Impacts of Energy Codes on GHG Reduction

PA Climate Change Action Committee

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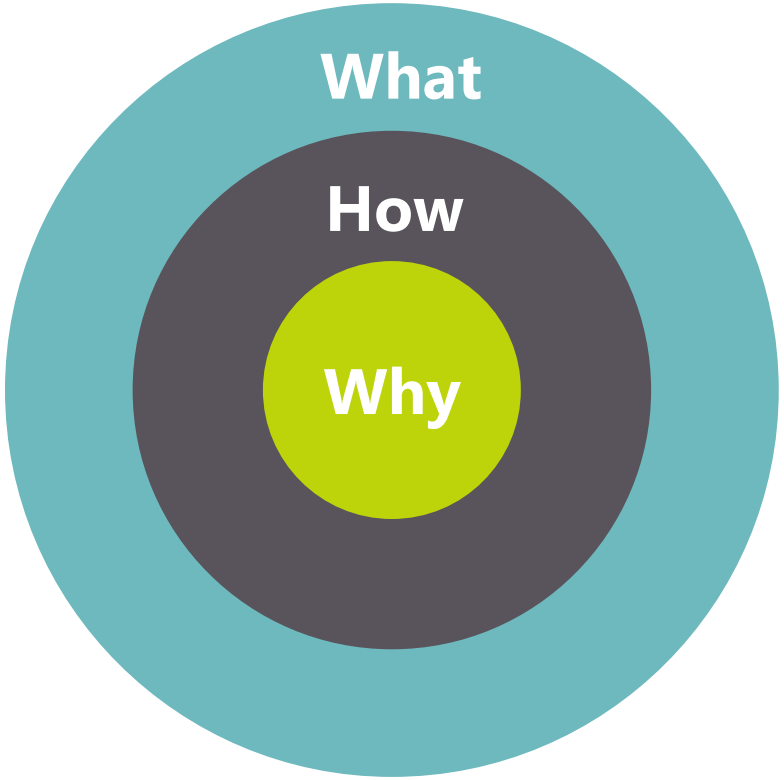
Energy Solutions

About
Energy Solutions

- Founded in 1995
- Employee-owned since 2013
- Over 250 employees and growing
- Nationwide reach with offices in CA, MI, MA, OR & NY
- More than 25 years of experience
- 13 national program awards since 2010

Energy Solutions' Golden Circle



Why: Large-scale environmental impacts.

How: Market-based solutions – leveraging opportunities for cost-effective interventions.

What: Upstream Programs, Building Codes, Solar/Storage, Demand Management, Appliance Standards

