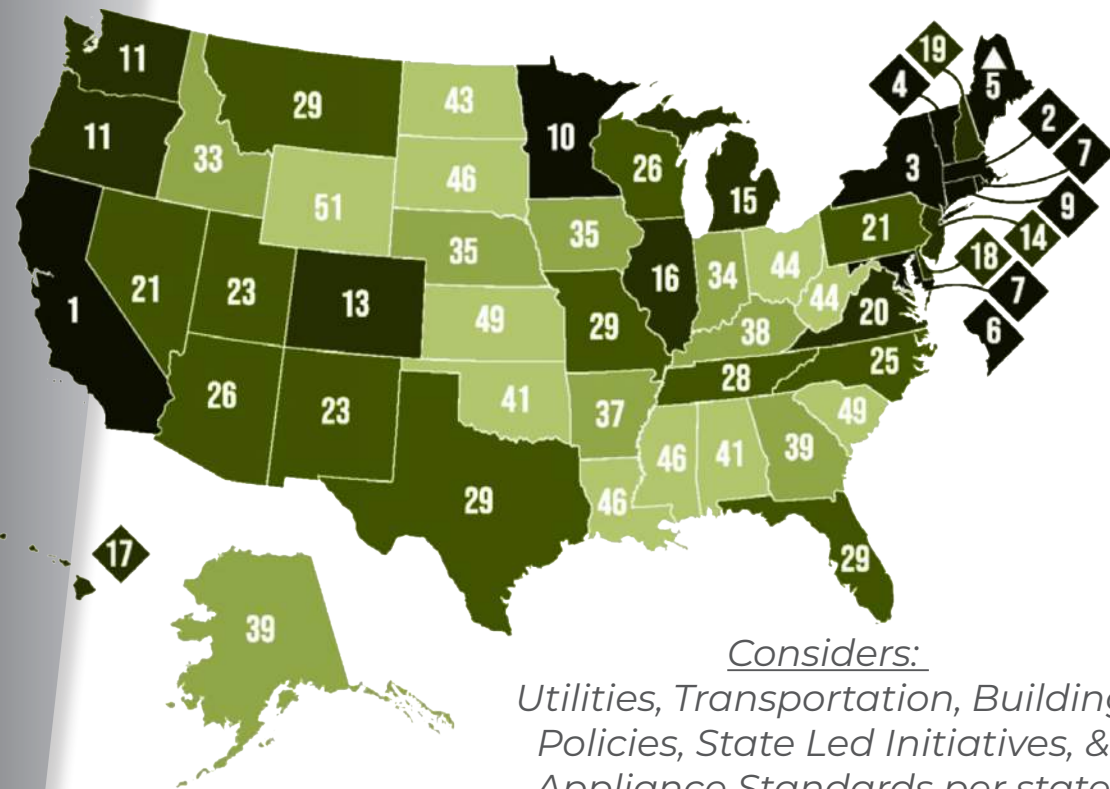


Whitman: A Green Community

2022 US Scorecard for Energy Efficiency

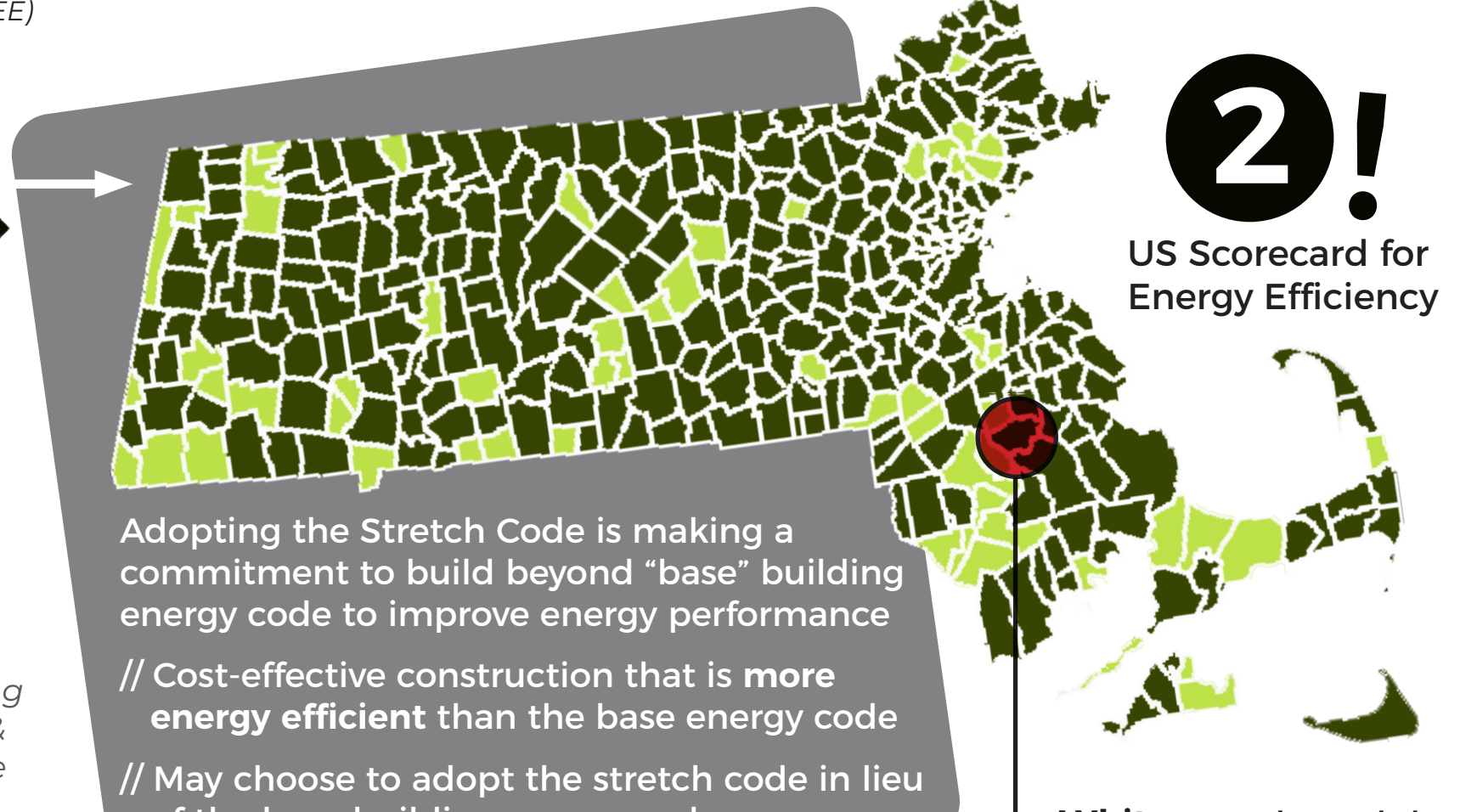
American Council for an Energy-Efficient Economy (ACEEE)



*Considers:
Utilities, Transportation, Building
Policies, State Led Initiatives, &
Appliance Standards per state*

- Ranks 1-10
- Ranks 11-20
- Ranks 21-30
- Ranks 31-40
- Ranks 41-50
- ☆ Rising States

MA Stretch Energy Code Adoption by Community



- Adopted the MA Stretch Code (79%)
- Unadopted the MA Stretch Code (21%)

Whitman adopted the Stretch Code in **2016** and is a designated **Green Community** by the Dept. of Energy Resources (DOER)

Energy Goals & How to Achieve Them

Nearly 40% of all CO2 pollution comes from power plants burning fossil fuels

STRETCH CODE UPDATES:

In July 2023, the new Stretch Code updates will automatically go into effect for all communities that have previously adopted the Stretch Code.

- // Primarily includes new limits on the energy used for building heating and cooling systems
- // Exterior envelope requirements for continuous insulation & reduction/elimination of thermal bridging
- // Projects 5 stories or less must be solar ready (involves leaving at least 40% of roof area available for future PV and installation of electrical conduits)
- // To achieve Net-Zero Energy, renewable production must be on site (ownership vs. a PPA does not matter; just need to prove installation of the system)



Producing electricity on site is more attainable today than ever before, for both **technology** and **cost**. Schools with this capability are great **resources** for communities and the municipality at large.



Reducing demand is another way of practicing **sustainability**, or meeting the needs of the present without compromising the needs of the future. Maintain **ecological balance** by only using as much energy as required.



Fossil fuels are non-renewable resources; there is a finite amount that will **eventually deplete**. The burning of fossil fuels increases a building or site's carbon footprint, a source of **climate change**.

Additionally, the MA Board of Building Regulations & Standards (BBRS), is required to update its building code every three years to be consistent with the International Energy Conservation Code (IECC).



