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vocon.

Strategy Design Architecture

oswald
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CLIMATE CHANGE: A CANDID DISCUSSION

TODAY’S SPEAKERS:

Dr. David Orr, Paul Sears Distinguished Professor of Environmental Studies, Oberlin College

Heather Taylor-Miesle, Executive Director, Ohio Environmental Council

Mike Foley, Director of Sustainability, Cuyahoga County

Matt Gray, Chief of Sustainability, City of Cleveland
David W. Orr
david.orr@oberlin.edu
Paul Sears Distinguished Professor of Environmental Studies & Politics, Emeritus. He also served as “Counselor to the President” of Oberlin College for ten years. He is the author of eight books, including Dangerous Years: Climate Change and the Long Emergency (Yale, 2016) and Down to the Wire: Confronting Climate Collapse (Oxford, 2009) and co-editor of three others. He has authored over 220 articles, reviews, book chapters, and professional publications. In the past twenty-five years he has served as a board member or adviser to ten foundations and on the Boards of many organizations including the Rocky Mountain Institute, Bioneers, and the Aldo Leopold Foundation. He is currently a Trustee of the Alliance for Sustainable Colorado, Children and Nature Network, and the WorldWatch Institute. He has been awarded nine honorary degrees and a dozen other awards including a Lyndhurst Prize, a National Achievement Award from the National Wildlife Federation, leadership awards from the U.S. Green Building Council (2014) and from Second Nature (2012), and a lifetime achievement award from Green Energy Ohio (2015) and the North American Association for Environmental Education (2018). He has lectured at hundreds of colleges and universities throughout the U.S., Europe, Latin America, and Asia. He headed the effort to design, fund, and build the Adam Joseph Lewis Center, which was named by an AIA panel in 2010 as “the most important green building of the past thirty years,” as “one of thirty milestone buildings of the twentieth century” by the U.S. Department of Energy, and as one of “52 game-changing buildings of the past 170 years” by the editors of Building Design +Construction in January, 2016. He was instrumental in the design and funding of the Platinum-rated Peter B. Lewis Gateway Center. He is the founder of the Oberlin Project and a founder of the journal Solutions. His current work is on the state of American democracy (www.stateofamericandemocracy.org) that includes publication of a co-edited book Democracy Unchained: Politics as if All People Matter (The New Press, 2020) and public events in major cities across the U.S.
1. The Science
Figure 2.11: Global mean energy budget under present day climate conditions. Numbers state magnitudes of the individual energy fluxes in W/m², adjusted within their uncertainty ranges to close the energy budgets. Numbers in parentheses attached to the energy fluxes cover the range of values in line with observational constraints. Figure adapted from Wild et al. (2013).
Atmospheric CO₂ at Mauna Loa Observatory

Scripps Institution of Oceanography
NOAA Earth System Research Laboratory

414 ppm, June, 2019
15-20 year lag effects
Atmosphere CO2 increased by the second highest annual amount in the past six decades in 2018.

1990s: average annual growth rate c. 1.5 ppm

Last decade: average annual growth rate c. 2.2 ppm

Concentrations were 414.8 parts per million in May... 3.5 ppm higher than the same time last year.
For centuries, atmospheric carbon dioxide had never been above this line.
New NOAA data show that atmospheric methane levels surged to a new record in 2018.

Large scale fracking of shale starts in the USA (one candidate reason for the increase, or part thereof).

And the oil and gas industry fracks away, often lobbying to suppress even monitoring of leakage, often substantial where measured.
Temperature Anomaly (°C)
(Difference from 1980-2015 annual mean)

Record Years

1880
Global temperatures – change from pre-industrial

Data: NOAA, NASA, UK Met Office/CRU
Summer temperatures 1951-1980

- Extremely cold
- Normal
- Extremely hot

Base period
carbon residence in atmosphere

decades  centuries  milennia
At 100 yrs after emission 33% of emission is still in the atmosphere

Remaining Airborne
33% at 100 years
19% at 1000 years

FIGURE 5.1 Decay of fossil fuel CO_2 emission.

The climatic impacts of releasing fossil fuel CO\(_2\) to the atmosphere will last longer than Stonehenge. Longer than time capsules, longer than nuclear waste, far longer than the age of human civilization so far. Each ton of coal that we burn leaves CO\(_2\) gas in the atmosphere. The CO\(_2\) coming from a quarter of that ton will still be affecting the climate one thousand years from now.

