O’Neill School of Public and Environmental Affairs

FEASIBILITY ANALYSIS OF IMPLEMENTING A SUSTAINABLE ENERGY UTILITY

Spring 2026 Graduate Capstone Project

Research Questions

1. How **feasible is the implementation of a Sustainable Energy Utility (SEU)** in the City of Bloomington, Indiana, considering relevant constraints and opportunities in **social, financial, technical, environmental, and legal domains**?
2. What are **viable alternative scenarios** that could support Bloomington in making progress on energy-related carbon emission goals without creating an SEU?
3. Among the options available, which **align best with Indiana's recently established Five Pillars of electric utilities** with reasonable risk and positive stakeholder impact?

Background

City of Bloomington

- Bloomington's Climate Action Plan
- The Energy and Built Environment sector accounts for most citywide emissions
- The City has a variety of existing energy-related programs:
    - Bloomington Green Home Improvement Program (BGHIP)
    - Solar, Energy Efficiency, and Lighting (SEEL) Program
    - Bloomington Energy Works
    - Sustainable Neighborhoods Grant Program

What is a SEU?

- Sustainable Energy Utility
  - 100% renewable energy
  - Examples in Ann Arbor, Michigan, Washington DC, and Delaware
  - Municipally owned and operated electric utility

Indiana's 5 Pillars of Electric Utility Service

1. Reliability
2. Affordability
3. Resiliency
4. Stability
5. Environmental Sustainability

Codified under Indiana Code § 8-1-2-0.6

Baseline SEU Feasibility

- Primary limiting factor is Indiana utility code
  - Indiana law does not allow for what was done in Ann Arbor
- Alternative options
  - Full municipalization
  - Behind the meter
  - Alternative Regulatory Plans

Alternative Scenarios

Scenarios 1 and 2

Scenario 1: Business-As-Usual

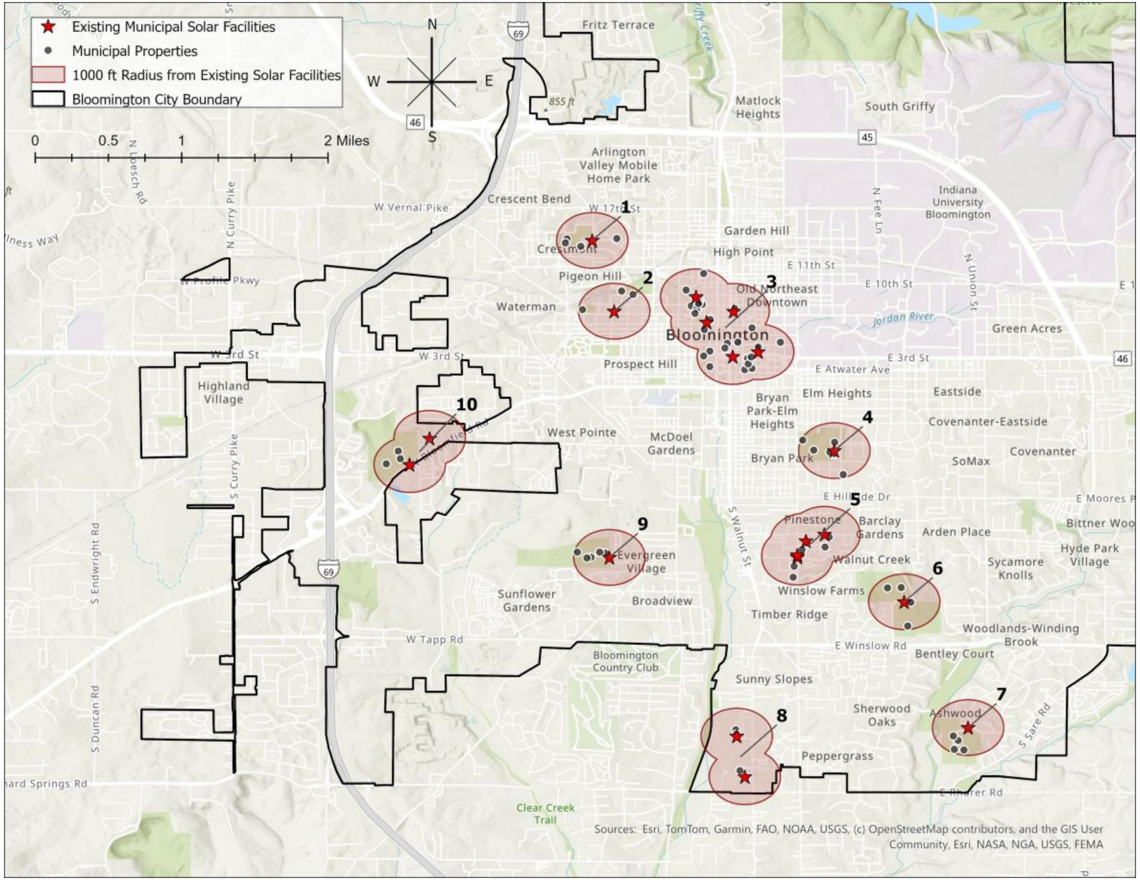
- Baseline scenario
- Continuation of current programs and roll out pace over a 10 year period
    - Bloomington Energy Works, BGHIP, Sustainable Neighborhood Grants Program, SEEL

