

Eco Districts

An Old Idea for Infrastructure Gets New Life

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Introduction

As we grow in population, and gather in cities for connectivity with each other and the synergy that provides for our economic and cultural endeavors, we face the reality that how we build, grow food and use water will have to be done in ways that sustain subsequent generations on an Earth with finite resources. We do not do that now, and need to plan and design to become “future ready,” instead of our current “future proofing” (Pearsall, 2013), limiting the potential for a favorable future.

Over the next 50 to 100 years, most of our built environment will need to be repaired, upgraded or replaced, simply due to age and the impacts of climate disruption (Steffen, 2013; Law and Public Policy Podcasts, 2010). Can we plan and design the development and redevelopment of the built environment in ways that contribute to sustainability? The built environment is already one of the top sectors of the Michigan economy, contributing more than \$133 billion in 2013, based on recently updated figures (BESTT, 2012). According to the Built Environment Showcase – Today and Tomorrow,

“The built environment encompasses all human-made surroundings that facilitate human activities in buildings and parks to neighborhoods and eventually cities. Cities provide infrastructure for utilities and services that make life convenient, comfortable and safe. The built environment encompasses materials, spatial and cultural products of human labor and culture that combine these elements into human made spaces where people live, work, travel and recreate on a daily basis.”

The entire system of constructing and maintaining the built environment has depended on inexpensive resources, especially energy (Lovins, 2011). There is no longer going to be cheap fossil fuel energy, and we should not be burning it. Following improvements in water quality of our rivers and lakes beginning in the 1970s, water quality is beginning to decline again from the long-term deposit of partially treated sanitary waste, untreated urban stormwater, and agricultural runoff into our water bodies. We do not have water infrastructure in place to reverse that trend.

A few cities in America have been experimenting with an approach to deal with the need to replace aging or inefficient infrastructure, and to develop and redevelop more sustainably: the Eco District.

“An EcoDistrict is a new model of public-private partnership that emphasizes innovation and deployment of district-scale best practices to create the neighborhoods of the future—resilient, vibrant, resource efficient and just” (EcoDistricts, 2014).

According to the organization, EcoDistricts,

“The EcoDistricts Framework provides a way to institutionalize sustainability best practice, including: Building alliances and governance for local pilots; creating a performance-based neighborhood sustainability roadmap to addresses the eight EcoDistrict Performance Areas (see below); launching catalytic district-scale sustainability projects; and forming district management to guide project implementation over time.”

The practice of planning for districts within jurisdictions is not new, as we have had planning for Central Business Districts (CBD), corridors, enterprise zones, historic districts and other sub-city areas for many years. The distinction for Eco Districts is that they:

- Are intended to help green a neighborhood or district through setting and meeting zero carbon, water efficiency, waste cycling and, in some cases, social justice goals.
- Recognize that it is difficult to meet greening goals one building project at a time, as it can be difficult or impossible for individual buildings to reach those goals; thus, requiring multiple building or district systems for energy, waste, recycling, black and grey water and stormwater.
- Recognize that it can be difficult to meet greening goals with whole city planning, in which the large scale of transformation required can overwhelm the will of those asked to participate.

Practitioners of Eco District planning appear to set very high greening standards. This may be happening for two reasons:

- They take to heart the planetary futurists' warnings about climate change and the need to drastically alter our carbon budget. If we are to avoid climate departure (when average temperatures exceed previous highs and make human habitation of Earth precarious), carbon emissions (and soot and other greenhouse gas emissions) need to plummet, sooner rather than later. For Americans, carbon emissions need to drop from 18 tons of carbon per capita to one ton per capita in 30 years (Steffen, 2013).
- The technology to produce a green built environment exists and is quickly emerging. A number of Eco Districts currently require at least a LEED Gold standard for buildings, and LEED ND for exterior settings, as well as developing efficient energy systems that can gradually convert from low carbon (natural gas) to what some consider carbon neutral (bio-fuel) to zero carbon (solar, wind, hydro and geo-thermal) over time. They are also employing technologies to separate waste from food and fiber systems and from water systems so water can be recycled and organic waste used for energy production or composting to regenerate soils.

