

New Policy

TREE RETENTION AND PLANTING TO REDUCE HEATING AND COOLING LOADS

Policy summary: Trees help to reduce heating and cooling loads in buildings. This policy would provide incentives to plant new trees around existing housing, and retain trees within new housing developments, to conserve energy and reduce GHG emissions. This pilot program might be feasible within current utility efficiency programs, or might require new funding and/or regulatory authority.

Economy-wide GHG emissions reduced in 2020	100,000 metric tons in 2020, 300,000 tons in 2035 from trees planted by 2020
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Clean energy economy impacts: On the order of 500 direct jobs per year from the scale of tree planting envisioned here, in nurseries, planting, and maintenance. Reduced energy costs and lower fuel imports.

Rationale: Strategically located around housing, trees can significantly reduce cooling and heating loads.³⁰ Retaining trees when new homes are built, and planting new ones around existing housing, can be a low-cost means of saving energy and reducing GHG emissions. Optimally trees should be located on the southeast and southwest sides of a building to provide shade and reduce air conditioning load. Evergreen trees planted on the north and northwest sides (given prevailing winds in Massachusetts) provide wind breaks and can reduce winter heating needs. Retaining and planting trees could be subsidized by the electric and gas utilities on the same basis that they provide incentives for other efficiency measures.

Design issues: For existing residential buildings, incentives could be provided to owners to plant new trees in the correct locations. For new housing development, incentives could be provided to developers to retain existing tree cover, and to particularly keep trees in the optimal locations for cooling and heating savings. Another option would be to provide incentives to municipal governments that pass local planning ordinances requiring developers to follow specific tree retention practices. Because trees generally take 15 years to reach their full shade potential, this policy would need to begin soon to have much impact by 2020. On the other hand, even if impacts by 2020 are small, they will rise after 2020 as trees mature, contributing to the 2050 GHG requirement.

³⁰ Studies of large scale tree-planting programs in New York, Chicago, and Philadelphia resulted in a 1.7C average reduction in maximum air temperature in the hottest areas. Chicago heat island reduction measures reduced annual cooling degree days by 39. "Energy Savings for Heat-Island Reduction Strategies in Chicago and Houston (including updates for Baton Rouge, Sacramento, and Salt Lake City," S. Konopacki and H. Akbari, 2002, Lawrence Berkeley National Laboratory LBNL-49638; "Shade trees reduce building energy use and CO2 emissions from power plants," H. Akbari, 2002, *Environmental Pollution* 116: S119-S126; "Energy conservation potential of urban tree planting," E.G. McPherson and R.A. Rountree, 1993, *Journal of Arboriculture* 19(6):321-331. Trees also reduce ambient air temperature through evapotranspiration. Per-tree calculation: a single white spruce with dbh 8inches is projected to save 1.1MBTU in heating energy for a single family home in Boston. (Casey Trees, based on the USFS iTree model). Toronto area heat energy savings: single family residences saved 3 percent (built pre-1980) and 2.5 percent (after 1980); efficient R-2000 houses 2 percent; row-houses 1.6 percent (built before 1980) and 1 percent (built after 1980) (Konopacki and Akbari, 2002).

GHG impact: About 100,000 metric tons CO₂e potential by 2020 under realistic assumptions of possible participation. Savings become much greater over time, rising to 300,000 tons in 2035 from the trees planted/retained by 2020, because most will not have reached their full growth until well past 2020. (Note that GHG savings from trees sequestering CO₂ are real but are not included here. Due to data problems, tree sequestration is not included in the 1990 baseline emissions estimate, nor are reductions or increases in sequestration in the years since then included. Without those numbers it is not valid to include sequestration gains due to a policy measure.)

Other benefits: Trees significantly improve the quality of life for immediate residents and the neighborhoods around them. This may have other secondary benefits which have not been quantified — such as higher real estate values, better-maintained homes, lower crime, etc.

Costs: Depending on the scale and scope of these programs, their costs could vary greatly. More than most efficiency programs, the benefits accrue over a long time period. Pilot programs between state agencies and utilities will allow for analysis of cost and benefits, as well as identifying implementation issues. One current estimate is on the order of \$150 per tree for purchase and planting.

Equity issues: To fairly distribute benefits to urban and lower-income residents, it would be essential to ensure that the tree planting take place on a large scale in cities as well as around suburban homes, despite the likelihood of greater siting difficulties. As with the existing efficiency programs, this could be a particular challenge for rental housing, where landlords often lack the incentive to cut energy costs when tenants are paying the electricity and/or heating bills. Greater efforts would need to be made to achieve participation in rental properties.

Experience in other states: Utility-funded tree-planting programs are already in place in several cities and states. Sacramento, CA has avoided the cost of constructing a new 19 MW power plant by planting over 450,000 trees next to homes. With funding from the Sacramento Municipal Utility District (SMUD), the Sacramento Shade (for residences) and Neighbor Woods (for public spaces) Programs aim to plant 5 million trees by 2025. Residents are eligible for up to 10 free trees. SMUD estimates that each tree provides \$90 in annual benefit.³¹ In Iowa, the Municipal Tree Planting Program is a partnership between the non-profit Trees Forever and four utilities, in which the utilities provide funding for community planting programs.³² Here in Massachusetts, Grow Boston Greener is a collaborative effort of the City of Boston and its partners in Boston's Urban Forest Coalition to increase the urban tree canopy cover in the city by planting 100,000 trees by 2020.

31 The partnership between the Sacramento Municipal Utility District and Sacramento Tree Foundation has been ongoing since 1990. <http://www.smud.org/en/residential/trees/Pages/index.aspx> or <http://www.sactree.com/doc.aspx?25> . Riverside, California program: <http://www.riversideca.gov/UTILITIES/resi-treepower.asp>. Pasadena, Alameda, and a number of other California utility companies have similar programs. Initiatives to capture environmental savings from trees are also underway in more temperate climates. The Department of Public Services in Portland, Maine will deliver and plant trees that residents purchase at local nurseries. The "Treebate" program in Portland, Oregon offers residents a rebate on trees they purchase and plant (funded for water quality). Washington, DC residents can receive a \$50 rebate for each eligible species of tree.

32 www.treesforever.org

Legal authority: PAs have the authority to conduct pilots and to expand these into new efficiency programs, based on approval of the Energy Efficiency Advisory Council and the DPU. Pilots will help determine whether and over what time period energy savings exceed costs. The results of such pilot programs will help determine the value and feasibility of tree planting and retention activities.

Implementation issues: This would be a pioneering program in the northeast, and so a variety of program approaches to achieving participation, planting trees effectively, and maintaining them could occur.

Uncertainty: We do not know the degree to which residents will be willing to participate, even with subsidies; nor the degree to which developers and landlords will participate; nor municipalities for a program design in which they require developers to retain trees.