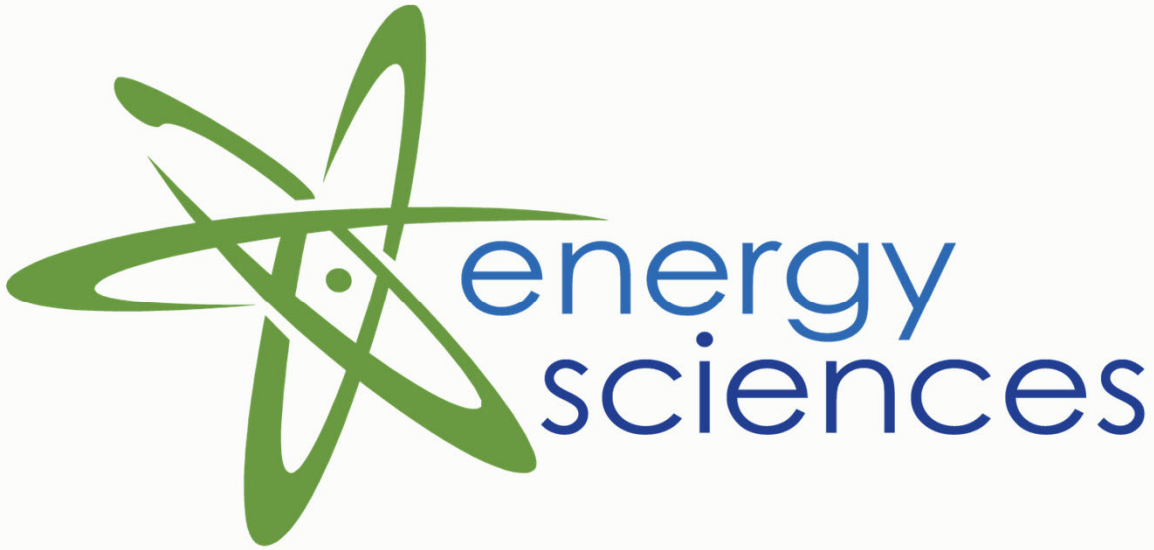
energy
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What is Sustainability and How Energy Optimization Plays a Major Role

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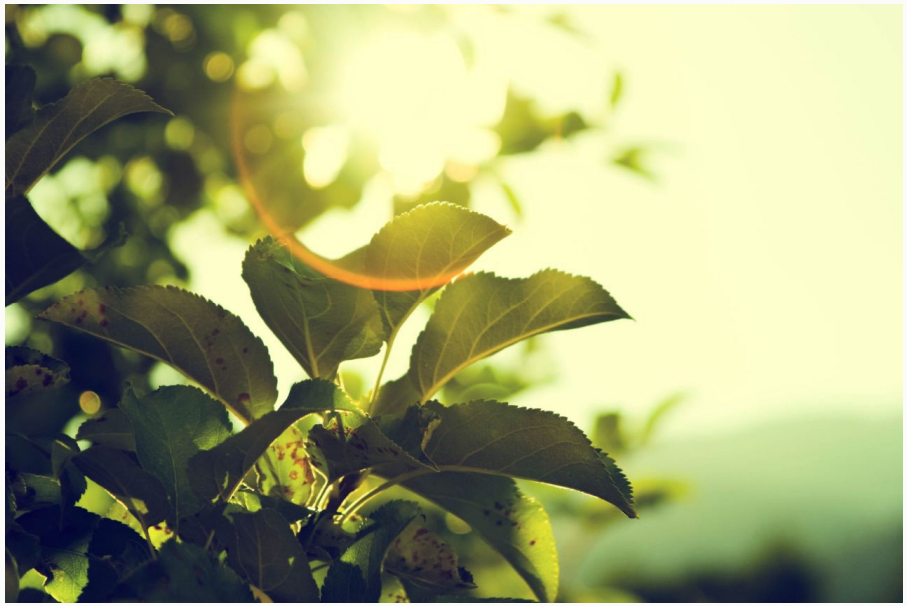
Today's presentation will cover:

1. What is sustainability?
2. Sustainability and (energy) waste reduction
3. Climate change and greenhouse gas emissions from buildings
4. Advancing energy codes and how energy optimization of buildings plays a major role in reducing greenhouse gas emissions
5. Future changes to building codes, legislation and zero net energy
6. Questions

What is sustainability?

