Energy Code Update Options

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Flagstaff City Council | December 16, 2025

TEAM FLAGSTAFF

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Seeking Council Direction

- Today, staff seek direction from Council on which energy code option to **explore**
  - 4 specific questions

- Based on Council direction, staff will:
  - Explore the preferred option through **further research**
  - **Meet** with development and building partners and the Flagstaff community to review barriers and opportunities

- Staff will **return to Council in 2026** to share community feedback received, additional research performed, proposed local amendments, and draft code language - for **all** of the 2024 codes

Seeking Council Direction

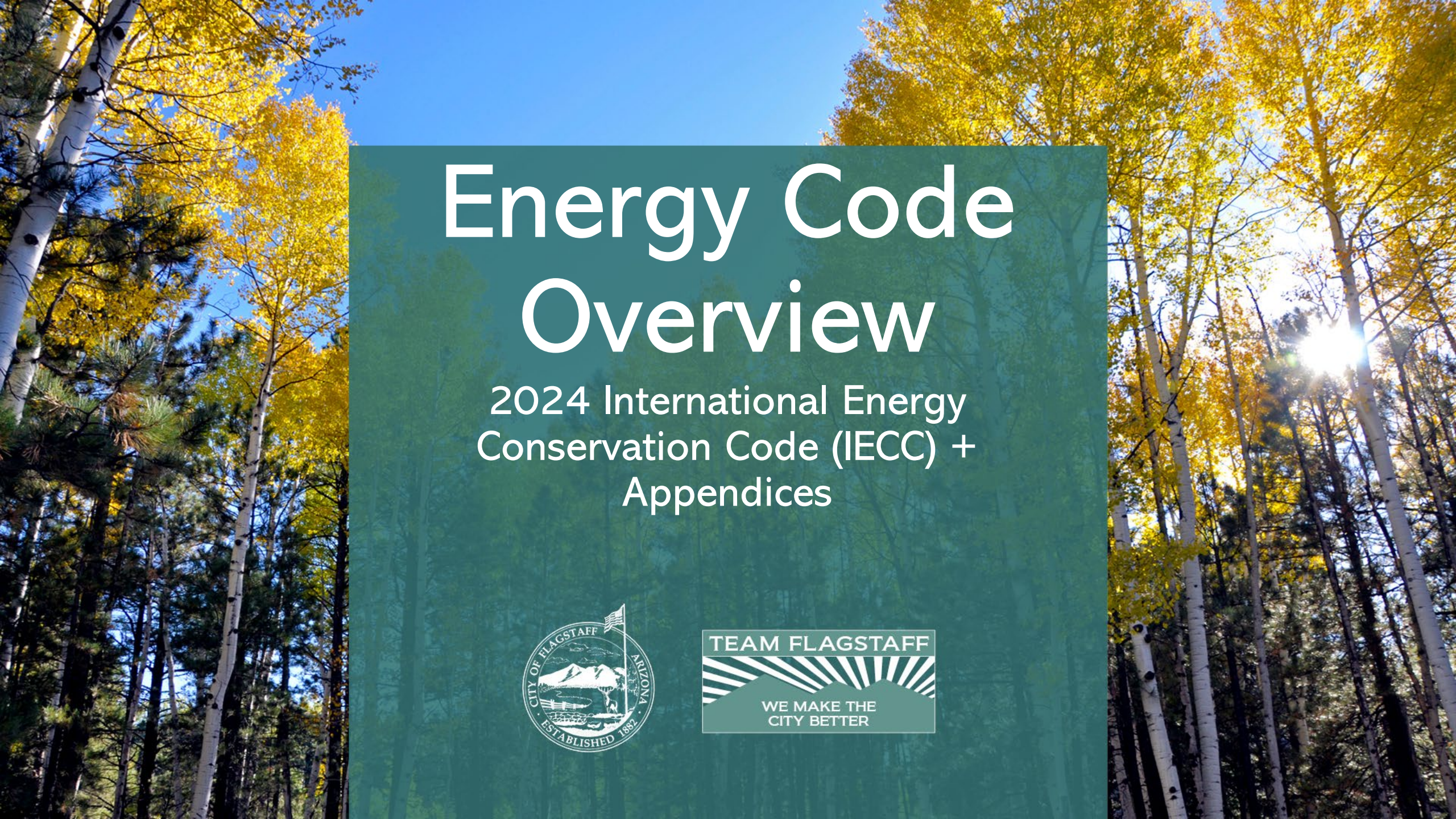
1. What energy code **option** should staff explore?
2. Are there any **other energy code options** that staff should explore, beyond the options presented here?
3. What **“complementary”** code options should staff explore, if any?
4. What **additional information** should be included when staff return to Council with proposed energy code updates in mid-2026?

Agenda

1. Energy code overview
2. Guiding principles
3. Energy code options and costs
4. Summary and questions

Energy Code Overview

2024 International Energy Conservation Code (IECC) + Appendices



Why Are We Here Today?

The City is on a 6-year update cycle for building and fire codes

- **Current code:** 2018 Suite of Codes (adopted in June 2019)
- 2024 codes are published; **goal is to adopt in mid-2026**
- City is preparing to vet potential code updates with the Flagstaff community before bringing them to City Council

Model codes are created by **national experts** at the International Code Council (ICC)

- ICC creates a standardized set of building regulations that incorporate advancements in technology, sustainability, and construction practices to enhance safety, efficiency, and resilience
- States, counties, and cities adopt these codes, often with local amendments

Flagstaff's Adopted Building Codes

Adopted in June 2019

- 2018 International…
  - **Building** Code (IBC)
  - **Fire Code** (IFC)
  - **Residential** Code (IRC)
  - **Existing Building** Code (IEBC)
  - **Mechanical** Code (IMC)
  - **Plumbing** Code (IPC)
  - **Fuel Gas** Code (IFGC)
  - **Swimming Pool and Spa** Code (ISPSC)
  - **Solar Energy** Provisions (ISEP)
  - **Energy Conservation** Code (IECC)

- Other codes
  - NFPA 70 / National **Electrical** Code (NEC) (2017)
  - ICC A117.1-2017 **Accessible and Usable** Buildings and Facilities
  - Uniform Code for the **Abatement of Dangerous Buildings** (1997)
  - Uniform Administrative Code (1997)
  - Uniform Housing Code (1997)
  - Wildland Urban Interface (IWUIC) (2006)

