January 15, 2020

The Honorable Mayor Fournier and Members of the City Commission:

The approved July 27, 2020 Resolution Acknowledging the Climate Emergency and Completing a Greenhouse Gas (GHG) Emissions Inventory tasked staff with the immediate development of a GHG emissions inventory to set a baseline by September 30, 2020 and to collaborate with other essential stakeholders to develop GHG emission reduction target recommendations for 2030 and 2050 within 90 days of the baseline. These reduction targets are intended to guide the future development of city’s climate action goals embedded within the sustainability plan.

City staff populated the ClearPath GHG inventory software with all relevant 2018 data. ClearPath is a highly regarded global protocol for municipals to measure greenhouse gas emissions. The 2018 data and GHG emission results were then analyzed for quality by a retired energy-sector engineer and resident volunteer. Staff also had access to consultations with GHG professionals within ICLEI, the sustainability organization for governments that manages ClearPath and with whom we are a member. The 2018 GHG inventory tracks the city’s data for energy usage, transportation, waste generation, water/sewer treatment, and fugitive emissions. Categories that were not feasible or applicable for the city to track are citywide food, durable goods, and non-durable goods consumption, leisure travel, non-municipal gasoline yard maintenance equipment usage, non-municipal off-road vehicles usage, and non-municipal leakage from air conditioners, chillers, and refrigerators. An inventory was created for the citywide emissions and another for municipal operations emissions. The separate municipal operations inventory will allow staff to focus on energy saving emissions reduction projects expeditiously.

Immediately following the creation of these inventories, a GHG goals workgroup was convened to develop draft GHG emission reduction targets for 2030 and 2050. The workgroup consists of two staff members, two Royal Oak Environmental Advisory Board (EAB) members, and two community members. The group met four times to discuss potential reduction targets based on the internal inventory results and diverse external information, including Governor Whitmer’s pledge for net-zero emission by 2050, local natural gas and electric utilities’ commitments for net-zero carbon by 2040 and 2050, respectively, the mayor’s climate commitment pledges, and the Intergovernmental Panel on Climate Change’s (IPCC) 2019 special report recommendations. These discussions were led with the overarching goal to be ambitious but realistic in the reduction targets development. The workgroup presented their recommended targets to the entire EAB for discussion and feedback on December 2, 2020 (Attachment 1).
The EAB approved the target goals of 40 percent below our 2018 baseline by 2030 and being net-zero carbon by 2050.

The 2050 target reduction is the main goal and as mentioned above, more readily facilitated due to the state and local utility corporations’ commitments pledging carbon neutrality by 2050. The 2030 goal is an interim bellwether and will assist in judging our progress at that point. The EAB recognizes the 2030 goal is ambitious, but are confident there are several pathways to achieve substantial GHG emissions reductions by that date.

As the city of Royal Oak desires to protect and enhance the quality of life for all who live, work, and play in our community, the Royal Oak Environmental Advisory Board recommends the city approve the following resolution:

Whereas, the city of Royal Oak is responsible to promote the public health and safety of its residents, including access to clean air, clean water and a livable environment; and

Whereas, energy resources we utilize as a municipal government and community significantly impact public health and safety, including the economic and social well-being of current and future residents; and

Whereas, there is scientific consensus regarding the reality of climate change and the connection between human activity, especially the combustion of fossil fuels that create greenhouse gases, and warming of the planet; and

Whereas, emissions from electricity generation are the largest component of both the municipal operations and citywide greenhouse gas inventories, making up more than 50 percent of all greenhouse gas emissions from both footprints; and

Whereas, the city of Royal Oak is already dealing with the effects of climate change locally through increased temperatures, heavy rain and flooding events, other extreme weather events, increased transmission of disease through insects and pests, and other disruptions that threaten our economy, residents and overall quality of life; and

Whereas, the transition to a low-carbon community reliant on the efficient use of renewable energy resources and electrified transportation will provide a range of benefits including improved air quality, enhanced public health, increased national and energy security, local green jobs, reduced reliance on finite resources and myriad other positive outcomes; and

Whereas, the city of Royal Oak is committed to helping facilitate this transition alongside other local, national, and international communities that prioritize addressing climate change by investing in clean energy to enhance the well-being of current and future generations.