Definition of sustainability

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



Global Assessment Report on Biodiversity and Ecosystem Services

- Recent United Nations assessment on the decline in biodiversity across the globe
- Compiled by hundreds of international experts, based on thousands of scientific studies
- 1 million plant and animal species at risk of extinction due to humans, posing dire threat to ecosystems that people all over the world depend on for survival
- As the BBC put it, what does the future hold? It all depends on what we do.
- Requires "transformative change" in every aspect of how humans interact with nature

17 Global Sustainable Development Goals

People, planet, profit

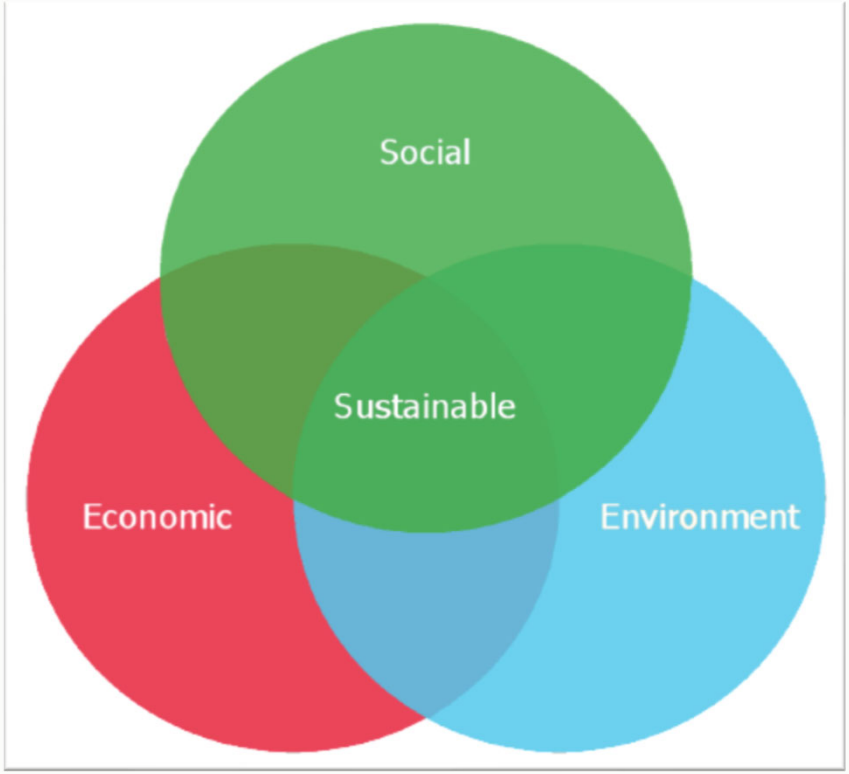
- **People (Social):** people and ability for society to satisfy basic human needs and ensure social well-being

- **Planet (Environment):** planet and consuming natural resources, such as materials, energy fuel sources, land, and water at a sustainable rate

- **Profit (Economic):** profit and efficient use of resources, in an equitable and responsible manner to operate sustainably

Triple bottom line approach

- Value social and environmental profits and losses, as well as financial ones
- Benefit economically, while also considering social and environmental impacts, and profit without negatively impacting people or the planet
- Increase profits by 51-81% within 5 years (The Sustainability Advantage)



Sustainability makes business sense

- Save money by reducing waste in areas such as energy, water, waste, purchasing, transportation and electronics
- Leading global brands and organizations incorporating environmental and social value into marketing and communications strategies
- Implementing sustainability practices may help your business be better prepared for increasing expenses associated with the following:
  - Supply insecurity; increases in
  - resource and raw material costs
  - Waste and disposal costs
  - Energy costs
  - Environmental laws and regulations

Quick ROI
The Carbon Disclosure Project (CDP) examined 500 businesses and found that 59% of investments businesses made in energy efficiency and renewable energy paid for themselves in three years.

