

Beneficial Electrification

The vital role of **efficiency** in electrification

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Today's Goals

- Define “beneficial electrification”
- Who, what, why, and how?
- Simple terms, no acronyms
- Ideate solutions
- Answer questions



Quiz time!

Q: Why are we here?

A: Carbon neutrality

Q: What is carbon neutrality?

A: Balancing carbon emissions

Q: Where do carbon emissions come from? **A: Fossil fuels**

Q: Why do we use fossil fuels?

A: Energy

Q: What is a “net zero” building?

A: Balancing energy

A²ZERO Strategies

STRATEGY 1:

100% Renewable Energy

STRATEGY 2:

Electrify everything

STRATEGY 3:

EFFICIENCY!

Why Electrify?

- Only two options for energy: electricity or methane gas.
- Methane gas is a fossil fuel.
- Methane cannot be burned without releasing carbon emissions.
- Methane's primary uses are for **HEAT**
 1. Space heating
 2. Water heating
 3. Food heating
- Currently no clean and renewable energy substitute for methane gas (leaving electricity as our only option)

Bucket = building



Water = energy



What IS Beneficial Electrification?

- *Electrification*: replacing direct fossil fuel use with electricity...
- **Beneficial** achieves at least one without compromising others:
 - Saves consumer money over time
 - Reduces greenhouse gas emissions (GHGs)
 - Improves product quality or consumer quality of life
 - Fosters a more robust and resilient grid



Achieving Beneficial Electrification

- Look beyond the electricity!
 - Continuous insulation
 - Air-tight construction
 - High performance windows & doors
- For new-builds: Start at the beginning
 - Design the project around efficient core components

Achieving Beneficial Electrification

- Existing buildings require expensive retrofits
- OSI is working to make existing buildings more efficient
 - *Home Energy Advisor, Direct Rebates*
- However, our biggest opportunity is new buildings
 - Build them as energy efficient as possible

Known challenges

- Complex political & legal processes
 - City can't require higher standard than Michigan Building Codes
 - Different codes for commercial vs. residential
- Lack of shared understanding/vernacular
 - City staff, CPC, developers, kBTUs/ft²/yr, “electrification”
- Timing of input
 - Net Zero standards must begin at outset of project, CPC table is often too late!
- Evaluation materials
 - Inclusion of relevant information in project packages
 - Energy Use Intensity targets for our climate zone

Possible Pathways

- **Building certifications**

- Passive House Institute, US (PHIUS)
- Living Building Challenge (LBC), by the Living Future Institute (LFI)
- Energy Star
- Enterprise Green Communities
- Leadership in Energy Efficient Design (LEED, USGBC)
 - LEED ZERO
- Prescriptive measures vs. performance requirements
- Voluntary vs. required

Building Codes

- International Code Council (ICC)
- International Energy Conservation Code (IECC)
- Michigan Uniform State Code
- Energy Utilization Intensity (EUI)

2021 IECC EUIs



TABLE CC103.1 ENERGY UTILIZATION INTENSITY FOR BUILDING TYPES AND CLIMATES (kBtu/ft² – yr)

BUILDING AREA TYPE	CLIMATE ZONE																
	0A/1A	0B/1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
	kBtu/ft ² – yr																
Healthcare/hospital (I-2)	119	120	119	113	116	109	106	116	109	106	118	110	105	126	116	131	142
Hotel/motel (R-1)	73	76	73	68	70	67	65	69	66	65	71	68	65	77	72	81	89
Multiple-family (R-2)	43	45	41	41	43	42	36	45	43	41	47	46	41	53	48	53	59
Office (B)	31	32	30	29	29	28	25	28	27	25	29	28	25	33	30	32	36
Restaurant (A-2)	389	426	411	408	444	420	395	483	437	457	531	484	484	589	538	644	750
Retail (M)	46	50	45	46	44	44	37	48	44	44	52	50	46	60	52	64	77
School (E)	42	46	42	40	40	39	36	39	40	40	39	43	37	44	40	45	54
Warehouse (S)	9	12	9	11	12	11	10	17	13	14	23	17	15	32	23	32	32
All others	55	58	54	53	53	51	48	54	52	51	57	54	50	63	57	65	73

Further conversation

- Understanding Energy Utilization Intensity (EUI)
 - Different types of building have different EUI targets
- Acquiring building energy models for projects
- By right vs. public benefit

Thank You!

Questions?

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