



NATIONAL ACADEMY of MEDICINE  
**ACTION COLLABORATIVE ON  
DECARBONIZING THE  
U.S. HEALTH SECTOR**

## Carbon Clinic 3

Scope 3, Part 2: Fuel- and energy- related activities, waste, business travel, employee commuting, leased assets, investments, carbon offsets

# Agenda

Carbon Clinic Overview

Scope 3 Overview, Tools, and Resources

Implementation: Providence

Implementation: Cleveland Clinic

Questions & Answers

# The Carbon Clinic Series



## Clinic 1: Scopes 1&2

Understanding the basics  
Scope 1 and 2

### Speakers

- Jon Utech, *Cleveland Clinic*
- Seema Wadhwa, *Kaiser Permanente*
- Matthew St. Claire & Seema Gandhi, *UC Health*



## Clinic 2: Scope 3

Purchased goods & services / supply chain, capital goods, upstream and downstream transportation, use of sold products

### Speakers

- Jodi Sherman, *Yale*
- Beth Schenk, *Providence*
- Matthew Eckelman, *Northeastern University*



## Clinic 3: Scope 3 con't

Fuel- and energy- related activities, waste, business travel, employee commuting, leased assets, investments, carbon offsets

### Speakers

- Matthew Eckelman, *Northeastern University*
- Beth Schenk, *Providence*
- Jon Utech, *Cleveland Clinic*

# Speakers

- Matthew Eckelman, *Northeastern University*
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- Jon Utech, *Cleveland Clinic*



Northeastern  
University







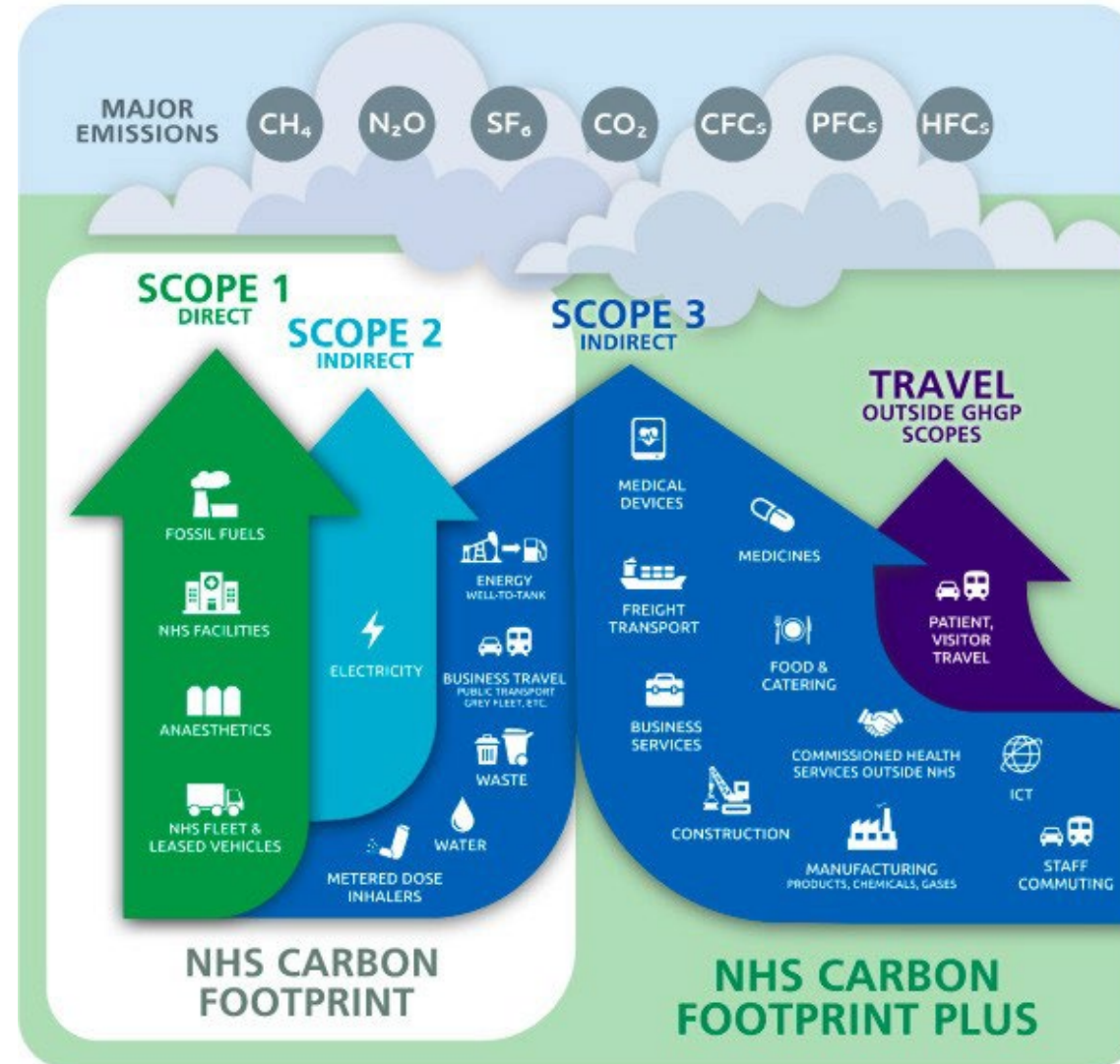
# Carbon Clinic 3

## Scope 3 Emissions (part II)

Matthew Eckelman, PhD

Assoc. Prof., Civil & Environmental Engineering **Northeastern University**

# Carbon Footprint of Health Care





# What are Scope 3 Emissions?

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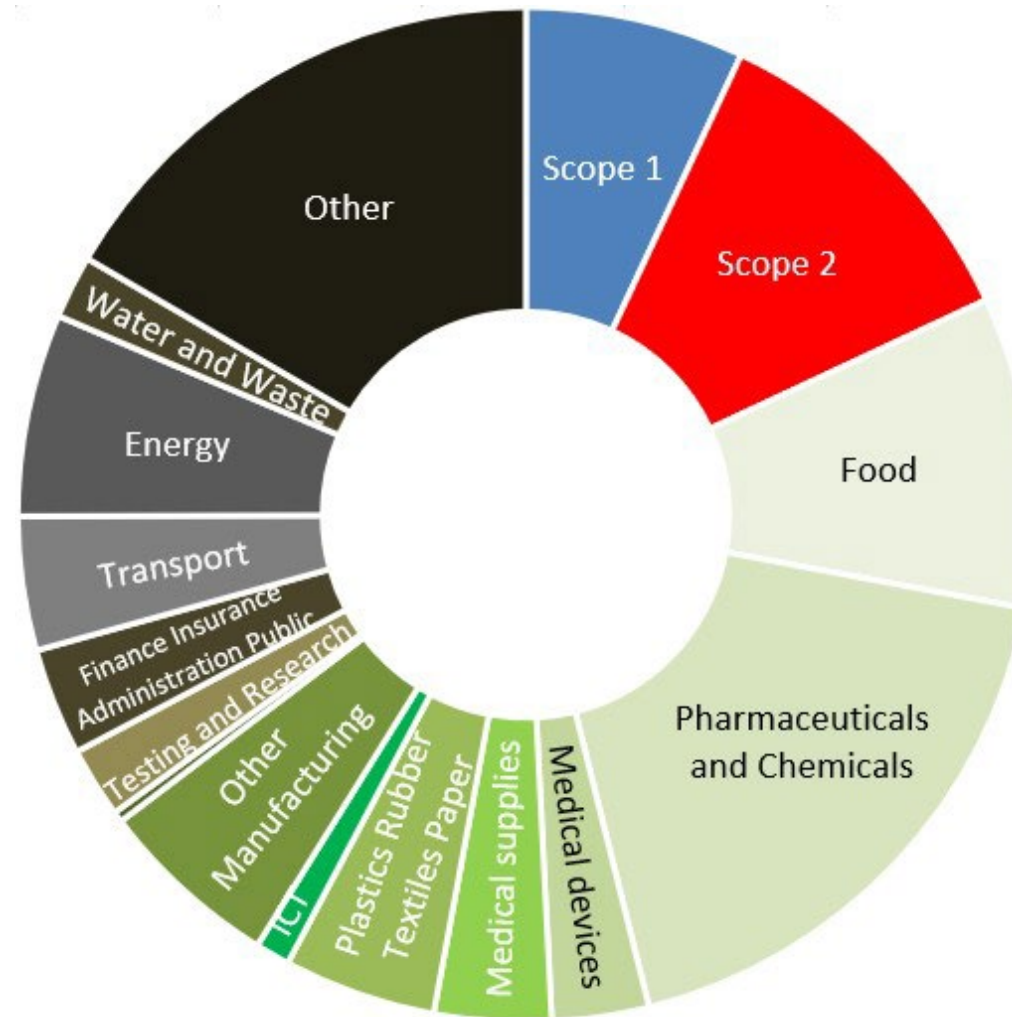


**“Indirect” Emissions in the Value Chain**  
(spatially distributed, huge variety)



# U.S. Health Care GHG Emission Contributions

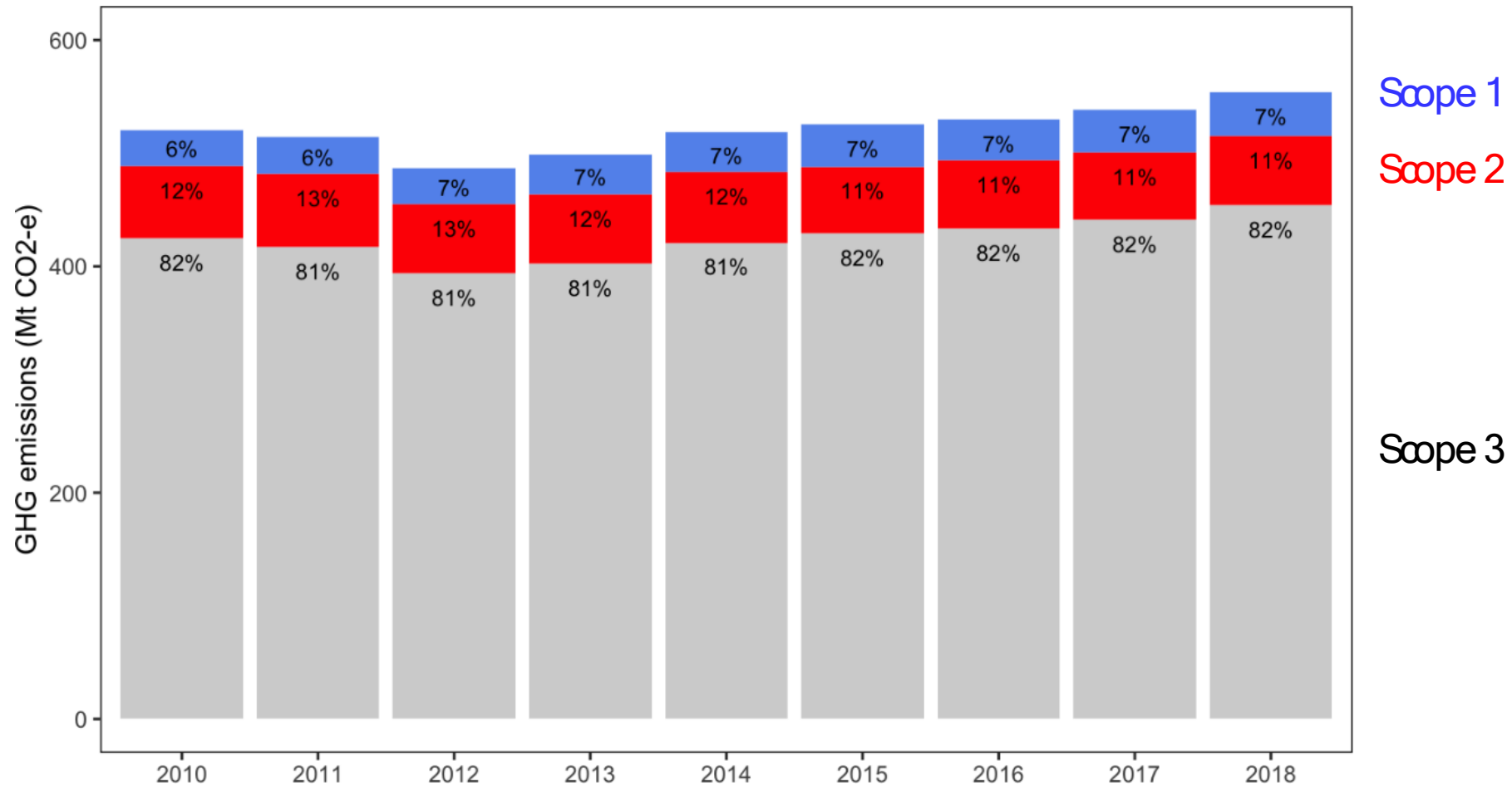
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Eckelman et al., *Health Affairs* 2020



# U.S. Health Care GHG Emission Trends



# Scope 3 Categories

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## Upstream

- ☐ Purchased Goods & Services
- ☐ Capital Goods
- ☐ **Upstream Fuel & Energy**
- ☐ Upstream Transp. & Distribution
- ☐ **Waste**
- ☐ **Business Travel**
- ☐ **Employee Commuting**
- ☐ **Upstream Leased Assets**

## Downstream

- ☐ Downstream Transp. & Distribution
- ☐ Processing of Sold Products
- ☐ Use of Sold Products
- ☐ End-of-Life of Sold Products
- ☐ **Downstream Leased Assets**
- ☐ **Franchises**
- ☐ **Investments**



# Scope 3: Upstream Fuel & Energy

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## Category description

**T**his category includes emissions related to the production of fuels and energy purchased and consumed by the reporting company in the reporting year that are not included in scope 1 or scope 2.



Bucket wheel excavator (Getty)

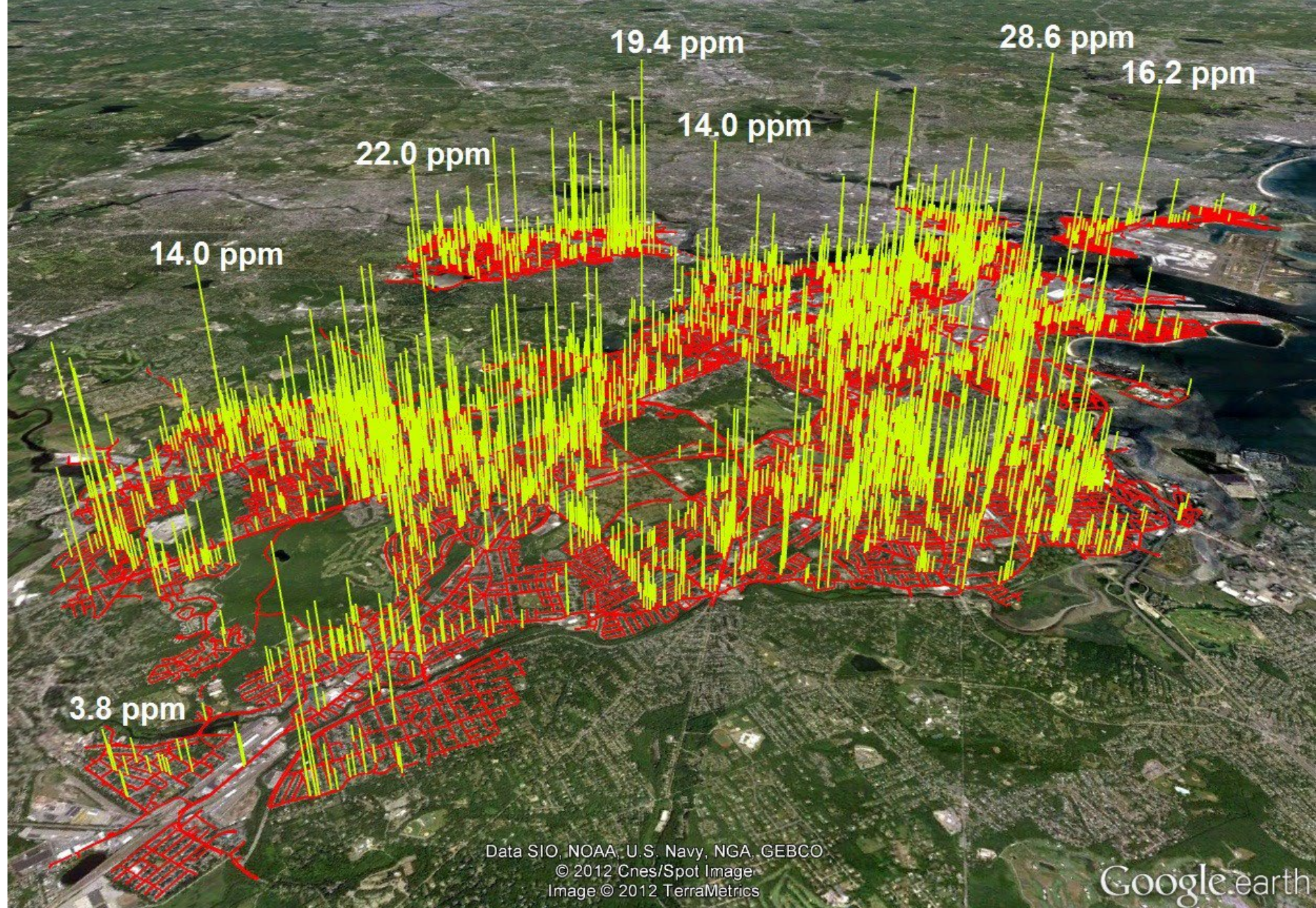


Oil rig gas flaring (Britannica)



Malfunctioning flare (NYT)





Map of Boston natural gas distribution leaks  
(Phillips *et al.* Environmental Pollution **2012**)





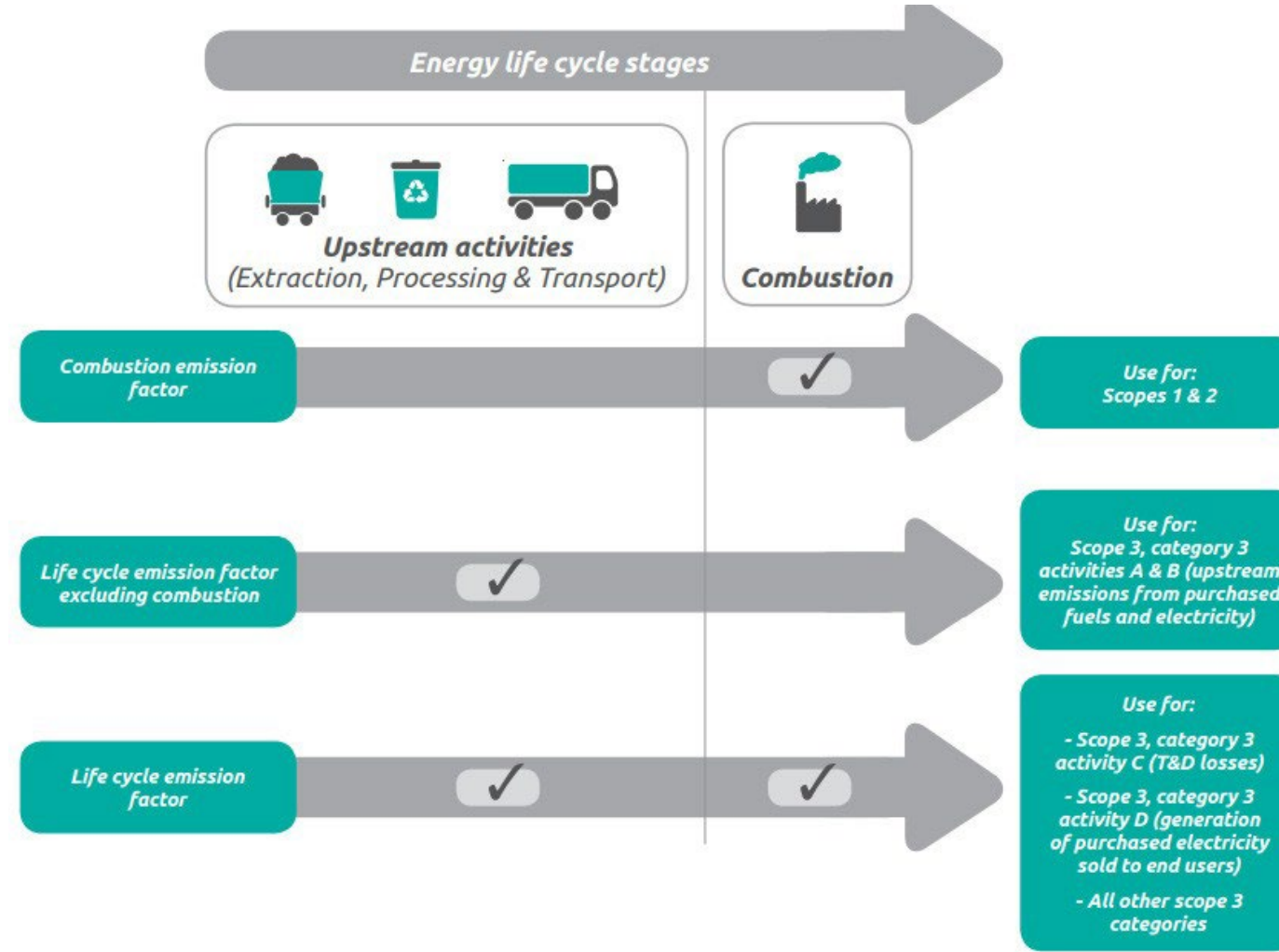
Electricity Transmission & Distribution (T&D) or “line losses”  
(wikipedia)



# Scope 3: Upstream Fuel & Energy

<i>Activity</i>	<i>Description</i>	<i>Applicability</i>
<b>A. Upstream emissions of purchased fuels</b>	Extraction, production, and transportation of fuels consumed by the reporting company Examples include mining of coal, refining of gasoline, transmission and distribution of natural gas, production of biofuels, etc.	Applicable to end users of fuels
<b>B. Upstream emissions of purchased electricity</b>	Extraction, production, and transportation of fuels consumed in the generation of electricity, steam, heating, and cooling that is consumed by the reporting company Examples include mining of coal, refining of fuels, extraction of natural gas, etc.	Applicable to end users of electricity, steam, heating, and cooling
<b>C. Transmission and distribution (T&amp;D) losses</b>	Generation (upstream activities and combustion) of electricity, steam, heating, and cooling that is consumed (i.e., lost) in a T&D system – reported by end user	Applicable to end users of electricity, steam, heating, and cooling
<b>D. Generation of purchased electricity that is sold to end users</b>	Generation (upstream activities and combustion) of electricity, steam, heating, and cooling that is purchased by the reporting company and sold to end users – reported by utility company or energy retailer Note: This activity is particularly relevant for utility companies that purchase wholesale electricity supplied by independent power producers for resale to their customers.	Applicable to utility companies and energy retailers*

# Scope 3: Upstream Fuel & Energy



# Scope 3: Upstream Fuel & Energy

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**Step 1.** Determine fuel and electricity purchases from Scopes 1 and 2 reporting

**Step 2.** Collect emissions factors

- **For energy production-** USEPA recommends using upstream emissions factors (“well-to-tank” or WTT) from the UK:  
[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1083855/ghg-conversion-factors-2022-full-set.xls](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1083855/ghg-conversion-factors-2022-full-set.xls)
- **For electricity T&D-** USEPA publishes T&D loss factors for each US region, combine with electricity carbon emissions factors (from Scope 2)  
[https://www.epa.gov/system/files/documents/2022-01/egrid2020\\_summary\\_tables.pdf](https://www.epa.gov/system/files/documents/2022-01/egrid2020_summary_tables.pdf)

**Step 3.** Multiply for each ‘energy carrier’





# Scope 3: Upstream Fuel & Energy

## Natural Gas Upstream Emissions Example.

**Step 1.** My facility uses 1 million cubic meters of natural gas annually.

**Step 2.** Find WTT emissions factor:

Activity	Fuel	Unit	Total kg CO <sub>2</sub> e per unit
Gaseous fuels	Butane	tonnes	342.14737
		litres	0.19686
		kWh (Net CV)	0.02719
		kWh (Gross CV)	0.02509
	CNG	tonnes	537.6183
		litres	0.09408
		kWh (Net CV)	0.04282
		kWh (Gross CV)	0.03865
	LNG	tonnes	885.68706
		litres	0.40076
		kWh (Net CV)	0.07055
		kWh (Gross CV)	0.06367
	LPG	tonnes	347.0093
		litres	0.18383
		kWh (Net CV)	0.02719
		kWh (Gross CV)	0.02532
	Natural gas	tonnes	432.58645
		cubic metres	0.3434
		kWh (Net CV)	0.03446
		kWh (Gross CV)	0.0311