Today's focus for *preliminary* discussion

2024 Suite of Codes

- 2024 International…
  - **Building** Code (IBC)
  - **Fire Code** (IFC)
  - **Residential** Code (IRC)
  - **Existing Building** Code (IEBC)
  - **Mechanical** Code (IMC)
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  - **Swimming Pool and Spa** Code (ISPSC)
  - **Solar Energy** Provisions (ISEP)
  - **Green Construction Code** (IgCC)
  - **Energy Conservation** Code (IECC)

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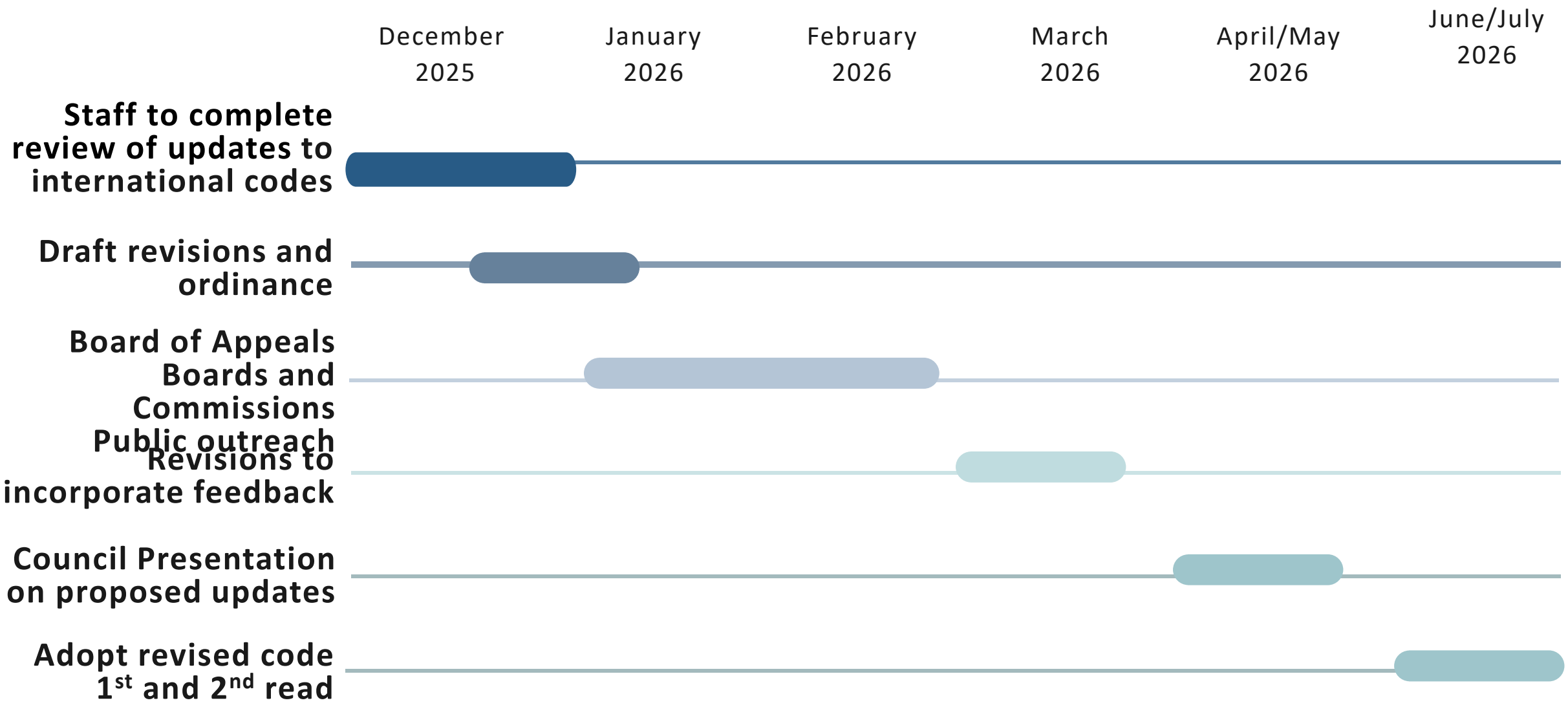
Today's focus for *preliminary* **discussion**

Flagstaff's Energy Code History

- The City has **adopted past versions** of the International Energy Conservation Code (IECC) with local amendments
  - 2012 IECC: adopted in 2013
  - 2018 IECC: adopted in 2019

- The 2024 Suite of Codes, including the 2024 IECC, were **published in 2024**
  - Staff provided an introduction to Building and Fire Codes via an April 2025 presentation to City Council