Why Building Sector should be PA's #1 Priority

NEW BUILDINGS

- Nearly 100,000 new buildings/year
- All subject to UCC Energy Code

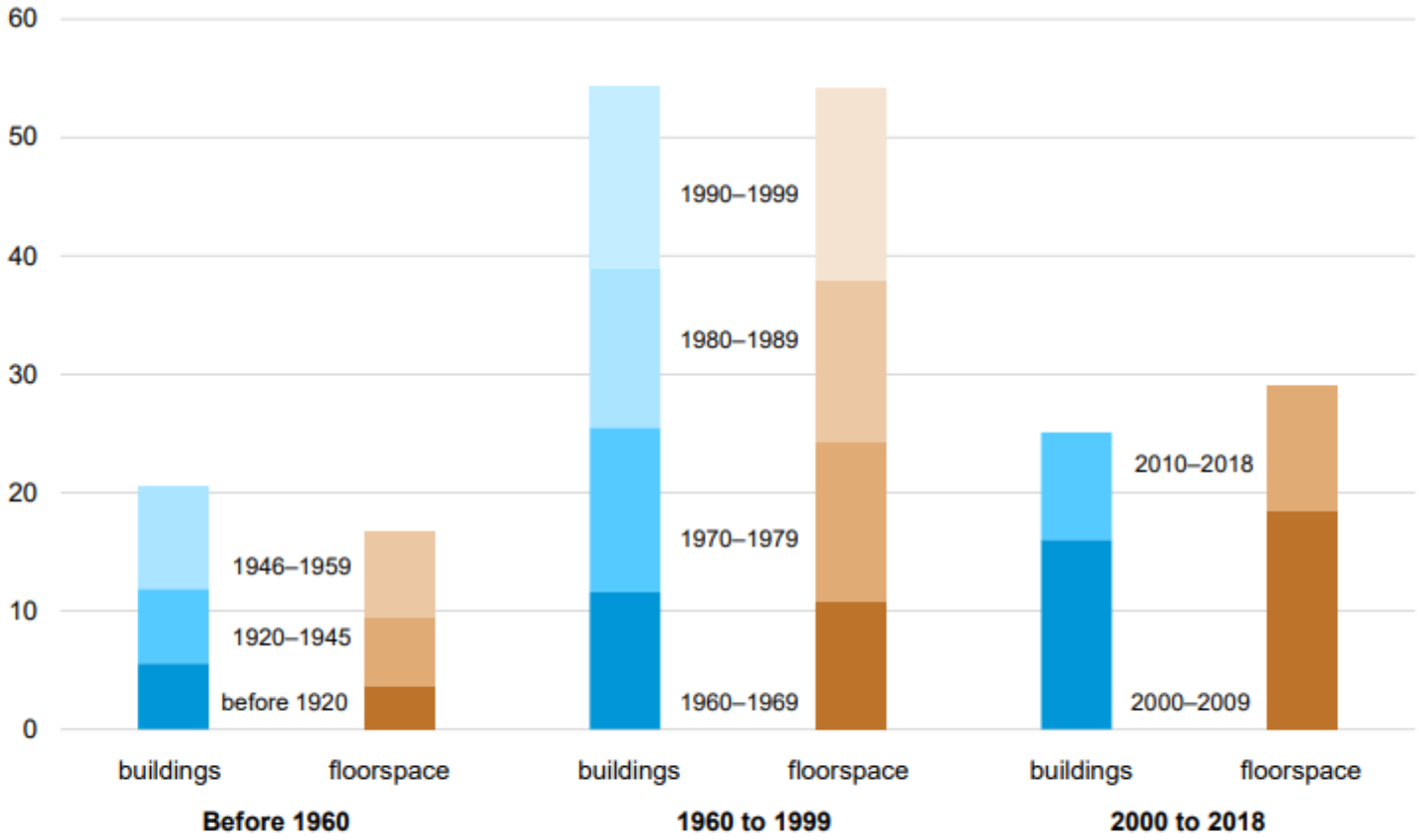
Why Building Sector should be PA's #1 Priority

EXISTING BUILDINGS

- Over 5 million residential buildings
- Over 50,000 commercial buildings
- Nearly 100,000 new buildings/year