David Archer, 2009
2. Global destabilization: all Hell breaks loose!
On the horizon, a future of cascading system failures threatening basic necessities like food supply and electricity.
Background: climate change what’s at stake?

**James Lovelock:** Some time during this century the Earth system will pass a threshold beyond which it is committed to irreversible and mostly adverse change. Once we pass this threshold set by the level of carbon dioxide in the air of somewhere between 400 and 500 parts per million, nothing the nations of the world do will alter the outcome. We are in a sense like passengers on a small pleasure boat sailing quietly down the St. Lawrence River towards the Niagara Falls, not knowing that the engines are about to fail.

**Martin Rees:** Odds are 50-50, maybe less . . .
The Greenland ice sheet is melting unusually fast this summer.

Reminder: if the entire sheet melts it would raise global sea levels by more than 7 metres.

Source: National Snow and Ice Data Centre, University of Colorado Boulder
Climate-driven disease: 2019 ... candida auris

1. Global warming is responsible for raising the ambient climate temperatures, which selects fungal clades that can reproduce at avian and mammalian basal temperatures.

2. Candida auris previously existed as a plant saprophyte that gained thermotolerance and salinity tolerance as a result of the effects of climate change on the wetland ecosystem.

3. Thermotolerant C. auris may have been transplanted by birds across the globe to rural areas where human and birds are in constant contact.

4. Rural environment activities (e.g., farming) provide the opportunity for interspecies transmission of virulent pathogens such as C. auris.

5. Human migration towards urban areas eventually led C. auris into health care environments.

FIG 2 Proposed scheme for the emergence of C. auris.
Economic Impacts of warming 2080-2100 @ 0.7%/degree. Science, 30 June, 2017

predicted damage 2080-2099 percent by county

-5% 0 +5 10
Flooding in Brooklyn, NY 7-22-2019/heat-wave previous four days
Several wildfires between about 62°N and 69°N in Alaska, USA, and the Yukon Territory, Canada - July 22nd, 2019 - Enhanced natural colors with MCD14 thermal anomalies (Hot spots). Aqua and Terra MODIS data through NASA Worldview, processed by Pierre Markuse.

July 22, 2019
Smoke from Western wildfires September 2017
Refugee camp in Chad . . .
Two billion climate change refugees by 2100, Charles Geisler
3. Why didn’t we act when we knew the facts?
“It’s very hard to see us fixing the climate until we fix our democracy.”

James Hansen
“Media coverage of climate change directly affects the level of public concern . . .

The most important factor in influencing public opinion on climate change, however, is the elite partisan battle over the issue . . . When elites have consensus, the public follows suit and the issue becomes mainstreamed . . .

Robert Brulle, Jason Carmichael, J Craig Jenkins, Climate Change, 2.3.12
Key Components of the Climate Change Denial Machine

**Fossil Fuels Industry**
- ExxonMobil, Peabody Coal, American Petroleum Institute, Western Fuels Association, Edison Electric Institute, et al.

**Corporate America**

**Conservative Foundations**

**Conservative Think Tanks**
- American Enterprise Institute, Cato Institute, Committee for a Constructive Tomorrow, Competitive Enterprise Institute, Heritage Foundation, Heartland Institute, George C. Marshall Institute, et al.

**Front Groups**

**Astroturf Organizations and Campaigns**
- Americans for Prosperity ("Regulation Reality" tours), Freedom Works ("Hot Air" rallies), Americans for Balanced Energy Choices ("citizens’ army" to lobby for coal and oppose climate legislation), American Coalition for Clean Coal Energy (media and lobbying campaigns, forged letters to Congress), Energy Citizens (rallies against climate legislation), et al.

follow the money:

fossil fuel industry:  ~$3 trillion/yr business

with annual subsidies of $594 billion*

with externalities of $120 billion** to $500 billion***

*management information systems
**National Research Council 2009;
***Paul Epstein et.al. 2011
ahead: the mother of all bubbles

combustion of another 565 gigatons >2°C

reserves = 2,795 gigatons = ~$20 trillion*

upshot: laws of physics & chemistry v. f.f. economy

(what good is a big economy if you don’t have a planet to put it on?)