Sustainability and (energy) waste reduction

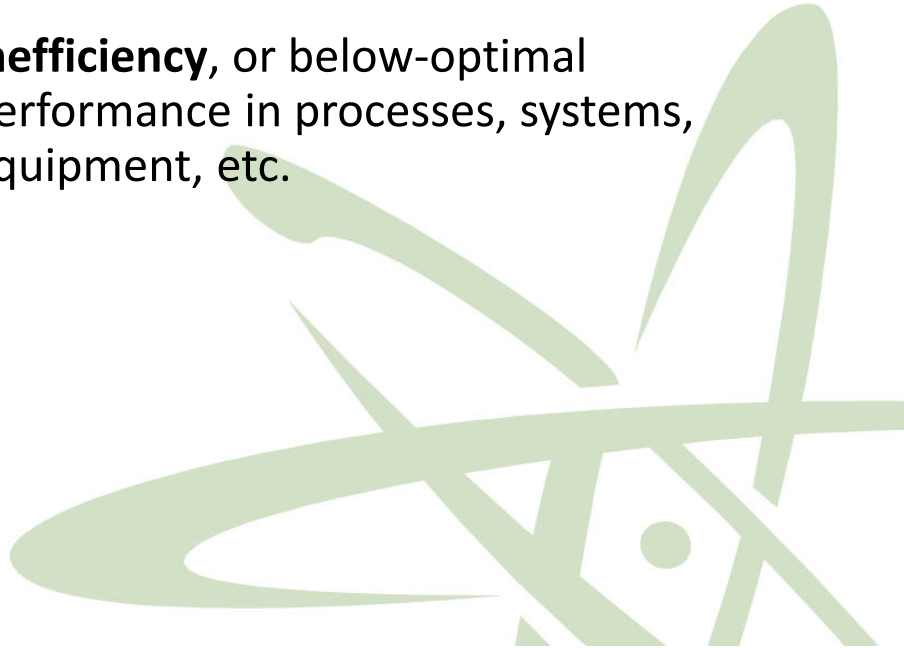
Sustainability is about waste reduction

Considerations for reducing waste:

- Reduce waste in areas such as energy, water, waste, purchasing, transportation and electronics
- The more you waste, the more you purchase
- Waste is not sold but costs to dispose
- Reducing waste requires behavioral changes, technological and/or mechanical upgrades

Types of Waste:

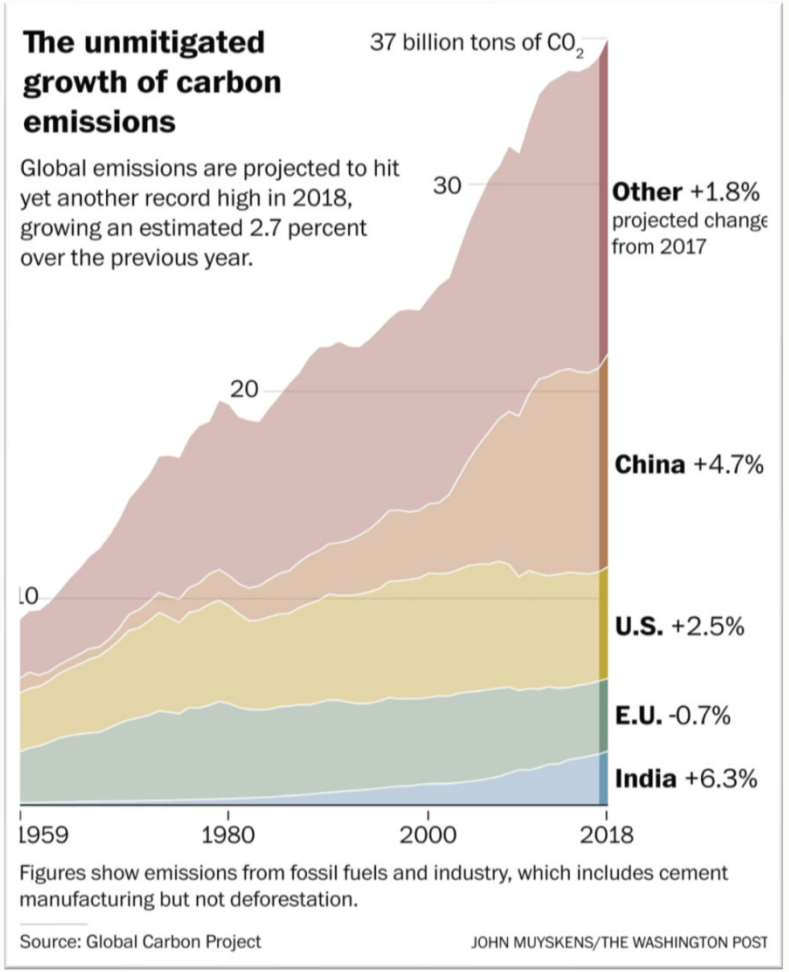
1. **Physical waste**, such as resources and materials that are discarded
2. **Inefficiency**, or below-optimal performance in processes, systems, equipment, etc.



