Decarbonization 101

MHCEA
MINNESOTA HEALTHCARE ENGINEERS ASSOCIATION

LEO A DALY

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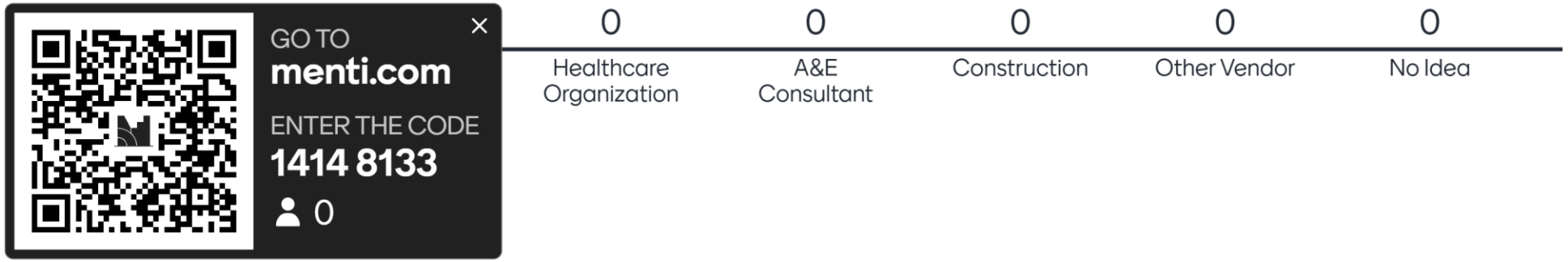
Market Sector Leader – Healthcare

LEO A DALY

Go to **www.menti.com** and use the code **1414 8133**

What Industry do you work in

Mentimeter

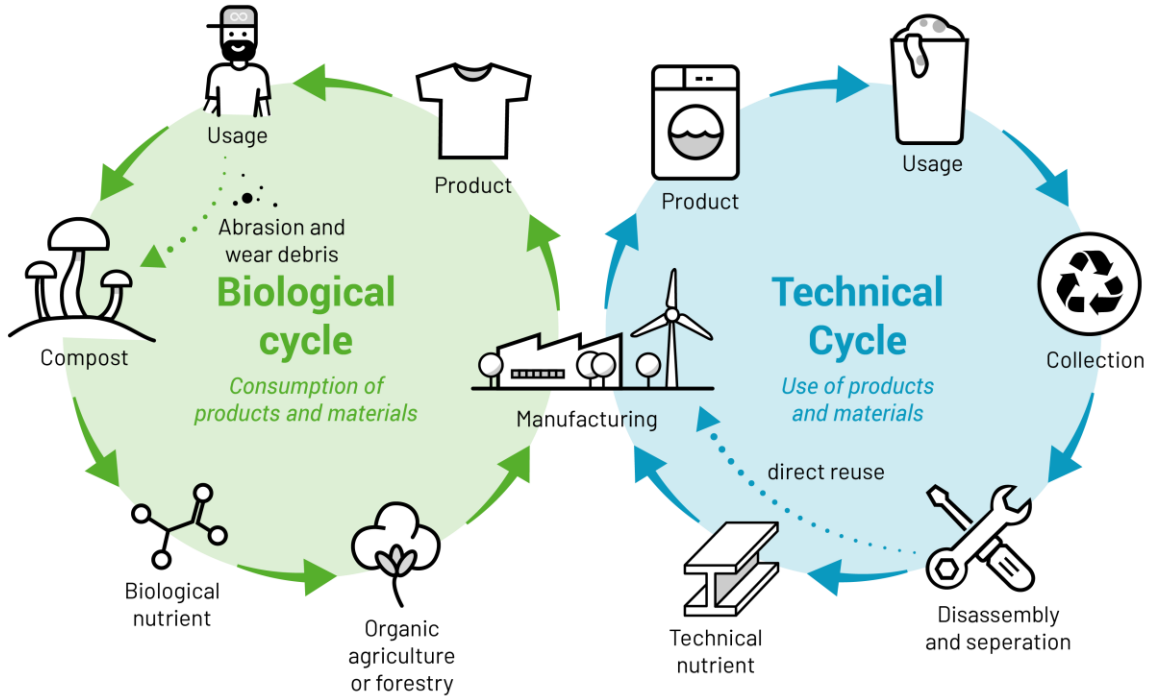


Presentation Overview

- What is Decarbonization
- Three scopes of emission
- What is embodied Carbon
- ESG
- HHS Health Sector Climate Pledge and IRA
- Where to start
- Tools
- Questions

CRADLE TO CRADLE

A concept by Michael Braungart and William McDonough



The circular economy model:
less raw material, less waste, fewer emissions

Decarbonization

The process by which countries, individuals or other entities aim to achieve zero fossil carbon existence. Typically refers to a reduction of the carbon emissions associated with electricity , industry and transport.

https://www.ipcc.ch/sr15/chapter/glossary/

Sustainability

Meeting the needs of the present without compromising the ability of future generations to meet their own needs

https://www.un.org/en/academic-impact/sustainability

Drivers of Decarbonization

- Organizational policy (ESG)
- Building codes
- Existing building decarbonization requirements
- Resiliency
- Energy independence
- Future proofing

Buildings and Decarbonization

- **Limiting energy use (to limit carbon created by generating energy)**
- **Going all electric (Electrification)**

(no fossil fuels burned on site + electricity generation CAN be from renewable means)

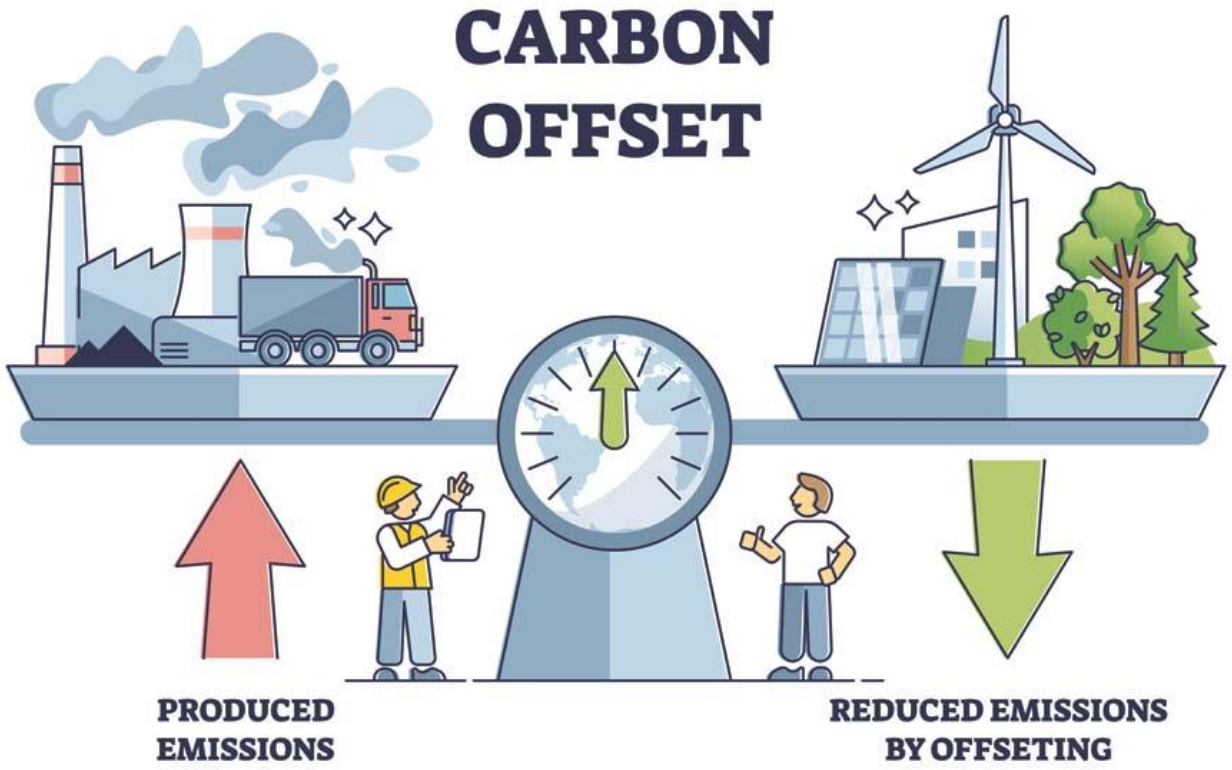
- **Generating renewable/carbon-free electricity on site**

(typically, solar panels also referred to at Photovoltaic panels or PV)

What is Net Zero?

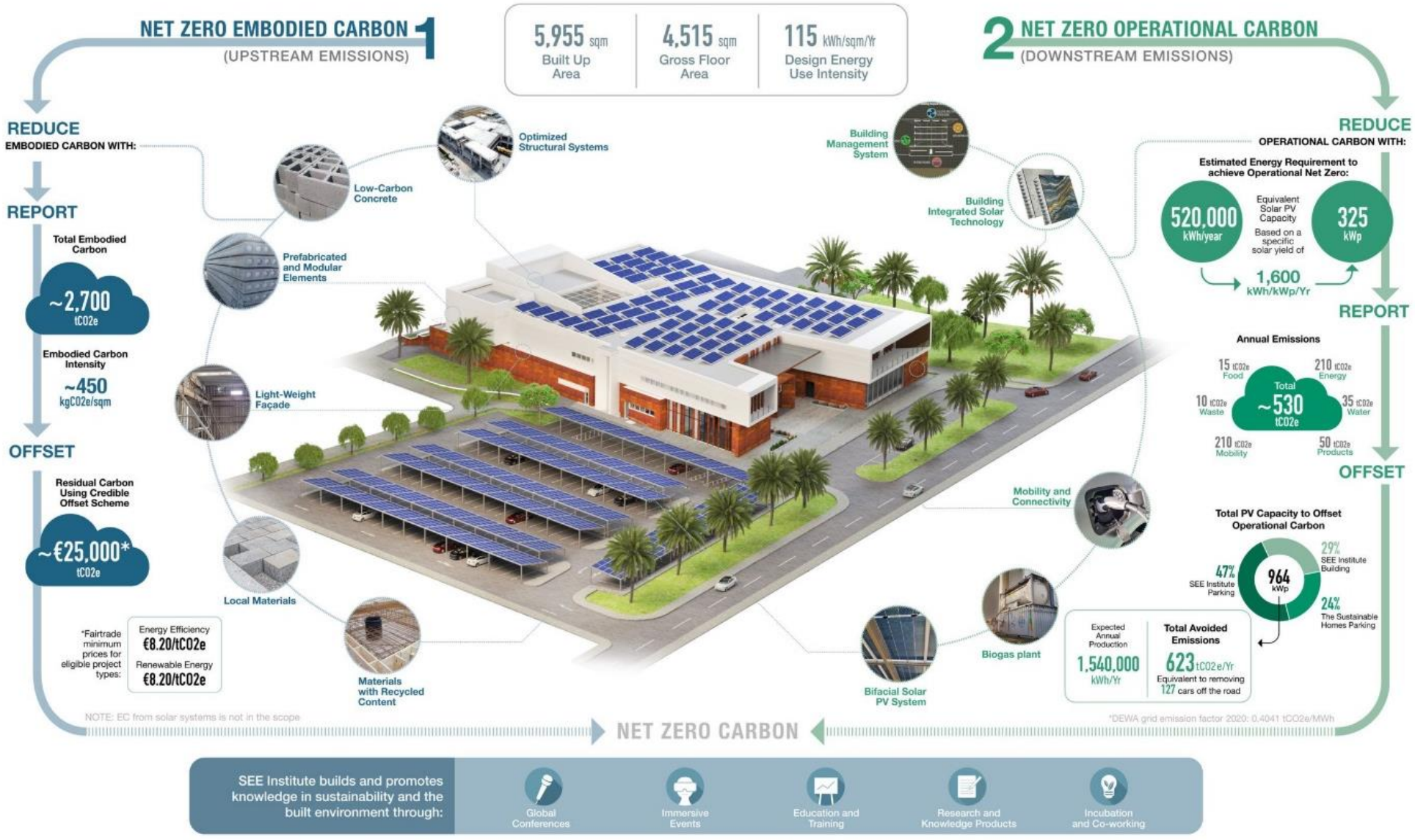
Goal

Stop adding to the burden of climate-heating gases in the atmosphere.



What is Net Zero?

1. Reduce as much energy/ emissions as possible to result in a low energy consuming building
2. Any remaining energy is generated through renewable emission free energy



Scope 1 Direct emissions emanating directly from health care facilities and health care owned vehicles.