Now therefore be it resolved, the city commission approves the citywide greenhouse gas emission target reduction goals of 40 percent by 2030 and net-zero by 2050. These reductions are relative to the 2018 citywide greenhouse gas emissions inventory baseline; and
Be it further resolved, the city commission directs the city manager in collaboration with staff and other essential stakeholders, to use the 2018 greenhouse gas inventory data and approved target reduction goals to guide the creation of climate actions for the city’s developing sustainability plan; and.

Be it further resolved, the city commission directs the city manager in collaboration with staff and other essential stakeholders, beginning in 2022 and continuing at three-year intervals, to update the GHG emissions inventory and review and consider recommending changes to the goals established for 2030 and 2050 so that those goals are economically feasible and in alignment with ongoing updates to scientific findings regarding climate change to the extent possible; and

Be it finally resolved, the city commission directs the city manager in collaboration with staff and other essential stakeholders, to begin the work to develop the citywide sustainability plan with an estimated completion date by early 2022.

Julie Lyons Bricker, LEED® AP O+M, PMP
Grants Coordinator/Energy and Sustainability Manager
Ex Officio Member, Royal Oak Environmental Advisory Board

Approved,

[Signature]

Paul J. Brake, ICMA-CM, CEcD
City Manager

1 Attachment
Climate Action Needed Now

- Earth’s climate is now changing faster than at any point in the history of modern civilization, primarily as a result of human activities.

- Without substantial and sustained global mitigation and regional adaptation efforts, climate change is expected to cause increasing losses to American infrastructure, agriculture, ecosystems and property and impede the rate of economic growth over this century.

- The total cost of extreme (greater than one billion dollars) weather events for the United States from 2010 to 2019 has been calculated to be 802 billion dollars by the National Oceanic Atmospheric Administration. This includes Southeast Michigan’s 2014 flood.

- Members of our community and others are already feeling the local effects of climate change through higher frequency of high heat days, more extreme precipitation and flooding events, and greater length of droughts and heat waves that affect our economy and way of life.
Royal Oak Prioritizes Sustainability

- June 2017-Joined National Mayors’ Support of Paris Climate Agreement. Mayor Mike Fournier joined 467 US Mayors commitment to adopt, honor, and uphold Paris Climate Agreement goals.

- February 2019-Approved by City Commission the Final Strategic Plan for Fiscal Year 2019-2020, includes development of a city-wide environmental sustainability plan.

- May 2019-Awarded 2019 LEED® for Cities and Communities grant program funded by Bank of America in partnership with USGBC.

- April 2020-Achieved the LEED® for Cities Certified designation. Royal Oak is the 1st city in Michigan and the 3rd in the nation to certify under LEED v4.1.

- July 2020-Adopted unanimously by City Commission the Resolution Acknowledging the Climate Emergency and Completing a Greenhouse Gas Emission Inventory.

- September 2020-Completed the first citywide greenhouse gas (GHG) inventory.

- December 2020-Established GHG reduction targets.
Environmental Advisory Board (EAB) Subcommittee- GHG reduction goals workgroup

Amanda Herzog, Ph.D.
EAB Chair and Engineer

Paul Vial
EAB Board Member and Engineer

Aaron Filipski, MSA
Royal Oak DPS Director and EAB Ex Officio

Andrew Sarpolis
EAB Board Member and Sierra Club Organizer

Woody Gontina, LEED AP BD+C
EAB Board Member and Planning Commission Member

Julie Lyons Bricker, LEED AP O+M, PMP
Royal Oak Energy and Sustainability Manager and EAB Ex Officio

GHG Inventory: April – September 2020
Reduction Targets: October – December 2020
2018 GHG Inventory Software

International Council for Local Environments (ICLEI)-Local Governments for Sustainability is a global network of more than 1,750 local and regional governments committed to sustainable urban development. Active in 100+ countries, they influence sustainability policy and drive local action for low emission, nature-based, equitable, resilient and circular development.

