

Construction Codes in the Northeast: Myths and Realities of Energy Code Adoption and the Economic Effects

2018 UPDATE



Table of Contents

Executive Summary	1
Introduction	1
Why Conduct This Analysis?	3
Methodology	3
Background on Energy Codes in the Northeast and Mid-Atlantic Regions	3
Construction Trends in the Region	8
Commercial State Analysis	9
Connecticut	9
District of Columbia	11
Delaware	13
Massachusetts	15
Maine	17
Maryland	19
New Hampshire	21
New Jersey	23
New York	25
Pennsylvania	27
Rhode Island	29
Vermont	31
West Virginia	33
Residential State Analysis	35
Connecticut	35
District of Columbia	36
Delaware	38
Massachusetts	39
Maine	41
Maryland	42
New Hampshire	44
New Jersey	45
New York	47
Pennsylvania	48



Rhode Island.....	50
Vermont.....	51
West Virginia.....	53
Conclusion.....	54
2017 Construction Downturn.....	58
Back to Reality.....	59
Appendix A: NEEP Building Energy Code Resources.....	59
NEEP Code Tracking Page.....	59
NEEP Code Adoption Toolkit.....	59
NEEP Code Compliance Toolkit.....	60
NEEP’s Building Energy Codes for a Carbon Constrained Era: A Toolkit of Strategies and Examples Report.....	60
NEEP Model Progressive Building Energy Code Policy.....	60
NEEP’s Attributing Building Energy Codes to Energy Efficiency Programs Report.....	60
NEEP Roadmap to Zero Net Energy Public Buildings.....	60
Northeast CHPS Criteria for New Construction and Renovations.....	61
Massachusetts BAR Pilot.....	61
Appendix B: Additional Resources.....	61
U.S. Department of Energy Code Compliance Tools.....	61
U.S. Department of Energy Model Energy Code Policies.....	61
U.S. Department of Energy Building Energy Code Resource Guide: Code Officials Edition.....	61
The Building Codes Assistance Project’s Online Code Environment and Advocacy Network (OCEAN).....	61



Acknowledgements

This project was developed by the Buildings and Communities Solutions Team at NEEP. Please direct questions or comments to the authors of this paper:

Christina Rohrbacher, High Performance Buildings Associate, NEEP, crohrbacher@neep.org
781-860-9177 ext. 114

Darren Port, Building Energy Codes Manager, NEEP, Dport@neep.org
781-860-9177 ext. 132

Samantha Caputo, Policy and Research Associate, NEEP, scaputo@neep.org
781-860-9177 x102

Data collection and analysis thanks to:

Gerrianna Cohen, Research Intern, NEEP

A special thanks to the Strategic Marketing & Communications Team:

Lisa Cascio, Public Relations Senior Manager, NEEP, lcascio@neep.org
781-860-9177 x137

Chris Tanner, Digital Marketing Senior Associate, NEEP, ctanner@neep.org
781-860-9177 x155

The following NEEP staff provided invaluable input and feedback on this report: Carolyn Sarno-Goldthwaite

About NEEP

Founded in 1996, NEEP is a non-profit whose goal is to assist the Northeast and Mid-Atlantic region to reduce building sector energy consumption three percent per year and carbon emissions 40 percent by 2030 (relative to 2001). Our mission is to accelerate regional collaboration to promote advanced energy efficiency and related solutions in homes, buildings, industry, and communities. We do this by fostering collaboration and innovation, developing tools, and disseminating knowledge to drive market transformation. We envision the region's homes, buildings, and communities transformed into efficient, affordable, low-carbon, resilient places to live, work, and play. To learn more about NEEP, visit our website at <http://www.neep.org>.

Disclaimer: NEEP verified the data used for this white paper to the best of our ability. This paper reflects the opinion and judgments of the NEEP staff and does not necessarily reflect those of NEEP Board members, NEEP Sponsors, or project participants and funders.

©Northeast Energy Efficiency Partnerships, Inc. 2018



Executive Summary

Residential and commercial buildings are among the largest users of energy in the United States, accounting for approximately 51 percent of all energy consumption in 2017.¹ Because this represents such a significant portion of our energy use, policies have been put into place that govern the way buildings and homes use energy. Building energy codes act as the “floor”, or minimum level of efficiency, at which new buildings or renovations can be constructed.

Building energy codes are a cost-effective way to achieve large scale energy savings while ensuring consumer protection. The energy efficiency of a building is not visible to most buyers, so codes are a way of ensuring consistency in construction and design practices. This translates into more energy efficient buildings, which means affordable and manageable energy bills for customers.

Outreach and innovation can be used to fill existing gaps in energy code compliance, and newer energy codes can be implemented to capture lasting energy savings. To achieve even greater energy efficiency, states can adopt a "stretch" energy code to supplement their base building energy code, thereby giving communities the option to enforce a code that is typically 15 to 20 percent more energy efficient than the state’s base code. These stretch codes also help inform the development of new versions of national model energy codes and standards.

Today’s building codes are about 30 percent more efficient than they were 10 years ago. By adopting and complying with these more efficient energy codes, states in the Northeast and Mid-Atlantic will steadily move towards a future where all new buildings are zero energy buildings.

Introduction

Energy codes are a critical piece of the puzzle for state and community energy and carbon emissions reduction plans. All states and several cities in the NEEP region have aggressive emissions reduction goals, and increased efficiency in building codes will help them achieve these goals. Yet, when states begin the process of updating their energy code, they are often faced with some opposition from stakeholders.

The arguments against updating the energy code include:

1. It will be too costly for builders to build to the new code;
2. Building prices will go up because of additional costs to builders, pricing out moderate to low-income homebuyers and drive away businesses from owning/leasing newer buildings;
3. Builders will take their business to areas with a less efficient energy codes.

NEEP has discovered that this simply is not the case for updated energy codes. In fact, energy code updates provide an opportunity for energy and cost savings.

The Myth:

Opponents of updated energy codes state that it will be too costly for builders, contractors, and homebuyers. This is due to the perceived extra work, complexities, and materials needed to build to a new code.

¹ Calculated using EIA total energy consumption available at: <https://www.eia.gov/totalenergy/data/monthly/#summary>



This report examines commercial and residential construction data from the Northeast and Mid-Atlantic regions to see if more rigorous code implementations have led to any noticeable impacts on investments in construction projects.

This report analyzes data that reflects the number of commercial and residential permits each year, creating a picture of the construction landscape based on county and square footage. Also included are projections of potential energy cost savings and carbon emissions savings potentials if all states in the NEEP region were to implement the newest energy codes from their previous or current codes. These savings are significant and can point out the importance of energy codes as a tool for reducing energy consumption, greenhouse gas emissions, and energy costs for building owners and occupants.

The Realities:

- NEEP has discovered no correlation between codes update years and slows in construction starts in subsequent years.
- The number of commercial and residential projects has risen steadily over the past decade.
- Significant cost and emissions savings opportunities exist if NEEP states adopt the latest energy codes. Commercial and residential sector building owners and occupants could save \$590,595,919.70 from 2018-2022, and avoid 5.1 million metric tons of carbon emissions. This is a carbon emissions equivalent of 969,718 homes' electricity use for one year².
- 2017 was a year of fewer construction projects than 2016, due to many factors including, but not limited to:
 - Construction costs have increased over the past several years;
 - Large construction firms are doing more business overseas;
 - Oil pricing is volatile: construction projects are linked to investments, and investments increase when the price of oil increases. The price of oil rose rapidly in 2016, and saw a decline in 2017 followed by a significant increase in late 2017/early 2018³.
 - Election and presidential administration changes that can affect business confidence.
 - Public buildings represent opportunity for energy savings. Local and state governments have an opportunity to lead by example through more energy efficient building codes for public buildings.

This report provides a state-by-state look at commercial and residential construction data to support the realities of building codes and the potential impact on builders and the new construction industry. This granular level detail provides a closer look at state trends in permit numbers through the past decade while also highlighting the potential savings the newest building code can achieve.

² EPA. (2017). *Greenhouse Gas Equivalencies Calculator*. EPA.

³ <http://www.macrotrends.net/1369/crude-oil-price-history-chart>



Why Conduct This Analysis?

This white paper has three primary goals:

1. To determine if energy codes updates have any correlation with economic development in the region based on construction permits, cost, and square footage data;
2. To identify areas of increased development for targeted energy efficiency program outreach;
3. To identify areas of increased development and target those counties, cities, and neighborhoods for energy code compliance enhancement programs. Counties with higher rates of development could be targeted for trainings.

Methodology

NEEP utilized [ConstructConnect](#) data for all states in the NEEP region to determine the number of construction permits, square footage, county, and year (2014-2017) for commercial new construction and commercial alterations. The data from 2005-2013 came from the previous version of this report published in 2015.⁴

Census data was pulled for residential new construction only for the years 2014-2017. This includes buildings sorted by number of units and the costs for each state in the NEEP region. This data does not include square footage numbers or by-county numbers as is used in the commercial data analysis.

Savings calculations are based on Department of Energy (DOE) analysis of each year of energy codes. The projections for square footage for both commercial and residential buildings come from Pacific Northwest National Laboratories (PNNL) estimates. This savings calculator determines Energy Use Intensity Index (EUI) and cost per square foot per year for that code based on the climate zone. The average climate zone for a state was used to calculate savings for each state. This information was then rolled up to determine total savings for the entire NEEP region.

Once the energy savings was determined, NEEP utilized the EPA carbon calculator to come up with carbon savings for each state and subsequently the entire NEEP region. The carbon equivalents were calculated to more easily demonstrate the amount of savings. Average costs for college tuition and fees and average costs per mile of five-foot-wide bike lanes came from The College Board and The Pedestrian and Bicycle Information Center, respectively. This creates a complete picture of what each state is saving and reflects environmental and cost savings, both of which are goals for the states in the NEEP region.

Background on Energy Codes in the Northeast and Mid-Atlantic Regions

In the NEEP region, states currently employ building energy codes based on the last four generations of the national model codes and standards. Specifically, these are:

- 2009 IECC and ASHRAE Standard 90.1-2007;
- 2012 IECC and ASHRAE Standard 90.1-2010; and
- 2015 IECC and ASHRAE Standard 90.1-2013; and

⁴ <http://neep.org/construction-codes-northeast-myths-and-realities-energy-code-adoption-and-economic-effects>



- 2018 IECC and ASHRAE Standard 90.1-2016.⁵

Comparison of Energy Savings: A significant push to increase the energy efficiency of these model codes and standards over the past decade has resulted in substantial changes in code requirements and, in turn, energy savings potential among these four code cycles. The chart below shows average reductions in site energy usage between the different code updates.

Code	Percent Site Energy Reduction Over Previous Version of Code			
Commercial: ASHRAE Standard 90.1	2004 to 2007: 5% ⁶	2007 to 2010: 18% ⁷	2010 to 2013: 8% ⁸	2013 to 2016: 8.2% ⁹
Residential: IECC	2006 to 2009: 14% ¹⁰	2009 to 2012: 21% ¹¹	2012 to 2015: 1% ¹²	2015 to 2018: N/A*

*DOE Cost Effectiveness tests not yet completed for the 2018 IECC.

Cost Effectiveness: In order to ensure the initial costs of implementing these new codes is recouped in a reasonable amount of time, the U.S. Department of Energy conducts cost effectiveness tests on each code update. These tests provide lifecycle cost net savings, cash flow analyses, and simple payback estimates. Once this analysis is completed, the analysis is released so state and local governments are better informed about the impacts of implementing these codes.

⁵ Energy and cost savings analysis have not yet been completed for each state. With savings of about 1% of energy use or less in the 2018 IECC over the 2015 IECC, 2015 IECC analyses are used here to determine savings. This means that the savings determinations are conservative.

⁶ US Government Publishing Office. "Building Energy Standards Program: Determination Regarding Energy Efficiency Improvements in the Energy Standard for Buildings, Except LowRise Residential Buildings, ANSI/ ASHRAE/IESNA Standard 90.1–2007" <http://www.gpo.gov/fdsys/pkg/FR-2011-07-20/pdf/2011-18251.pdf>

⁷ U.S. Government Publishing Office. "Building Energy Standards Program: Final Determination Regarding Energy Efficiency Improvements in the Energy Standard for Buildings, Except LowRise Residential Buildings, ANSI/ ASHRAE/IESNA Standard 90.1–2010" <http://www.gpo.gov/fdsys/pkg/FR-2011-10-19/pdf/2011-27057.pdf>

⁸ Regulations.gov. "2014-09-26 Determination Regarding Energy Efficiency Improvements in ANSI/ASHRAE/IES Standard 90.1–2013: Energy Standard for Buildings, Except Low-Rise Residential Buildings; Notice of Determination." <http://www.regulations.gov/#!documentDetail;D=EERE-2014-BT-DET-0009-0006>

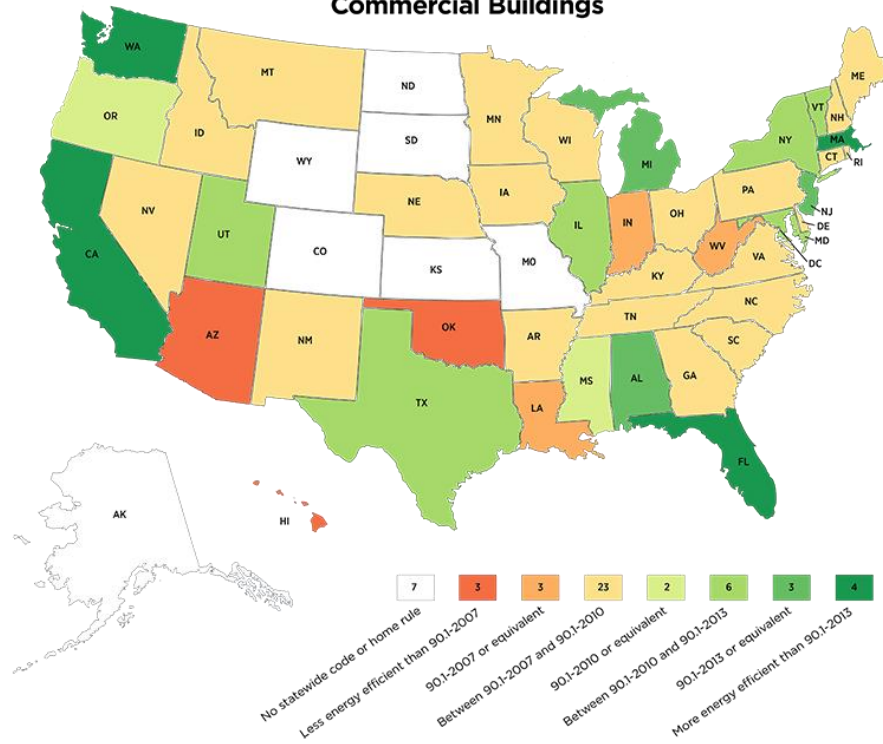
⁹ U.S. Government Publishing Office. "Building Energy Codes Program: Commercial Determination ANSI/ASHRAE/IES Standard 90.1-2016: Energy Standard for Buildings, Except Low-Rise Residential Buildings; Notice of Determination." <https://www.regulations.gov/document?D=EERE-2017-BT-DET-0046-0008>

¹⁰ US Government Publishing Office. "Updating State Residential Building Energy Efficiency Codes" <http://www.gpo.gov/fdsys/pkg/FR-2011-07-19/pdf/2011-18080.pdf>

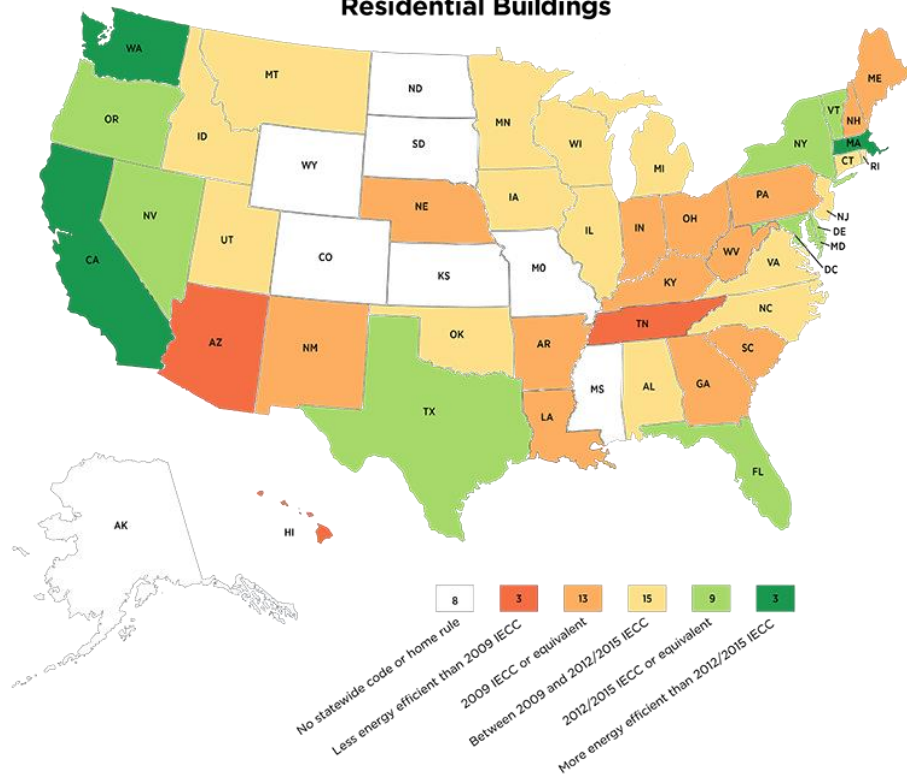
¹¹ U.S. DOE. <https://www.energycodes.gov/sites/default/files/documents/NationalResidentialCostEffectiveness.pdf>

¹² Regulations.gov. "2014-09-26 Preliminary Determination Regarding Energy Efficiency Improvements in the 2015 International Energy Conservation Code; Notice of Preliminary Determination" <http://www.regulations.gov/#!documentDetail;D=EERE-2014-BT-DET-0030-0001>

Commercial Buildings



Residential Buildings





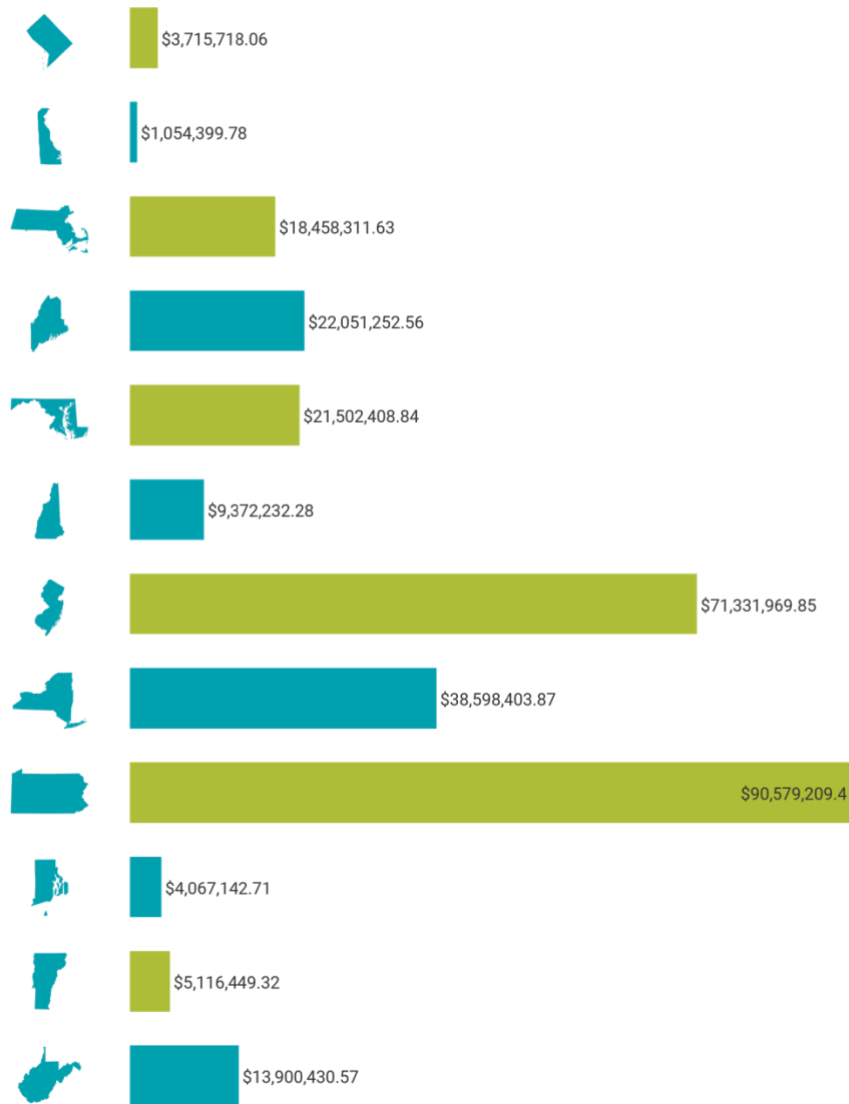
State Code Tracking Matrix

The table below is a state code tracking matrix that displays the current energy code, the code update cycle, and the governing body in charge of updating the energy code. A code tracking matrix that is updated regularly can be found [here on the NEEP website](#).

State	Current Regional Commercial Energy Code Adoptions (as of June 2015)	Energy Code Update Cycle	Authority-Having Jurisdiction (AHJ)
CT	2012 IECC with reference to ASHRAE Standard 90.1 2010. Effective: 10/01/2016	Not more than every 4 years	Department of Administrative Services - Codes & Standards Committee
DC	2012 IECC with minor amendments. Effective 3/28/2014. 2012 IgCC-based Green Code	Every 3 years (the 2006 D.C. Green Building Act requires that updated building codes be submitted to the City Council)	Department of Consumer and Regulatory Affairs
DE	ASHRAE Standard 90.1-2010. Effective: 05/11/2014	Every 3 years	Department of Natural Resources and Environmental Control- Division of Energy and Climate
MA	2015 IECC. Effective 01/02/2017	MA is required by the 2008 Green Communities Act to adopt each new IECC edition within one year of its publication.	Department of Public Safety- Board of Building Regulations and Standards
MD	2015 IECC with reference to ASHRAE 90.1-2013 Effective 07/01/2015	Every 3 years (Corresponding to the ICC change cycle)	Department of Housing and Community Development- Code Administration
ME	ASHRAE Standard 90.1-2007. Effective 12/01/2010 (optional for towns with fewer than 4,000 residents)	No set schedule, but cannot be more than 2 cycles behind.	Department of Public Utilities- Bureau of Building Codes and Standards
NH	2009 IECC. Effective 04/01/2010	Every 3 years	Department of Public Safety- Building Code Review Board
NJ	ASHRAE Standard 90.1-2013. Effective 03/21/2016	Every 3 years (Corresponding to the ICC change cycle)	Department of Community Affairs- Division of Codes and Standards
NY	2015 IECC / ASHRAE Standard 90.1-2013 with NY amendments. Effective 10/01/2016	Code can be revised at any time. The State Fire Prevention and Building Code Council meets at least four times a year to consider revisions to the code.	Department of State- Division of Building Standards and Codes

PA	2009 IECC with reference to ASHRAE 90.1-2007. Effective 12/31/2009	Every 3 years (Corresponding to the ICC change cycle)	Department of Labor and Industry - UNIFORM CONSTRUCTION CODE
RI	2012 IECC. Effective 10/01/2013	Every 3 years	RI Building Code Commission
VT	2015 IECC with VT amendments plus stretch code where applicable. Effective 03/01/2015	Every 3 years	Department of Public Service

Potential Commercial Savings by State



Construction Trends in the Region

The following graphs provide a visual representation of the construction activity in the NEEP region. They are organized by the number of permits, the dollar value of projects, and the project type.

11,865,067

(Metric Tons CO2)
2018-2022 Regional Emissions Savings Potential with Code Updates

\$584,964,954.31¹³

2018-2022 Regional Cost Savings Potential with Code Updates

These savings could:



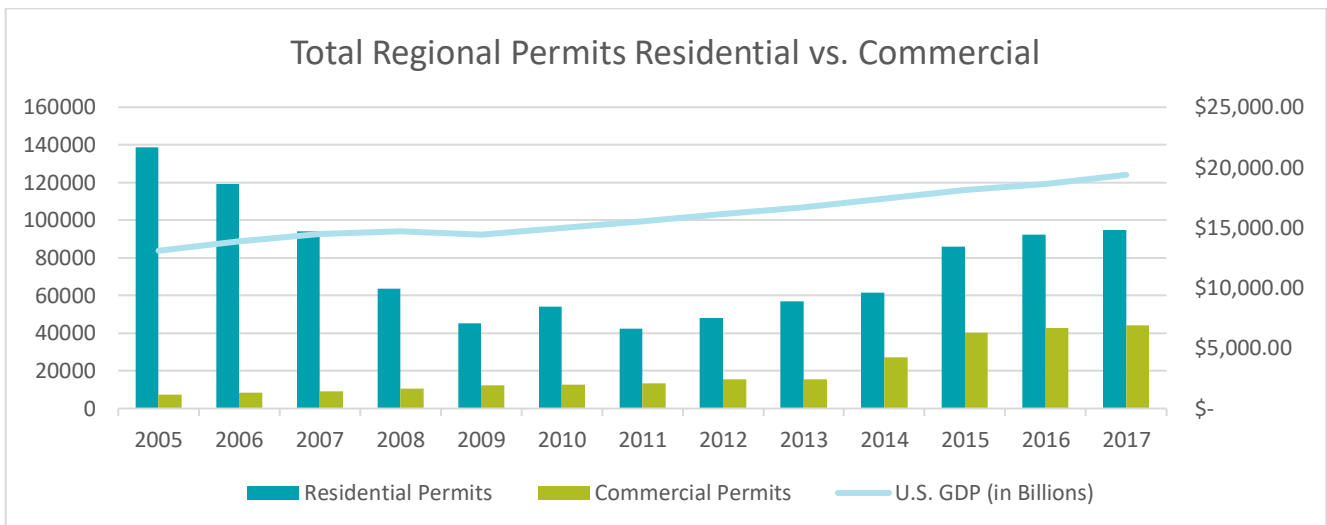
Pay for **14,668** students to attend a four-year college



Build **4,499** miles of new bike lanes



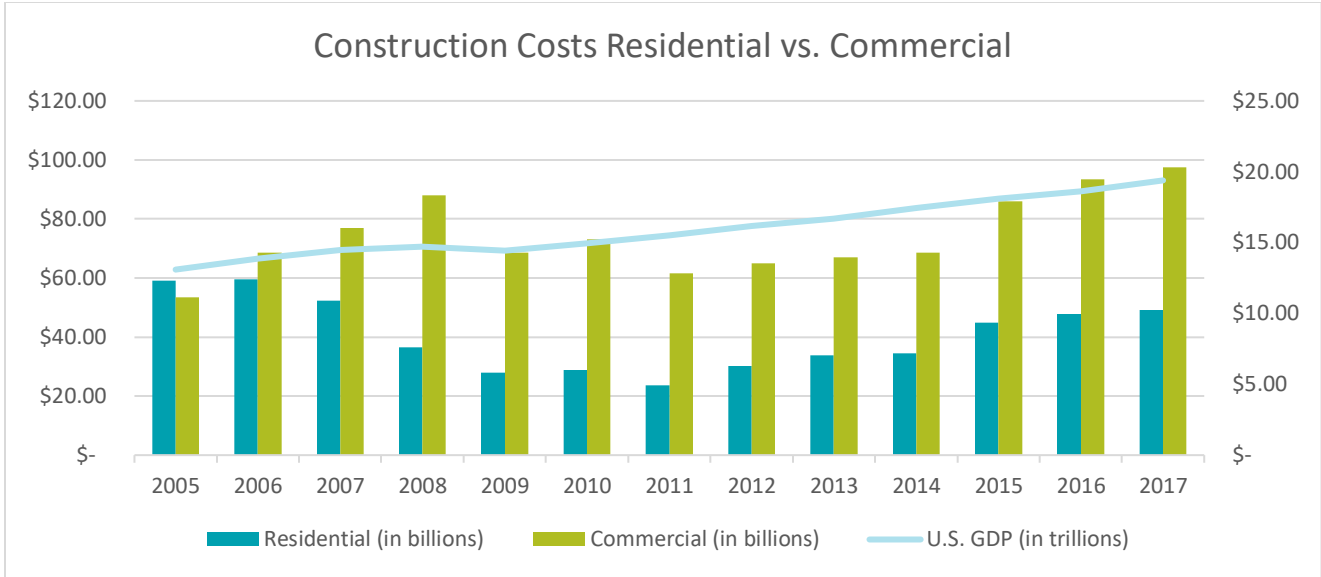
Power **1,281,186** homes for one year



¹³ College calculations came from The College Board: https://trends.collegeboard.org/sites/default/files/2017-trends-in-college-pricing_0.pdf