*Capital Institute
Climatic destabilization

- scientific consensus among those who study climate for a living, ~100%
- unfolding faster, larger than anticipated
- scale & duration: global, ~permanent
- tipping points/nasty surprises ahead
- risks are foolish . . . efficiency + solar = global energy demand
climate change is not:

1. global warming, but planetary destabilization
2. a matter of belief, but physics & chemistry
3. an isolated problem, but a system crisis
4. controversial, but consensus science
5. a short-term problem
4. What can we do??
2.27MW ... 3.2 MW output ... baseload 11MW

White House: One of 16 “climate champion” cities Clinton Climate Initiative “participant status,” C-40
U.S. electricity generation from renewables surpassed coal in April

U.S. monthly electricity generation from selected sources (Jan 2005-Apr 2019)

Source: U.S. Energy Information Administration, Electric Power Monthly
Adam Joseph Lewis Center

“one of thirty milestone buildings in 20th century,” DOE
“most important green building in past 30 years,” AIA
“One of 30 ‘game changers’ of past 170 years”

Building Design + Construction (January, 2016)
The Gateway Center, USGBC Platinum, solar-powered
1. we pay for sustainability whether we get it or not.

- health
- security
- environment
- social stability
- economy
- climate
- mind
The problem of unsustainability . . .

Systemic errors of societal design will make things worse and worse . . . until the systemic errors are addressed, the very conditions for survival and prosperity will continue to systematically decline . . . The problem is that industrial society is designed so that pollutants are bound to increase in concentrations globally . . .

Karl-Henrik Robert, et.al.
Questions:

1. Are we **resilient** enough to deal with larger storms, climate variability, extended heat-waves, supply disruptions?

2. Where are **leverage points**, i.e. $2 + 2 = 22$?

3. Can we be **carbon neutral** by 2030?

4. Are we developing informed, committed **leaders**?

5. Can we grow to deal with **internal U.S. migration** from coasts, south, and interior?

6. A comprehensive **regional climate policy**?
Heather Taylor-Miesle has more than 20 years of experience advocating for greater environmental and public health protections, and working with our nation’s top decision-makers to bring environmental issues into the political spotlight. Prior to joining the OEC, Heather was the leader of the NRDC Action Fund, where she grew the organization from a mere concept into an environmental powerhouse in national politics. She also served as the NRDC’s deputy legislative director, worked with Fortune 500 companies to strengthen their sustainability practices, and held key aide positions on Capitol Hill working on energy and natural resources issues. Heather studied political science and communications at Marietta College in Marietta, Ohio and earned her master’s of public administration from the University of Southern California.

Heather is also the President of the OEC Action Fund.
Mike Foley is the first Director of the Department of Sustainability for Cuyahoga County. He was appointed to lead the office in February, 2015 by Executive Armond Budish after having served in the Ohio General Assembly from 2006-2014. Foley represented the 120,000 people of the 14th House District and was active in the legislature on environmental, utility, revenue and budget issues. Term limits prevented Foley from running for office after 2014. Prior to being in the General Assembly, Foley was Executive Director of the Cleveland Tenants Organization (CTO) for almost ten years and has extensive experience in affordable rental housing issues both locally and those involving national policy. Before CTO he was the Court Administrator for Cleveland Municipal Housing Court. Mike has been married to his wife Chris for 30 years, and they have 4 children.
Cuyahoga County Community GHG Emissions Inventory: Overview

- Completed with the Brendle Group in conjunction w/the City of Cleveland’s GHG inventory update – using Global Protocol (international standard for GHG emissions inventories)
- 2010-17 data
- Energy (electricity and natural gas), Transportation, Waste, and Industrial Processes
- 10% total decrease in emissions
- Energy emissions decrease by 21%
- Transportation emissions increase by 9%