**Step 3.** Multiply:

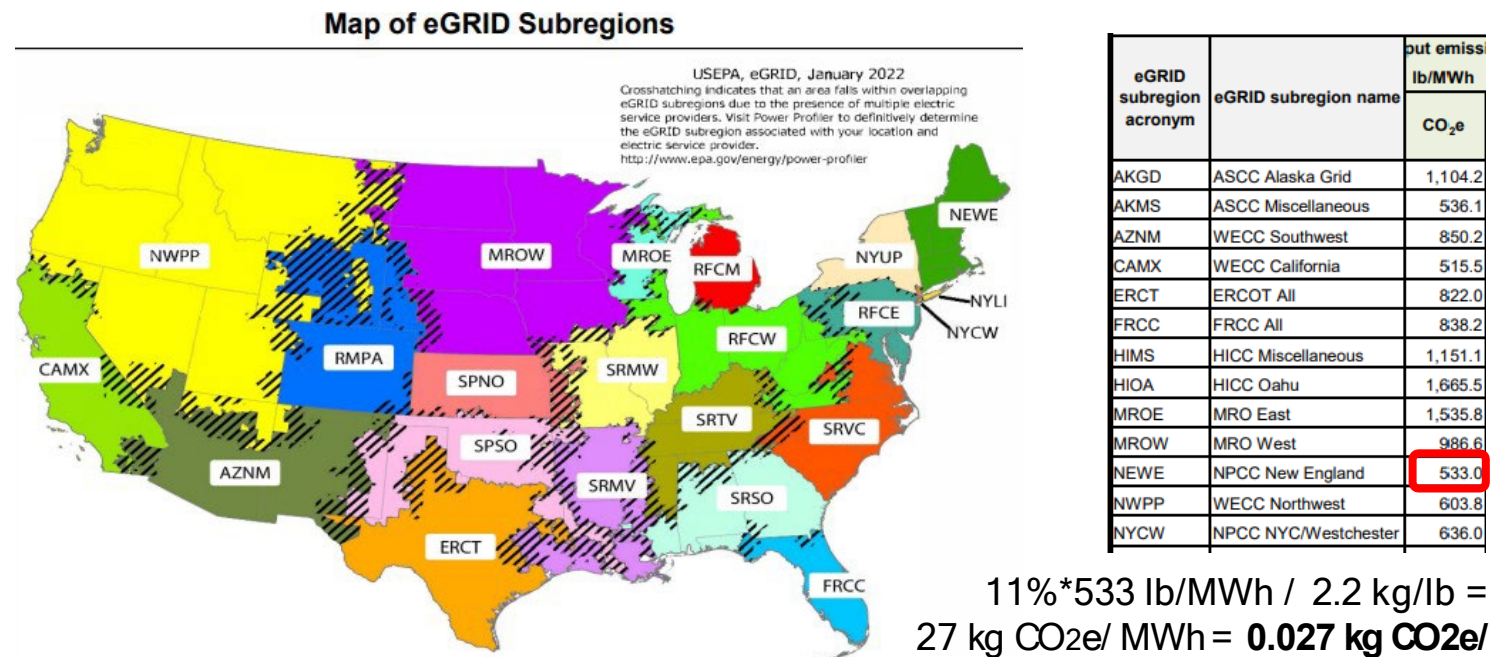
$$(1 \text{ million m}^3) \times (0.343 \text{ kg CO}_2\text{e/m}^3) / 1000 \text{ kg/ton} = 343 \text{ tons CO}_2\text{e}$$

# Scope 3: Upstream Fuel & Energy

## Electricity Upstream Emissions Example.

**Step 1.** My facility uses 1 million kWh of electricity annually.

**Step 2.** Find upstream emissions factor (US average of ~11% of direct EF):



**Step 3.** Multiply:

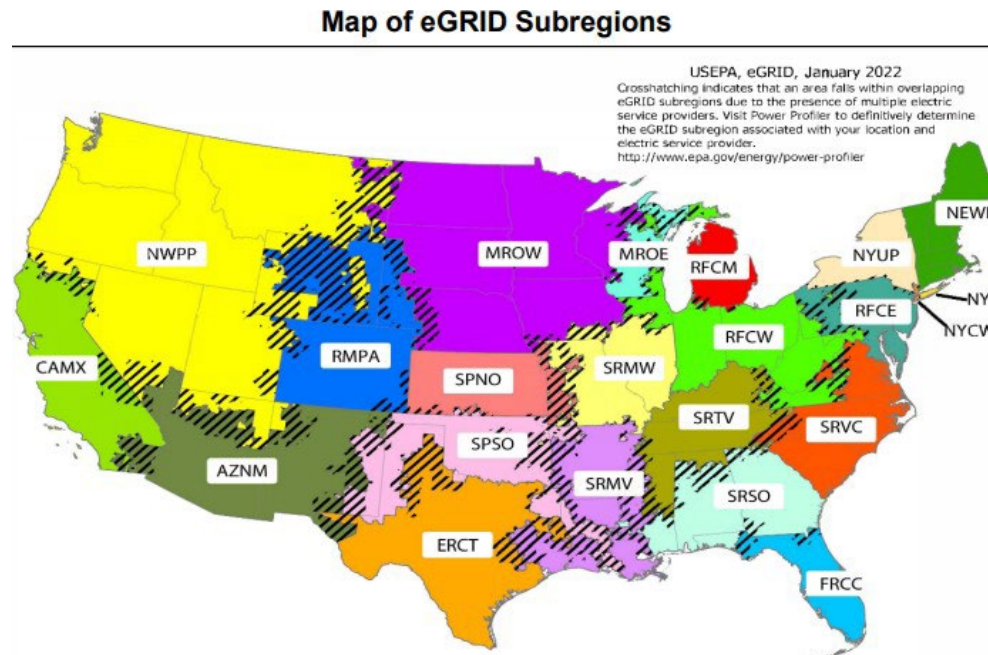
$$(1 \text{ million kWh}) * (0.027 \text{ kg CO}_2\text{e/kWh}) / 1000 \text{ kg/ton} = \mathbf{27 \text{ tons CO}_2\text{e}}$$

# Scope 3: Upstream Fuel & Energy

## Electricity T&D losses Example.

**Step 1.** My facility uses 1 million kWh of electricity annually.

**Step 2a.** Find T&D grid loss factor from USEPA:



(GGL)

eGRID subregion acronym	eGRID subregion name	Grid Gross Loss (%)
AKGD	ASCC Alaska Grid	5.5%
AKMS	ASCC Miscellaneous	5.5%
AZNM	WECC Southwest	5.3%
CAMX	WECC California	5.3%
ERCT	ERCOT All	5.2%
FRCC	FRCC All	5.3%
HIMS	HICC Miscellaneous	5.6%
HIOA	HICC Oahu	5.6%
MROE	MRO East	5.3%
MROW	MRO West	5.3%
NEWE	NPCC New England	5.3%
NWPP	WECC Northwest	5.3%
NYCW	NPCC NYC/Westchester	5.3%
NYLI	NPCC Long Island	5.3%
NYUP	NPCC Upstate NY	5.3%
PRMS	Puerto Rico Miscellaneous	0.0%
RFCE	RFC East	5.3%
RFCM	RFC Michigan	5.3%
RFCW	RFC West	5.3%
RMPA	WECC Rockies	5.3%
SPNO	SPP North	5.3%
SPSO	SPP South	5.3%
SRMV	SERC Mississippi Valley	5.3%
SRMW	SERC Midwest	5.3%
SRSO	SERC South	5.3%
SRTV	SERC Tennessee Valley	5.3%
SRVC	SERC Virginia/Carolina	5.3%
U.S.		5.3%

**Step 2b.** Find loss rate:

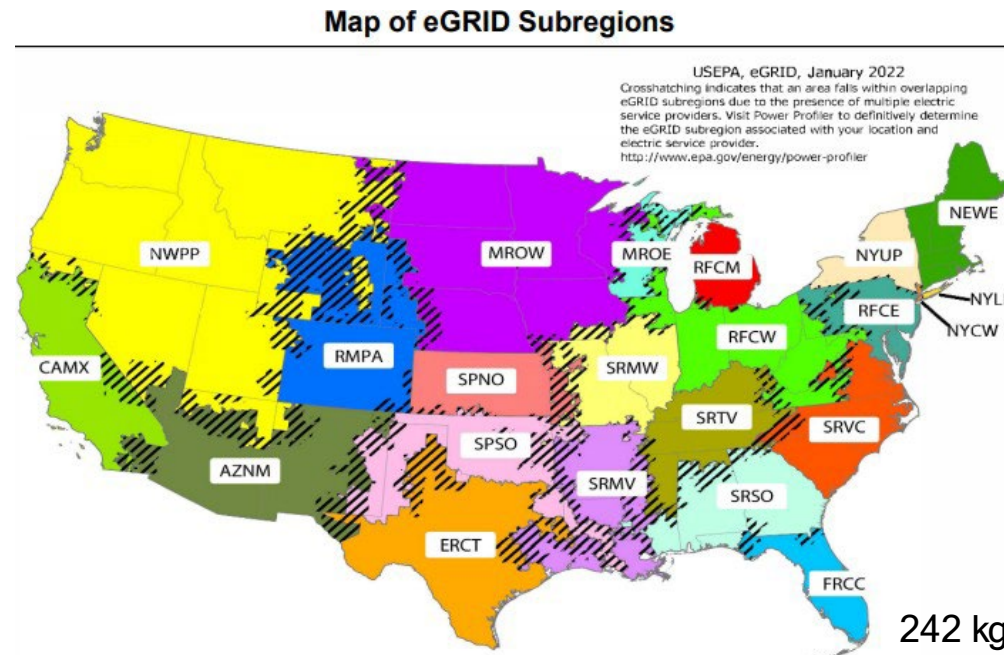
$$(GGL)/(1-GGL) = 0.053/(1-0.053) = 0.056 \text{ kWh loss/kWh consumed}$$

# Scope 3: Upstream Fuel & Energy

**Step 2c.** Calculate total T&D losses:

$$(1 \text{ million kWh}) \cdot (0.056 \text{ kWh/kWh}) = 56,000 \text{ kWh}$$

**Step 2d.** Find electricity emissions factor from USEPA



eGRID subregion acronym	eGRID subregion name	put emiss
		lb/MWh CO <sub>2</sub> e
AKGD	ASCC Alaska Grid	1,104.2
AKMS	ASCC Miscellaneous	536.1
AZNM	WECC Southwest	850.2
CAMX	WECC California	515.5
ERCT	ERCOT All	822.0
FRCC	FRCC All	838.2
HIMS	HICC Miscellaneous	1,151.1
HIOA	HICC Oahu	1,665.5
MROE	MRO East	1,535.8
MROW	MRO West	986.6
NEWE	NPCC New England	533.0
NWPP	WECC Northwest	603.8
NYCW	NPCC NYC/Westchester	636.0

$$533 \text{ lb/MWh} / 2.2 \text{ kg/lb} = 242 \text{ kg CO}_2\text{e/ MWh} = \mathbf{0.242 \text{ kg CO}_2\text{e/ kWh}}$$

**Step 2e.** Combine with upstream EF for electricity:  $0.242 + 0.027 = \mathbf{0.269 \text{ kg CO}_2\text{e/kWh}}$

**Step 3.** Multiply:  $(56,000 \text{ kWh}) \cdot (0.269 \text{ kg CO}_2\text{e/kWh}) / 1000 = \mathbf{15 \text{ tons CO}_2\text{e}}$



# Scope 3: Waste

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## Category description

**C**ategory 5 includes emissions from third-party disposal and treatment of waste generated in the reporting company's owned or controlled operations in the reporting year. This category includes emissions from disposal of both solid waste and wastewater.

- Treatment and disposal of both liquid and solid wastes can produce GHGs through combustion or decomposition



# Scope 3: Waste

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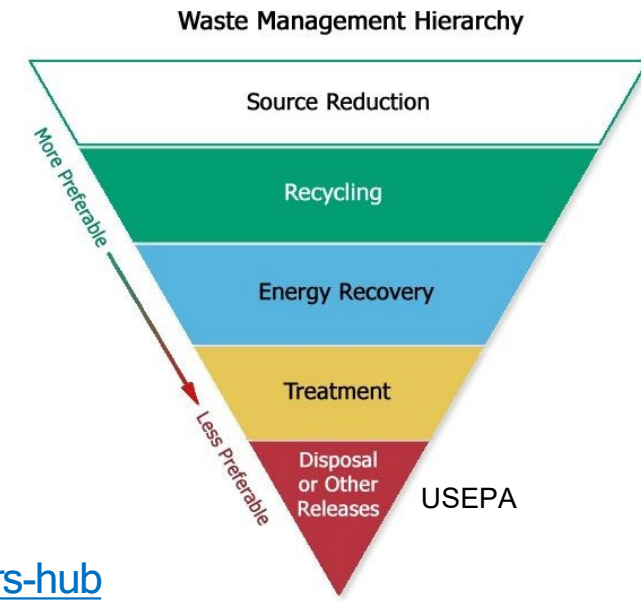
- (follow same directions as for Waste Mgmt. (*Category 12*))

- Estimate material quantities/ types

- Determine prevalent treatment/disposal method

- Use USEPA emissions factors:

<https://www.epa.gov/climateleadership/ghg-emission-factors-hub>



# Scope 3: Business Travel & Employee Commuting

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## *Category description*

**T**his category includes emissions from the transportation of employees for business-related activities in vehicles owned or operated by third parties, such as aircraft, trains, buses, and passenger cars.

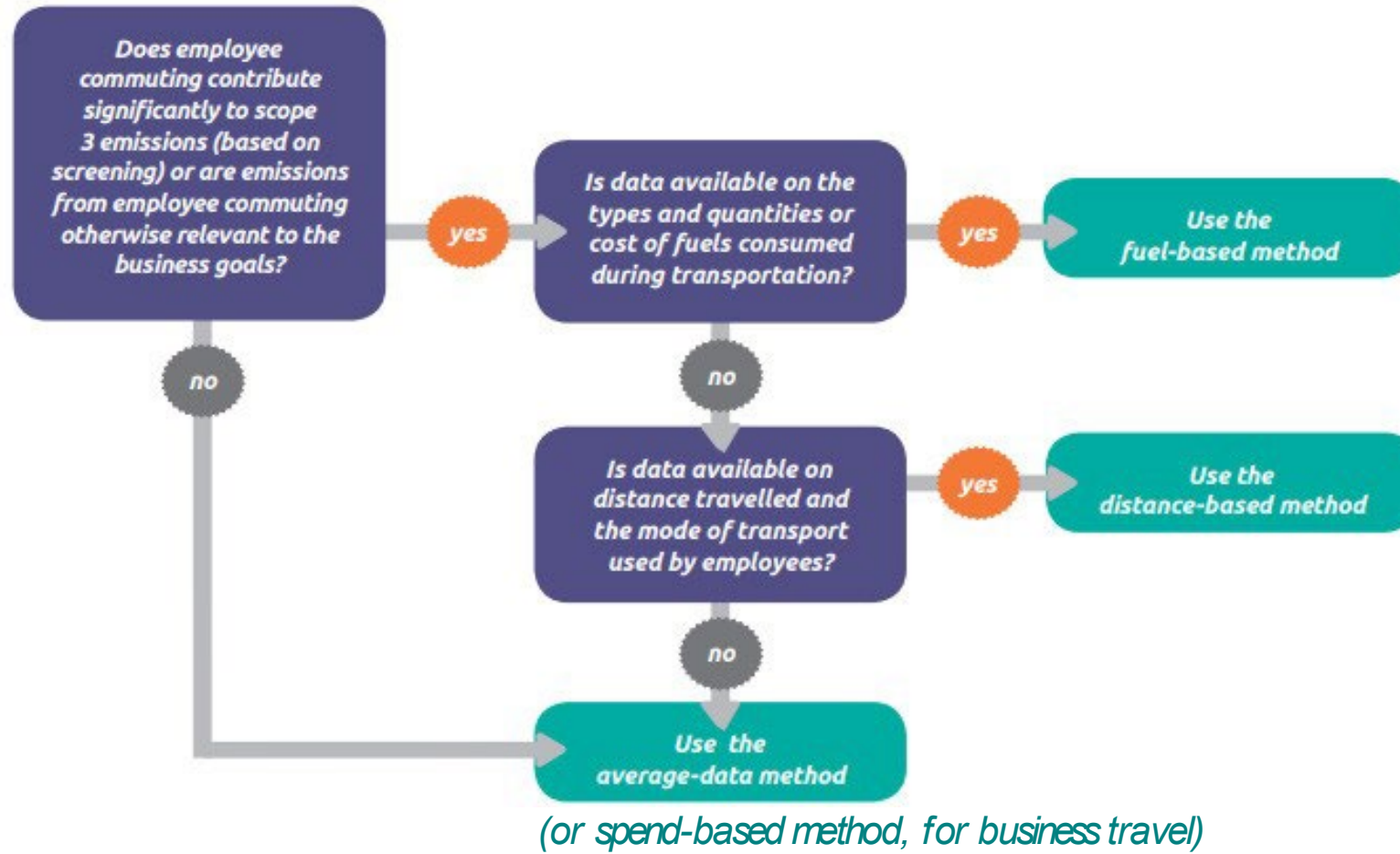
## *Category description*

This category includes emissions from the transportation of employees<sup>4</sup> between their homes and their worksites. Emissions from employee commuting may arise from:

- Automobile travel
- Bus travel
- Rail travel
- Air travel
- Other modes of transportation (e.g., subway, bicycling, walking).

Companies may include emissions from teleworking (i.e., employees working remotely) in this category.

# Scope 3: Business Travel & Employee Commuting





# Scope 3: Business Travel & Employee Commuting

## Train Travel Example.

**Step 1.** My employees travel 10,000 miles by train on the East Coast annually

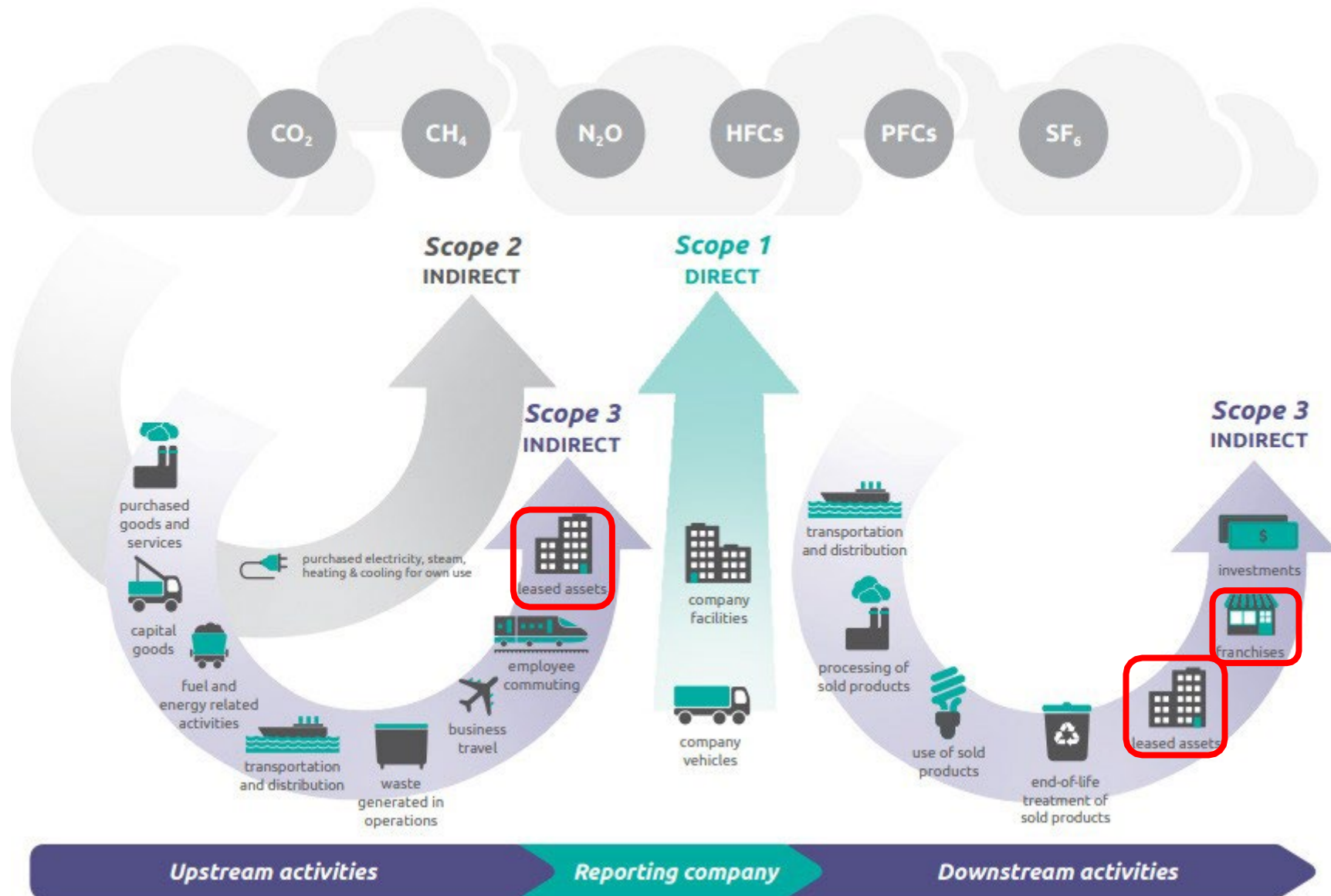
**Step 2.** Use USEPA emissions factor:

Vehicle Type	CO <sub>2</sub> Factor (kg / unit)	CH <sub>4</sub> Factor (g / unit)	N <sub>2</sub> O Factor (g / unit)	Units
Passenger Car <sup>A</sup>	0.332	0.007	0.007	vehicle-mile
Light-Duty Truck <sup>B</sup>	0.454	0.012	0.009	vehicle-mile
Motorcycle	0.183	0.070	0.007	vehicle-mile
Intercity Rail - Northeast Corridor <sup>C</sup>	0.058	0.0055	0.0007	passenger-mile
Intercity Rail - Other Routes <sup>C</sup>	0.150	0.0117	0.0038	passenger-mile
Intercity Rail - National Average <sup>C</sup>	0.113	0.0092	0.0026	passenger-mile
Commuter Rail <sup>D</sup>	0.139	0.0112	0.0028	passenger-mile
Transit Rail (i.e. Subway, Tram) <sup>E</sup>	0.099	0.0084	0.0012	passenger-mile
Bus	0.056	0.0210	0.0009	passenger-mile
Air Travel - Short Haul (< 300 miles)	0.207	0.0064	0.0066	passenger-mile
Air Travel - Medium Haul (>= 300 miles, < 2300 miles)	0.129	0.0006	0.0041	passenger-mile
Air Travel - Long Haul (>= 2300 miles)	0.163	0.0006	0.0052	passenger-mile

**Step 3.** Multiply:

$$(10,000 \text{ miles}) * [0.058 + (0.0055) * (25) / 1000 + (0.0007) * (298) / 1000] = 583 \text{ kg CO}_2\text{e}$$

# Scope 3: Up/Downstream Leased Assets & Franchises



# Scope 3: Up/Downstream Leased Assets & Franchises

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- Just like normal Scopes 1 and 2 accounting, but instead based on operations of properties/items you lease **to** or **from** others
  
- Collect data on:
  - Fuel and electricity use
  - Refrigerant leakage emissions (from averages)
  - Waste anaesthetic gas emissions
  
- Use USEPA emissions factors:  
<https://www.epa.gov/climateleadership/ghg-emission-factors-hub>

# Scope 3: Investments

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## Category description

**T**his category includes scope 3 emissions associated with the reporting company's investments in the reporting year, not already included in scope 1 or scope 2. This category is applicable to investors (i.e., companies that make an investment with the objective of making a profit) and companies that provide financial services. This category also applies to investors that are not profit driven (e.g. multilateral development banks), and the same calculation methods should be used. Investments are categorized as a downstream scope 3 category because providing capital or financing is a service provided by the reporting company.

