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center for maximum potential building systems

This final report, covering benchmarks and goal setting, was created by the **Center for Maximum Potential Building Systems**, consultants for the **Seaholm EcoDistrict** development project for the City of Austin Economic Growth and Redevelopment Office and the Office of Sustainability, following the progress of the January 2013 EcoDistricts workshop

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The information contained within this report represents the findings and recommendations of the Center for Maximum Potential Building Systems, and does not imply an endorsement by the City of Austin Office of Sustainability or other City of Austin department.

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image credit: Brendan Wittstruck/CMPBS

ECODISTRICT INITIATIVE

The Seaholm EcoDistrict is an effort between public, private, and non-profit stakeholders in Austin that is based on the efforts of sustainable urbanism championed by EcoDistricts (formerly the Portland Sustainability Institute).

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)

JANUARY 2013 ECODISTRICT WORKSHOP ATTENDEES

PUBLIC SECTOR

City of Austin
COA Economic Growth + Redevelopment Office
COA Office of Sustainability
COA Planning + Development
COA Austin Energy
COA Austin Water
COA Parks + Recreation Department
COA Bike Program
COA Transportation + Parking
COA Libraries
COA Cultural Arts Division
COA Public Works
Capital Metro
Austin Federal Courthouse

COMMUNITY

Downtown Austin Alliance
Center for Maximum Potential Building Systems
Art Alliance of Austin
Spring Condominium HOA

PRIVATE SECTOR

Trammell Crow Company
Gables Residential
Constructive Ventures
Southwest Strategies/Seaholm Power LLC
Lake|Flato Architects
Bury + Partners
HOLOS

EcoDistricts [former the Portland Sustainability Institute]