<table>
<thead>
<tr>
<th>Source</th>
<th>2010</th>
<th>2017</th>
<th>GHG Change (million MTCO2e)</th>
<th>Emissions % change</th>
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<tr>
<td>Stationary Energy</td>
<td>15.4</td>
<td>12.2</td>
<td>-3.26</td>
<td>-21%</td>
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<tr>
<td>Natural Gas</td>
<td>6.5</td>
<td>6.0</td>
<td>-0.54</td>
<td>-8%</td>
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<tr>
<td>Residential</td>
<td>2.9</td>
<td>2.5</td>
<td>-0.35</td>
<td>-12%</td>
</tr>
<tr>
<td>Commercial</td>
<td>1.7</td>
<td>1.5</td>
<td>-0.24</td>
<td>-14%</td>
</tr>
<tr>
<td>Industrial</td>
<td>2.0</td>
<td>2.0</td>
<td>0.05</td>
<td>3%</td>
</tr>
<tr>
<td>Electricity</td>
<td>9.0</td>
<td>6.3</td>
<td>-2.72</td>
<td>-30%</td>
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<tr>
<td>Residential</td>
<td>2.5</td>
<td>1.7</td>
<td>-0.83</td>
<td>-33%</td>
</tr>
<tr>
<td>Commercial</td>
<td>3.3</td>
<td>2.2</td>
<td>-1.05</td>
<td>-32%</td>
</tr>
<tr>
<td>Industrial</td>
<td>3.2</td>
<td>2.3</td>
<td>-0.82</td>
<td>-26%</td>
</tr>
<tr>
<td>Fugitive NG Emissions</td>
<td>0.9</td>
<td>0.7</td>
<td>-0.22</td>
<td>-25%</td>
</tr>
<tr>
<td>Transportation</td>
<td>5.3</td>
<td>5.7</td>
<td>0.45</td>
<td>9%</td>
</tr>
<tr>
<td>On-Road</td>
<td>4.9</td>
<td>5.3</td>
<td>0.45</td>
<td>9%</td>
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<tr>
<td>Commercial Air</td>
<td>0.2</td>
<td>0.1</td>
<td>-0.03</td>
<td>-17%</td>
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<tr>
<td>Municipal Air</td>
<td>0.0</td>
<td>0.1</td>
<td>0.01</td>
<td>11%</td>
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<tr>
<td>Marine Vessels</td>
<td>0.2</td>
<td>0.2</td>
<td>0.02</td>
<td>13%</td>
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<tr>
<td>Waste</td>
<td>0.7</td>
<td>0.5</td>
<td>-0.16</td>
<td>-24%</td>
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<tr>
<td>Solid Waste</td>
<td>0.4</td>
<td>0.3</td>
<td>-0.16</td>
<td>-36%</td>
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<tr>
<td>Wastewater</td>
<td>0.2</td>
<td>0.2</td>
<td>0.00</td>
<td>1%</td>
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<tr>
<td>Industrial Process</td>
<td>3.8</td>
<td>4.4</td>
<td>0.60</td>
<td>16%</td>
</tr>
<tr>
<td>Total</td>
<td>26.1</td>
<td>23.5</td>
<td>-2.59</td>
<td>-10%</td>
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</table>
Cuyahoga County Community GHG Emissions Inventory: Emissions make up by source

Overall, 10% total decrease in emissions

Mostly attributable to natural gas replacing coal in our energy grid, and energy efficiency

2010

26.1 million metric tons of C0₂e

2017

23.5 million metric tons of C0₂e

*IPPU – Industrial Processes & Product Use
Cuyahoga County Climate Change Overview: Annual Average Temperature

Graph illustrates three climate periods including: Historic 100-Year Average, 30-Year Average (normal), and the Most Recent 10-Year Average.

- Recent 10-year vs.
  - 100-year increased by 0.9°F
  - 30-year increased by 0.7°F

Source: Midwestern Regional Climate Center
Cuyahoga County Climate Change
Overview: Growing Season

1990 Map

2015 Map


Arbor Day Foundation Plant Hardiness Zone Map published in 2015.

Zone

© 2015 Arbor Day Foundation®
Cuyahoga County Climate Change Overview: Precipitation – Ave. Annual per year

- Recent 10-year vs.
  - 100-year increased by 12.8%
  - 30-year increased by 7.7%

*Source: Midwestern Regional Climate Center*
Cuyahoga County Climate Change Overview: Historic Extreme Precipitation

"Extreme" is defined as the number of days with precipitation exceeding 1 inch

- Recent 10-year vs.
  - 100-year increased by 26.2%
  - 30-year increased by 16.6%

Source: Midwestern Regional Climate Center
Cuyahoga County Climate Change Overview: Ice Cover

### Great Lakes Ice Coverage Decline 1973-2010

<table>
<thead>
<tr>
<th>Lake</th>
<th>Ice Coverage Decline</th>
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</thead>
<tbody>
<tr>
<td>All Great Lakes</td>
<td>71%</td>
</tr>
<tr>
<td>Lake Ontario</td>
<td>88%</td>
</tr>
<tr>
<td>Lake Superior</td>
<td>79%</td>
</tr>
<tr>
<td>Lake Michigan</td>
<td>77%</td>
</tr>
<tr>
<td>Lake Huron</td>
<td>62%</td>
</tr>
<tr>
<td>Lake Erie</td>
<td>50%</td>
</tr>
<tr>
<td>Lake St. Clair</td>
<td>37%</td>
</tr>
</tbody>
</table>

- Ice Cover on Lake Erie has decreased; the graph depicts the change in ice cover since 1975 in km².