- Combustion of Natural Gas
- Combustion of Diesel Generators
- Emissions from Refrigerants
- Medical Gas System leaks and exhaust
- Landscape and misc equipment emissions
- Fleet Fuel combustion

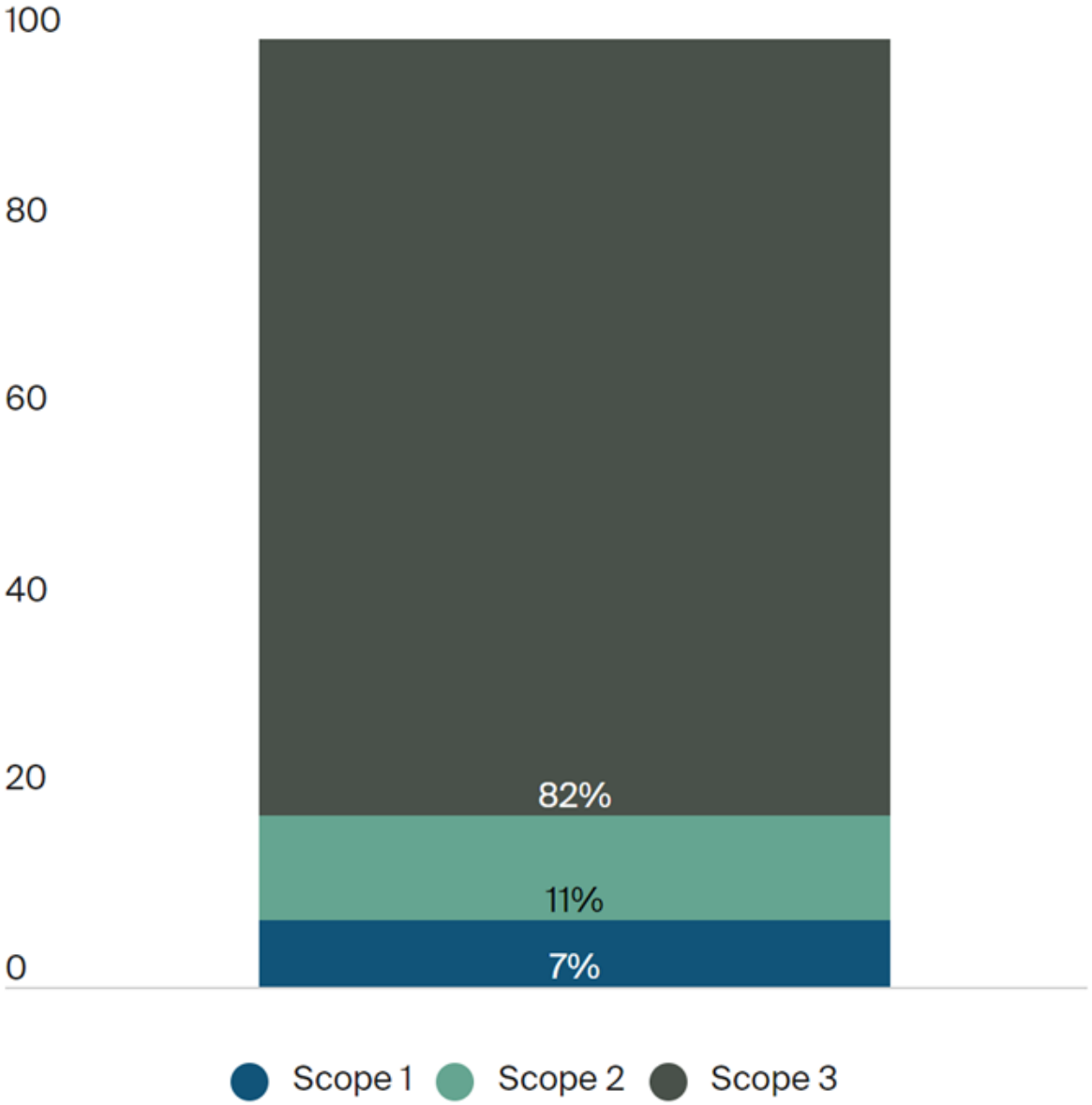
Scope 2 Indirect emissions from purchased energy sources such as electricity, steam, cooling and heating.

- Emissions from purchased energy

Scope 3 Emissions derived from health care supply chain through the production, transport and disposal of goods and services.

- Water Embodied Carbon
- Building Product/Supplies Embodied Carbon
- Patient Transportation
- Visitor Transportation
- Staff Transportation
- Vendor Transportation
- Equipment Embodied Carbon
- Supplies Embodied Carbon
- Waste
- Pharmaceuticals Embodied Carbon
- Food Embodied Carbon
- Investments
- Emissions of Outsourced Services

ASHE Sustainability (https://www.ashe.org/sustainability)



Scope 3

All other supply-chain emissions including:

- Water and waste
- Energy
- Transport
- Finance, insurance, administration, and public health
- Testing and research
- Construction
- Other manufacturing
- Information and computer technology, equipment, and services
- Plastics, rubber, textiles, and paper
- Medical supplies
- Medical devices
- Pharmaceuticals and chemicals
- Food
- Other

Scope 2

Emissions from direct purchases of energy

Scope 1

Direct emissions from health care facilities

https://www.commonwealthfund.org/publications/explainer/2022/apr/how-us-health-care-system-contributes-climate-change

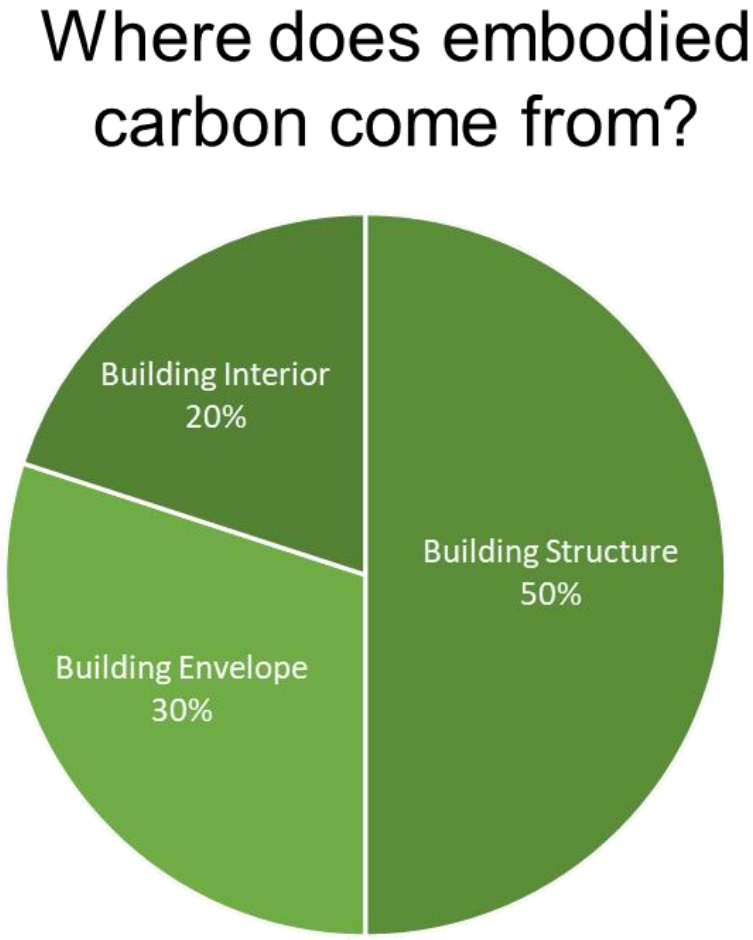
a: Matthew J. Eckelman et al., "Health Care Pollution and Public Health Damage in the United States: An Update," *Health Affairs* 39, no. 12 (Dec. 2020): 2071–79.
rce: Shanoor Seervai, Lovisa Gustafsson, and Melinda K. Abrams, "How the U.S. Health Care System Contributes to Climate Change," explainer, Commonwealth Fund, Apr. 2022. https://doi.org/10.26099/m2nn-gh13

Types of Carbon

- ***Embodied carbon*:** refers to the greenhouse gas emissions arising from the manufacturing, transportation, installation, maintenance, and disposal of building materials.
- **Operational carbon** refers to the greenhouse gas emissions due to building energy consumption.
- ***Carbon Footprint:*** quantified in kilograms of CO2 equivalent (kg CO2e) also called global warming potential

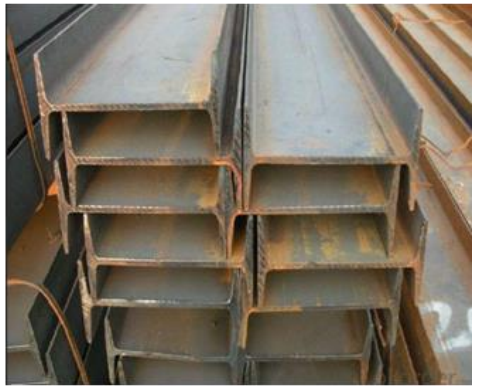
https://carbonleadershipforum.org/embodied-carbon-101/

Embodied Carbon



Concrete (11%)

Steel (10%)

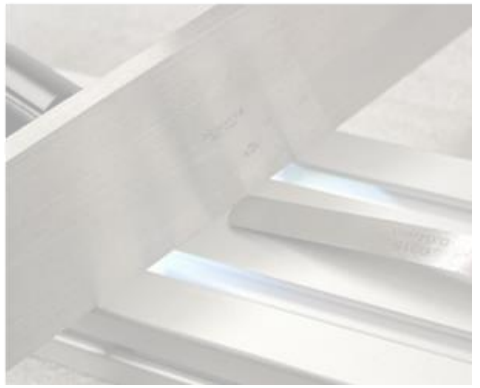


Aluminum (2%)

Embodied Carbon

Emissions by the **cement** industry
=
8% of total global emissions

Emissions by the **aviation** industry
=
2% of total global emissions



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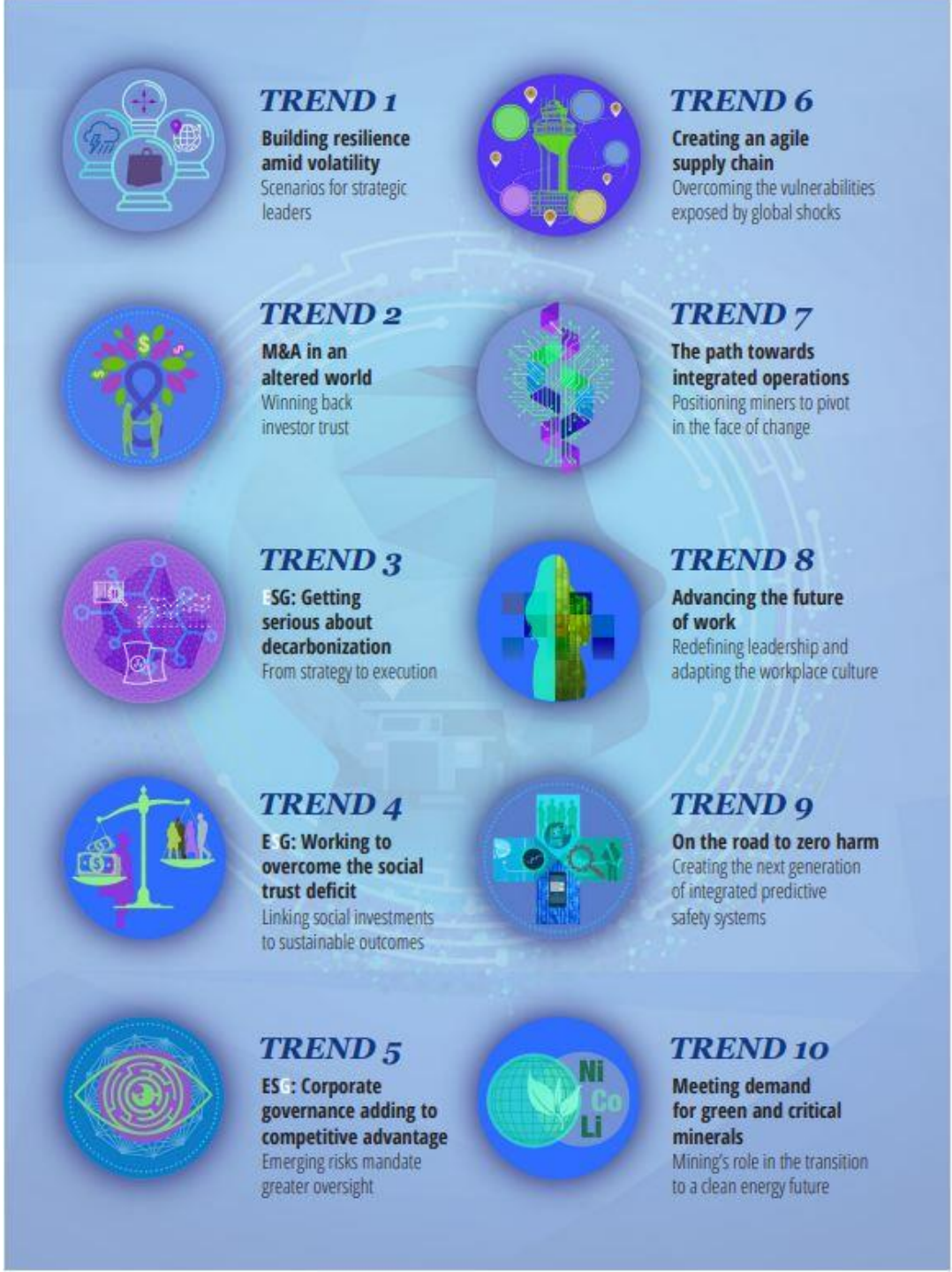
ESG

Environmental, social, and governance refers to the three central factors in measuring the sustainability and societal impact of an investment in a company. ESG objectives include reducing greenhouse gas emissions, promoting social responsibility, and promoting good governance practices.



