



## Chronological History of Energy Code Adoptions in Ohio Commercial and Residential

Effective Date	BBS Rule No.	Ohio Energy Chapter	Summary of Ohio Energy Code Adoption Options- Energy Standard adopted	Energy Standard Edition date	Standard Publisher	1-, 2-, & 3 Family Dwellings	Other Residential Buildings	All other Commercial Buildings	Notes
03-01-1975	BB-48	OBC Ch 48 Appendix E	"Energy Analysis Report" (EAR) was optional ...used as data collection for BBS	N/A	BBS	No	Yes	Yes	In 1974, the federal government, in response to the Arab oil embargo which led to a national energy crisis, mandated that states establish energy conservation programs. The Ohio Department of Energy, now the Ohio Department of Development, approached the BBS and requested that energy conservation standard be added to the Ohio Building Code. Otherwise, Ohio would lose millions of federal grant dollars. BBS started working with industry to develop Ohio's first energy conservation standards. Ultimately, the BBS adopted performance recommendations (not a prescriptive code) of local ASHRAE chapters (including OSU Mechanical Engineering Dept) & the Architects Society of Ohio. The methodology used a budget approach for energy use: a maximum BTU/sq. ft. with building area and height adjustments.
06-01-1976	BB-48	OBC Ch 48	"Energy Analysis Report" (EAR) required	N/A	BBS	No	Yes	Yes	Technical requirements and EAR became mandatory
November 1977									ORC 3781.181, 3781.182, & 3781.21 first requires the BBS to adopt energy conservation requirements for all buildings, including 1-, 2-, & 3-family dwellings [HB 159 eff. 11-01-1977 and SB 127 eff. 11-29-1977]
12-30-1977	4101:2-48	OBC Ch 48	"Model Code for Energy Conservation in New Building Construction" (MCEC) <sup>1</sup>	1977	NCSBCS (National Conference of States on Building Codes and Standards)	Yes	Yes	Yes	BBS first adopts a national model energy code.  The MCEC was developed by NCSBCS under contract with the US Department of Energy and was based upon the ASHRAE 90-75 standard.

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07-01-1979	4101:2-20	OBBC Ch 20	"Model Code for Energy Conservation in New Building Construction" (MCEC) <sup>1</sup>	1977	NCSBCS (National Conference of States on Building Codes and Standards)	Yes	Yes	Yes	BBS first adopts a national building code (the 1998 BOCA Basic Building Code), but deleted the Energy Conservation chapter in favor of keeping the same energy conservation requirements as previously adopted
07-10-1981	4101:2-20-03	OBBC Ch 20	Model Code for Energy Conservation in New Building Construction (MCEC) <sup>1</sup>	1977	NCSBCS (National Conference of States on Building Codes and Standards)	Yes	Yes	Yes	BBS adopted the 1980 BOCA Basic Building Code, but deleted the Energy Conservation chapter in favor of keeping the same energy conservation requirements as previously adopted
			Ohio residential prescriptive values added	N/A	BBS	Yes	No	No	BBS added simplified wall, ceilings, floor and slab R-values applicable only for 1-, 2-, and 3-family dwellings
07-01-1982	4101:2-25-03	OBBC Ch 25	Model Code for Energy Conservation in New Building Construction (MCEC) <sup>1</sup>	1977	NCSBCS (National Conference of States on Building Codes and Standards)	Yes	Yes	Yes	BBS adopted the 1981 BOCA Basic Building Code, but deleted the Energy Conservation chapter in favor of keeping the same energy conservation requirements as previously adopted
			Ohio residential prescriptive values maintained	N/A	BBS	Yes	No	No	BBS maintained simplified wall, ceilings, floor and slab R-values applicable only for 1-, 2-, and 3-family dwellings
03-01-1985	4101:2-24-99	OBBC Ch 24	MEC <sup>1</sup>	1983	CABO	Yes	Yes	Yes	BBS adopted and amended the 1984 BOCA Basic Building Code energy conservation chapter
			ASHRAE 90A	1980	ASHRAE		Yes	Yes	
			ASHRAE 90B	1975	ASHRAE		Yes	Yes	
			Ohio residential prescriptive	N/A	BBS	Yes	No	No	
01-01-1989	4101:2-31-99 4101:2-52-03	OBBC Ch 31	MEC <sup>1</sup>	1986	CABO	Yes	Yes	Yes	BBS adopted and amended the 1987 BOCA Basic Building Code energy conservation chapter
			ASHRAE 90A	1980	ASHRAE		Yes	Yes	
			ASHRAE 90B	1980	ASHRAE		Yes	Yes	
			Ohio residential prescriptive	N/A	BBS	Yes	No	No	
09-01-1992	4101:2-31-99 4101:2-52-03	OBBC Ch 31	MEC <sup>1</sup>	1989	CABO	Yes	Yes	Yes	BBS adopted and amended the 1990 BOCA Basic Building Code energy conservation chapter
			ASHRAE 90A	1980	ASHRAE		Yes	Yes	
			ASHRAE 90B	1975	ASHRAE		Yes	Yes	
			Ohio residential prescriptive	N/A	BBS	Yes	No	No	
07-01-1995	4101:2-13	OBBC Ch 13 Appendix E	MEC <sup>1,4</sup>	1993	CABO	Yes	Yes	Yes	BBS adopted and amended the 1993 BOCA Basic Building Code energy conservation Ch 13 Unique Ohio prescriptive packages for 1-, 2-, and 3-family dwellings were adopted in Section 1301 Unique Ohio Alternative Residential Energy Compliance (OAREC) Method was adopted
			ASHRAE 90.1 <sup>5</sup>	1989c	ASHRAE	No	Yes, if >3 stories	Yes	