Draft Timeline: 2024 Building and Fire Code Update

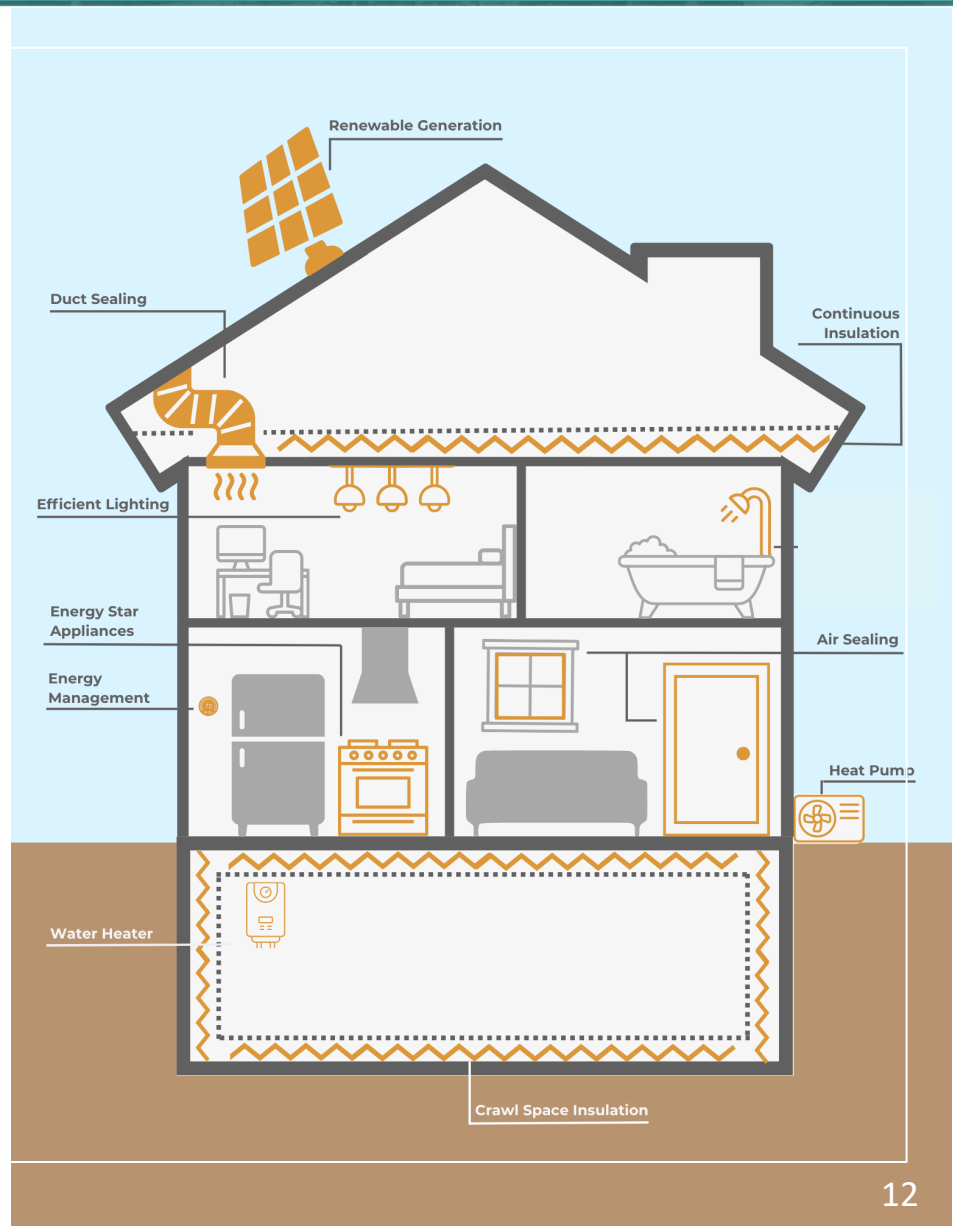


The Energy Code Is…

- A technical code developed by thousands of national **building science experts** over a rigorous 3-year process
- Designed to be **broadly adopted** by small and large cities, states, and counties across the U.S.
- Sets **minimum energy efficiency standards** in new buildings
- Standards vary by type of construction
  - **Residential:** single-family homes, duplexes, townhomes, and other residential structures three stories or less in height
  - **Commercial:** all other buildings, including large multifamily residential buildings

What the Energy Code Regulates

1. Insulation amount and location
2. Window and skylight efficiency
3. Ductwork design and requirements
4. Duct and building envelope testing
5. Efficiency of appliances and mechanical systems
6. Lighting and electrical outlet efficiency
7. Standards for gas fireplaces and heaters
8. Minimum amount of renewable energy, if required
9. Other energy-using equipment
10. Pumps, piping, circulation systems
11. **Many more features**



What the Energy Code Is Not

The energy code **does not:**

- Regulate development patterns, building placement (height, setbacks), land use, site design, etc.
- Regulate transportation patterns or infrastructure
- Usually apply to existing construction
- **Require one building energy type over another**

2018 vs. 2024 Energy Code

- Both codes include a **base code and optional appendices**
  - Provides **flexibility** to advance energy efficiency locally

Energy efficiency + cost savings for Flagstaff's climate zone:

2024 Residential IECC vs 2018	2024 Commercial IECC vs 2018
• 15% improvement in energy efficiency • 13% reduction in energy costs • 12% reduction in greenhouse gas (GHG) emissions	• 29% improvement in energy efficiency • 28% reduction in energy costs • 29% reduction in GHG emissions

Source: Pacific Northwest National Laboratory (PNNL). Commercial code assumptions are preliminary because PNNL has not released their final determination.

Our Approach: Key Principles

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Key principles

1. We are building for the **next 75+ years**
2. Healthy, more efficient buildings can benefit **everyone**
3. Utility costs are projected to **increase** over the next 75+ years
4. Energy efficiency and lower monthly utility costs can help with **affordability**
5. Energy efficiency features are a **small %** of total housing construction costs
6. The energy code is linked to **other** development code changes
7. The energy code supports **resilience** to extreme weather and grid outages
8. Flagstaff has a unique climate in Arizona, and we can learn from **other peer cities**
9. The energy code is one of the **most effective ways** to accelerate climate action
10. **Local amendments** will help fit the code to our local needs

1. We are building for the next 75+ years

- The buildings we build today will last 50-100+ years
- New construction is the least expensive way to avoid costly retrofits later
- Our building stock is part of our resilience to climate change
- Operational costs impact a home over its life expectancy
- Durable, well-built housing can endure for generations

2. Healthy, more efficient buildings can benefit everyone

- Codes can lead to long-term benefits for building occupants including improved health outcomes
- Codes can help reduce exposure to harmful pollutants generated outside and inside of the house, including wildfire smoke

3. Utility costs are expected to increase over the next 75 years

- Electricity and natural gas rates are projected to increase
  - APS and Unisource have requested rate increases
  - Arizonans are expected to spend $92,500 on utilities over the next 25 years
- Energy-efficient buildings will save occupants thousands over the building's lifespan by partially insulating them from future utility price increases

4. Energy efficiency and lower monthly operational costs can help with affordability

- We can address housing and climate goals concurrently through more energy-efficient buildings, which can lower utility costs
  - Low-income households pay up to 15% of their income on energy costs
- Residents benefit from lower utility bills every month over the building's life

5. Energy efficiency features are a small % of total housing construction costs

- Energy efficiency features represent less than 5% of the average sales price of a new single-family home in Flagstaff
- Cost of energy efficiency features can be equivalent to the cost of countertops, windows, and other features, or the sales commission
- Energy efficiency features can lower monthly utility bills and save residents money—unlike many other design decisions

Energy efficiency is a small % of housing development costs

Table 1. SINGLE-FAMILY PRICE AND COST BREAKDOWNS
2024 National Results

Average Lot Size:	20,907
Average Finished Area:	2,647

I. Sale Price Breakdown[1]	Average	Share of Price
A. Finished Lot Cost (including financing cost)	$91,057	13.7%
B. Total Construction Cost	$428,215	64.4%
C. Financing Cost	$10,220	1.5%
D. Overhead and General Expenses	$38,248	5.7%
E. Marketing Cost	$5,633	0.8%
F. Sales Commission	$18,955	2.8%
G. Profit	$72,971	11.0%
Total Sales Price	**$665,298**	**100.0%**

Source: National Association of Homebuilders (NAHB), 2025.

