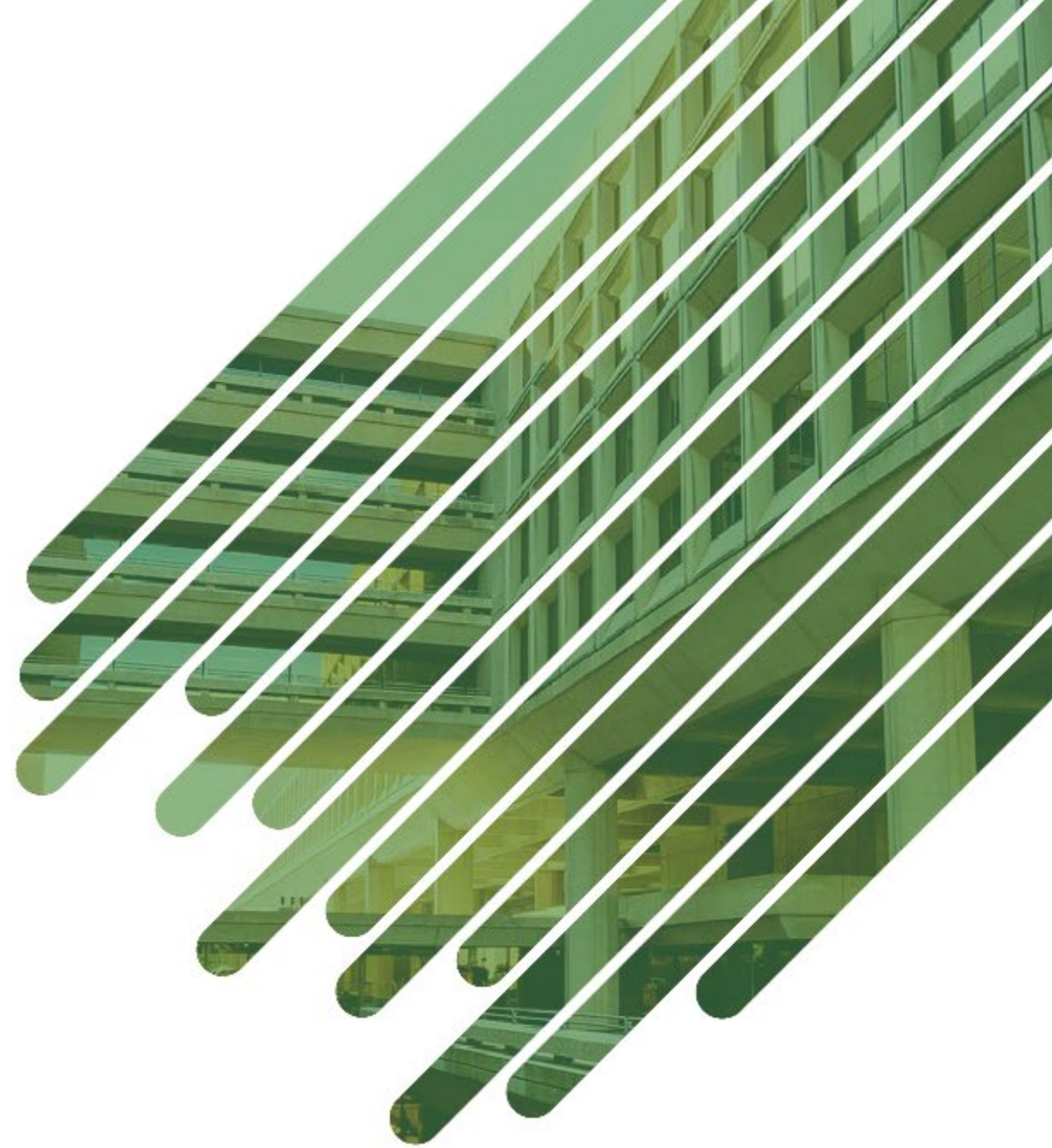




U.S. DEPARTMENT OF
ENERGY

Market Transformation: Need and Opportunities

Discussion with States
March 15, 2024

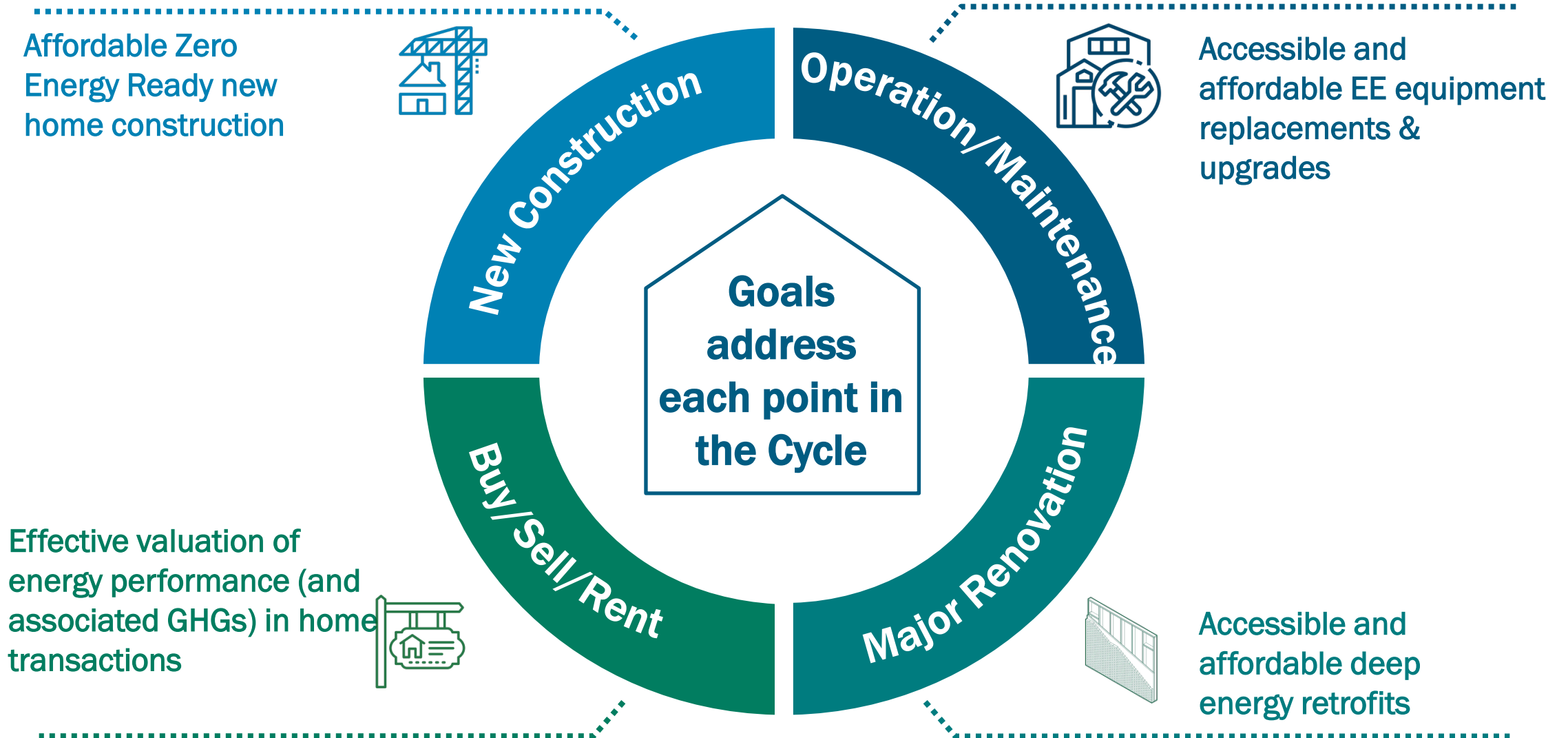


Why it's essential to implement plans that drive EE beyond \$8.8B rebates

- U.S. residential building stock consists of 120 million housing units
 - ~ 80 million single family homes (approximately 7 million are manufactured homes)
 - ~ 40 million multifamily units
 - Estimated that residential sector accounts for ~ 50% of peak electricity load¹
 - More than 20% of nation's energy use & carbon emissions
 - Over 70% of today's residential buildings will be in use in 2050 ([NREL Restock](#)).