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07-01-1997	4101:2-13-01 4101:2-35-04	OBBC Ch 13	MEC <sup>1,4</sup>	1995	CABO	Yes	Yes	Yes	
03-01-1998	4101:2-13-01 4101:2-35-04	OBBC Ch 13	MEC <sup>1,4</sup>	1995	CABO	Yes	Yes	Yes	BBS adopted the 1996 BOCA Basic Building Code, but deleted the one sentence in the energy conservation chapter
			Ohio prescriptive (Table 1301 and App E packages)	N/A	BBS	Yes	No	No	
01-01-2002	4101:1-13-01 4101:1-35-01	OBC Ch 13 OBC Ch 35	IECC <sup>2,4</sup>	2000 w/'01 Supp	ICC	Yes	Yes	Yes	BBS adopted the 2000 IBC w 2001 Supplement, but deleted the sentence in the energy conservation Ch 13 2000 IECC made reference to 1999 ASHRAE 90.1 <sup>5</sup> as an acceptable option
			Ohio prescriptive (Table 1301 and App E packages)	N/A	BBS	Yes	No	No	
03-01-2005	4101:1-13-01 4101:1-35-01	OBC Ch 13 OBC Ch 35	IECC <sup>2,4</sup>	2003	ICC	Yes	Yes	Yes	BBS adopted the 2003 IBC energy conservation chapter without amendments. 2003 IECC made reference to 2001 ASHRAE 90.1 <sup>5</sup> as an acceptable option. BBS deleted unique Ohio prescriptive packages for residential in favor of a simple reference to the IECC
09-06-2005	4101:1-13-01 4101:1-35-01	OBC Ch 13 OBC Ch 35	IECC	2003	ICC	Yes	Yes	Yes	BBS was petitioned by the US DOE to update to the 2004 ASHRAE 90.1 to synchronize the lighting options with the 2003 IECC. BBS modified OBC Ch 13 and Ch 35 to directly reference the ASHRAE 90.1-2004 as an option
			ASHRAE 90.1 <sup>5</sup>	2004	ASHRAE	No	Yes, if >3 stories	Yes	
05-27-2006	4101:8-11-01 4101:8-43-01	RCO Ch 11 RCO Ch 43	Referred user to OBC Ch 13 which referenced IECC	2003	ICC	Yes	No	No	New RCO based upon OBOA Residential Code. RCO Ch 11 references OBC for energy conservation requirements. This is where residential energy conservation requirements have been located for several years...and overlooked/missed.
07-01-2007	4101:1-13-01 4101:1-35-01	OBC Ch 13 OBC Ch 35	IECC <sup>3,4</sup>	2006	ICC	Yes	Yes	Yes	BBS adopted and amended the 2006 IBC Energy Conservation Ch 13 and Ch 35 to directly reference the ASHRAE 90.1 in addition to the IECC  2006 IECC completely rewritten. Ohio went from 5 climate zones down to 2  Because the RCO simply referenced the OBC for residential energy conservation, when the OBC energy conservation requirements were updated to the 2006 IECC, the RCO energy requirements were automatically updated, too, without the RCO changing. Again, energy conservation changes/requirements were overlooked/missed.
			ASHRAE 90.1 <sup>5</sup>	2004	ASHRAE	No	Yes, if >3 stories	Yes	