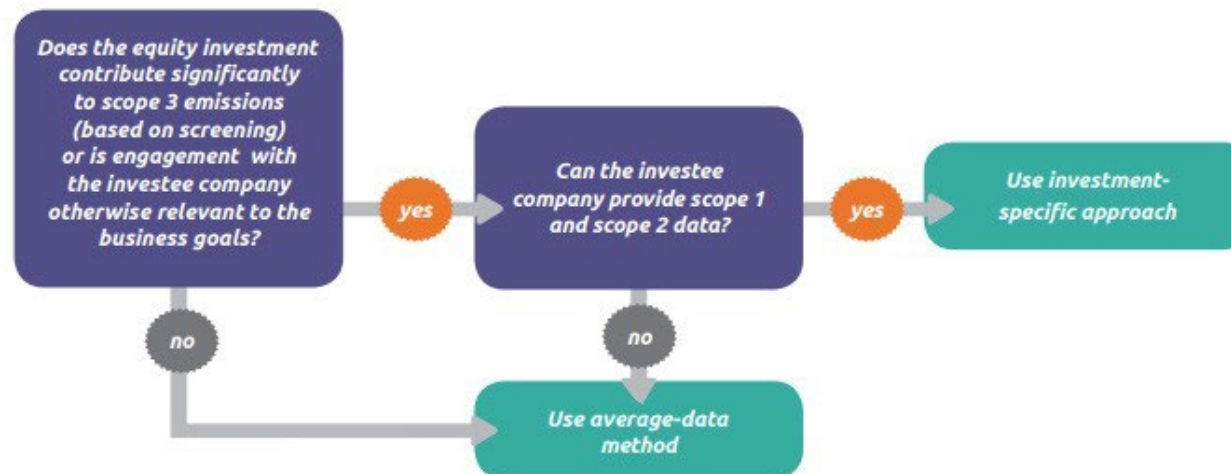




# Scope 3: Investments

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- Types of investments to assess:
  - ▮ Equity (required)
  - ▮ Debt (required if for a known project, optional if unknown)
  - ▮ Project finance (required)
  - ▮ Managed investments (optional)
- Two approaches: *investment-specific* or *average*, based on share of your investment in the total



# Scope 3: Investments

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## Investments Example: Investment-Specific

**Step 1a.** My HCO's employee retirement fund invests \$10M in Coca-Cola

**Step 1b.** Find share of Coca-Cola total equity:

Total market cap: \$206,490M, equity share = 0.0048%

**Step 2.** Find Coca-Cola annual emissions (from Carbon Disclosure Project): 793,460 tons (Scope 1)  
747,876 tons (Scope 2) = 1,541,336 tons

**Step 3.** Find share of Coca-Cola emissions due to investment:  $(0.0048\%)(1,541,336 \text{ tons}) = 74.6 \text{ tons CO}_2\text{e}$

# Scope 3: Investments

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## Investments Example: Average Data

**Step 1a.** My HCO's employee retirement fund invests \$10M in beverages sector

**Step 2.** Find EEOmissions factor for the entire sector:

carbon dioxide	kg/2018 USD, purchaser price	0.325
methane	kg/2018 USD, purchaser price	0.008
nitrous oxide	kg/2018 USD, purchaser price	0.001

$$0.325 + (0.008) * (25) + (0.0001) * (298) = 0.823 \text{ kg CO}_2\text{e}/\$2018$$

<https://pasteur.epa.gov/uploads/10.23719/1517796/SupplyChainEmissionFactorsforUSIndustriesCommodities.xlsx>

**Step 3.** Multiply (adjust for inflation if necessary):

$$(\$10\text{M}) * (0.823 \text{ kg CO}_2\text{e}/ \$2018) = \mathbf{8,230 \text{ tons CO}_2\text{e}}$$

(much higher, includes Coca-Cola Scope 3)





Carbon Clinic 3

Scope 3: Supply Chain

Providence's Approach to Carbon Accounting

Beth Schenk, PhD, RN, FAAN

Executive Director of Environmental Stewardship



**120k**  
CAREGIVERS



**36k**  
NURSES



**25k**  
PHYSICIANS



**\$1.9b**  
COMMUNITY  
BENEFIT



**52**  
HOSPITALS



**950**  
CLINICS



**28.1m**  
TOTAL  
PATIENT  
VISITS



**1.9m**  
COVERED  
LIVES



**1700+**  
PUBLISHED  
RESEARCH  
STUDIES



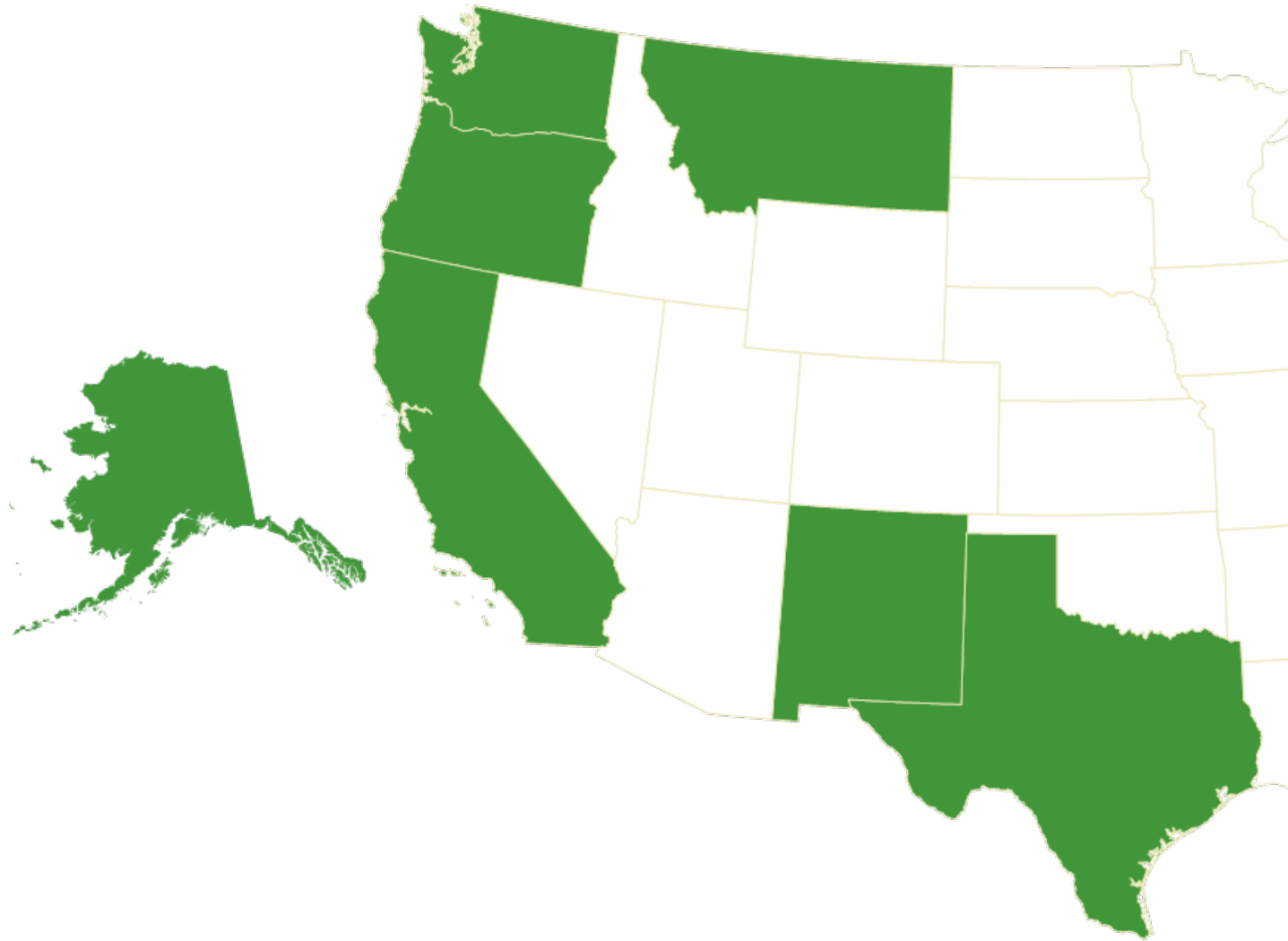
**1**  
HEALTH  
PLAN



**17**  
SUPPORTIVE  
HOUSING  
FACILITIES



HIGH SCHOOL  
NURSING  
SCHOOLS &  
UNIVERSITY





## Providence's Approach



Moonshot Goal: Carbon Negative by 2030

Do all we can this decade to reduce emissions and transform health care to be *planet-safe*

Measurement using the WE ACT Scorecard –

Usage, cost,  
and carbon  
data

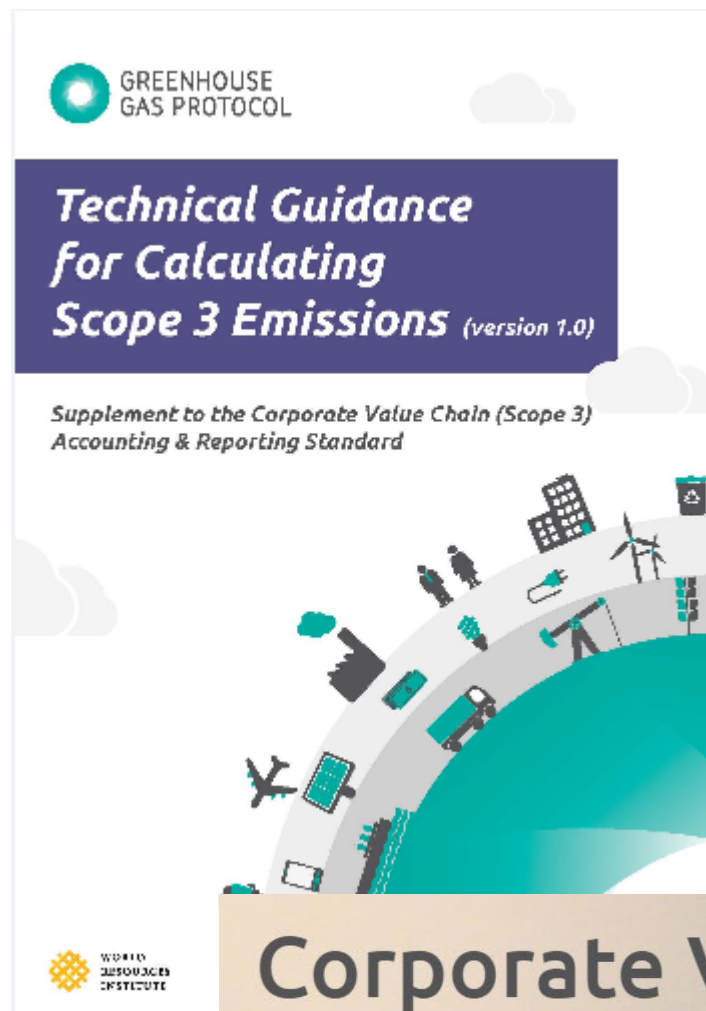
Each site

Monthly

Automated,  
transparent,  
accurate

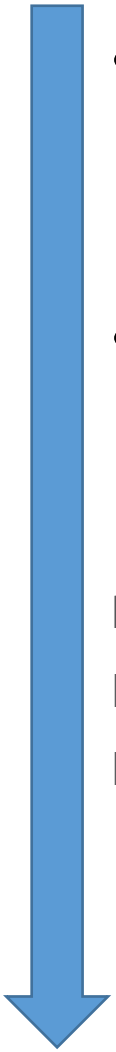


GREENHOUSE  
GAS PROTOCOL



Corporate Value Chain (Scope 3)  
Standard Online Course

## Category 3: Fuel and Energy related activities not included in Scope 1 or Scope 2

- 
- **Supplier-specific method** —data from **fuel providers** on upstream emissions (extraction, production and transportation) of fuel consumed by the reporting company
  - **Average-data method** — estimates emissions by using secondary (e.g., **industry average**) **emission factors** for upstream emissions per unit of consumption (e.g., kg CO<sub>2</sub>e/kWh).

### **Providence: Average Data Method**

Electricity: Schneider uses EPA E-grid T&D loss for each E-grid region (12,467)

Natural Gas: Schneider uses emission factor for natural gas from DEFRA (30,813)

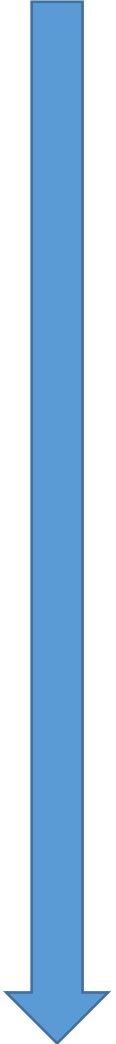


# Category 3:

Supplier Specific Method: **Provided by Schneider Electric**

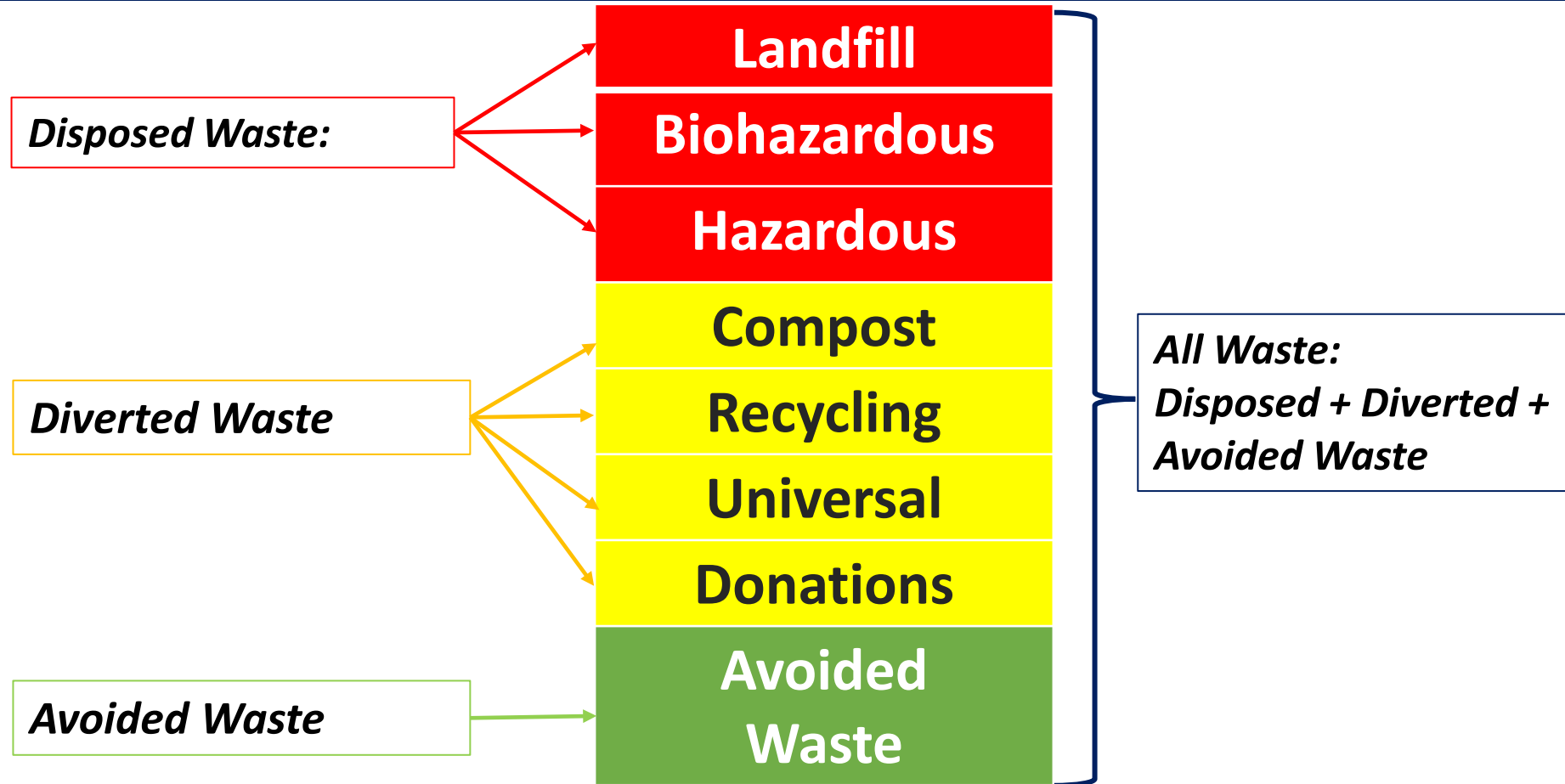
Environmental Stewardship						
WEACT Scorecard Version: 1.0.0						
Please Read This						
Providence						
Division	Region	Facility	Year	Month		
All	All	All	2022	All		
MTCO2e (Metric Tons of Carbon Dioxide Equivalent)	CENTRALIA	COVENANT CHILDRENS	COVENANT LEVELLAND	COVENANT MEDICAL CTR	COVENANT PLAINVIEW	COVENANT SPECIAL
Waste Type	165.69	253.18	9.57	213.96	80.40	15
Autoclaved	8.14	8.99	0.83	29.57	5.49	
Incinerated	22.04	32.05	4.39	62.09	5.60	
Landfill	133.05	204.42	4.34	122.30	69.30	1
Waste to Energy						
Composted						
Recycled	2.46	7.72				
Energy and Water Type	2,163.01	16,689.97	753.71	19,888.75	4,757.77	42
Electricity	756.89	9,976.48	652.80	11,965.84	2,330.49	3
Electricity Upstream Losses	42.36	547.23	35.81	656.35	127.83	
Renewable Energy Certificates						
Natural Gas - Methane	1,151.46	5,225.28	54.69	6,121.36	1,942.44	
Natural Gas - Methane Upstream Losses	206.98	939.25	9.85	1,100.33	349.15	
Carbon Offsets						
Diesel						
Fuel Oil						
Propane						
Steam						
Water & Wastewater	5.32	1.73	0.56	44.87	7.85	
Chemicals Type	76.60	140.33	0.59	819.01	159.71	
Nitrous Oxide	40.55	98.41		323.06	90.84	
Desflurane	26.84	10.74		450.94	64.42	
Sevoflurane	9.21	31.19	0.59	39.50	4.46	
Isoflurane				5.51		
Total Volatile Agents	36.05	41.92	0.59	495.95	68.87	
Total	3,572.70	18,154.31	996.54	23,339.14	5,478.36	71

## Category 5: Waste Generated in Operations

- 
- **Supplier-specific method**, which involves collecting waste-specific scope 1 and scope 2 emissions data **directly from waste treatment companies** (e.g., for incineration, recovery for recycling)
  - **Waste-type-specific method**, which involves using **emission factors for specific waste** types and waste treatment methods
  - **Average-data method**, which involves estimating emissions based on total waste going to each disposal method (e.g., landfill) and **average emission factors for each disposal method**.

**Waste Goal: : Divert more than 50% of waste from landfill and hazardous streams by 2030**

**Waste Goal % = (Diverted + Avoided waste)/All waste**

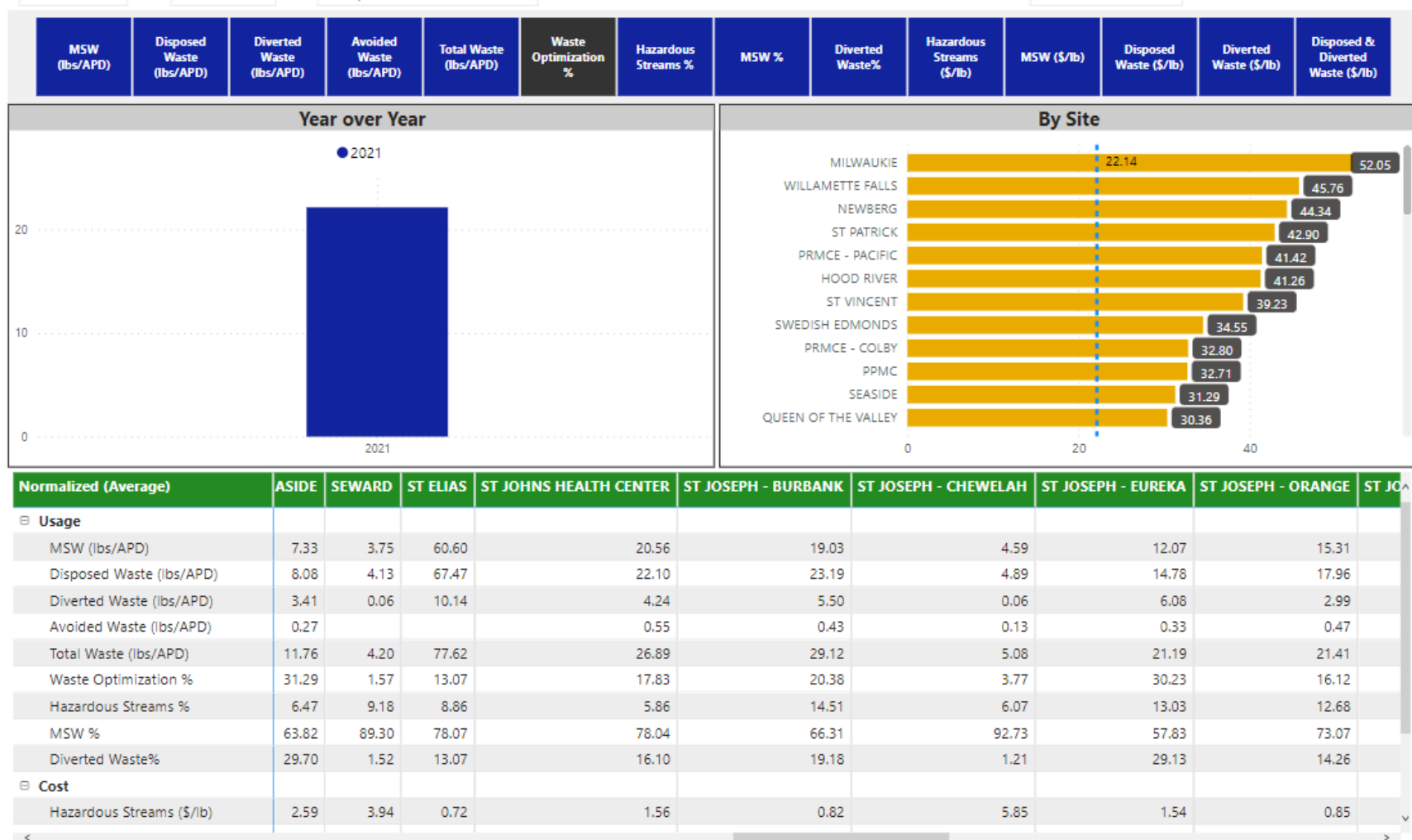


## Category 5:

Average Data Method: Calculated on WE ACT Scorecard

Waste Usage and Cost	CENTRALIA	COVENANT CHILDRENS	COVENANT LEVELLAND	COVENANT MEDICAL CTR	COVENANT PLAINVIEW	COVENANT SPECIALTY	GRACE SURGICAL
WASTE							
Usage							
Disposed Waste							
Biohazardous (lbs)							
Autoclaved - RMW (lbs)	38,662	33,579	4,138	145,575	29,077	8,592	
Autoclaved - RMW/Sharps (lbs)							
Incinerated - Path/Chemo (lbs)	302	6,325		8,436			
Incinerated - Path/Chemo/Pharm (lbs)							
Incinerated - Sharps/Pharm (lbs)	18,048	17,356	4,273	84,694	2,868	4,805	
Hazardous (lbs)							
Incinerated - Narcotics (lbs)		2,211	77	2,090	48		
Incinerated - RCRA (lbs)				1,170		2,569	
Incinerated - RCRA Pharmaceutical (lbs)				246			
Municipal Solid Waste (MSW) (lbs)							
Landfill (lbs)	733,440	990,880		2,982,000	279,400	128,700	
Waste to Energy (lbs)							
Diverted Waste							
Composted (lbs)							
Food Waste (lbs)	8,334						
Donations (lbs)							
Global Partnership/MSRO (lbs)	1,657						
Recycled (lbs)							
Cardboard (lbs)	15,000						
HIPAA Paper (lbs)	129,181	68,100	43,751	139,538		29,625	
Single Stream (lbs)	40,872					81,744	
SUD Collections (lbs)		617	133	1,717	526		
Universal (lbs)							
Mixed Universal (lbs)							
e-Waste (lbs)							
Avoided Waste							
Reprocessed (lbs)							
SUD Reprocessed Purchases (lbs)		30	72	2,950	319		
Reused (lbs)							
Sharps Containers (lbs)	15,428	10,798	2,954	45,779	647	3,753	
Total Waste							
Total Waste (lbs)							
Total Waste (lbs)	1,000,924	1,129,896	55,398	3,414,194	312,885	259,789	





