmarking building energy use

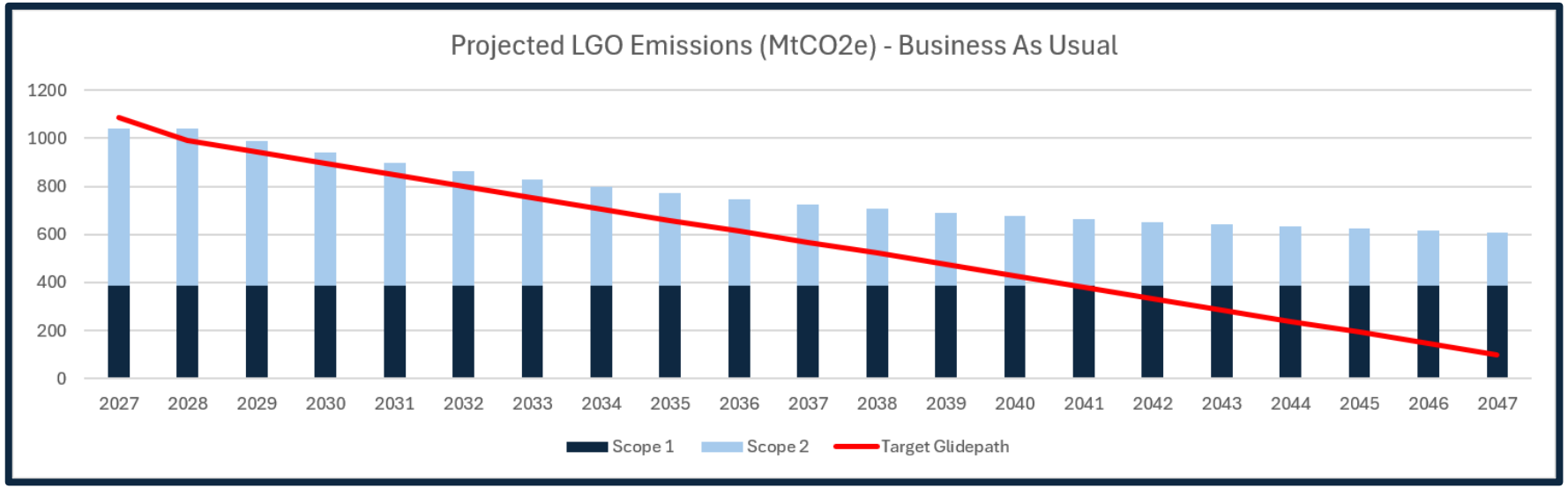
- Follow process guide to identify proper steps in implementing energy efficiency improvements
- Use communication tool to explain benefits of energy benchmarking resolution

Rockford Pilot Analysis

Using the FCA tool, I found that Rockford could reduce the carbon emissions of its local government operations by **57%** by enrolling in Consumers Energy's Renewable Energy Program.

I created a presentation for the Rockford City Council to communicate the benefits that the program would bring to the City.





Milford Pilot Analysis



- **Benchmarking has identified buildings best suited for energy efficiency improvements.**
- **I am supporting the institutionalization of comprehensive energy management by drafting an executive order and an accompanying policy memorandum.**

Thank you!

Questions?

This material is based upon work supported by the Department of Energy and the Michigan Department of Environment, Great Lakes, and Energy (EGLE) under Award Number EE0008653. The views expressed herein do not necessarily reflect those of the United States Government or any agency thereof. Find this document and more about the CLC Fellowship that supported this project at graham.umich.edu/clcf.