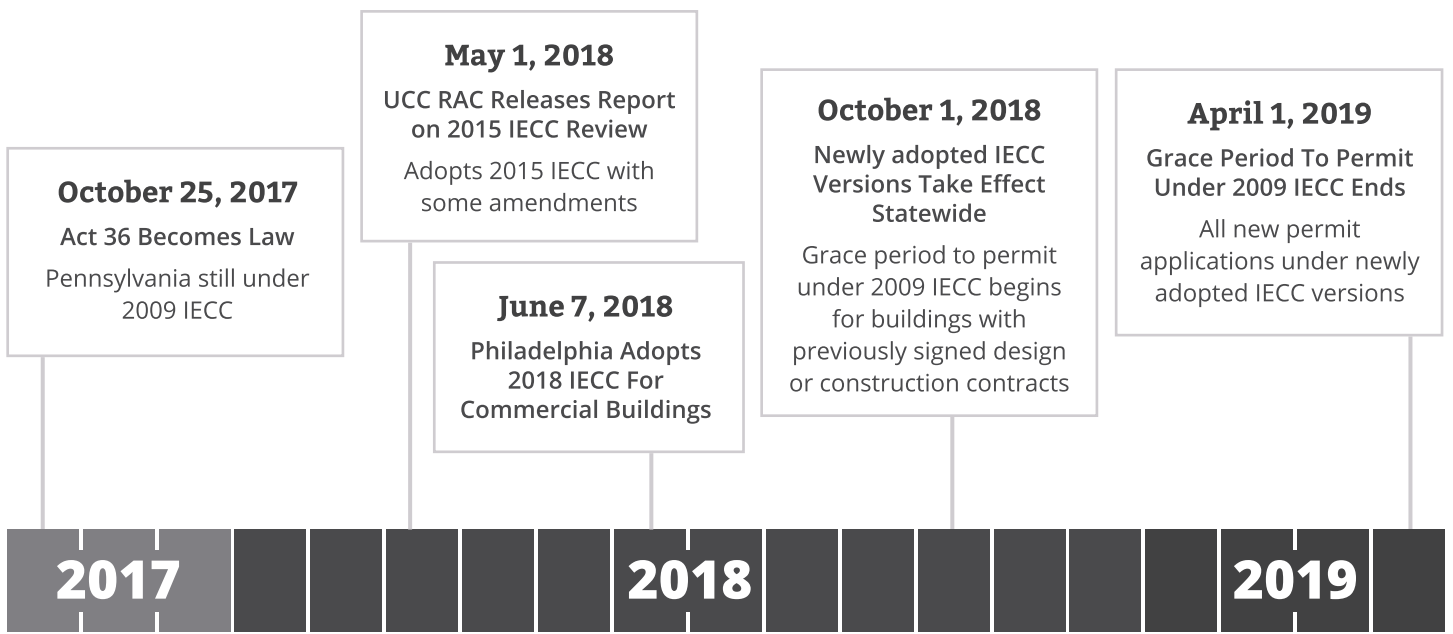
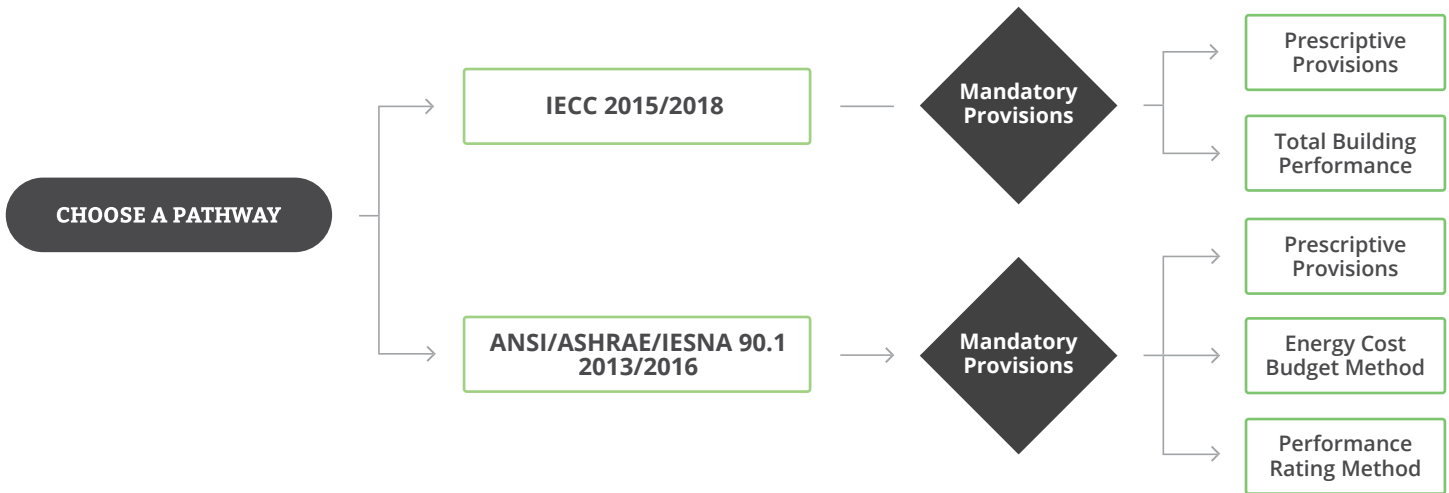