ICLEI USA was founded in 1991. They offer climate action planning and programs to reduce greenhouse gas emissions and cutting-edge resources that embrace wider sustainability and resilience issues. ClearPath GHG inventory software is provided as an ICLEI member benefit.

- All data and source documents were uploaded to the ICLEI ClearPath software.

- ClearPath converted energy and other emission sources into Carbon Dioxide Equivalents in metric tons (CO2e MT).

- More than 500 cities, towns and counties have used ClearPath, making it the most widely-used tool for managing local climate mitigation efforts.
2018 GHG Inventory – Executive Summary

- **Citywide emissions: 891,149 Metric Tons CO2 equivalent**
  - 94.1% of emissions occur in top seven sectors
  - Commercial electricity is the highest single emitting sector at 24.9%
  - Residential Energy (electricity and natural gas) accounts for 32.9% and is the highest category
  - Commercial Energy (electricity and natural gas) accounts for 29.9%
  - Transportation (gasoline and diesel) and mobility (SMART buses) account for 25.1%
  - Industrial Energy (electricity and natural gas) accounts for 6.9%

- **Municipal operations emissions: 12,478 Metric Tons CO2 equivalent**
  - Municipal operations only account for 1.4% of citywide emissions total

**Findings:**

- Mitigation strategies must focus on highest emitting sector(s)
- Municipality climate actions can only affect so much change
- Majority of reduction opportunities and responsibility falls on community (commercial and residential sectors)
- Substantial opportunities for residential energy waste reduction and utility cost savings
- Substantial opportunities for commercial electricity waste reduction and utility cost savings
- City needs to advocate for GHG reducing policies, programs, incentives from the county and state to provide to businesses and residents
Inventory Results and Anticipated GHG Reduction Details
## 2018 GHG Inventory Results: Entire Community

<table>
<thead>
<tr>
<th>Categories</th>
<th>CO2e (MT)</th>
<th>Percent of Total</th>
<th>Top 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial Electricity</td>
<td>221,811</td>
<td>24.9%</td>
<td></td>
</tr>
<tr>
<td>Transportation Gasoline</td>
<td>161,668</td>
<td>18.1%</td>
<td></td>
</tr>
<tr>
<td>Residential Electricity</td>
<td>148,302</td>
<td>16.6%</td>
<td></td>
</tr>
<tr>
<td>Residential Natural Gas</td>
<td>145,364</td>
<td>16.3%</td>
<td></td>
</tr>
<tr>
<td>Industrial Electricity</td>
<td>58,923</td>
<td>6.6%</td>
<td></td>
</tr>
<tr>
<td>Transportation Diesel</td>
<td>57,728</td>
<td>6.5%</td>
<td></td>
</tr>
<tr>
<td>Commercial Natural Gas</td>
<td>44,394</td>
<td>5.0%</td>
<td></td>
</tr>
<tr>
<td>Electric Grid Transmission Losses</td>
<td>21,085</td>
<td>2.4%</td>
<td></td>
</tr>
<tr>
<td>Landfilling of Solid Waste</td>
<td>8,321</td>
<td>0.9%</td>
<td></td>
</tr>
<tr>
<td>Natural Gas System Leakage</td>
<td>6,268</td>
<td>0.7%</td>
<td></td>
</tr>
<tr>
<td>Transportation SMART</td>
<td>4,508</td>
<td>0.5%</td>
<td></td>
</tr>
<tr>
<td>Wastewater Treatment</td>
<td>4,138</td>
<td>0.5%</td>
<td></td>
</tr>
<tr>
<td>Street Lighting</td>
<td>3,045</td>
<td>0.3%</td>
<td></td>
</tr>
<tr>
<td>Industrial Natural Gas</td>
<td>2,398</td>
<td>0.3%</td>
<td></td>
</tr>
<tr>
<td>Potable Water Treatment</td>
<td>1,922</td>
<td>0.2%</td>
<td></td>
</tr>
<tr>
<td>Waste Collection and Transport</td>
<td>1,274</td>
<td>0.1%</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>891,149</strong></td>
<td><strong>100%</strong></td>
<td></td>
</tr>
</tbody>
</table>

