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for a Great Transition

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Vision for Sustainable Greater Boston 2050

Energy and Climate

Energy use in Boston and its environs in the mid-21st century is significantly more efficient than at any time in the region's history. Despite growth in population and the economy, the total energy used in the region in 2050 is about half of that used in 2000. The overall consumption of natural gas and petroleum has been reduced dramatically, and renewables now account for nearly 40% of electricity generated, with significant roles in transport and industry. Changes in personal attitudes in the region took place gradually at first, but cascaded into a dramatic shift in the second decade of the century, as the urgency of the threat of climate change became well established in the public's mind. This transformation of attitudes and behavior, driven by a broad acceptance of personal responsibility to reduce individual carbon footprints, was followed by similar changes throughout the world. As a result, the region's CO_2 emissions have been reduced by more than 70% from 2000 levels.

Boston leads the nation in reducing dependence on fossil fuels, particularly in the transport sector, primarily due to more efficient vehicles, a shift from private vehicles to public transport, widespread use of hydrogen and alternative fuels, and a large reduction in travel demand. In the passenger transport sector, petroleum use has been virtually eliminated except for aviation; in freight it is much reduced but still important because of the difficulty in switching completely to hydrogen and fuel cells. In industry, fossil fuels (particularly oil and natural gas) continue to provide a major share of energy requirements, but are utilized roughly twice as efficiently as they were at the turn of the century due to major process improvements and widespread adoption of technologies like cogeneration.

Indeed, efficient technologies and systems are used in all sectors. The green building movement at the beginning of the century transformed the residential and commercial building design field, resulting in significant improvements in energy efficiency, increased use of passive and active solar lighting and heating, and smaller building footprints. Advanced cogeneration systems have become commonplace for providing electricity and heat for individual buildings as well as entire neighborhoods. In transport, bicycling and walking, along with efficient transit systems, have replaced automobiles to a large extent. Where private vehicles are still used, they are fueled by hydrogen with regenerative braking systems to conserve even more energy. Lighting has also become significantly more efficient, with new LED and plasma technologies leading the way.

The electric supply industry has itself become far cleaner than before, but is also more decentralized with plenty of opportunities for renewables and local cogeneration systems to feed the grid. Conventional nuclear power plants serving the region were phased out as their licenses expired in the early part of the century, with renewables and end-use efficiency improvements

filling the gap. While a new generation of nuclear facilities was contemplated, high overall costs and continued concerns about safety and waste management prevented adoption of this idea, though research continues on the feasibility and commercial viability of cold fusion reactors as a potential clean and safe source.

Together with energy efficient technologies, lifestyle changes at the household level relating to reduced personal travel, more compact homes, and decreased consumption of superfluous appliances (such as multiple refrigerators and television sets) have played a major role in this energy revolution. A strong social ethic to reduce resource and energy use and to behave as globally responsible citizens has motivated these changes in behavior. Several local governments in the Boston region have adopted resolutions to lower per capita energy use toward globally sustainable levels.

In the region's industrial and commercial services sectors, leaders have emerged who promote social and environmental responsibility and have played an important role in reducing the use of natural resources by adopting energy guidelines. In the first decades of the 21st century they had set near-term energy intensity targets and helped incubate new energy technologies and innovative process changes. A strong R&D effort funded jointly by government, academic and private research institutions aided many of these experiments.

Looking back at the massive efforts to reduce CO_2 emissions in recent decades, today, people throughout the Boston region and elsewhere look back at the turn of the century with gratitude, realizing that had the early cavalier attitudes and wasteful patterns of behavior prevailed, the world might have plunged into a major climate catastrophe.

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