# Quick Guide to Pennsylvania and Philadelphia Commercial Energy Code Changes (2009 IECC vs 2015 and 2018 IECC)



# Permit Pathways



## Air Barrier

**2009:** Seal all penetrations in the building envelope

**2015 and 2018:** The 2015 and 2018 IECC both require a continuous air barrier for the entirety of the building envelope. Mandatory section C402.5 of the 2015 and 2018 versions of the IECC define materials and assemblies that are considered air barriers. Materials or assemblies that are not listed must be tested and meet the requirements listed in C402.5.1.2.1 for materials or C402.5.1.2.2 for assemblies to be considered an acceptable air barrier. Additionally, the air barrier material and location must be called out in the construction drawings.

Common Air Barrier Materials*	Common Air Barrier Assemblies*
Plywood (minimum of 3/8" thick)	Concrete masonry walls coated with either one application of block filler or two applications of paint or sealer coating
OSB (minimum of 3/8" thick)	Masonry walls constructed of clay or shale masonry units with a nominal width of 4 inches or more.
Extruded polystyrene insulation board (minimum of 1/2" thick)	A Portland cement/sand parge, stucco or plaster not less than 1/2 inch in thickness.
Foil backed polyiso (minimum of 1/2" thick)	
Closed cell spray foam (minimum of 1/2" thick)	
Open-cell spray foam (minimum of 4.5" thick)	
*The air barrier must be continuous across the entire thermal envelope. Air barrier joints and seems must be sealed, including sealing transitions in places and changes in material.	

## Windows

Fenestration category types have been simplified to fixed, operable and entrance doors. There is no longer a separate (and more lenient) category for metal framed fenestration. Metal framed fenestration now must perform on par with vinyl framed fenestration.

2009 Fenestration Requirements	Climate Zone 4/5/6	Climate Zone 4/5/6
	U-Value	SHGC
Framing Materials other than Metal	0.40/0.35/0.35	0.40
Metal Framing – Curtain Wall/Storefront	0.50/0.45/0.45	0.40
Metal Framing – Entrance Door	0.85/0.80/0.80	0.40
Metal Framing – All Other	0.55/0.55/0.55	0.40

2015/18 Fenestration Requirements	Climate Zone 4/5/6	Climate Zone 4/5/6
	U-Value	SHGC
Fixed Fenestration	0.38/0.38/0.36	0.40 (SEW), 0.53 (N)
Operable Fenestration	0.45/0.45/0.43	0.40 (SEW), 0.53 (N)
Entrance Doors	0.77/0.77/0.77	0.40 (SEW), 0.53 (N)

# Envelope Changes

There have been some updates to the prescriptive R-value requirements for opaque assemblies. For example, depending on project type and climate zone, roof insulation entirely above deck has increased from R-20 to R-25 or R-30. The full list of prescriptive envelope requirements can be found in tables C402.1.3 and C402.1.4.

# ERV Requirement

The mandatory application of energy recovery ventilation has been expanded to cover more instances. See the table below for the new requirements in Pennsylvania climate zones. The full requirement can be found in tables C403.2.7(1) and C403.2.7(2) of the 2015 IECC and tables 403.7.4(1) and C403.7.4(2) of the 2018 IECC.

Energy Recovery Requirement (Ventilation systems operating less than 8,000 hours per year)	
% Outdoor Air at Full Design Airflow Rate	Design Supply Fan Airflow Rate
≥10% and < 20%	≥26,000
≥20% and < 30%	≥16,000
≥30% and < 40%	≥5,500
≥40% and <50%	≥4,500
≥50% and <60%	≥3,500
≥60% and <70%	≥2,000
≥70% and <80%	≥1,000
≥80%	>0

Energy Recovery Requirement (Ventilation systems operating not less than 8,000 hours per year)	
% Outdoor Air at Full Design Airflow Rate	Design Supply Fan Airflow Rate
≥10% and < 20%	>0
≥20% and < 30%	>0
≥30% and < 40%	>0
≥40% and <50%	>0
≥50% and <60%	>0
≥60% and <70%	>0
≥70% and <80%	>0
≥80%	>0

Under the 2009 version of IECC, only individual fan systems that have both a design supply air capacity of 5,000 CFM or greater and a minimum outdoor air supply of 70% or greater of the design supply air quantity are required to have an ERV.