Bike Lane calculations came from The Pedestrian and Bicycle Information Center: http://www.pedbikeinfo.org/planning/facilities_bike_bikelanes.cfm

Greenhouse Gas Equivalent came from The EPA: <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>



Commercial State Analysis

Connecticut

Current Code: **2012 IECC or ASHRAE 90.1-2010**

Effective Date: **10/1/2016**

Total Commercial Projects (2005-2017): **12,218**

Average Cost per Alteration Project: **\$1,515,460.92**

Average Cost per New Construction Project: **\$10,594,131.95**

508,825

(Metric Tons CO2)

2018-2022 Regional Emissions Savings Potential with Code Update

\$34,976,718.42¹⁴

2018-2022 Regional Cost Savings Potential with Code Update

¹⁴ College calculations came from The College Board: https://trends.collegeboard.org/sites/default/files/2017-trends-in-college-pricing_0.pdf

Bike Lane calculations came from The Pedestrian and Bicycle Information Center: http://www.pedbikeinfo.org/planning/facilities_bike_bikelanes.cfm

Greenhouse Gas Equivalents came from The EPA: <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

These savings could:



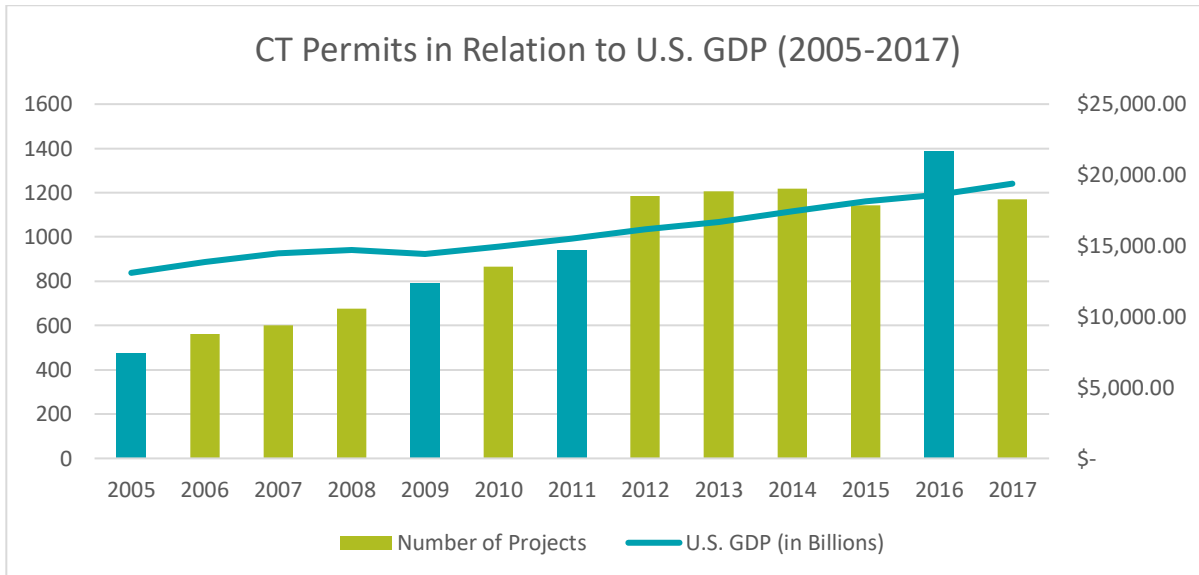
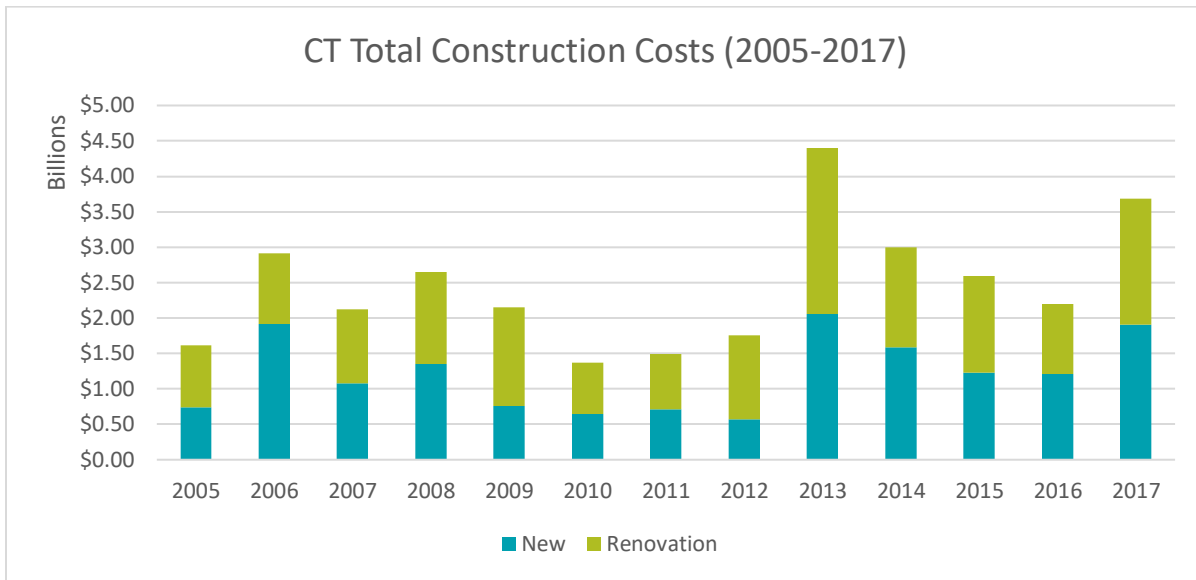
Pay for **877** students to attend a four-year college



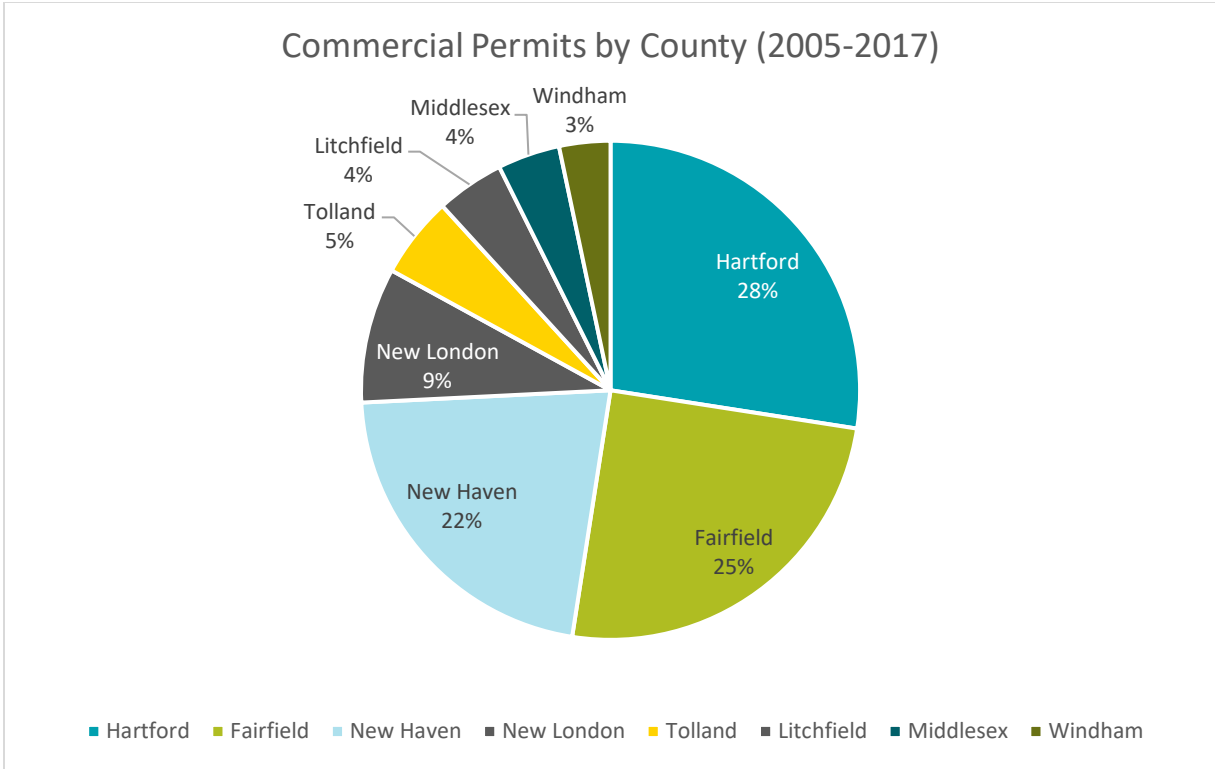
Build **269** miles of new bike lanes



Power **54,943** homes for one year



**Blue columns indicate year of energy code update*



District of Columbia

Current Code: **2012 IECC with DC amendments, plus 2012 IgCC-based Green Code**

Effective Date: **3/28/2014**

Total Commercial Projects (2005-2017): **2,625**

Average Cost per Alteration Project: **\$5,903,105.64**

Average Cost per New Construction Project: **\$33,327,299.72**

66,943

(Metric Tons CO2)

2018-2022 Regional Emissions Savings Potential with Code Updates

\$3,715,718.06

2018-2022 Regional Cost Savings Potential with Code Updates

These savings could:



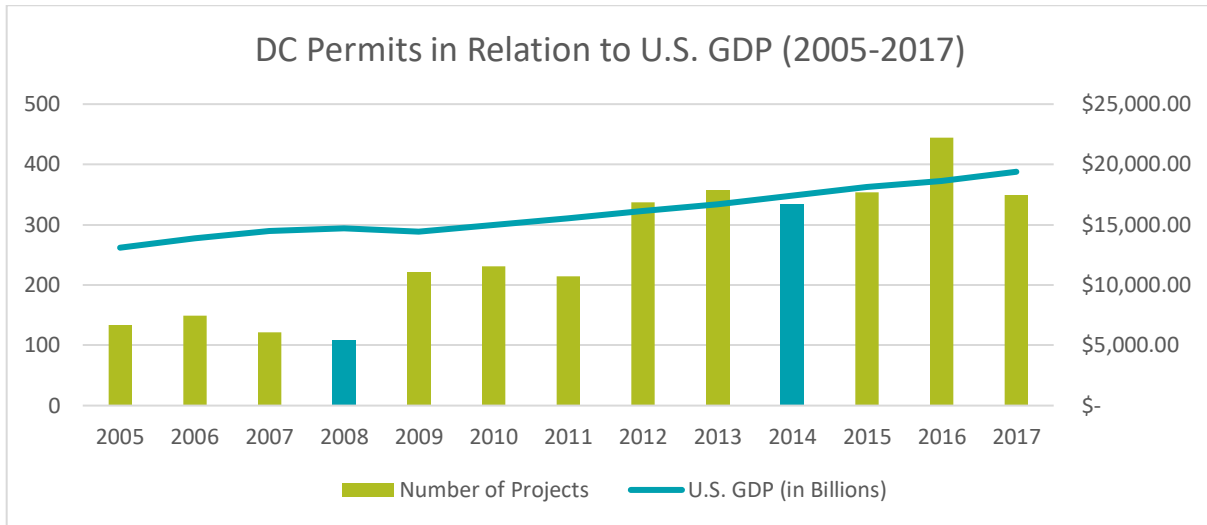
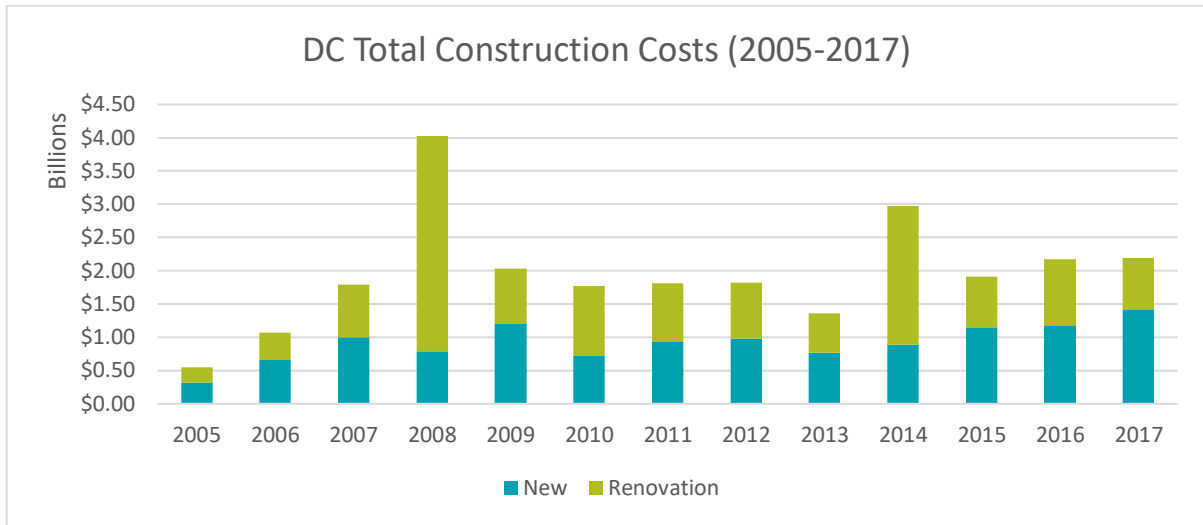
Pay for **93** students to attend a four-year college



Build **28** miles of new bike lanes



Power **7,228** homes for one year



**Blue columns indicate year of energy code update*

Delaware

Current Code: **ASHRAE 90.1-2010**

Effective Date: **11/11/2014**

Total Commercial Projects (2005-2017): **2,454**

Average Cost per Alteration Project: **\$1,393,774.68**

Average Cost per New Construction Project: **\$9,072,923.20**

7,036

(Metric Tons CO₂)

2018-2022 Regional Emissions Savings Potential with Code Updates

\$1,054,399.78

2018-2022 Regional Cost Savings Potential with Code Updates

These savings could:



Pay for **26** students to attend a four-year college

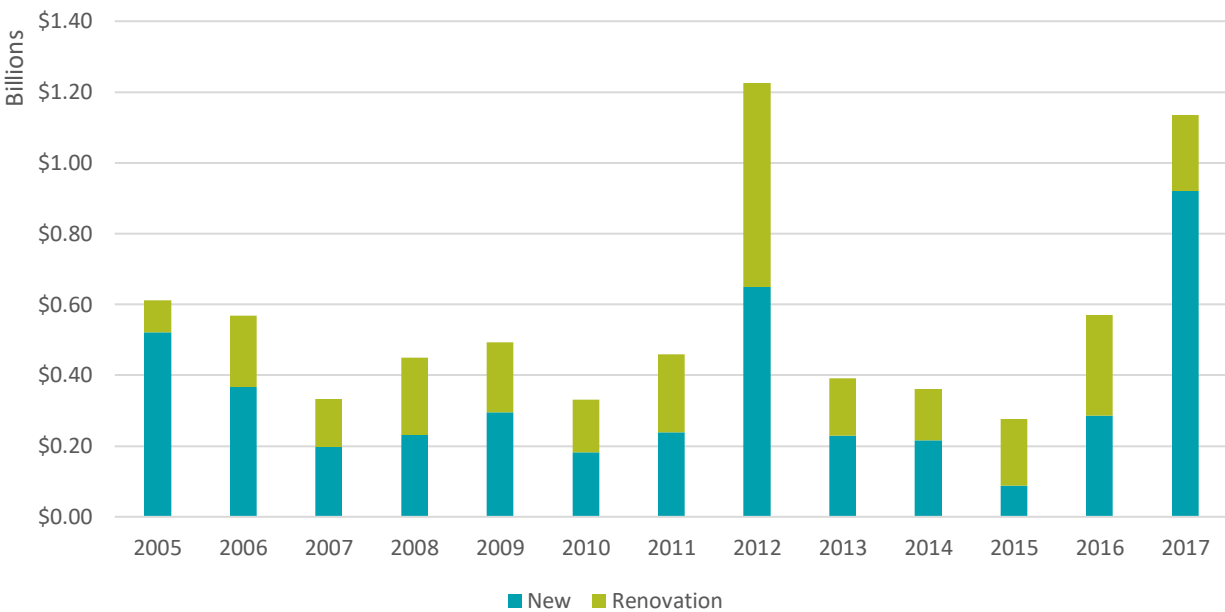


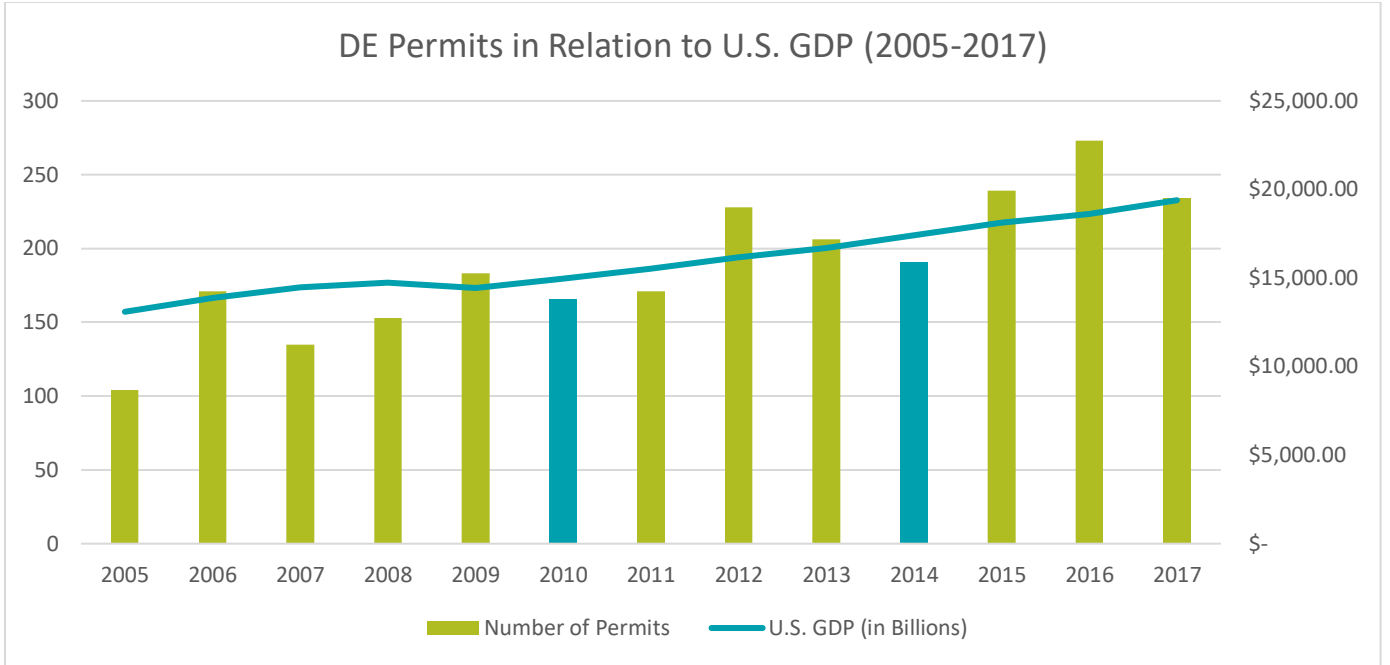
Build **8** miles of new bike lanes



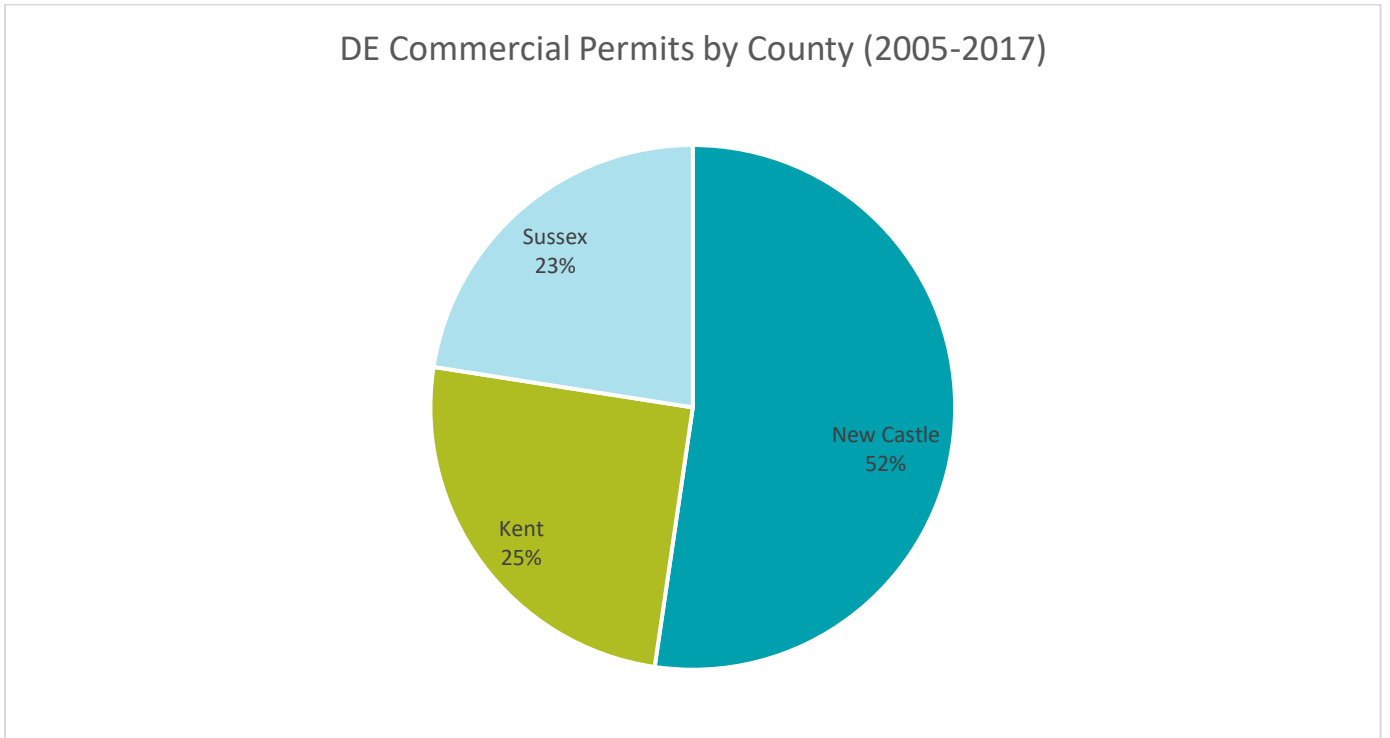
Power **760** homes for one year

DE Total Construction Costs (2005-2017)





****Blue columns indicate year of energy code update***



Massachusetts

Current Code: **2015 IECC with MA amendments or ASHRAE 90.1-2013 + stretch code**

Effective Date: **1/2/2017**

Total Commercial Projects (2005-2017): **24,257**

Average Cost per Alteration Project: **\$1,493,631.81**

Average Cost per New Construction Project: **\$15,937,438.53**

304,786

(Metric Tons CO2)

2018-2022 Regional Emissions Savings Potential with Code Updates

\$18,458,311.63

2018-2022 Regional Cost Savings Potential with Code Updates

These savings could:



Pay for **462** students to attend a four-year college



Build **141** miles of new bike lanes

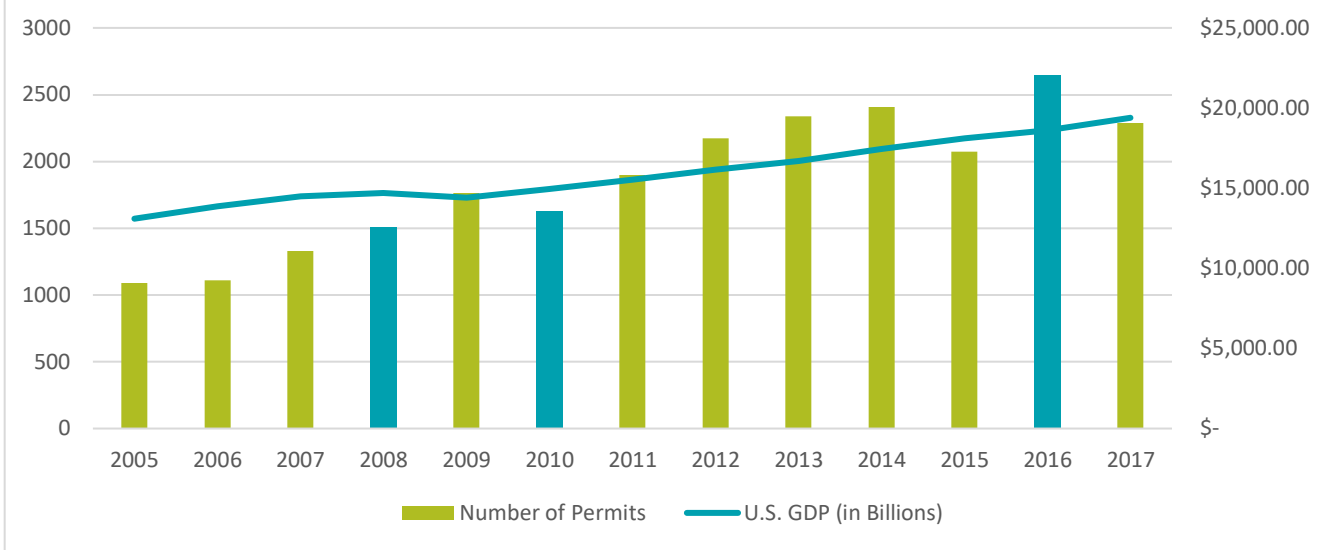


Power **32,911** homes for one year

MA Total Construction Costs (2005-2017)

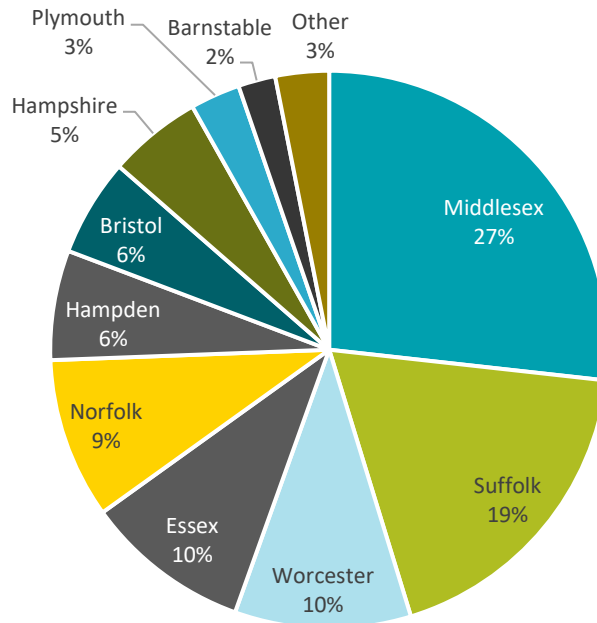


MA Permits in Relation to GDP (2005-2017)



**Blue columns indicate year of energy code update*

MA Permits by County



Maine

Current Code: **2006 IECC - ASHRAE 90.1-2007 optional**

Effective Date: **6/24/2011**

Total Commercial Projects (2005-2017): **4,464**

Average Cost per Alteration Project: **\$1,163,563.32**

Average Cost per New Construction Project: **\$4,546,861.12**

393,094

(Metric Tons CO₂)

2018-2022 Regional Emissions Savings Potential with Code Updates

\$22,051,252.56

2018-2022 Regional Cost Savings Potential with Code Updates

These savings could:



Pay for **552** students to attend a four-year college

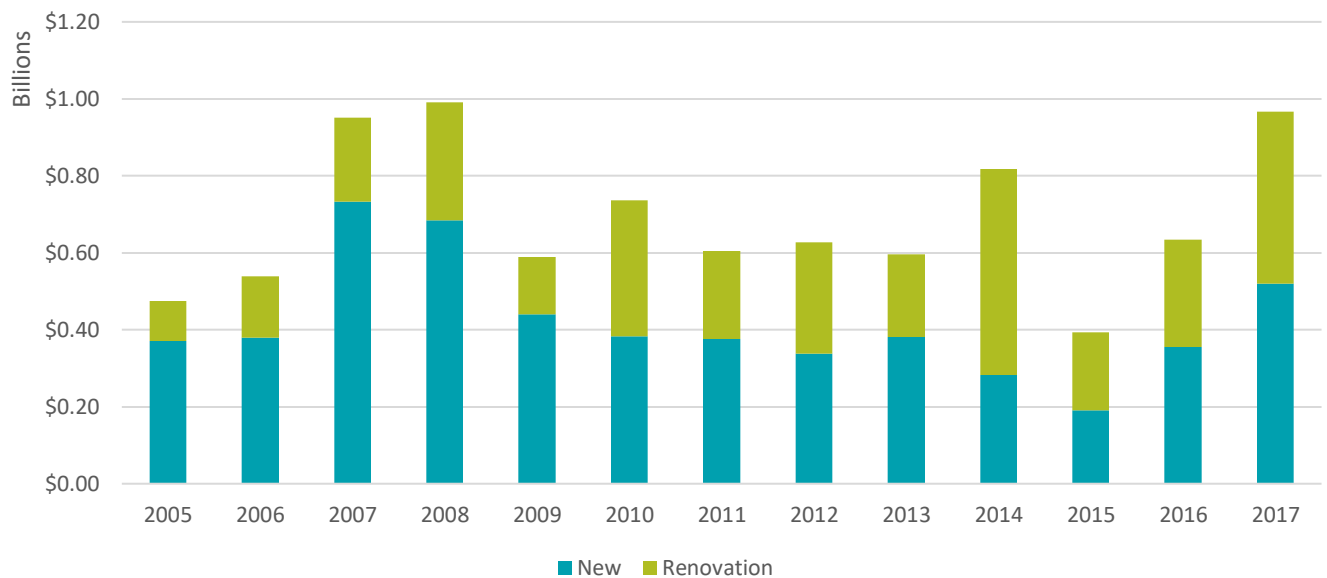


Build **169** miles of new bike lanes

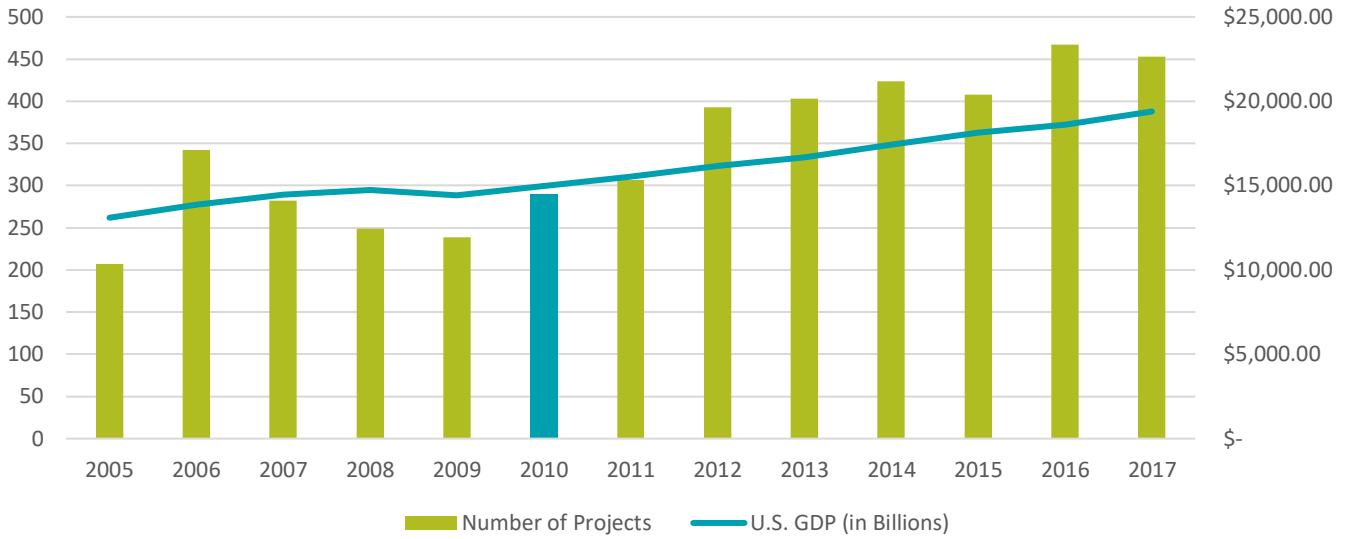


Power **42,446** homes for one year

ME Total Construction Costs (2005-2017)

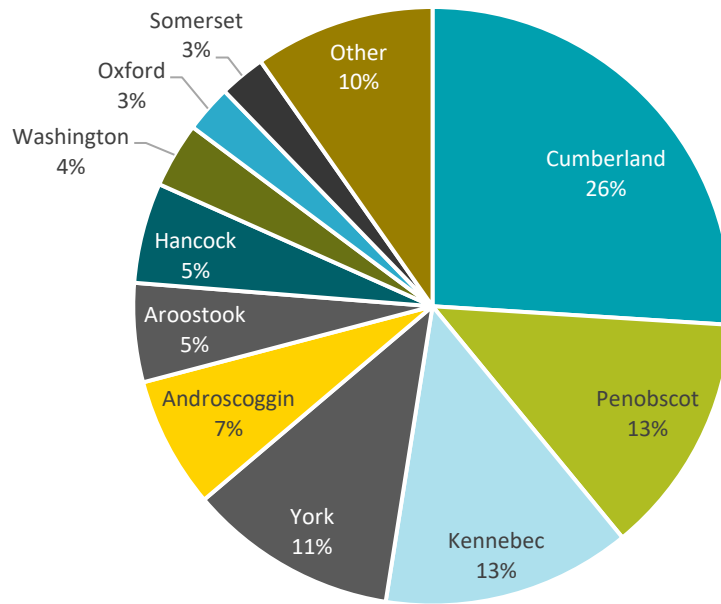


ME Permits in Relation to U.S. GDP (2005-2017)



**Blue columns indicate year of energy code update*

ME Permits by County



Maryland

Current Code: **2015 IECC with reference to ASHRAE 90.1-2013**

Effective Date: **7/1/2015**

Total Commercial Projects (2005-2017): **15,518**

Average Cost per Alteration Project: **\$2,122,706.62**

Average Cost per New Construction Project: **\$12,664,331.38**

364,211

(Metric Tons CO₂)

2018-2022 Regional Emissions Savings Potential with Code Updates

\$21,502,408.84¹⁵

2018-2022 Regional Cost Savings Potential with Code Updates

These savings could:



Pay for **539** students to attend a four-year college



Build **165** miles of new bike lanes

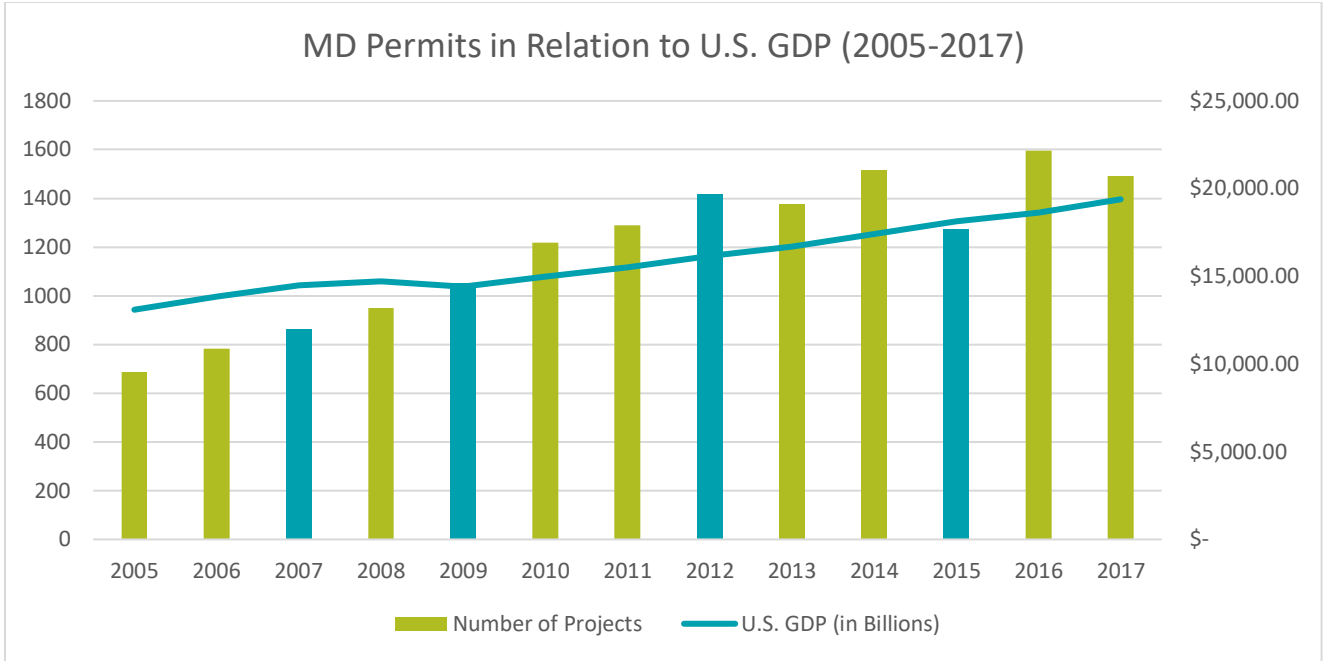


Power **39,327** homes for one year

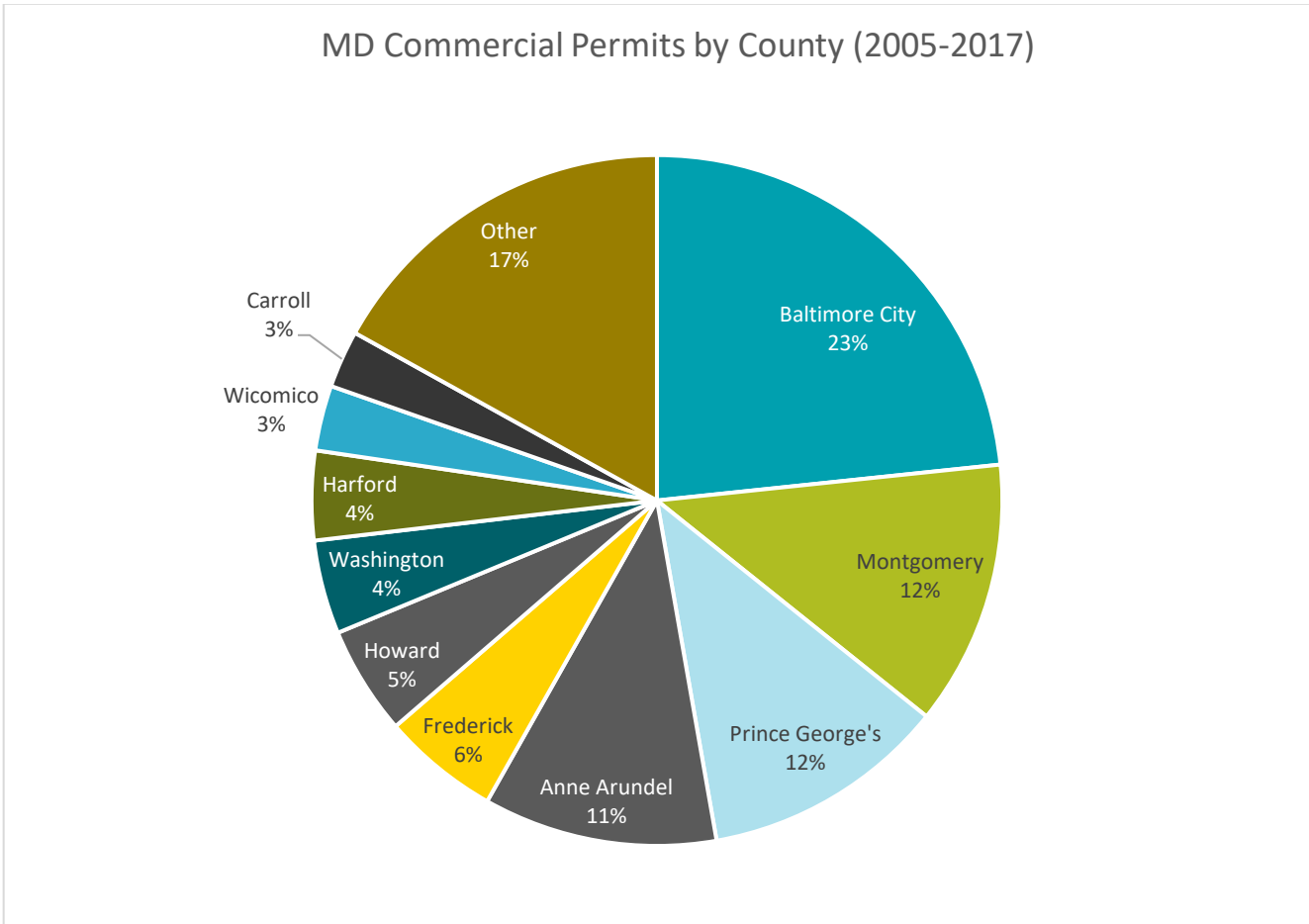
MD Total Construction Costs (2005-2017)



¹⁵ Maryland has already updated their energy code to the 2015 IECC, meaning these savings will be realized over the next 5 years.



**Blue columns indicate year of energy code update*



New Hampshire

Current Code: **2009 IECC**

Effective Date: **4/1/2010**

Total Commercial Projects (2005-2017): **4,583**

Average Cost per Alteration Project: **\$1,064,524.63**

Average Cost per New Construction Project: **\$6,540,702.24**

132,480

(Metric Tons CO₂)

2018-2022 Regional Emissions Savings Potential with Code Updates

\$9,372,232.28

2018-2022 Regional Cost Savings Potential with Code Updates

These savings could:



Pay for **325** students to attend a four-year college

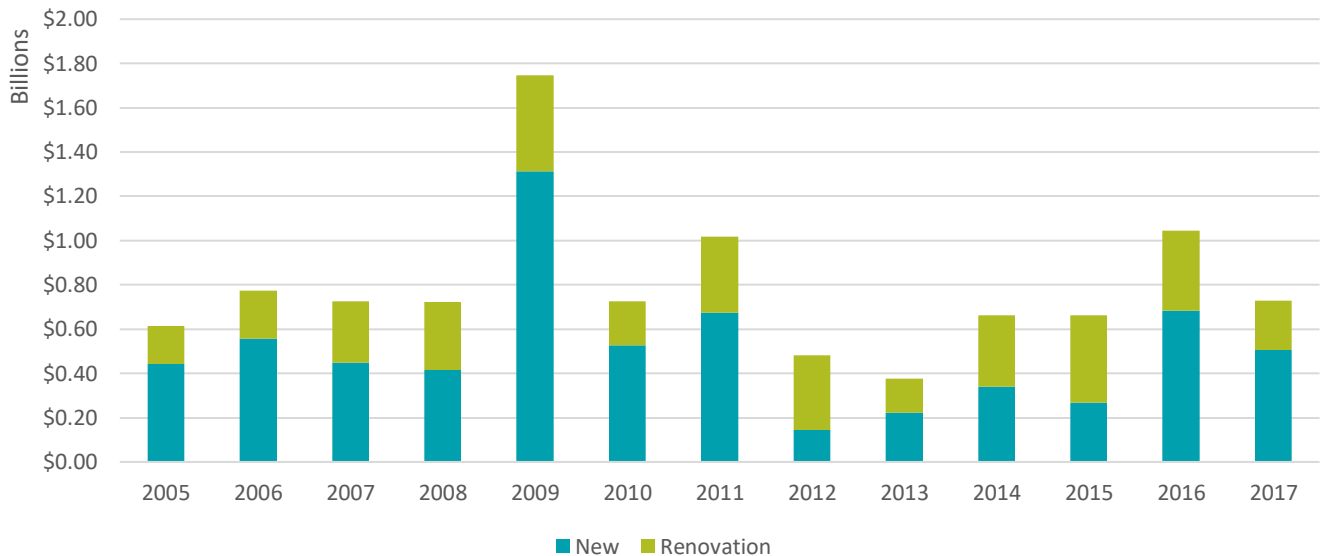


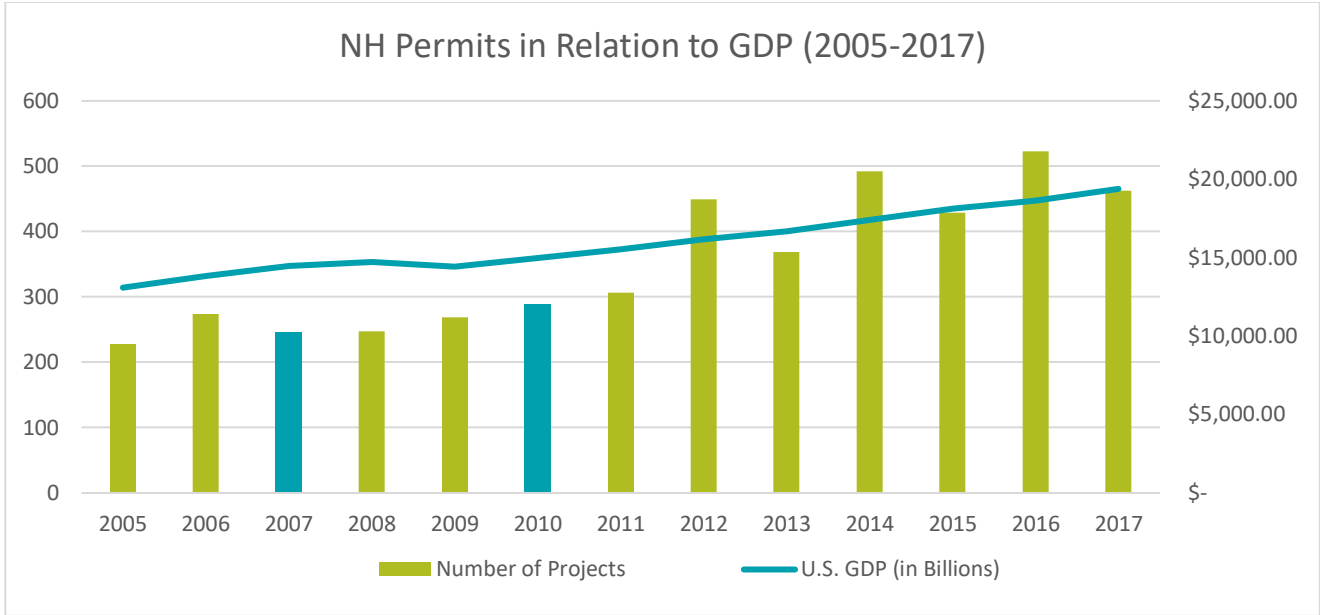
Build **72** miles of new bike lanes



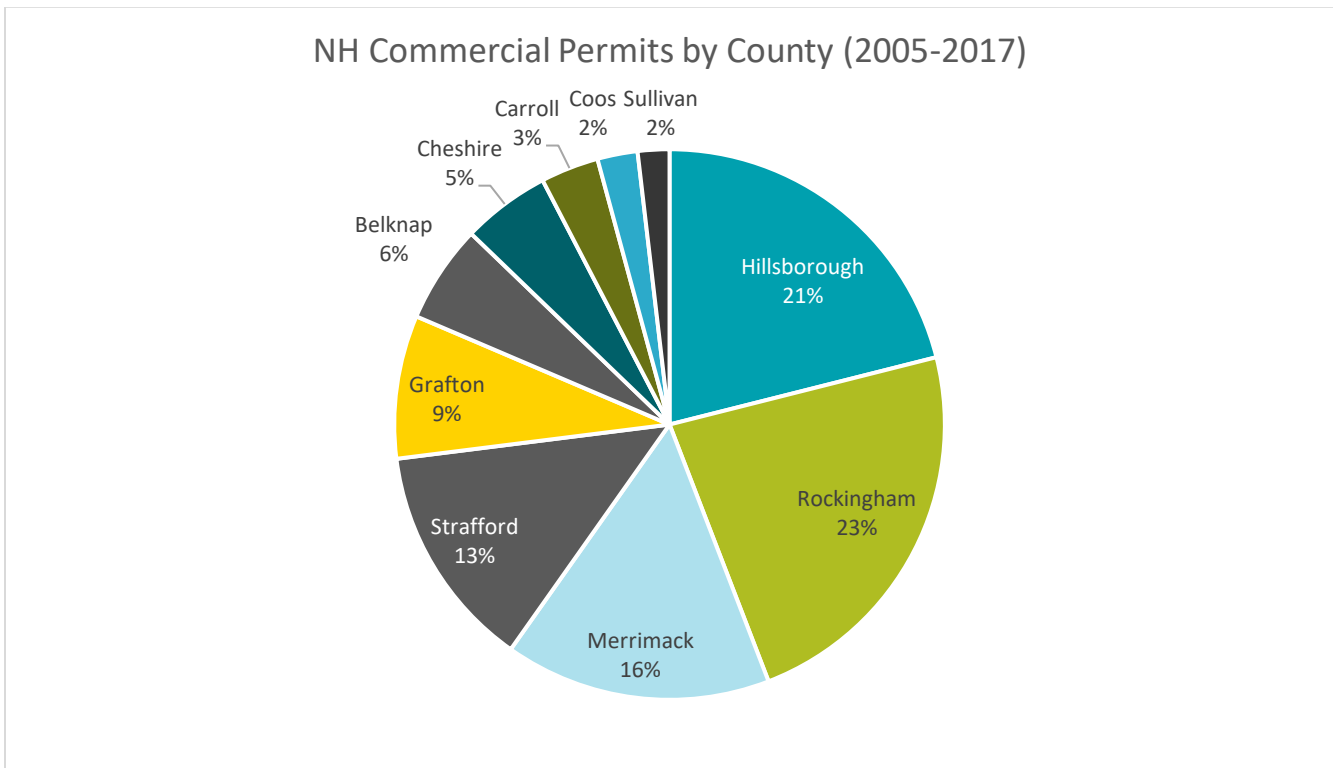
Power **14,305** homes for one year

NH Total Construction Costs (2005-2017)





**Blue columns indicate year of energy code update*



New Jersey

Current Code: ASHRAE 90.1-2013

Effective Date: 3/21/2016

Total Commercial Projects (2005-2017): 22,913

Average Cost per Alteration Project: \$1,192,145.66

Average Cost per New Construction Project: \$15,257,429.24

1,086,297

(Metric Tons CO₂)

2018-2022 Regional Emissions Savings Potential with Code Updates

\$71,331,969.85¹⁶

2018-2022 Regional Cost Savings Potential with Code Updates

These savings could:



Pay for **1,788** students to attend a four-year college

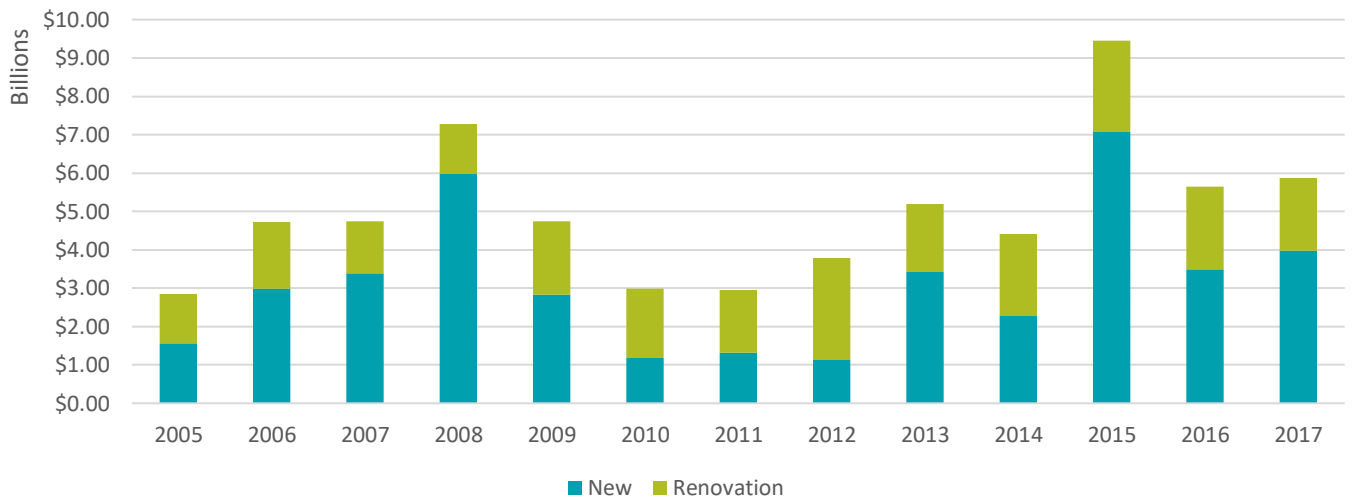


Build **548** miles of new bike lanes

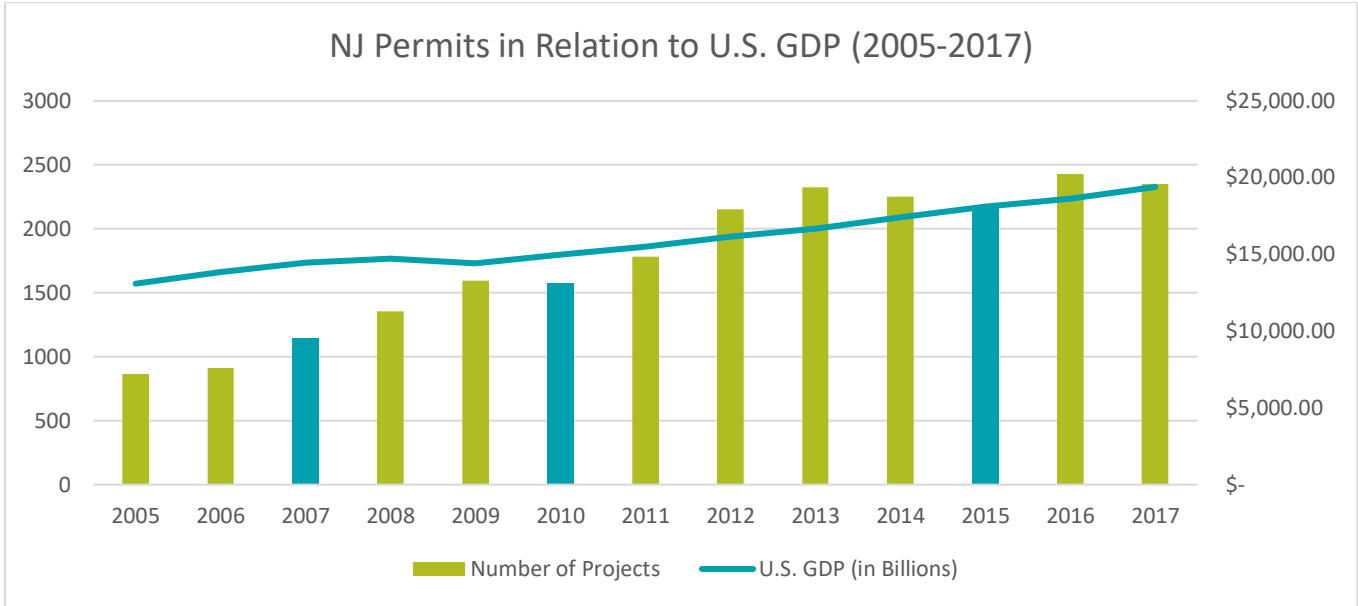


Power **117,298** homes for one year

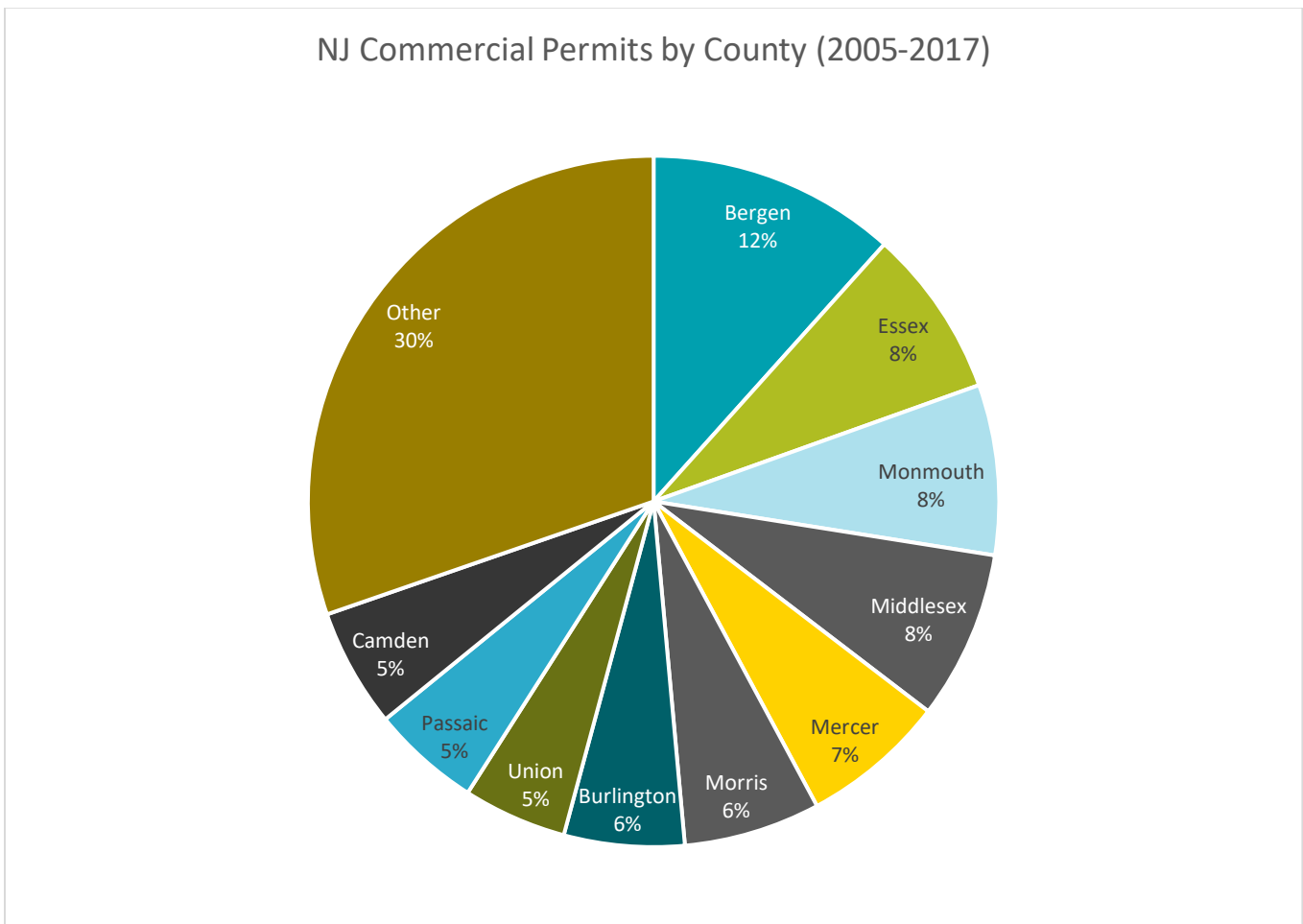
NJ Total Construction Costs (2005-2017)



¹⁶ New Jersey has already updated their energy code to the 2015 IECC, meaning these savings will be realized over the next 5 years.