- Home energy retrofit rate is extremely low ~ 2% annually
- The annual rate of residential new construction is only around 1% (plus accounts for additional energy/GHG for materials & construction)
- Rebates expected to “touch” approximately 1 million of those homes – less than 1% of residential units

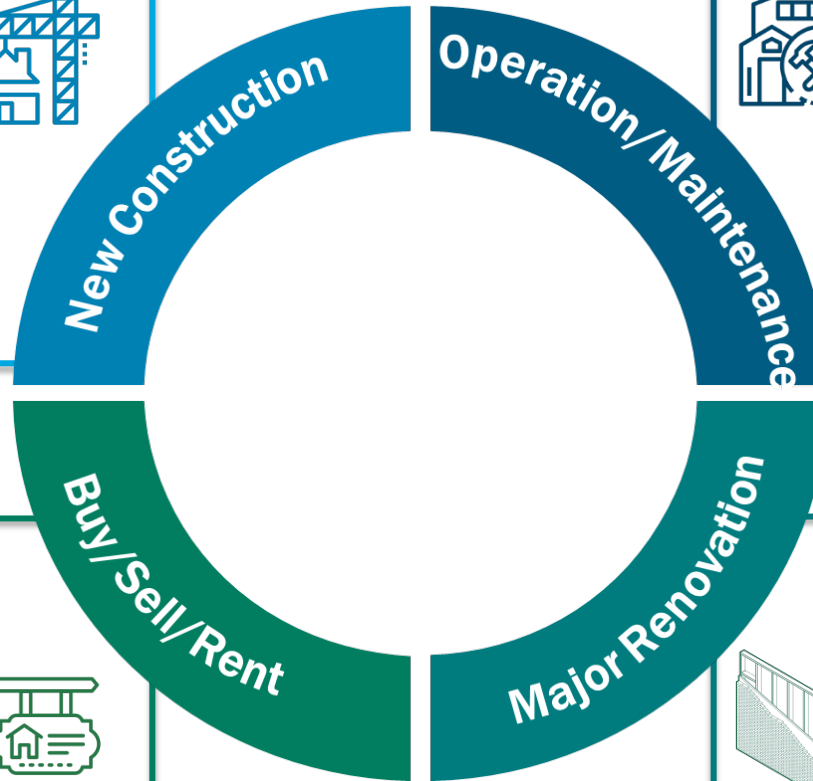
¹ In 2018, the Texas residential sector consumed 37% of total electricity generation in the state and contributes disproportionately to system peak load (53% in 2011) [9], [10]; [Quantifying the impact of residential space heating electrification on the Texas electric grid - ScienceDirect](#)