More than half of U.S. commercial buildings were built between 1960 and 1999

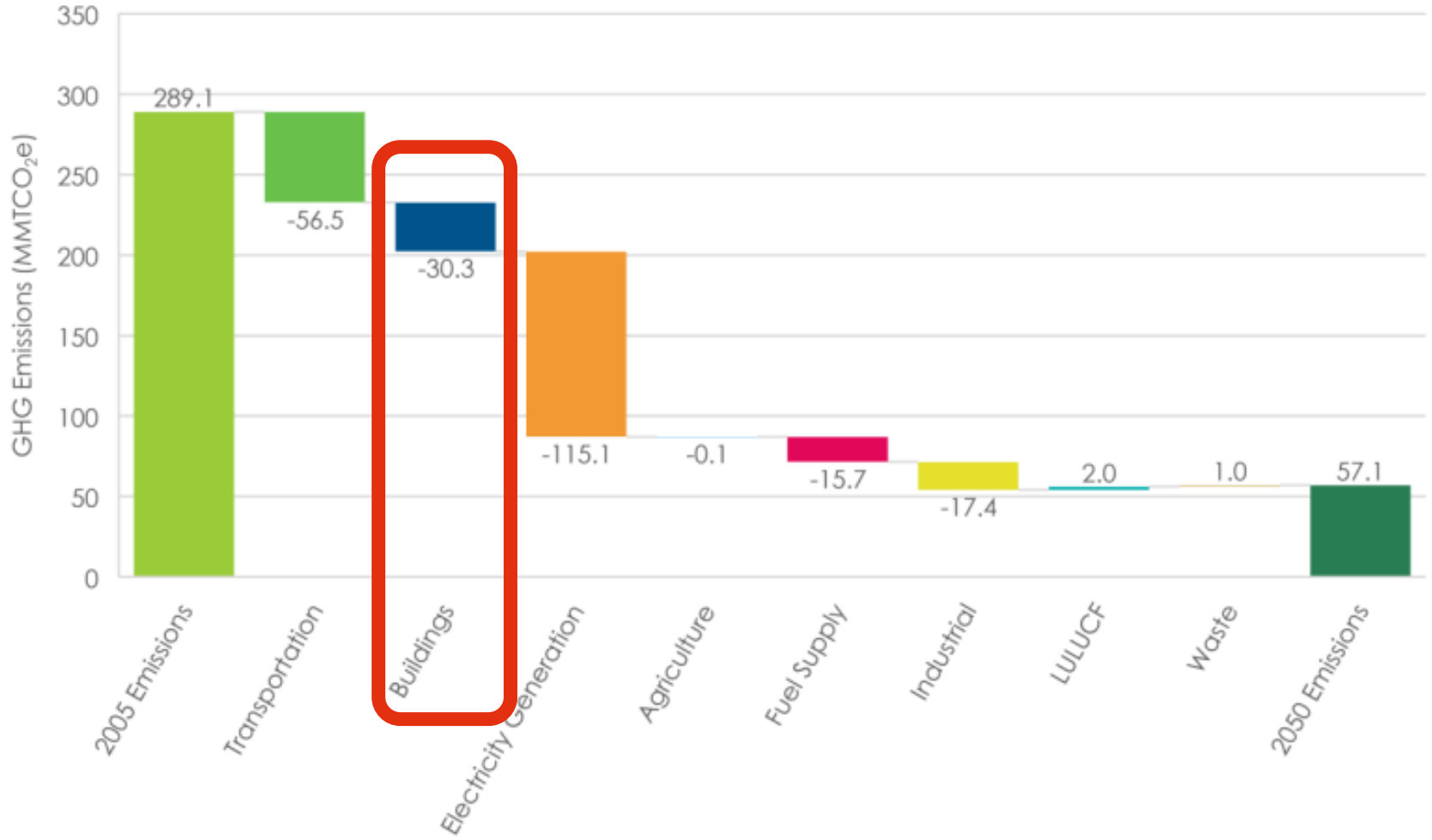
Share of number of buildings and floorspace by year constructed
percentage of total for all buildings



- Buildings built between 1960 and 1999 account for 54% of both number of buildings and of floorspace.
- One-quarter of buildings (25%) were built since 2000, accounting for 29% of total floorspace.
- Buildings built before 1960 represent 21% of buildings but only 17% of total floorspace.
- The median year of construction is 1982.

Findings from the 2021 Climate Action Plan

Figure 15. Cumulative GHG reductions by sector, 2005-2050 ($MMTCO_2e$)



Findings from the 2021 Climate Action Plan

Table 3. Building sector GHG reduction strategies and associated reductions ($MTCO_2e$)

GHG Reduction Strategy	2025	2050
A. Support energy efficiency through building codes	24,444	164,278
B. Improve residential and commercial energy efficiency (electricity)	N/A*	N/A*
C. Improve residential and commercial energy efficiency (gas)	1,365,613	4,311,296
D. Incentivize building electrification	483,807	12,288,250
E. Increase distributed on-site solar	296	5,819,168
Total GHG reduction	**1,874,160**	**22,582,992**

