

Thousand Home Challenge - Many Paths To Thermal Comfort¹

	Community Solutions	Behavioral Choices	Technical Fix – higher cost²	Technical Fix – lower cost	On-Site Renewables
Estimated Range - % Reduction³	20% – 60%	10% – 80%	30% – 90%	5% – 80%	10% – 110%
<p>Thermal comfort accounts for 25% to 80% of the residential energy use / household</p> <p>Options to reduce the energy use per person needed to achieve affordable, sustainable thermal comfort</p>	<p>Feedback, benchmarking, aggregation</p> <p>Competitions / Challenges within & between communities</p> <p>GHG reduction campaigns</p> <p>Comfort centers</p> <p>Cogen or micro-cogen</p> <p>Use of waste heat from commercial or industrial processes</p> <p>Community-based thermal storage</p>	<p>24/7 set point adjustment or setback</p> <p>Apply comfort zone</p> <p>Change use of space; new thermal boundaries</p> <p>Adaptive comfort (clothing, surface temp, air movement)</p> <p>Increase occupancy</p> <p>Reduce internal gains (behavioral – cooling loads)</p> <p>Decrease occupancy: (short-term or long-term) relocate or demolish</p>	<p>Climate specific, thermal bridge free, superinsulation: (walls, ceiling, floor, foundation R 25 – R 80)</p> <p>Efficient windows (climate specific SHG, + U 0.1 to 0.3)</p> <p>Super air tightening (to 0.1 CFM/ft² surface area or less)</p> <p>High efficiency mechanical ventilation</p> <p>Ultra high efficiency HVAC system</p> <p>Automatic movable window insulation</p> <p>Highly insulated doors</p>	<p>Fill cavities with insulation</p> <p>Air sealing (to 1 CFM50/ft²)</p> <p>Do-it-yourself insulation / superinsulation</p> <p>Seal / insulate attic ducts; better yet eliminate ducts</p> <p>Point source for heating or cooling</p> <p>High performance storm windows</p> <p>Manually controlled movable window insulation</p> <p>Reduce internal gains technical fix (cooling loads)</p> <p>Control systems to optimize comfort, IAQ, & humidity control</p>	<p>Increase / decrease solar gain through windows</p> <p>Sunspace or solar buffer to reduce heat loss</p> <p>Trees, vegetation, or other shading to reduce cooling loads</p> <p>Wood heat (EPA approved)</p> <p>Active solar thermal</p>

¹ The items in each column are not listed in order of importance. Achieving deep reductions requires a combination of options shown both within and between the columns, optimized in response to the site, occupants, resources, and the community.

² When making a significant investment to achieve deep reductions, reducing the load substantially by increasing the performance of the building enclosure can result in the elimination of a conventional centrally distributed heating or cooling system.

³ This percentage relates just to the reduction of the thermal comfort load. While the highest percentage reductions may be more possible in cooling-dominated or moderate climates than cold climates, larger absolute savings result when preconsumption is highest.