Climate change and greenhouse gas emissions from buildings

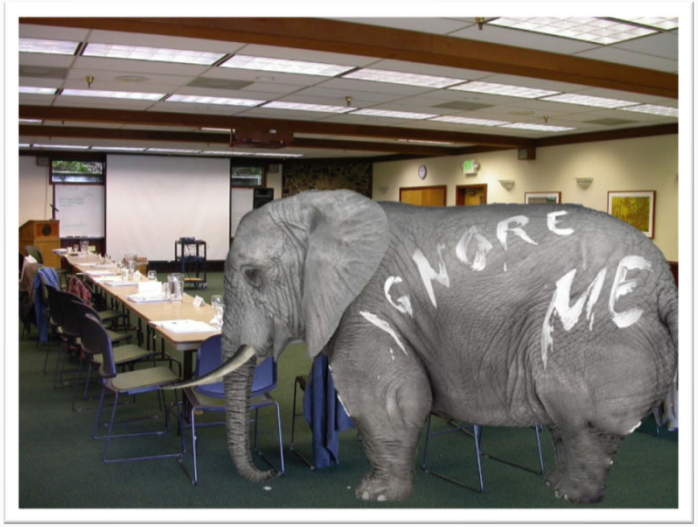
Why does this matter?

- Reducing waste by using less energy and resources reduces greenhouse gas emissions
- Global carbon emissions grew in 2018 by 2.7%, reaching new record high
- Fossil fuel and industrial emissions have reached the highest levels on record
- Due in part to development and climate change, world is seeing alarming rates of extinction. Studies show the **current extinction rate is 1,000 times faster than the average pace in Earth's history.**



Climate change

- Special report on impacts of climate change that the Earth's temperature increased 1.8 °F since 19th century
- Crucial threshold of 2.7 °F above pre-industrial levels, as early as 2030 - currently, 2/3 of the way there
- Collectively, must reduce greenhouse gas emissions by 45% from 2010 levels by 2030, and all buildings must achieve "net zero energy" by 2050
- Governments globally must take "rapid, far-reaching and unprecedented changes in all aspects of society" to avoid disastrous levels of global warming



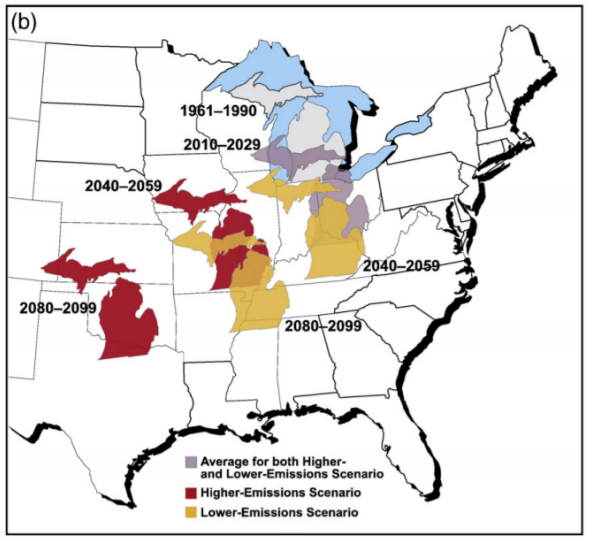
Global warming

More and extreme heat waves and hot summers, greater sea level rise, and for many parts of the world, worse droughts and rainfall extremes