**The GHG reductions from this strategy are captured in the electricity generation sector.*

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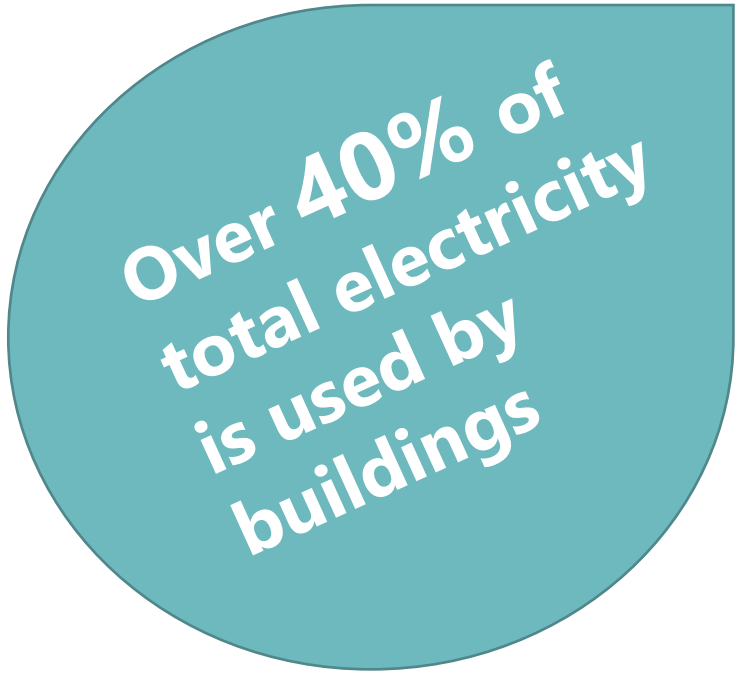
Electricity Consumption by Buildings in PA



Summary	Pennsylvania
Total Consumption	3,413 trillion Btu
Total Consumption per Capita	298 million Btu
Total Expenditures	$ 37,545 million
Total Expenditures per Capita	$ 3,585
by End-Use Sector	**Pennsylvania**
Consumption	
» Residential	850 trillion Btu
» Commercial	525 trillion Btu

EIA, 2021, "Pennsylvania State Profile and Energy Estimates"