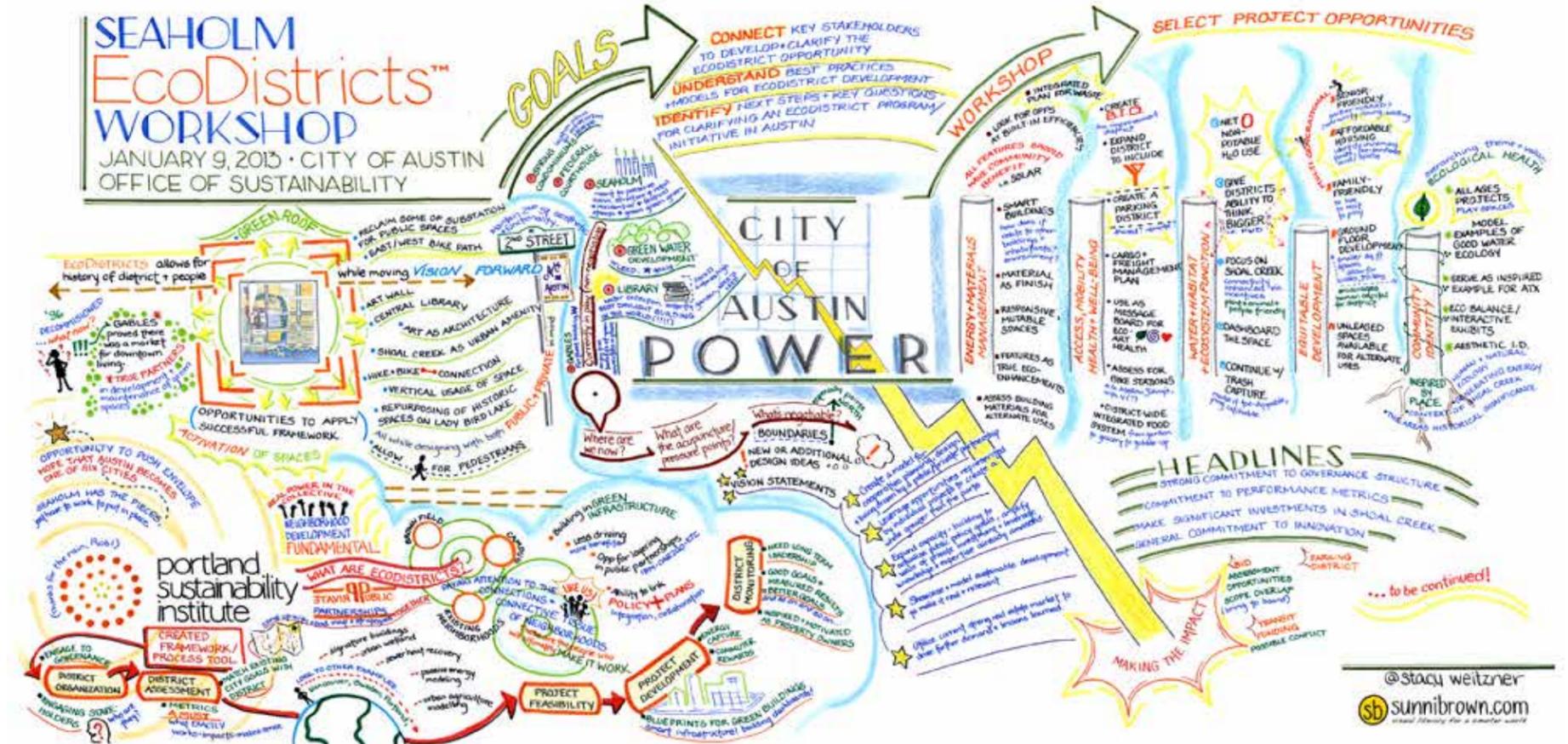


image credit: Stacy Weitzner/Sunni Brown



EXECUTIVE SUMMARY

Sustainability is a central organizing principle of the Seaholm Development District. The 65-acre District is anchored by three distinct parcels: to the west, the Southwest Strategies/Seaholm Power LLC mixed-use redevelopment on the former Seaholm Power Plant site; in the middle, the new Austin Central Library; and to the east, the Trammell Crow mixed-used redevelopment on the former Green Water Treatment Plant site.

In 2012, the Seaholm District was selected as one of ten projects in North America to participate in *EcoDistricts*¹ Pilot Program. To further advance this work, the City of Austin's Office of Sustainability contracted the Center for Maximum Potential Building Systems (CMPBS) to engage with diverse public, private, and non-profit sector stakeholders with an objective to identify quantitative and qualitative opportunities and benefits, articulate the project's sustainability vision, goals, and process, develop an action agenda, and explore how emerging tools such as ecoBalance and Visible Green can add value to the EcoDistrict framework. Underscoring the assessment was the congruence between *EcoDistricts*' eight key performance areas and the action areas of the Imagine Austin Vision Plan and the Office of Sustainability's Rethink/Austin Plan.

The report concludes with recommended action areas acknowledging the Seaholm EcoDistrict's unique opportunity to emerge as an exemplar of cohesive, healthy green building and urban design, ecological and social mindfulness, resilient infrastructure, and extraordinary innovation.

¹ formerly the Portland Sustainability Institute



The following is a summary CMPBS' key findings:

- Planning and implementation will benefit from clearly articulated 'first principles' to reinforce resilient, productive, place-based urbanism
- The Seaholm EcoDistrict's geographic location makes it a special venue for Austin's most progressive environmental urban design initiative to date
- EcoDistrict developers have committed to using green building practices that exceed code and contribute to Austin's green building portfolio
- 'District Thinking' extends building scale practices to parcel-to-parcel and District-scale approaches, fulfilling shared resource needs by balancing production and storage capacities
- The Seaholm EcoDistrict has significant solar energy and water harvest and reclaim potential which offsets reliance on fossil fuel generated energy and municipally-supplied potable water
- Combined open space, vertical building surfaces and rooftop areas have the potential to grow more than one million pounds of food each year
- Green infrastructure can capture and treat more than 36 million gallons of stormwater each year
- District Benchmarks and Metrics provide a road map to guide planning, design and construction decisions, track implementation and performance, and provide feedback loops to promote continuous improvement
- The ecoBalance Conserve-Integrate-Cycle method benefits the economy and effectiveness of managing the Seaholm EcoDistrict's resource flows and spatial utilization

FIRST PRINCIPLES

CMPBS has identified several First Principles which have the potential to distinguish the Seaholm EcoDistrict as a pioneer for productive, resilient place-based urbanism:

- *DESIGN FOR SOURCE-USE BALANCE*

Balancing the resource inequities and *EcoBalance* of the District-scale will allow for **more efficient and effective distribution of total resources** while supporting the operation of the District as a cohesive whole

- *DESIGN FOR PEOPLE, PLACE & ECOLOGY*

Develop place-based strategies for action and funding support ecosystems, stakeholders, residents, visitors, and the City's economy and environmental health

- *DESIGN FOR CLIMATE*

Implement design guidelines that take advantage of solar, shade, prevailing breeze, vegetation and other regional climatic factors to improve performance and promote District-wide climate resilience

- *EMBRACE INDEPENDENCE & INTERDEPENDENCE*

District strategies must be viewed simultaneously as independent pieces and an interdependent assembly. Balance is achieved by recognizing the strengths and needs of the District's parts and how they **support themselves and each other**

- *ACKNOWLEDGE FEEDBACK LOOPS*

It is critical to recognize within distinct Performance Areas the feedback loops that maintain **relationships and overlaps between categories**, particularly as they relate to maximizing benefits and outcomes