**Blue columns indicate year of energy code update*



**Other includes: Hudson, Ocean, Atlantic, Somerset, Gloucester, Cumberland, Hunterdon, Cape May, Warren, Sussex, Salem*

New York

Current Code: **2015 IECC / ASHRAE 90.1-2013 with NY amendments**

Effective Date: **10/1/2016**

Total Commercial Projects (2005-2017): **45,324**

Average Cost per Alteration Project: **\$2,455,703.25**

Average Cost per New Construction Project: **\$17,277,779.61**

608,257

(Metric Tons CO₂)

2018-2022 Regional Emissions Savings Potential with Code Updates

\$38,598,403.87¹⁷

2018-2022 Regional Cost Savings Potential with Code Updates

These savings could:



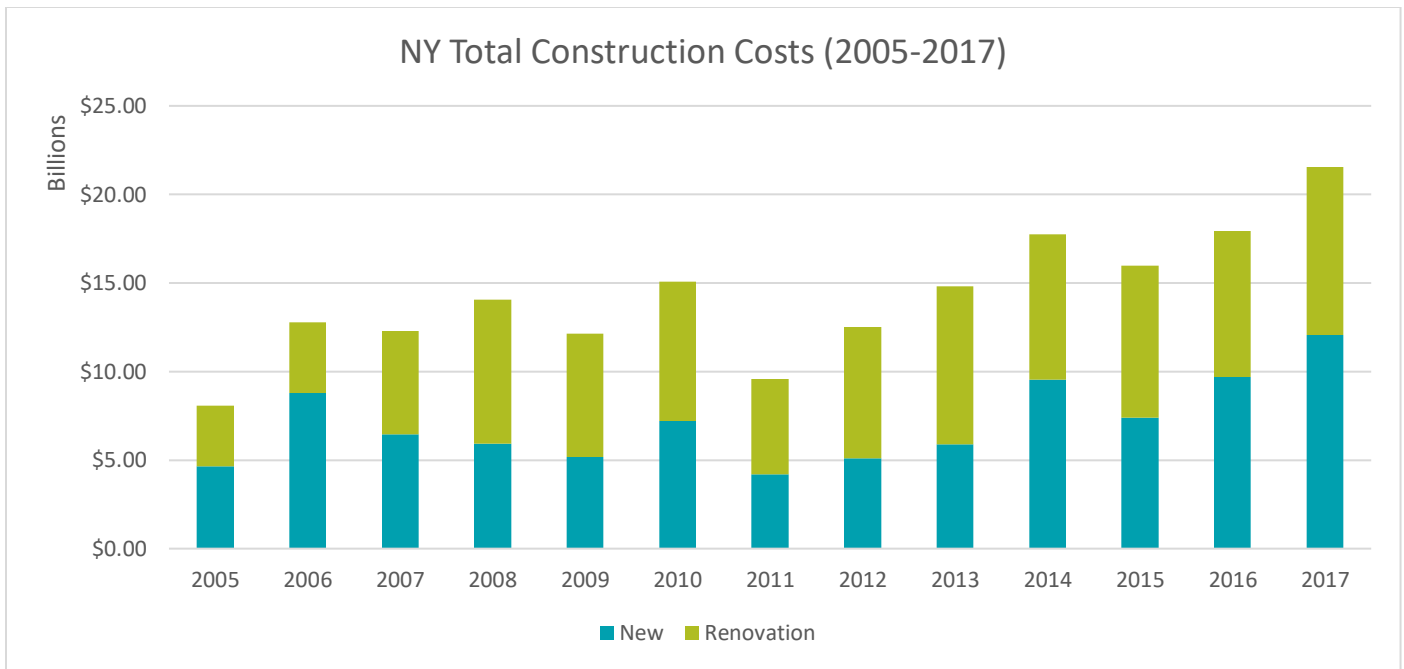
Pay for **967** students to attend a four-year college



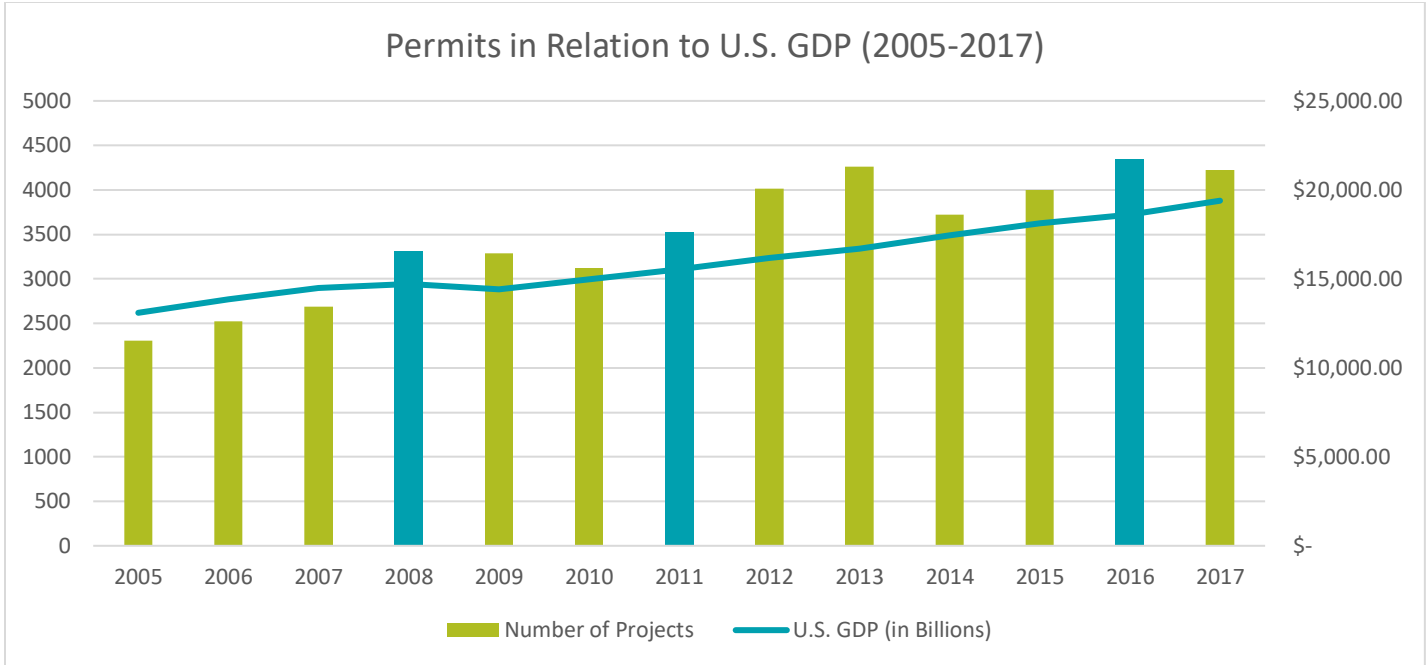
Build **296** miles of new bike lanes



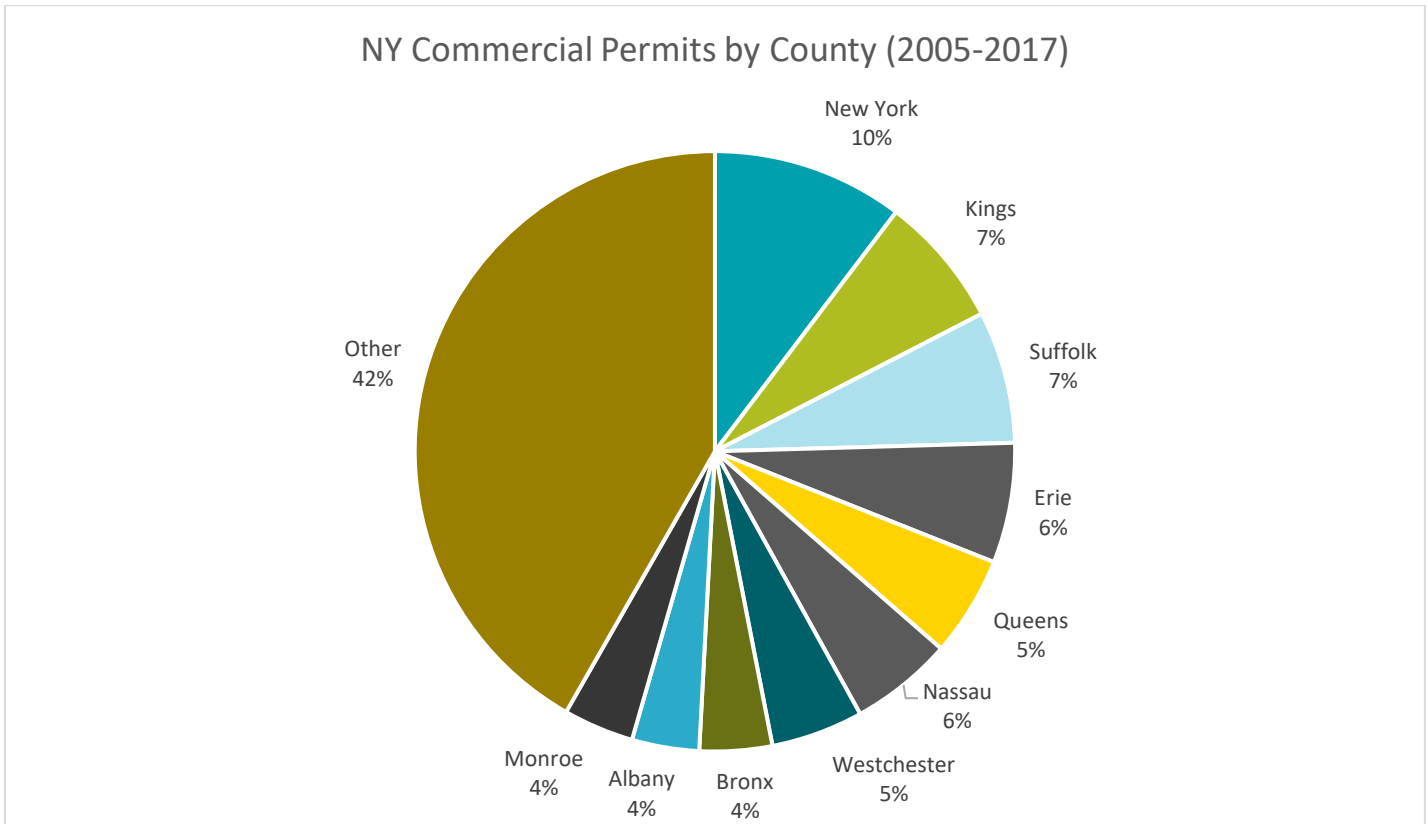
Power **65,679** homes for one year



¹⁷ New York has already updated their energy code to the 2015 IECC, meaning these savings will be realized over the next 5 years.



**Blue columns indicate year of energy code update*



Pennsylvania

Current Code: **2015 IECC**

Effective Date: **10/1/2018**

Total Commercial Projects (2005-2017): **29,390**

Average Cost per Alteration Project: **\$1,419,024.44**

Average Cost per New Construction Project: **\$11,597,642.24**

1,236,484

(Metric Tons CO₂)

2018-2022 Regional Emissions Savings Potential with Code Updates

\$90,579,209.40¹⁸

2018-2022 Regional Cost Savings Potential with Code Updates

These savings could:



Pay for **2,271** students to attend a four-year college

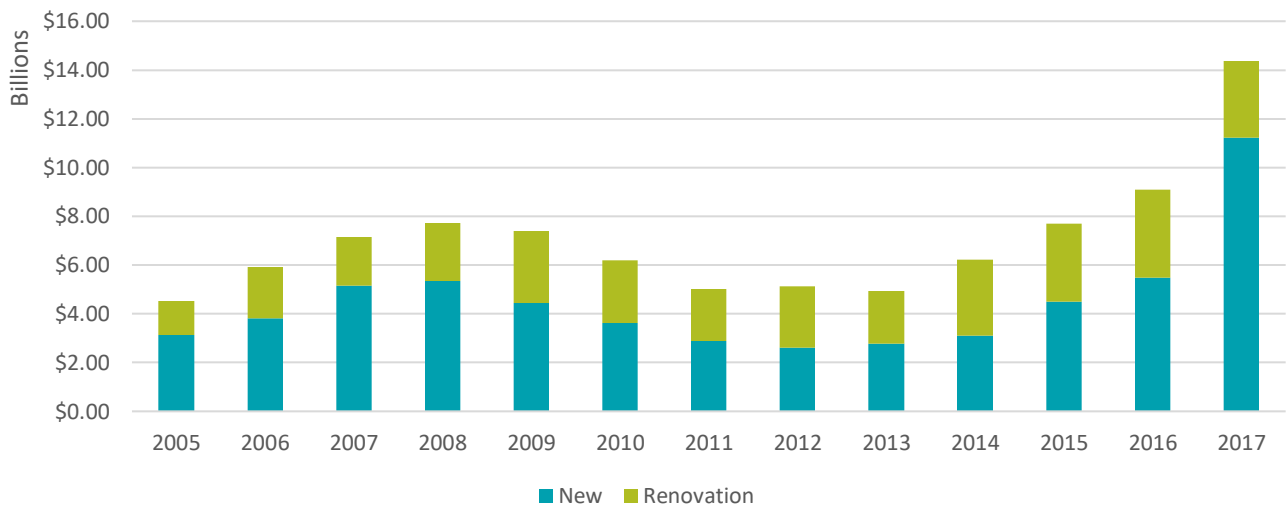


Build **696** miles of new bike lanes

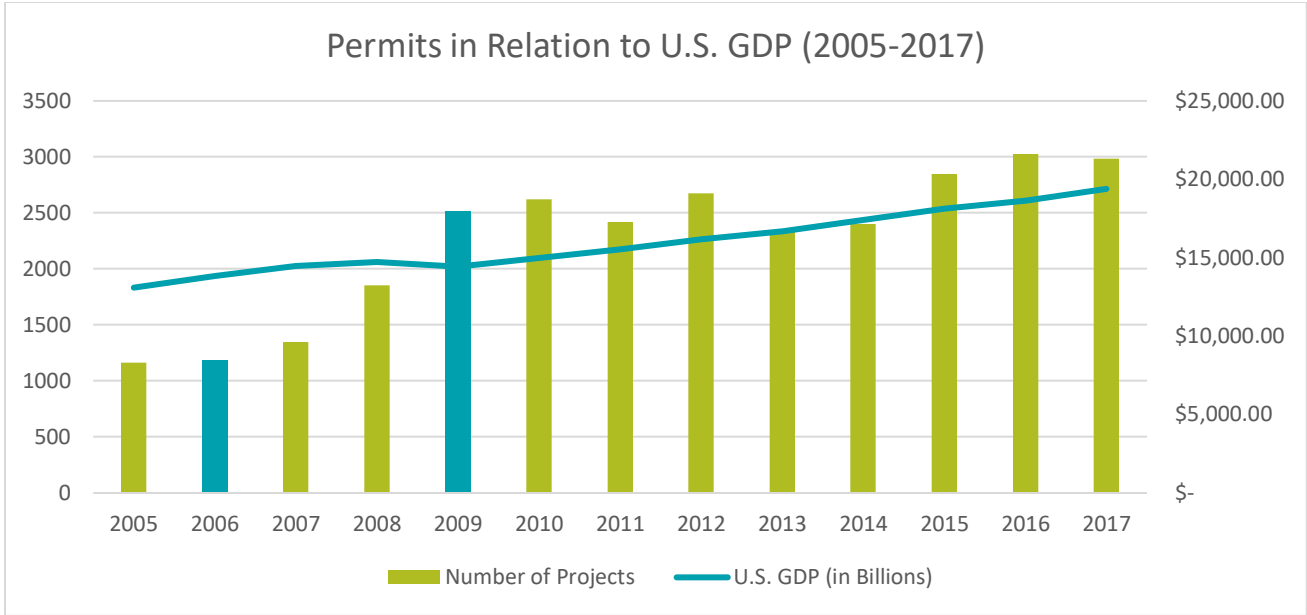


Power **133,515** homes for one year

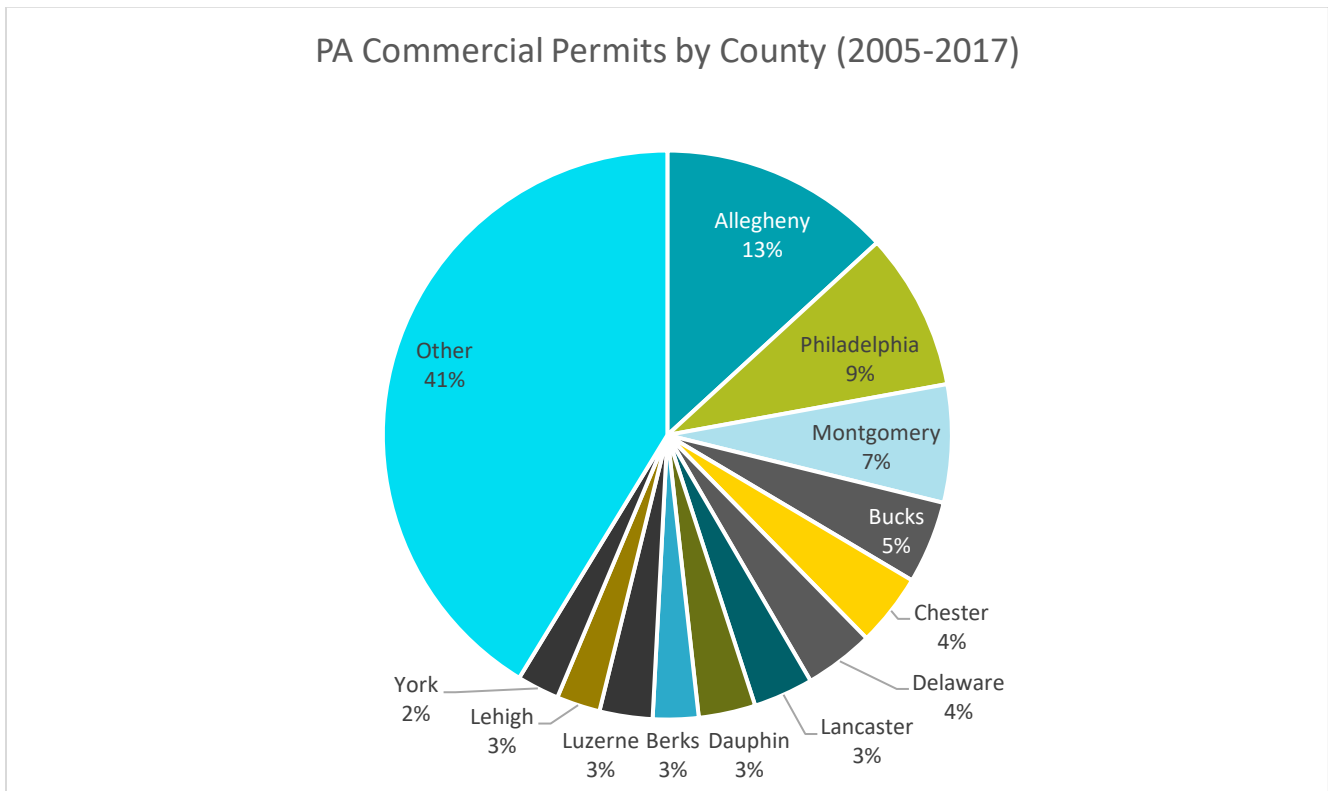
PA Total Construction Costs (2005-2017)



¹⁸ Pennsylvania has already updated their energy code in 2018 to the 2015 IECC, meaning these savings will be realized over the next 4 years. This is due to the fact that the code will not be effective until October 1, 2018 and savings will be delayed about a year.



**Blue columns indicate year of energy code update*



Rhode Island

Current Code: **2012 IECC with RI amendments**

Effective Date: **10/1/2013**

Total Commercial Projects (2005-2017): **3,355**

Average Cost per Alteration Project: **\$1,227,875.30**

Average Cost per New Construction Project: **\$10,128,816.75**

64,218

(Metric Tons CO₂)

2018-2022 Regional Emissions Savings Potential with Code Updates

\$4,067,142.71

2018-2022 Regional Cost Savings Potential with Code Updates

These savings could:



Pay for **101** students to attend a four-year college

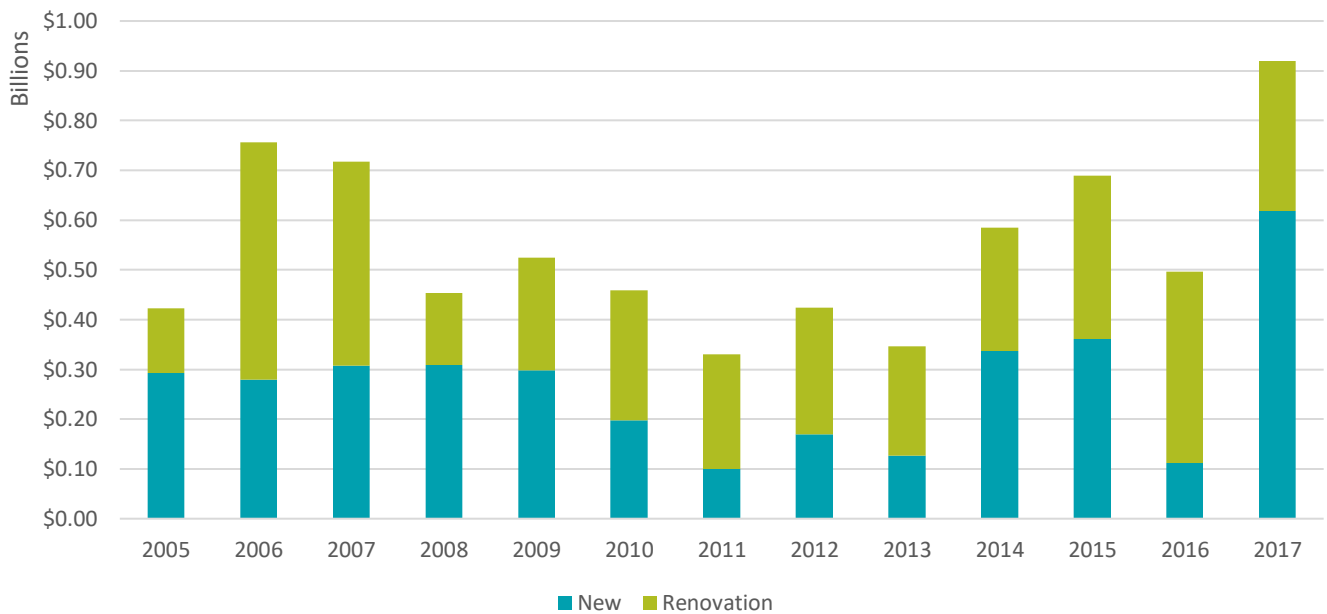


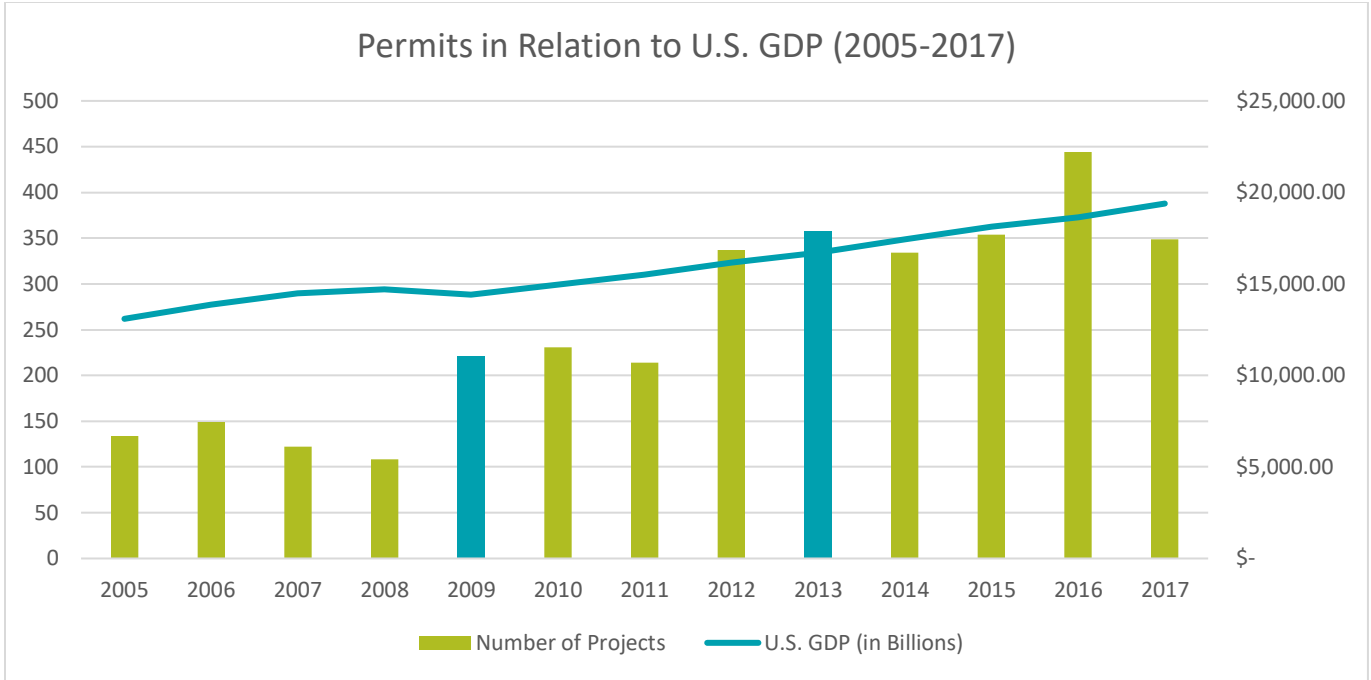
Build **31** miles of new bike lanes



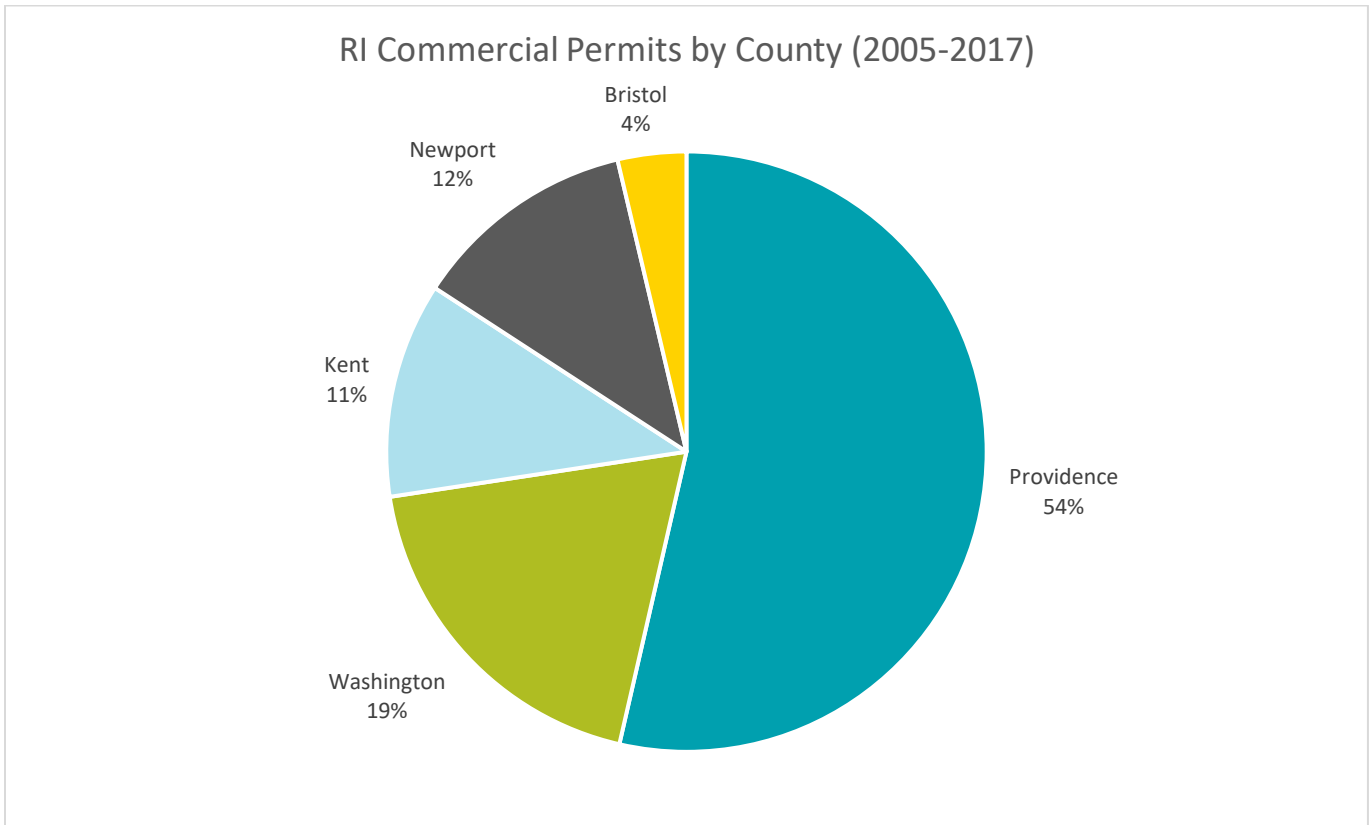
Power **6,934** homes for one year

RI Total Construction Costs (2005-2017)