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01-01-2008	4101:8-11-01 4101:8-43-01	RCO Ch 11 RCO Ch 43	IECC <sup>3</sup>	2006	ICC	Yes	No	No	BBS adopted the 2006 IRC Ch 11 energy conservation requirements, breaking the link between the OBC and the RCO for energy conservation. The hope was that changes to the RCO energy requirements would be more transparent and no longer be overlooked/missed
03-31-2008	4101:8-11-01 4101:8-43-01	RCO Ch 11 RCO Ch 43	IECC	2003	ICC	Yes	No	No	Governor issues Executive order requiring BBS to file emergency rules to roll back the 2006 IECC to the 2003 IECC and set up Energy Ad Hoc Advisory Committee to study impact of 2006 IECC
01-01-2009	4101:8-11-01 4101:8-43-01	RCO Ch 11 RCO Ch 43	IECC <sup>3</sup>	2006	ICC	Yes	No	No	2006 IECC re-adopted into RCO Chapter 43 BBS adopted and amended the 2006 IRC based RCO Ch 11 Energy Ad Hoc Advisory Committee developed an Ohio Prescriptive path which was added to the RCO Ch 11 Section 1104
			IRC Ch 11 (Ohioized)	2006	ICC and modified by BBS	Yes	No	No	
			Ohio residential 1-, 2-, 3-family dwelling prescriptive energy options	N/A	BBS	Yes	No	No	
11-01-2011	4101:1-13-01 4101:1-35-01	OBC Ch 13 OBC Ch 35	IECC	2009	ICC	No	Yes	Yes	BBS adopted and amended the 2009 IBC Energy Conservation Ch 13 and Ch 35 to directly reference the ASHRAE 90.1 as an option
			ASHRAE 90.1 <sup>5</sup>	2007	ASHRAE	No	Yes, if >3 stories	Yes	
01-01-2013	4101:8-11-01 4101:8-44-01	RCO Ch 11 RCO Ch 44	IECC	2009	ICC	Yes	No	No	BBS adopted and amended the 2009 IRC based RCO Ch 11 Unique OHBA prescriptive path added to the RCO Ch 11 Section 1105
			IRC Ch 11 (Ohioized)	2009	ICC and modified by BBS	Yes	No	No	
			OHBA prescriptive	N/A	BBS	Yes	No	No	
07-01-2014	4101:1-13-01 4101:1-35-01	OBC Ch 13 OBC Ch 35	IECC	2009	ICC	No	Yes	Yes	BBS modified the commercial IECC standard
			ASHRAE 90.1 <sup>5</sup>	2007	ASHRAE	No	Yes, if > 3 stories	Yes	
01-01-2017	4101:1-13-01 4101:1-35-01	OBC Ch 13 OBC Ch 35	IECC	2012	ICC	No	Yes	Yes	BBS adopted and modified the commercial IECC and the ASHRAE standards BBS added an exception to allow certain Group R-3 to use some of the RCO energy options.
			ASHRAE 90.1 <sup>5</sup>	2010	ASHRAE	No	Yes, if >3 stories	Yes	
07-01-2019	4101:8-11-01 4101:8-44-01	RCO Ch 11 RCO Ch 44	IECC	2018	ICC	Yes	Some R-3	No	BBS adopted and amended the 2018 IRC based RCO Ch 11 Retained unique OHBA prescriptive path (moved to RCO Ch 11 Section 1112)  The adoption of the 2018 IECC offers a new performance method called the "Energy Rating Index" (ERI)
			IRC Ch 11 (Ohioized)	2018	ICC and modified by BBS	Yes	Some R-3	No	
			OHBA prescriptive	N/A	BBS	Yes	No	No	

