

From: John Mirsky

Sent: Friday, February 03, 2023 1:28 PM

To: City Council <CityCouncil@a2gov.org>; Planning <Planning@a2gov.org>; Energy Commission <EnergyCommission@a2gov.org>; Stults, Missy <MStults@a2gov.org>; Delacourt, Derek <DDelacourt@a2gov.org>

Cc: Wayne Appleyard; Ken Garber; Brown, Stephen; Mitchell, Rita (GMail)

Subject: All-electric, Sustainable Construction

Dear Mayor Taylor, City Council and Planning and Energy Commissioners:

Please review the attached estimate of emissions from 43 newly approved and proposed construction in the city, compiled and updated by Ken Garber. At least 30 will be natural gas (NG) connected. ***It shows that emissions from these new buildings will be a factor of four higher than all of the emission reductions achieved by all of our recent and planned solar installations, even taking reduced commuter emissions into account.*** It's even worse than that. Each new fossil fuel-burning building will result in emissions for decades, while the opportunity cost of a delay of one year in the deployment of new solar, weatherization and other such activities is only one year of emissions.

We all need to work together to implement ASAP the planned policies under consideration by the planning commission that would ensure every new building be all-electric. If that policy approach is judged likely to fail, we need to come up with other policies which would provide carrots that promote the sustainable development we need and sticks which discourage code-compliant but energy-inefficient, NG-connected construction. As Onion Flats' Tim McDonald presented to the energy commission last September (shared with the planning commission), ***sustainable, affordable multi-family housing is being developed at scale at costs equal to or less than that of standard housing.***

The approval of The Village of Ann Arbor's rezoning on Monday's city council agenda (first reading), is a case in point. Robertson Brothers still intends to heat the ***320 apartments (and probably the 120 additional apartments in phase 2)*** with natural gas. If council approves rezoning, it's my understanding that The Village becomes a "by right" project which goes to the planning commission for a rubber-stamp approval and the city's leverage to ask for changes vanishes. While the city may not be able to require electrification of the apartments because that would be conditional zoning, it can indicate its displeasure. Robertson Brothers argues electric heat pump heating will be costlier for tenants; I dispute that given the recent rise in NG prices and higher construction costs due to dual electric and NG supply.

If we do not act soon, the achievement of A2Zero Plan targets will be significantly undermined.

Thank you for considering these uncomfortable facts.

John Mirsky

Chair, A2 Energy Commission

Member, A2 Environmental Commission

Greenhouse gas emissions from natural gas-heated new construction in Ann Arbor (February 1, 2023)

Top line data:

Number of projects: 43. With gas heating: 30. All-electric: 7. Unknown or to be determined: 6

Building types (with gas heating) (excluding U-M):

- Residential: 1,854 units
- Hotel: 882 rooms, 548,241 square feet
- Commercial: 86,292 square feet
- Religious: 71,259 square feet.
- Research/industrial: 131,300 square feet.

Total estimated annual emissions: 23,867 metric tons CO₂ equivalent from gas combustion.

These emissions, yet to happen but now mostly locked in, will represent approximately:

- A 6.8% increase on top of current non-U-M building gas emissions (roughly 350,000 metric tons annually)
- A 1.7% increase in overall city-wide total greenhouse gas emissions (excluding U-M) (roughly 1.37 million metric tons).
- More than four times the estimated 5682 metric tons of annual emissions prevented through the combination of Solarize installations (through May 2022) and the pending Solar at City Facilities (Enerlogics) and parks (Homeland Solar) projects.
- The estimated emissions prevented by converting commuters to residents by these residential projects will be approximately 3,369 metric tons, or about one-seventh the overall emissions created.

Calculations and references follow table.

Contact: Ken Garber, kengarber@prodigy.net. (734) 741-0134 office.

Table: ongoing, pending and proposed new construction in city (excluding U-M)

Location	number of residential units	other space	status	gas or electric?
841 Broadway (former MichCon site)	96 units	148 hotel rooms, 91,760 sq ft (est.), 13,800 sq ft commercial	approved, construction pending	gas
616 E. Washington	261 units	retail (5,438 sq ft)	under construction	gas
1100-1122 S. University	133 units	retail (17,377 sq ft)	under construction	gas
1200 Broadway (Beekman)	206 units (phase 3)	possible retail	proposed, not yet submitted	gas
2270 Platt Rd	149 units	community center	approved	electric