**Blue columns indicate year of energy code update*



Vermont

Current Code: **2015 IECC with VT amendments + stretch code**

Effective Date: **3/1/2015**

Total Commercial Projects (2005-2017): **2,282**

Average Cost per Alteration Project: **\$1,497,519.13**

Average Cost per New Construction Project: **\$5,385,692.60**

84,505

(Metric Tons CO₂)

2018-2022 Regional Emissions Savings Potential with Code Updates

\$5,116,449.32¹⁹

2018-2022 Regional Cost Savings Potential with Code Updates

These savings could:



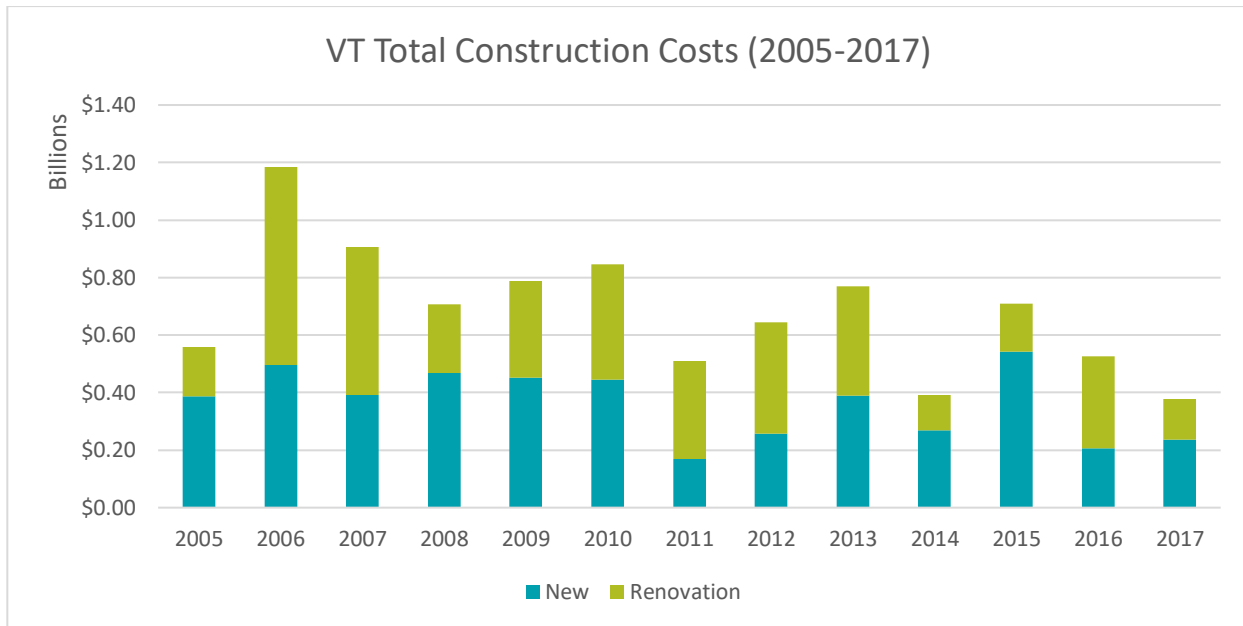
Pay for **128** students to attend a four-year college



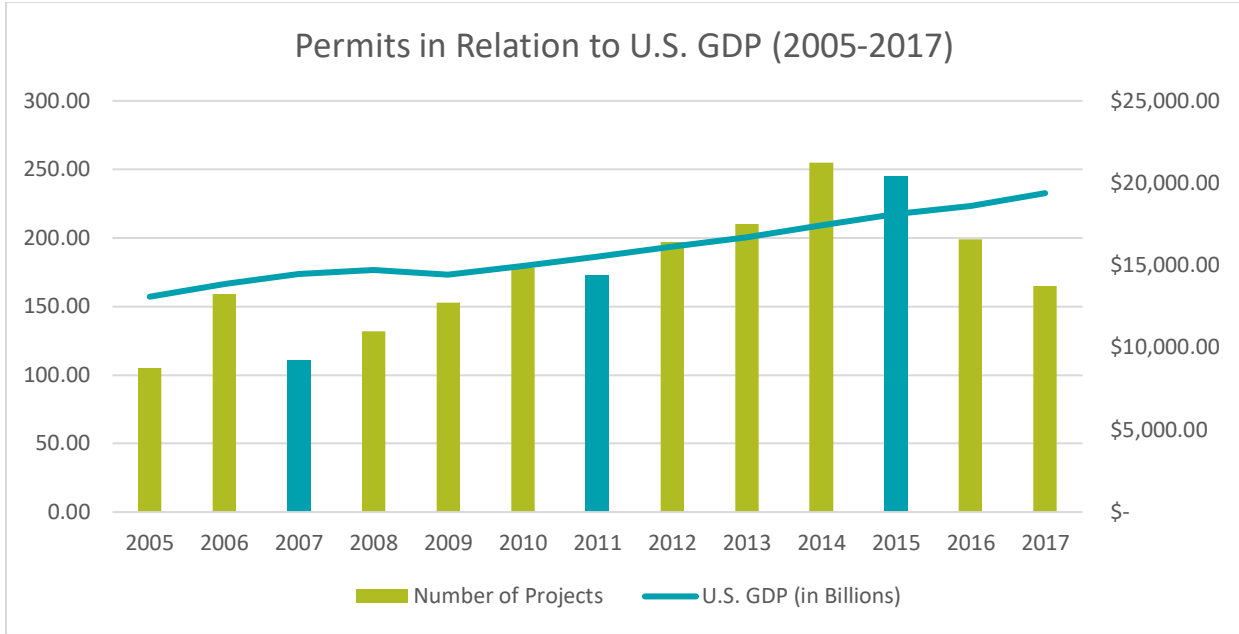
Build **39** miles of new bike lanes



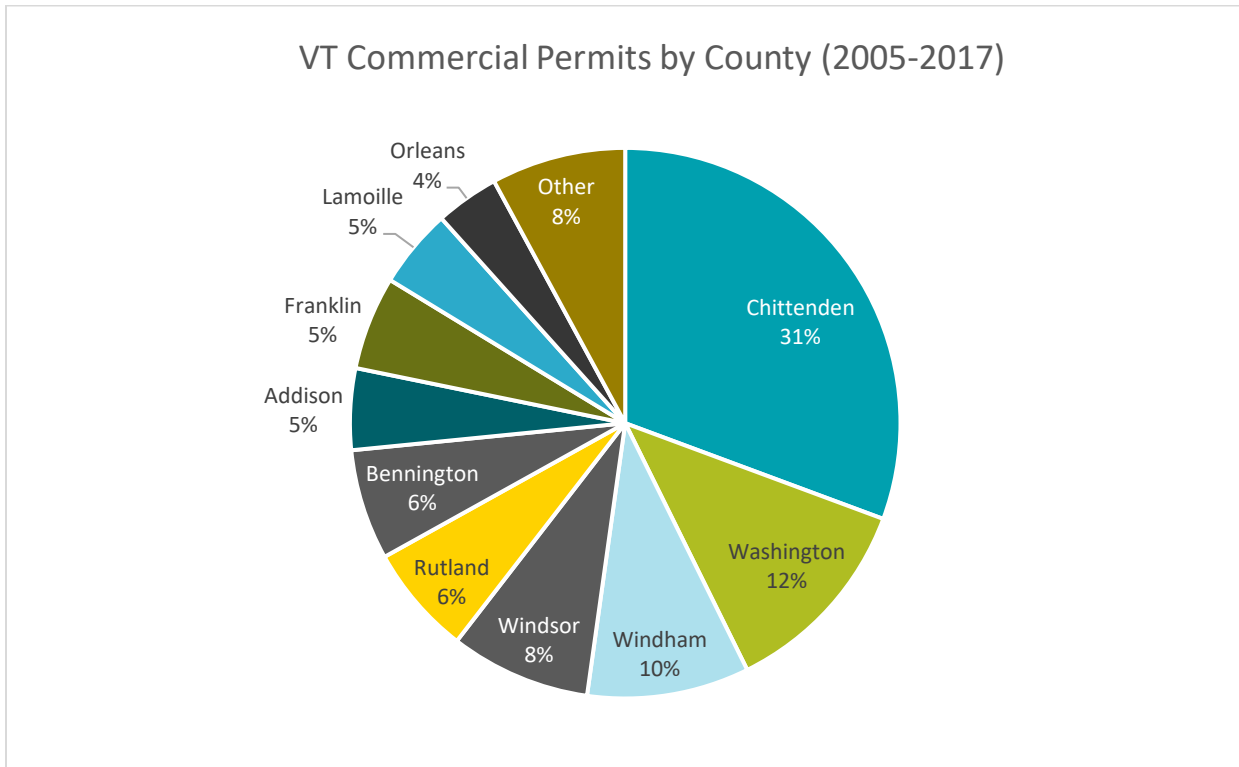
Power **9,125** homes for one year



¹⁹ Vermont has already updated their energy code to the 2015 IECC, meaning these savings will be realized over the next 5 years.



**Blue columns indicate year of energy code update*



West Virginia

Current Code: **ASHRAE 90.1-2007**

Effective Date: **9/1/2013**

Total Commercial Projects (2007-2017): **4,901**

Average Cost per Alteration Project: **\$976,413.45**

Average Cost per New Construction Project: **\$6,251,728.74**

246,475

(Metric Tons CO₂)

2018-2022 Regional Emissions Savings Potential with Code Updates

\$13,900,430.57

2018-2022 Regional Cost Savings Potential with Code Updates

These savings could:



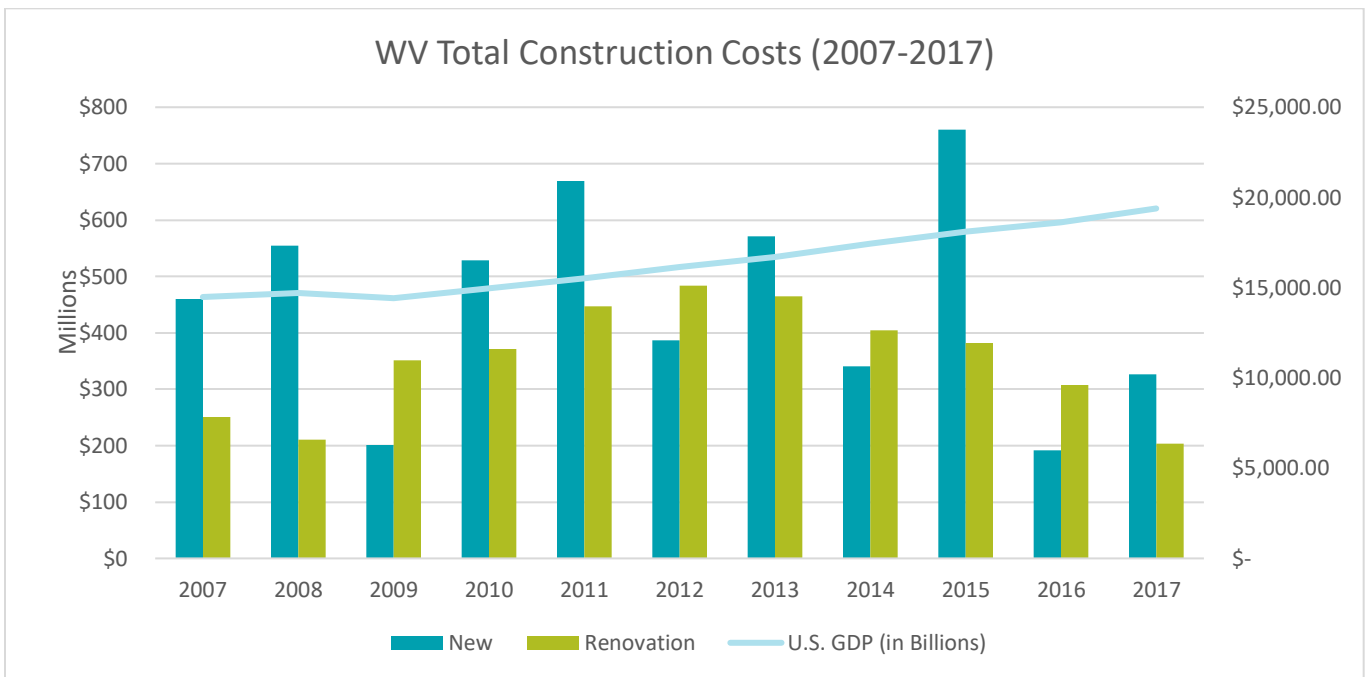
Pay for **348** students to attend a four-year college

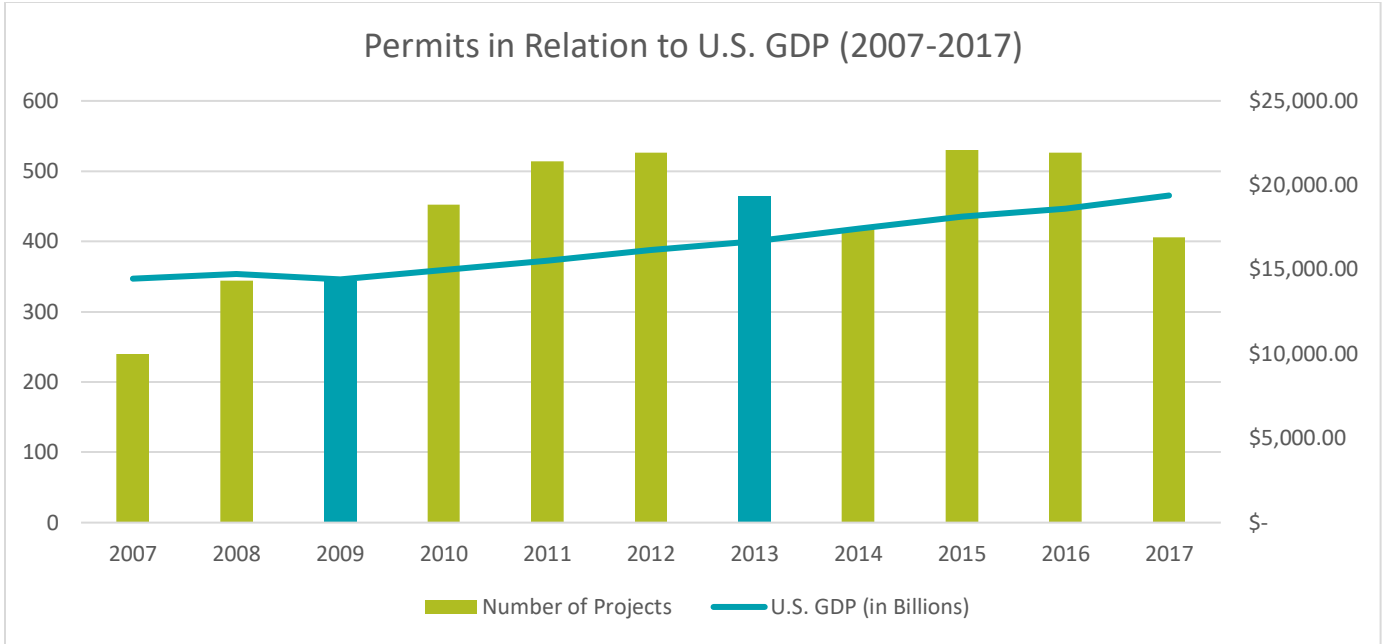


Build **106** miles of new bike lanes

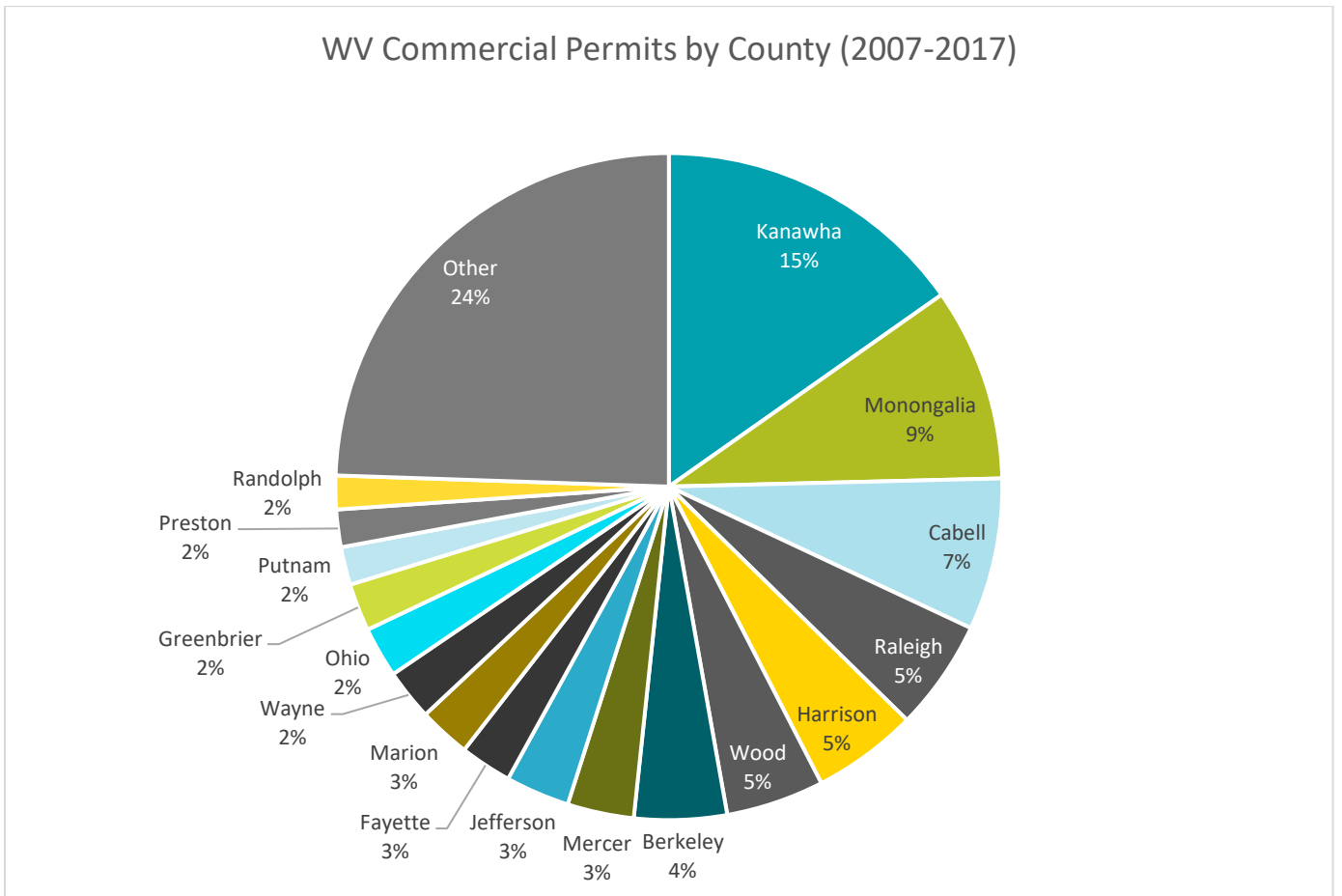


Power **26,614** homes for one year





**Blue columns indicate year of energy code update*



Residential State Analysis

Connecticut

Current Code: **2012 IECC with CT amendments**

Effective Date: **10/1/2016**

Total Residential Projects (2005-2017): **76,587**

150,162

(Metric Tons CO2)

2018-2022 Regional Emissions Savings Potential with Code Updates

\$18,495,666

2018-2022 Regional Cost Savings Potential with Code Updates

These savings could:



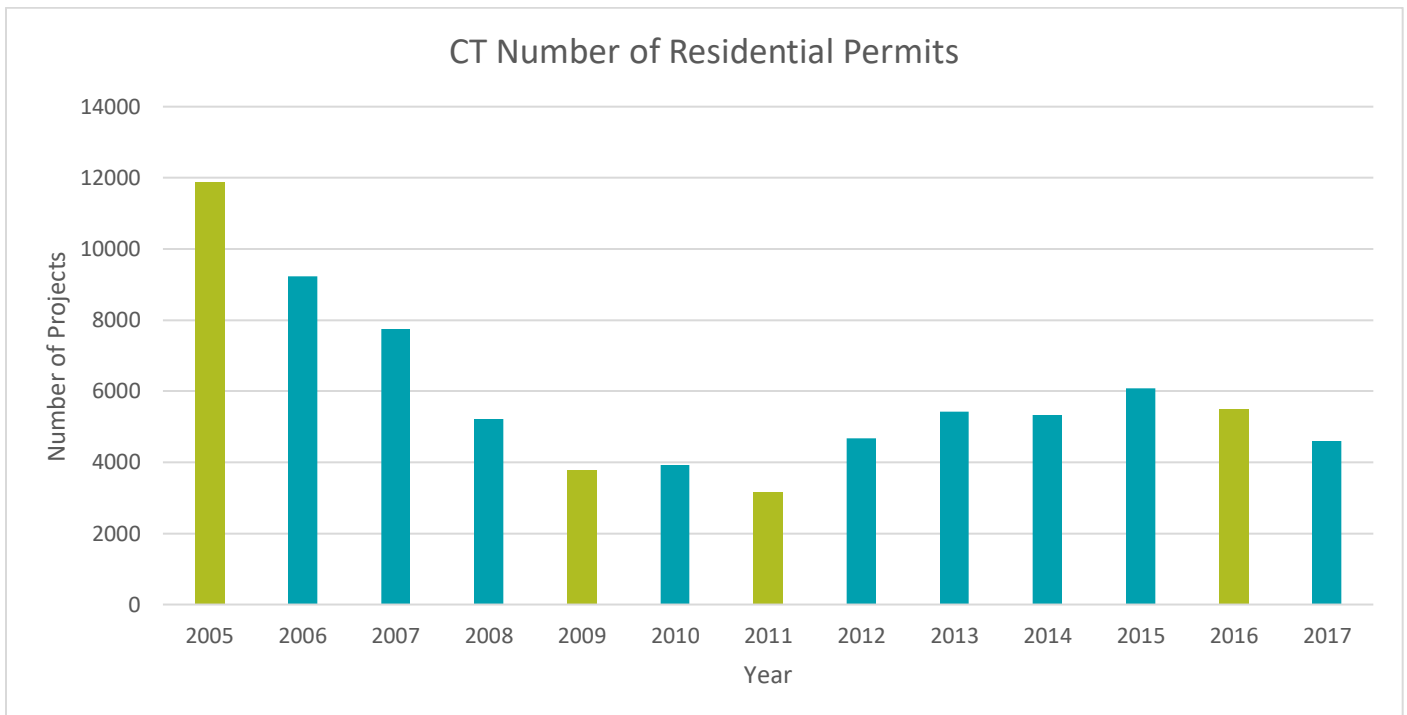
Pay for **463** students to attend a four-year college



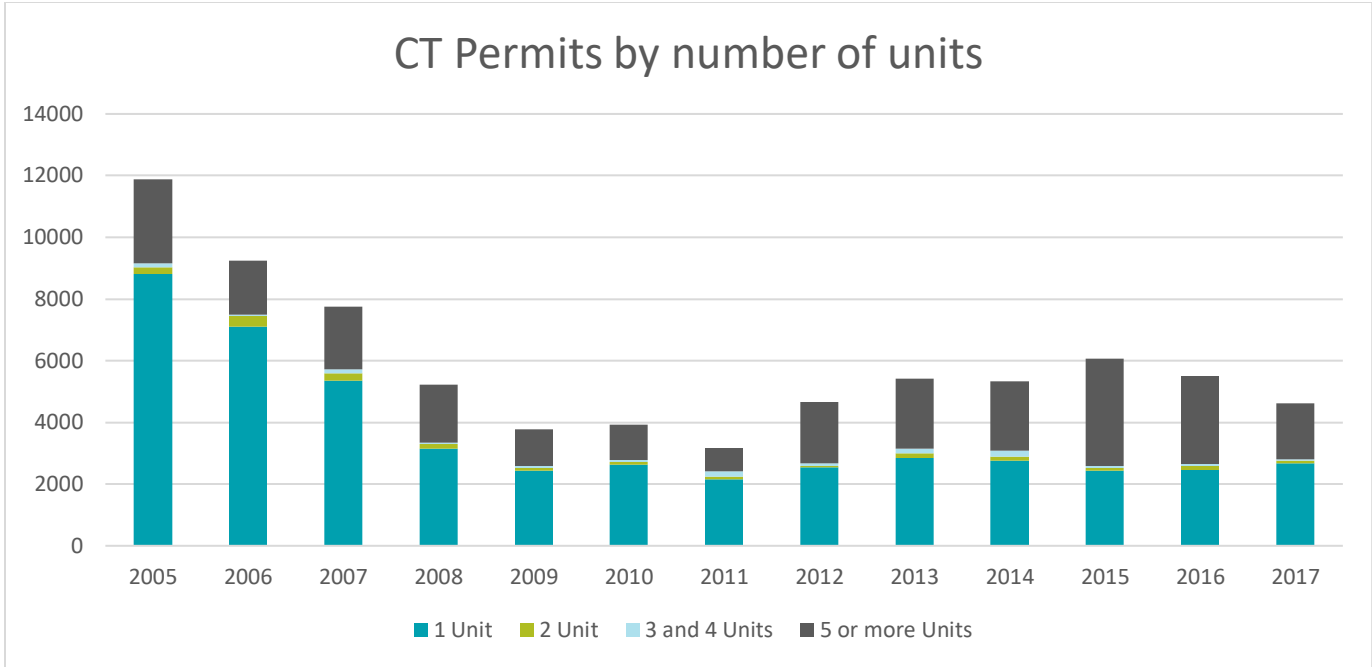
Build **142** miles of new bike lanes



Power **16,214** homes for one year



**Green columns indicate year of energy code update*



District of Columbia

Current Code: **2012 IECC with DC amendments**

Effective Date: **3/28/2014**

Total Residential Projects (2005-2017): **40,838**

31,559

(Metric Tons CO₂)

2018-2022 Regional Emissions Savings Potential with Code Updates

\$1,804,414

2018-2022 Regional Cost Savings Potential with Code Updates

These savings could:



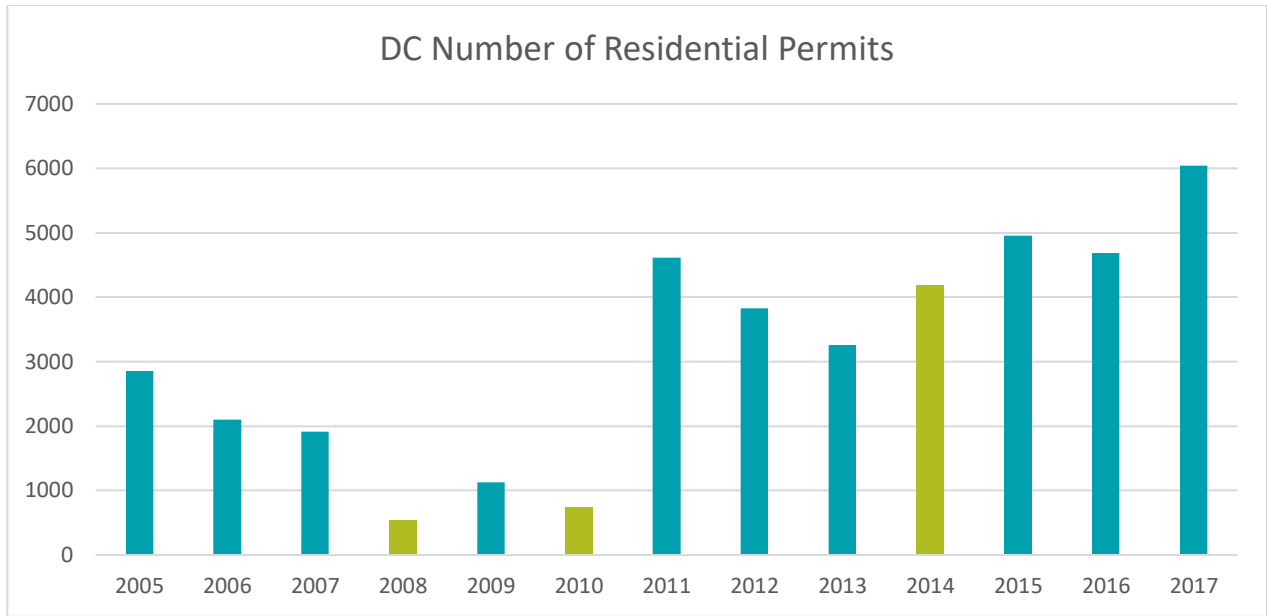
Pay for **45** students to attend a four-year college



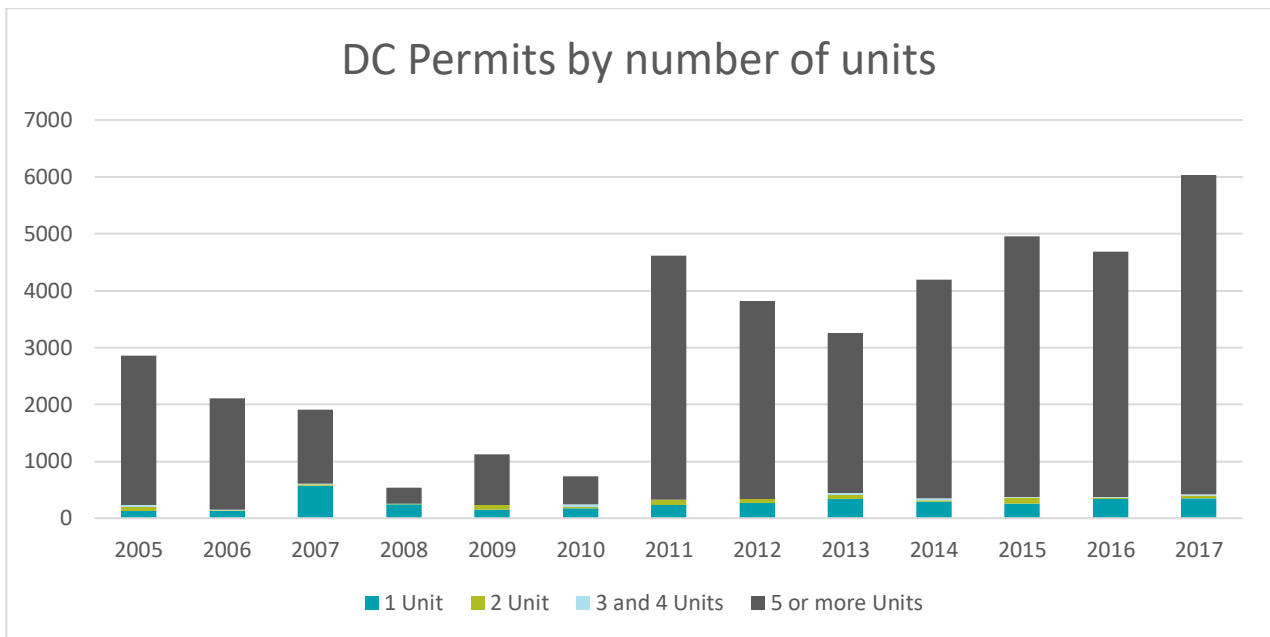
Build **13** miles of new bike lanes



Power **3,408** homes for one year



**Green columns indicate year of energy code update*



Delaware

Current Code: **2012 IECC with DE amendments**

Effective Date: **11/11/2014**

Total Residential Projects (2005-2017): **64,390**

111,207


(Metric Tons CO2)

2018-2022 Regional Emissions Savings Potential with Code Updates


\$1,928,936

2018-2022 Regional Cost Savings Potential with Code Updates


These savings could:



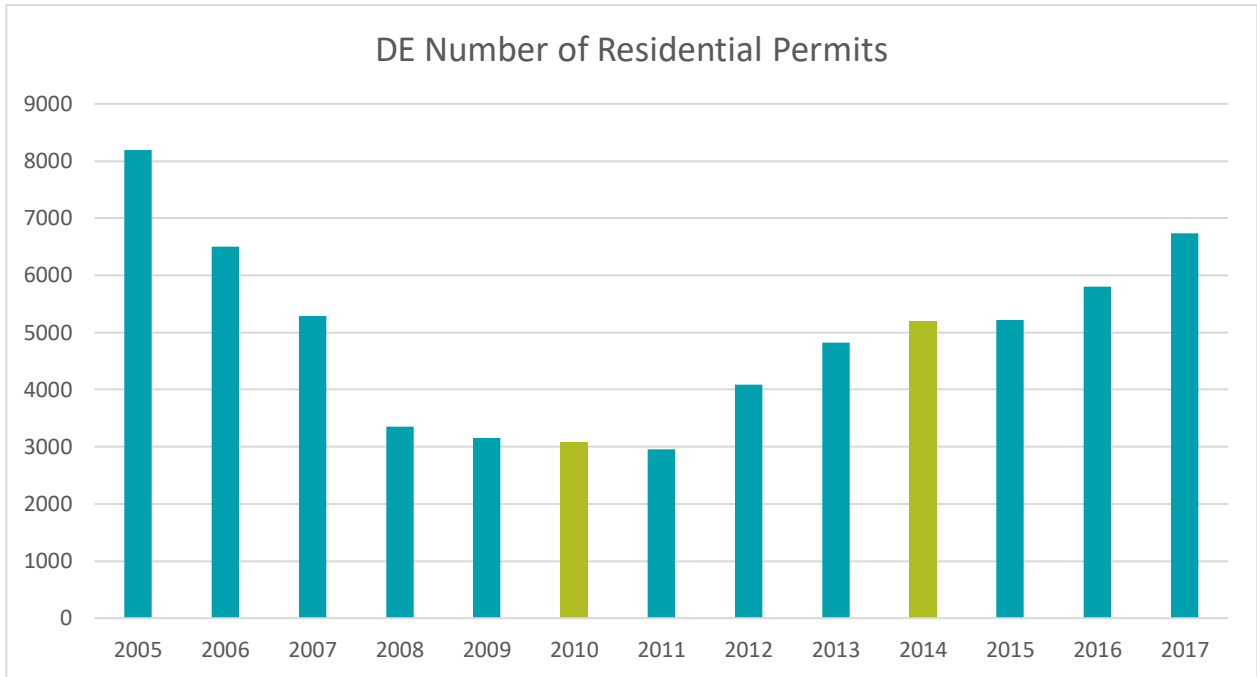
Pay for **48** students to attend a four-year college



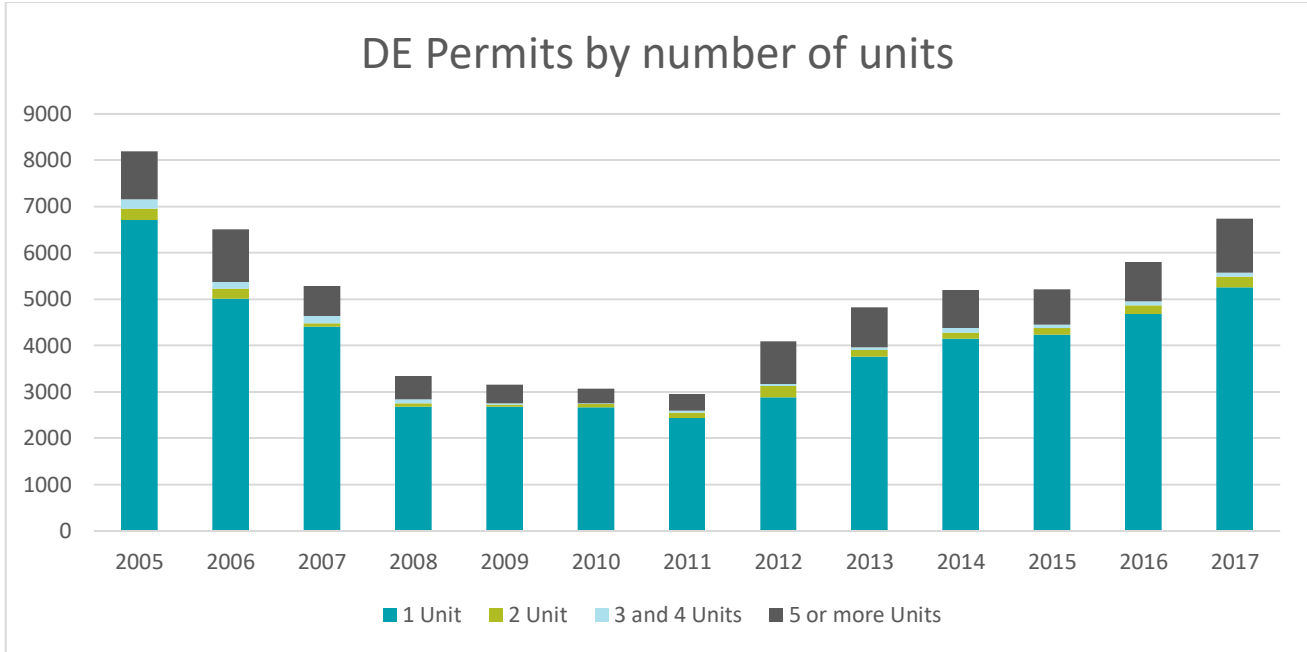
Build **14** miles of new bike lanes



Power **12,008** homes for one year



**Green columns indicate year of energy code update*



Massachusetts

Current Code: **2015 IECC with MA amendments + stretch code**

Effective Date: **1/2/2017**

Total Residential Projects (2005-2017): **183,200**

281,155

(Metric Tons CO2)

2018-2022 Regional Emissions Savings Potential with Code Updates

\$17,536,661²⁰

2018-2022 Regional Cost Savings Potential with Code Updates

These savings could:



Pay for **439** students to attend a four-year college

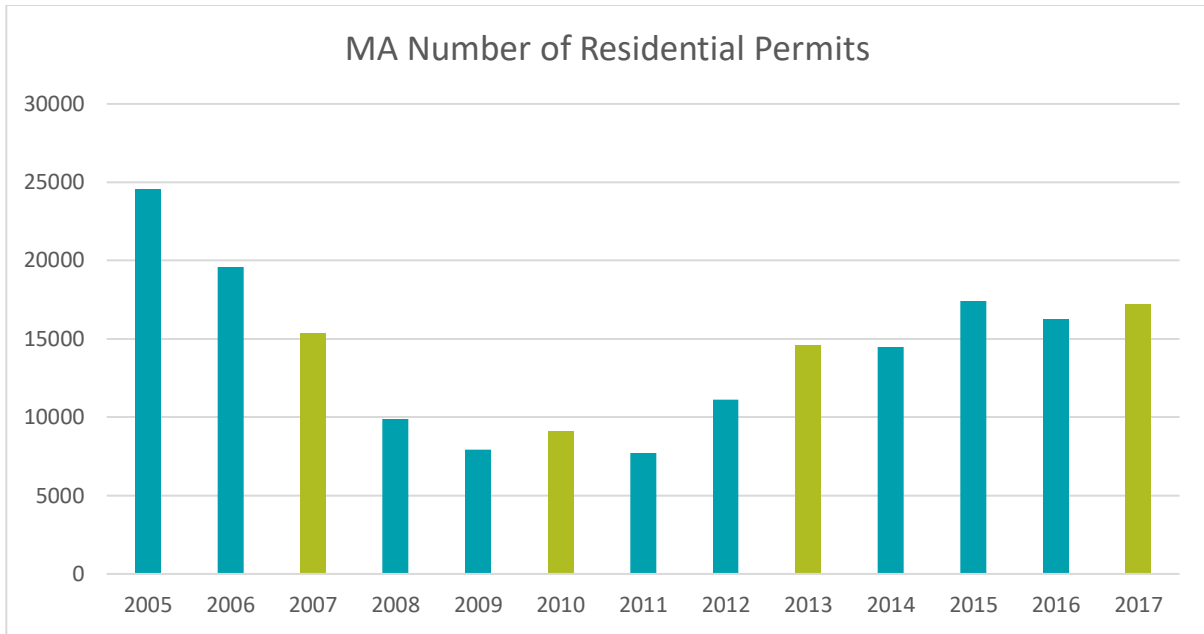


Build **134** miles of new bike lanes

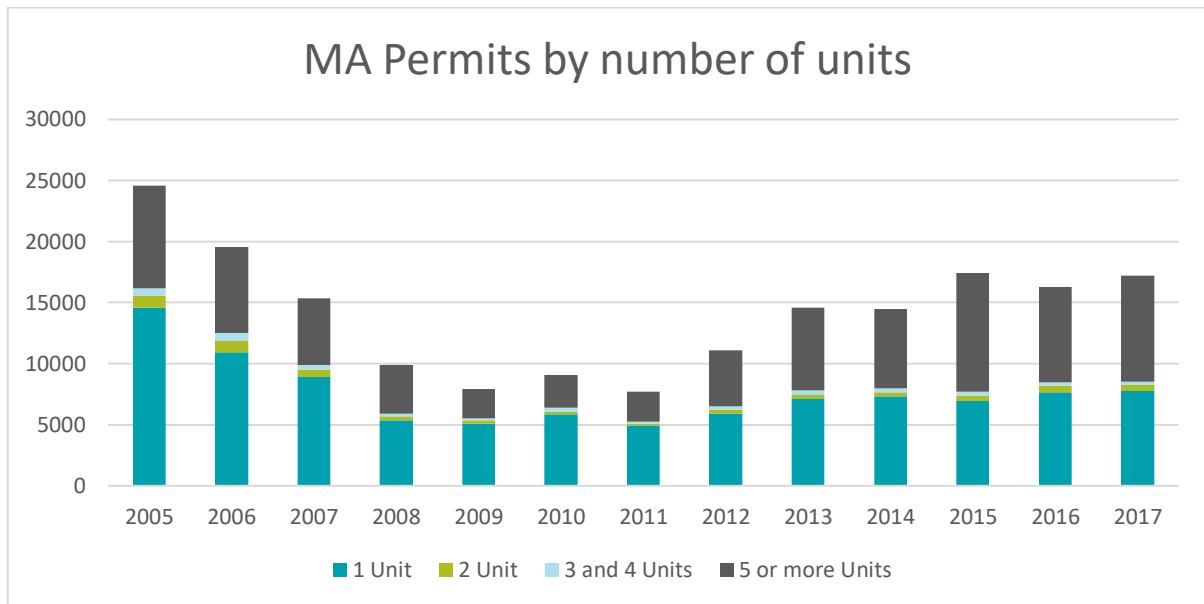


Power **30,359** homes for one year

²⁰ Massachusetts has already updated their energy code to the 2015 IECC, meaning these savings will be realized over the next 5 years.



**Green columns indicate year of energy code update*



Maine

Current Code: **2009 IECC; Building and/or Energy Code is an opt-in code for towns with pop. size <4000**

Effective Date: **6/24/2011**

Total Residential Projects (2005-2017): **56,642**

263,150

(Metric Tons CO2)

2018-2022 Regional Emissions Savings Potential with Code Updates

\$21,158,137

2018-2022 Regional Cost Savings Potential with Code Updates

These savings could:



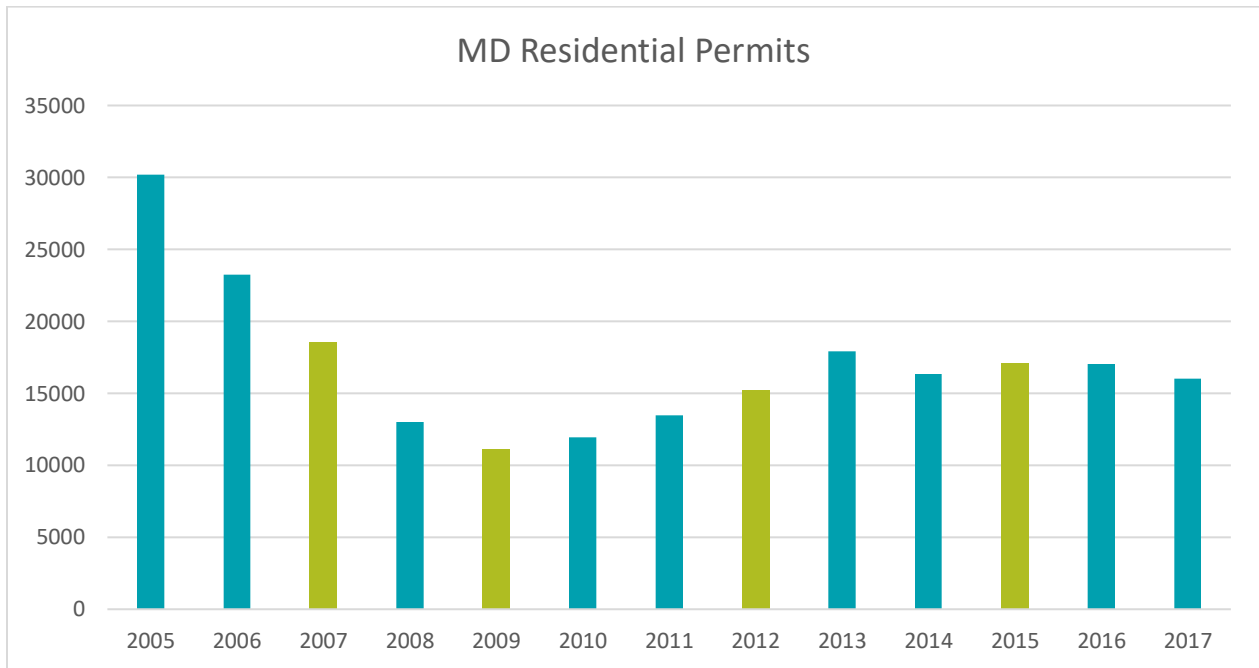
Pay for **530** students to attend a four-year college



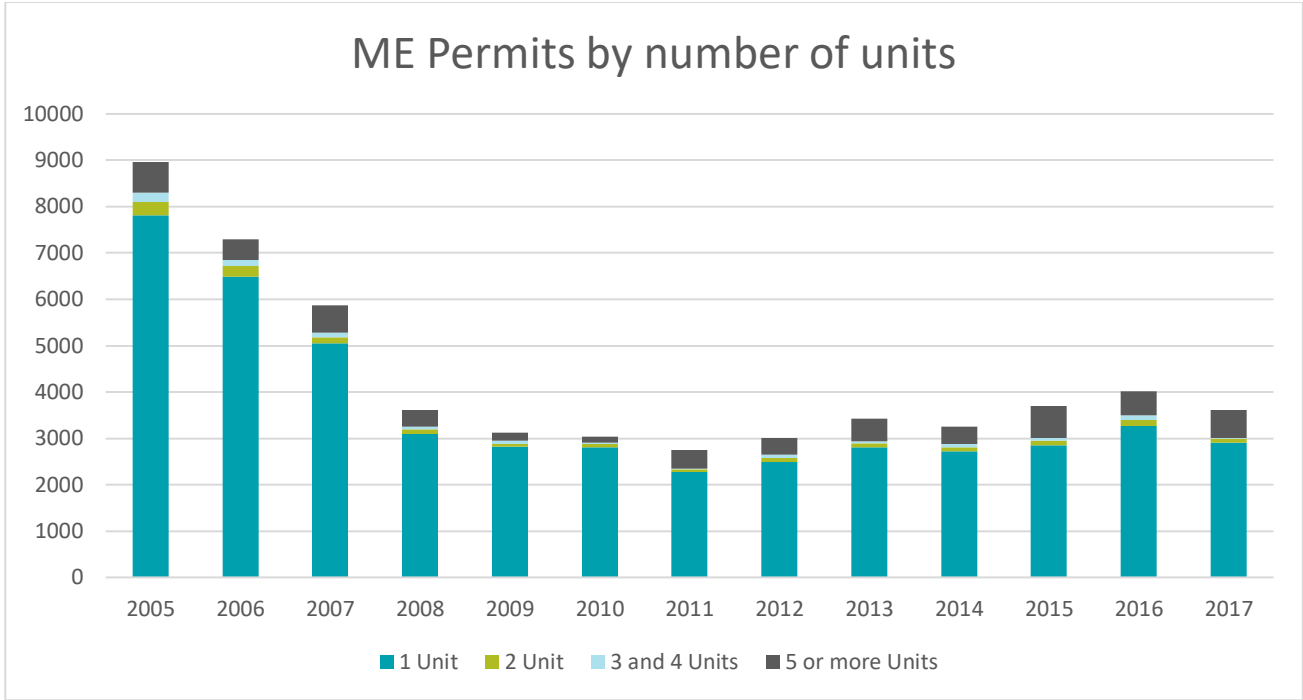
Build **162** miles of new bike lanes



Power **28,415** homes for one year



**Green columns indicate year of energy code update*



Maryland

Current Code: **2015 IECC**

Effective Date: **7/1/2015**

Total Residential Projects (2005-2017): **221,153**

205,076

(Metric Tons CO₂)

2018-2022 Regional Emissions Savings Potential with Code Updates

\$13,318,098²¹

2018-2022 Regional Cost Savings Potential with Code Updates

These savings could:



Pay for **333** students to attend a four-year college

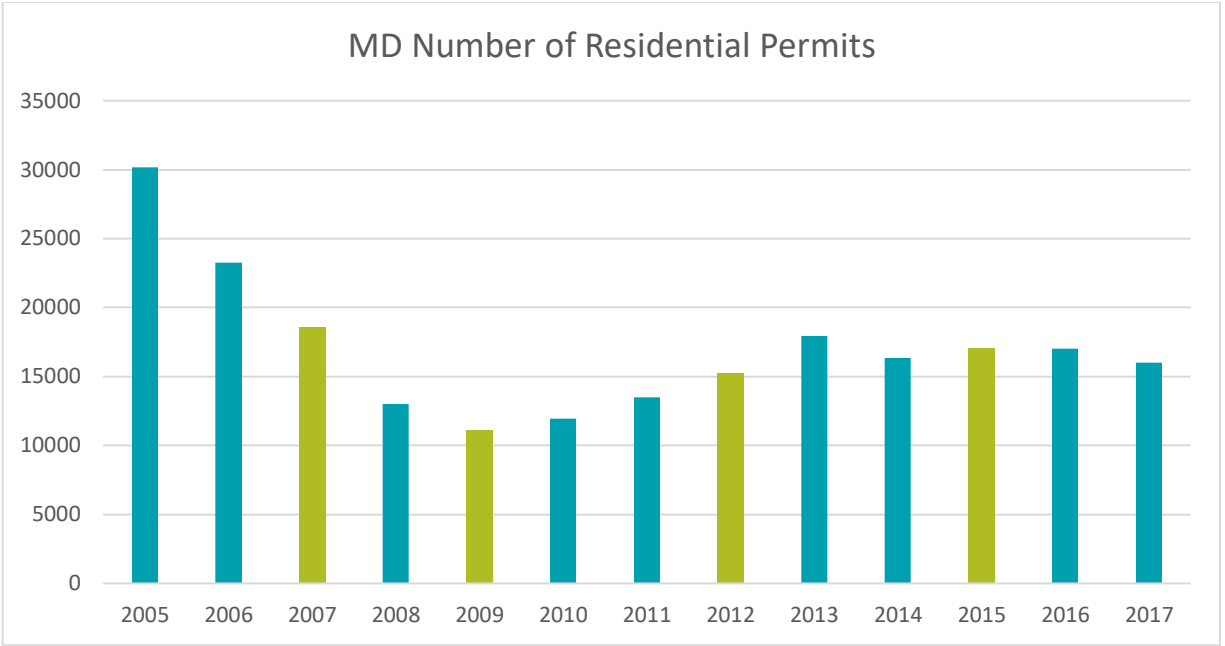


Build **102** miles of new bike lanes

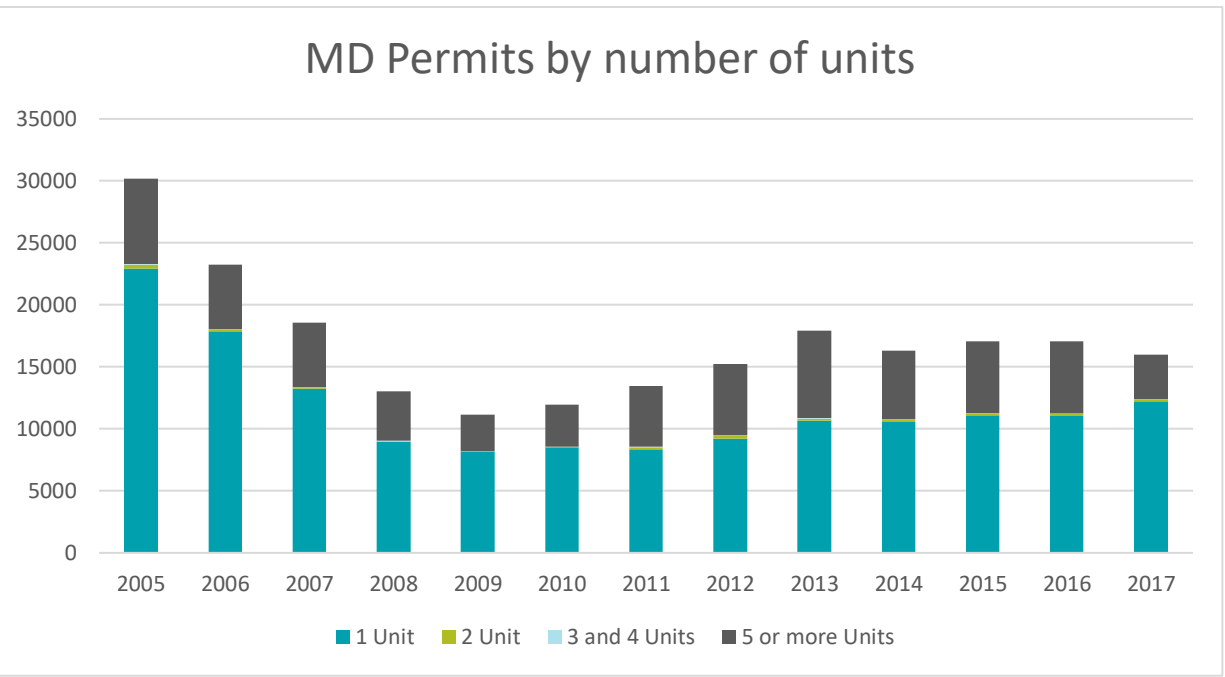


Power **22,144** homes for one year

²¹ Maryland has already updated their energy code to the 2015 IECC, meaning these savings will be realized over the next 5 years.