Source: GLISA (Great Lakes Integrated Sciences & Assessments)
Cuyahoga County Climate Change Overview: Urban Heat Island Effect

Cuyahoga County Climate Change Overview: Vulnerability Assessment Tool

Climate Vulnerability Map

The map is designed to show the two factors in combination. The Social Factor is displayed semi-transparently over the Physical Factor, and will thus appear lighter if viewed alone.
Cuyahoga County Climate Change Overview: Health

Effects of increased temperatures from climate change on human health

- Elevated level of medical response due to heat-related illnesses
- More people suffer and die from illness and complications related to excessive heat than from cold weather conditions
- Particularly vulnerable groups include the elderly, infants and children under the age of 5, veterans, the poor and ethnic minorities
- Increase in violent crime when daily temperature increases to 95°F or above impacting law enforcement and medical personnel
Vector-borne diseases

- 3x: Number of vector-borne disease case have tripled in the US from 2004 to 2016 (CDC)
- 9: Nine new pathogens spread by mosquitoes and ticks have been discovered or introduced into the US since 2004 (CDC)

West Nile Virus (WNV) in Ohio (2018)

- 64 human cases (9 in Cuyahoga County)
- 16 asymptomatic viremic blood donors (2 in Cuyahoga County)
- 50 veterinary cases (1 in Cuyahoga County)
- 3,281 WNV positive mosquito samples statewide (34 in Cuyahoga County)

Other locally acquired human cases in Ohio (2018)

- La Crosse Encephalitis – 39
- Unspecified California virus - 3

Travel-associated mosquito-borne disease cases in Ohio (2018)

- Chikungunya virus – 1
- Dengue – 5
- Malaria - 50
Impacts on babies and children
• Children, infants, and other vulnerable populations already disproportionately suffer heavy health impacts and mortality from extreme weather – high heat days and heavy rain
• 88% of disease due to climate change occurs in children less than 5 years old
• Due to a lesser acquired immune response, children have a higher mortality rate from climate change induced diseases (e.g. malaria) than do older people

Vector-borne diseases
• Number of vector-borne disease case have tripled in the US from 2004 to 2016 (CDC)
• Nine new pathogens spread by mosquitoes and ticks have been discovered or introduced into the US since 2004 (CDC)
• West Nile Virus (WNV) in Ohio (2018): 64 human cases (9 in Cuyahoga County)
• Other locally acquired human cases in Ohio (2018)
  • La Crosse Encephalitis – 39
  • Unspecified California virus – 3
• Travel-associated mosquito-borne disease cases in Ohio (2018)
  • Chikungunya virus – 1
  • Dengue – 5
  • Malaria - 50
General Focus Area Visions

**Energy:** 100% Renewable Energy by 2050.

**Transportation:** Cleaner Fuel Vehicles, More Public Transit, Biking, and Walking.

**Ecosystems:** Understand What’s Coming, Expand and Protect What’s Here.

**Health:** Extreme Weather, Extreme Heat, New Diseases, New Stresses, Be Prepared and Ready.

**Land Use:** Develop Wisely, More Trees and Greenspace.
Executive Budish - State of the County Speech

- Green Bank
- Greenway Plan
- Roof top Solar
- Transit Oriented Development
- Trees - $1m a year for 5 years
- Electric Vehicle charging stations
- Downtown Microgrid
Want to Go Solar?

Join the
SOLAR UNITED NEIGHBORS
CUYAHOGA COUNTY
SOLAR CO-OP

SolarUnitedNeighbors.org/cuyahoga
Questions?
email: ohteam@solarunitedneighbors.org

Learn More
at one of our
Community Information Sessions

Wednesday, July 24, 2019
Lakewood Public Library
15425 Detroit Ave., Lakewood
6:00-8:00pm

Thursday, July 25
Cleveland Heights Library
2345 Lee Rd.
6:00-8:00pm

Co-op financing considerations

- Systems are sized based on the size of available sunny space on your roof, your electricity consumption, and the size of your budget.
- Costs are per watt since panels have different wattages.
- Prices are for a complete, turn-key system and includes equipment and installation.
- Solar is a long-term investment and allows you to hedge against rising electricity prices.