(Veridian)				
350 S. Fifth Ave.	370 units	retail, office (13,333 sq ft)	area plan approved	unspecified
Catherine & Fourth Ave. (Avalon)	66 units	none	proposed, not yet submitted	electric
S. State and Stimson (South Town)	250 units	office and retail	proposed, not yet submitted	electric
84 Valhalla Dr. (Arbour on Main)	450 units	none	approved	electric
State and Packard (5 Corners)	360 units	unspecified	proposed, not yet submitted	unspecified
333 E. William (Core Spaces)	unspecified (around 15 stories)	mixed use (unspecified)	preliminary discussions	unspecified
707-721 Church	18 units, 108 bedrooms	none	staff review	gas
2900 S. Main	46 units	none	staff review	unspecified
530 N. Division (Doug Selby)	4 units	none	city council review (PUD)	electric
1815 N. Maple	79 units	none	city council review (PUD)	electric
414 S. Main (ex-DTE building)	120 units, converted from office	unspecified	staff review	gas
600 S. Main (Main and Madison)	32 units	retail	under construction	gas
140 Hill St.	4 units, 16 bedrooms	none	under construction	gas
2805 Burton (Brightdawn Village)	120 units	none	under construction	gas
330 Detroit St.	14 units	retail or office (1,850 sq ft)	under construction	gas or geothermal electric
212 Miller	8 units	none	approved	gas
325 E. Summit (The Garnet)	10 units	none	nearing completion	gas
340 Depot	4 units	retail or office (2,530 sq ft)	approved	gas
1680 Dhu Varren (The Village) phase 1	468 units	clubhouse	planning commission initial approval	148 electric, 320 gas
2750 Pontiac Trail (Bristol Ridge)	69 units	none	under construction	gas
660 Earhart (Concord Pines)	57 units	none	under construction	gas

3050 Birch Hollow Dr. (Mill Creek Townhomes addition)	120 units	community center	under construction	gas
2195 E. Ellsworth (Lockwood Senior Living)	154 units	none	under construction	electric (except for commercial kitchen)
300 W. Huron (Fairfield Inn)	none	95 rooms, 43,414 sq ft	under construction	gas
201 Glen (Vanguard Hotel)	24 units	162 hotel rooms with 132,468 sq ft, 7,435 retail	under construction	gas
3611-3621 Plymouth Rd. (Hampton Inn) (replaces existing motel)	none	127 hotel rooms, 76,200 sq ft, restaurant	approved, partially under construction	gas
2658 W. Liberty (Liberty Townhomes)	52 units	none	approved 2020	gas
2800 Jackson Rd. (Aloft)	none	128 hotel rooms, 69,442 sq ft	approved 2020	gas
2800 Jackson Rd. (Home 2)	none	107 hotel rooms, 63,295 sq ft	approved 2020	gas
361 W. Eisenhower (Home 2)	none	115 room hotel, 71,662 sq ft	approved 2020	gas
2150 Frieze (St. Francis of Assisi)	none	71,259 square foot addition	under construction	gas
907 and 913 S. Main	6 units, 35 bedrooms	none	approved 2021	gas
2111 Packard	72 units	retail (3,642 sq ft)	approved 2021	electric
300 S. Maple (Lewis Jewelers)	none	24,529 sq ft new retail	construction complete	gas
700 N. Main (Near North townhomes)	22 units	none	approved 2021	18 electric, 4 gas (at corners)
3874 Research Park Dr. (Sartorius Biotech)	none	131,300 sq ft (research & industrial)	under construction	gas
1605 N. Maple (Maple Cove II)	70 units	none	approved 2022	gas
2520-40, 2560 Pontiac Trail (Village ph. 2)	120 units (apartments)	none	plan pending	gas

The first 30 projects were listed in the Jan. 2, 2023 MLive story: “30 Ann Arbor developments to watch in 2023” <https://www.mlive.com/news/ann-arbor/2023/01/30-ann-arbor-developments-to-watch-in-2023->

[including-more-high-rises.html](#) The remainder were sourced from planning department, planning commission and City Council documents.

Residential emissions: 14,647 metric tons annually
Hotels: 3,618 metric tons
Commercial and religious: 1,442 metric tons
Research & industrial (Sartorius Biotech): 4,160 metric tons
Total: 23,867 metric tons CO2 equivalent emissions annually.

Sources and calculations for emissions:

Residential: Most of the new units are multifamily, with a smattering of single family homes and large townhomes. For example, the average floor area of the Village’s 320 gas-heated apartments is 938 square feet, so we will conservatively assume a city-wide average of 1,000 square feet per unit, factoring in single family homes and larger townhomes. (This is almost certainly an underestimate—for example, Bristol Ridge townhomes average 1,850 square feet, and Liberty Street Townhomes 2,417 square feet each.) Then factor in the “common area factor” for multifamily, which is typically 12-20% per unit. We will assume 15% additional square footage, for a city-wide average 1,150 square feet per unit for these new residential developments.

Greenhouse gas emissions: the “Consumers Energy All-Electric Multifamily Design Guide” (October, 2021) cites a 52.9 kBTU per square foot energy from gas consumption for new mid-Michigan low-rise multifamily buildings. Multiplied by our average Ann Arbor new unit’s 1,150 square feet results in 60,834 kBTUs, or 608.34 therms per unit. Multiplying that by the 13kg per therm greenhouse gas conversion factor (see below) yields 7908 kilograms per unit, or just over 7.9 tons CO2 equivalent emissions. Multiply that by the 1,854 units proposed or under construction, and we can conservatively anticipate 14,647 metric tons total CO2e emissions per year (from burning gas only) at these new residential units.