**Waste Goal : : Divert more than 50% of waste from landfill and hazardous streams by 2030**

$$\text{Waste Goal \%} = (\text{Diverted} + \text{Avoided waste}) / \text{All waste}$$

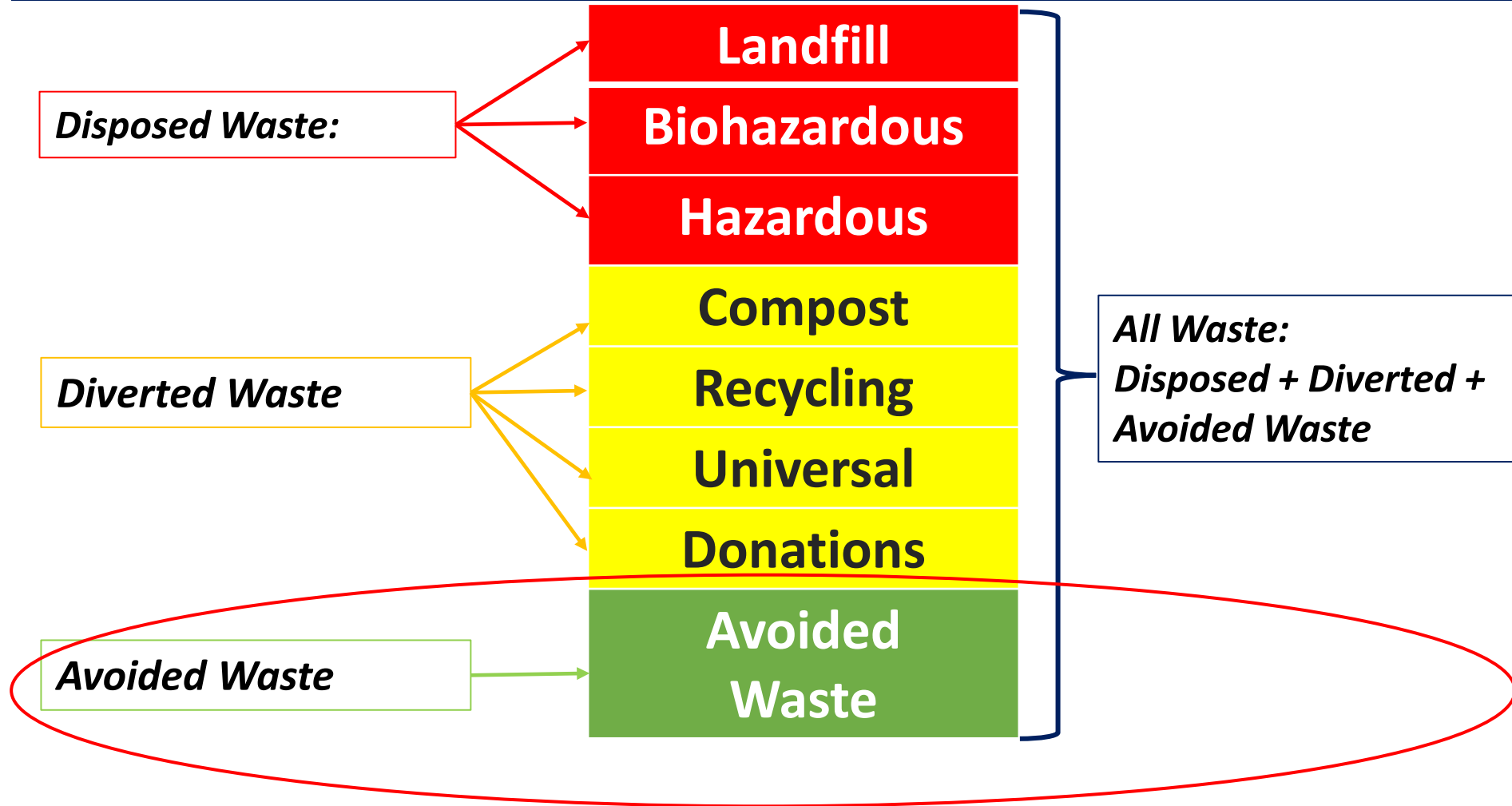
- **Average-data method**, which involves estimating emissions based on total waste going to each disposal method (e.g., landfill) and **average emission factors for each disposal method**.
- EPA GHG Emissions Hub

MTCO2e (Metric Tons of Carbon Dioxide Equivalent)	MISSION -Together	MOUNT CARMEL	NEWBERG	PAMC	PETALUMA VALLEY	PPMC
Waste Type	1,301.02	78.20	86.25	658.83	101.00	70.00
Autoclaved	51.73	2.14		39.66	11.77	4.00
Incinerated	177.14	6.72	20.81	19.21	13.75	2.00
Landfill	1,028.14	67.22	57.72	586.44	60.58	3.00
Waste to Energy						
Composted	17.60		2.13	0.75	6.14	
Recycled	26.42	2.12	5.59	12.78	8.77	4.00

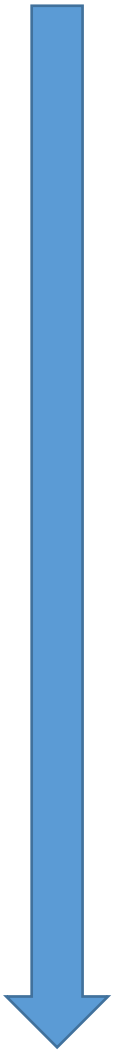
- **Total Waste emissions (2021):** **22,264** MTCO2e
- N2O: 11,222
- Volatile Anesthesia: 3,366
- Business travel: 535
- Reimbursed Miles: 996

**Waste Goal: : Divert more than 50% of waste from landfill and hazardous streams by 2030**

**Waste Goal % = (Diverted + Avoided waste)/All waste**



## Category 6: Business Travel

- 
- **Fuel-based method**, which involves determining the **amount of fuel consumed** during business travel (i.e., scope 1 and scope 2 emissions of transport providers) and applying the appropriate emission factor for that fuel
  - **Distance-based method**, which involves determining the **distance and mode of business trips**, then applying the appropriate emission factor for the mode used
  - **Spend-based method**, which involves determining the amount of **money spent** on each mode of business travel transport and applying secondary (EEIO) emission factors.



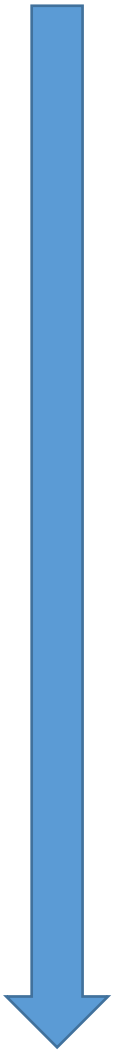
## Distance-based Method

- Flights (# segments, class, distance – from AMEX)
- Rental Cars (# miles, MPG from vendors)
- Reimbursed Miles (# miles, regional emission factor)
- Hotels (# nights, EF based on city and use intensity of hotel)

Transportation Type	1,764.34	2,186.31	3,951.93	1,539.30	2,299.59	230.97	709.95
Flights	3.87	0.85	50.32	0.69	0.59	4.84	0.24
Hotels	1.82	0.34	5.01	0.80	1.08	1.08	0.71
Rental Cars	1.69	0.62	3.08	0.62	0.31	0.31	0.46
Total Business Travel	7.38	1.80	58.42	2.10	1.97	6.22	1.42
Reimbursed Miles	2.22	3.56	33.40	7.17	2.48	3.91	13.62

- Business travel (2021): 535 MTCO<sub>2</sub>e
- Reimbursed Miles: 996

## Category 7: Employee Commuting

- 
- **Fuel-based method**, which involves determining the **amount of fuel consumed** during commuting and applying the appropriate emission factor for that fuel
  - **Distance-based method**, which involves collecting **data from employees** on commuting patterns (e.g., distance travelled, and mode used for commuting) and applying appropriate emission factors for the modes used
  - **Average-data method**, which involves estimating emissions from employee commuting **based on average** (e.g., national) data on commuting patterns.

# Distance-based Method

- Survey employees
- Use existing state or local employee surveys
- Create emissions factor per employee for each Providence region
- Calculate based on FTE

Transportation Type	1,764.34	2,186.31	3,951.93	1,539.30	2,299.59	230.97	709.95
Flights	3.87	0.85	50.32	0.69	0.59	4.84	0.24
Hotels	1.82	0.34	5.01	0.80	1.08	1.08	0.71
Rental Cars	1.69	0.62	3.08	0.62	0.31	0.31	0.46
Total Business Travel	7.38	1.80	58.42	2.10	1.97	6.22	1.42
Reimbursed Miles	2.22	3.56	33.40	7.17	2.48	3.91	13.62
Employee Commuting	1,754.73	2,180.94	3,860.12	1,530.03	2,295.14	220.84	694.92

- Business travel (2021): 535 MTCO<sub>2</sub>e
- Reimbursed Miles: 996
- Employee Commuting: **98,032**

## Category 8: Upstream Leased Assets

## Category 9: Downstream Leased Assets

(The calculation methods for upstream and downstream leased assets do not differ.)

- **Asset-specific method**, which involves collecting asset-specific (e.g., site-specific) fuel and energy use data and process and fugitive emissions data or **scope 1 and scope 2 emissions data from individual leased assets**
- **Lessor-specific method**, which involves collecting the **scope 1 and scope 2 emissions from lessor(s)** and allocating emissions to the relevant leased asset(s)

### **Providence – Asset –specific method**

- Onboarding 615 non-acute facilities onto scorecard
- Tracking energy and emission data as we do for acute sites





Waste Optimization: Data tracking; Action plans



Energy and water audits; efficiency projects; renewable electricity procurement strategy



Reduce carbon intensity of meals; reduce food and packaging waste; healthy, sustainable foods



Reduce GHGs from anesthetic agents, nitrous oxide. Reduce chemicals of concern in products and supplies



Commuter support; EV Charging strategy; Fleet vehicle management plan; Business travel reduction goal

## Category 15: Investments

- Companies should account for the proportional scope 1 and scope 2 emissions of the investments that occur in the reporting year.
- When scope 3 emissions are significant compared to other sources of emissions, investors should also account for the scope 3 emissions of the investee company.

## Providence

- Investment firm performed assessment in 2021, in alignment with the GHGP.
- 20% of our entire footprint, similar to all of our energy use.
- Socially Responsible Investment Committee

“The goal is to  
turn data into  
information,  
and  
information  
into insight.”

Carly Fiorina



*Health for a Better World*

*Thank You*



# Sustainability at Cleveland Clinic

Jon Utech

Senior Director, Sustainability Strategy

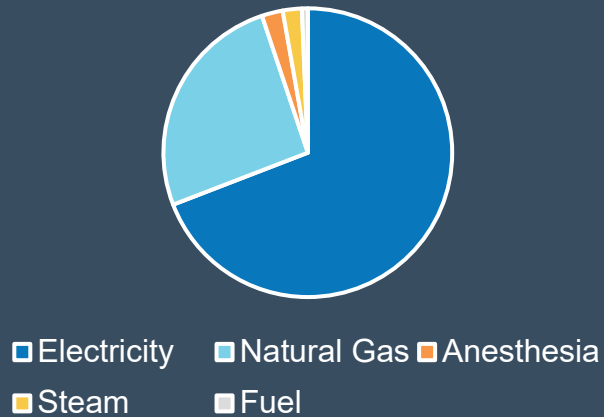
Buildings + Design

1/26/23

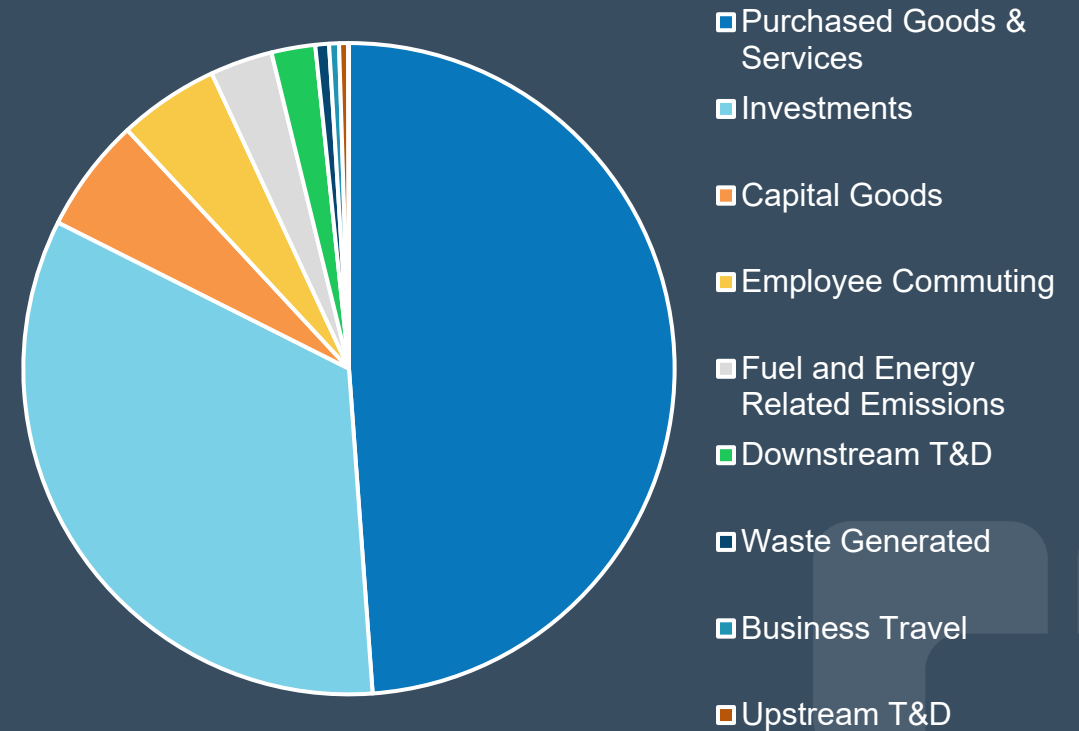


# At Cleveland Clinic, Scope 3 is 5 times bigger than Scope 1+2...

Scope 1 + 2 = **412,194** tons



Scope 3 = **2,083,551** tons

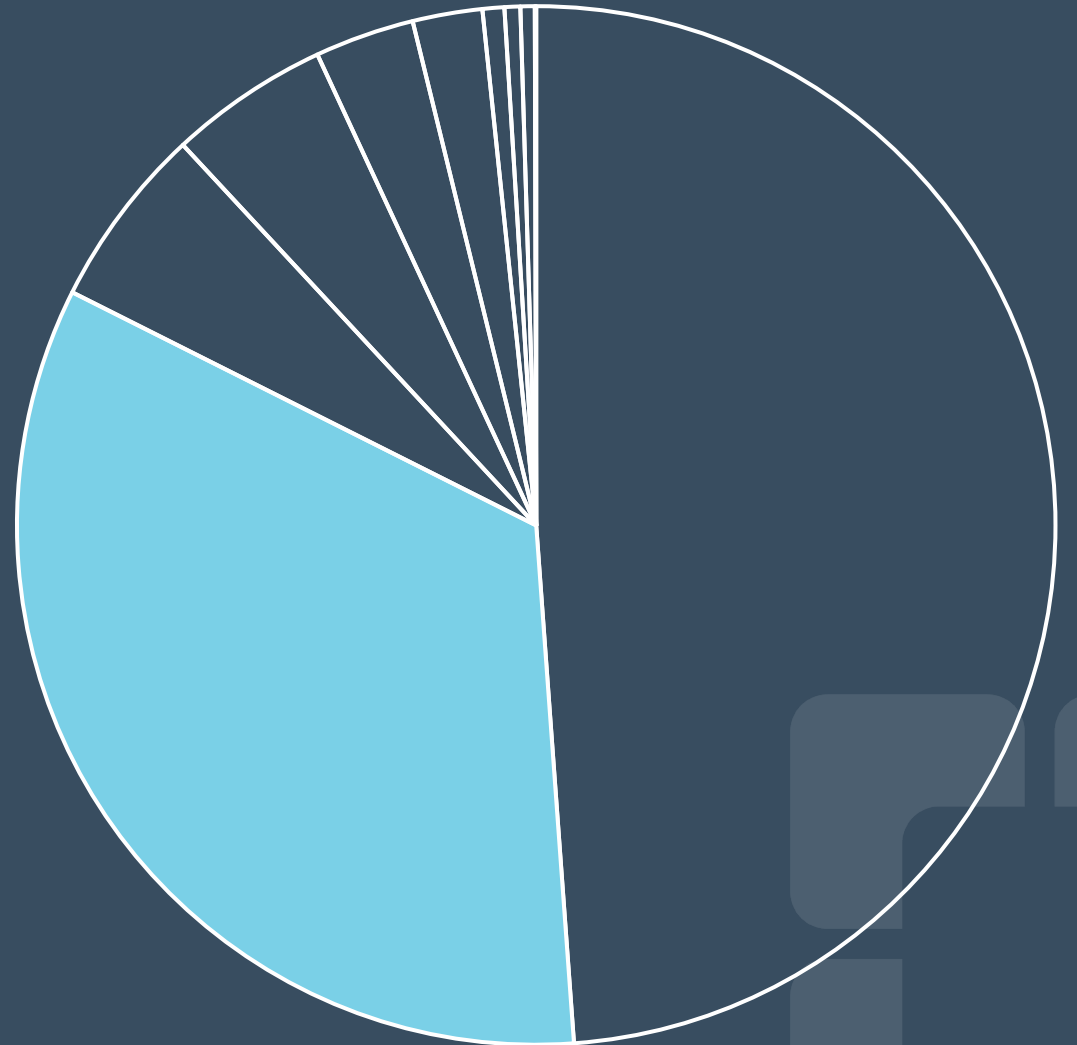


# Investments are 34% of Scope 3...

## Data Gathering:

- Public Filings for Cleveland Clinic
- Total Investments YE 2019: \$6.5B
- Normalized to YE 2017 : \$5.54B

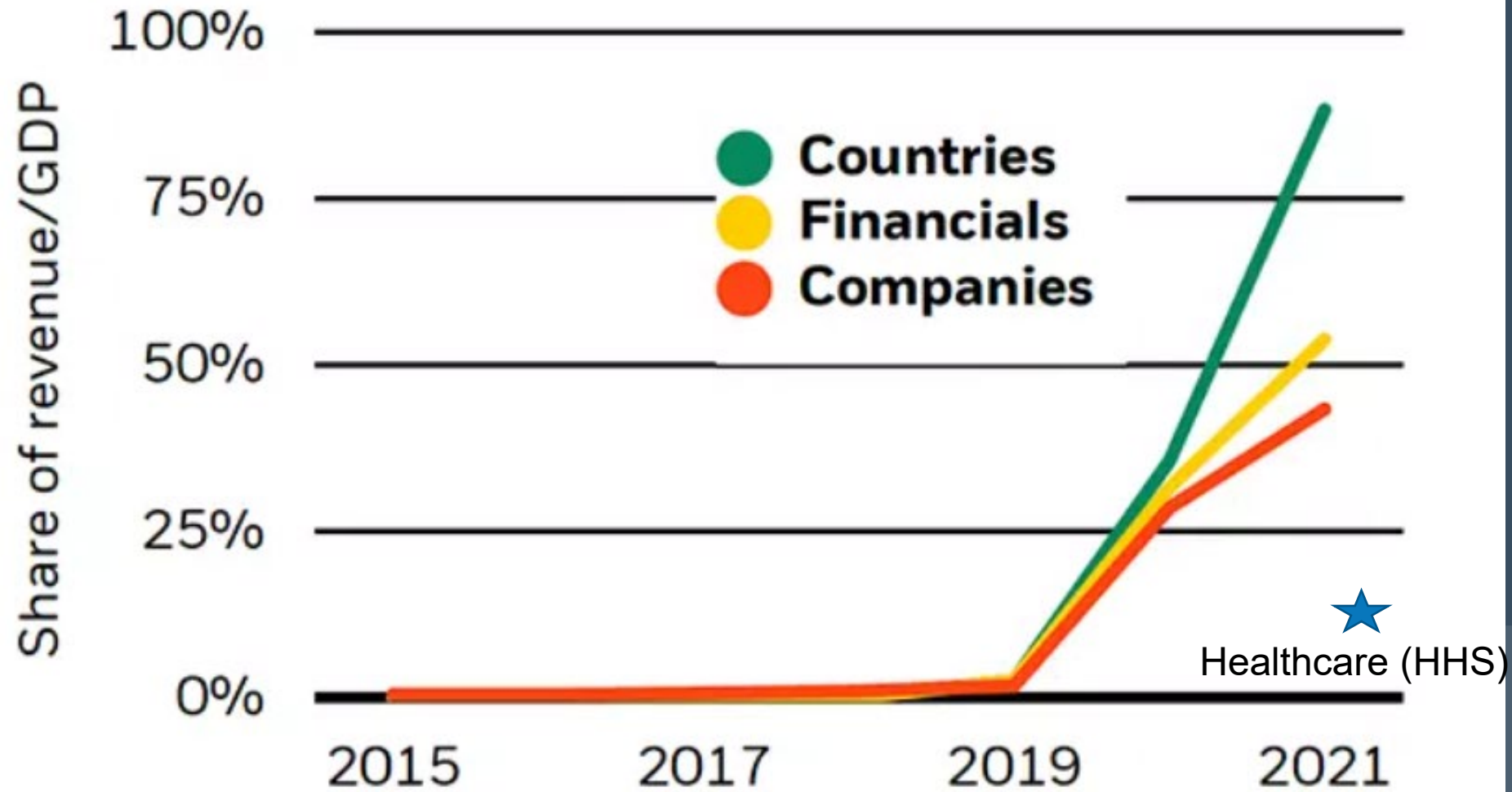
Activity Factor	GHG Intensity(1)	Investment Footprint
<i>\$ Millions of 2017 Investments</i>	<i>(tons of CO 2e/\$Million)</i>	
5,540	* 126.252	= 699,449



(1) GHG Intensity of S&P 500 per US EPA

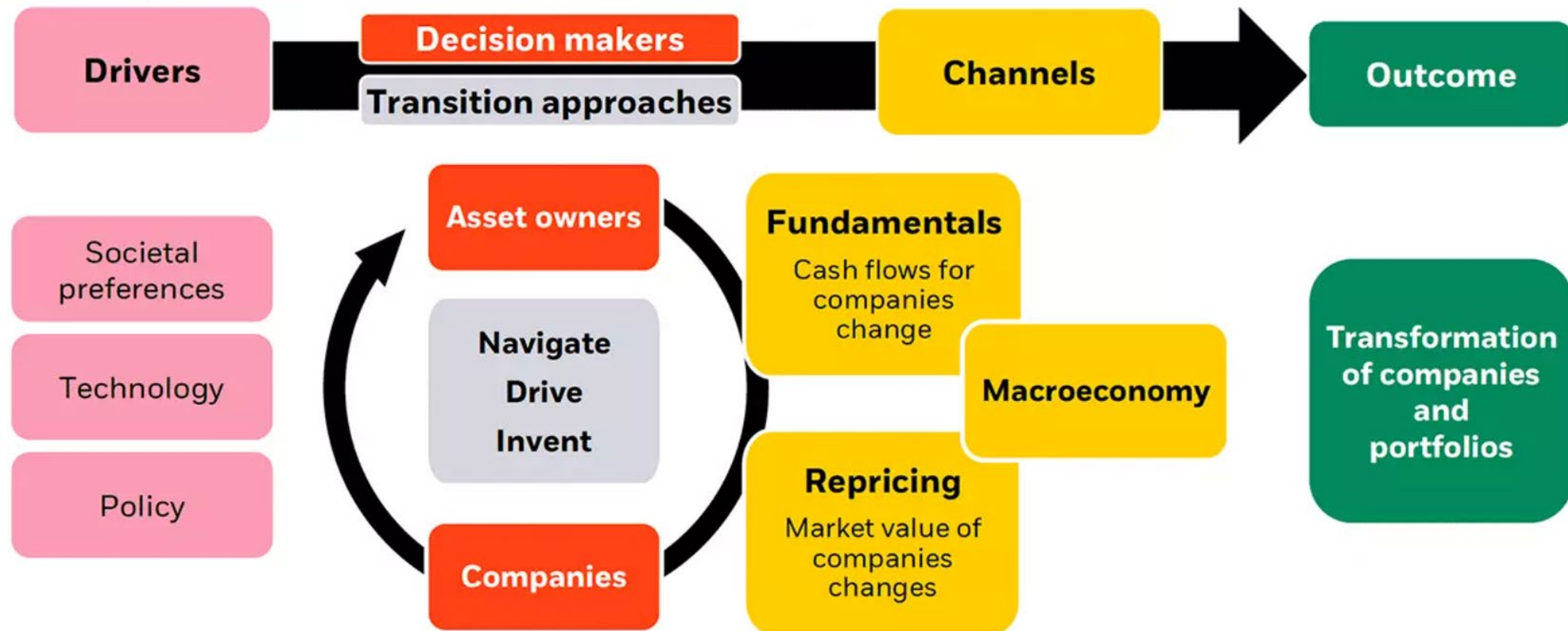
# The times they are a-changin'

Share of net-zero pledges by key players, 2015-2021



# Transition in action

BlackRock guide to the net-zero transition, February 2022



Source 

Source: BlackRock Investment Institute, Feb. 1, 2022. Notes: For illustrative purposes only. Subject to change without notice.