Scenario 2: Enhanced Programming

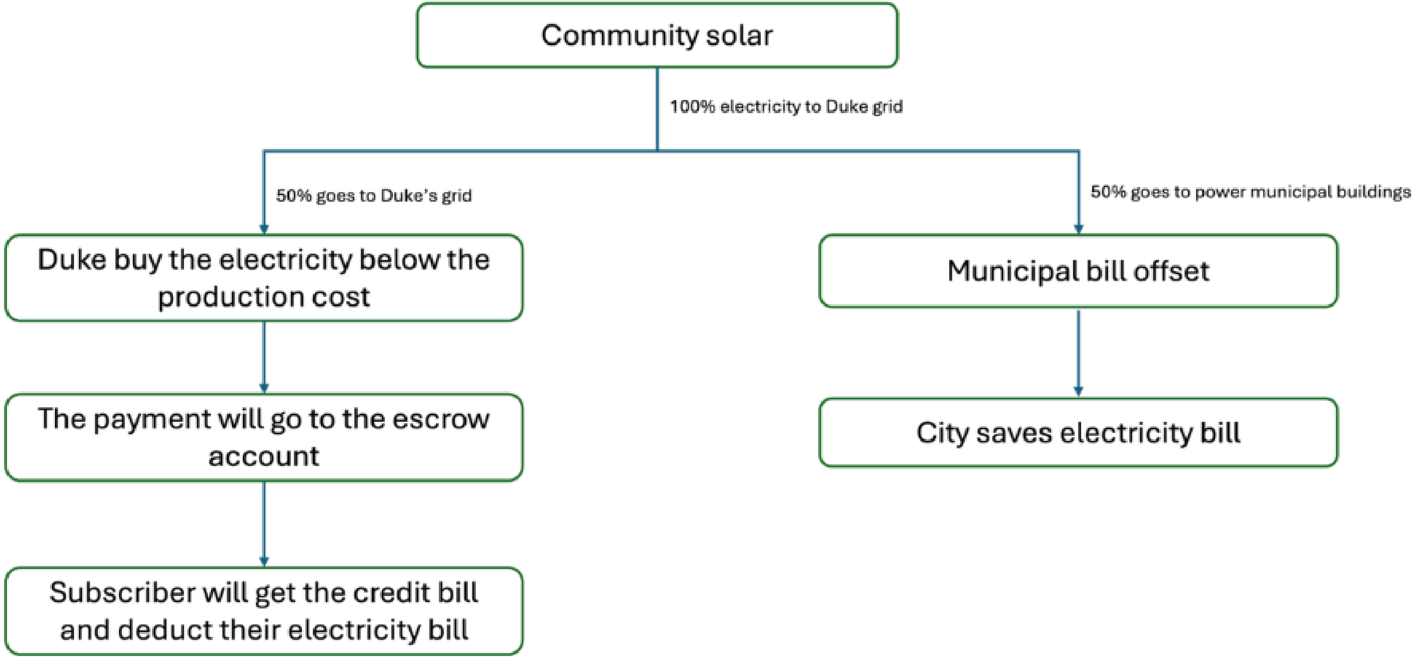
- Enhanced resource allocation to programs
    - 50%, 100%, 200% project rollout increases
- Expansion into new activities
    - Only considered qualitatively
        - Peak demand response model
        - Expanded program eligibility

Scenario 3
Municipal Microgrid

- Develop behind-the-meter distribution network for municipally owned buildings
  - Current, 50%, 100% and 200% increase in solar/battery capacity
- Identified 10 potential microgrid nodes



Scenario 4
Community Solar



Scenario-Pillar Analysis: Methodology

Methodology

- **Reliability, Stability, and Resiliency Pillars:** Bloomington Energy Scenario Impacts Tool (BESIT)
- **Affordability Pillar:** Energy Burden for low-income and low-moderate income households
- **Environmental Sustainability Pillar:**
    - EPA COBRA
    - EPA eGRID 2023
    - Literature review: historical land use changes