- *PROMOTE VISIBILITY & ENGAGEMENT*

The idea of *Visible Green* contends that any impact of measures taken to meet performance goals is amplified by its understandable manifestation visually accessible to those who come in contact with it. The key performance indicators should be **visible, legible, and interactive** to an empowered public



DISTRICT THINKING: SCALES

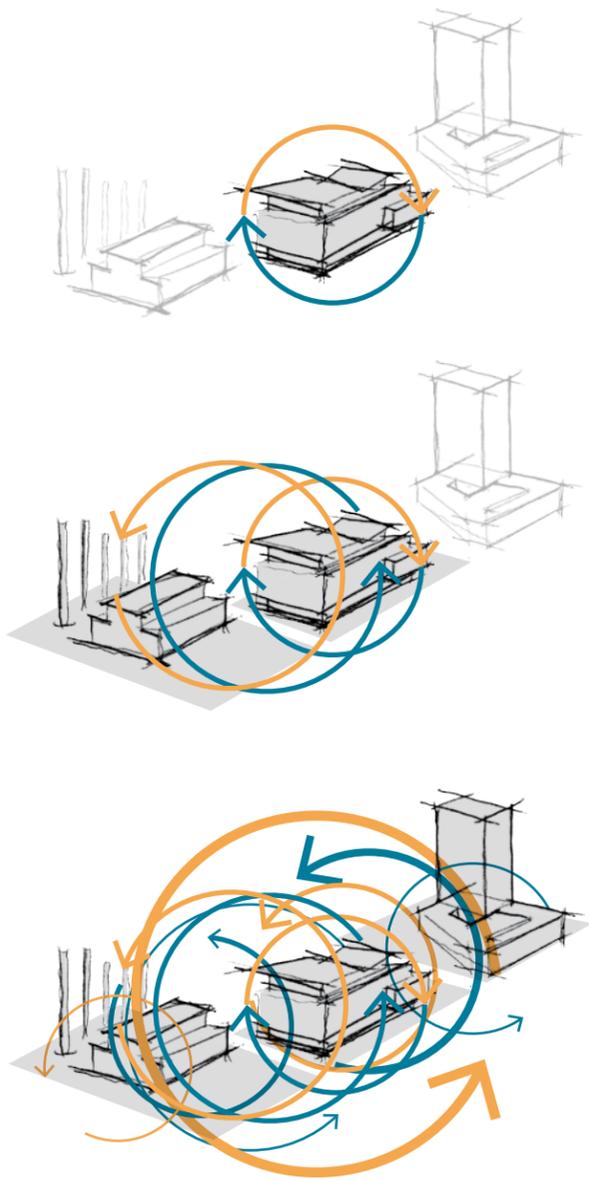
Designing and planning EcoDistrict development must address a range of scales at play within the District--from building details like fixtures and appliances to the intra-parcel infrastructure and systems design:

BUILDING SCALE
Individual buildings will be designed to **meet City of Austin sustainability requirements**. District developments are pursuing goals that exceed code and contribute to Austin's green building portfolio.

PARCEL RELATIONSHIPS
Parcel-to-parcel relationships open the door to innovative and cost-effective water, energy, and stormwater solutions. A key example of this is the planned rainwater collection system within the existing vaults of the Seaholm power plant, which will be used to irrigate adjacent park land beyond the parcel boundary. In addition, the District Chiller provides chilled water service to many buildings within the District.¹

DISTRICT THINKING
Thinking at the District level further advances parcel-to-parcel integration and "cycling" opportunities. Buildings can contribute to each others' resource needs by **pooling their production and storage capacities**, resulting in a more effective and productive use of aggregated District resources, peak load reductions, and resource use intensity balancing between developments.

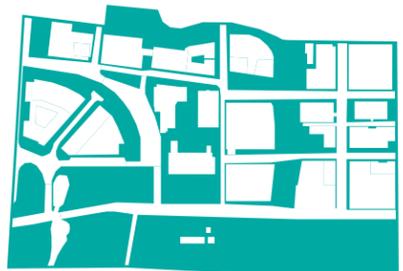
¹ District Chiller at Third and San Antonio Streets is part of the largest ice thermal system in Central Texas



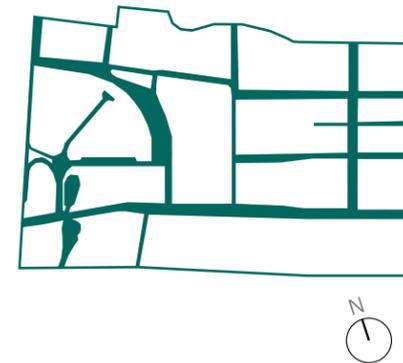
Total Building Footprint Area:
468,000 sf [10.7 ac]
Total New Construction Floor Area:
4,827,000 sf
Total Existing Floor Area:
965,000 sf¹