Demand for communities that match Eco District goals and performance appears to be growing as the demographic composition of our society changes and also the preferences of that changed demographic. Both the majority of young people and a large portion of Baby Boomers seek the vitality and convenience of urban areas, particularly where it is easy to walk, bike or take transit to where they are going, where they can fall into fun, and where the population is diverse, eco-minded, and where they can support themselves whether or not they are employed in the field of their training and choice.

The EcoDistrict's Performance Areas

The organization, EcoDistrict, provides guidance to communities in the planning and development of Eco Districts. They provide an eight-part framework for performance of Eco Districts:

1. *Equitable Development*: The goal is to promote equity and opportunity and ensure fair distribution of benefits and burdens of investment and development. Objectives include job creation, local investment, local projects, mitigating forced displacement of existing residents and businesses and ensuring diverse stakeholder involvement.

2. *Health and Well-Being*: The goal is to promote human health and community well-being. Objectives include providing access to local recreation and natural areas, access to health, local and affordable food, safe and connected streets, supporting an economically diverse population, and improving indoor and outdoor air quality.
3. *Community Identity*: The goal is to create cohesive neighborhood identity through the built environment and community culture. Objectives include creating beautiful, accessible and safe places that promote interaction and access, fostering social networks and developing local governance capacity.
4. *Access and Mobility*: The goal is to provide access to clean and affordable transportation options. Objectives include providing accessible services through mixed uses and improved street access, prioritizing active transportation, reducing vehicle miles traveled and the use of low and zero emission vehicles.
5. *Energy*: The goal is to achieve net zero energy use annually. Objectives include conserving energy by minimizing demand and maximizing conservation, optimizing infrastructure performance, at all scales, and using renewable energy.
6. *Water*: The goal is to meet both human and natural needs through reliable and affordable water management. Objectives include reducing water consumption through conservation, reusing and recycling water resources and managing stormwater and building stormwater discharge within the district.
7. *Habitat and Ecosystem Function*: The goal is to achieve healthy urban ecosystems that protect and regenerate habitat and ecosystem function. Objectives include protecting and enhancing local watersheds, prioritizing native and structurally diverse vegetation, creating habitat connectivity within and beyond the district, avoiding human-made hazards to wildlife and promoting nature friendly urban design.
8. *Materials Management*: The goal is zero waste and optimized materials management. Objectives include eliminating practices that produce waste, minimizing the use of virgin materials and minimizing toxic materials in new products, optimizing material reuse and salvage, encouraging use of regionally manufactured products or parts, maximize use of products made with recycled content where opportunities for waste prevention are limited and capturing the greatest residual value of organic wastes (including food) through energy recovery and/or composting.

There are Eco Districts in planning or implementation phases in a number of cities in the U.S. and other countries. These include Portland, OR; Vancouver, Canada; Austin, TX; Washington, DC; Cambridge, MA; Sweden; Great Britain; and The Netherlands. Groups in Detroit, MI, are gearing up to develop neighborhood Eco Districts.

Transformational Ideas Being Employed in Eco Districts

Among the concepts presented at the EcoDistricts Summit in Boston (November 12-14, 2013) are the following:

District Energy:

“District energy systems are comprised of thermal heating and/or cooling plants that distribute energy via a network of pipes. Using water (hot and/or chilled) or steam, district systems provide buildings with space heating, domestic hot water and/or air conditioning. District energy is not a new technology, as these systems are common on university and hospital campuses, as well as in many cities (especially in northern Europe and Canada). Some district energy systems employ combined heat and power (CHP) technology, which generates electricity and utilizes the waste heat for thermal purposes (e.g., to heat water for a district heating system).” (Portland Sustainability Institute, 2010)

Some of the newer systems are being designed to gradually convert to renewable energy, while some new systems begin with renewables. The design of some systems employ waste heat from facilities that generate the heat, such as IT centers.



Photo: District Energy Plant in Kendal Square Eco District in Cambridge, MA.