Average sales price in Flagstaff for a new single-family home in November 2025: $911,037

Source: Realtor.com

6. The energy code is linked to other development code changes

- Energy code updates should be considered holistically with other development code updates
- Other Building and Fire Code updates may impact costs
- Several recent code changes aim to reduce housing barriers and costs
- Future code changes from LASS+CAP could also reduce costs
- Energy code costs may be small compared to potential cost savings

7. The energy code support resilience to extreme weather and grid outages

- Well-insulated, energy-efficient homes are more comfortable and protect occupants from extreme weather
- The Federal Emergency Management Agency (FEMA) sees the adoption of current building codes, including the energy code, as a key tool in building natural hazard-resistance
- Homes enhance passive survivability—how long a resident can stay in their home when the power goes out

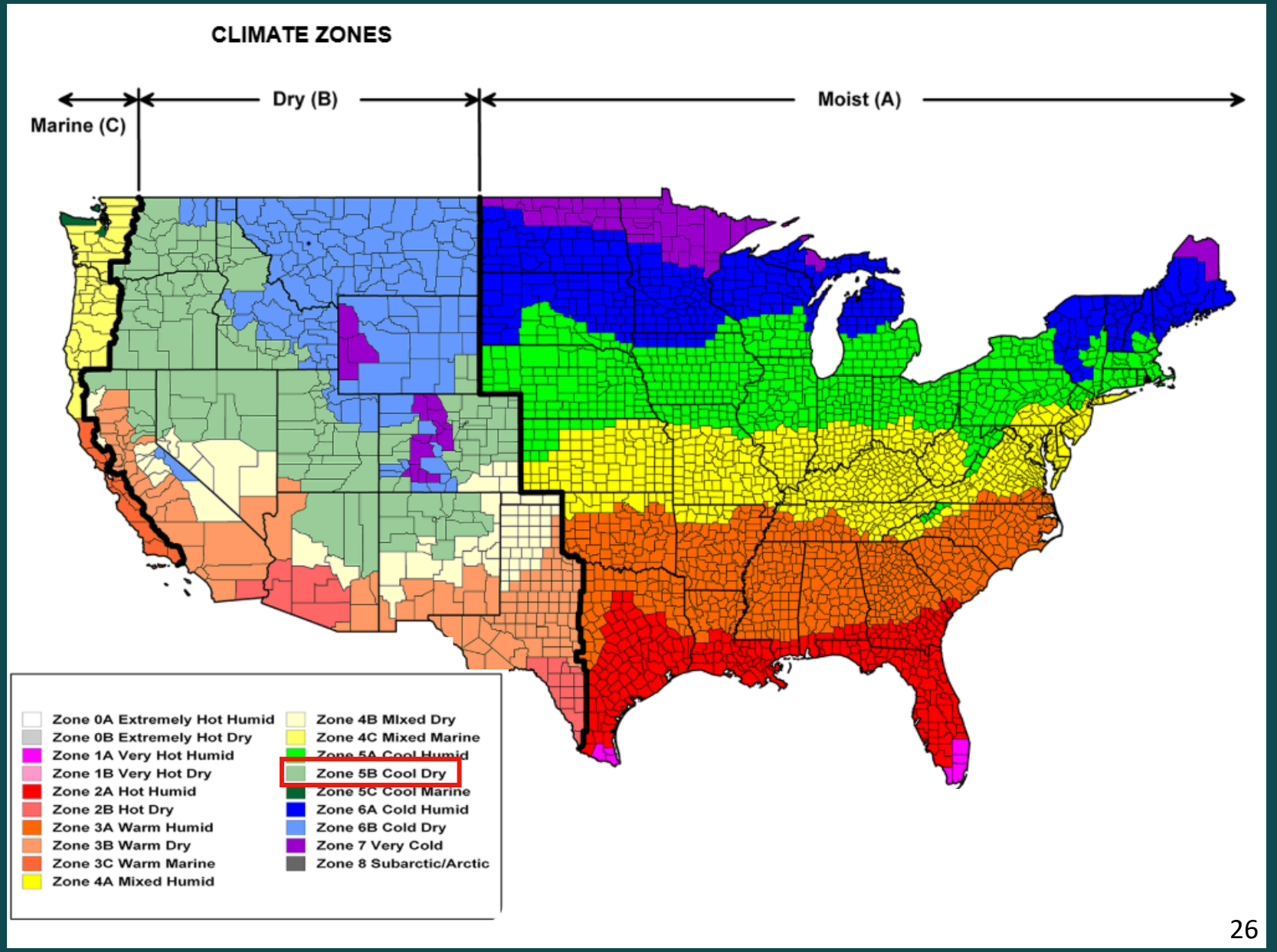
More Efficient Homes Stay Warm Longer

Time to Fall Below 40°F in a Power Outage

House model	Number of hours
Typical 1950s home	8
Typical 1980s home	23
Code-compliant 2009 home	45
Net-zero energy ready home	61
Passive House	152

Source: Rocky Mountain Institute, 2020.

8. Flagstaff has a unique climate in Arizona, and we can learn from other peer cities



9. The energy code is one of the best ways to accelerate climate action

- Buildings account for 55% of Flagstaff's greenhouse gas emissions
- The energy code is the most effective way to reduce emissions from our built environment
  - Reaching CNP goals requires net-zero construction by 2030
- A building's operations and environmental impact is largely determined by up-front decisions before construction
- Retrofits are costly and difficult

10. Local amendments will help fit the code to our local needs

- Easy to adopt the 2024 IECC with additions, deletions, and modifications to the base code and appendices
- Common for cities to adopt with local amendments
  - Flagstaff adopted the 2018 IECC with local amendments
- Building and Fire Code Board of Appeals, developers, the Flagstaff community, and staff will generate additional amendments
- Final energy code update will be slightly different than the options presented here

Energy Code Options

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Energy Code Options

Option 1	**No change** Remain on the 2018energy code. Flagstaff will be behind in meeting its climate goals.
Option 2	**Stay the course** Continue using base codes: Adopt the 2024 energy code + minor appendices. Flagstaff will be closer, but still behind its climate goals.
Option 3	**Progress to net-zero** An intermediate step beyond the base code, prioritizing energy efficiency. Flagstaff will be closer to meeting its climate goals.
Option 4	**Net-zero-ready** Buildings can become net-zero with the future addition of solar panels. Flagstaff will be on track to meet its climate goals.