Climate is changing in Michigan

Recent extreme weather events

- Heat wave, March 2012
- Major drought, summer 2012
- Third wettest year on record in 2013
- Coldest winter in more than 100 years, 2013/2014
- Top ten coldest winter 2014/2015
- Flood of August 2014
- Record warm December 2015
- Wettest year on record in 2017



Projected changes: warm considerably and have less summer rainfall. Summers will feel progressively more like summers currently experienced by states to our southwest.

Advancing energy codes and how energy optimization of buildings plays a major role in reducing greenhouse gas emissions

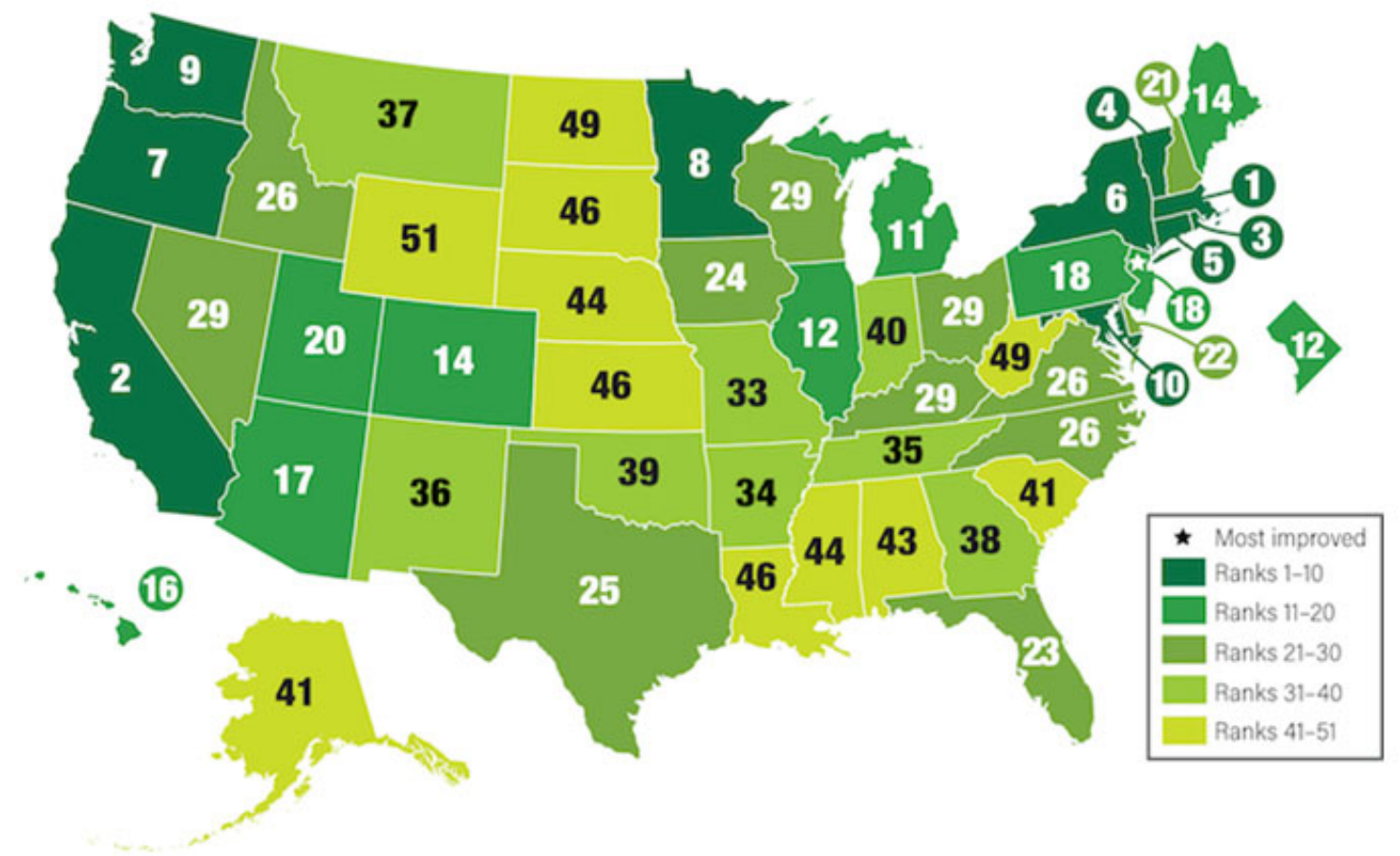
2019 is the year of energy codes

- Defining theme for the building sector in 2019 - it's energy codes
- Regulations defining next generation of building design and construction in terms of energy performance