HHS Health Sector Climate Pledge

- At minimum, reduce organizational emissions by 50% by 2030 (from a baseline no earlier than 2008) and achieve net-zero by 2050, publicly accounting for progress on this goal every year.

- Designate an executive-level lead for their work on reducing emissions by 2023 and conduct an inventory of Scope 3 (supply chain) emissions by the end of 2024.

- Develop and release a climate resilience plan for continuous operations by the end of 2023, anticipating the needs of groups in their community that experience disproportionate risk of climate-related harm.

    - Advocate Aurora Health
    - Ascension
    - Aspirus Health
    - **CommonSpirit Health**
    - **Gillette Children's**
    - Gundersen Health System
    - SSM Health
    - Western Wisconsin Health

Inflation Reduction Act (P.L. 117-169)

The Inflation Reduction Act changed a wide range of tax laws and provided funds to improve our services and technology to make tax filing easier for you.

Since the Inflation Reduction Act is a 10-year plan, the changes won't happen immediately. We're working to implement the law as quickly as we can.

- Updates to Energy Efficient Commercial Buildings Tax Deduction (179d)
- Updates to Energy Investment Tax Credit (ITC) – Section 48c

https://www.dsireusa.org/

~$216B*

In **estimated** corporate **Tax Credits** designed to catalyze private investment in **clean energy**, transport, and manufacturing

*Source: McKinsey & Company

$30.5B+

To **boost U.S. production to support building electrification** (incl. energy storage & heat pumps)

$30B

To transition states & electric utilities to clean electricity

$3.42B

To decarbonize federal buildings through construction or retrofit

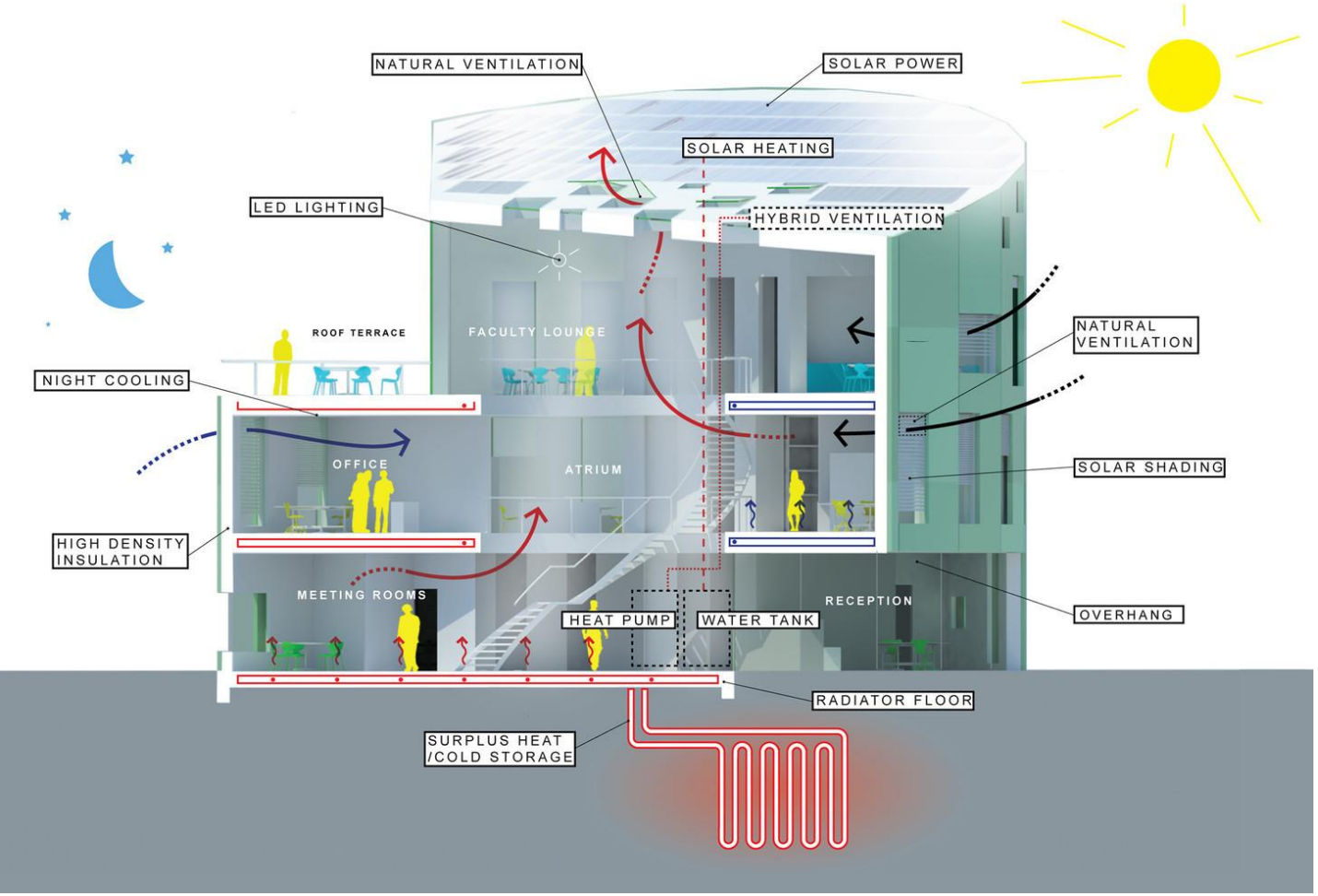
$1B+

In grants for **local gov'ts to modernize commercial** & residential buildings to meet energy codes

$50M+

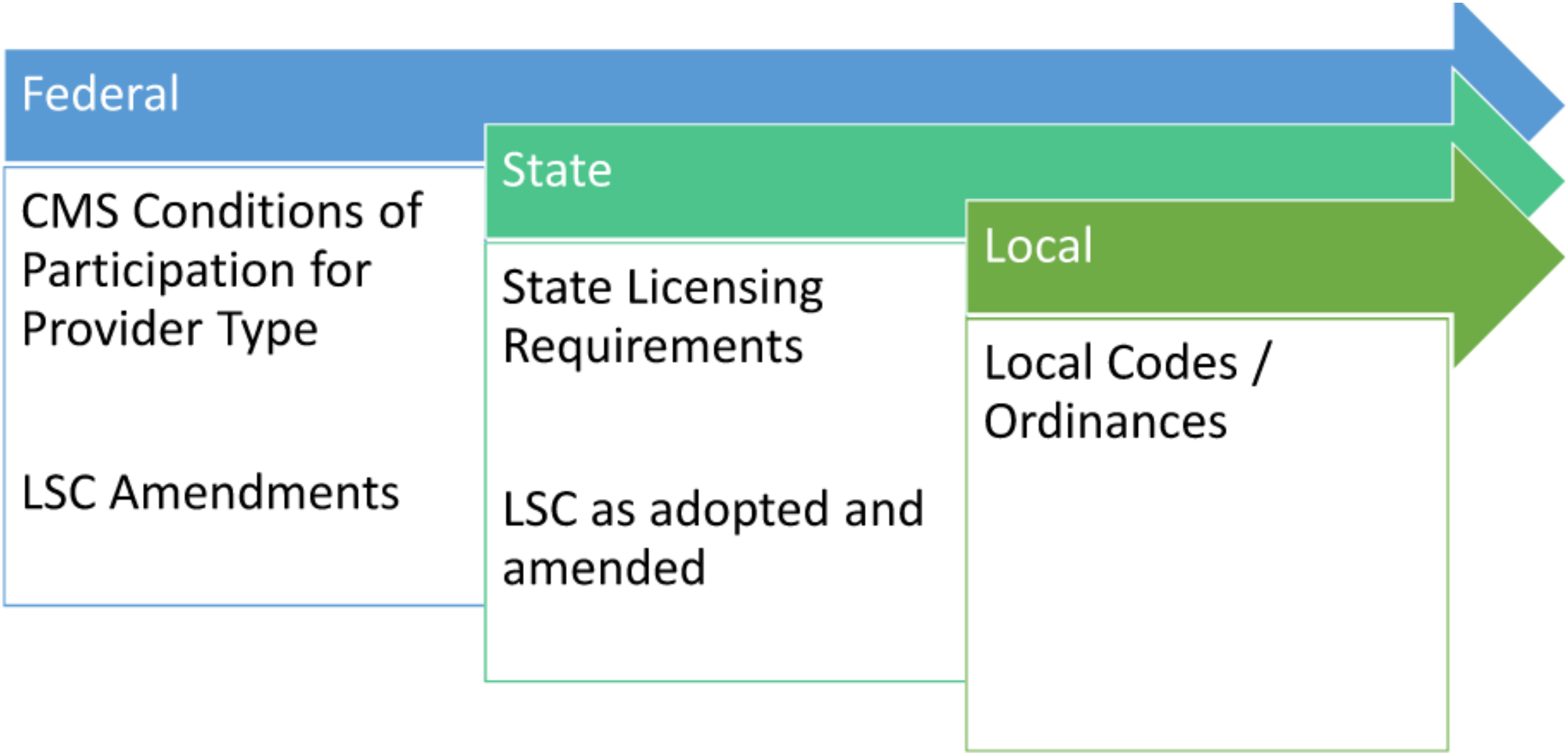
To reduce air pollutants in schools

Energy Investment Tax Credit (ITC) – Section 48c



- Geothermal
- Heat pumps (electric)
- Heat recovery heat pump
- Solar
- Thermal storage

Regulates Healthcare



Joint Commission Environmental Sustainability Hospital Program (HAP)

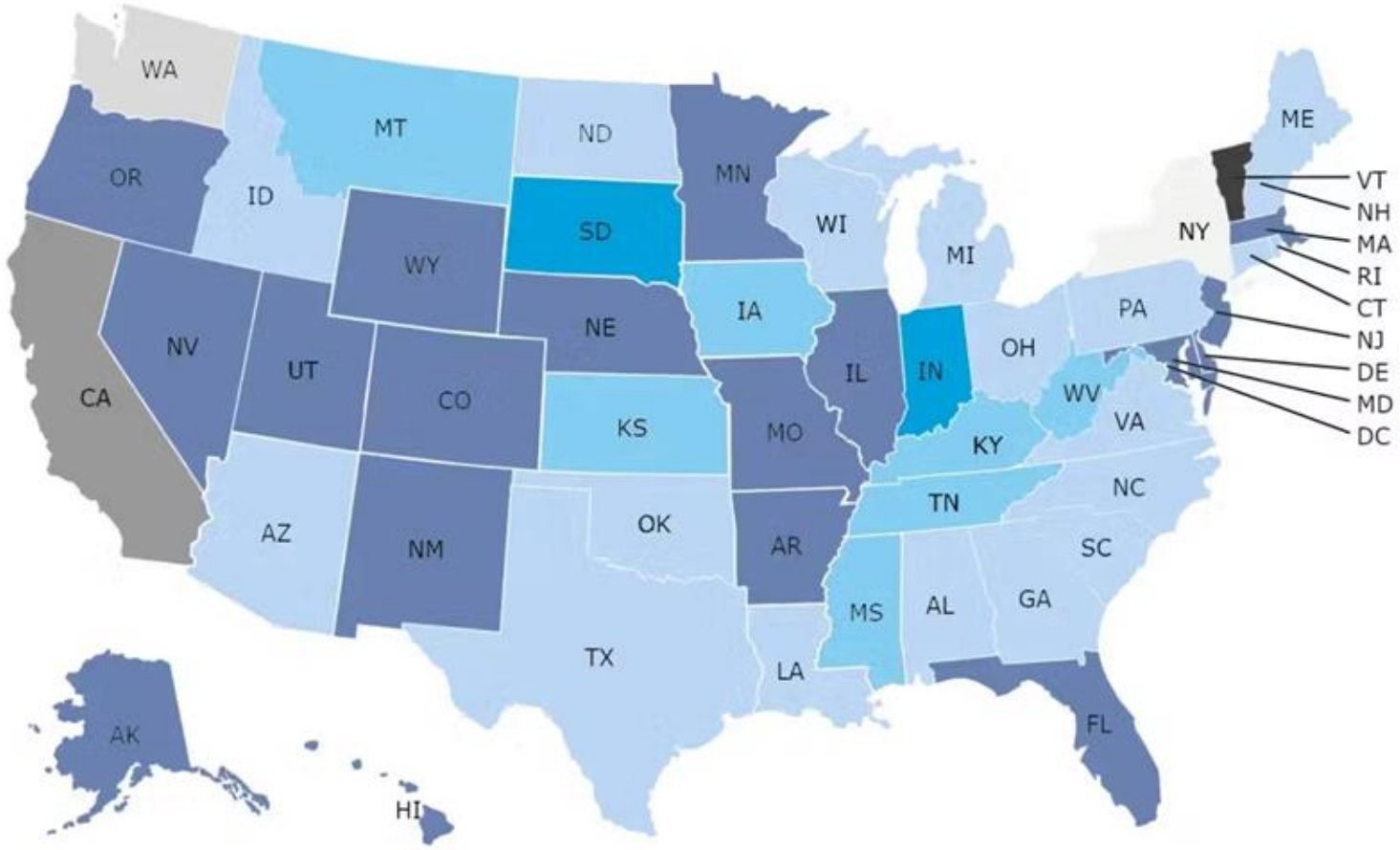
LD.05.01.01: The hospital decreases greenhouse gas emissions and waste.