Option 1: No change from current code

0% improvement in energy efficiency over Flagstaff's current code

Stay on the 2018 IECC (decline to adopt the 2024 IECC)

Maintain current energy efficiency standards

Option 2: Maintain Flagstaff's current path

15% - 29% improvement in energy efficiency over Flagstaff's current code

Adopt the 2024 base code with amendments

- Gas furnaces in new construction must be at least **95% efficient**
- Heat pumps in new construction must be **cold-climate heat pumps**

Adopt these 2024 appendices

- **Solar-ready**
- **Electric vehicle charging** (w/ amendment to ensure minimum standards are not less than current code)
- **Electric-ready**
- **Demand responsive controls** (Commercial only)

Option 2: Base 2024 IECC + Minor Appendices

Appendices

Solar-Ready Zone Appendix

Electric Ready + EV Charging Appendices

Demand Responsive Controls Appendix (commercial only):

Option 3: More progress to net-zero

24 - 34%+ improvement in energy efficiency over Flagstaff's current code

Adopt the 2024 base code with the amendments in Option 2

Adopt the 2024 appendices in Option 2 plus the following:

- **Stronger solar-ready** standards (residential)
- **Stretch code** (residential): additional +10% energy efficiency over base code
- **HVAC Total System Performance** (commercial): +5% energy efficiency
- Additional **energy credits** over 2024 IECC base code (commercial)

Option 4: Net-zero ready

31 - 42%+ improvement in energy efficiency over Flagstaff's current code

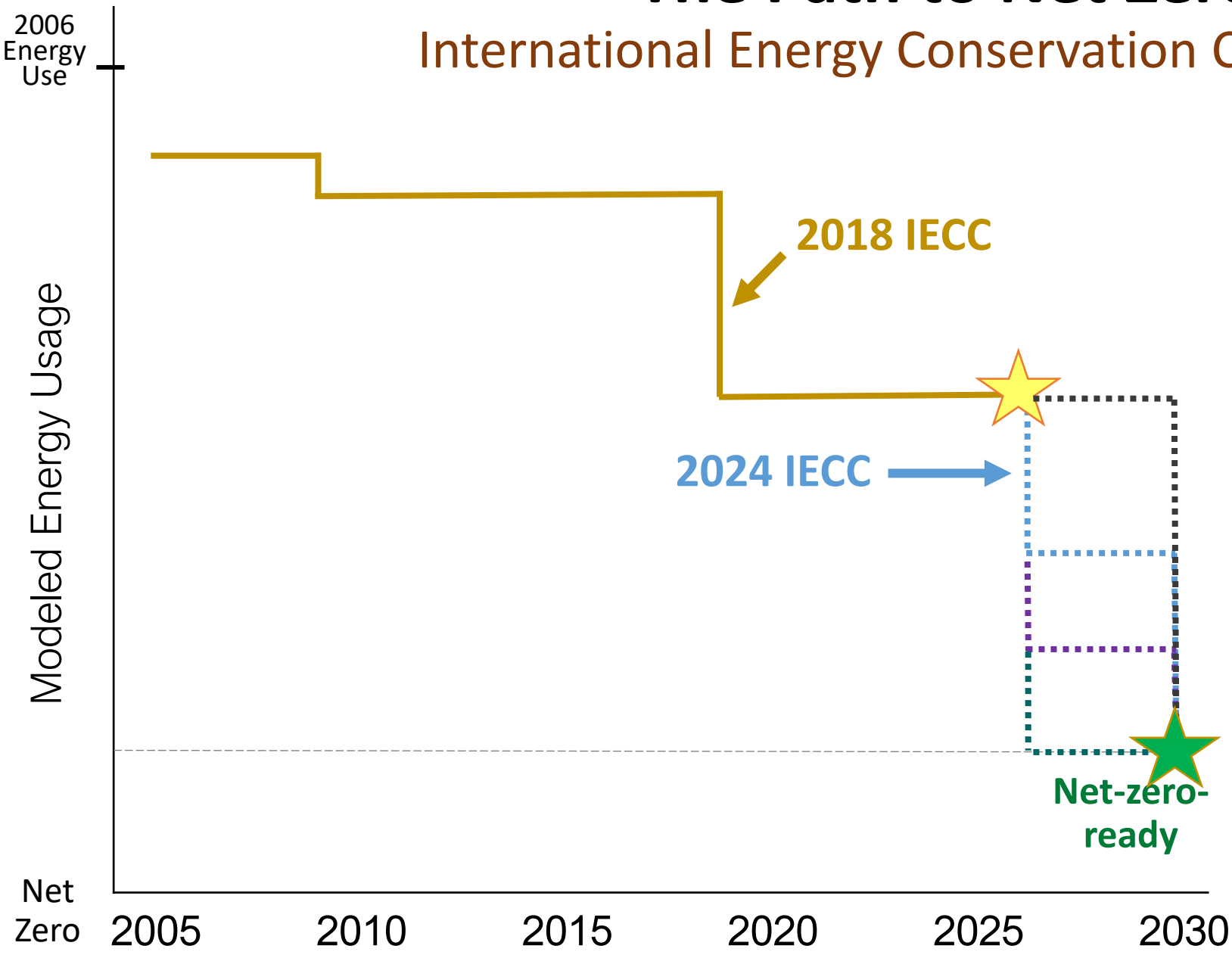
Adopt the 2024 base code with the amendments in Option 2

Adopt the 2024 appendices in Option 2 plus the following:

- **Stronger solar-ready** standards (Residential)
- **Net-zero-ready** standards (Residential: +16% energy efficiency)
- **2030 glide path** (Commercial: +29% energy efficiency)

The Path to Net Zero

International Energy Conservation Code (IECC)