- Growing pressure to address climate change put spotlight on codes as a critical lever for states and cities when trying to cut carbon emissions that are fueling climate change

Making strides on advancing energy codes

- ACEEE (American Council for an Energy-Efficiency Economy) published 2018 State Energy Efficiency Scorecard - tracks state's progress in energy efficiency
- States are ranked in areas such as utility programs, transportation, building energy codes, combined heat and power, state initiative, and appliance standards
- Advancing building energy codes is one of the most impactful actions that states can take to meet energy and carbon reduction goals
- Michigan, Florida, Wisconsin and Idaho improved their performance scores by adopting the 2015 International Energy Conservation Code (IECC)

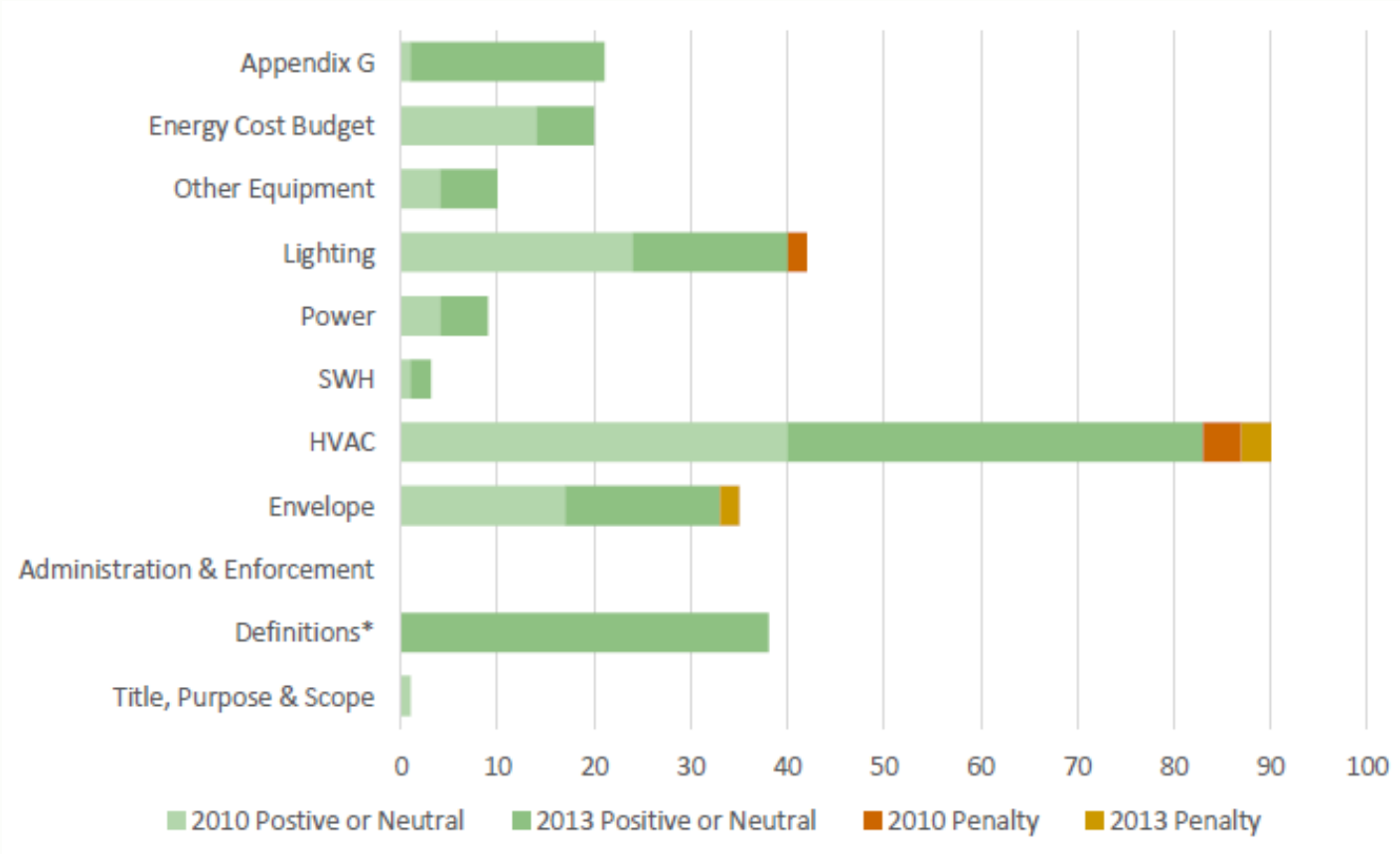
ACEEE 2018 State Energy Efficiency Scorecard