# Parking Garages

New to the 2015 and 2018 versions of the code, parking garages must have contamination sensing devices and automatic controls configured to stage or modulate fan average airflow rates to 50% or less of design capacity, or intermittently operate fans less than 20% of the occupied time or as required to maintain acceptable contaminant level in accordance with the International Mechanical Code.

# Duct and Pipe Insulation

Duct insulation has increased for ducts located in unconditioned space. In 2009, R-5 was required. In the 2015 and 2018 versions, R-6 is required.

In Climate Zones 5 and 6 ducts outside of the envelope need R-12, compared to R-8 when following 2009 IECC.

Required insulation thickness for heating pipes and domestic hot water pipes has increased. The table to the right is used to determine the required insulation thickness. The extent of pipe insulation requirements can be found in sections C403.2.10 and C404.4 of the 2015 IECC and C403.11.3 and C404.4 of the 2018 IECC.

Fluid Operating Temperature range and Usage (F)	Nominal Pipe Size – Inches				
	<1	1 to <1.5	1.5 < 4	4 to <8	≥8
	<b>Required Insulation Thickness</b>				
>350	4.5	5.0	5.0	5.0	5.0
251-350	3.0	4.0	4.5	4.5	4.5
201-250	2.5	2.5	2.5	3.0	3.0
141-200	1.5	1.5	2.0	2.0	2.0
105-140	1.0	1.0	1.5	1.5	1.5
40-60	0.5	0.5	1.0	1.0	1.0
< 40	0.5	1.0	1.0	1.0	1.5

## Additional Mechanical Changes

In general, the mechanical section of the energy code has become more comprehensive to cover a wide array of systems and a multitude of system specific controls. For example, projects that are required to utilize an economizer now have detailed requirements on how the system must operate.

Economizer requirements can be found in section C403.3 of the 2015 IECC and section C403.5 of the 2018 IECC. The following is a high-level, non-exhaustive list of changes which should be considered on all projects pursuing compliance with IECC 2015 or 2018.

- Optimized start capabilities
- Shutoff damper controls
- Zone isolation control
- Snow and Ice melt and freeze protection controls
- Economizer Fault Detection requirements
- Hot water boiler outdoor temperature setback control
- Fan control (stepped or modulating)

## Dwelling Unit Lighting

Dwelling units that are within commercial buildings must meet all commercial lighting requirements unless they install high efficacy lighting in line with the residential lighting requirements in section R404.1 of the 2015 or 2018 IECC.

2009	2015	2018
50% High Efficacy Lighting	75% High Efficacy Lighting	90% High Efficacy Lighting

## Lighting Power Density

In general, lighting power density (LPD) allowances have decreased. See the table below for common Building Area Type LPDs. The full lighting power density allowances can be found in section C405.4 of the 2015 IECC and section C405.3 of the 2018 IECC.

Building Area Type	2009 LPDs (W/ft <sup>2</sup> )	2015 LPDs (W/ft <sup>2</sup> )	2018 LPDs (W/ft <sup>2</sup> )
Convention Center	1.2	1.01	0.76
Hotel	1.0	0.87	0.75
Multifamily	0.7	0.51	0.68
Office	1.0	0.82	0.79
Parking Garage	0.3	0.21	0.15

## Lighting Controls

**2009:** Generally, manual controls configured to allow for stepped control and paired with a time-clock system will satisfy the lighting controls requirement.

**2015 and 2018:** Most enclosed rooms now require an occupant sensor configured to automatically turn the lights off. If the lights are automatically turned on by the sensor, they must turn on to less than 50% power. Additionally, daylight zones must now have daylight responsive controls.

## Cx Requirements

Commissioning is a new requirement when comparing to the 2009 IECC. The new versions of the code require a Cx plan to be developed by a registered design professional or approved agency and must include air and hydronic systems balancing and functional testing of equipment and controls, including lighting controls.

PA has amended the Cx requirement to remove the need for a preliminary Cx report and does not require for the final report to be submitted in order to receive a certificate of occupancy. In Philadelphia, both the preliminary and final Cx reports are required for CO.

## Additional Efficiency Package

One additional efficiency package must be selected and achieved in order to comply with the 2015 and 2018 IECC. The 2009 IECC does not have an equivalent requirement. See the list of packages. The full requirements for each package can be found in section C406.

- More efficient HVAC performance
- Reduced lighting power density system
- Enhanced lighting controls
- On-site supply of renewable energy
- Provision of a dedicated outdoor air system for certain HVAC equipment
- High-efficiency service water heating
- Enhanced envelope performance (2018 only)
- Reduced air infiltration (2018 only)