Flagstaff energy code

Where we are today

Energy Code Option 1

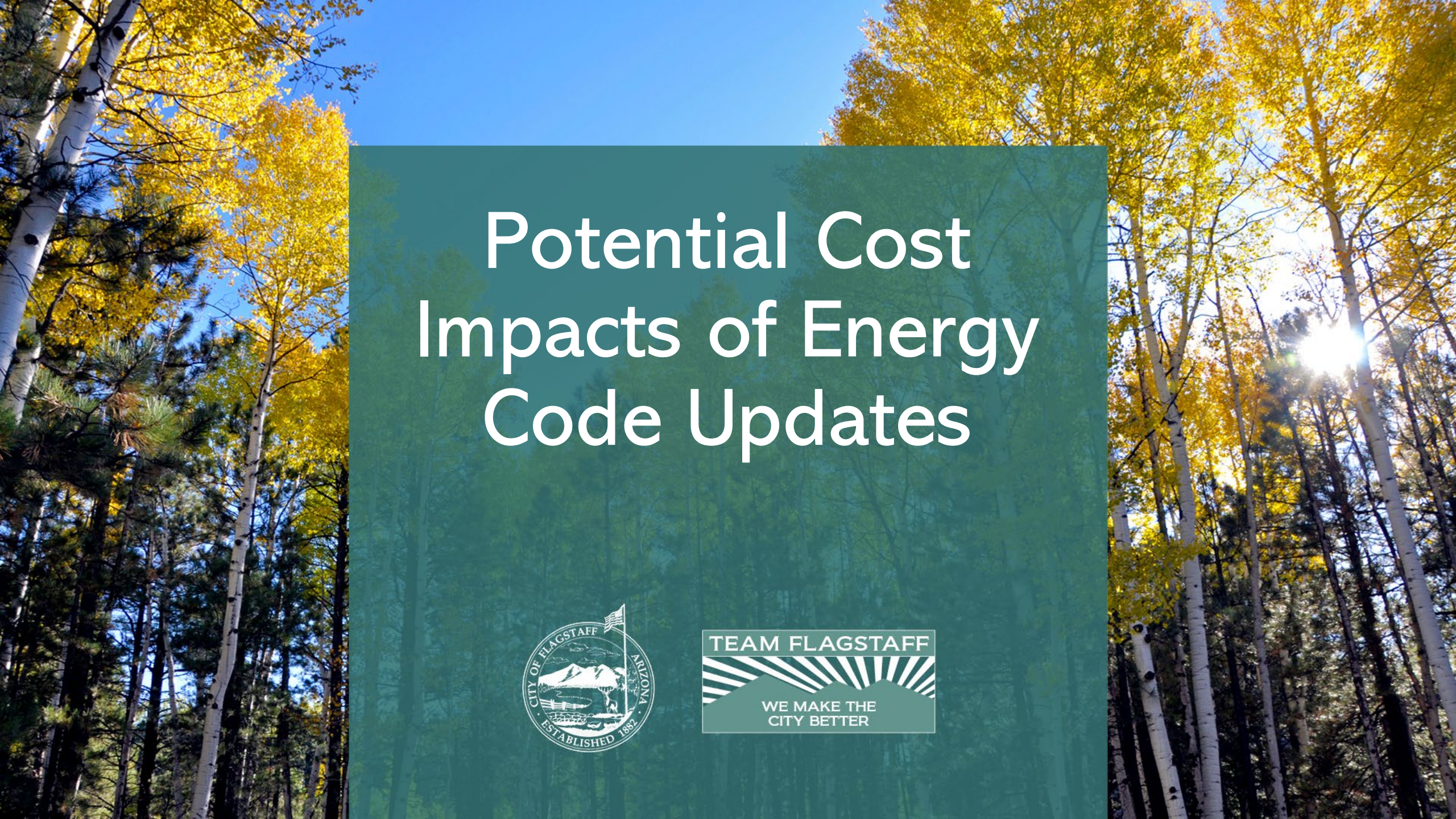
Energy Code Option 2

Energy Code Option 3

Energy Code Option 4

Net-zero ready
becomes net-zero with renewable energy

Potential Cost Impacts of Energy Code Updates



Additional Information on Costs Estimates

- Construction cost and utility savings estimates are for **single-family homes** because more data are available
- Provided as a **range** when multiple data points are available
- Should be taken as **ballpark estimates**, due to large variation in construction costs and utility cost savings based on:
  - Building type, heating and cooling system types, available utility rate plans, actual future utility rate increases, building occupant behavior, other external factors

Data Sources

- Local and national data sources:
  - *Analysis of the Costs, Benefits, and Barriers to Building Highly Energy-Efficient and All-Electric Residential Homes in Flagstaff, Arizona* – (data from 13 local builders and energy modeling)
  - Capstone Homes
  - U.S. Department of Energy (DOE)
    - Energy Information Administration
    - Pacific Northwest National Laboratory
  - National Association of Homebuilders (NAHB)
  - Rocky Mountain Institute (RMI)

Staff will continue to update cost estimates when additional data are available.

Option 1: No change

Keep the 2018 IECC: 0% improvement in energy efficiency

Additional up-front cost	$0
Additional mortgage cost	$0
Annual utility cost savings	$0
Total utility cost savings over 75 years	$0
Simple payback period (average cost)	N/A

Option 2: Stay the Course

Adopt the 2024 IECC + minor appendices: *15% improvement in energy efficiency*

Additional up-front cost	$4,300 - $14,900 ($9,700 average)	
Additional mortgage cost	$24 - $119 monthly	
Average utility cost savings	Year 1: $250 Year 12: $350 Year 30: $600 Year 75: $2,250	$21 monthly $29 $50 $188
Average utility cost savings over 75 years	$68,700	
Simple payback period	11 – 33 years *(national estimate for Flagstaff's climate zone: 16.7 years)*	

Option 3: Progress to Net-Zero

Adopt the 2024 IECC + minor appendices + Stretch Code Appendix:
24% improvement in energy efficiency

Additional up-front cost	$7,300 - $19,300 ($13,300 average)	
Additional mortgage cost	$39 - $154 monthly	
Average utility cost savings	Year 1: $350 Year 12: $500 Year 30: $850 Year 75: $3,150	$29 monthly $42 $71 $263
Average utility cost savings over 75 years	$96,300	
Simple payback period	16 – 27 years	

Option 4: Net-Zero Ready

Adopt the 2024 IECC + minor appendices + Net-Zero-Ready Appendix:
31% improvement in energy efficiency

Additional up-front cost	$8,550 – $27,400 ($18,000 average)	
Additional mortgage cost	$64 - $175 monthly	
Average utility cost savings	Year 1: $500 Year 12: $700 Year 30: $1,150 Year 75: $4,350	$42 monthly $58 $96 $363
Average utility cost savings over 75 years	$133,050	
Simple payback period	13 - 30 years	