Sharable Cities: There are two basic parts to this concept. The first is that we waste a lot of resources by duplicating stuff. While nearly every household has a few electric power tools, the average amount of time they are used in the lifetime of that tool could be measured in minutes. Probably every household does not need their own electric drill. The same could be said of bikes and cars in densely populated areas where there is not enough room for everyone to have their own car. Or if one only bikes on occasion, there is little need to own their own bike. Bike share, ride share and car share programs, such as Zip Car, fill that need at a great savings for each household. Cambridge, MA, experiences 6,000 Zip Car rides and 1,200 ride share (owners lend out their car) per year. People can even rent kayaks for one-way trips to and from Cambridge and Boston, MA. The second part of the sharable cities concept is that to stimulate innovation, and create vibrancy, pop-up businesses or civic events should be enabled by space devoted to short-term use. Examples include pop-up restaurants, which may open for only one evening, a public art showing for a few weeks or a charrette. Such spaces can provide entrepreneurs with little capital a space to get started until they secure a greater amount of investment. Some Eco

Districts have established policies and zoning regulations that require a certain percentage of any new construction to include shared space. An example of shared space in Michigan is the new market in Grand Rapids, which has both licensed kitchen incubator space for new businesses to perfect a food-related product and empty ground-floor space for activities, such as a pop-up restaurant.



Photo: Bike repair station in Kendal Square Eco District in Cambridge, MA, with tools and air pump.

Inclusiveness and Connectivity: The Eco District approach looks at both the physical and social aspects of cities. In the physical realm, it takes an environmental approach that also is intended to benefit the economy and social justice. In the social realm, it takes the approach that the first step is to develop leadership capacity, understanding of community values and inclusiveness in planning of all sectors of the community. Subsequent steps require continued leadership, trust, transparency and inclusion in planning. There are a number of planning tools that permit community engagement and openness in planning. One is CrowdGauge, developed by Sasaki Associates. The point was made by a number of EcoDistrict Summit presenters that we need to be conscious that we are trying to craft a new and desirable future, rather than rebuild what cities offered in the past. Uwe Brandes, Georgetown Urban and Regional Planning professor, said, “*It is not about bouncing back, it is about bouncing forward, our cities were not doing well before,*” and “*we need to invent new social networks,*” to accomplish this. John Cleveland, Executive Director of the Boston Green Ribbon Commission, said, “*We need to make the science talk the sidewalk talk.*”

A related concept is called the “intentional community.” In these communities, residents take part in the construction and maintenance of shared elements of the communities. In Detroit, a special-purpose development is being planned to help bring a select at-risk population through a difficult period, while participating in crafting the community using advanced technology related to building, teaching advanced skills and building self-esteem.

Water Quality and Conservation: A number of Eco Districts pay particular attention to water. They frequently separate potable and grey water, the latter being derived from stormwater or treated effluent, and is used to flush toilets and irrigate. An emerging technology is to extract waste from black water (from toilets and often showers and sinks) for use in generating electricity or use as compost along with composted food waste. In urban settings, a green infrastructure system is used to collect and treat stormwater before it is used for grey water or allowed to percolate to groundwater. In tight spaces, and to accommodate extremes of precipitation that may be more frequent with climate change, a combination of landscaped detention pond and underground tanks may be used in an interconnected system.



Photo: Rain harvesting basin with underground catchment tank on MIT Campus, Cambridge MA.

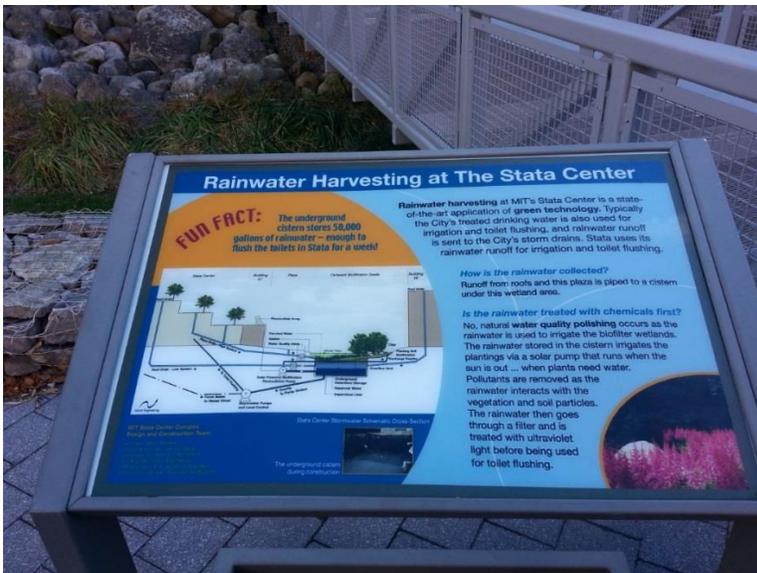


Photo: Sign explaining a rainwater harvesting system in Kendall Square Eco District in Cambridge, MA, and MIT campus. Rainwater is recycled for irrigation and toilet flushing.