Seizing Opportunities for EE at Key Points in Home Cycle



Magnitude of Market Opportunities

- 1.4 million homes are built each year. About 1 million of these are single family homes ([U.S. Census Bureau](#)).
- Over a half million new single-family homes are sold annually ([U.S. Census Bureau](#)).



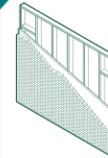
- ~85 million major home appliances and equipment shipments annually ([Statista](#)).
- Homeowners spend ~\$90 billion annually on energy equipment replacements and home maintenance, accounting for about 30% of annual homeowner expenditures ([JCHS 2021](#)).



- Over 5 million existing homes are sold annually ([NAR](#)).
- 44 million households are renters, with 16.5 million of these in single-family homes ([EIA RECS](#)).
- ZERH tax credit provides \$5K per unit*



- In 2019, there were about 16 million home renovation projects in the U.S. ([JCHS 2021](#)).
- Homeowners spend around \$110 billion annually on major remodels, additions, and envelope replacements projects ([JCHS 2021](#)).



* DOE may develop specs for Zero Energy Ready Homes (ZERH) existing homes to be eligible for tax credit.

MT Strategy #1: Value EE at Point of Sale & Rental

- ✓ 50121 requires third-party certificates designed to capture this value
- ✓ Key to driving market:
 - Ensure that information consistently measures a home's energy performance (particularly after upgrades)
 - Home Energy Score and its associated metrics generated through consistent method for measuring a home's energy performance
 - Applies standard operating assumptions, strictly defined ways to measure insulation, square footage and other key parameters)
- ✓ Benefits of Home Energy Score
 - Analytically based
 - Recognized by FHA, Fannie Mae & Freddie Mac
 - Still very niche products, strong indications that this will become a real factor in the future
 - Principal way to ensure that information can be used by mortgage and refinancing sectors
 - Provides a simple way to value otherwise invisible assets
 - Goals: Becomes standard part of home appraisals; drives lending to homeowners and buyers to invest in improvements

MT Strategy #2: Improve Delivery Models of EE Upgrades

✓ Address poor installation

- Between 60% and 90% of HVAC installed improperly
 - Results in reduced efficiency/higher bills, greater maintenance costs, refrigerant leakages

✓ Reduce overall costs – program transaction costs, time for installations

✓ How?

- Strategize about how to get the **biggest bang for your buck** in terms of a combination of **training, standards for the workforce, documentation of installation, diagnostics, inspections and follow-up** (contractors, etc.)
 - Example: require contractors and inspectors to do simple steps like checking all vents for air flow
- **Match qualifications of workers to task** (don't use highest end labor for simpler steps)
- **Use purchasing power** to drive manufacturer integration of automated fault detection & diagnostics
 - Comparable to check engine light (Clean Air Act requirement)
- **Educate homeowners and contractors** about existing AFFD systems and what to look for in terms of quality installation
 - Currently available features are not widely communicated to homeowner
 - **Installation guidelines** are available (for example, DOE's Home Improvement Checklists – available on PNNL web site)

MT Strategy #3: Grow Qualified Workforce

✓ Attract new entrants to workforce

- High school vocational programs & technical colleges; disadvantaged communities
- Make the field “appealing”
 - Opportunities for growth; partnerships with contractors from apprenticeship after demonstrating ability on initial tasks
 - Relevance to multiple career pathways (trades, builders, home inspection, real estate, property management)
 - Connection to potential areas of interest -- tech, green jobs, customer service

✓ Use new entrants and lower-skilled/lower cost labor for multiple functions

- Create pool of Home Energy Score Qualified Assessors* by leveraging DOE’s free training, testing, and support
- Home Energy Score Qualified Assessors: example of less specialized workers who can serve multiple needs
 - Collect data for assessments; potentially include desk review by more skilled contractor who will perform the upgrade
 - Use Home Energy Score to fulfill BPI 2400 requirement for homes without calibration
 - Conduct basic post-upgrade walkthroughs to help triage quality inspections and focus on those found to potentially have problems with installation

* DOE program is working on further simplifying process of becoming qualified assessors

Follow up on these and other opportunities

- I'm happy to brainstorm and help if interested.
- Please contact your project officer and cc me to set up a time to discuss.
- Joan.Glickman@hq.doe.gov
- 301-395-1735 (if you find it easier than email, feel free to text me)