Elements of Performance (EPs) for LD.05.01.01

- *The hospital leaders designate an individual(s) responsible for the oversight of activities to reduce greenhouse gas emissions in accordance with clinical and facility representatives.*
- *The hospital measures three or more of the following:*
    - *Energy use*
    - *Purchased energy (electricity and steam)*
    - *Anesthetic gas use*
    - *Pressurized metered dose inhaler use*
    - *Fleet vehicle gasoline consumption*
    - *Solid waste disposal to landfills or through incineration*
- *The hospital develops written goals and action plans to reduce greenhouse gas emissions in three or more areas that they have measured.*
- *At least annually, the hospital analyzes its sustainability measures (EP2) to determine whether it is meeting its goal(s) and revises its plan (EP3) if goals are not achieved or sustained.*

Codes

IECC 2030 and ASHRAE 90.1-2031 are anticipated to require net zero performance



MAP KEY

- Ashrae 90.1 2019 - IECC 2021
- Ashrae 90.1 2016 - IECC 2018
- Ashrae 90.1 2013 - IECC 2015
- Ashrae 90.1 2010 - IECC 2012
- Ashrae 90.1 2007 - IECC 2009
- 2019 Building Energy Efficiency Standards - Title 24
- 2018 Washington State Energy Code
- NYC Energy Conservation Code (NYCECC)
- 2020 Vermont Commercial Building Energy Standards (CBES)

Minnesota to 100 Percent Clean Energy by 2040

(HF7) The new law requires all electric utilities, including investor-owned utilities, municipalities, and rural electric cooperatives, to generate or procure 100 percent of the electricity they provide to retail customers in Minnesota from carbon-free technologies. The law ramps up to the 100 percent mandate, requiring carbon-free technology to provide:

- 80 percent of electricity for public utilities, and 60 percent for other electric utilities by 2030; and
- 90 percent of electricity for all utilities by 2035.

https://www.revisor.mn.gov/bills/text.php?number=Hf0007&version=1&session=ls93&session_year=2023&session_number=0

What’s your Story?

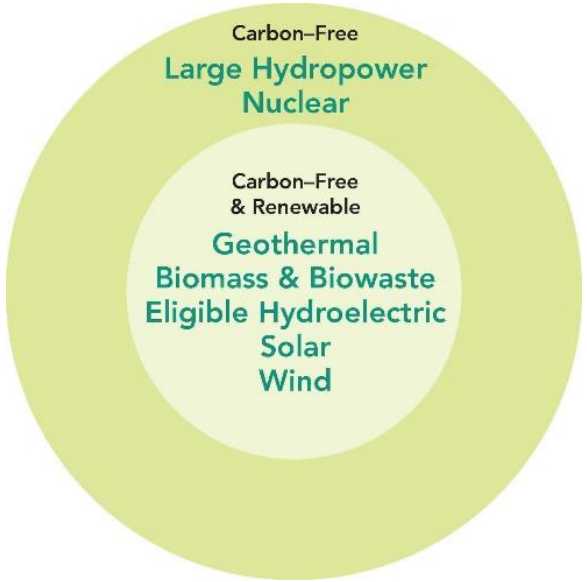
What is your favorite place to go to be outdoors?

What is one new thing you have learned thus far from this presentation?

What is one questions you have?

What is “Carbon Free” Energy

Electrical energy produced from resources that generate no carbon emissions



Wind Power

Solar Energy

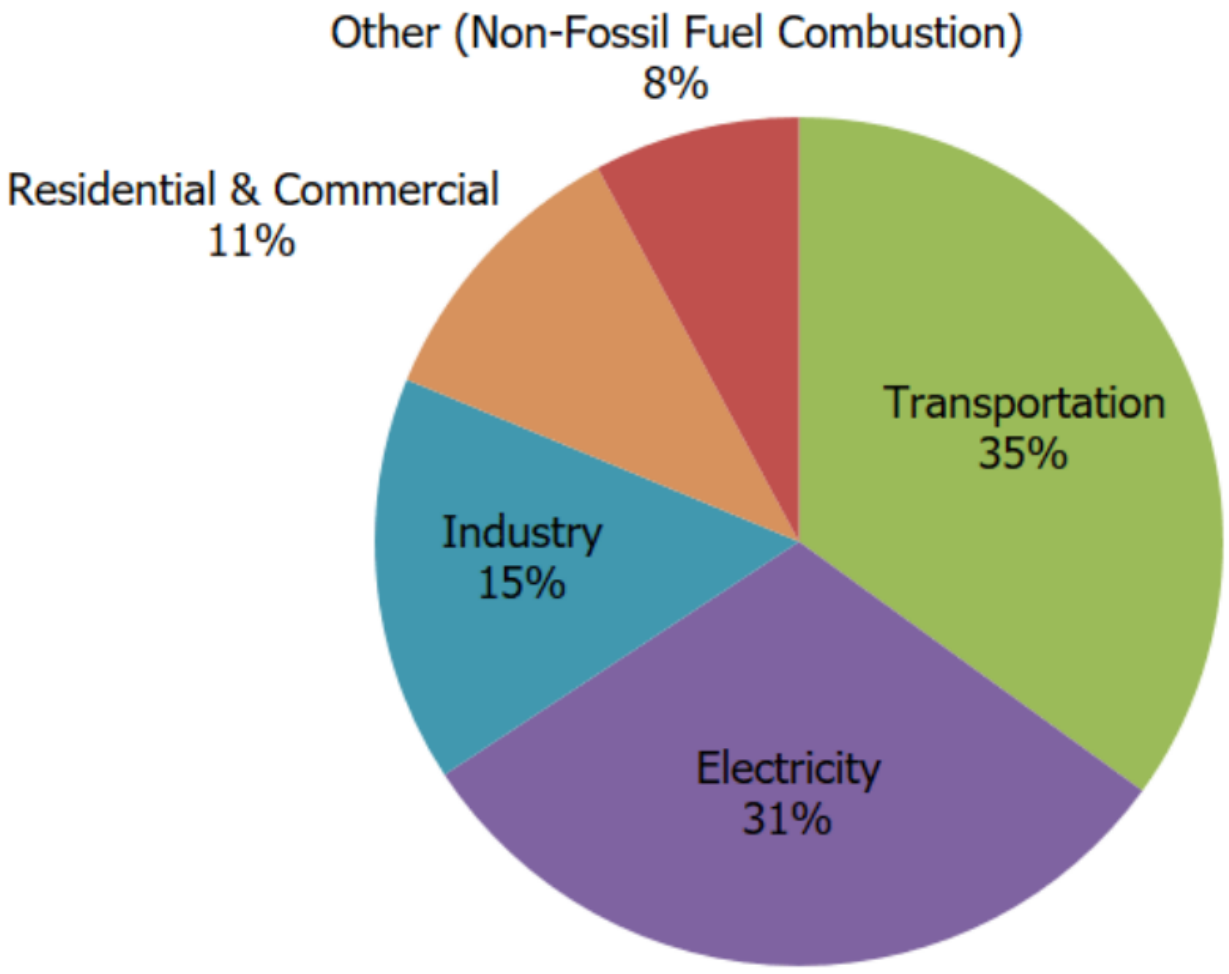
Hydropower

Biofuel

Wave Power

Geothermal Energy

U.S. Carbon Dioxide Emissions, by Economic Sector



Getting Started

- Establish a Sustainability Champion
- Track your Energy
- Build alliances
- Engage the workforce
- Complete a Greenhouse Gas (GHS) Emission Inventory
- Efficiency is key and cannot be overlooked
- Start Small
- Share Success Stories

GHC Inventory

A greenhouse gas (GHG) inventory is the annual process of cataloging GHG emission sources and quantifying the GHG they emit.

- The most common greenhouse gases
- carbon dioxide (CO2)
- methane (CH4)
- nitrous oxide (N2O)
- fluorinated gases (HFCs, PFCs, NF3, & SF6)
- ***GHG Protocol Corporate Accounting and Reporting Standard***

ghg-protocol-revised.pdf (ghgprotocol.org)

https://ghgprotocol.org/sites/default/files/ghgp/standards/ghg-protocol-revised.pdf

GHC Inventory

Carbon Footprint Calculator

https://www3.epa.gov/carbon-footprint-calculator/

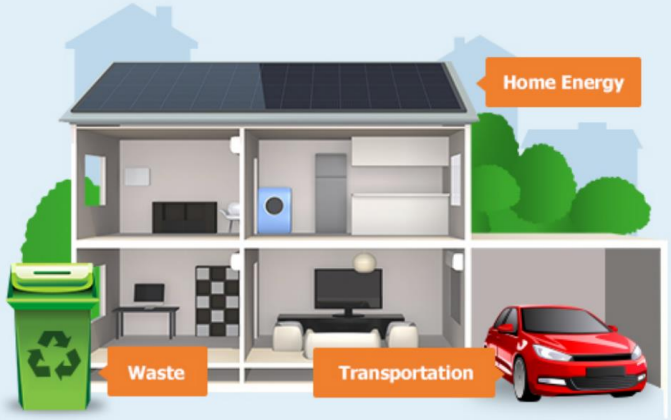
What is your carbon footprint?

Take a few minutes to find out with EPA's Household Carbon Footprint Calculator.

Number of people in your household

ZIP Code

Get Started



About

- Many of our daily activities - such as using electricity, driving a car, or disposing of waste - cause greenhouse gas emissions. Together these emissions make up a household's carbon footprint.
- The calculator estimates your footprint in three areas: home energy, transportation and waste. Everyone's carbon footprint is different depending on their location, habits, and personal choices.
- For an explanation of the calculator's assumptions and sources, see the **Assumptions and References page**.

How To

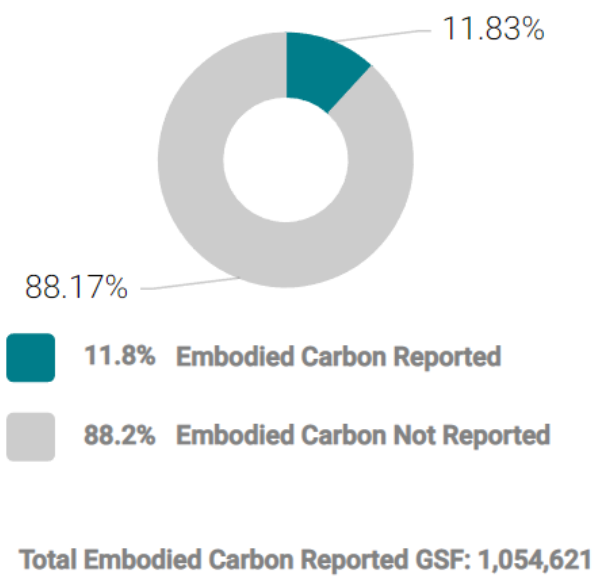
- You can get a quick, rough estimate of your carbon footprint by using U.S. average values. They are provided *(along with other useful information)* in the "tool tips" throughout the calculator.
- For a more accurate estimate, use your own numbers. Gather your utility bills (electricity, natural gas, fuel oil, propane) to calculate your average use over a year. You can find your car's rated fuel efficiency at **fueleconomy.gov**, or you can **calculate your car's actual efficiency.**

Download

- To work offline or see the formulas behind the calculator, you can download it as a spreadsheet.