**Green columns indicate year of energy code update*



New Hampshire

Current Code: **2009 IECC**

Effective Date: **4/1/2010**

Total Residential Projects (2005-2017): **47,804**

110,400

(Metric Tons CO₂)

2018-2022 Regional Emissions Savings Potential with Code Updates

\$8,043,884

2018-2022 Regional Cost Savings Potential with Code Updates

These savings could:



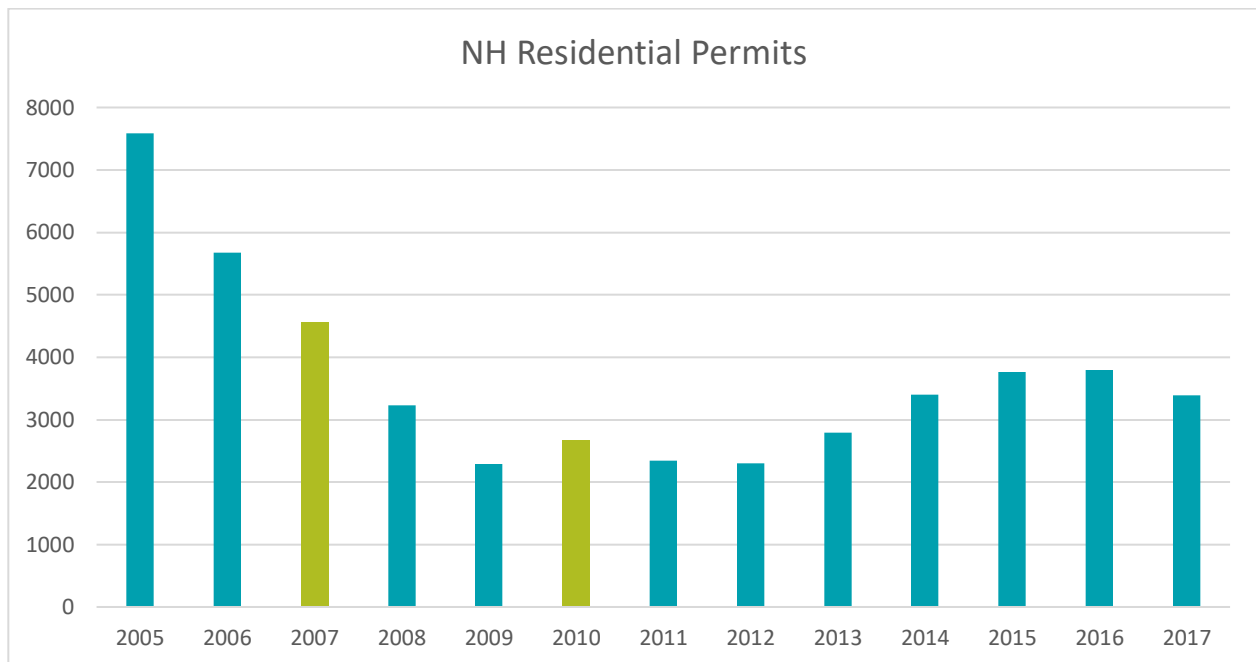
Pay for **201** students to attend a four-year college



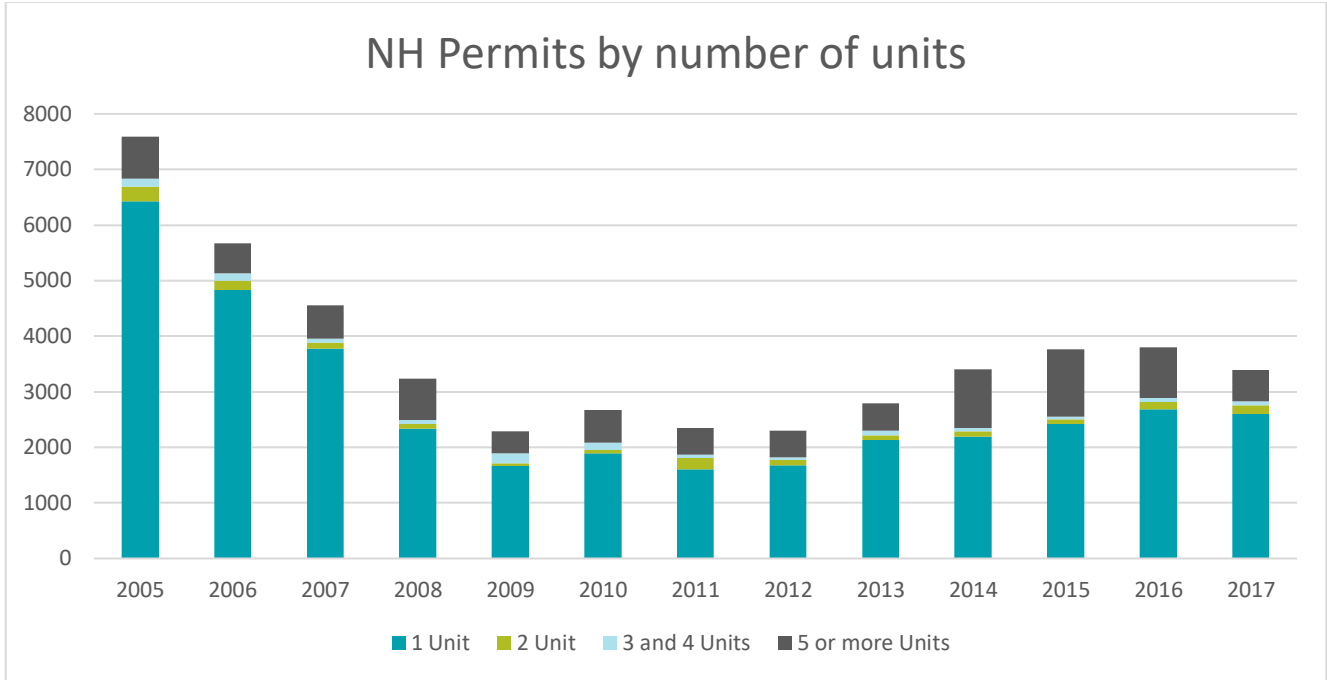
Build **61** miles of new bike lanes



Power **22,144** homes for one year



**Green columns indicate year of energy code update*



New Jersey

Current Code: **2015 IECC with NJ amendments**

Effective Date: **3/21/2016**

Total Residential Projects (2005-2017): **312,120**

1,048,084

(Metric Tons CO₂)

2018-2022 Regional Emissions Savings Potential with Code Updates

\$51,807,106²²

2018-2022 Regional Cost Savings Potential with Code Updates

These savings could:



Pay for **1,299** students to attend a four-year college

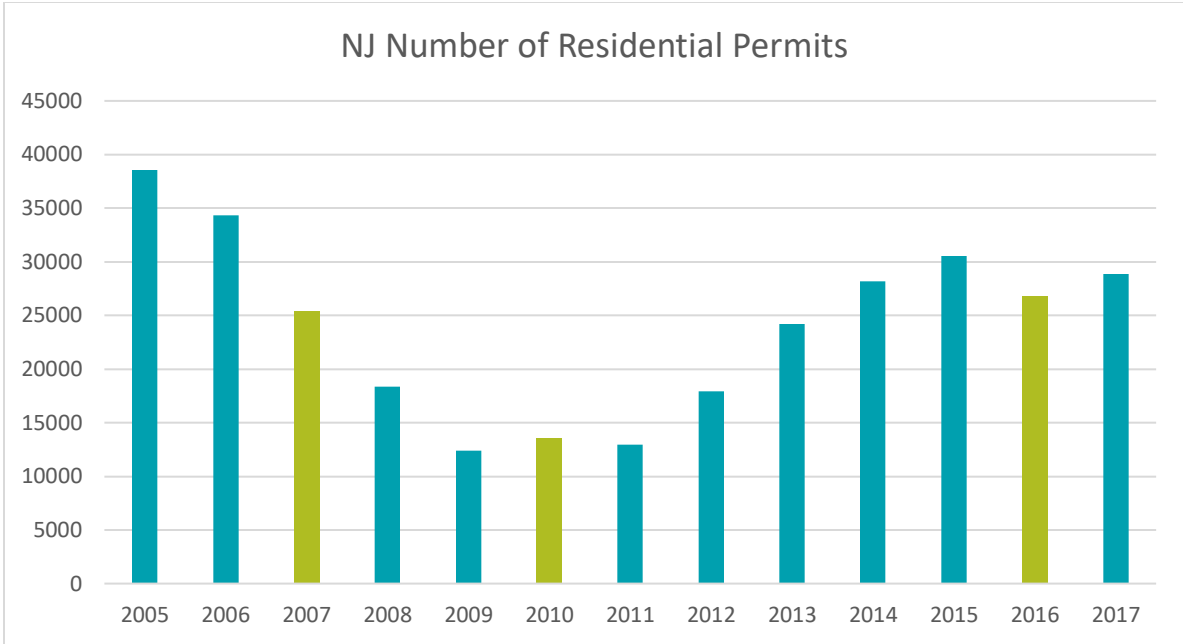


Build **398** miles of new bike lanes

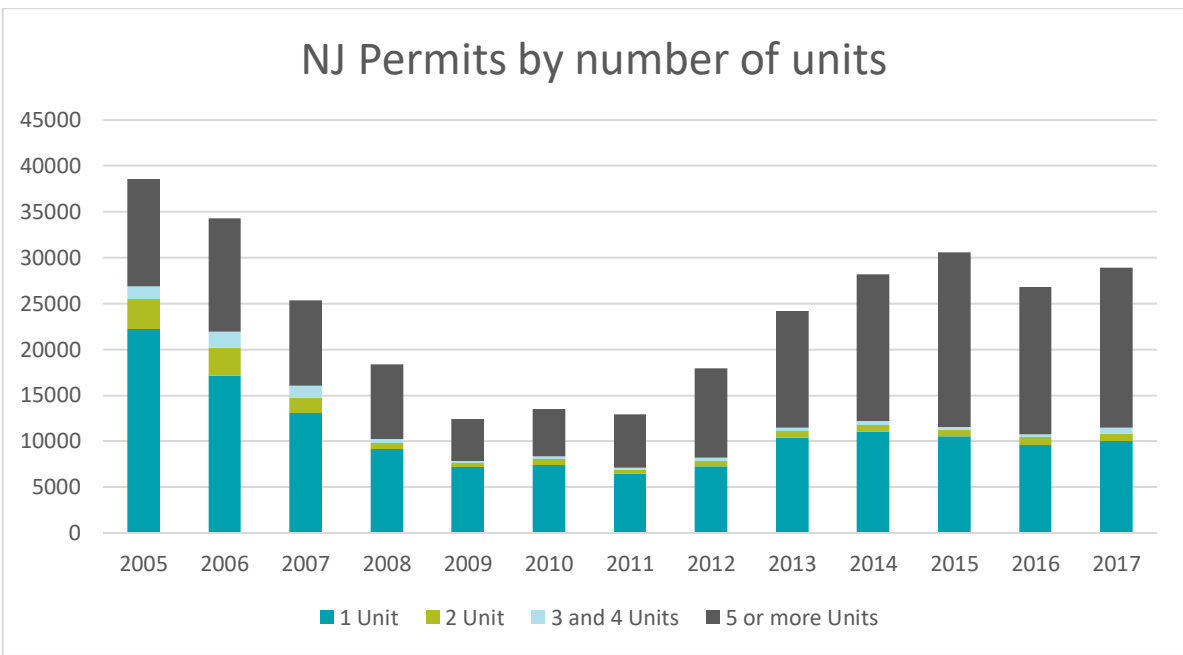


Power **113,172** homes for one year

²² New Jersey has already updated their energy code to the 2015 IECC, meaning these savings will be realized over the next 5 years.



**Green columns indicate year of energy code update*



New York

Current Code: **2015 IECC with NY amendments**

Effective Date: **10/1/2016**

Total Residential Projects (2005-2017): **525,341**

414,116

(Metric Tons CO2)

2018-2022 Regional Emissions Savings Potential with Code Updates

\$23,878,322²³

2018-2022 Regional Cost Savings Potential with Code Updates

These savings could:



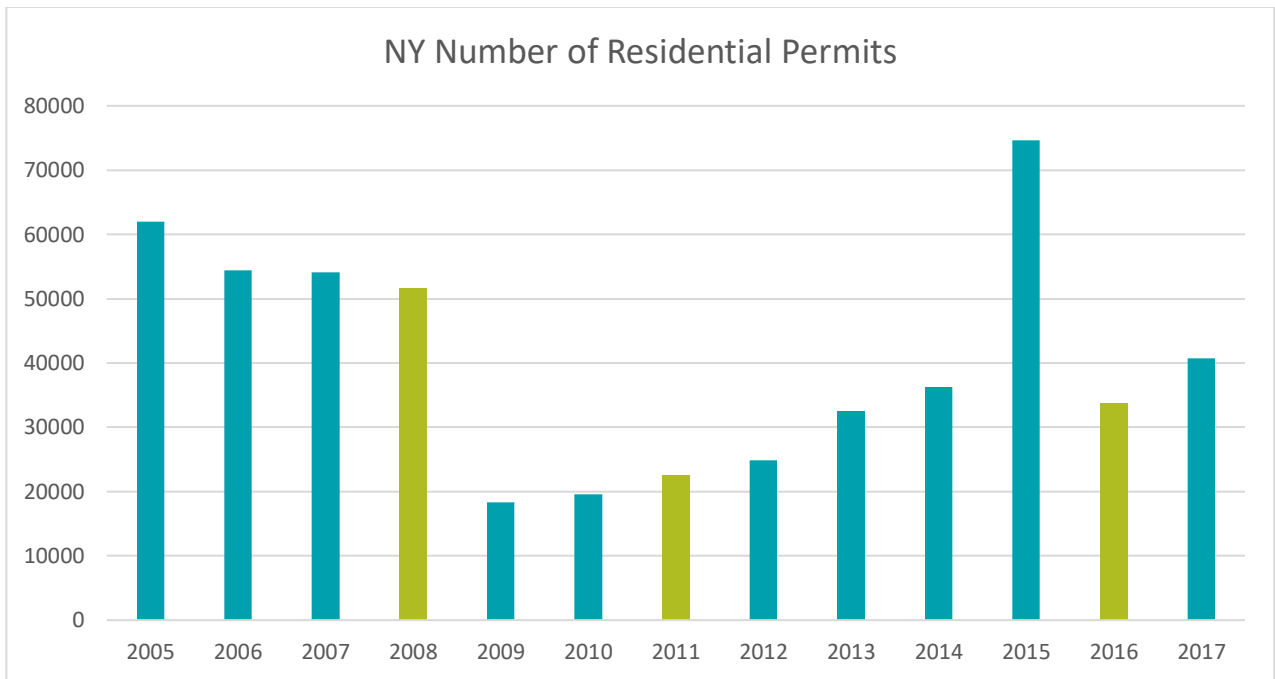
Pay for **598** students to attend a four-year college



Build **183** miles of new bike lanes

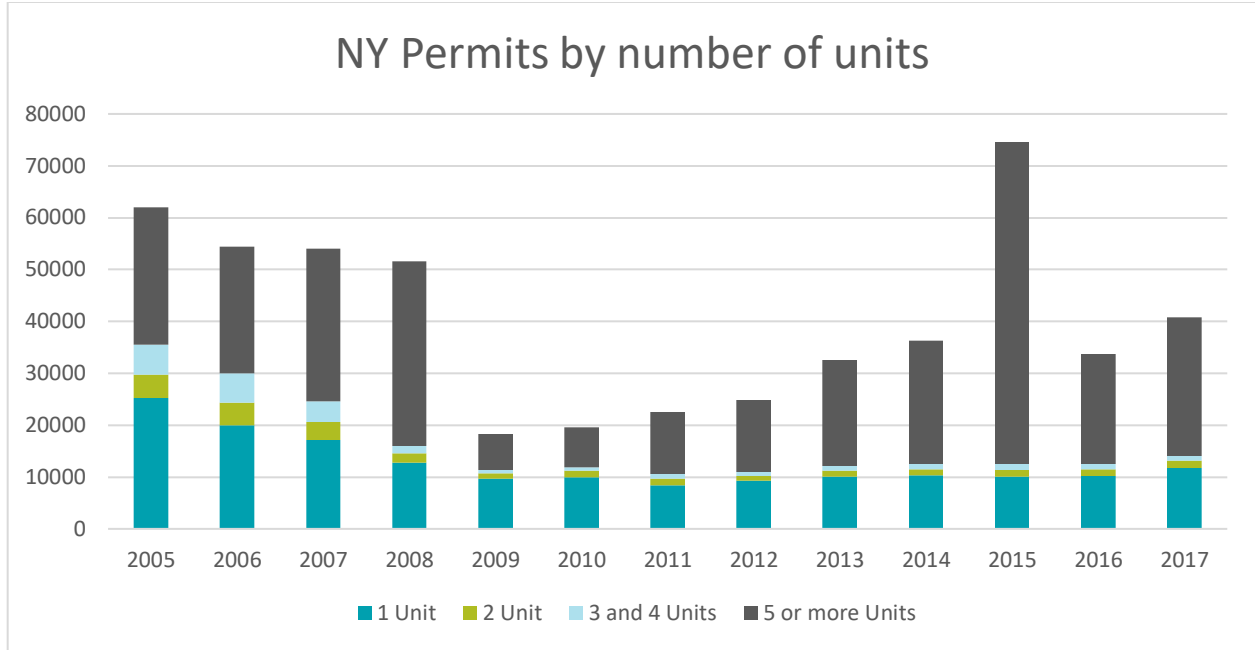


Power **44,716** homes for one year



**Green columns indicate year of energy code update*

²³ New York has already updated their energy code to the 2015 IECC, meaning these savings will be realized over the next 5 years.



Pennsylvania

Current Code: **2015 IECC with PA amendments²⁴**

Effective Date: **October 1, 2018**

Total Residential Projects (2005-2017): **329,097**

1,048,084

(Metric Tons CO₂)

2018-2022 Regional Emissions Savings Potential with Code Updates

\$51,807,106²⁵

2018-2022 Regional Cost Savings Potential with Code Updates

These savings could:



Pay for **1,299** students to attend a four-year college



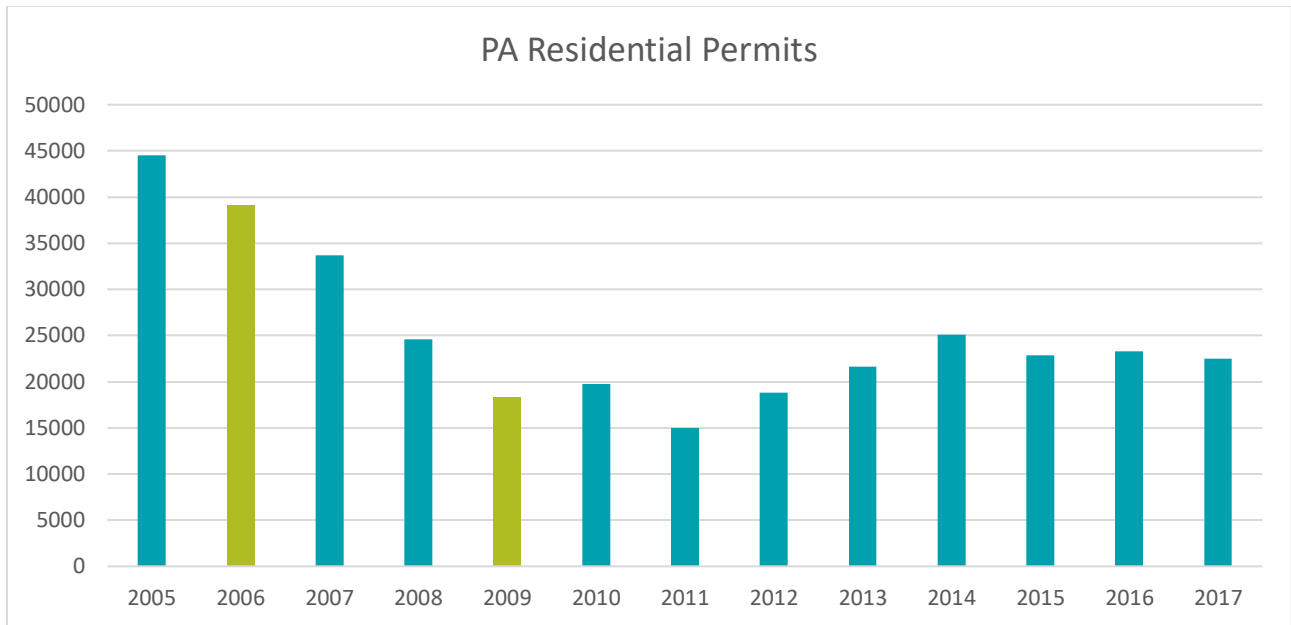
Build **398** miles of new bike lanes



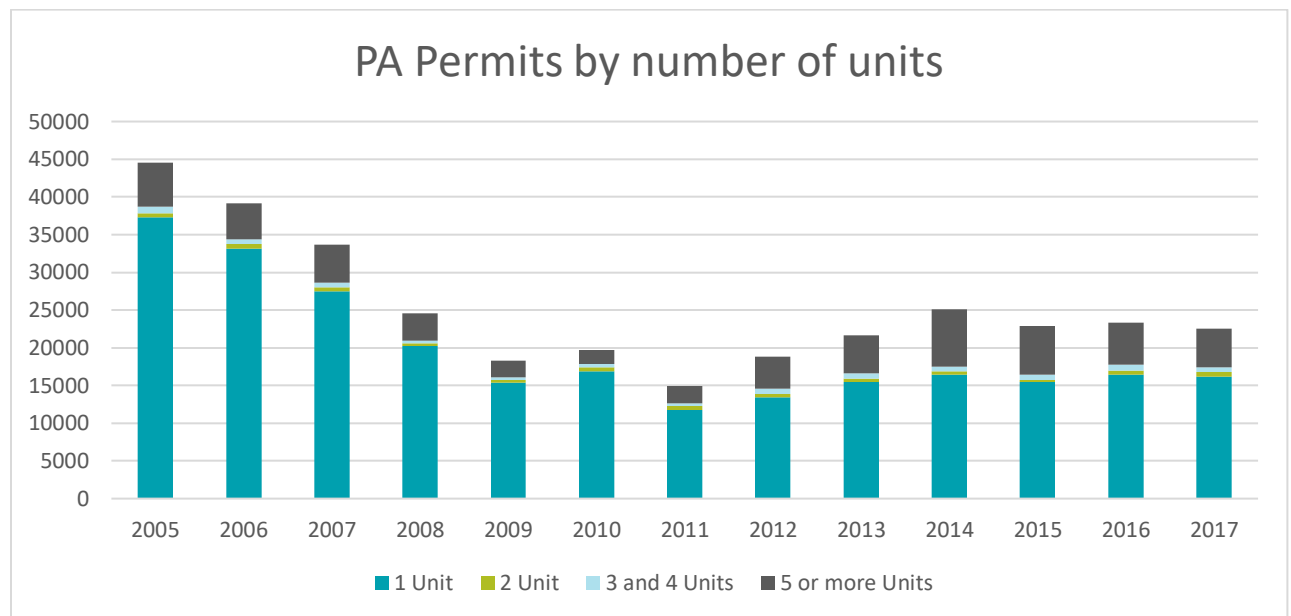
Power **113,172** homes for one year

²⁴ The Pennsylvania Uniform Construction Code Review and Advisory Board voted to adopt the 2015 IECC and announced this on May 1, 2018. It will go into effect October 1, 2018. This is why it is not reflected in the bar graph featured. You can find more information about the Pennsylvania 2015 IECC and the Pennsylvania-specific amendments here: <http://www.dli.pa.gov/ucc/RAC2015ReReview/Pages/default.aspx>

²⁵ Pennsylvania has already updated their energy code in 2018 to the 2015 IECC, meaning these savings will be realized over the next 4 years. This is due to the fact that the code will not be effective until October 1, 2018 and savings will be delayed about a year.



**Green columns indicate year of energy code update*



Rhode Island

Current Code: **2012 IECC with RI amendments**

Effective Date: **10/1/2013**

Total Commercial Projects (2005-2017): **16,788**

22,346

(Metric Tons CO2)

2018-2022 Regional Emissions Savings Potential with Code Updates

\$1,457,590

2018-2022 Regional Cost Savings Potential with Code Updates

These savings could:



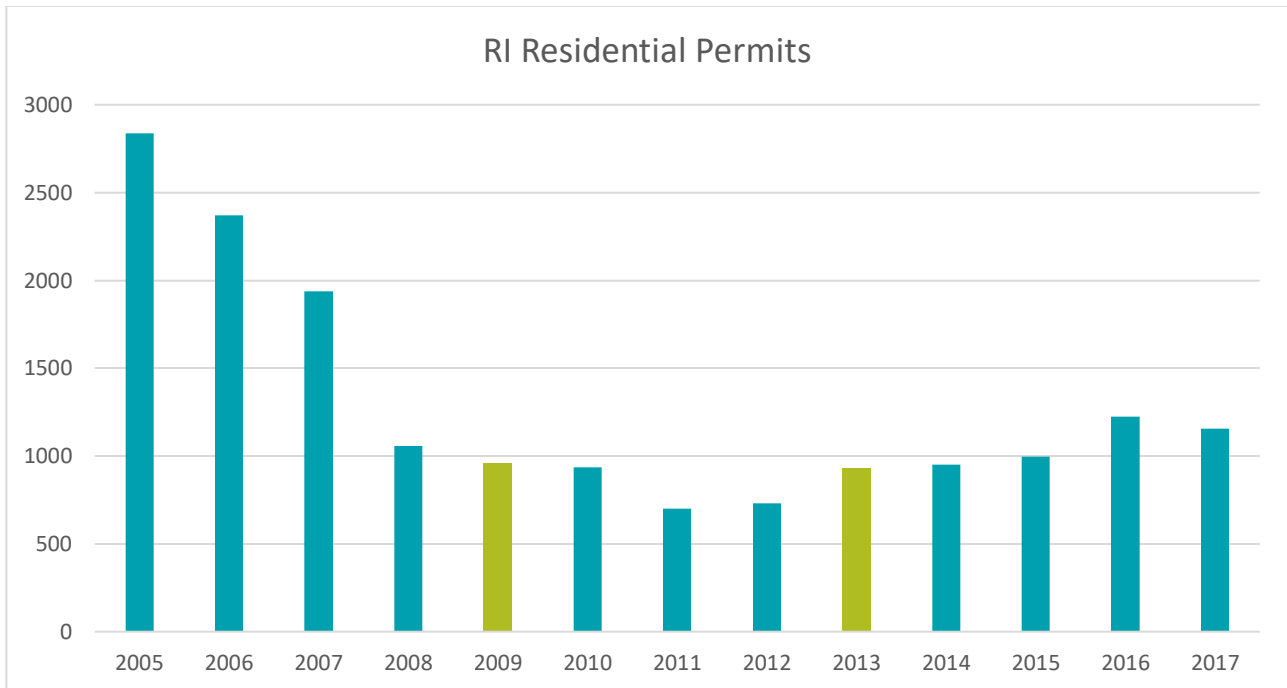
Pay for **36** students to attend a four-year college



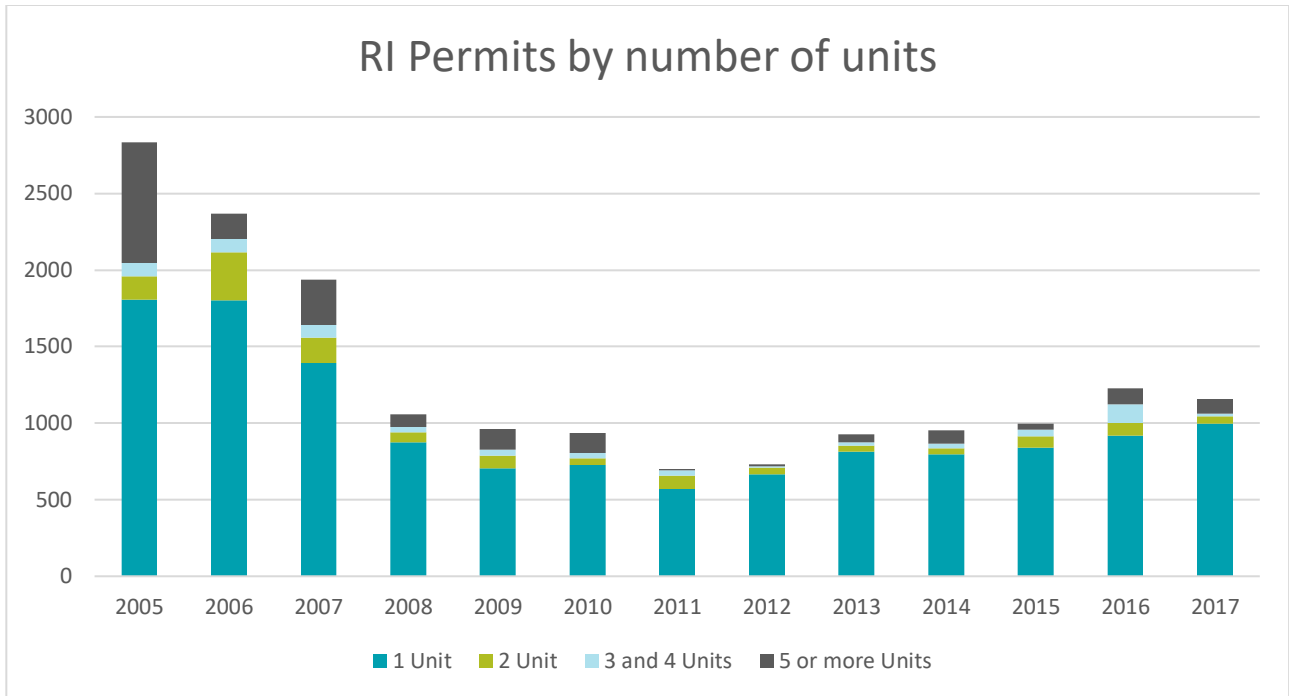
Build **11** miles of new bike lanes



Power **2,413** homes for one year



**Green columns indicate year of energy code update*



Vermont

Current Code: **2015 IECC with VT amendments + stretch code**

Effective Date: **3/1/2015**

Total Residential Projects (2005-2017): **22,871**

37,372

(Metric Tons CO₂)