Going Further: Net-Zero

100% improvement in energy efficiency over Flagstaff's current code

Additional up-front cost	$25,800 - $44,550 ($35,200 average)	
Additional mortgage cost	$151 - $356 monthly	
Average utility cost savings	Year 1: $1,150 – $1,700 Year 12: $1,600 – $2,450 Year 30: $2,750 – $4,400 Year 75: $10,450 – $17,550	$96 - $140 monthly $134 - $204 $229 - $366 $872 – 1,461
Utility cost savings over 75 years	$318,900 – $521,950 ($420,400 average)	
Simple payback period	12 – 25 years	

Cost Estimates for All Energy Code Options

Option	Average Additional Construction Costs	Additional Monthly Mortgage Costs	Average Monthly Utility Cost Savings (over 30 years)	Average Total Utility Cost Savings (over 75 years)	Simple Payback Period (Years)
Option 1	$0	$0	$0	$0	N/A
Option 2	$9,700	$24 - $119	$45	$64,800	11 – 33
Option 3	$13,300	$39 - $154	$47	$96,300	16 – 27
Option 4	$18,000	$64 - $175	$65	$133,050	13 – 30
Beyond Option 4	$35,200	$145 - $349	$195	$420,400	12 – 25

Commercial IECC Costs

- Costs are not provided because there is **very little data**
- Often constructed and occupied by same company
  - **Owner benefits directly** from investments in energy efficiency through lower utility costs
- Commercial buildings often **last longer** than residential
  - Utility cost savings can accrue over a longer period
- Out of state commercial developers work with building codes across the country, including codes stronger than Flagstaff's

“Complementary” code update options for Council consideration

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“Complementary” Code Options

1. Should staff explore a local amendment to allow large multifamily construction to opt into the Residential IECC?
2. Should staff explore a local amendment to make standards for radon mitigation and/or testing required for new residential construction?

Large Multifamily Can Opt Into the Residential IECC

- Large multifamily residential required to meet Commercial IECC standards in the 2024 IECC
- Commercial standards are higher than Residential
- Allowing these buildings to opt into the Residential IECC may **decrease design and construction costs**
- Several AZ cities have adopted or are considering this amendment
  - Phoenix, Tucson, Chandler, Avondale

Radon Gas Overview

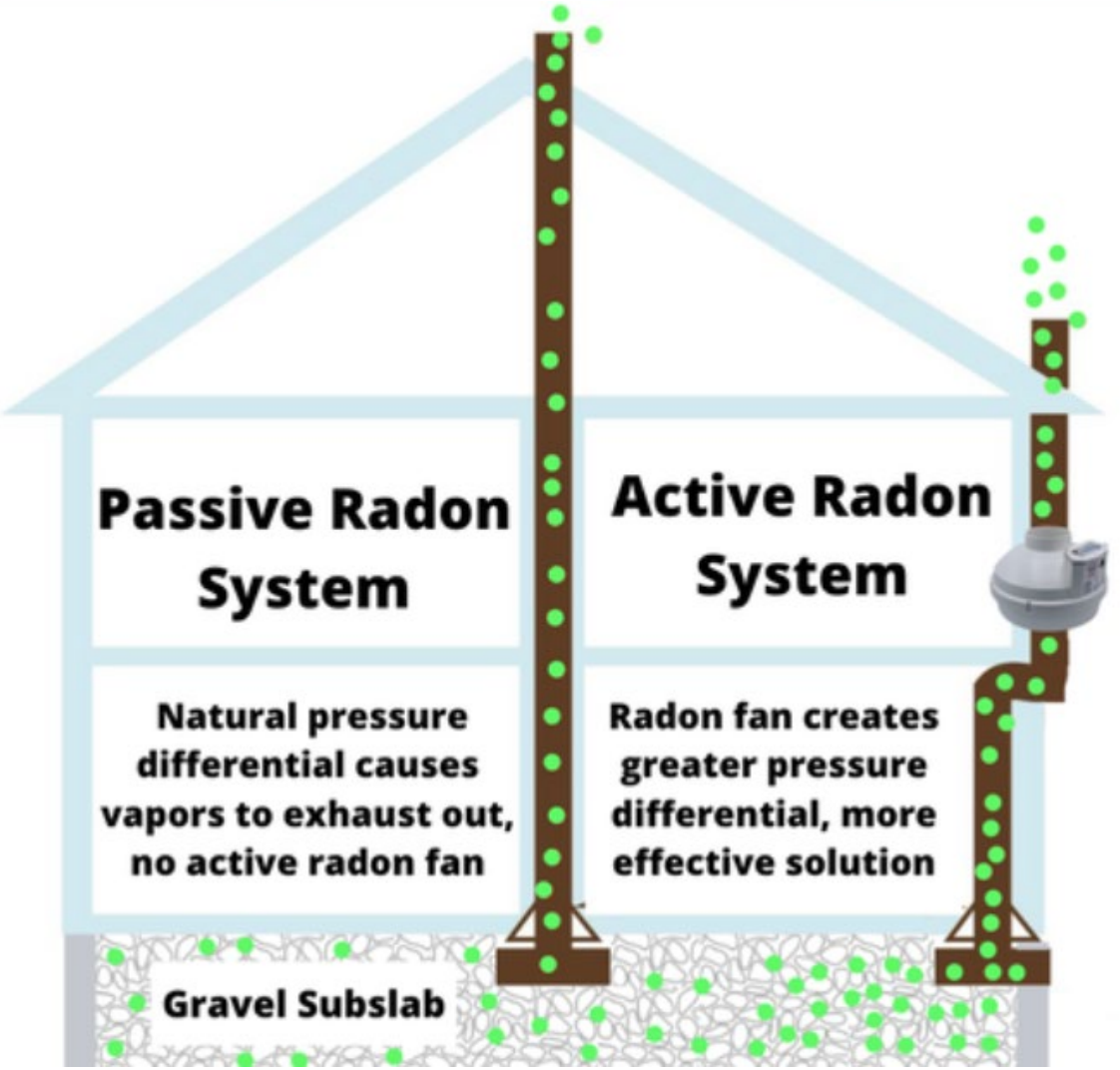
- **Leading cause of lung cancer in non-smokers**
  - 21,000 people die annually in the U.S. from lung cancer caused by radon
- No safe level of radon
  - EPA maximum recommended level of 4.0 pCi/L is the equivalent of **smoking 8 cigarettes a day**
- Colorless, odorless radioactive gas from the breakdown of uranium
  - Concentrates in buildings without radon-resistant features

Why are we talking about radon?