Branding: Several Eco Districts work on branding both the Eco District as a whole, for educational purposes and competitive advantage, and individual buildings or features, to help people connect to the organizations and people inside. The use of explanatory signs, especially for cutting-edge technology, helps in this process. Also to help branding, first floors of buildings often have large windows with interactive displays related to the work of organizations in the building.



Photo: First Floor Lobby of the Brain Institute in Cambridge, MA, where scientists explore gene therapy.

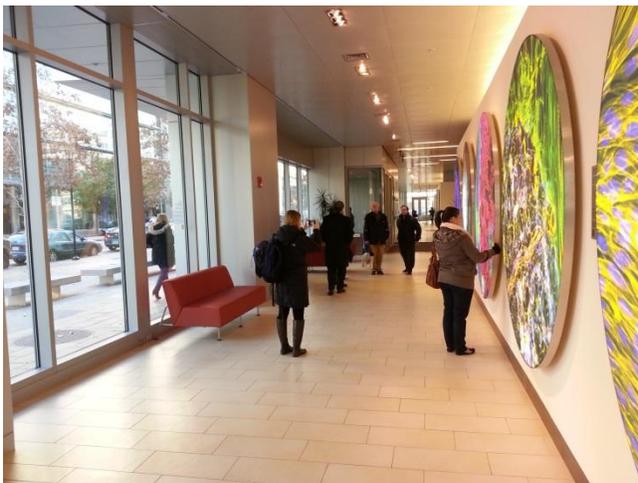


Photo: First floor of the David H. Koch Institute for Integrative Cancer Research at the MIT Campus in Cambridge, MA, showing enlarged microscopic images of research materials.

Citizens, city officials and stakeholder leaders in Detroit, as well as an MSU Extension Educator, recently attended an Eco District training session in Portland, OR. The purpose of the training was to build Eco District development capacity in teams from cities across the nation.

One of the Detroit teams included participants from Detroit Future City, EcoWorks, Community Development Advocates of Detroit, Greening of Detroit and Vista Vantage. A compact was created among those organizations to provide a framework for Eco District neighborhood development in Detroit, called Eco-D. Other organizations could become signatories of the compact. A representative from the Michigan State Housing Development Authority also participated with this team in the Portland training.

The vision of Eco-D is for Detroit to become a 21st Century model for urban sustainability. Eco-D will do this by helping every Detroit neighborhood become an Eco District. Eco-D will work to match a neighborhood's green commitment with resources to reach its vision.

The Detroit Future City (DFC) framework plan will serve as the base platform for Eco-D. Detroit Future City (the organization) will participate in Eco-D planning and joint fundraising for prospective Eco-D neighborhoods, along with the other signatories of the Eco-D compact. The compact signatories will also help promote the Eco-D opportunity to potential collaborators and aspiring Eco Districts throughout Detroit. Signatories will also lend expertise to the evaluation and support of prospective and approved Eco-D communities. Detroit Future City will also review Eco-D neighborhood projects for alignment with the DFC strategic framework, coordinate policy reform and land use planning in support of Eco-D communities and provide coordination among Eco-D work by community groups and relevant stakeholders. All the signatories will provide technical assistance and education about Eco-Districts as funding permits.

James Tischler, Director of the Community Development Division at the Michigan State Housing Development Authority, said that the State's role could be to funnel State dollars through this Eco-D framework. Given adequate qualification mechanisms and success indicators, State support would then be focused where it may have the most impact. This could also apply to federal dollars. Given that there is a lot of vacant land for which the DFC Framework Plan proposes natural or reserve greening efforts, such efforts may be eligible for natural resource/environmental protection programs, according to Tischler.

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