ADDITIONAL INCENTIVES AND FINANCING OPTIONS:
- Solar Renewable Energy Credits (SRECs) are an additional source of revenue from your solar system. These can be solar upfront or they are generated. 1 SREC = 1 MWh of solar energy.
- Traditional loans, solar loans, home equity line of credit (HELOC).
- Installers may offer additional financing options.

SAMPLE CASH PURCHASE:

| 4kW SYSTEM | $11,000 |
| 8kW SYSTEM | $12,000 |
| 30% Federal Tax Credit (2019) | -$3,300 | -$6,600 |
| Net cost | $7,700 | $5,400 |
| Solar Renewable Energy Credit (annual cap) | $15 | $30 |
| Estimated year 1 electricity savings* | $600 | $1,100 |
| Estimated year 10 savings (cumulative)* | $6,000 | $12,500 |
| Estimated lifetime savings (25 years)* | $12,500 | $35,000 |
| Net Profit | $8,800 | $15,400 |

SAMPLE LOANS:
These are sample prices, actual cost will depend on system size, interest rate, credit score, and other factors. These prices do not include incentives besides 30% tax credit.
- Home equity line of credit, interest rate 4%, 30% down with 90% tax credit.

| 4kW SYSTEM | $11,000 |
| 8kW SYSTEM | $12,000 |
| Monthly loan payment | $78 | $57 | $455 | $115 |
| Monthly electric savings** | $50 | $50 | $210 | $100 |
| Net monthly payment | $28 | $7 | $43 | $15 |
| End incentive (after 20 years) | $8,000 | $7,000 | $16,000 | $14,000 |

* 26% interest rate increase over 1-year, 32% 5-year MAX.
** 30% interest rate increase, 32% 5-year production (5kW only, does not include renewable energy credits or additional incentives besides 30% federal tax credits.
Matt Gray serves as Chief of Sustainability for the City of Cleveland. Working on all things urban sustainability, Matt leads the Sustainable Cleveland 2019 initiative to create a thriving green city on a blue lake. He is responsible for advising the City on policies related to sustainability and leading implementation of the Cleveland Climate Action Plan.
Cleveland Taking Climate Action

July 25, 2019
Building Education Series
Matt Gray
407 US #ClimateMayors, representing 70 million Americans, have committed to adopt, honor and uphold the climate goals of the Paris Agreement.
Cleveland Leading on Climate

Top 5 cities leading on climate disclosure

Durban, South Africa
Paris, France
Mexico City, Mexico
Sydney, Australia
Cleveland, Ohio

GLOBAL COVENANT OF MAYORS FOR CLIMATE & ENERGY
COMPLIANT 2017

NATIONAL WINNER 2018
ONE PLANET CITY CHALLENGE
Observed changes in Northeast Ohio

- Rising average temps: 2.4
- Longer freeze-free season: 20
- More rain: 26
- More heavy rain: 22

Cleveland Climate Action Plan: Climate & Social Vulnerability Assessment

Appendix C

USDN Great Lakes Climate Adaptation Network
Climate impacts in Northeast Ohio

- **Public Health**: urban heat island effect, change in vector borne disease patterns
- **Water Quality**: algal blooms, combined sewer overflows, water levels, beach health
- **Food Systems**: increase crop yields in short term, decreased agricultural productivity in long term
- **Forests**: tree species shifting northward
- **Energy**: reduced building heating loads, increased A/C
- **Transportation**: longer navigation season; local roads affected by freeze-thaw cycles, flooding and erosion, etc.
- **Fish and Wildlife**: ecosystem disturbances
- **Climate Refugees**: Over time, increased population
City of Cleveland GHG Inventory
Carbon footprint is down 8%, economic activity is up 20%, population levels have stabilized.
Process for Achieving Our 2030 Goals

Baseline: 12.9 MT
2030 Goal: 7.7 MT
Reduction: 40.3%

-1.7 MT
-2.8 MT
-0.6 MT
-0.1 MT
$170 million saved
100% renewable + jobs, equity
Vision Zero, 70% to 55% SOV
10-min walk to a park, 30% canopy
Food access, circular economy
80% less GHGs
Social & Racial Equity
Good Jobs, Green Jobs
Climate Resilience
Business Leadership
SUMMIT 2019
OCTOBER 16TH
SUSTAINABLE CLEVELAND 2019
CELEBRATING 10 YEARS • BUILDING THE FUTURE
www.sustainablecleveland.org
Thank You!

Matt Gray
Chief of Sustainability
City of Cleveland
mgray@city.cleveland.oh.us

Join us at:
www.SustainableCleveland.org