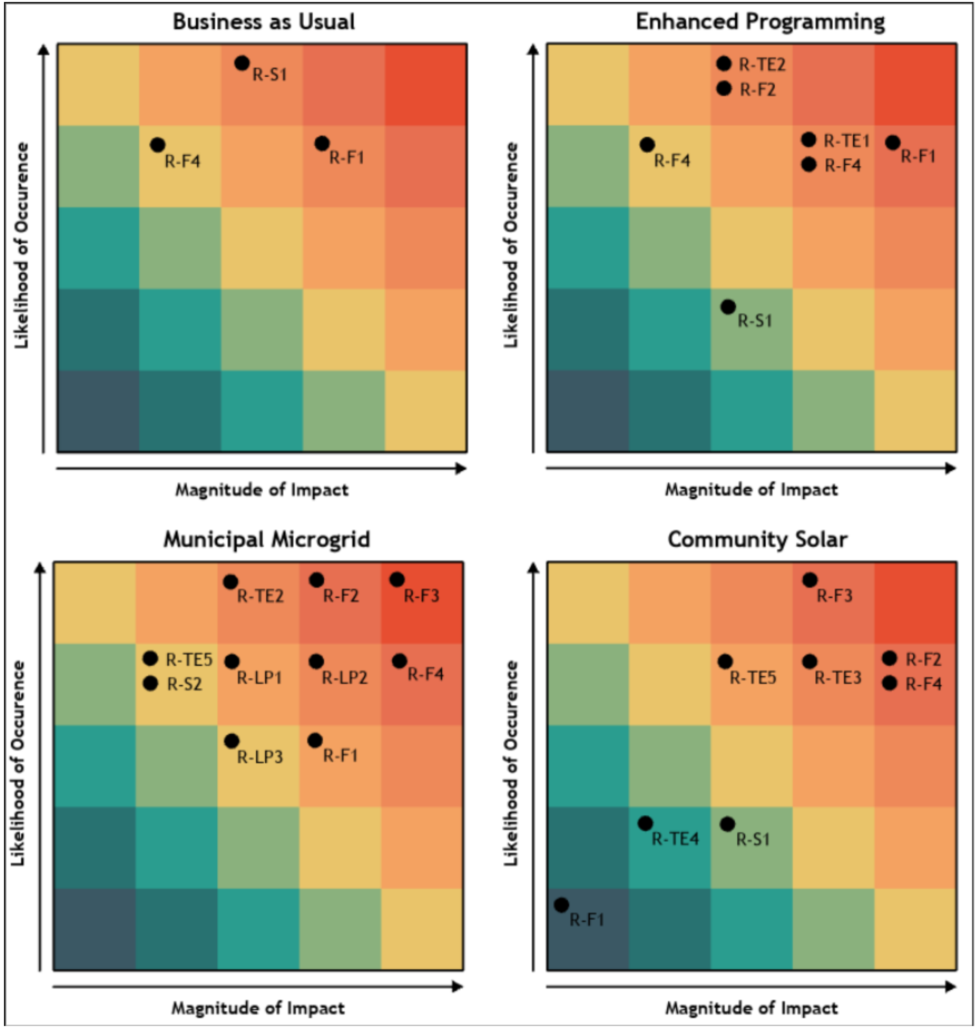
Scenario-Pillar Analysis: Results

Scenario 3: Municipal Microgrid

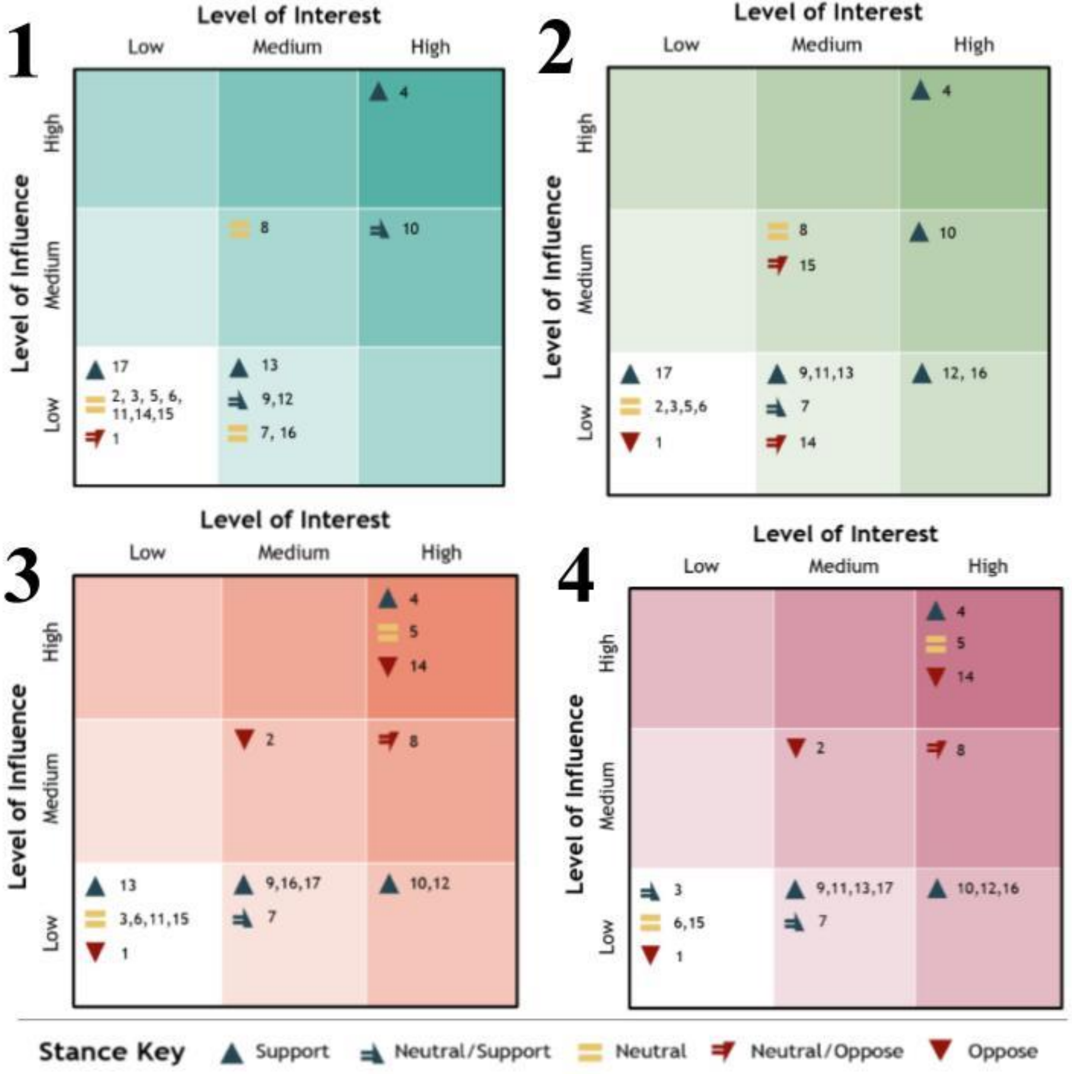
Pillar	Description	Baseline Capacity	50% Capacity Expansion	100% Capacity Expansion	200% Capacity Expansion
Reliability	Reduction in peak load during defined peak periods	Poor (0kW)	Fair (11.62kW)	Fair (369.42 kW)	Good (1164.24 kW)
Affordability	Municipal energy savings and Net Financial Position (NFP)	Fair (-$382,988 NFP)	Good (+$5.64M NFP)	Good (+$7.15M NFP)	Good (+$10.17M NFP)
Resiliency	Outage survival duration (hours) based on available energy and critical load	Poor (0kW)	Poor (0.3 hours)	Fair (9.5 hours)	Good (29.85 hours)
Stability	Average hourly change in net load (net ramp variability)	Fair (72.1 kW)	Fair (88.15 kW)	Fair (82.96 kW)	Poor (126.67 kW)
Environmental Sustainability (GHG Emissions)	Avoided CO_2e through renewables displacing fossil fuel electricity	Poor 2,940 mtCO_2e/yr	Poor 4,410 mtCO_2e/yr	Poor 5,880 mtCO_2e/yr	Fair 8,820 mtCO_2e/yr
Environmental Sustainability (Energy Share)	Share of Bloomington's electricity supply met by locally generated renewable energy	Poor 0.24%	Poor 0.35%	Poor 0.47%	Poor 0.71%
Environmental Sustainability (Regional Pollutant)	Total monetary health effects in revenue gained	Fair $13,500	Good $20,500	Good $27,500	Good $55,000