# Not-for-profit Healthcare

## ESG Issuer Profile Scores and Credit Impact Scores Distribution

# ESG Classification System Incorporates Credit Relevant Considerations

Our assessment of ESG risks is framed by the classification



## Environmental

Physical climate risks

Carbon transition

Water management

Waste and pollution

Natural capital



## Social

Customer relations

Demographic and societal trends

Human capital

Health and safety

Responsible production



## Governance

Financial strategy & risk management

Management credibility & track record

Organizational structure

Board structure, policies & procedures

Compliance & reporting

# ESG Influence...

## Cleveland Clinic Health System Oblig. Group

U.S. PUBLIC FINANCE

### MIS RATING SUMMARY

[VIEW ALL](#)

SENIORMOST REVENUE BACKED  
RATING

**Aa2**

LT SR REV UNDERLYING  
28 APR 2021

OUTLOOK

**Stable**

28 APR 2021

**Sector:** HEALTH CARE-HOSPITAL

**State:** Ohio

## Moody's affirms Cleveland Clinic Health System Obligated Group's (OH) Aa2; stable outlook

29 APR 2021 | RATING ACTION | [MOODY'S INVESTORS SERVICE](#)

New York, April 28, 2021 -- Moody's Investors Service has affirmed **Cleveland Clinic** Health System Obligated Group's (CCHS) Aa2, Aa2/VMIG 1 and P-1 ratings. The outlook is stable. CCHS's total debt outstanding is approximately \$5.2 billion. RATINGS RATIONALE The Aa2

# Investment Levers

## Activity Factor

*\$ Millions of 2017 Investments*

## GHG Intensity(1)

*(tons of CO<sub>2</sub>e/\$Million)*

Levers of Change

- Investment Performance
- Contributions

- Industry Investment Mix
- Specific Investment Types
- Investor Engagement

# Investment Activity: Investment Performance

- Investment Performance: *Impact Varies*
  - what matters is not the performance of the investment but it's performance relative to it's carbon intensity.
  - Investment increases at the same rate as carbon in the investment there is no change (intensity matters)
- Contributions: *Increases footprint*
  - If philanthropic contributions and/or cash flow from operations are invested then total footprint increases



# Investment Activity: GHG Intensity

- Industry Investment Mix: *Lower Intensity Lowers Footprint*
  - If investments are shifted to lower carbon intensity sectors then footprint decreases
- Specific Investments: *Removing High Intensity Lowers Footprint*
  - If investments high carbon investments are exited footprint decreases
- ESG Policy for Investing: Can set guidelines for many issues including carbon

# Employee Commuting is 6% of Scope 3...

## Data Gathering:

- Bureau of Transportation Statistics
- Employee Survey
- Home work routes



# Employee Commuting Levers

## Activity Factor

Miles Commuted (Home –Work)

## GHG Intensity(1)

GHG per Trip

Levers  
of  
Change

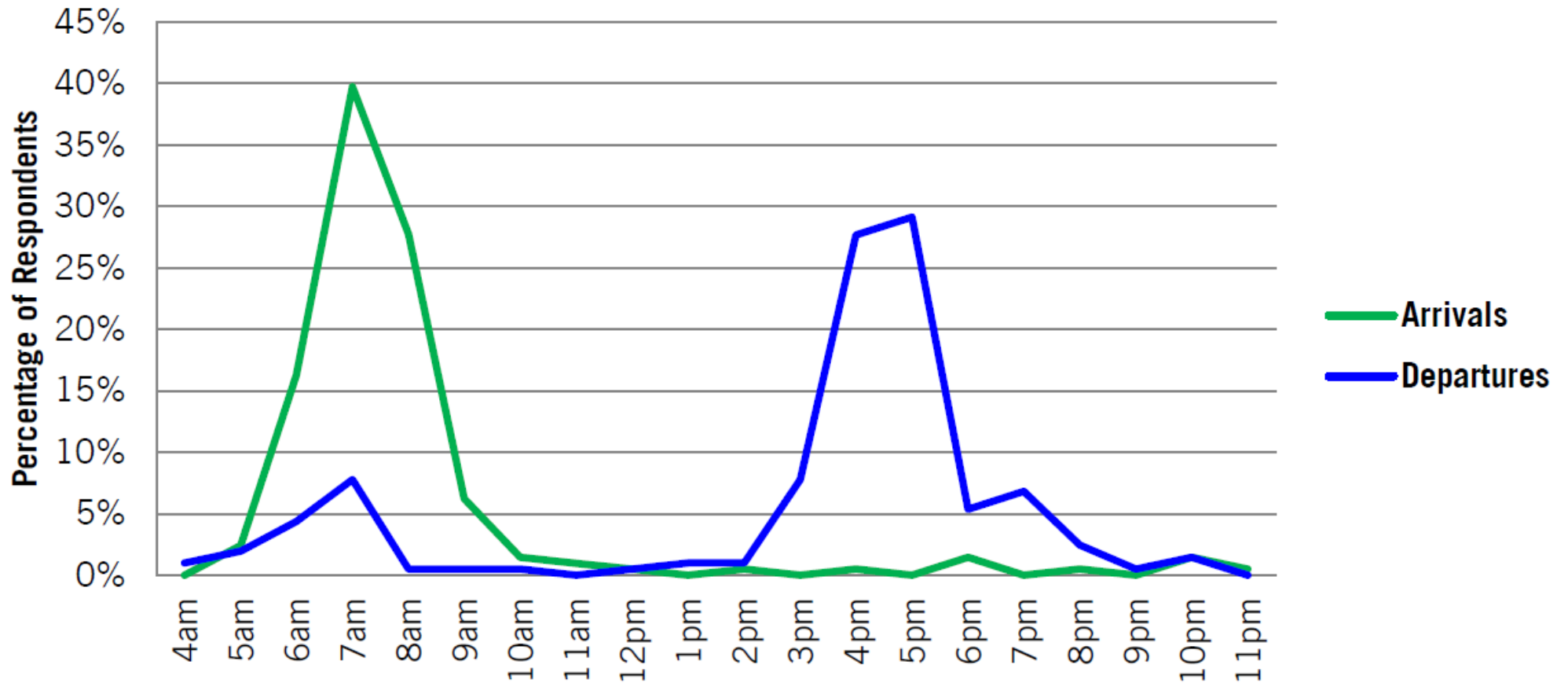
- Work Location
  - Work from Home
- Miles from Home
  - Live Local

- Commute Mode
  - Drive alone vs. others
- Vehicle Type
  - Vehicle Shift



# Transportation Policies for Mode Shift

## CCF Peak Commute Times



# Transportation Policies for Mode Shift

**Q15\*: Of the options below, which 3 factors most heavily impact your decision to travel by the mode(s) you selected? Please check only 3 boxes.**

<b>Travel time (duration)</b>	<b>21%</b>
<b>Work/shift hours (time of day)</b>	<b>18%</b>
<b>Availability of vehicle</b>	<b>13%</b>
<b>Travel distance</b>	<b>12%</b>
<b>Availability of transit service</b>	<b>7%</b>
<b>Safety</b>	<b>6%</b>
<b>Other (please explain)</b>	<b>6%</b>
<b>Reliability of transit service</b>	<b>6%</b>
<b>Travel Experience</b>	<b>5%</b>
<b>Cost (expenses)</b>	<b>3%</b>
<b>Commuter benefits provided by your employer</b>	<b>1%</b>
<b>Environmental reasons</b>	<b>1%</b>
<b>Physical ability</b>	<b>1%</b>
<b>Health benefits</b>	<b>0%</b>



**Q16: Of the options below, which 3 factors would most heavily impact your decision to choose a different travel mode from those you selected? Please check only 3 boxes.**

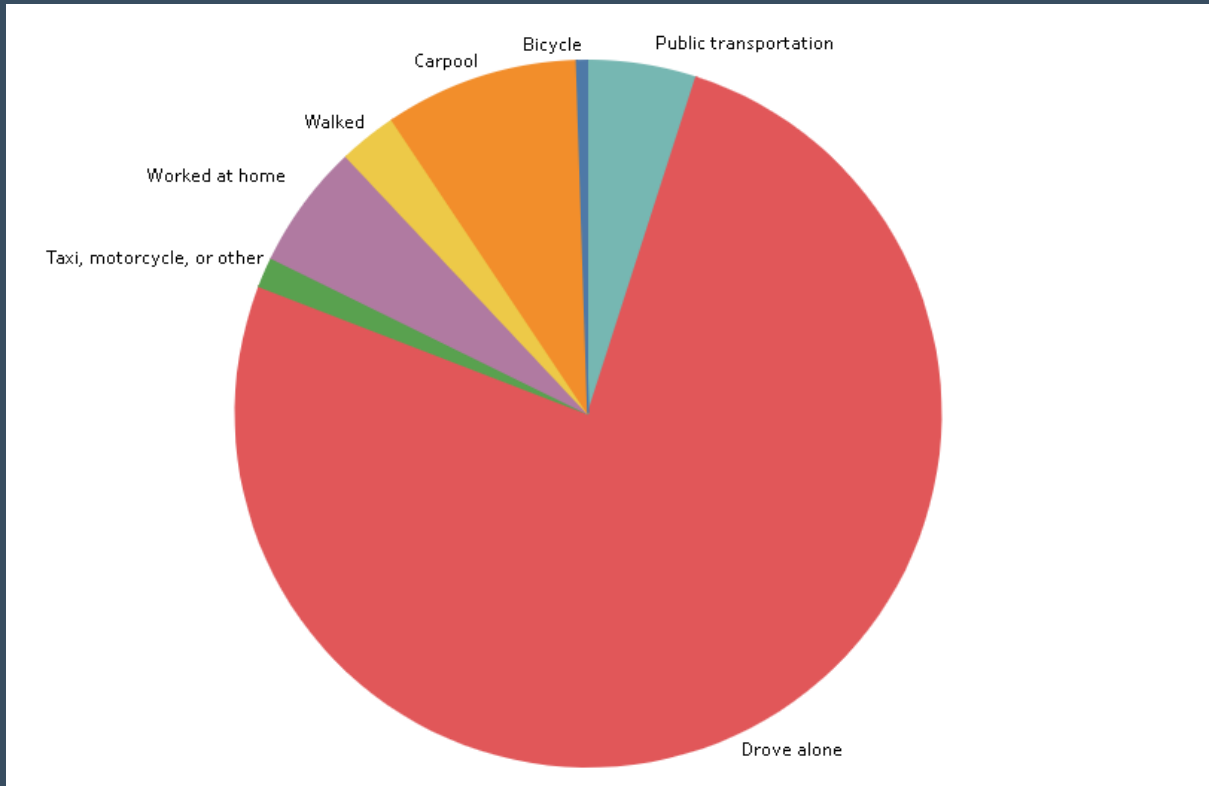
Reliability of transit service	17%
Availability of transit service	17%
Travel time (duration)	16%
Cost (expenses)	11%
Safety	8%
Commuter benefits provided by your employer	7%
Travel distance	6%
Work/shift hours (time of day)	5%
Travel Experience	4%
Availability of vehicle	3%
Other (please explain)	3%
Environmental reasons	2%
Physical ability	0%
Health benefits	0%

**Q17\*: Regardless of how you typically get to work, what other options would you consider for your commute if the factors you selected in Question 16 were present? Check all that apply.**

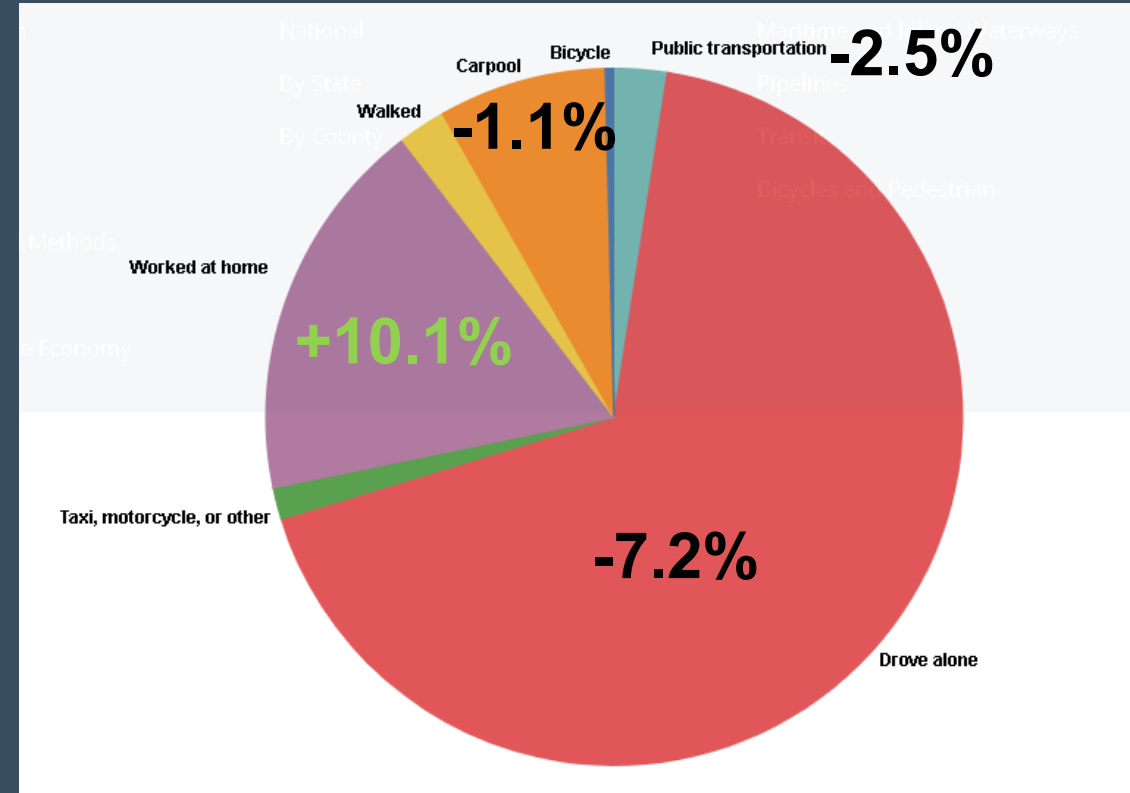
<b>RTA/local bus/HealthLine</b>	<b>18.2%</b>
<b>RTA Rail</b>	<b>16.4%</b>
<b>Carpool</b>	<b>15.0%</b>
<b>Telework</b>	<b>12.9%</b>
<b>Drop off/pick up by someone else</b>	<b>10.8%</b>
<b>Bike</b>	<b>9.0%</b>
<b>Drive alone</b>	<b>8.2%</b>
<b>Walk</b>	<b>4.5%</b>
<b>Vanpool</b>	<b>3.7%</b>
<b>Other</b>	<b>1.3%</b>

# National Commuting COVID Change

2019



2021

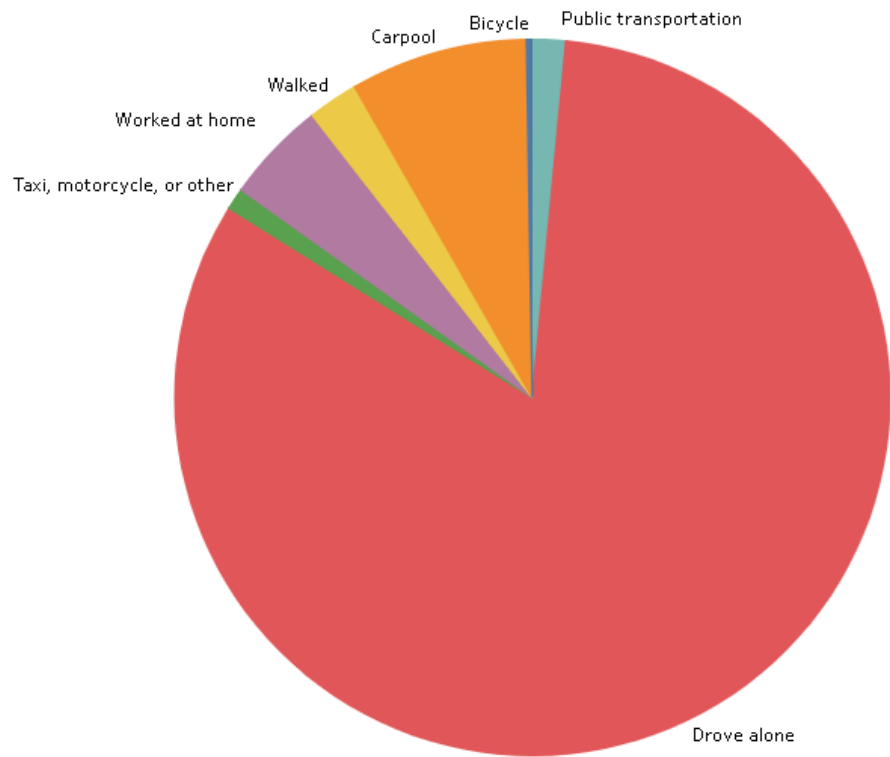


# Commute Mode by State

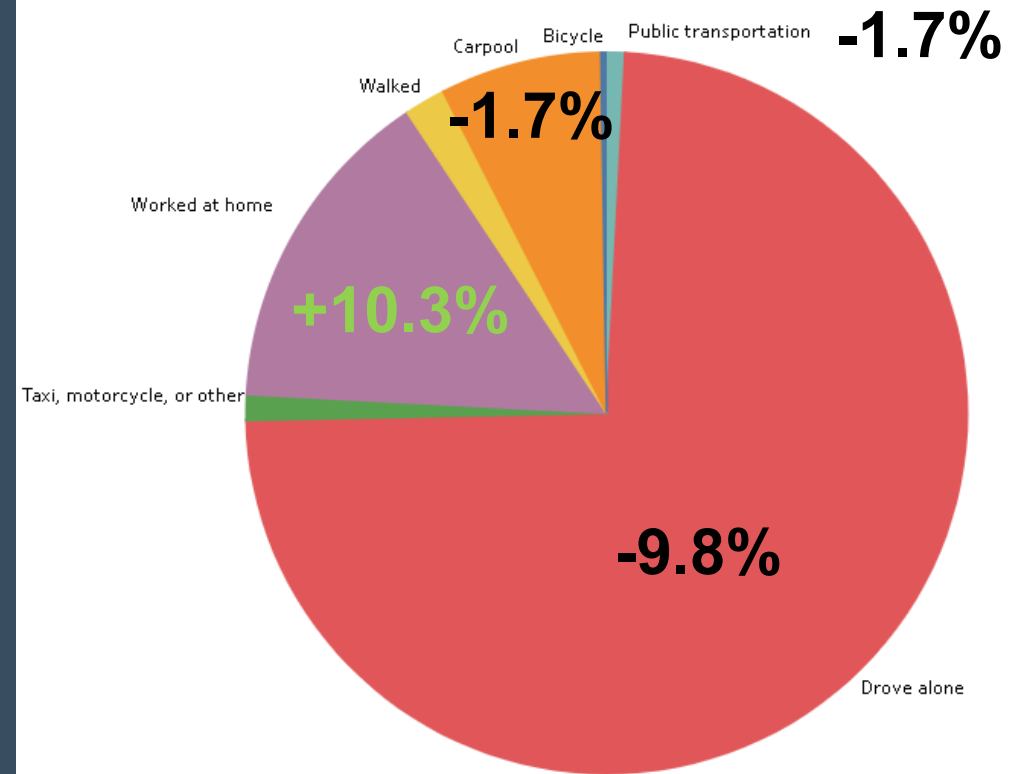
Bureau of Transportation Statistics Commute Mode data by percent by state (2019)		
Source	<a href="https://www.bts.gov/commute-mode">https://www.bts.gov/commute-mode</a>	
State	Mode	Commute mode share (percent)
Alabama	Bicycle	0.1%
Alabama	Carpool	8.7%
Alabama	Drove alone	85.2%
Alabama	Public transportation	0.4%
Alabama	Taxi, motorcycle, or other	1.0%
Alabama	Walked	1.2%
Alabama	Worked at home	3.4%
Alaska	Bicycle	0.7%
Alaska	Carpool	12.0%
Alaska	Drove alone	70.0%
Alaska	Public transportation	1.0%
Alaska	Taxi, motorcycle, or other	5.0%
Alaska	Walked	7.1%
Alaska	Worked at home	4.3%