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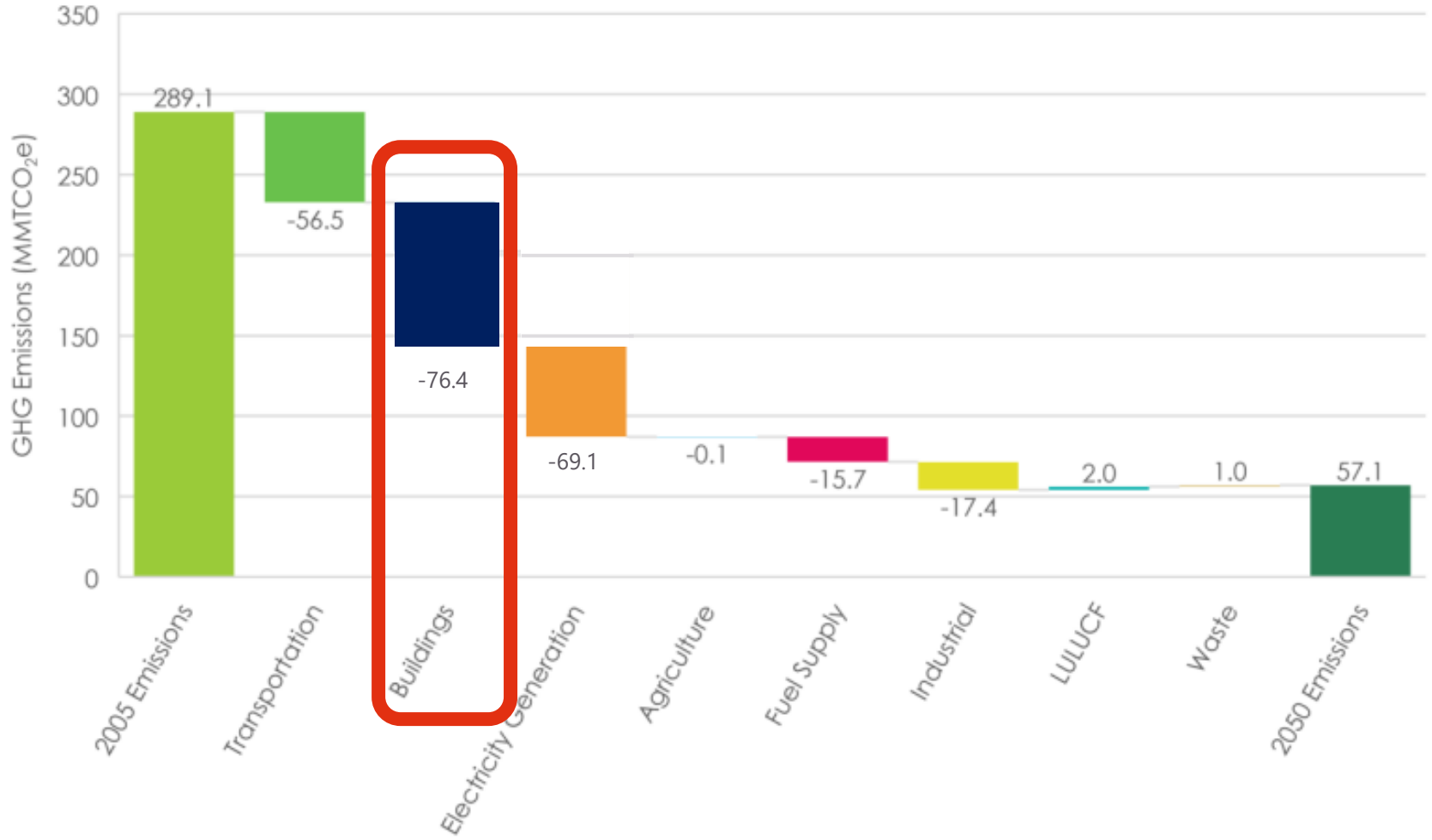
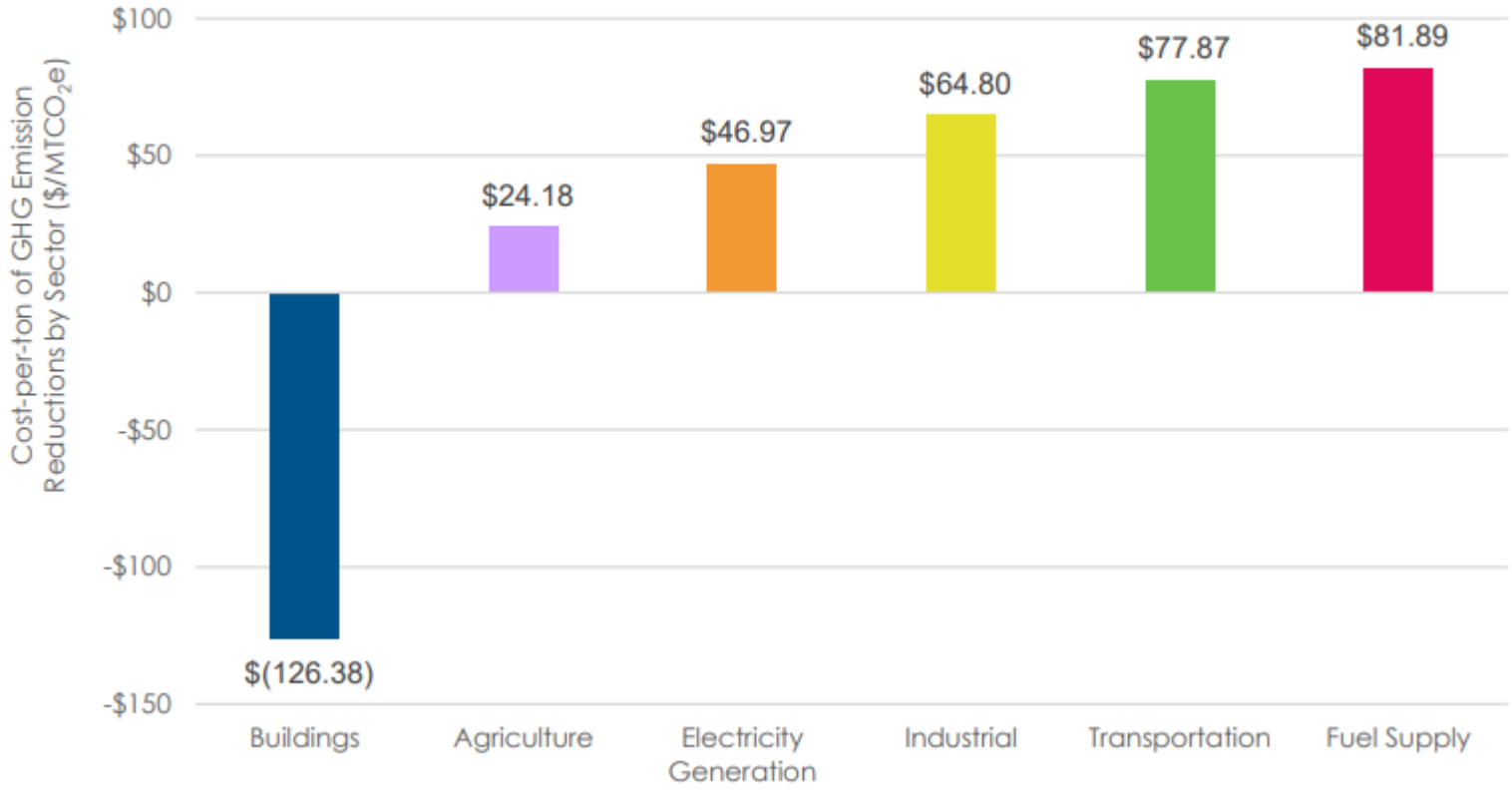