Calculator in Excel

Embodied Carbon (% GSF) by Leo A Daly



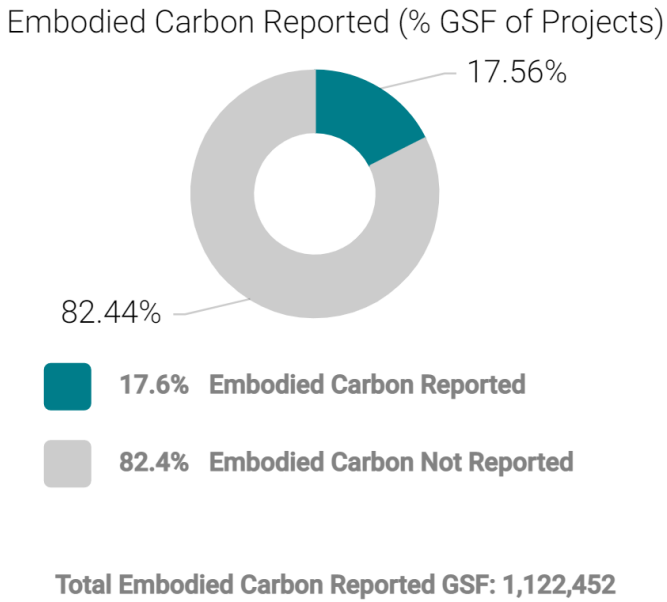
2021

% Projects Models

11.83% → 17.56%

Gross Square Footage Modeled

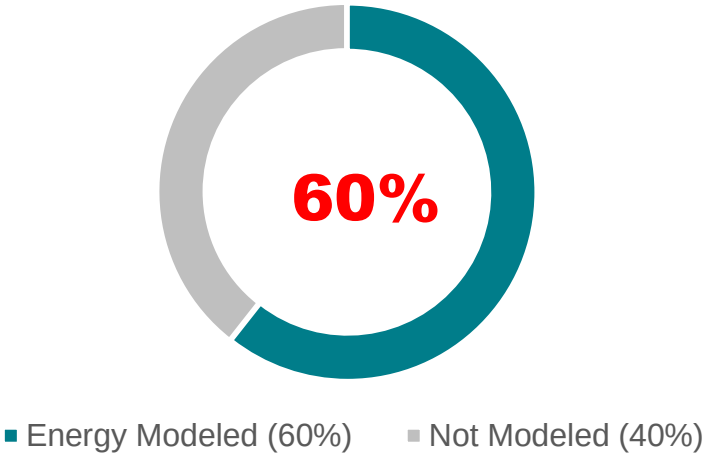
1.055m → 1.122m



2022

Industry Trends Comparison

Industry
% GSF Energy Modeled



2021

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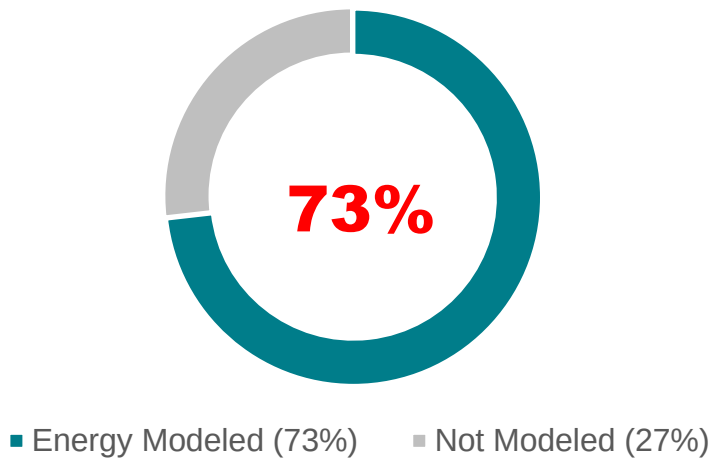
% GSF Energy Modeled



2022

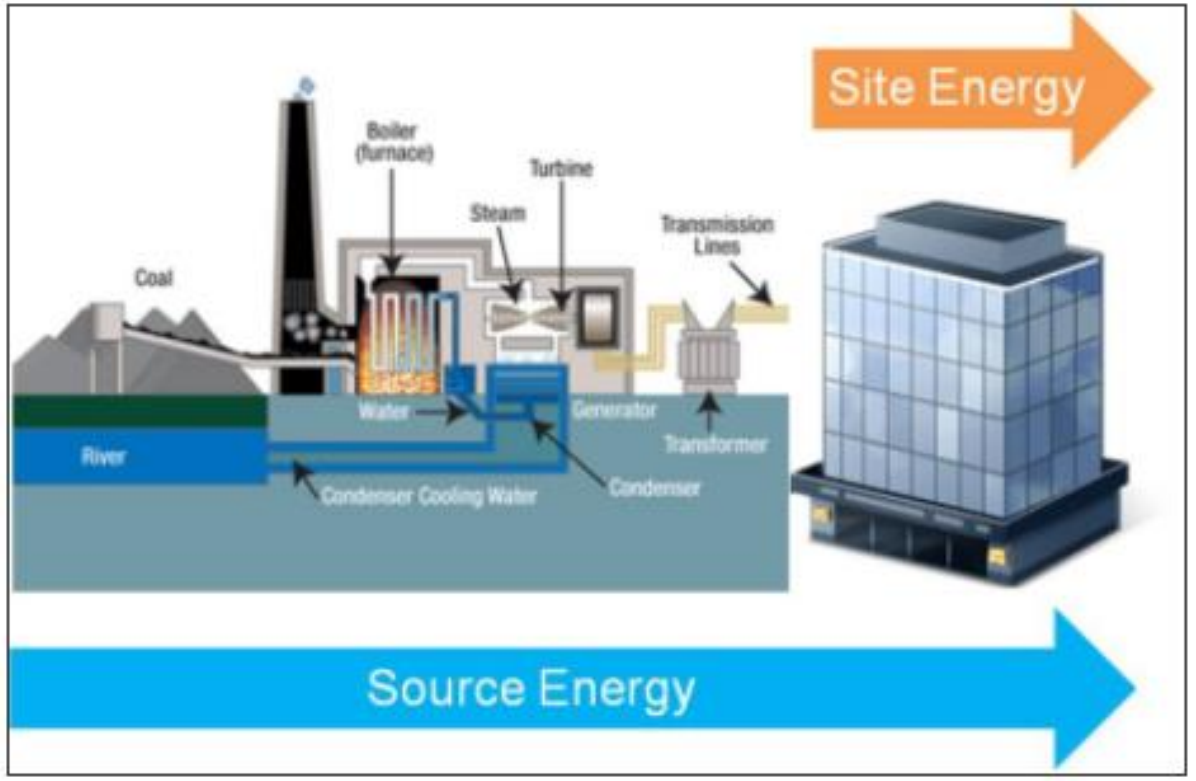
So why the move to electrification?

- The goal is that renewables will be powering the grid in the near future, hence the move the move to electrification.
- Many of the major utilities across the country have carbon reduction goals:
  - Excel Energy: 80% Carbon reduction by 2030
  - ConEd: 100% carbon reduction by 2040
  - OPPD: Net Zero Carbon emissions by 2050
- Difference between Site versus Source Energy

Site versus Source

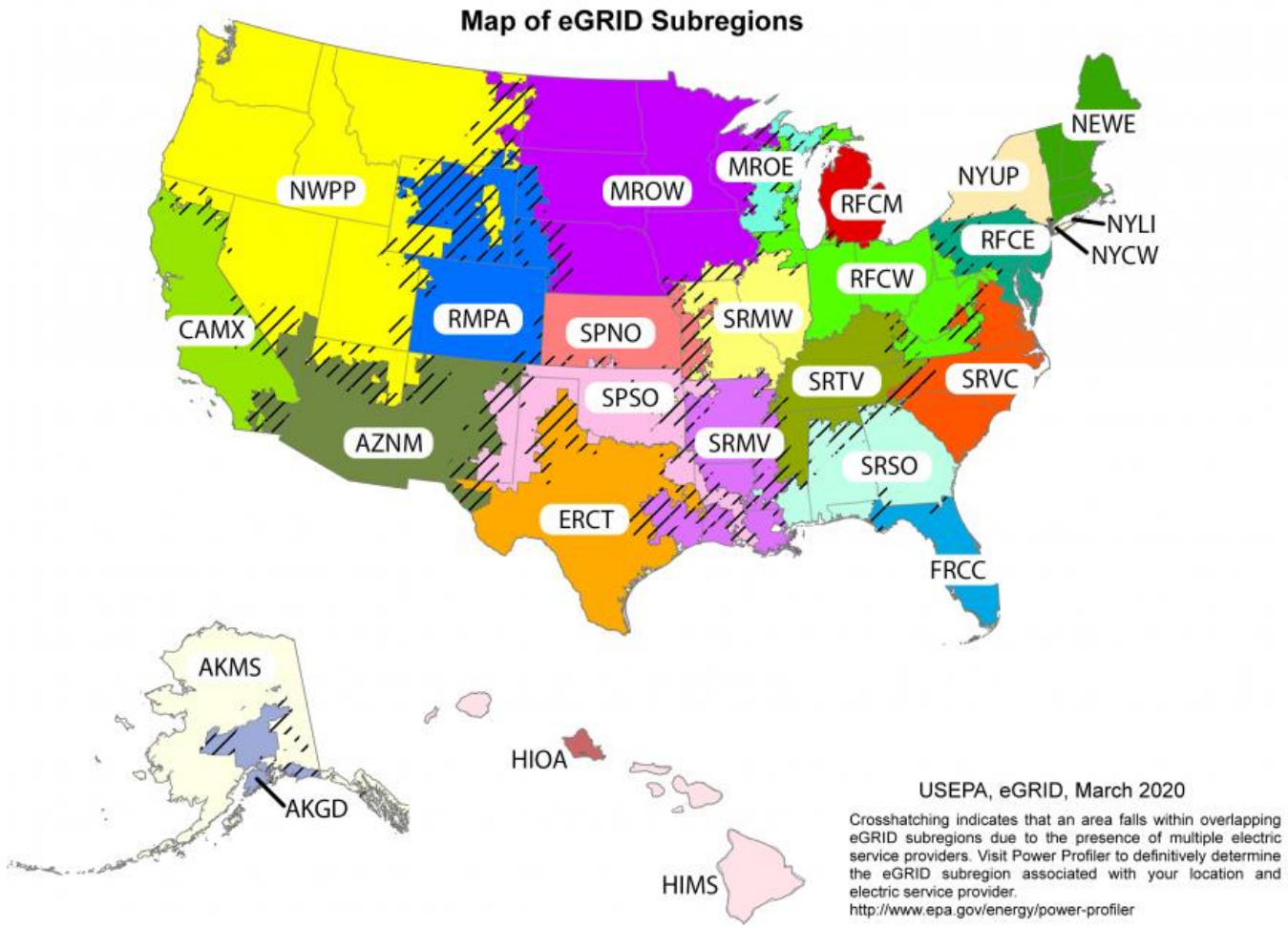
- Site: Amount of heat and electricity consumed by a building as reflected in your utility bills. **(Building Energy Only)**

- Source: Total amount of raw fuel required to power a building. **(All the transmission, delivery, and production energy included)**



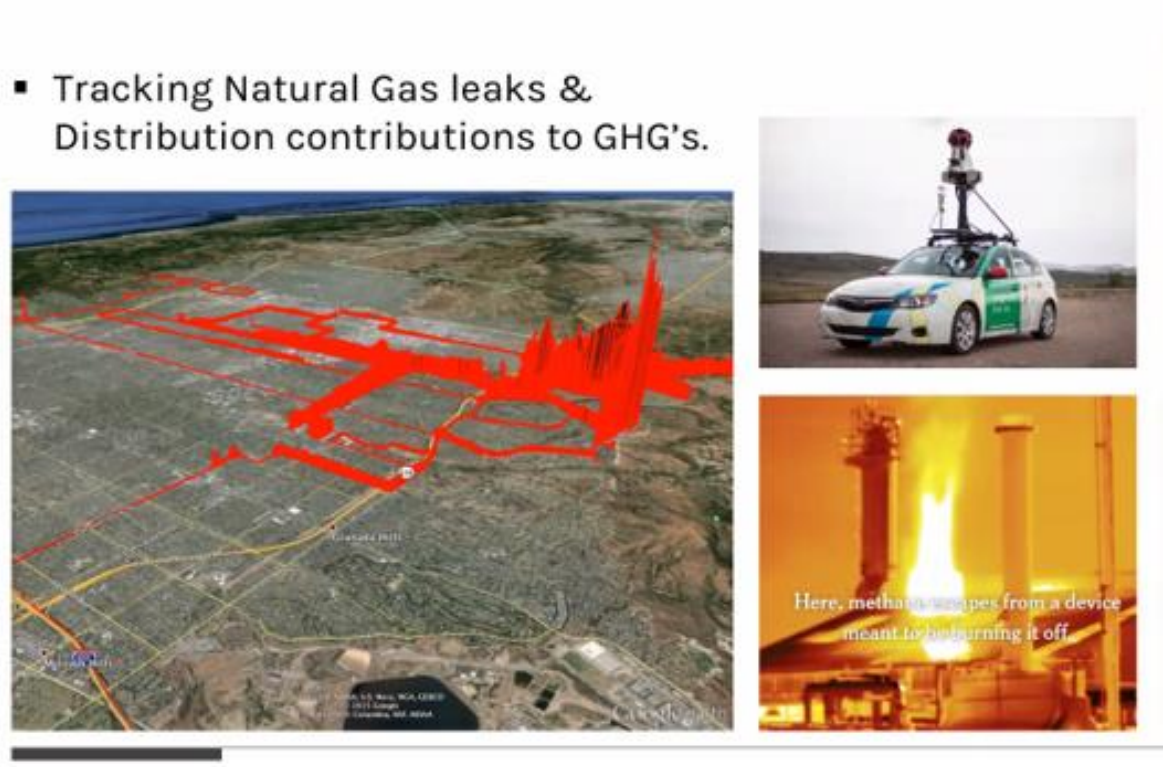
How Green is my Grid

- Emissions & Generation Resource Integrated Database (eGRID)
  - Managed by the EPA
  - www.epa.gov/egrid
- Comprehensive source of data on the environmental characteristics of almost all electric power generated in the US
  - Emissions
  - Emission Rates
  - Generation
  - Resource Mix
  - Etc.