# Ohio Commuting COVID Change

2019

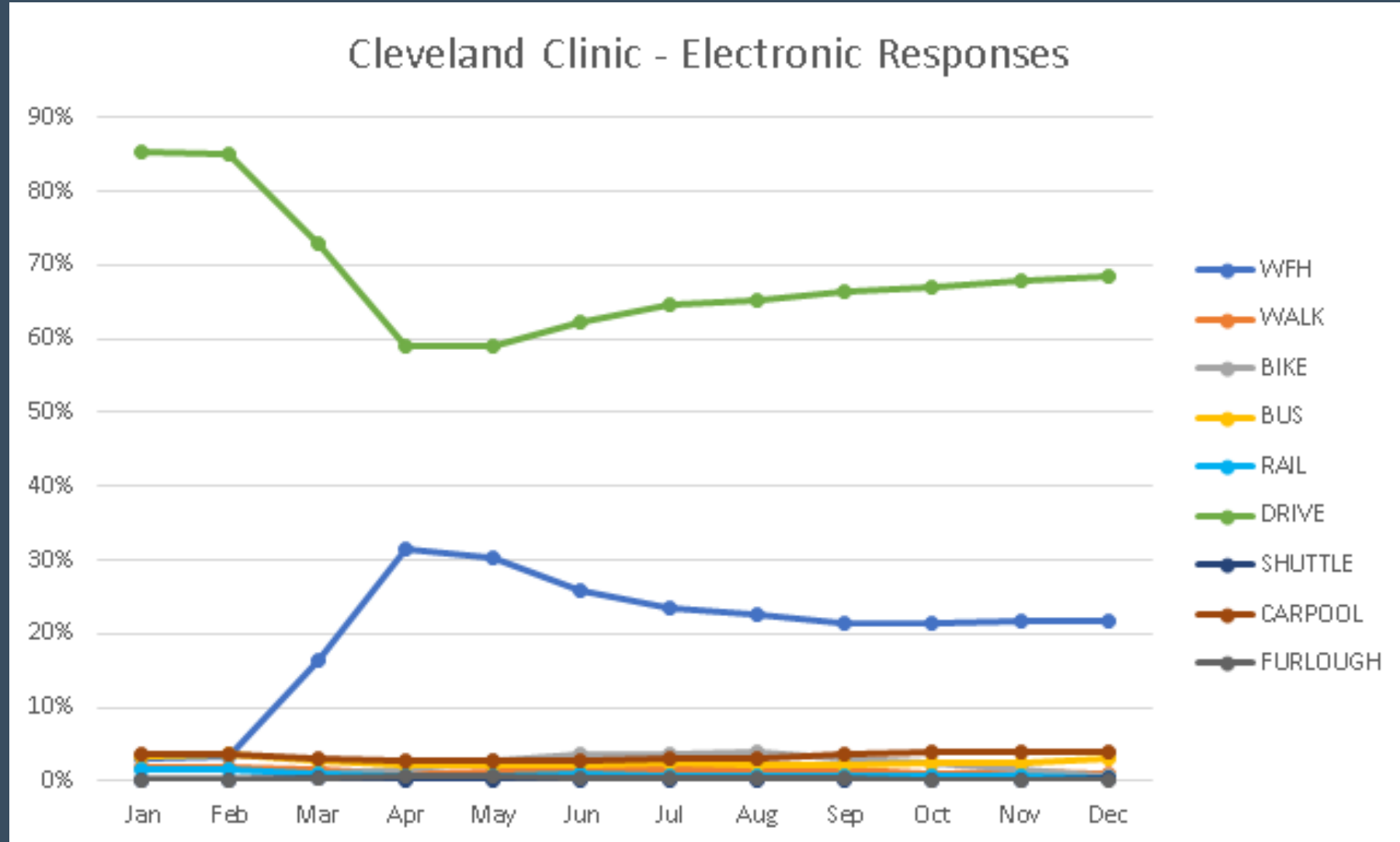


2021

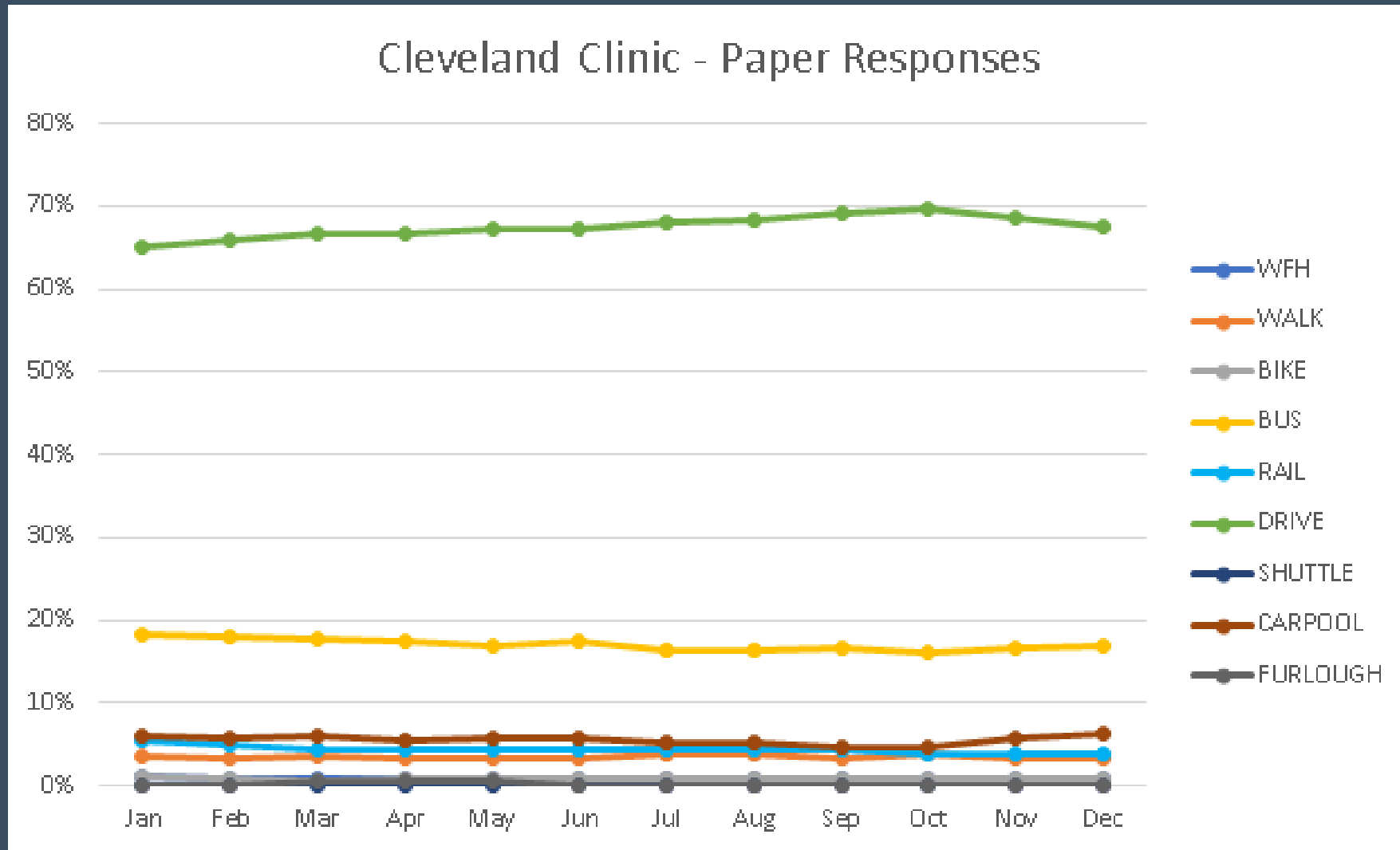




# Cleveland Clinic 2020 Transportation Survey



# Cleveland Clinic 2020 Transportation Survey

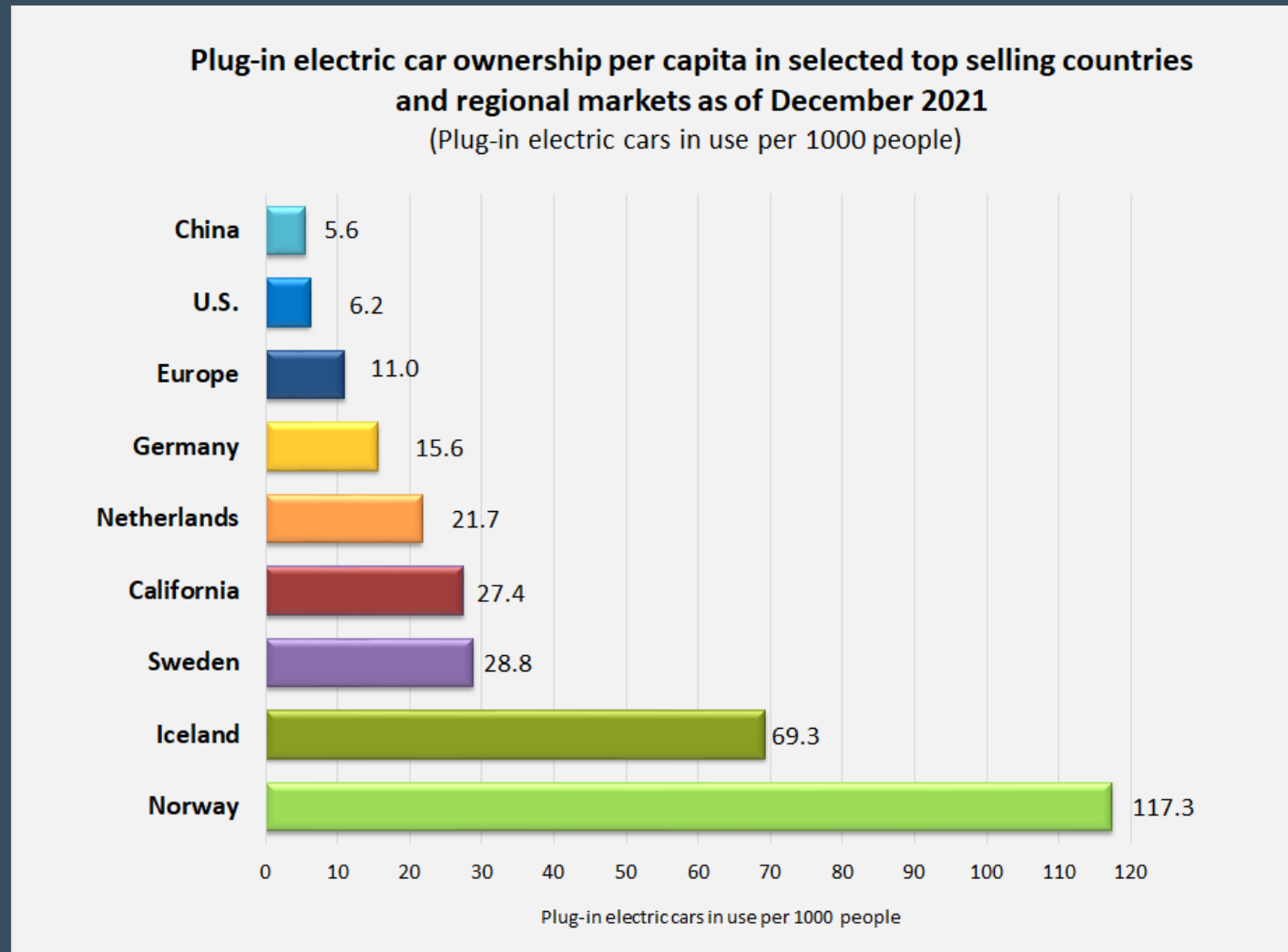


# Transportation Policies

- Carpool Incentive: 50% for 2, Free for 4
- Fuel Efficiency Vehicle Incentive: Lower Rate
- EV Purchase Incentive: \$1,000 new or \$500 Used
- Public Transportation: RTA Commuter Advantage
- Biking: Map Locations for Bikes + Showers



# Electric Vehicles Set to Grow



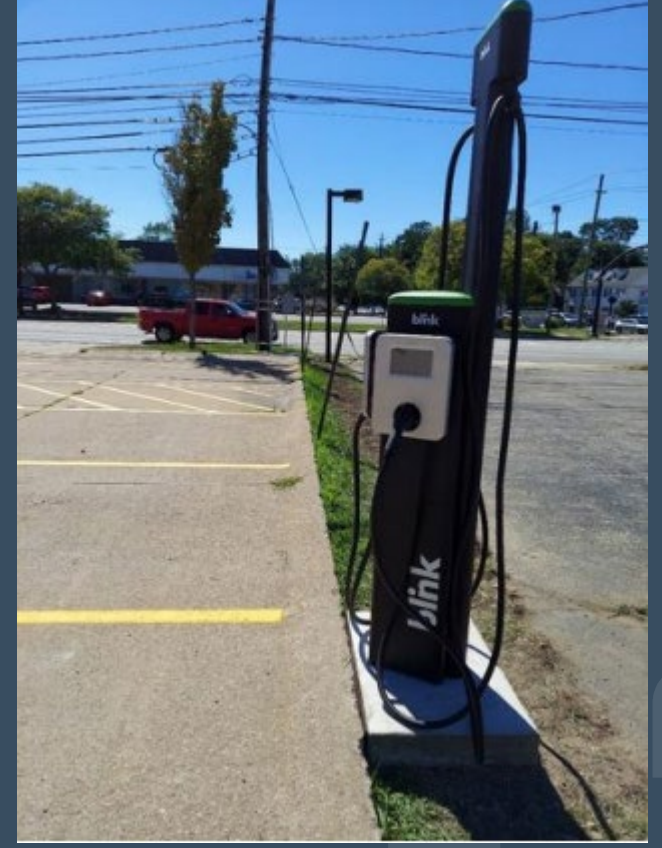
# Ohio is 12<sup>th</sup> Highest State in EVs/Port

## EV Chargers by State - September 2021

		Ports					
	State	Total Evs	Level 1	Level 2	Level 3	Total	EVs/Port
1	New Jersey	66,555	14	1095	501	1,610	41.34
2	California	930,811	280	27762	6143	34,185	27.23
3	Hawaii	19,243	5	662	84	751	25.62
4	New Hampshire	7,171	5	211	89	305	23.51
	Arizona	43,171	1	1542	409	1,952	22.12
12	Ohio	31,654	7	1467	333	1,807	17.52
47	West Virginia	1,795	1	196	69	266	6.75
48	Kansas	5,848	2	825	110	937	6.24
49	Mississippi	1,689	0	211	70	281	6.01
50	North Dakota	656	0	73	61	134	4.9
51	Wyoming	707	4	90	75	169	4.18
	Total	2,147,070	1,305	88,070	19,932	109,307	



# EV Charging Stations



# Work From Home Impact

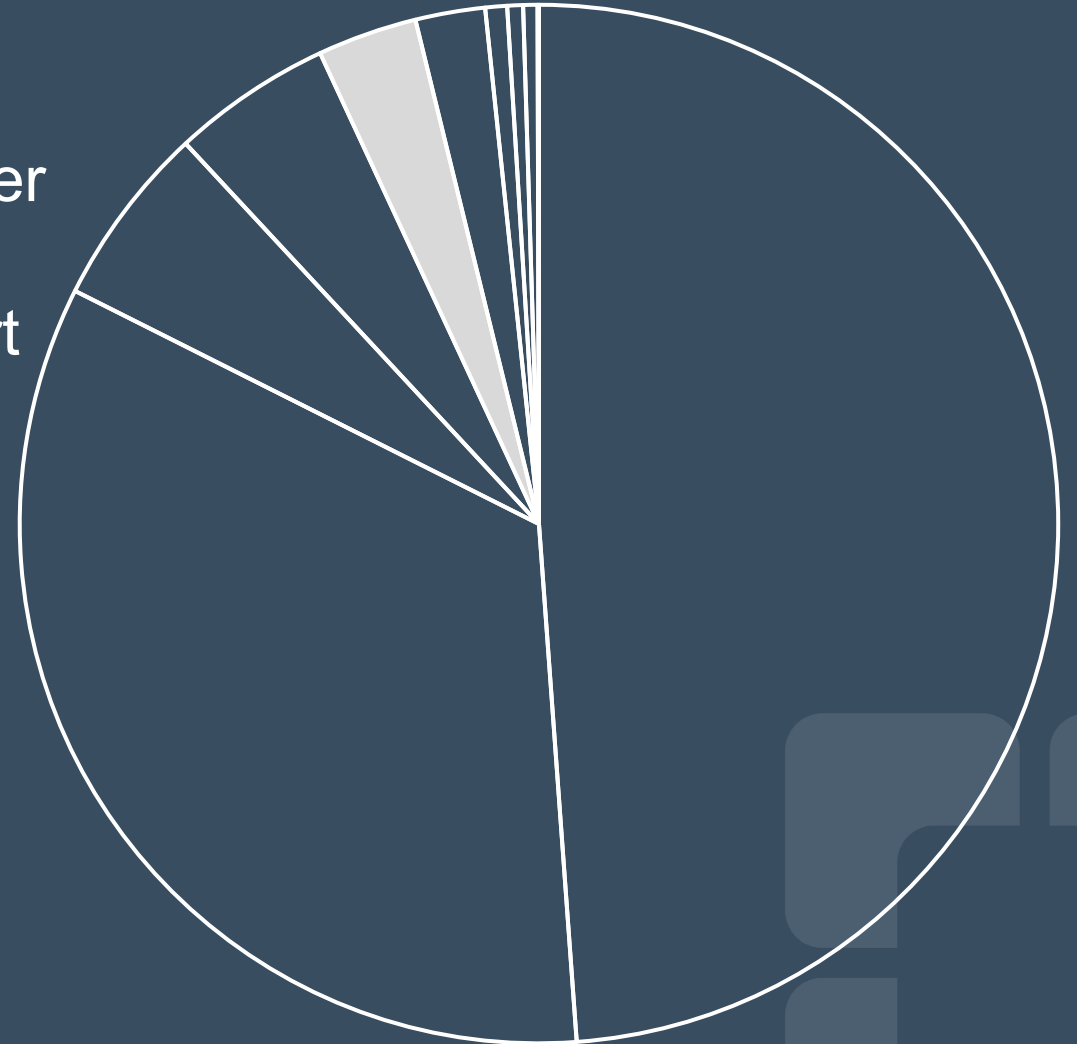
- 7,500 FTE commuting reduction
- 52 million miles/year less
- Reduction of 10% in Carbon Footprint



# Fuel and Energy Related Emissions are is 3% of Scope 3...

## Data Gathering:

- Utility Bills for Electricity + Natural Gas
- Automatically loaded into Portfolio Manager
- Gas, Diesel and Fuel Oil from Fleet Report



# Upstream Energy Emissions

## Upstream Emissions of Purchased Fuels

Fuel	Activity Factor	GHG Intensity Kg CO2e/UoM	Emissions (Tons/CO2e)
Fuel Oil	21,522 gallons	2.284	49
Gasoline	239,389 gallons	2.261	541
Diesel	40,490 gallons	2.37	96
Natural Gas	20,223,274 Therms	0.701	14,171

## Upstream Emissions of Purchased Electricity

Energy	Activity Factor	GHG Intensity Kg CO2e/UoM	Emissions (Tons/CO2e)
Electricity	519,355,812 kWh	0.146	34,503

# Transmission and Distribution Losses

## Upstream Emissions of Purchased Electricity

Energy	Activity Factor	Loss Factor %	T&D kWh	GHG Intensity kg CO2e/UoM	Emissions (Tons/CO2e)
Electricity	519,355,812 kWh	5%	25,353,836	0.146	15,184

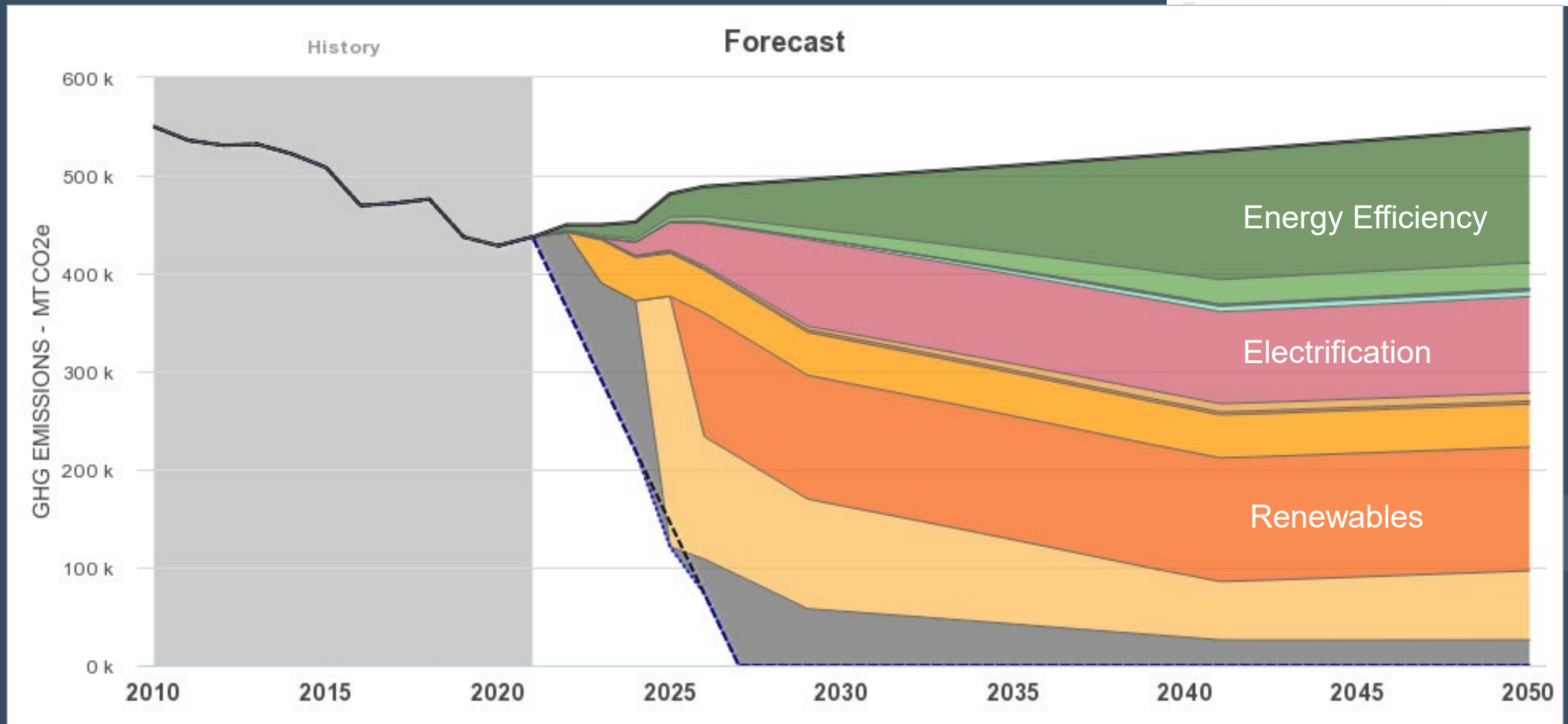
*Upstream Energy + T&D = 4% of Scope 3*

# Other Energy Solutions

Fuel	Upstream + T&D	% of Upstream + T&D	Solutions
Electricity	49,687	77%	Energy Efficiency + Renewables
Natural Gas	14,171	22%	Electrification or Offsets
Gasoline	541	1%	Electric Vehicles
Diesel	96	0%	Electric Vehicles
Fuel Oil	49	0%	Electrification



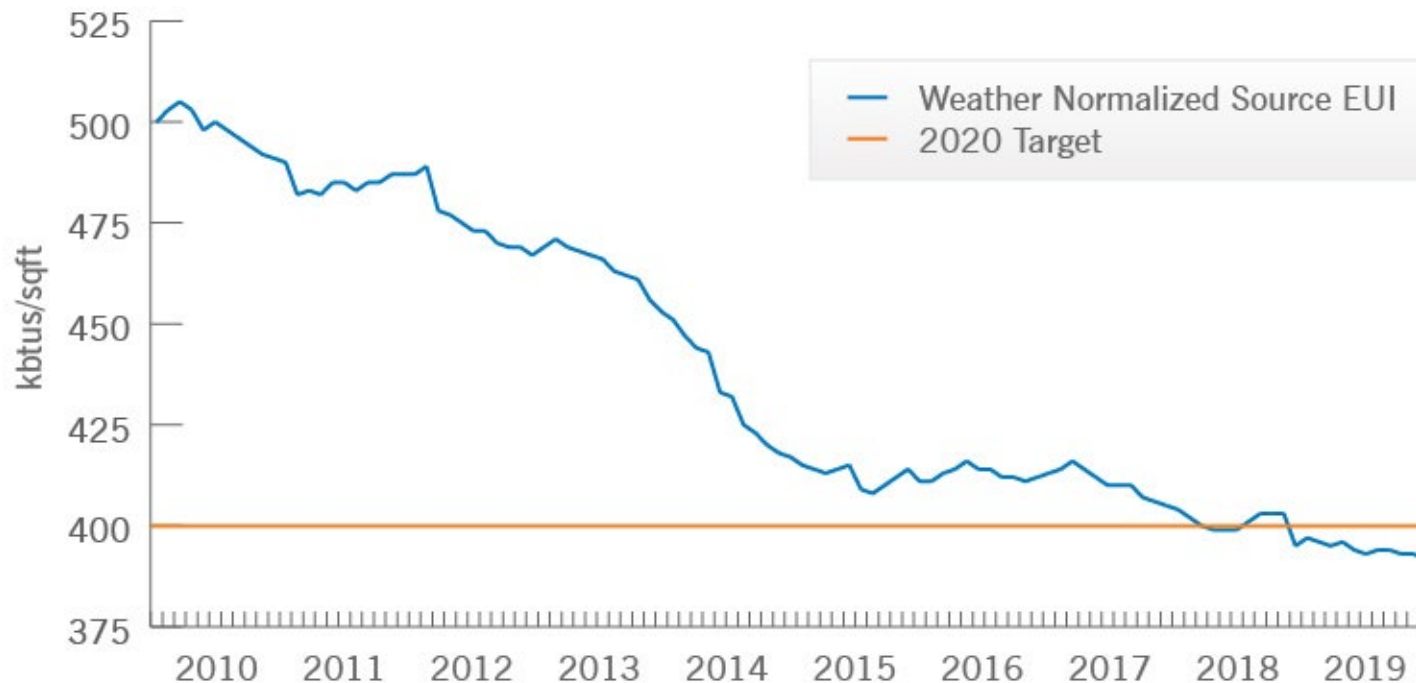
# Scope 1+2 Strategy



# Energy Efficiency: Mitigation = 20% Goal



## Enterprise Weather Normalized Source Energy Use Intensity

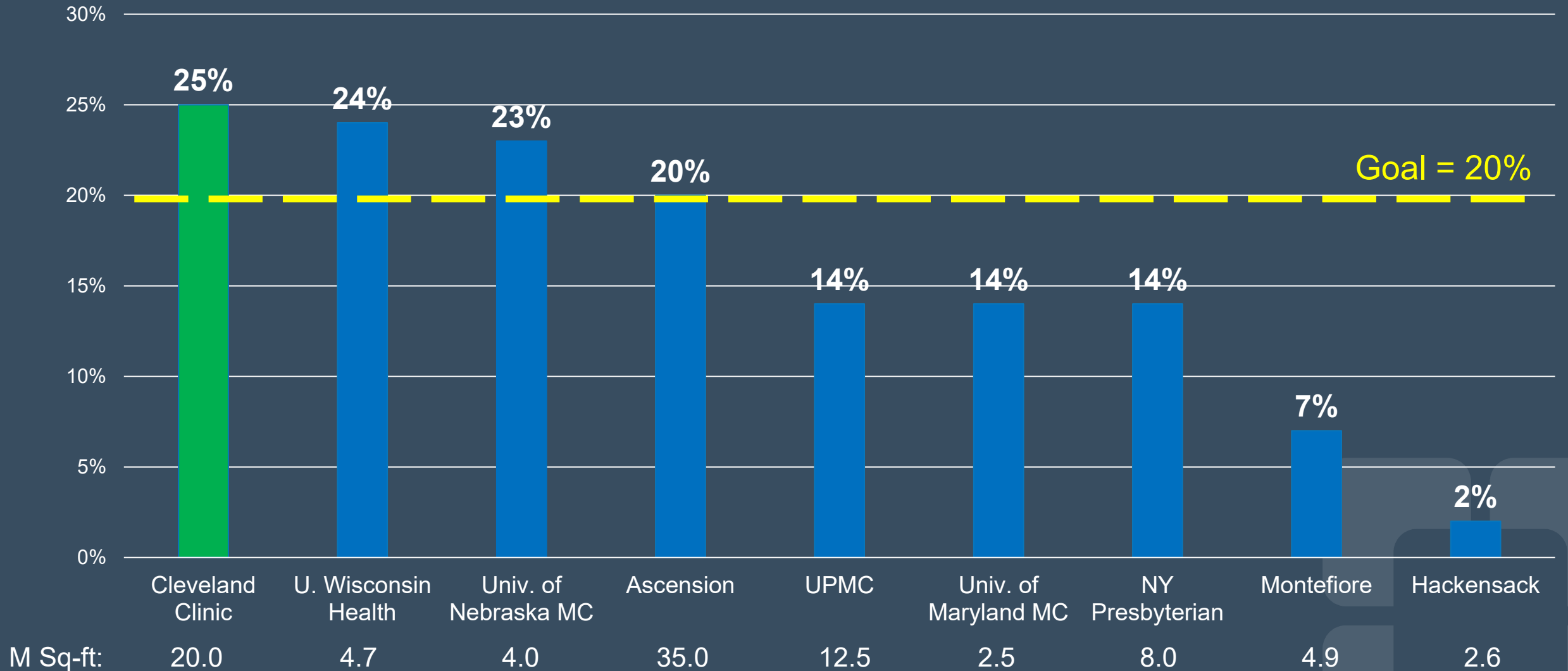


- LED Retrofits
- OR Setbacks
- Chiller Optimizations
- Filter Optimizations
- Retro-Commissioning
- Building Monitoring
- Temperature Control