New Michigan energy code

- Intent is to “regulate the design and constriction of buildings for the use and conservation of energy over the life of each building.”
- ASHRAE 90.1-2013
- 2015 International Energy Conservation Code (IECC)

Quantity of changes



Future legislation and building codes

International Energy Agency

According to the American Council for an Energy-Efficiency Economy (ACEEE):

- Energy efficiency is a potential solution to the climate crisis
- Energy efficiency is largest contributor to reaching the Paris climate targets, with 44% of the greenhouse gas emissions reductions coming from efficiency
- Recent NRDC study found energy efficiency could reduce US energy demand by 40%, which would make a significant contribution to reducing GHG pollution by at least 80% by 2050.

2021 IECC update underway

- Updating of the 2021 International Energy Conservation Code (IECC) is underway
- Improve design and construction approaches
- Target of 10-15% efficiency improvement
- Presents the best near-term opportunity to dramatically reduce energy use and carbon emissions from new residential and commercial construction projects
- Buildings account for roughly 40% of energy used in US and over 1/3 of carbon emissions. Without addressing buildings, climate action and energy policy goals are not achievable.

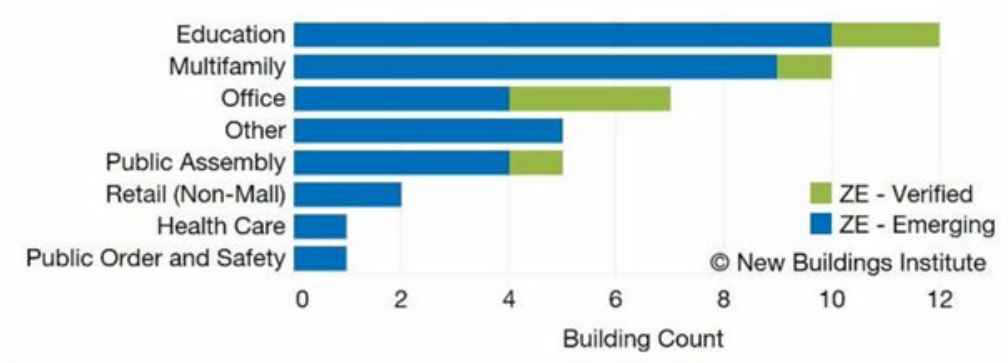
NYC legislation on buildings' carbon emissions

- Legislation passed by City Council is first of its kind worldwide
- Set pollution standards on existing buildings
- Set emission caps for with goal of achieving a 40% overall reduction of emissions by 2030
- Forces thousands of large buildings to sharply reduce their greenhouse gas emissions
- Buildings that do not meet the caps could face steep fines
- Buildings and other structures responsible for about 40% of carbon production in US, but in dense cities it's the chief emitter. Buildings in New York emit nearly 70% of its greenhouse gases.