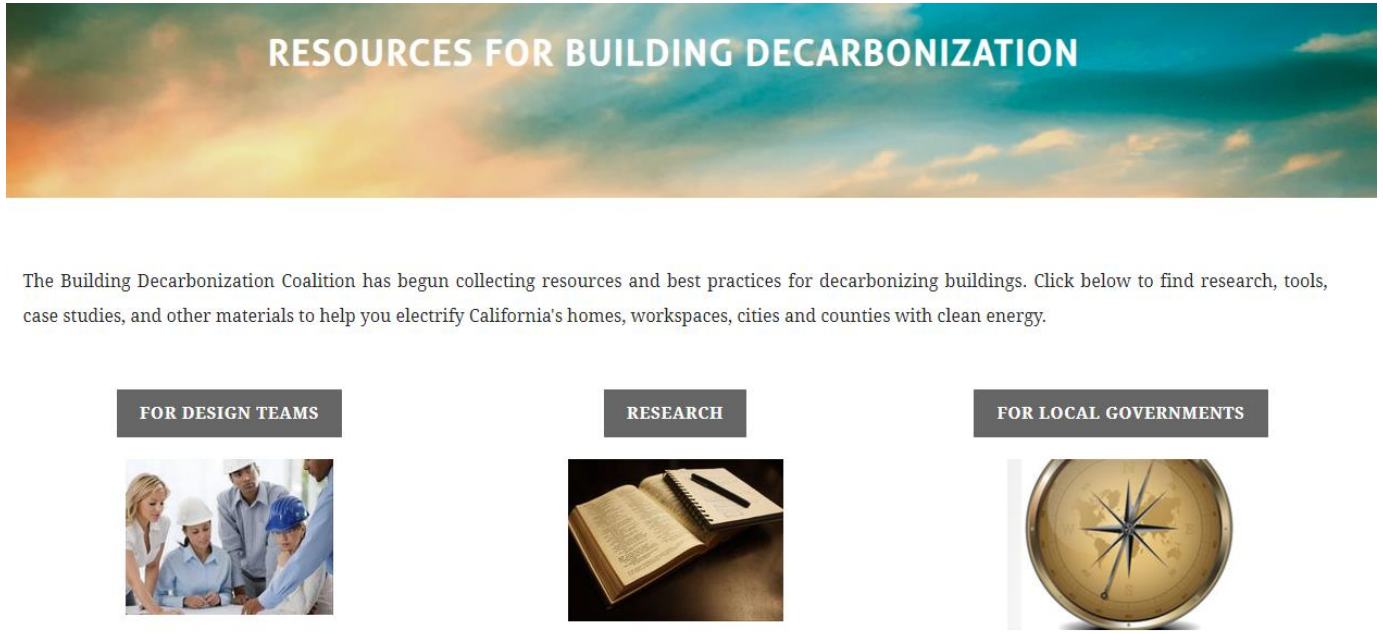
Challenges…

- Reliability of the grid
  - Where to focus resiliency resources
  - Reliability of the grid can be location dependent
  - Microgrids
- Utility Cost
  - Natural Gas is cheap in many locations
- Labor
  - Transition of workers from fuel based utilities to electrified utilities
  - New trade development programs



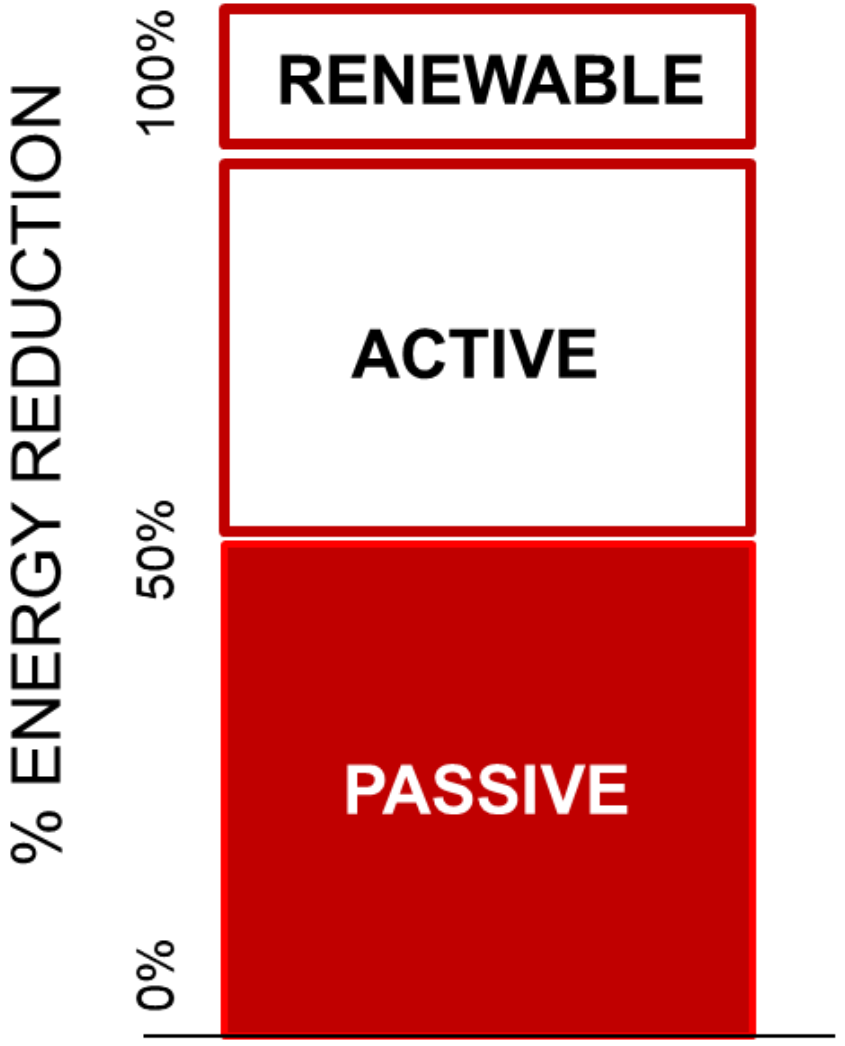
Resources Available

- Rocky Mountain Institute
  - Building Electrification Accelerators for municipalities
  - www.rmi.org
- NREL (National Renewable Energy Lab)
  - Electrification Futures Study Series
  - www.nrel.gov
- Building Decarb Coalition
  - www.buildingdecarb.org
- William J Worthen Foundation
  - Design Professional's Guide to Decarbonization of the Built Environment
  - www.collaborativedesign.org



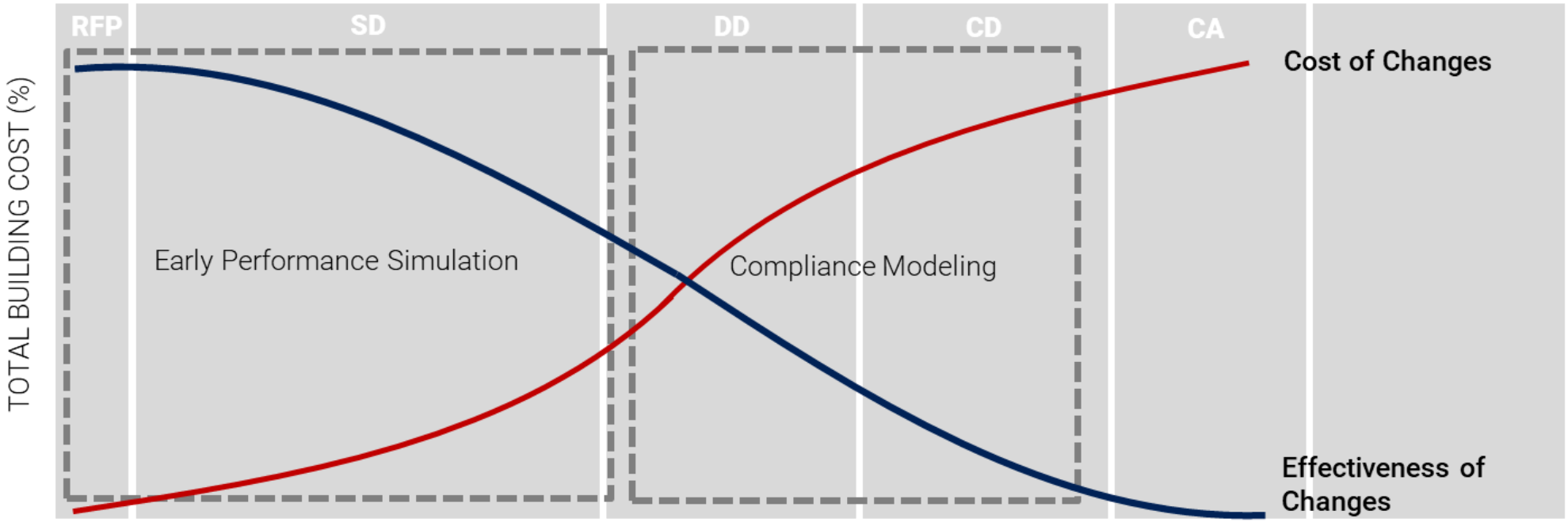
Operational Carbon

Design strategies have the greatest impact on **building energy use**, and architects have the greatest impact on design strategies early in the design process.



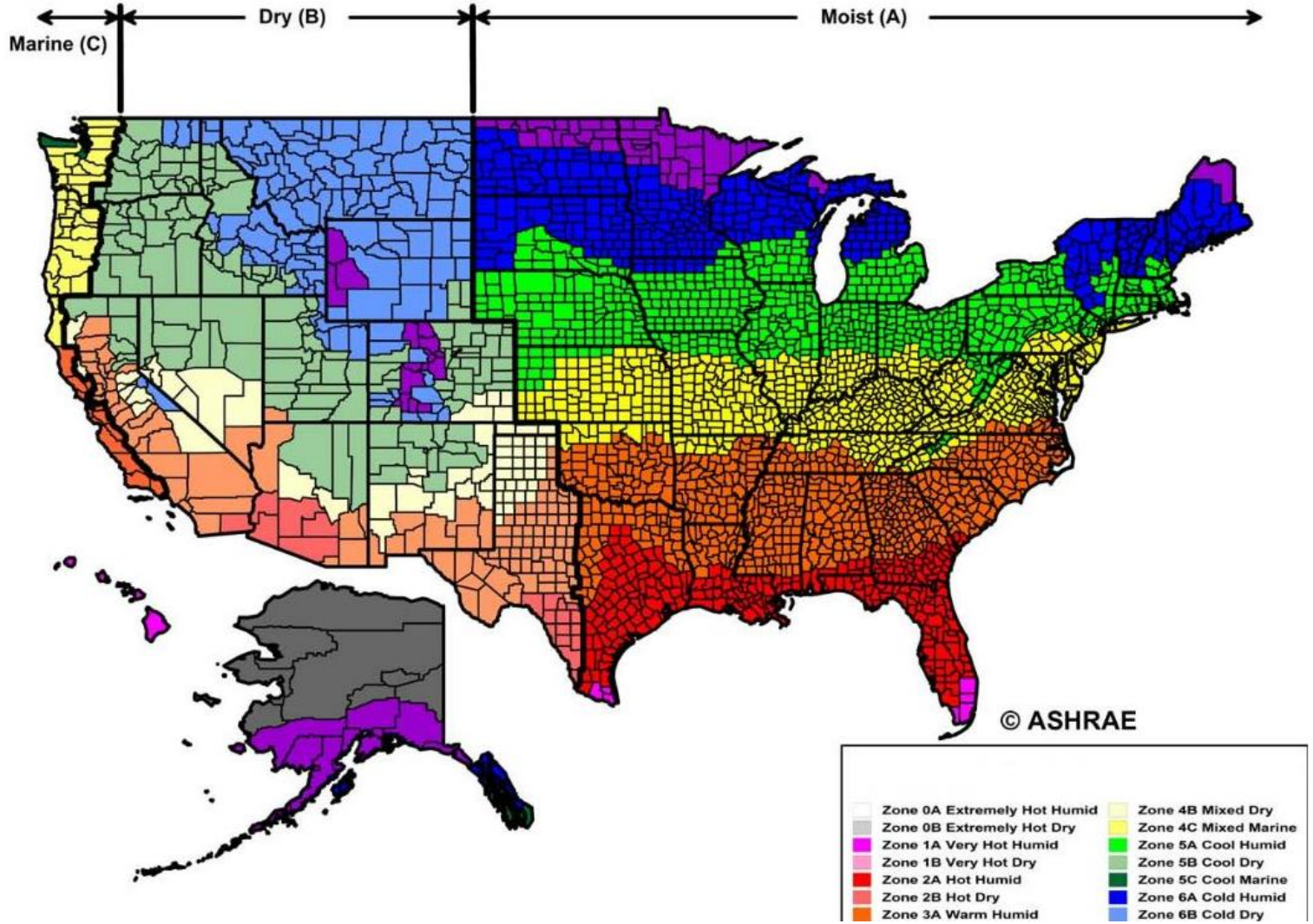
Early Phase Performance Analysis

Early building performance simulation not only reduces energy costs and environmental impacts, but it also enables decisions that impact operational and first costs.