**25% Reduction**



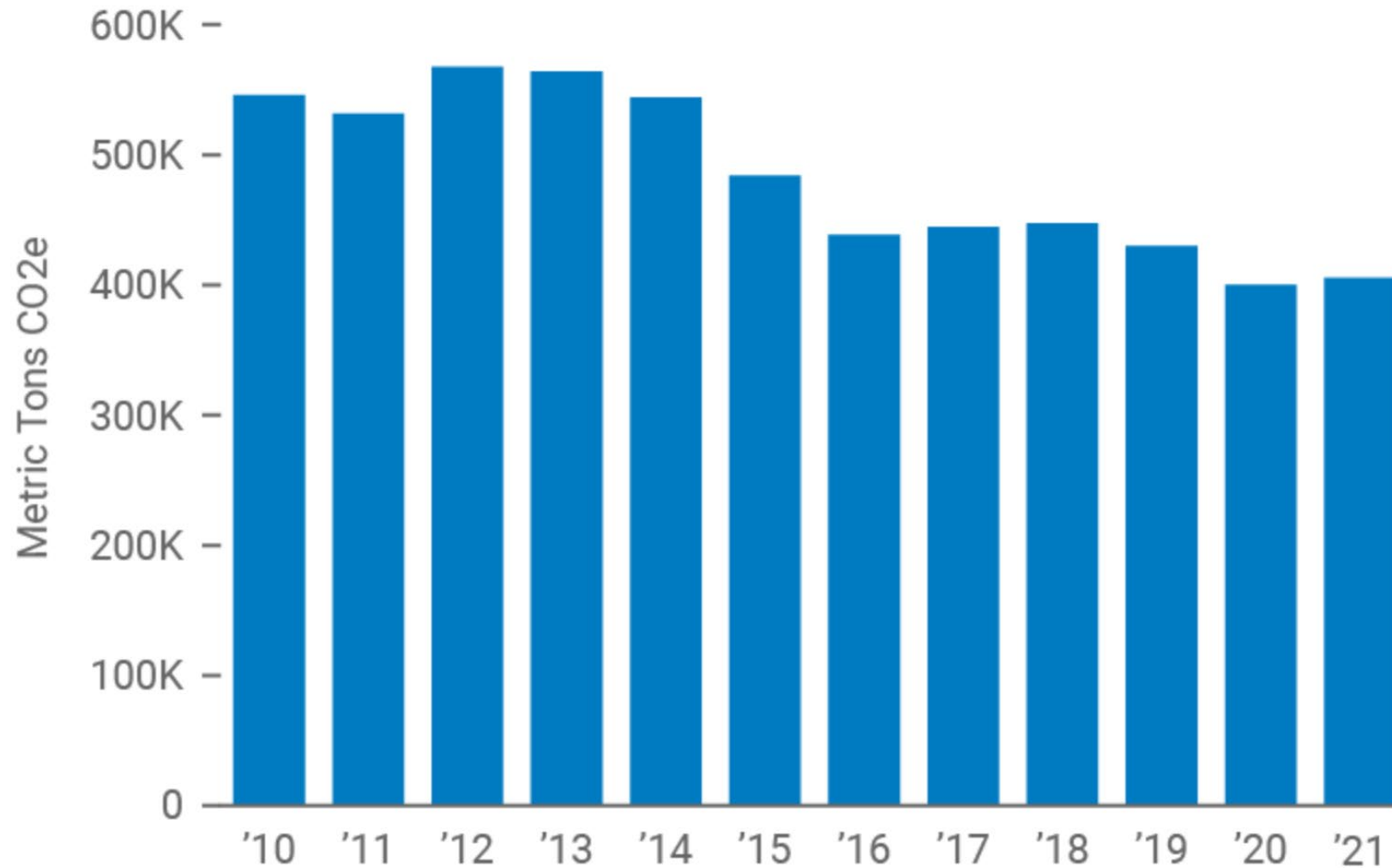
# Percent EUI Reduction from Baseline 2010-2020



Note: other participants include Mayo Clinic, Kaiser Permanente, Legacy Health, North Shore-Long Island Jewish, Univ. S. Alabama Medical Center, University of Utah Healthcare

# Cleveland Clinic has reduced its carbon footprint by 25% in total since 2010

## Cleveland Clinic CO<sub>2</sub> Emissions, Scope 1 & 2



## Carbon Reduction Drivers

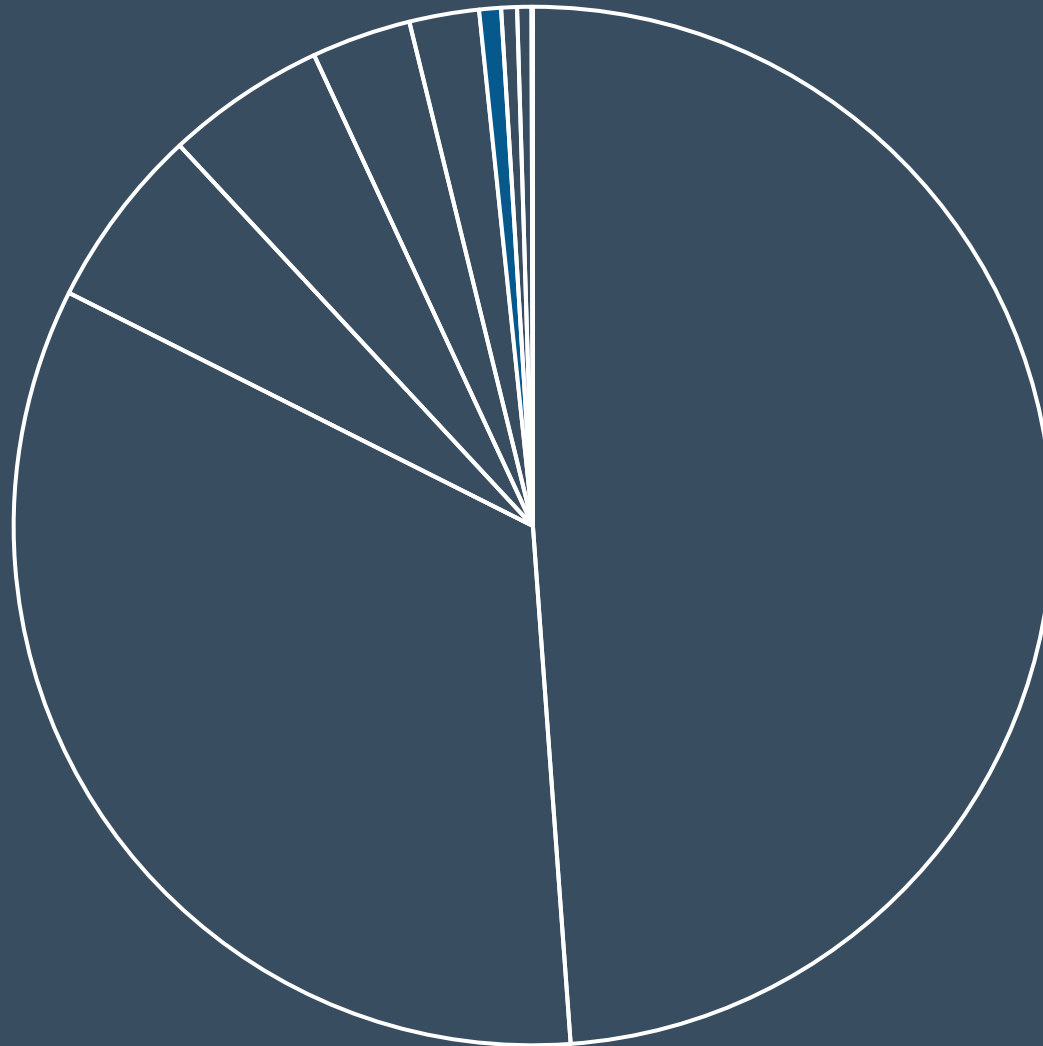
### 2010-2020 (Sq Ft)

- Energy Efficiency (26%)
- Fleet Efficiency (2%)
- Anesthesia (2%)
- Renewables/Grid (3%)



### 2020-2027

- More Efficiency
- Better Buildings
- Renewable Energy
- Offsets

Waste Generated is 1% of Scope 3...

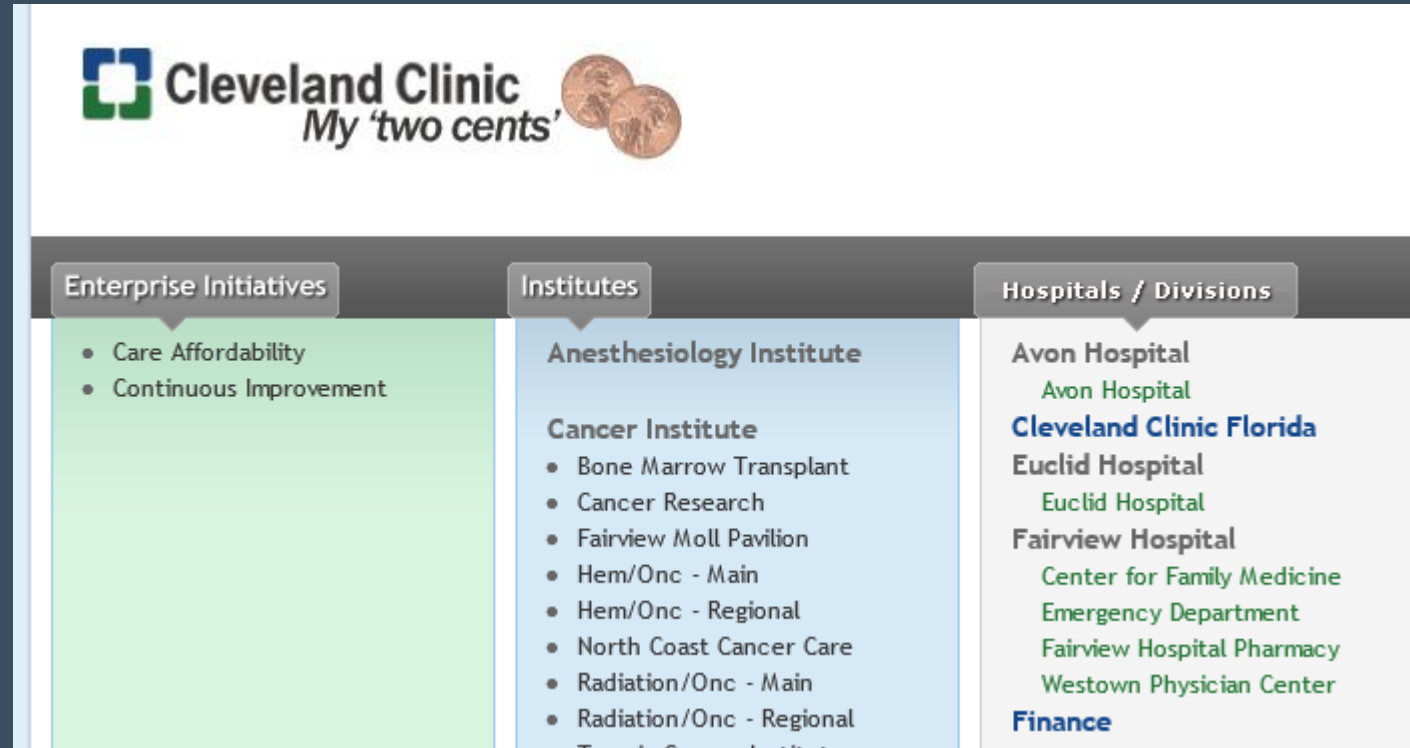


# Cost Saving Ideas: “My two cents”

 <b>Cleveland Clinic</b> <i>My 'two cents'</i> 		
Enterprise Initiatives	Institutes	Hospitals / Divisions
<ul style="list-style-type: none"><li>• Care Affordability</li><li>• Continuous Improvement</li></ul>	<b>Anesthesiology Institute</b>  <b>Cancer Institute</b> <ul style="list-style-type: none"><li>• Bone Marrow Transplant</li><li>• Cancer Research</li><li>• Fairview Moll Pavilion</li><li>• Hem/Onc - Main</li><li>• Hem/Onc - Regional</li><li>• North Coast Cancer Care</li><li>• Radiation/Onc - Main</li><li>• Radiation/Onc - Regional</li></ul>	<b>Avon Hospital</b> Avon Hospital <b>Cleveland Clinic Florida</b> <b>Euclid Hospital</b> Euclid Hospital <b>Fairview Hospital</b> Center for Family Medicine Emergency Department Fairview Hospital Pharmacy Westown Physician Center <b>Finance</b>



# Cost Saving Ideas: “My two cents”



Cleveland Clinic My 'two cents'		
Enterprise Initiatives	Institutes	Hospitals / Divisions
<ul style="list-style-type: none"><li>Care Affordability</li><li>Continuous Improvement</li></ul>	<b>Anesthesiology Institute</b>  <b>Cancer Institute</b> <ul style="list-style-type: none"><li>Bone Marrow Transplant</li><li>Cancer Research</li><li>Fairview Moll Pavilion</li><li>Hem/Onc - Main</li><li>Hem/Onc - Regional</li><li>North Coast Cancer Care</li><li>Radiation/Onc - Main</li><li>Radiation/Onc - Regional</li></ul>	<b>Avon Hospital</b> Avon Hospital <b>Cleveland Clinic Florida</b> <b>Euclid Hospital</b> Euclid Hospital <b>Fairview Hospital</b> Center for Family Medicine Emergency Department Fairview Hospital Pharmacy Westown Physician Center <b>Finance</b>

*More than 80% of ideas submitted are related to waste reduction*

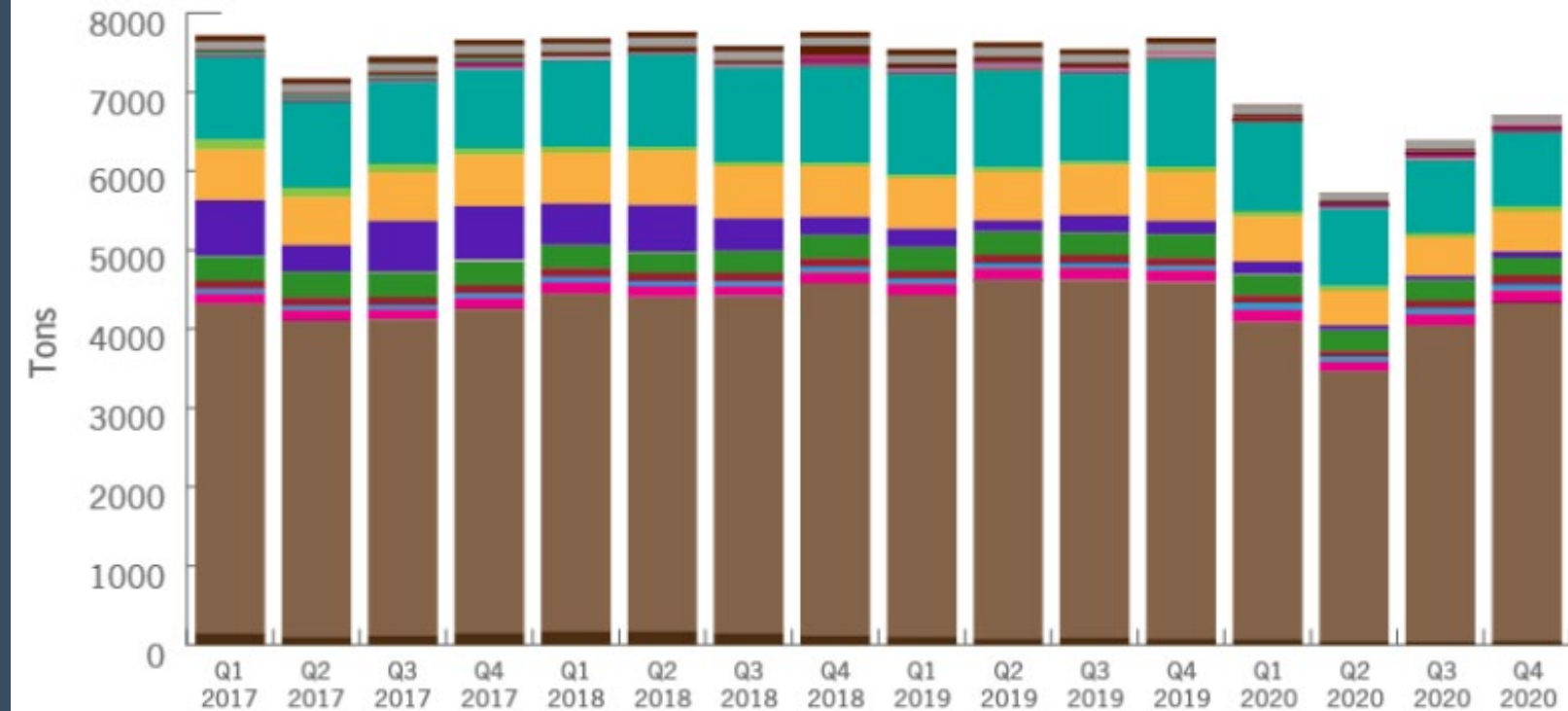
# We Track Many Waste Streams

Category	EPA Material Category
MSW	Mixed MSW (municipal solid waste)
Treated RMW	Mixed MSW (municipal solid waste)
Paper	Mixed Paper (general)
RMW-Biohazard	Mixed MSW (municipal solid waste)
RMW-Sharps	Mixed MSW (municipal solid waste)
Comingled	Mixed Recyclables
C&D-Landfill	Mixed MSW (municipal solid waste)
RMW-Path&Chem	Mixed MSW (municipal solid waste)
C&D-Recycling	Mixed Recyclables
Hazardous	Mixed MSW (municipal solid waste)
Medical Supplies	Mixed MSW (municipal solid waste)
Linen	Mixed MSW (municipal solid waste)
RMW-Non-Reg Pharm	Mixed MSW (municipal solid waste)
Scrap Metal	Mixed Metals
Cardboard	Corrugated Containers
Wood Pallets	Dimensional Lumber
RMW-Reg Pharm	Mixed MSW (municipal solid waste)
Universal Waste	Mixed MSW (municipal solid waste)
Sharps Plastic Credit	Mixed Plastics
Landscaping Organics	Mixed Organics
Composting	Mixed Organics
E-Waste	Mixed Electronics
Single Device Reprocess	Portable Electronic Devices
Batteries	Mixed Electronics
X-Ray Film	Mixed Plastics
Ice-Packs	Mixed MSW (municipal solid waste)
Lamps	Mixed Electronics

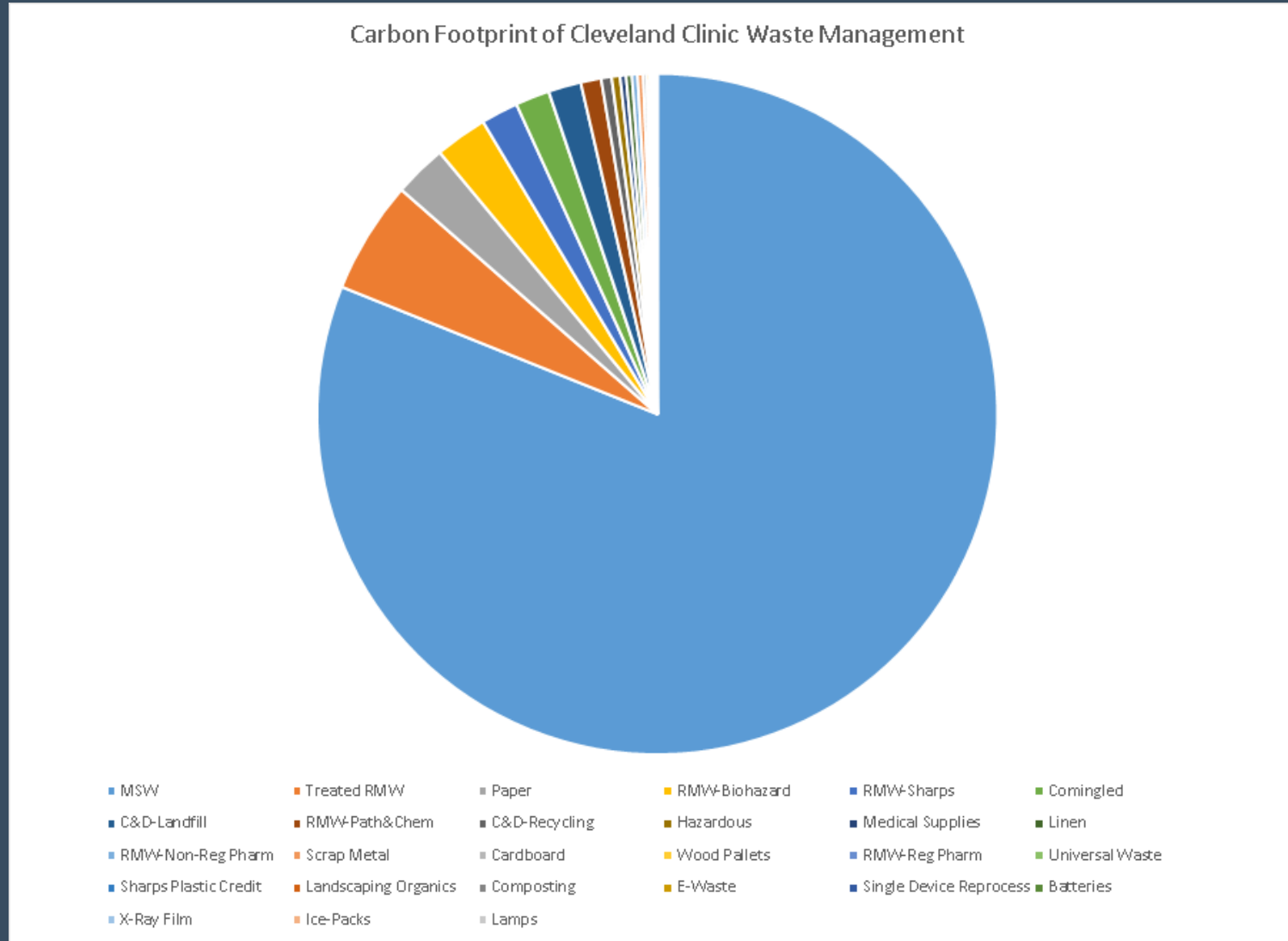
# We Publish Them in our ESG Report

## Cleveland Clinic Enterprise Waste Profile

Main Campus and Regional Operations



# Municipal Solid Waste Drives Carbon Footprint



# Two Programs Have Driven Change...

Material	Tons/Year	Factor/Ton	Tons of CO2e
MSW	17,885	0.63	11,268
Paper	4,968	0.07	348
Comingled	2,504	0.09	225
Everything Else	5,086	various	2,054
<b>Total</b>	<b>30,443</b>		<b>13,894</b>