Zero Net Energy (ZNE)

Per the New Buildings Institute:

- A ZNE building is an ultra-efficient building that generates as much energy as it consumes annually. Also known as Zero Net Energy.
- As governments consider options for meeting significant greenhouse gas reduction goals, attention has turned to how to achieve zero energy or zero emissions from new construction in the building sector.



Goals for ZNE in California

Per the New Buildings Institute:

- All new commercial construction will be ZNE by 2030
- All new residential construction in California will be ZNE by 2020 50% of existing buildings will be retrofit to ZNE by 2030
- The California Efficiency Strategic Plan (Sep 2008)

Questions

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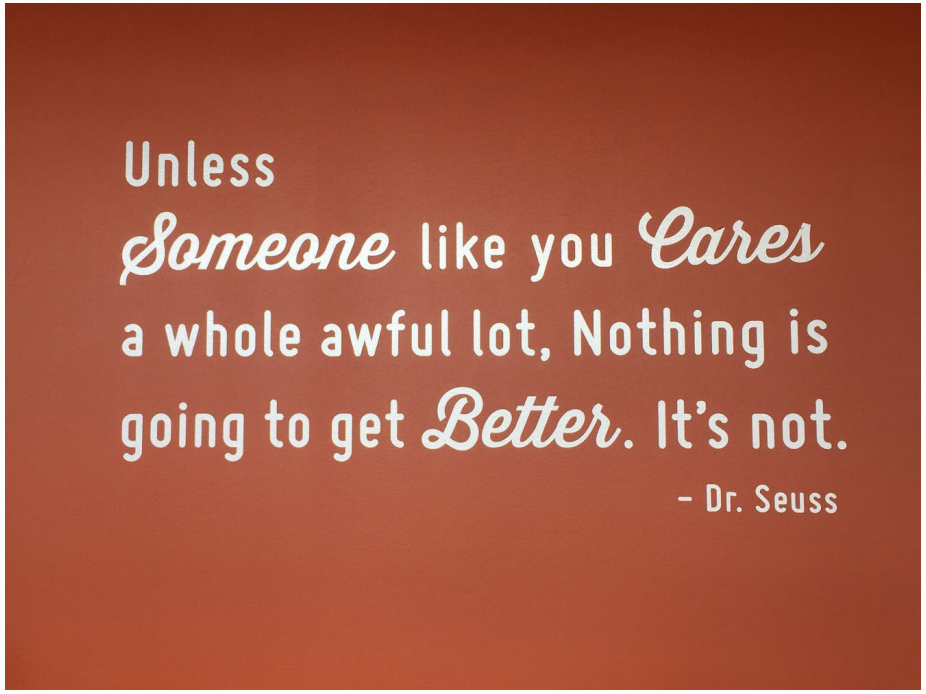

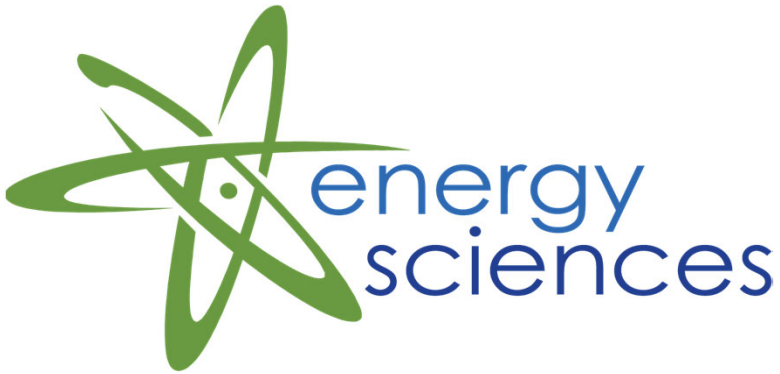

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