TEDI EUI NZE

THERMAL ENERGY DEMAND INTENSITY

A measure of envelope performance, air infiltration, & ventilation energy recovery

HEATING TEDI (kBtu/sf/year) vs. COOLING TEDI (kBtu/sf/year)

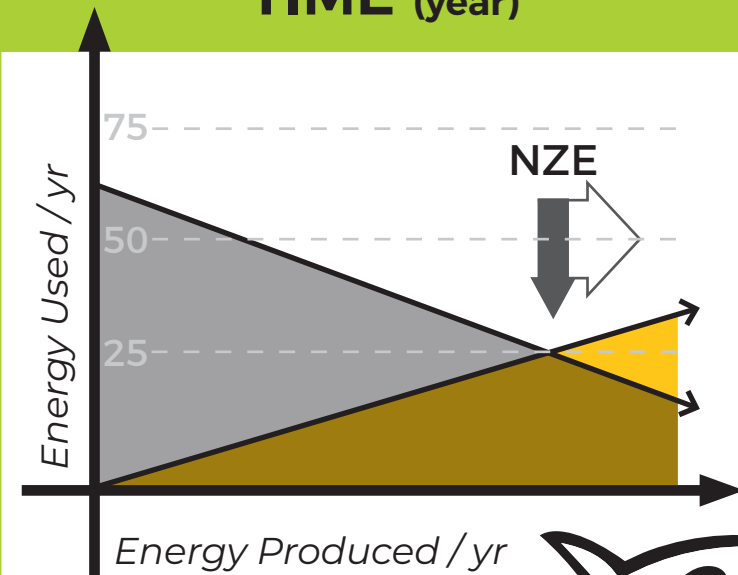
Size of School	Heating TEDI Limit	Cooling TEDI Limit
> 125,000 sf	2.2	12
75,000 sf - 125,000 sf	$2.7 - 4e^{-6} \times sf$	$2.7 - 1.6e^{-4} \times sf$
< 75,000 sf	2.4	20

Energy delivered to the building (heating) vs. Energy removed (cooling)

ENERGY USE INTENSITY

A measurement of a building's energy efficiency calculated as:

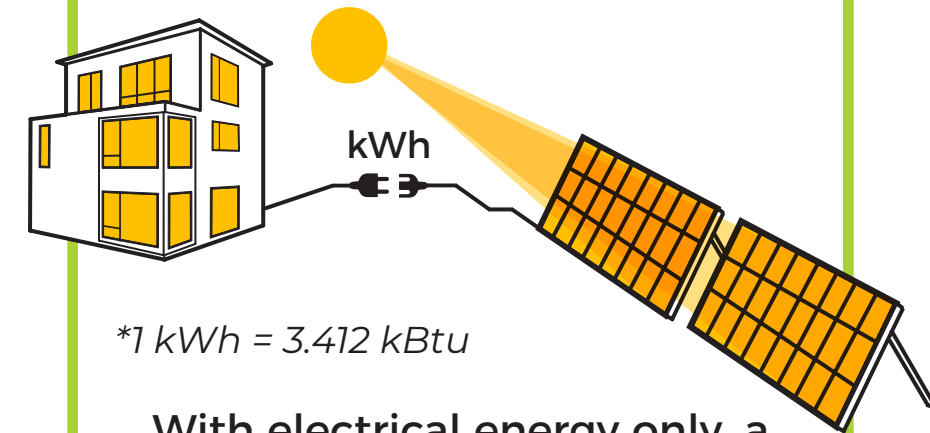
$$\frac{\text{ENERGY USED (kBtu)* / AREA (SF)}}{\text{TIME (year)}}$$



NET-ZERO ENERGY

When the total amount of **energy used** by the building annually is less than or equal to the amount of renewable **energy produced** on site

ENERGY USED ON SITE (kWh)*
less than \leq or equal to
ENERGY PRODUCED ON SITE (kWh)



With electrical energy only, a building can eliminate fossil fuel use entirely

New Stretch Code energy efficiency measurement tool

→ TEDI is "demand" while EUI is "consumption" →

25:
Typical target EUI to achieve NZE

How Everything Comes Together

RENEWABLE ENERGY SYSTEM:

// The building is **not directly served** by the renewable energy produced; this still goes to the grid before the grid distributes it back to the building for power

// Similarly, power from the ESS is not directly supplied to the building, it goes to the grid

The stored power contributes to Massachusetts overall, not just the municipality, but the financial return drives the incentive

// The ESS is **not a substitute** for the generator on site because stored electricity from the ESS cannot be directly sent to the building

// National Grid will determine if nearby electrical service is capable of taking the medium voltage that would be produced by a renewable energy system at Whitman Middle School

This will be determined by an Interconnection Study in later phases of the project