**USA 2016 = 15.5 CO₂e MT per person**  
**Royal Oak 2018 = 15.0 CO₂e MT per person**
2018 GHG Inventory Results: Municipal Operations

<table>
<thead>
<tr>
<th>Categories</th>
<th>CO2e (MT)</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buildings &amp; Facilities Electricity</td>
<td>4,885</td>
<td>39.1%</td>
</tr>
<tr>
<td>Street Lights &amp; Traffic Signals</td>
<td>3,045</td>
<td>24.4%</td>
</tr>
<tr>
<td>Buildings &amp; Facilities Natural Gas</td>
<td>1,705</td>
<td>13.7%</td>
</tr>
<tr>
<td>Employee Commute</td>
<td>1,389</td>
<td>11.1%</td>
</tr>
<tr>
<td>Vehicle Fleet</td>
<td>1,317</td>
<td>10.6%</td>
</tr>
<tr>
<td>Off-road Equipment</td>
<td>91</td>
<td>0.7%</td>
</tr>
<tr>
<td>Air Conditioning Fugitive Emissions</td>
<td>46</td>
<td>0.4%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>12,478</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>

City Government: 12,478
Entire Community: 891,149
City's Percentage: 1.4%
Emission sources not included:

1. Food consumption
2. Durable and non-durable consumer goods consumption
3. Leisure travel
4. Gasoline powered yard maintenance equipment for residential, commercial, and industrial. (municipal was counted)
5. Off-road vehicles, snowmobiles and boats for residential, commercial, and industrial. (municipal was counted)
6. Leakage from air conditioners, chillers and refrigerators for residential, commercial, and industrial. (municipal was counted)
7. Upstream energy sector construction and processing
GHG Reduction Target Recommendations:

- 2018 Inventory
- 2030: 40% Reduction
- 2050: Net Zero GHG Emissions
Global Warming of 1.5°C

An IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty.

United Nations IPCC, 2018 Special Report, Summary for Policy Makers
• Blue: net zero 2040
• Gray: net zero 2055
• Pink: no increase after 2030
GHG Reduction Actions Sectors:

- Electricity
- Transportation
- Natural Gas
- Carbon Sequestration

GHG Reduction Solutions
1. Reduce Use
2. Improve Efficiency
3. Switch to Renewables
4. Increase Native Flora
Examples of Existing City Sustainability Initiatives:

• **Energy**
  – Approved energy plan-March 2018

• **Waste**
  – Single stream recycling
  – Municipal building recycling program
  – Food composting program (library, senior center, and city hall)

• **Water**
  – Municipal rain gardens/bioswales (6)

• **Air Quality**
  – Tree Replacement Ordinance and Fund
  – Purchased 4 hybrid LEV

• **Transportation**
  – Non-Motorized Plan in Master Plan
  – EV Charging Stations (8)

• **Public Policy**
  – Pro-green ordinances (rain gardens, solar/wind, stormwater detention, permeable surfaces, ribbon drive)
Developing Prioritized Climate Action Strategies

**Short**
- Municipal Operations energy efficiency
- Urban Tree Canopy
- Renewable electric power generation-on-site
- Incorporate electric vehicles (EV) for fleet
- EV chargers

**Mid**
- Commercial, Industrial & Residential energy efficiency
- Education/incentive programs
- Telecommuting
- Non-motorized transportation infrastructure

**Long**
- Public Policy
- Building/Zoning policies
- Transportation- EV adoption
- Renewable electric power generation-offsite

Review

Metrics

Attachment 1
Big Picture: Climate actions to achieve GHG reduction targets will exist embedded within developing sustainability plan’s main focus areas.

