

Addendum to 239 Review - Tompkins County Energy Recommendations for New Construction

The Tompkins County Energy Roadmap (2016) is intended to help inspire immediate action to reduce energy use and transition to renewable energy as a way to help meet our County's 80% greenhouse gas emission reduction goal by 2050. Constructing buildings at higher energy standards and incorporating renewable energy systems are essential to attaining that goal. We recommend that all applicants for new construction address how they will support this goal, including whether they intend to follow the recommendations under each of the following five elements.

1) ENERGY STAR products include a wide range of equipment and appliances that are independently certified to save energy without sacrificing features or functionality. Water saving fixtures can reduce energy needed for hot water.

Recommendations:

- Require that water fixtures meet EPA's Water Sense requirements.
- Require that permanent appliances (apartment refrigerators, restaurant cooking equipment, etc.) be ENERGY STAR rated.

2) Recent advances in heat pump design have reduced installation costs and made them more cost-effective than electric resistance heat, propane, and oil, and close in life cycle costs to natural gas. Use of electric heat pumps allows elimination of fossil fuels as they can be powered by renewable energy sources such as solar photovoltaic.

Recommendations:

- Utilize electrically-powered heat pump systems (ground or air-sourced heat pumps); avoid boiler-assisted heat pump systems, avoid systems that burn fossil fuels.
- Utilize air-sourced heat pump hot water heaters.

3) The state has a goal that 50% of NYS electricity will be generated by renewables (solar, wind, hydropower, biomass) by the year 2030.

Recommendations:

- Design roofs to be "solar receptive": Maximize area available for solar collection systems. For pitched roofs, place roof-mounted components (plumbing vents, exhaust fans, etc.) on north-facing roof surfaces, to keep south-facing surfaces available for solar collection systems. Orient one roof surface to the south, plus/minus 30 degrees, to maximize potential for solar energy.
- Maximize solar collection systems on available roof areas, and consider using high-production solar panels to maximize solar production for a given roof area, especially for medium-rise and high-rise buildings.

4) Energy efficient building design begins with the building envelope -- the walls, windows, foundation and roof.

Recommendations:

- Design window-to-wall ratio less than 25% (the new energy code requires 30% or less). Keep large windows on south-facing surfaces and important facades, minimize windows on north-facing surfaces and in spaces which see low occupancy (stairwells, corridors, utility rooms, etc.).
- Avoid unusually complex building shapes.
- Use 20% more insulation R-value than required by the energy code.
- Use best practices for minimizing infiltration and stack effect, and require inspection/commissioning of these elements: vestibules at entrance doors, air sealing around window and door frames, sealing at exterior wall/floor junctions, and guarded blower door testing of individual spaces or entire building floors.

We recommend that all applicants for new construction of greater than 20 units also address whether they are intending to follow the recommendations under each of these three added elements.

5) Lighting controls and high-efficiency lighting technology (such as LED or induction) offer significant benefits including greatly reduced energy use and cost, sophisticated controls, simplified maintenance and longer life.

Recommendations:

- Perform lighting design on a space-by-space basis, using the space-by-space lighting power density method (not the whole-building method). Use LED lighting where possible. Design to lighting power density of 15% less than required by the energy code.
- Require occupancy sensors where possible, for both indoor and outdoor lighting. Require short off-delay (1 minute or less), and commissioning of lighting controls.

6) High-efficiency heating and cooling systems cost incrementally more than standard- efficiency but have a positive payback over their useful life.

Recommendations:

- Select high-efficiency heating and cooling plants with rated efficiencies at least 15% higher than required by the energy code.
- Select high-efficiency domestic hot water (DHW) plants with rated efficiencies at least 15% higher than required by the energy code.
- Avoid placing heating and cooling distribution systems in unheated spaces, such as attics, basements, etc. Give preference to systems that have efficient distribution systems and low distribution losses (for example, room-by-room fan coils).
- Use energy recovery ventilation systems in air-conditioned buildings, and heat-recovery ventilation systems in buildings that do not have air-conditioning. Design ventilation systems separate from heating and cooling systems.
- Assess ductwork for heating, cooling and ventilation. If leakage is greater than 10%, seal chases and shafts with aerosol duct sealing process.
- Select heating/cooling systems that allow thermal zoning on a space-by-space basis.

7) Whole building energy models can allow you to dramatically reduce energy costs, reduce carbon emissions and even reduce some construction costs.

Recommendation: Employ whole-building energy modeling to optimize building energy performance.