Hotels: The U.S. EIA’s [Commercial Building Energy Consumption Survey](#) (CBECS) reports that hotels and motels in the US use an average of 49 cubic feet of natural gas per square foot annually. While this doesn’t separate out new construction, which is presumably more efficient, it also does not take into account Michigan’s cold winters and higher energy usage. In the absence of more granular data, we will assume these factors cancel out.

49 cu ft = 0.49 ccf = 0.51 therms = at 13kg per therm (greenhouse gas conversion factor, see below), that’s 6.6 kg per square foot hotel space, or 0.0066 metric tons CO2e per square foot.

Commercial: US EIA commercial buildings energy consumption survey (CBECS), 2018 summary, <https://www.eia.gov/consumption/commercial/> . Overall average: 70,400 btu/sq ft. per year. Again, no allowance for newer, more efficient construction, or for Michigan’s colder temperatures and higher energy consumption than the national average. We assume these cancel each other out.

70,400 Btu = 0.7042 therms. Multiply by 13kg CO2e/therm (greenhouse gas conversion factor, see below = 9.15 kg per square foot commercial space, or 0.00915 metric tons CO2e per square foot.

Sartorius Biotech: This building has LEED Gold status, but will be energy intensive, because of the large amount of lab space and the associated fume hood air exchange requirements. Sartorius modeled and disclosed its building energy use intensity: 250 kiloBTUs per square foot per year. (See April 4, 2022 City Council agenda, PH-5, action item 22-00600, attachment: “A2Zero Sustainability Answers.”)

Emission calculations: 250 kBTU (250,000 BTU)/sf/ x 131,300 square feet = 32.825 million kBTU per year, or 3282 kilo therms per year. 100,000 BTU = 1 therm. 100 million BTUs = 1,000 therms. 32,000 million BTUs = 320,000 therms x 13kg CO₂e/therm = 4.16 million kg = 4,160 metric tons CO₂ equivalent emissions per year.

Solarize, Solar at City Facilities, and Homeland Solar. The combined 7.2 MW total new solar capacity is from the June 14 OSI presentation at Energy Commission, “A2Zero at Two,” slide 7. It includes all Solarize installations through May 31, 2022 (3 MW); the Enerlogics “Solar at City Facilities” project (3.1 MW); and the Homeland Solar parks contract (0.95 MW).

The 2021 emissions conversion factor of 0.0005956 metric tons was provided by OSI.

According to Sunwatts.com, in Michigan a kilowatt of solar will generate 1,325 kWh per year. This assumes a module with 19% or greater efficiency, a fixed array, 15% snow country system losses, a 20 degree tilt, an azimuth of 180 degrees, and 98 percent inverter efficiency. So the city’s new and projected 7.2 MW will, when fully installed, generate 9.54 million kWh per year, or 9,540 MWh. Multiply by OSI’s 2021 emissions conversion factor 0.0005956 MT/kWh, and you get 5,682 metric tons CO₂ equivalent emissions prevented annually by the city’s new and projected solar installations.

Commuter emissions. SEMCOG reports that the average Ann Arbor commute is 19.3 miles. Let’s assume a net of one person a day commuting an average round trip distance of 38.6 miles (to Ann Arbor) for one half of these 1614 1854 units = 35,782 miles a day, or 8.946 million miles a year. At 30 miles per gallon, that’s 298,183 gallons of gasoline a year.

The EPA reports that a gallon of gasoline releases 8.9 kg CO₂. I’ve added upstream emissions of 28% (as does Kalmus) to arrive at 11.3 kg CO₂ per gallon. So the combined new residential units prevent 3,369,472 kg, or just over 3,369 metric tons CO₂ a year in commuter emissions.

Greenhouse gas conversion factor: 13 kg CO₂e per therm. Taken from table 9.2, page 150, “Being the Change,” by NASA climate scientist Peter Kalmus. From page 155: “Burning a therm of gas emits 5.3kg CO₂; including the upstream emissions bumps this amount to 6.1kg CO₂. To account for leakage, and since half of the gas consumed in the U.S. is fracked, we can use the mean of the Howarth et al. ranges (5% methane leakage). This translates into an additional 6.5 kg CO₂e from methane leakage per therm of natural gas, for total emissions of 13kg CO₂e per therm.”

Howarth reference: Robert Howarth et al., “Methane and the greenhouse gas footprint of natural gas from shale formations,” Climatic Change 106 (2011).

Conversions:

100,000 Btu = 1 therm.

100 cubic feet (ccf) of natural gas = 103,700 Btu, or 1.037 therms