Findings from the 2021 Climate Action Plan

Figure 24. Cost per $MTCO_2e$ reduced ($/$MTCO_2e$) for all sectors



In fact, DOE agrees:

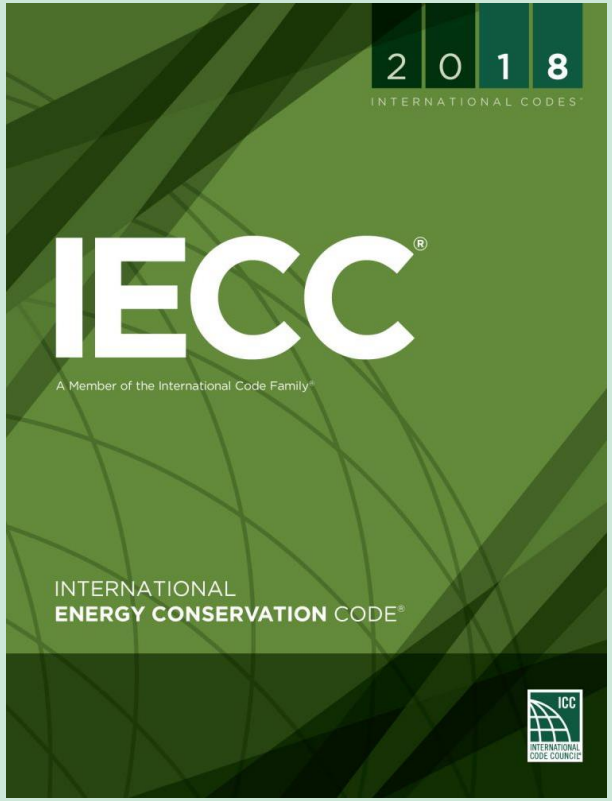
Metric	Compared to the 2015 IECC with amendments
Life-cycle cost savings of the 2018 IECC	$1,836.03
Simple payback period of the 2018 IECC	0.5 years
Net annual consumer cash flow in year 1 of the 2018 IECC[2]	$108.61
Annual (first year) energy cost savings of the 2018 IECC ($)[3]	$112.71
Annual (first year) energy cost savings of the 2018 IECC (%)[4]	5.7%