CLIMATE ZONES

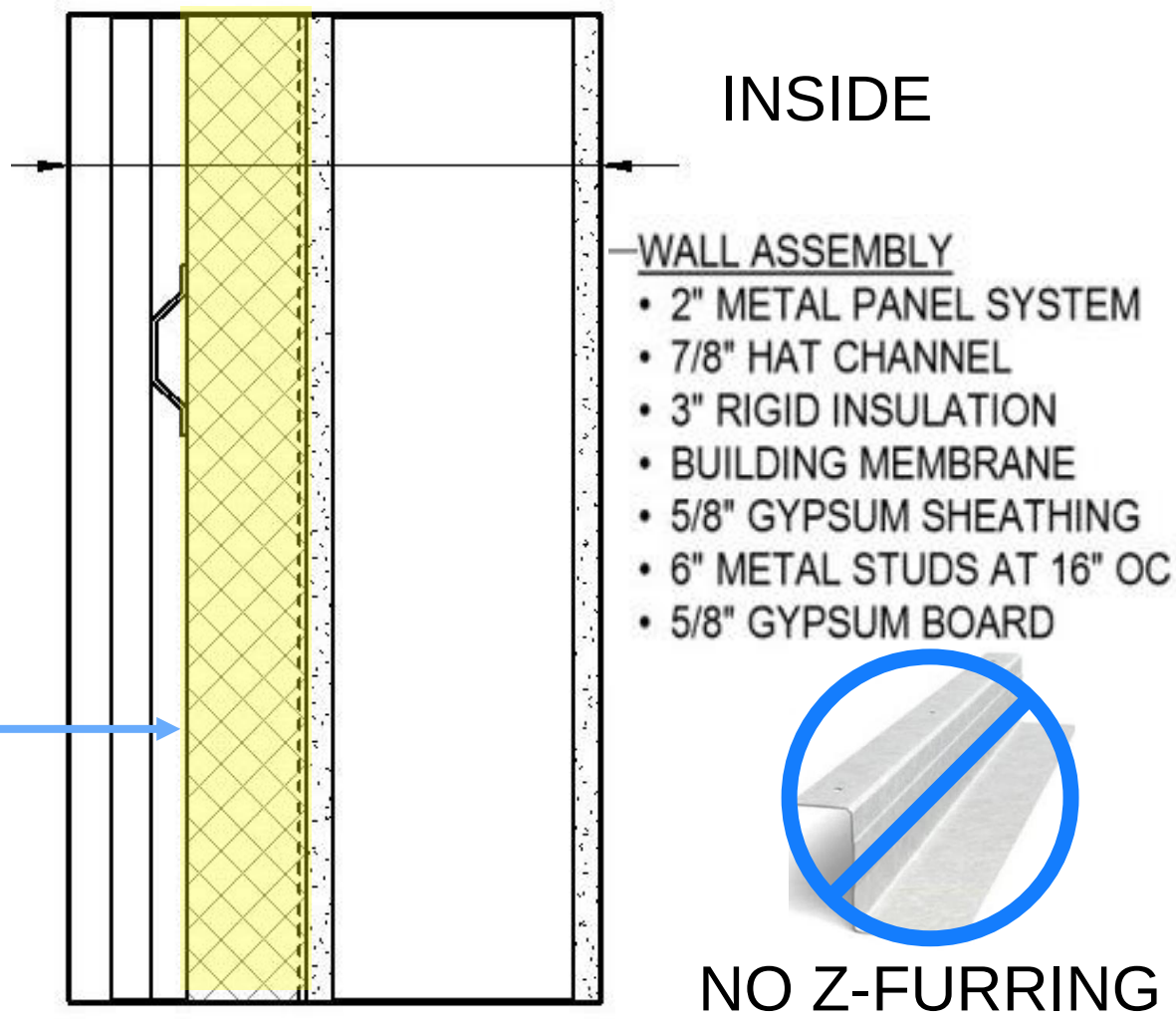
Minnesota has two climate zones
- Climate zone 6 (southern half)
- Climate zone 7 (northern half)



The “Perfect Wall”

Four Control Layers:

- Rain/Water
- Air
- Vapor
- Thermal

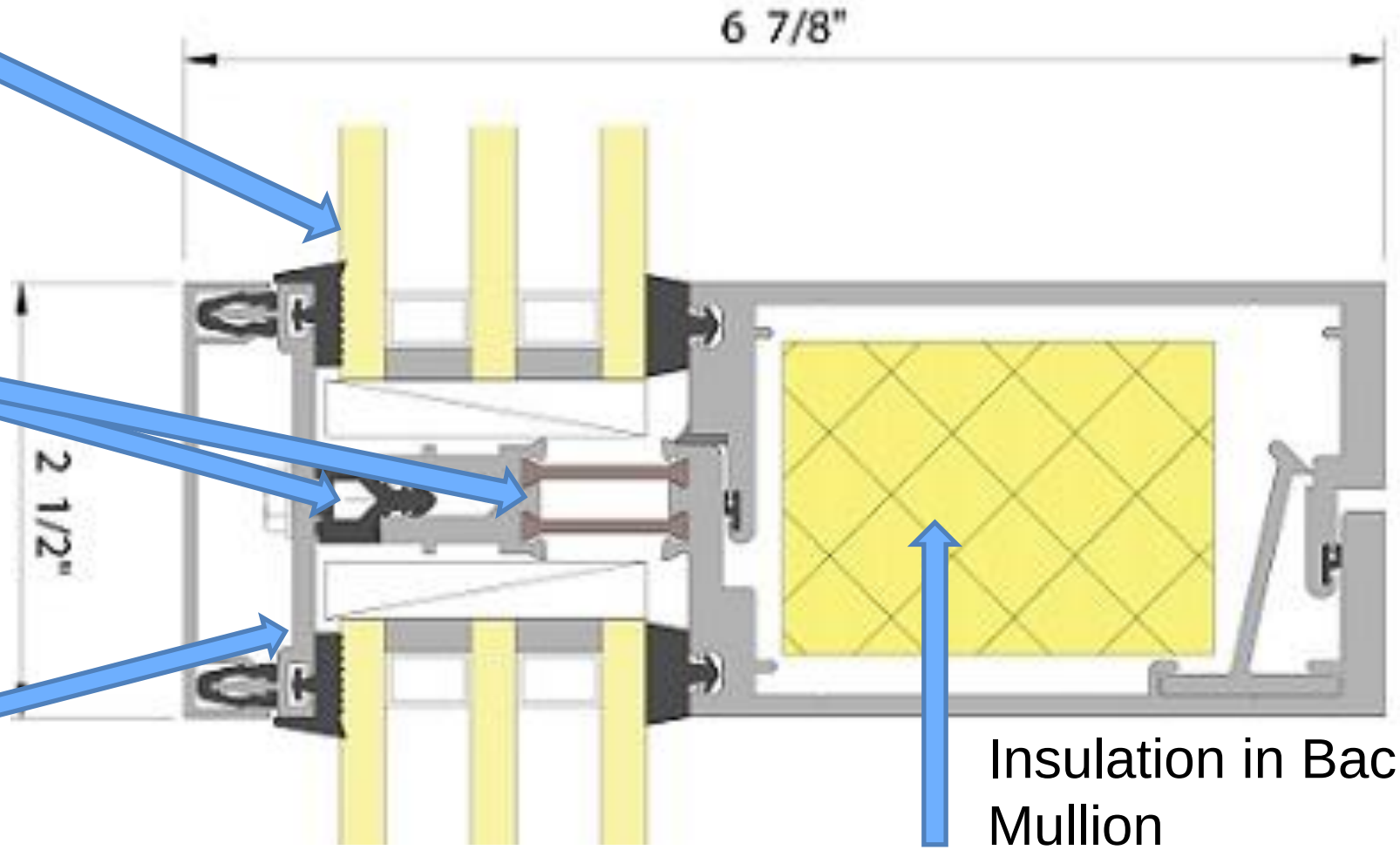


Insulated Glass – Triple Pane

Triple Paned Glass

Multi-Level
Thermal Break

Pressure Plate



Insulation in Back
Mullion

Tools

https://www.ashe.org/energytocare/sustainability-tips

https://betterbuildingssolutioncenter.energy.gov/carbon-hub/basics#Explore

https://www.epa.gov/climateleadership/scope-1-and-scope-2-inventory-guidance

https://www.ashe.org/sustainability/guide

https://www.ashe.org/energytocare/dashboard

Get Started with the Benchmarking Starter Kit | ENERGY STAR

https://www.ashe.org/system/files/media/file/2019/09/etc-toolkit-190904.pdf

https://www.epa.gov/climateleadership/ghg-reduction-programs-strategies

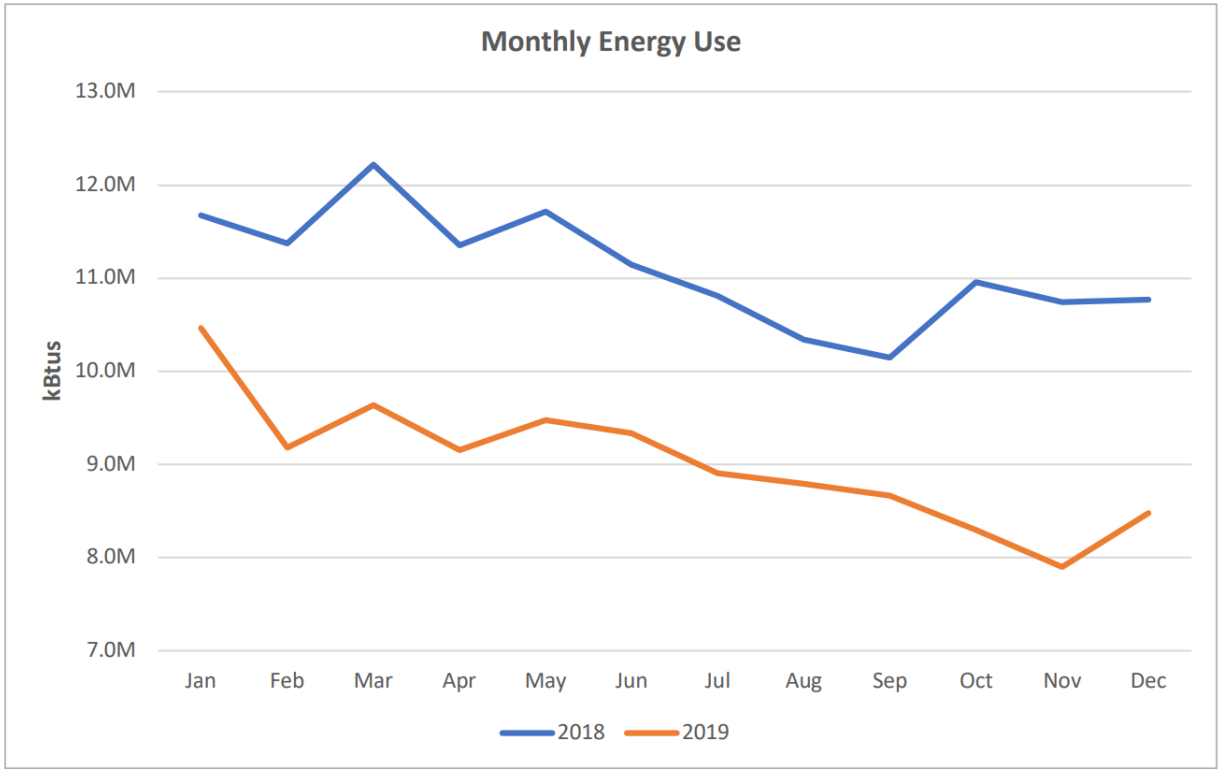
https://www.mwalliance.org/initiatives/policy

Success Stories

Atrium Health Cleveland, located in Shelby, N.C. and part of the Atrium Health system, is the winner of the 2020 Energy to Care Energy Champion Award. The hospital facility received this award in recognition of significant energy efficiency gains — the result of capital and operational investments, a committed plant operations and maintenance staff, and the fostering of a culture that brought together energy savings and patient care.

Atrium Health Cleveland has made great strides in energy efficiency in the last decade. In 2011, the facility's ENERGY STAR® score was 2, and in August 2020 it achieved ENERGY STAR certification with a score of 77. A renewed focus on energy reduction, along with staff engagement and leadership support, has led to impressive outcomes.

Over the two-year period from January 2018 to December 2019, Atrium Health Cleveland's energy consumption and costs decreased significantly. Monthly energy use at the facility dropped over 27%, from 11.7 million kBtus to 8.5 million, and energy costs decreased over 25%, from $150,000 per month to $112,000.