Sustainability Plan’s Focus Areas

- Energy
- Water
- Waste
- Transportation
- Quality of Life
Tentative Next Steps:
Responsibilities of staff and EAB

- Sustainability plan development:
  - Create basic plan framework based on GHG inventory findings
  - Community engagement and feedback through charettes, town halls, surveys
  - Distill feedback and incorporate into basic plan framework
  - Submit draft for final feedback session
  - Present plan to commission for approval

- Begin implementation of Sustainability Plan actions
Backup Data
Slides
Transportation Emissions Calculation

USED:

- SEMCOG Vehicle Miles Traveled data (it is the best available)
- Traffic counts taken over multiple years
- Assumptions about percentage of Royal Oak vehicles in traffic counts
- National EPA analysis to determine breakdown of vehicle types
Electricity use in U.S. commercial buildings by major end uses, 2012

Total = 1,243 billion kilowatthours (kWh)

- Lighting: 17%
- Refrigeration: 16%
- Ventilation: 16%
- Cooling: 15%
- Computers: 10%
- Office equipment: 4%
- Cooking: 2%
- Space heating: 2%
- Water heating: 0%
- All other: 18%

Note: All other includes motors, pumps, air compressors, process equipment, backup electricity generation, and miscellaneous appliances and plug-loads.

Electrical Energy GHG Reductions

Assumptions:
1. 1% year on year electrical energy efficiency improvement from 2020 to 2040
2. DTE Energy fulfills its net-zero by 2050 carbon reduction, renewable energy plan

<table>
<thead>
<tr>
<th>Year</th>
<th>2018</th>
<th>2030</th>
<th>2040</th>
<th>2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2e (MT)</td>
<td>459,226</td>
<td>240,270</td>
<td>78,458</td>
<td>0</td>
</tr>
<tr>
<td>% Improve</td>
<td></td>
<td>34%</td>
<td>76%</td>
<td>100%</td>
</tr>
</tbody>
</table>
Transportation GHG Reductions

Assumptions:

Sales of electric vehicles increase linearly from 2% in 2019 to 28% in 2030 to 58% in 2040 and to 100% in 2050.

Every year 10% of the Royal Oak car buying population buys a new car and keeps it for 10 years before buying another.

The average efficiency of gasoline and diesel vehicles do not change after 2020 (33mpg).

The average efficiency of electric vehicles do not change after 2020 (31kWh/100miles).

Royal Oak residents continue to drive the same number of miles every year from 2018 to 2050.

Royal Oak residents charge their electric vehicles with electricity supplied by DTE Energy.

DTE Energy increases their renewable electricity generation as stated in their current Integrated Resource Plan.

<table>
<thead>
<tr>
<th>Year</th>
<th>2018</th>
<th>2030</th>
<th>2040</th>
<th>2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2e (MT)</td>
<td>225,178</td>
<td>186,898</td>
<td>135,035</td>
<td>45,496</td>
</tr>
<tr>
<td>% Improve</td>
<td>15%</td>
<td>40%</td>
<td>80%</td>
<td></td>
</tr>
</tbody>
</table>
Natural Gas GHG Reductions

Assumption:
1. 0.75% year on year energy efficiency improvement from 2020 to 2050 (based on current state mandate levels)

<table>
<thead>
<tr>
<th>Year</th>
<th>2018</th>
<th>2030</th>
<th>2040</th>
<th>2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2e (MT)</td>
<td>198,424</td>
<td>175,880</td>
<td>159,063</td>
<td>143,853</td>
</tr>
<tr>
<td>% Improve</td>
<td>9%</td>
<td>15%</td>
<td>21%</td>
<td></td>
</tr>
</tbody>
</table>

Greater reductions can be made by switching from gas appliances to electric and gas furnaces to ground source heat pumps.
Potential City Government Actions - Municipal Operations and Policies

1. Energy efficiency upgrades of municipal buildings
2. City-wide LED street lighting conversion
3. Renewable energy- review opportunities for implementation
4. Revolving energy fund- to support municipal building upgrades
5. Tree canopy expansion
6. Native plantings expansion
7. Zero or low emissions vehicles for fleet
8. EV charger infrastructure for fleet and public usage expansion
9. Policies/programs that encourage new buildings achieve near-zero or net zero CO2 emissions
10. Policies/programs for large commercial and multi-family buildings to benchmark and report their energy performance
11. Policies/programs to assist large commercial and/or multifamily buildings to perform energy upgrades
12. New building standards for new or substantially renovated municipal buildings and for larger, new developments