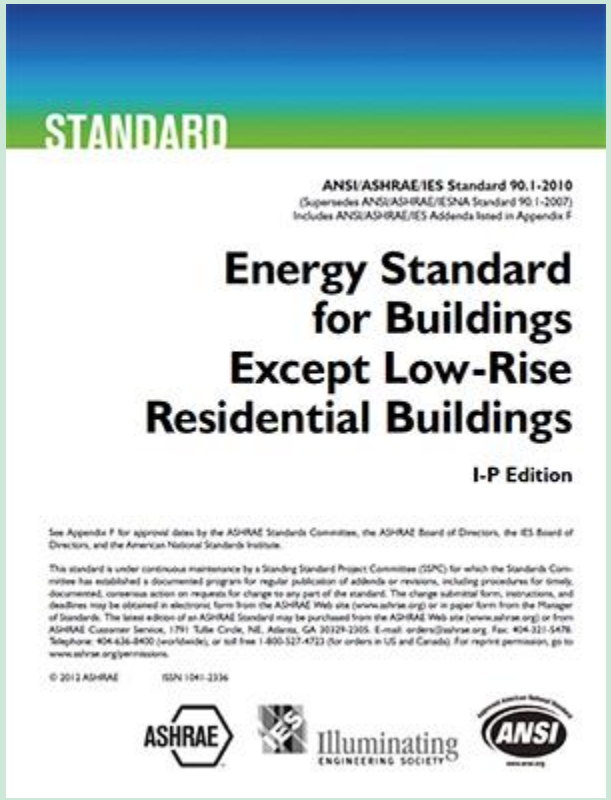
U.S. Department of Energy April 2021

History of Codes in Pennsylvania

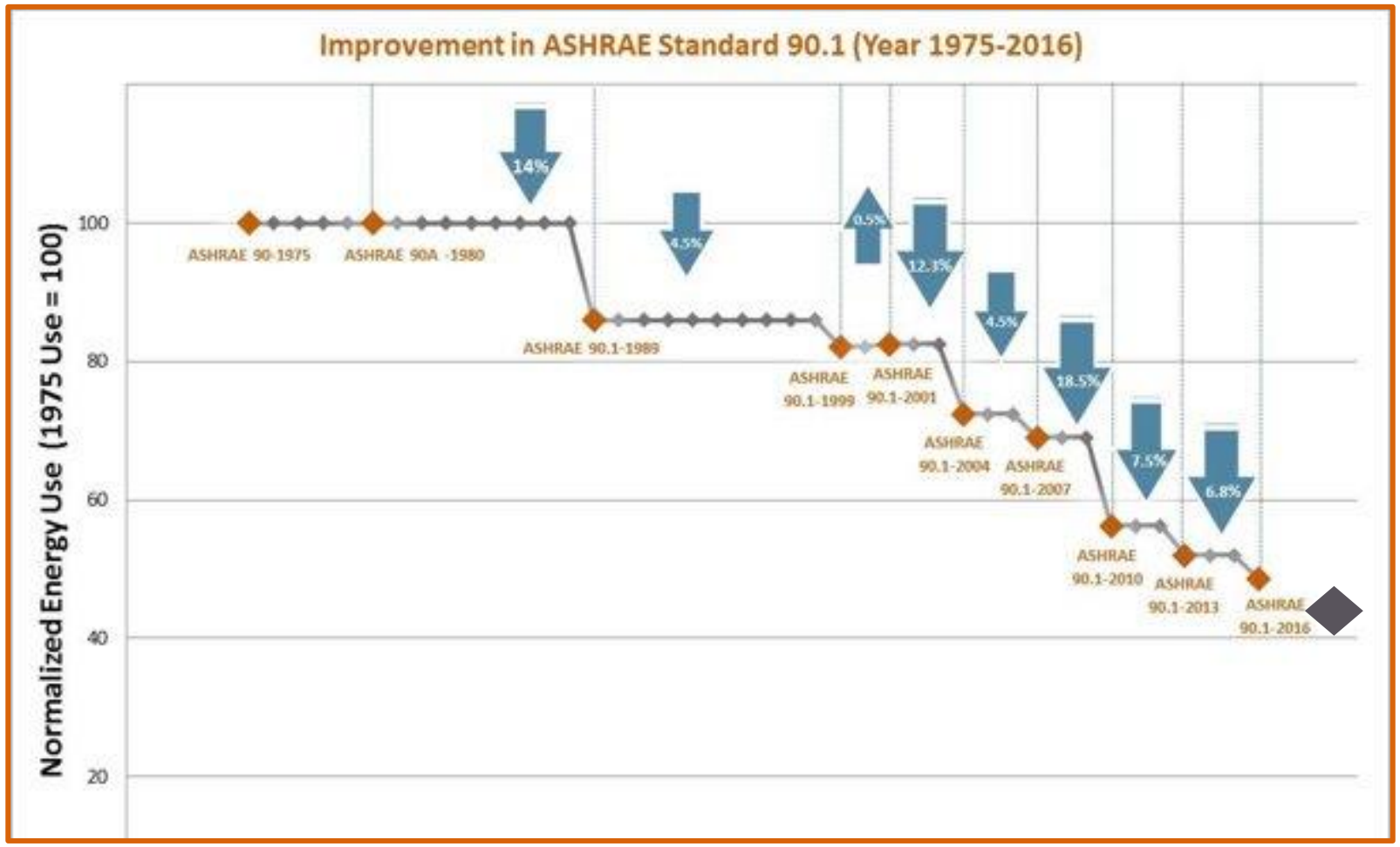
- 1927 Fire and Panic Act
- 1999 Uniform Construction Code
- 2008 UCC Review and Advisory Council

PA UCC – 2018 IECC and ASHRAE 90.1-2016





DOE Analysis of Savings



DOE Preliminary Analysis of 90.1-2019:

4+% increase in savings over 90.1-2016

Barriers to Building Sector Goals

Using Out-of-Date Codes

Pennsylvania will not adopt the 2024 IECC until 2028-2029. The significant improvements in this code will not benefit us until the mid-2030's

Restrictions on Adopting "Above" Codes

Jurisdictions must obtain approval from PA Department of Labor & Industry to implement more stringent provisions

Industry Workforce Resistance

Designers, builders and policy-makers are often opposed to energy code improvements

The enforcement workforce is shrinking in most jurisdictions. Moreover, staff are poorly trained on the energy code, and consider it a low priority,

Limited Focus on Existing Buildings

The energy code provisions for existing buildings are limited and seldom enforced

Using the Energy Code to Reduce GHG

Increased Energy Efficiency Standards

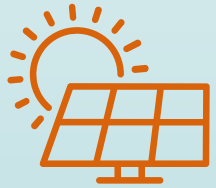
Update code, allow stretch codes

Existing Buildings

Improve requirements and enforcement; require benchmarking and building performance standards

Workforce

Training, certifications, encourage third-party enforcement

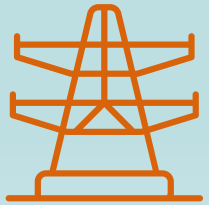


Renewable Generation

Rooftop PV and community-scale PV

Electrification

Of vehicles and buildings;
ex. high-efficiency heat pumps, EV charging



Demand Response

Lighting, water heating, HVAC

Thank You!

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