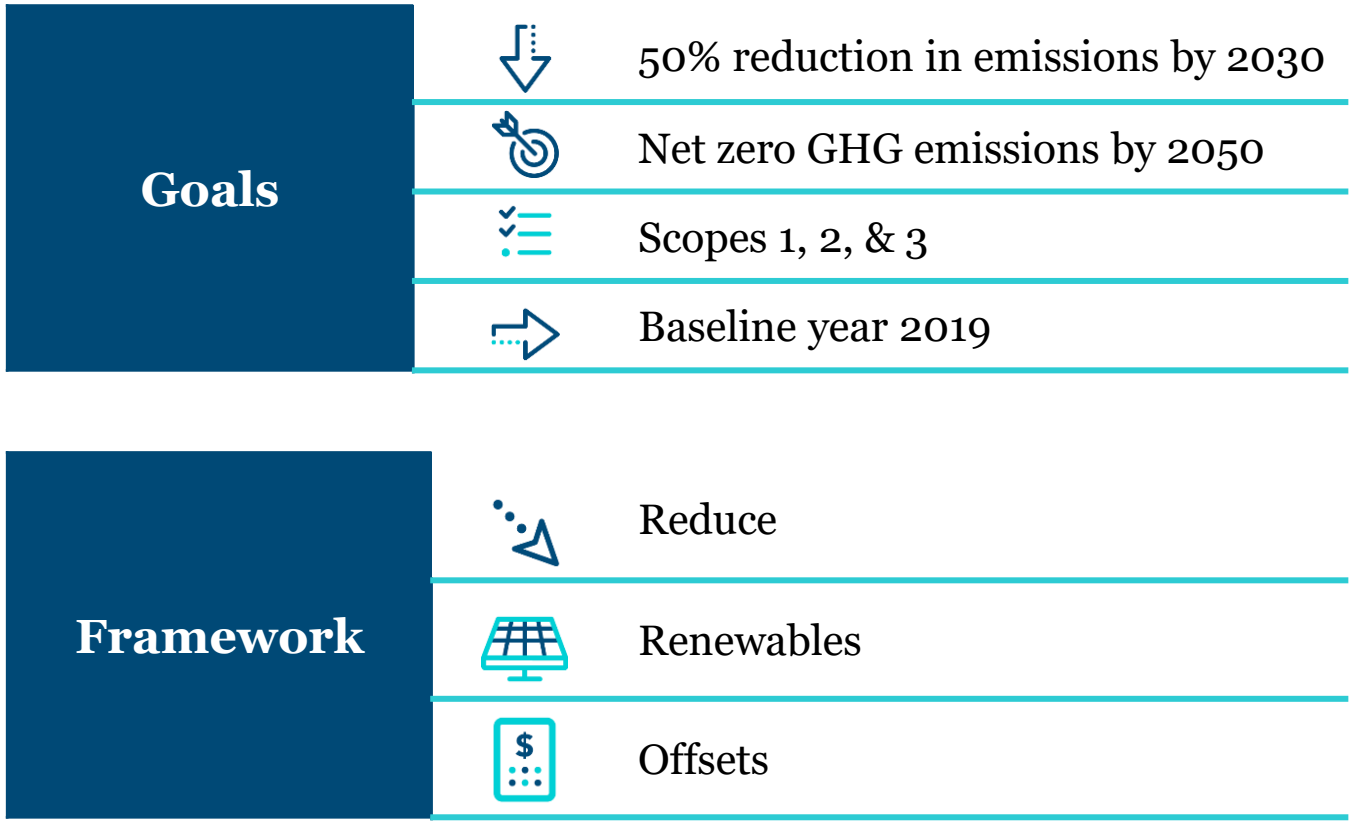
https://www.ashe.org/system/files/media/file/2022/04/ASHE-Energy-to-Care-Success-Story-Atrium-Health-Cleveland_v1.pdf

Q&A

Allina Health's Climate Action Plan

Allina Health has signed the **Health Care Climate Challenge**

- Pledge to climate mitigation, resilience and leadership
- Report greenhouse gas emissions
- Set a greenhouse gas emissions reduction goal in a year



Sustainability

A healthier environment, healthier lives

Fairview follows the principle that community health and environmental health are correlated—by improving environmental health, we're helping fulfill our mission to improve the health of the communities we serve.

Our Commitment

With the launch of our System Executive Green Team in 2010, Fairview began to work on sustainability improvements across the organization impacting our acute care settings, clinics, and long-term care facilities. After several years of growth, Fairview is now recognized locally and nationally for our expansive work in environmental sustainability.

To best target our environmental impact, we've focused our efforts in seven areas:

1. Energy Efficiency
2. Environmental Preferable Purchasing
3. Sustainable Facility Design (Refer to Our Construction Guidelines and Appendix)
4. Healthy Food systems

Making a Difference

Our Community Commitment

Patient Safety and Clinical Quality

Research

Sustainability

Vision Northland/Duluth Building Project

- Project Videos
- Project Overview
- **Sustainability**
  - Sustainability FAQs
- Information Updates
- Project Benefits
- Jobs
- Drawings
- Maps
- FAQs
- Videos
- Support Vision Northland
- Contact Us

Sustainability

The health and wellness of our patients and our communities depends on the health of our natural environment. Essentia Health is committed to supporting a healthy environment through sustainability efforts in our Vision Northland project.

Essentia Health is creating specific goals on sustainability for Vision Northland. We are drawing from a variety of certification programs, including LEED, WELL, Fitwel, RELi, LBC, SITES and Reset, to create a customized approach. We will incorporate criteria that best align with our mission - We are called to make a healthy difference in people's lives - and our values, particularly stewardship.

We're working with our architects and an internal sustainability committee to guide our decisions and set benchmarks. We are focusing on areas such as community, ecology, water, energy, wellness, resources and resilient design to meet changes in function and environmental conditions. We plan to share our efforts with our staff and the community when final decisions are made.

Here are some goals already met by the design of our new medical facility:

- Energy efficiency will be 10 percent better than the national standard set by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) and the Minnesota Energy Code.
- Water use will be 20% more efficient than LEED V4 baseline, thanks to plumbing fixtures such as high-efficiency toilets, sinks and showers.

Sustainability

Our commitment to providing a healthier and cleaner community.

As one of the largest health care organizations in our region, we have the responsibility and an opportunity to be good stewards of our environment. From the power sources we use, to the purchases we make, we are on a journey to implement practices across our organization that promote health by protecting the environment. Read our sustainability report that shows the progress we are making to strengthen green practices across our organization and how that is also helping to make care more simple and affordable.

Safe medication disposal

- Our medicine take-back program has disposed of 41,200 pounds of medication the right way.
- More than 17,000 people used the medicine take-back program since the program began in 2011.
- HealthPartners offers six total collection sites at Amery Hospital & Clinic, Hudson Hospital & Clinic, Lakeview Hospital, Methodist Hospital, Regions Hospital, and Westfields Hospital & Clinic.

Mayo Clinic Green Initiatives

Mayo Clinic is dedicated to improving the health of its patients and staff through excellence in the practice of medicine. Recognizing the linkage between environmental health and public health, Mayo Clinic is committed to fiscally responsible environment protection practices to benefit the health of our patients, staff, and communities.

Mayo Clinic exercises a thoughtful and comprehensive sustainable approach to environmental stewardship, including:

1. Conserving energy

   Mayo Clinic works to reduce energy consumption by designing and operating its facilities to be safe, efficient environments for patients, staff and visitors. We've reduced our energy consumption by more than 20 percent since 2020, and have a goal to achieve a 30 percent reduction by 2025. To accomplish this we are designing for more energy efficiency in new construction, making renovations to existing facilities, upgrading our utilities and equipment, and inspiring our staff to "think green" in their practices at work and at home.

2. Environmentally responsible supply chain practices

   Mayo Clinic works with suppliers to procure equipment and materials that serve and protect the health of our patients, staff and the environment. We are committed to reviewing all of our purchases with consideration of:

   Minimal packaging
   Toxicity and minimizing products containing lead, mercury, latex, polyvinyl chloride plastic (PVC) and di-ethylhexyl phthalate (DEHP), fragrances
   Use of recycled materials in the manufacturing of purchased products
   Use of energy efficient equipment
   Product's ability to be re-processed and/or recycled
   Use of reprocessed products
   Products that reduce water use or reduce the creation of contaminated wastewaterr

Community Health Needs Assessment

Mayo Clinic performs a community health needs assessment to better serve its populations.

MINNESOTA
Rochester

ARIZONA
Phoenix

FLORIDA
Jacksonville

MAYO CLINIC
Health System

Common greenhouse gas emission sources in health care

CO_2 CH_4 N_2O HFCs PFCs NF_3 SF_6

SCOPE 1

- Onsite energy
- Fleet vehicles
- Waste anesthetic gas
- Refrigerants

SCOPE 2

- Purchased electricity
- Purchased steam

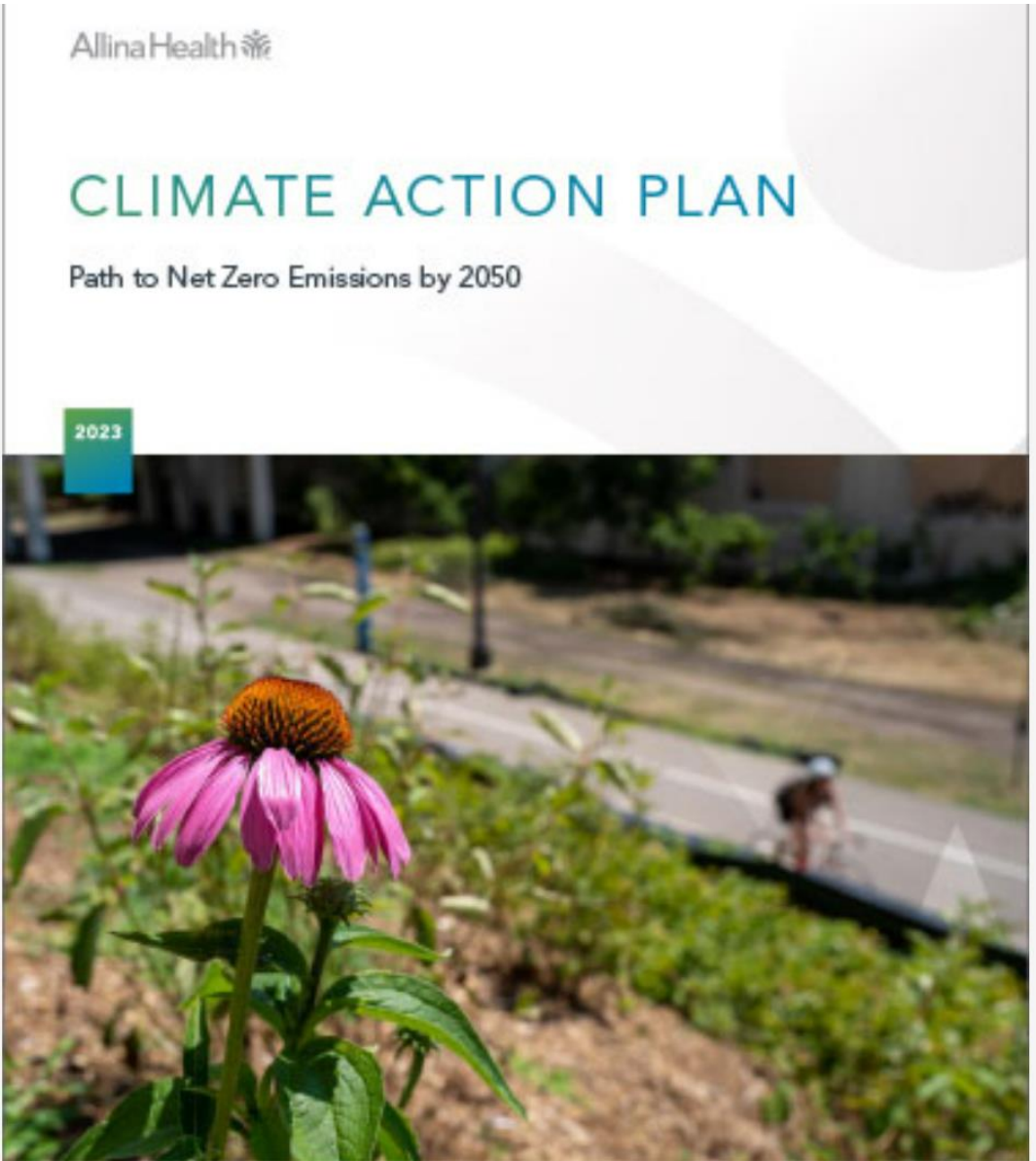
SCOPE 3

- Business travel
- Medical devices and equipment
- Employee commute
- Pharmaceuticals
- Waste disposal
- Meat procurement
- Other*

Carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), nitrogen trifluoride (NF_3), and sulphur hexafluoride (SF_6)

*Scope 3 other: These are the most common emissions for health care, but there are other relevant categories in Scope 3. To review all 15 categories covered in Scope 3, visit the GHG Protocol Scope 3 Guidance.

Source: Practice Greenhealth



- **Our climate-action commitments**
- We recognize climate change as one of the greatest public health threats of our time. It increases the risk of harm from severe weather and makes us more vulnerable to malnutrition, respiratory problems, heat-related illness, and diseases caused by rising temperatures and extreme weather.
- Through company-wide initiatives and site-based activities, we're taking steps to reduce our environmental impact and increase our capacity to respond to climate-related health effects in the communities we serve.
- Released in April 2023, our **Climate Action Plan** describes Allina Health's climate-action commitments in three focus areas:

Greenhouse gas reduction

We pledge to reduce our carbon footprint and be transparent about our progress.

Using 2019 as our baseline year, our goal is to reduce greenhouse gas emissions by 50% by 2030 and reach net-zero emissions by 2050.

Resilience

We pledge to prepare for increasing incidents of extreme weather and their impact on health.

We will incorporate climate resilience into our policies and procedures.

Engagement

We pledge to educate our staff and communities on challenges and solutions related to climate and health.

We will continue to foster and expand our partnerships with internal and external stakeholders.