**Footnotes:**

1. To provide maximum flexibility, the national model energy codes (MCEC and MEC) offered different paths or options for showing compliance as follows:
  - a. **The systems analysis design approach** - compared the overall energy usage (envelope and all systems) of a proposed design to that of a standard house which was designed to meet the component performance approach or the acceptable practices approach. This method allowed credit for non-depletable or renewable energy sources. Required considerable calculations.
  - b. **The component performance design approach** - The code user would calculate the total building thermal envelope UA (sum of U<sub>o</sub>A for each component) of the proposed building which would have to be lower than the total UA resulting from using the U<sub>o</sub> factors provided in the code prescribed table, based upon heating degree days. Some

individual components may not meet the prescribed value as long as other individual components exceed the prescribed value for that component, provided that the overall value was less than the prescribed value. Required some calculations.

- c. **Acceptable practices approach** - Each individual component had to meet the thermal transmittance value prescribed for that component. Wall  $U_o$  is based upon heating degree days and is modified for % glazing.
2. To provide maximum flexibility, the model energy code (IECC) offers different paths or options for showing compliance as follows:
  - a. **The systems analysis design approach** - compares the overall energy usage (envelope and all systems) of a proposed design to that of a standard house which is designed to meet the component performance approach or the acceptable practices approach. This method allows credit for renewable energy sources. Requires considerable calculations.
  - b. **The component performance design approach** - Requires some calculations. Tradeoffs not permitted for mechanical equipment.
    - i. **Compliance by performance on an individual component basis** - Each component of the envelope has to meet the maximum  $U_o$  or minimum R value prescribed in the code figures using  $U_o$  calculation methods specified in the code (sum of UA calcs for each component/gross area of walls). No trade-offs are permitted under this method.
    - ii. **Compliance by total building envelope performance** - The code user would calculate the total building thermal envelope UA (sum of  $U_oA$  for each component) of the proposed building which would have to be lower than the total UA resulting from using the  $U_o$  factors provided in the code prescribed table. Some individual components may not meet the prescribed value as long as other individual components exceed the prescribed value for that component, provided that the overall value is less than the prescribed value.
    - iii. **Compliance by acceptable practice on an individual component basis** - Similar to the "Compliance by performance on an individual component basis" above, except limited by the construction details located in the Appendix.
    - iv. **Compliance by prescriptive specification on an individual component basis** - The user simply determines the amount of window area as a percentage of gross area of exterior wall and then looks in a table based upon HDD to find the required envelope criteria.
    - v. **Prescriptive path for additions and window replacements** - Can be used only for additions of less than 500 sq ft.
  - c. **Simplified prescriptive approach** - Each individual envelope component has to meet the minimum R-value value prescribed for that component. Glazing was limited to 15%.
3. The 2006 IECC was greatly simplified in hopes of better achieving compliance. The code still provides flexibility by offering different paths to show compliance as follows:
  - a. **Simulated energy performance analysis** – This method is the same as the systems analysis approach described above. Requires considerable calculations using software tools capable of calculating the annual energy consumption of all building elements that differ between the standard reference design and the proposed design.
  - b. **Prescriptive path** – The code user simply goes to a table to find the prescribed insulation and fenestration values required based upon climate zone. No limit on amount of glazing.
  - c. **Total UA alternative** - The code user would calculate the total building thermal envelope UA which would have to be lower than the total UA resulting from using the U factors provided in a table. This allows for trade-offs in the building envelope.
4. The US DOE, working with Battelle PNNL, offers free software packages (REScheck, previously called MECcheck) that assist in calculating code compliance (UA trade-off calcs) using a quasi-simulated energy performance analysis. This method is a "deemed to comply" alternative method of showing compliance. It allows for trade-offs between building envelope HVAC components.
5. Just as the model energy code offers different paths to demonstrate compliance, the ASHRAE 90.1 standard also offers different paths or options for showing compliance:
  - a. Prescriptive Building Envelope Option
  - b. Building Envelope Trade-off Option
  - c. Energy Cost Budget Method