# Two Programs Have Driven Change...

Material	Tons/Year	Factor/Ton	Tons of CO2e
MSW	17,885	0.63	11,268
Paper	4,968	0.63	3,130
Comingled	2,504	0.63	1,577
Everything Else	5,086	various	2,054
<b>Total</b>	<b>30,443</b>		<b>18,029</b>

Impact of 4,135 ton reduction from paper and comingled recycling is 0.2% reduction in Scope 3 Footprint



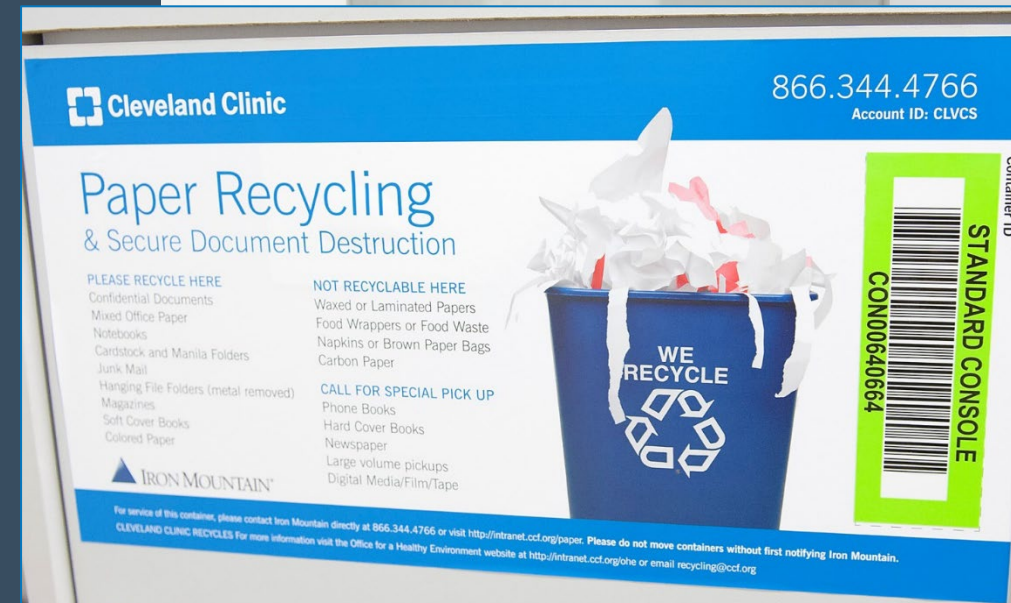
# Paper Recycling

## Paper Facts

- 70,000+ caregivers
- 3,569 Containers
- 4,968 tons recycled

## Paper Impact

- 15 years = 31,512 tons of CO<sub>2</sub>e
  - 6,790 gas cars for a year or
  - 6,131 homes' electricity or
  - 3.8 Billion smartphone charges



# Comingled Recycling

## CoMingled Facts

- 70,000+ caregivers
- 6,597 Containers
- 2,504 tons recycled

## CoMingled Impact

- 15 years = 15,562 tons of CO<sub>2</sub>e
  - 3,353 gas cars for a year or
  - 3,028 homes' electricity or
  - 1.9 Billion smartphone charges

 **Cleveland Clinic**  
Office for a Healthy Environment

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## Recycle this.

Make sure these items are **clean**, **dry**, and **empty** (pour out liquid, scrape out food).



BOTTLES, JUGS, & CONTAINERS      METAL CANS      CARDBOARD & PAPERBOARD

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## Trash that.

If we don't recycle right, all items will go into the trash.

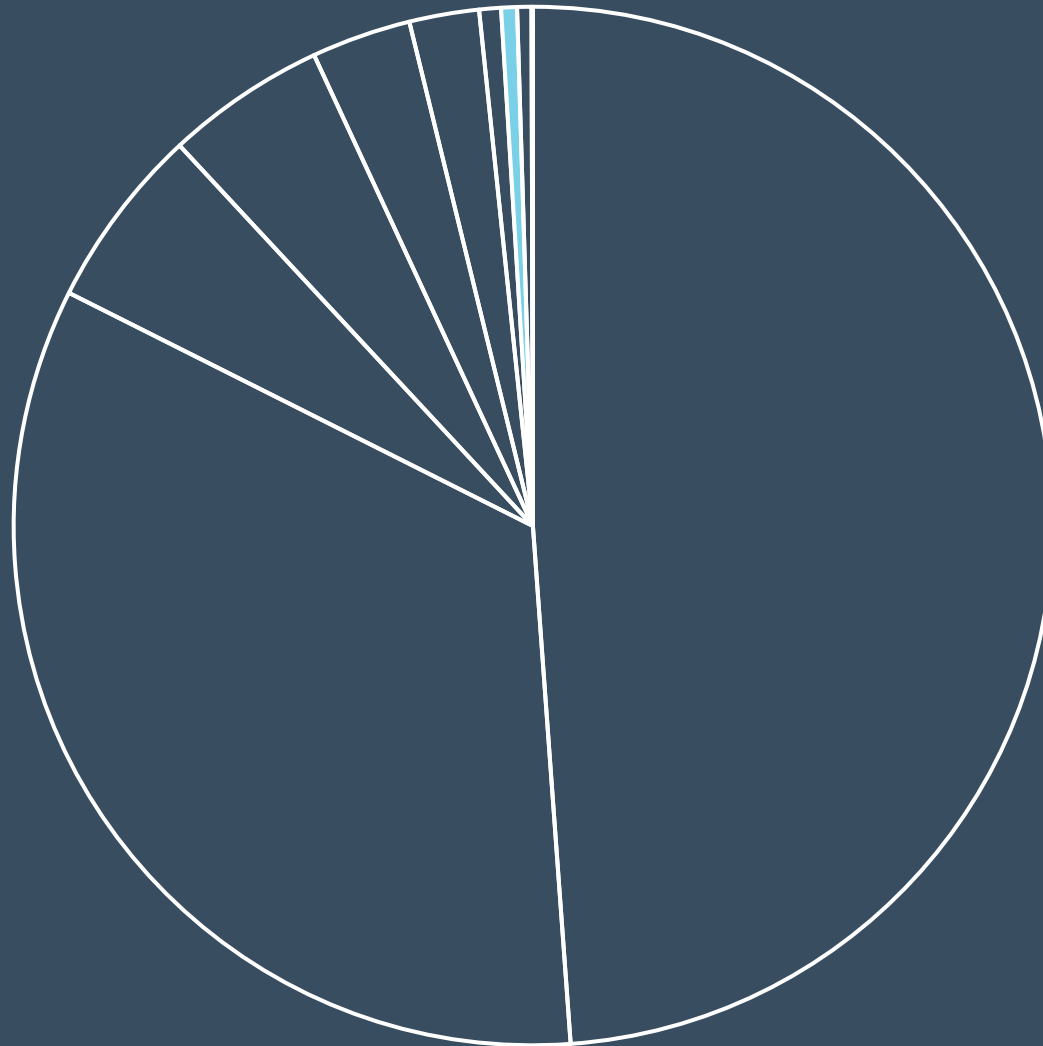


FOOD WASTE      NAPKINS, PLASTIC UTENSILS, PAPER CUPS, & STRAWS      PLASTIC BAGS OR WRAP

**Questions?** Contact [healthyenvironment@ccf.org](mailto:healthyenvironment@ccf.org)

Ohio Administrative Space

Business Travel is 0.5% of Scope 3...



# Business Travel

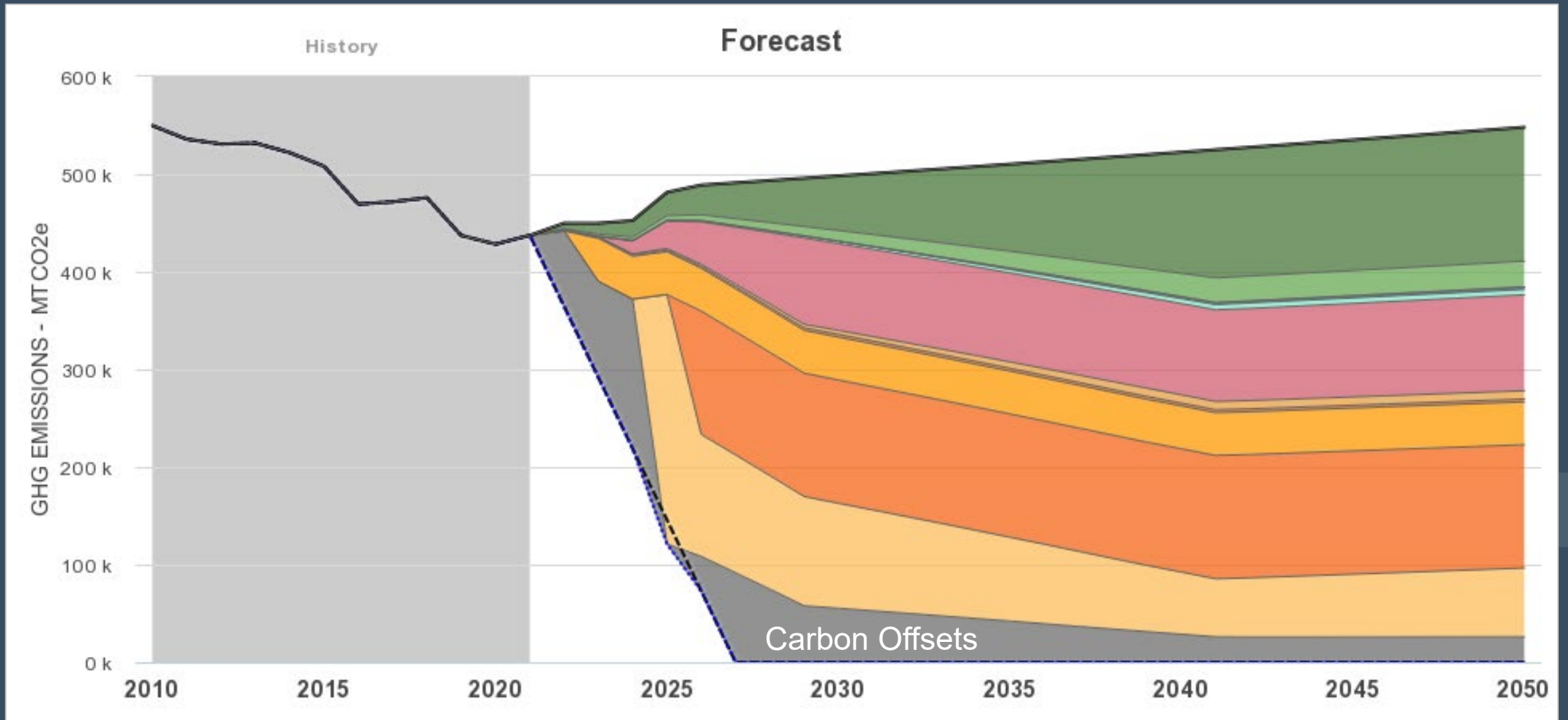
- 10,543 Tons
- Data from our business travel service partner

## Impact Levers

- Travel Less
- Virtual Meetings
- Offsets



# Cleveland Clinic + Carbon Offsets



# Carbon Offsets

- Voluntary vs. Compliance Carbon Offsets
- Healthcare carbon offsets are voluntary...but what are they really?



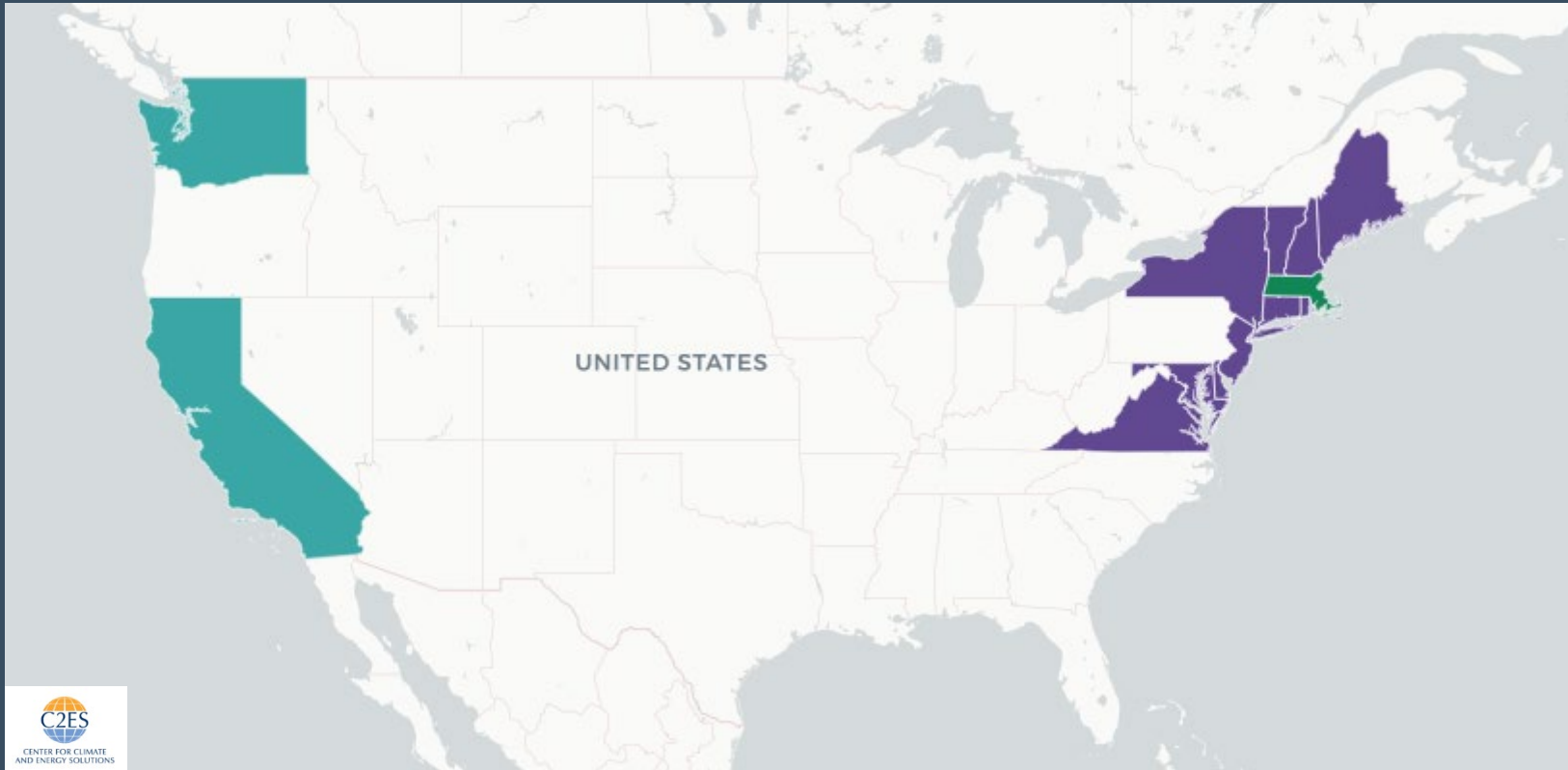


# What is a carbon market?

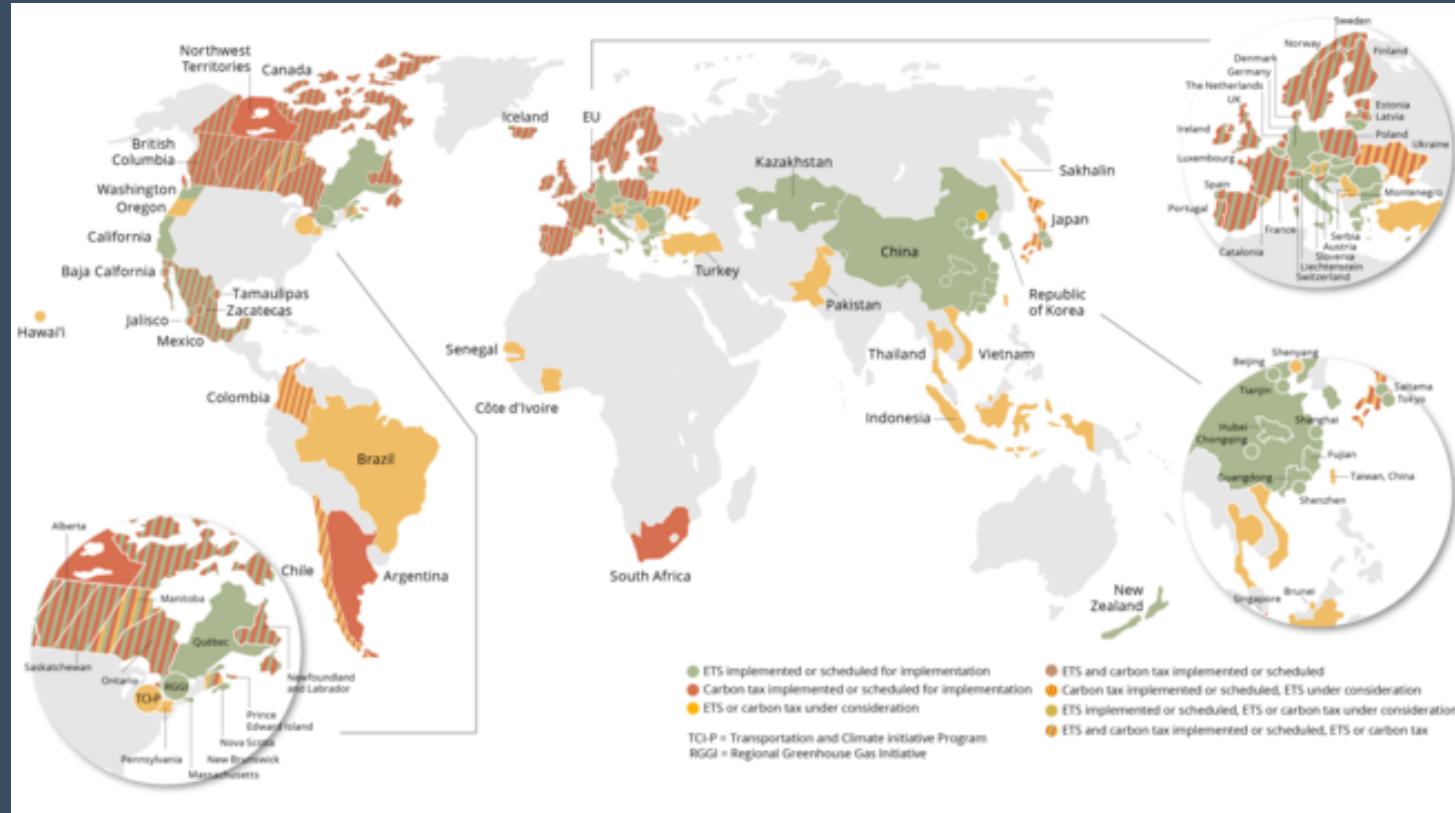
- Cap on Emissions (Country/Region)
- Reduce Cap Every Year Until Goal Reached
- If Company A can reduce lower than cap, they can sell reduction to company B
  - Cheaper than regulated reductions



# Carbon Markets in USA



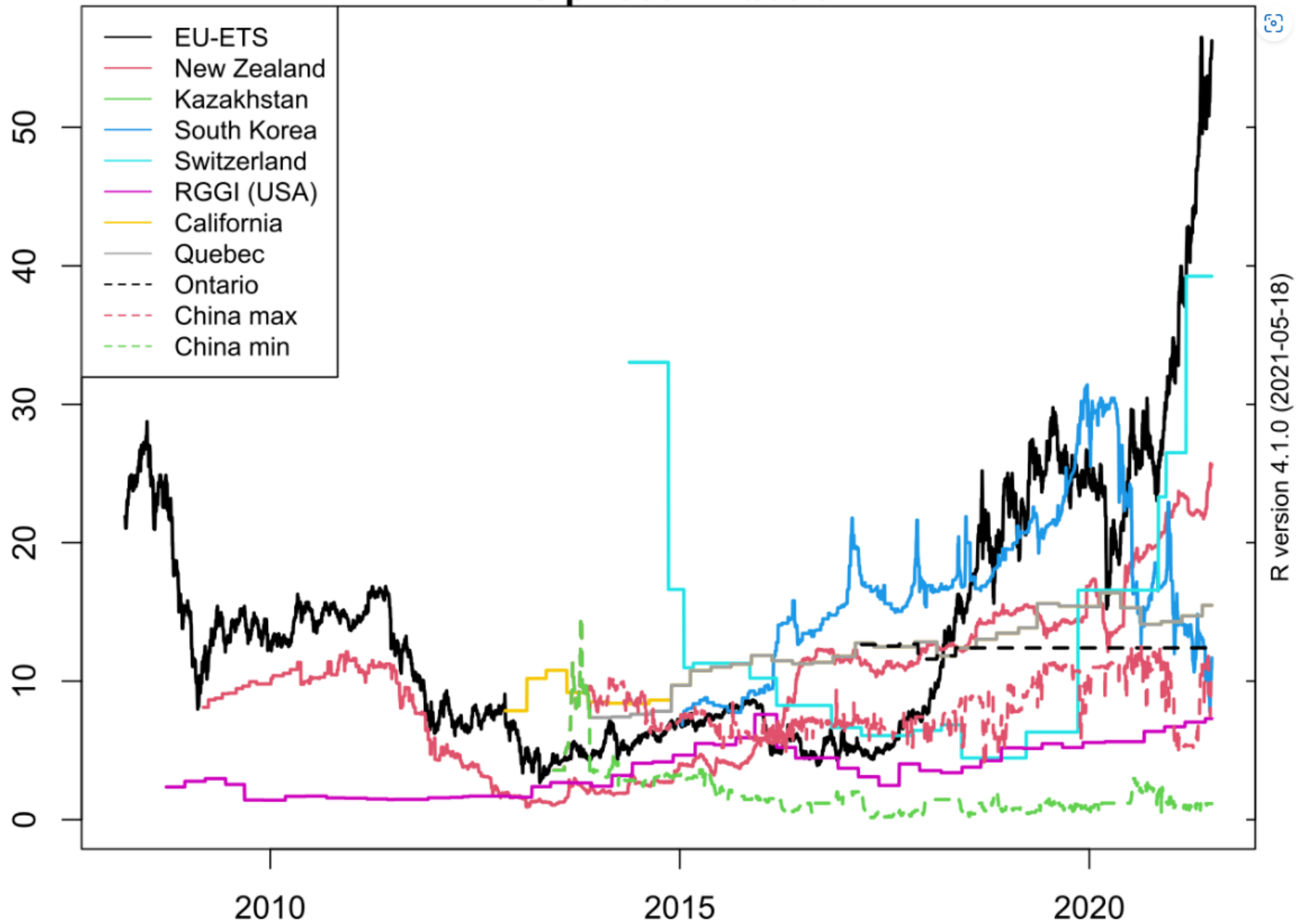
# Carbon Markets



Emissions trading and carbon taxes around the world (2021)<sup>[94]</sup>

- Carbon tax implemented or scheduled
- Carbon [emission trading](#) implemented or scheduled
- Carbon [emission trading](#) or carbon tax under consideration

## ETS prices in €/tCO<sub>2</sub>



# Carbon Offset Types

- Planting trees
- Not cutting down trees
- Agricultural/soil management practices
- Methane capture from unregulated sectors
- Destruction of potent industrial GHG gases
  - HFCs and SF6

# Carbon Offset Quality

- Verified: by an accepted 3<sup>rd</sup> party
- Additionality: but for this it would not have occurred
- Transparency: measurement and data
- Permanent: can't go back *(Must Have Threshold)*

## Healthcare Considerations:

- Co-Benefits: local/biodiversity
- Local/Health Equity





**Every life deserves world class care.**