2018-2022 Regional Emissions Savings Potential with Code Updates

\$7,181,257²⁶

2018-2022 Regional Cost Savings Potential with Code Updates

These savings could:



Pay for **180** students to attend a four-year college

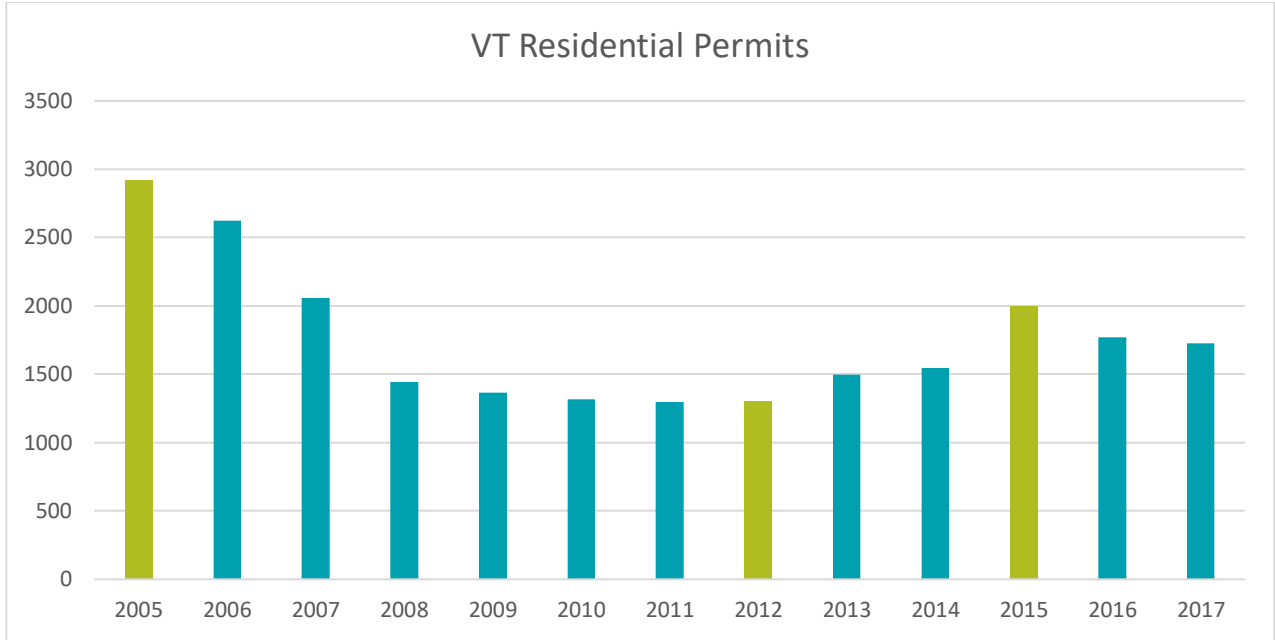


Build **55** miles of new bike lanes

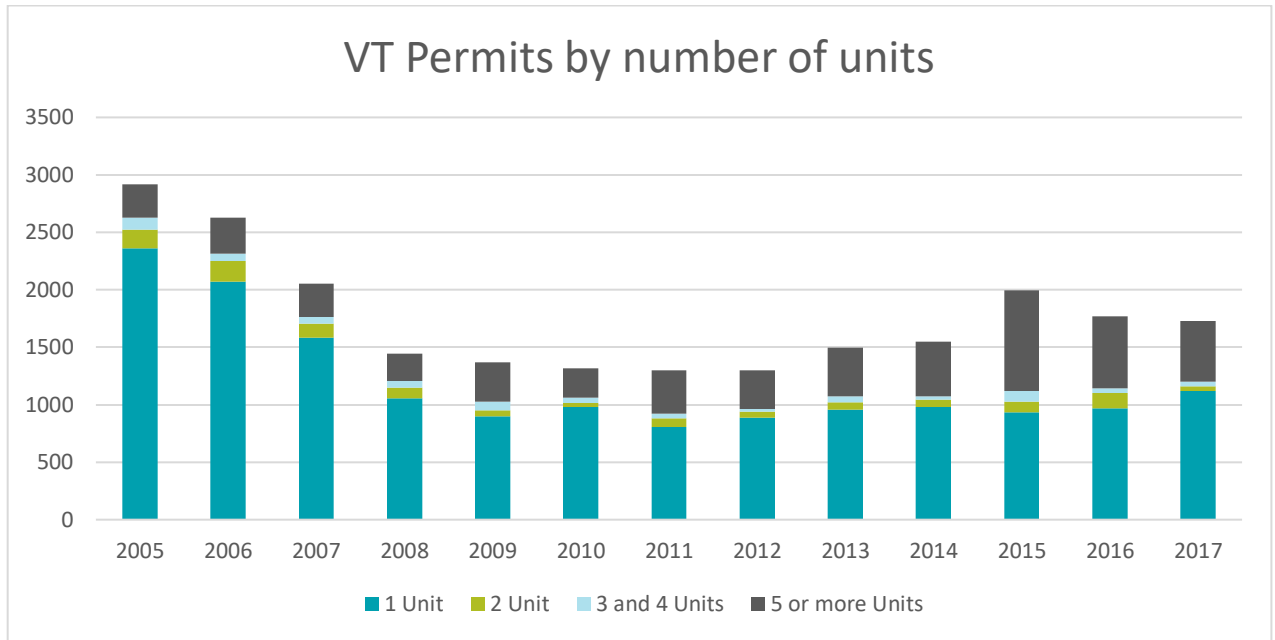


Power **4,035** homes for one year

²⁶ Vermont has already updated their energy code to the 2015 IECC, meaning these savings will be realized over the next 5 years.



**Green columns indicate year of energy code update*



West Virginia

Current Code: **2009 IECC**

Effective Date: **9/1/2013**

Total Residential Projects (2005-2017): **42,958**

131,746

(Metric Tons CO2)

2018-2022 Regional Emissions Savings Potential with Code Updates

\$10,853,728

2018-2022 Regional Cost Savings Potential with Code Updates

These savings could:



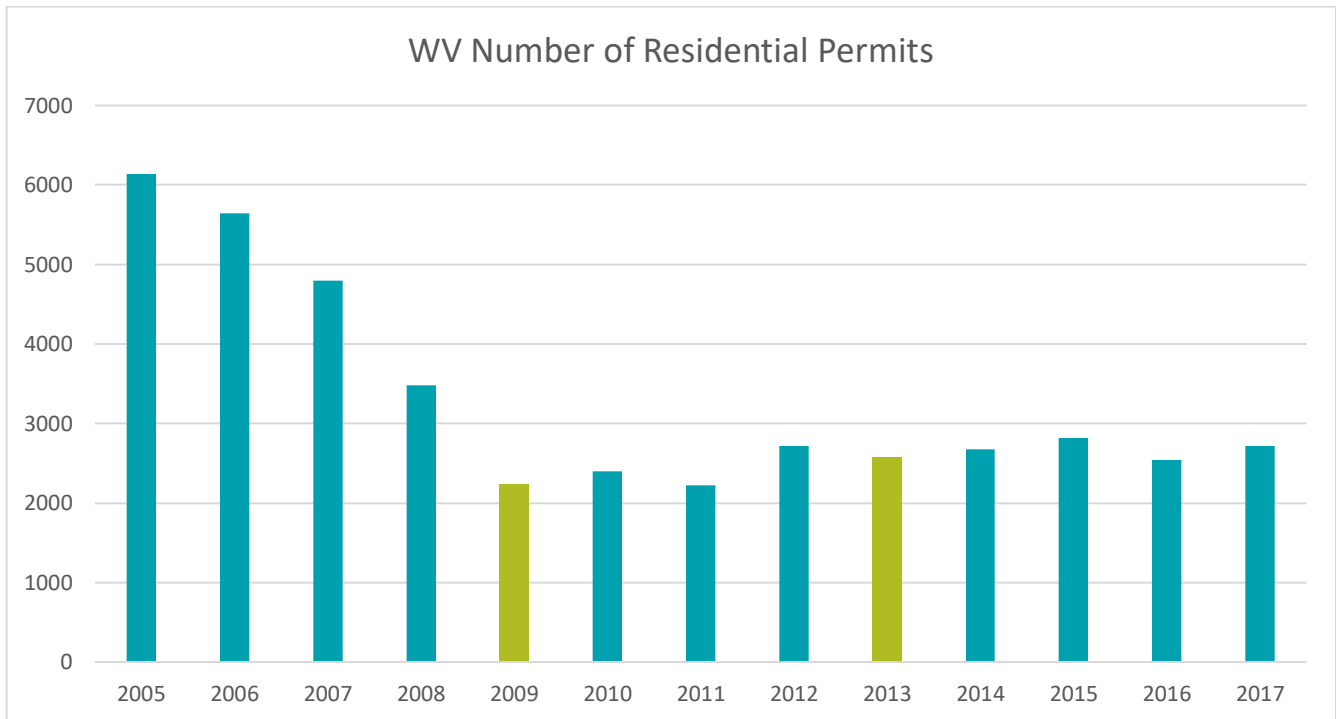
Pay for **272** students to attend a four-year college



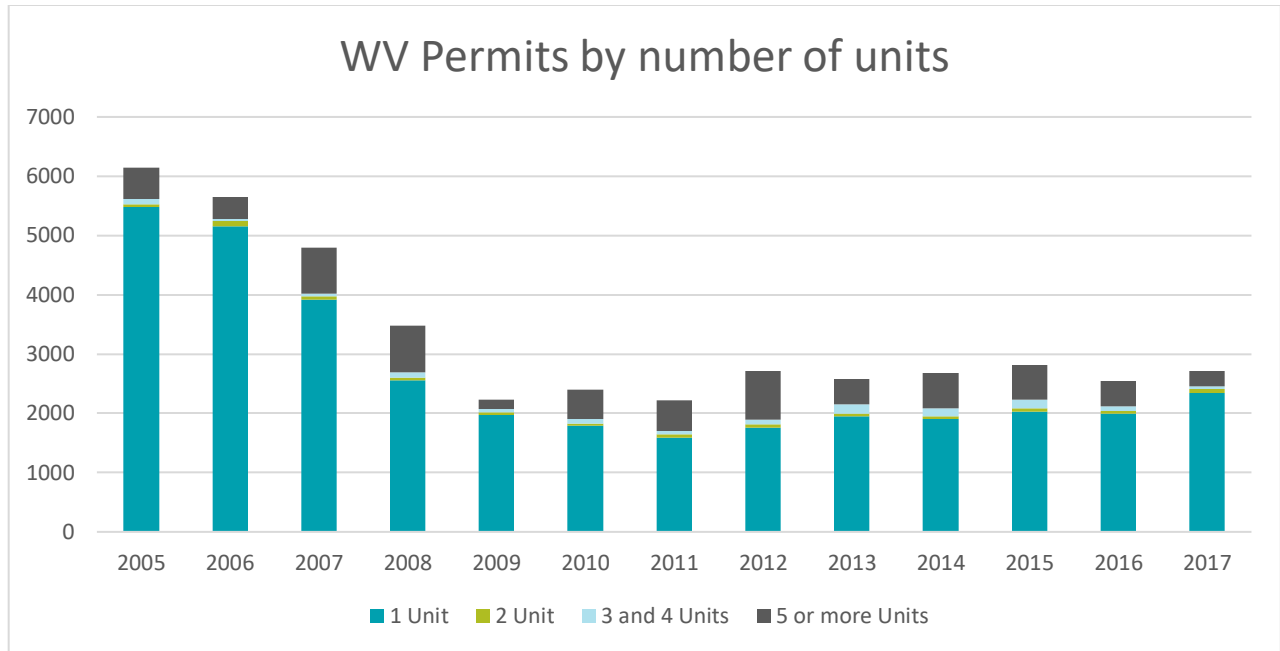
Build **83** miles of new bike lanes



Power **14,226** homes for one year



**Green columns indicate year of energy code update*



Conclusion

Construction permit data tells the story of economic development, unemployment rates, trends in building types and sizes. Using this information, NEEP shows that updated energy code adoption does not have a correlation with construction slowing down. Instead, we can use this information to target geographic centers of development for new energy efficiency initiatives or codes. States can take this information and use it to inform their energy code training programs. For instance, if it is clear that commercial construction is on the rise, an energy code compliance enhancement program can be tailored to meet the needs of the commercial sector, while locating those trainings in counties with higher development rates. Such trends and analysis of those trends are listed below.

Commercial Building Projects: Over the study period from 2005-2017, regional permit data shows an upward trend in the number of commercial building projects initiated. This is largely due to the fact that the number of renovation projects has risen sharply and is forecasted to continue doing so.

This growth in renovation projects highlights a significant opportunity to focus on incorporating energy saving retrofits into renovations as part of a broader energy efficiency strategy. States have the opportunity to focus on existing buildings because of this trend. Energy codes do address existing buildings, and states can ensure compliance by focusing efforts on enforcing codes during alterations and additions.

Residential Building Projects: The analysis included only new construction for the residential market. Even so, the new data analysis confirms that residential building projects have indeed increased since 2014. The construction trends show that where there are counties with larger population densities with many commercial buildings projects, multifamily projects are on the rise.

According to the U.S. Department of Housing and Urban Development, new homes sales in the Northeast have remained steady since the 2008 economic recession, which was largely due to the mortgage market. Compared



with the other regions in the U.S., the Northeast has remained stagnant with regard to new and existing home sales²⁷.

Total Building Projects: The total number of residential and commercial permits in the region has since rebounded from its downward slope. While commercial growth is faster than residential, each sector has seen a year-on-year increase in the total number of permits.

Public Building Projects

The share of public building construction projects since 2005 represents 44 percent of total construction activity. The top three overall construction project types in the region were government offices, pre-elementary and elementary schools, and junior and senior high schools. This represents a large opportunity to capture energy savings while ensuring healthy, productive indoor environments through programs designed to lead-by-example in the public sector. This can be done by constructing buildings that significantly exceed energy codes in their energy usage characteristics. More efficient public buildings is one way in which local and state governments can lead by example, encouraging and inspiring others to build beyond-code buildings or take advantage of resources available through stretch code policies.

Dollar Savings Projections 2018-2022: The total dollar savings potential for the entire region from 2018-2022 is \$590.6 million, if all states in the NEEP region update their energy code to 2015 IECC or 2018 IECC. This significant savings over the next five years makes updating the energy code compelling to stakeholders.

Emissions Savings Projections 2018-2022: The total emissions savings potential for the entire region from 2018-2022 is 8.9 million metric tons CO₂. Energy codes can play a significant role in reducing carbon emissions. Considering regional and state commitments for greenhouse gas reduction targets (mentioned below), energy codes should always be considered part of the reduction plan.

A note on savings: States with 2009 codes have the biggest opportunity for cost and emissions savings through updating to the 2015 or 2018 IECC, or their equivalents. The difference between the 2009 and 2015 IECC in terms of efficiency is significant. For example, the following table represents Maryland and Maine in terms of new square footage, dollar savings, and energy usage savings for an updated code:

State	2018 Commercial Project Square Feet	2018 Dollar Savings	2018 Energy Savings (kBTU)
Maine	7,542,328	\$4,362,719.32	181,015,880
Maryland	42,039,912	\$5,358,027.97	231,219,515

While Maine is only projected to add 7,542,328 square feet, Maryland is projected to add 5.6 times that at 42,039,912. However, the dollar savings are very close, along with the energy savings. This is because Maryland updated their code to the 2012 IECC before they adopted the 2015 IECC. The savings between 2012 and 2015 is not nearly as significant as Maine’s potential savings from the 2009 IECC to the 2015 IECC.

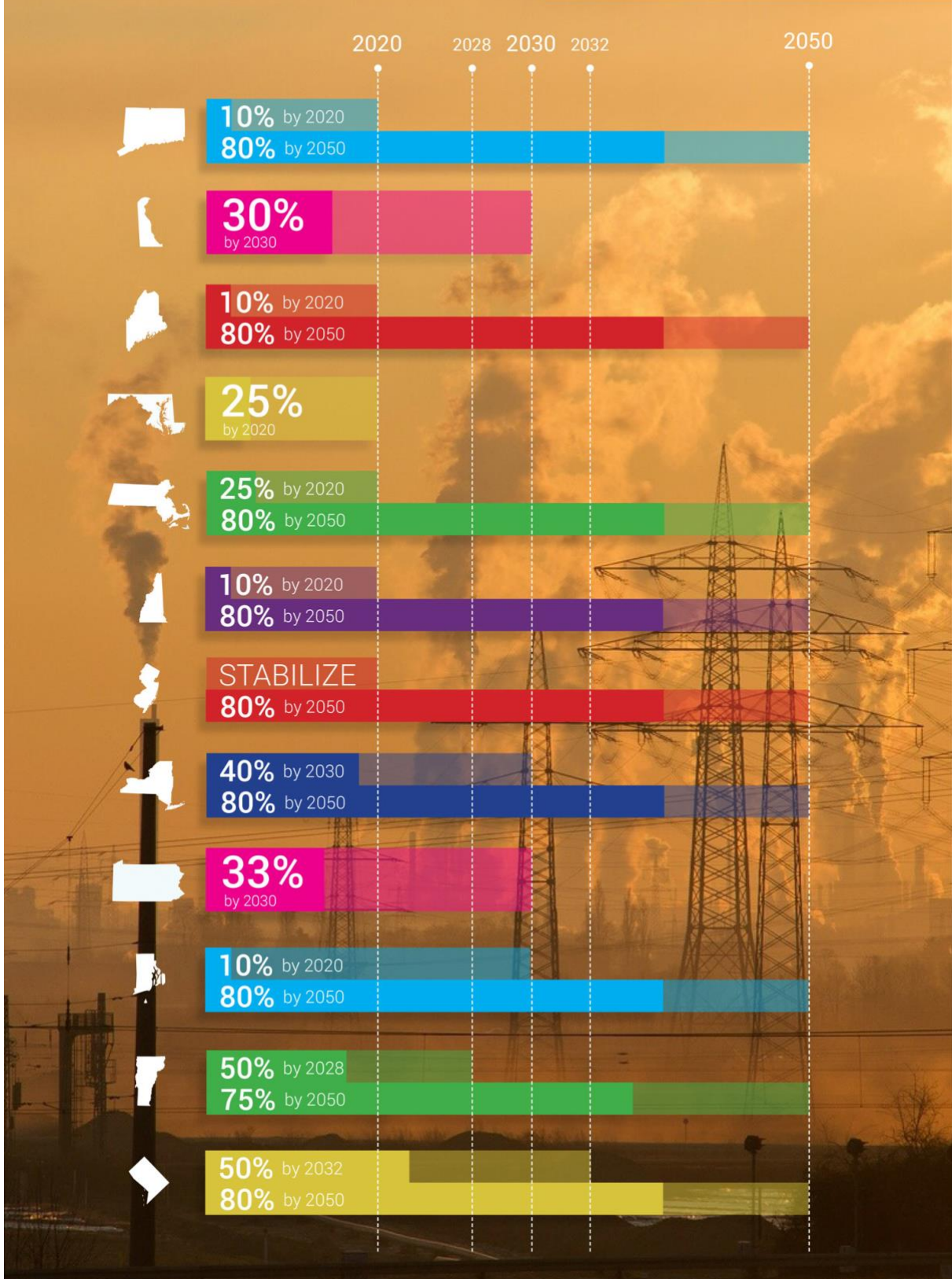
²⁷780 CMR Chapter 115 AA: Stretch Energy Code. (2018, May 15). Retrieved from Mass.Gov: <https://www.mass.gov/regulations/780-CMR-chapter-115-aa-stretch-energy-code>



States already updated: Some states have already updated to the 2015 IECC, while others are in the process of updating to the 2018 IECC. Those that have already updated to the 2015 IECC will realize the savings within this report. This means that their savings are guaranteed to happen, while the other states who have not updated their energy codes have the potential to realize these savings if they update to the 2015 IECC or a more efficient code.

Regional Commitments: States within the NEEP region have committed to reducing greenhouse gas emissions. Each has a climate action plan that outlines initiatives for reducing GHG emissions. All of these plans include, at least, a mention of building energy codes. This shows that states in the NEEP region understand the potential impact of updated energy codes in reducing GHG emissions. It is a practical way to mitigate climate change. Below is a summary of each plan's incorporation of energy codes within their climate action plans. NEEP explored the topic of carbon reduction plans via the white paper [“Building Energy Codes for a Carbon Constrained Era: A Toolkit of Strategies and Examples”](#).

Regional Commitments





Stretch Codes: Building energy stretch codes are model codes that are more efficient than the base code within a state. Certain states have taken on stretch codes as a way to encourage more energy efficient buildings. These advanced building energy codes are becoming more popular throughout the nation both as informative guides and as sound policy changes to promote state and community commitments to reduce energy use.

A Statewide Stretch Code:

- Provides one state-sanctioned building standard for local jurisdictions wishing to adopt a code beyond the baseline state energy code.
- Informs architects, engineers, and other building and design professionals looking to build energy efficient buildings with an appropriate reference.
- Synchronizes criteria for ratepayer-funded energy efficiency, new construction, and renovations programs.
- Establishes criteria for state policies to incentivize high performance buildings, such as tax credits or utility demand-side management incentives.
- Points the way for changes to future national model codes and to zero energy building policies

In Massachusetts, individual communities may adopt the stretch code as their “base” code, bringing buildings construction in those communities to a more efficient level than the base code for the state. The current stretch code follows a Performance Path of the base code and achieves a HERS rating of 55.

This HERS rating means that the building is 45 percent more efficient than a standard new home. To date, 216 municipalities within Massachusetts have adopted that stretch code. The state offers free stretch code training to increase compliance within those communities.

Adopting the stretch code in Massachusetts is a requirement of the Green Communities Designation. This program opens up communities to additional funding for energy efficient and renewable technologies including: LED streetlights, municipal electric vehicles, and technical assistance for energy code compliance.

2017 Construction Downturn

In 2017, a majority of states within the NEEP region experienced a downturn in commercial construction starts following an uptick in construction during 2016, which appears to be a peak, but will not be confirmed until 2018 data comes out. This downturn is not correlated with energy code updates, as New York and New Jersey actually saw an increase in construction projects in 2017 over 2016 after each adopted an updated energy code.

Construction Costs

Construction costs have significantly increased per project in nine of the 13 NEEP region states. According to the American Institute of Architects, oil-related products have risen in cost at a 20 percent pace, metal at 10 percent, and lumber at nine percent. This is significant and greatly affects the way that architects design project, and ultimately how builders complete them. This leads to scaling down project size, pausing a project, and sometimes dropping projects entirely.

There is no indication that energy code updates affect oil-related, metal, or lumber materials costs. These are affected by other factors in the economy.



Construction Unemployment Trends

Construction unemployment rates have been steadily declining since 2010, when they reached a decade peak. 2017 saw a slight rise in unemployment among construction jobs, and this is reflected in the drop in construction projects throughout the NEEP region in 2017²⁸.

Back to Reality

The data analyzed in this report indicates that there is no correlation between an energy code update and a downturn in construction activity. Upon further research, it is discovered that many other factors (like economic recessions, construction costs) affect construction activity. These other factors also point to the importance of energy codes as a means of streamlining new and renovated building stock and ensuring consistency. These other factors show the volatility of the construction market, while energy codes, and all building codes, ensure a level of safety that the market could not uphold.

The savings indicated in the analysis show that states have a lot to gain through updated energy codes from cost, energy, and greenhouse gas emissions savings. Through updated energy codes, states can ensure safe, reliable, and affordable new and renovated buildings for all occupants.

Energy codes can not only save occupants money and energy, but can also make buildings safer through proper ventilation, insulation, and a sealed building envelope. Occupants, the environment, and states with greenhouse gas reduction goals all benefit from updated energy codes.

Appendix A: NEEP Building Energy Code Resources

NEEP offers a number of resources on building energy codes including model code policies, beyond code (stretch code, net zero energy, etc.) guidance, and strategies for code attribution in efficiency programs. For more on NEEP's building energy codes initiative, visit our website here: <http://neep.org/initiatives/energy-efficient-buildings/building-energy-codes>

NEEP Code Tracking Page

NEEP's code tracking page is a table that tracks any and all energy code changes in the states in our region. It includes information such as: current residential & commercial code, code adoption status, effective dates, update cycle length, and the responsible agency.

<http://www.neep.org/initiatives/energy-efficient-buildings/codes-tracker>

NEEP Code Adoption Toolkit

NEEP's Code Adoption Toolkit is a collection of state, regional, and national resources developed to aid development and adoption of more efficient energy codes. This document includes links to materials such as code analyses and comparisons, state amendments and model language, and code case studies and talking points for topics such as stretch codes and the non-energy benefits of codes.

²⁸ Statistics, B. o. (2018, May 30). *Databases, Tables & Calculators by Subject*. Retrieved from United States Department of Labor: <https://data.bls.gov/timeseries/LNU04032231>



<http://www.neep.org/sites/default/files/resources/Adoption-Toolkit.pdf>

NEEP Code Compliance Toolkit

NEEP's Code Compliance Toolkit is a collection of state, regional, and national resources developed to improve compliance and enforcement of more efficient energy codes. This document includes links to materials such as code training materials, FAQs, inspection tools, field guides, code compliance assessments, and code case studies and talking points for topics like attribution of savings to utility code compliance programs and streamlined permitting.

<http://www.neep.org/sites/default/files/resources/Compliance-Toolkit.pdf>

NEEP's Building Energy Codes for a Carbon Constrained Era: A Toolkit of Strategies and Examples Report

This report provides a set of strategies that will better position states in the Northeast and Mid-Atlantic region to achieve two critical objectives:

- Advance building energy code development and adoption to enact zero energy buildings codes within the next 15 to 25 years;
- Improve the administration of building energy codes to ensure that desired performance levels are realized.

<http://neep.org/sites/default/files/resources/Building%20Energy%20Codes%20for%20a%20Carbon%20Constrained%20Era%20-%20A%20Toolkit%20of%20Strategies%20and%20Examples.pdf>

NEEP Model Progressive Building Energy Code Policy

The Model Progressive Building Energy Codes Policy Report provides a set of interconnected recommendations aimed at ensuring that states throughout the Northeast and Mid-Atlantic region adopt and achieve compliance with progressively more efficient building energy codes.

http://www.neep.org/sites/default/files/resources/Model%20Progressive%20Building%20Energy%20Codes%20Policy_1.pdf

NEEP's Attributing Building Energy Codes to Energy Efficiency Programs Report

This report details the methods for attributing savings from energy codes to energy efficiency programs in the region.

<http://www.neep.org/attributing-building-energy-code-savings-energy-efficiency-programs>

NEEP Roadmap to Zero Net Energy Public Buildings

Included in this report are "intermediate-term steps" that NEEP recommends be taken in the next 10-15 years to make zero net energy public buildings a widespread practice across the region. These are followed by a series of "critical next steps" that NEEP suggests must be taken now to pave the way to a future where all new buildings consume only as much energy as they produce.

http://www.neep.org/sites/default/files/resources/Report_zne-public-buildings-neep-2012.pdf



Northeast CHPS Criteria for New Construction and Renovations

The Northeast CHPS Verified Program (NE-CHPS) has been designed to provide guidance and verification for new school projects, renovations, and new schools on existing campuses to achieve high performance goals beyond the building code.

<http://www.neep.org/nechps>

Massachusetts BAR Pilot

This partnership between NEEP and the Massachusetts Department of Energy Resources (MA DOER) seeks to develop and test new methods of assessing the performance of a building's energy features.

<http://www.neep.org/initiatives/energy-efficient-buildings/building-asset-rating>

Appendix B: Additional Resources

U.S. Department of Energy Code Compliance Tools

REScheck™ and COMcheck™ are software tools that simplify and clarify compliance for the IECC model energy code and a number of state and local codes.

<http://www.energycodes.gov/compliance/tools>

U.S. Department of Energy Model Energy Code Policies

This page examines model policies from States and local jurisdictions across the nation that have demonstrated leadership in developing programs encouraging and requiring compliance with energy codes, stretch codes (e.g., above-minimum codes) and green building techniques, energy-efficiency practices, and environmentally-friendly procedures.

<https://www.energycodes.gov/resource-center/model-policy>

U.S. Department of Energy Building Energy Code Resource Guide: Code Officials Edition

This guide includes practical plan review and inspection resources, including the U.S. Department of Energy Building Energy Codes Program's REScheck™ and COMcheck™ quick reference guides, case studies, and sample inspection checklists; as well as excerpts from International Code Council's commentaries, workbooks, and code companion materials.

<https://www.energycodes.gov/building-energy-code-resource-guide-code-officials-edition>

The Building Codes Assistance Project's Online Code Environment and Advocacy Network (OCEAN)

OCEAN is an interactive resource designed to share experiences, best practices, educational resources, and news about building energy codes. By creating a virtual community, OCEAN enables stakeholders to discuss and learn about code issues, connect to trainers and educators, and find policies and program ideas that can serve as models.

<http://tnenergy.org/resource/online-code-environment-and-advocacy-network-ocean/>