- Energy efficiency can **increase** indoor radon
  - Air-tight homes offer fewer pathways for radon to escape
  - Not part of the IECC (but can offset a potential impact of the IECC)
- Flagstaff adopted **Appendix F: Radon Control Methods** and the **International Mechanical Code** in 2018
  - Provides standards for **passive** radon mitigation in new construction
  - Standards are **optional** because the EPA identifies Coconino County as having *moderate* radon potential (2-4 pCi/L)
- Anecdotal evidence suggests **radon is present in Flagstaff**, and at higher concentrations than 4pCi/L

Benefits of Radon Mitigation during Construction

- *Passive* mitigation during construction is **easier, less costly, and more effective**
  - National estimate: $350 - $500
  - Can reduce radon by **99%**
- Active mitigation (retrofit) is **more costly, difficult, and less effective**
  - Radon fan costs $2,300 in Flagstaff
  - Can reduce radon by **90%**
- **2024 IRC and the IMC standards are for passive mitigation**
  - 2024 IRC radon appendix also requires testing (and active mitigation if needed)



Summary and Questions

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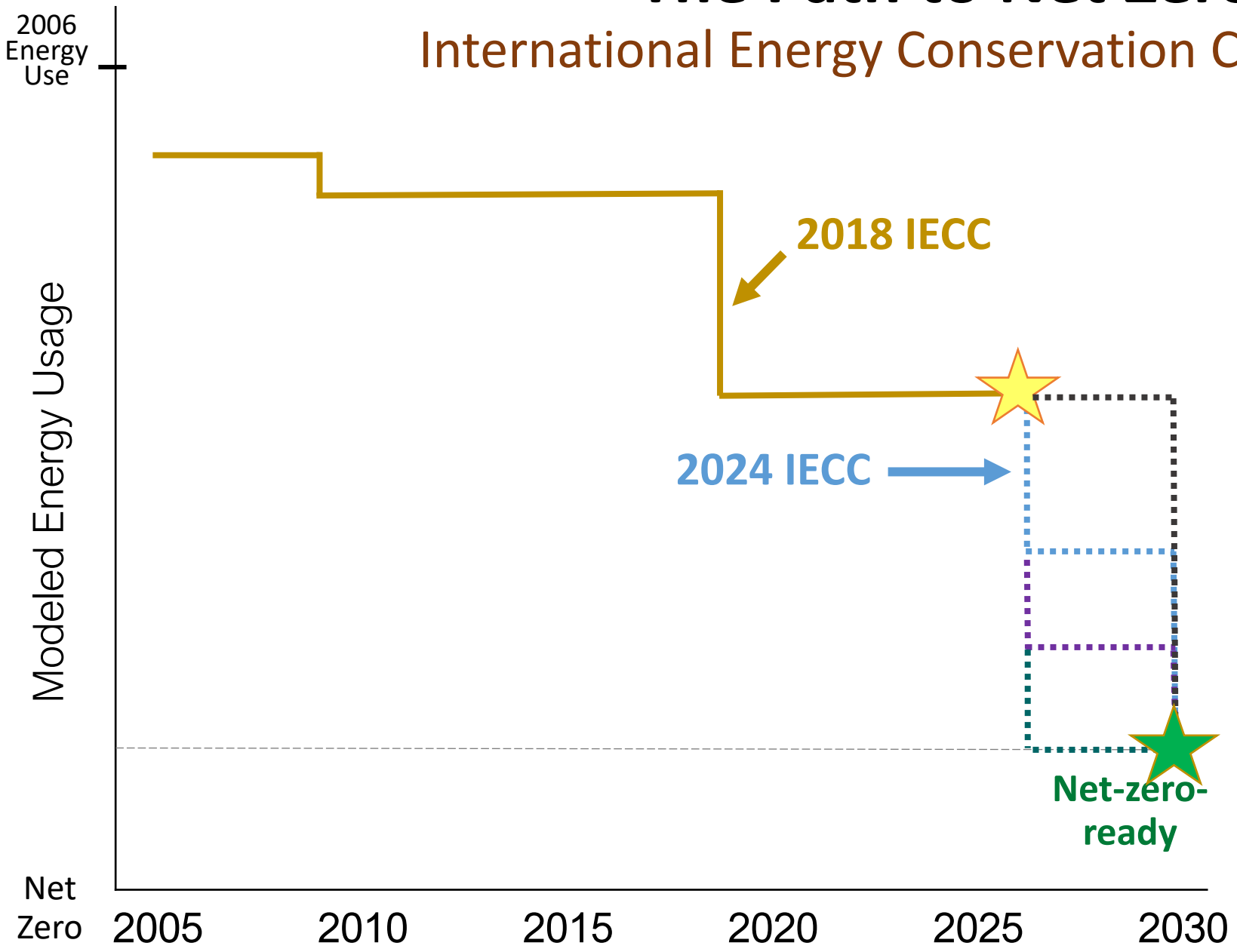
Next Steps

Today	City Council direction on preliminary energy code options
January – March 2026	Staff research on energy code options, based on Council direction
	Community engagement on *all codes*: staff (including legal review), design community, developers, City commissions, Board of Appeals, community members
April - May	City Council work sessions to review all proposed code updates and finalize draft amendments
June-July	City Council review and adoption process

The Path to Net Zero

International Energy Conservation Code (IECC)



Flagstaff energy code

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Council Direction: Question 1

What energy code option should staff explore?

Option 1	**No change** Remain on the 2018 energy code. Flagstaff will be behind in meeting its climate goals.
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Option 4	**Net-zero-ready** Buildings can become net-zero with the future addition of solar panels. Flagstaff will be on track to meet its climate goals.

Council Direction: Question 2

Are there any other energy code options that Council would like staff to pursue, beyond the options presented here?

Council Direction: Question 3

What "complementary" code options should staff explore, if any?

1. Allow new large multifamily buildings to opt into the Residential IECC
2. Require radon mitigation and/or testing for new residential construction?

Council Direction: Question 4

What additional information will be helpful to include when staff return to Council with proposed energy code updates in mid-2026?

Thank you

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