	BAU	Enhanced Programming			Municipal Microgrid				Community Solar		
Pillar		**50%**	**100%**	**200%**	**Current capacity**	**50%**	**100%**	**200%**	**1 MW**	**1.2 MW**	**2 MW**
Reliability	Poor	Poor	Poor	Fair	Poor	Fair	Fair	Good	Poor	Poor	Poor
Resiliency	Poor	Poor	Poor	Poor	Poor	Poor	Fair	Good	Poor	Poor	Poor
Stability	Poor	Fair	Fair	Poor	Fair	Fair	Fair	Poor	Fair	Fair	Fair
Affordability	Fair	Fair	Fair	Fair	Fair	Good	Good	Good	Fair	Fair	Good
Environmental Sustainability (GHG Emissions)	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Fair	Poor	Poor	Poor
Environmental Sustainability (Energy Share)	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor
Environmental Sustainability (Regional Pollutants)	Poor	Poor	Fair	Good	Fair	Good	Good	Good	Fair	Fair	Fair

Risk Analysis


Business as Usual
R-S1
R-F4
R-F1
Likelihood of Occurence
Magnitude of Impact
Enhanced Programming
R-TE2
R-F2
R-F4
R-TE1
R-F4
R-F1
R-S1
Likelihood of Occurence
Magnitude of Impact
Municipal Microgrid
R-TE2
R-F2
R-F3
R-TE5
R-S2
R-LP1
R-LP2
R-F4
R-LP3
R-F1
Likelihood of Occurence
Magnitude of Impact
Community Solar
R-F3
R-TE5
R-TE3
R-F2
R-F4
R-TE4
R-S1
R-F1
Likelihood of Occurence
Magnitude of Impact

Stakeholder Analysis



Stakeholder Key

1. Congressional Representatives
2. Indiana General Assembly
3. Monroe County Government
4. City of Bloomington
5. IURC
6. MISO
7. Chamber of Commerce
8. Indiana Energy Association
9. Beneficial Electrification League
10. Electrify Indiana
11. Hoosier Action
12. SIREN
13. Hoosier Environmental Council
14. Duke Energy Indiana
15. CenterPoint Energy
16. Citizens Action Coalition
17. MREA

Discussion

	BAU	Enhanced Programming			Municipal Microgrid				Community Solar		
Pillar		**50%**	**100%**	**200%**	**Current capacity**	**50%**	**100%**	**200%**	**1 MW**	**1.2 MW**	**2 MW**
Reliability	Poor	Poor	Poor	Fair	Poor	Fair	Fair	Good	Poor	Poor	Poor
Affordability	Fair	Fair	Fair	Fair	Fair	Good	Good	Good	Fair	Fair	Good
Resiliency	Poor	Poor	Poor	Poor	Poor	Poor	Fair	Good	Poor	Poor	Poor
Stability	Poor	Fair	Fair	Poor	Fair	Fair	Fair	Poor	Fair	Fair	Fair
Environmental Sustainability (GHG Emissions)	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Fair	Poor	Poor	Poor
Environmental Sustainability (Energy Share)	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor
Environmental Sustainability (Regional Pollutants)	Poor	Poor	Fair	Good	Fair	Good	Good	Good	Fair	Fair	Fair

Scenarios 1 & 2

1. Business-As-Usual
    - Lowest risk, lowest reward: not sufficient to meet CAP goals
2. Enhanced Programming
    - Modest GHG reduction and co-benefits, but insufficient alone
    - Key limits – no energy aggregation, funding gaps
    - Could serve as complement to other programs
    - More analysis on new programming (e.g. peak demand response) required.

Scenarios 3 & 4

3. Municipal Microgrid
    - Large initial investment, but once infrastructure is in place economies of scale improves affordability
        - Incremental implementation
    - Potential legal risks exist if Duke contests the city's right to self-furnish
    - Only impacts municipal operations, costs, and emissions
4. Community Solar
    - Biggest risk is failure to partner with Duke
    - Also requires a large initial investment, but has a positive impact on affordability for select households
    - City should start with developing a relationship with Duke and engaging community non-profits to find a collaborator

Recommendations

Short-Term Recommendations

1. Incremental municipal solar/battery expansion
2. Refined microgrid benefit/cost estimates
3. Bar-certified Indiana electric utility code review
4. Increased resource allocation to energy programming
5. Seek additional grant and external funding opportunities
6. Evaluate impact of demand response program.
7. Develop positive interactions with Duke
8. Find trusted community partner to facilitate community solar

Long-Term Recommendations

1. Partner with Duke on community solar development
    - Consider pursuing options against Indiana utility regulation
2. Develop municipal microgrid distribution infrastructure
3. Serve as an example for similar microgrid systems

Ongoing Recommendations

1. Stay aware of relevant state and federal legislative changes regarding energy policy
2. Engage stakeholders to create opportunities for future collaboration

Acknowledgements

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Thank You!

Questions?

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