Total Open Space Area:
1,943,000 sf [44.6 ac]
[including Shoal Creek but excluding Lady Bird Lake]



Total Infrastructure Area:
421,000 sf [9.6 ac]
[estimate for street + rail ROW area; estimates for location and linear feet of utilities were not available for this report]



¹ New and existing floor area numbers estimated based on schematic design footprint areas and number of stories

DISTRICT THINKING: PARTS

The District is made of of distinct parts whose development is led by public and private stakeholders. In order to realize the benefits of District thinking, all of these parts must be considered individually and as part of the whole:

BUILDINGS
Buildings in the District will use **established, measurable green building practices** as a matter of course. District-level thinking introduces new ways buildings can support each other.

OPEN SPACE
Open space is habitat for people and nature, as well as an economic value generator for retail,commerce and home ownership. District public spaces can be carefully designed for **productive, performative, and experiential** social areas.

INFRASTRUCTURE
Infrastructure--both visible and hidden--is critical to EcoDistrict performance. Greening infrastructure means maximizing reliance on natural systems, enhancing environmental performance of conventional infrastructure through healthy, high-performance materials, and **incorporating adaptability and multi-functionality** in design and operation.

SITE NARRATIVE

The mid-century Walter E. Seaholm Power Plant was Austin’s first electrical powerhouse, anchoring an industrial district that supported the early growth of the City. It was constructed between 1950 and 1958 and operated until 1989.

The Green Water Treatment Plant opened in 1925, becoming one of the first water treatment plants in the world to employ a new lime-based treatment developed at the University of Texas at Austin. At its opening, it ranked among the country’s most innovative new models of drinking water treatment.

Today, the Seaholm and Green sites and their neighbors have the opportunity to once again be visible champions of environmental and urban innovation and influence. The sites’ history as energy and water production centers provides a clear district identity that will guide a poetic and performative comparison and contrast of new and old innovative technologies.

image credits [left to right]: *Austin History Center/Austin Public Library; Wells Dunbar/Austin Chronicle; Brendan Wittstruck/CMPBS*



ECODISTRICT BOUNDARY

The 65-acre Seaholm EcoDistrict project area is defined as the area:

- Bounded firmly to the south by the lateral center of Lady Bird Lake
- Bounded firmly to the west by Lamar Boulevard
- Bounded loosely to the east by San Antonio Street, and to include all Trammell Crow parcels on Blocks 1 and 23 as well as the existing Austin Music Hall, Austin Ballet, 360 Condominiums, and State of Texas District Chiller site
- Bounded loosely to the north by a line following or approximating Fourth Street, both banks of the Shoal Creek riparian zone, bisecting the westerly block between Third and Fifth Streets in such a way as to include Spring Condominiums and planned 311 Bowie development

Key relationships and partnerships exist beyond this physical boundary, including the Austin Federal Courthouse and Whole Foods.

COMPLETED

Gables Phase I, *AEGB 2-Star Rated, LEED Certified Silver; 13,000 sf Retail, 290 D.U.*
 Spring Condominiums, *AEGB 1-Star Rated; 246 D.U.*
 360 Condominiums, *AEGB 1-Star Rated; 430 D.U.*
 Ballet Austin, *AEGB 1-Star Rated*
 Austin Music Hall, *AEGB 1-Star Rated*
 Pfluger Bridge Extension

PLANNED or UNDER CONSTRUCTION

* Lower Shoal Creek Improvements
 * Gables Phase II, *Targeting AEGB Rating + LEED Certification; 189,000 sf*
 * Austin Central Library, *Targeting LEED Gold Certification; 200,000 sf*
 * Seaholm Power Plant, *Targeting AEGB 2-Star Rating; 85,000 sf*
 * Seaholm Retail, *Targeting AEGB 3-Star Rating + LEED Gold Cert.; 66,000 sf*
 * Seaholm Residential Tower, *Targeting AEGB 3-Star Rating + LEED Gold Certification; 298 D.U.*
 * 311 Bowie, *Targeting AEGB Rating; 430 D.U.*
 Energy Control Center Site, *Targets T.B.D.; 15,000 sf Retail; 482 D.U.*
 GWTP Office Tower, *Targeting AEGB 3-Star Rating + LEED Gold Certification; 467,000 sf*
 GWTP Residential Towers 1 + 2, *Targeting AEGB 3-Star Rating + LEED Gold Certification; 832,000 sf*
 GWTP Hotel, *Targeting AEGB 3-Star Rating + LEED Gold Certification; 400 Rooms*
 Seaholm Intake Structures, *Targeting LEED Silver Certification*
 Austin Energy Power Substation Art Wall
 Second Street Bridge
 Bowie Underpass

* Indicates project construction work in progress

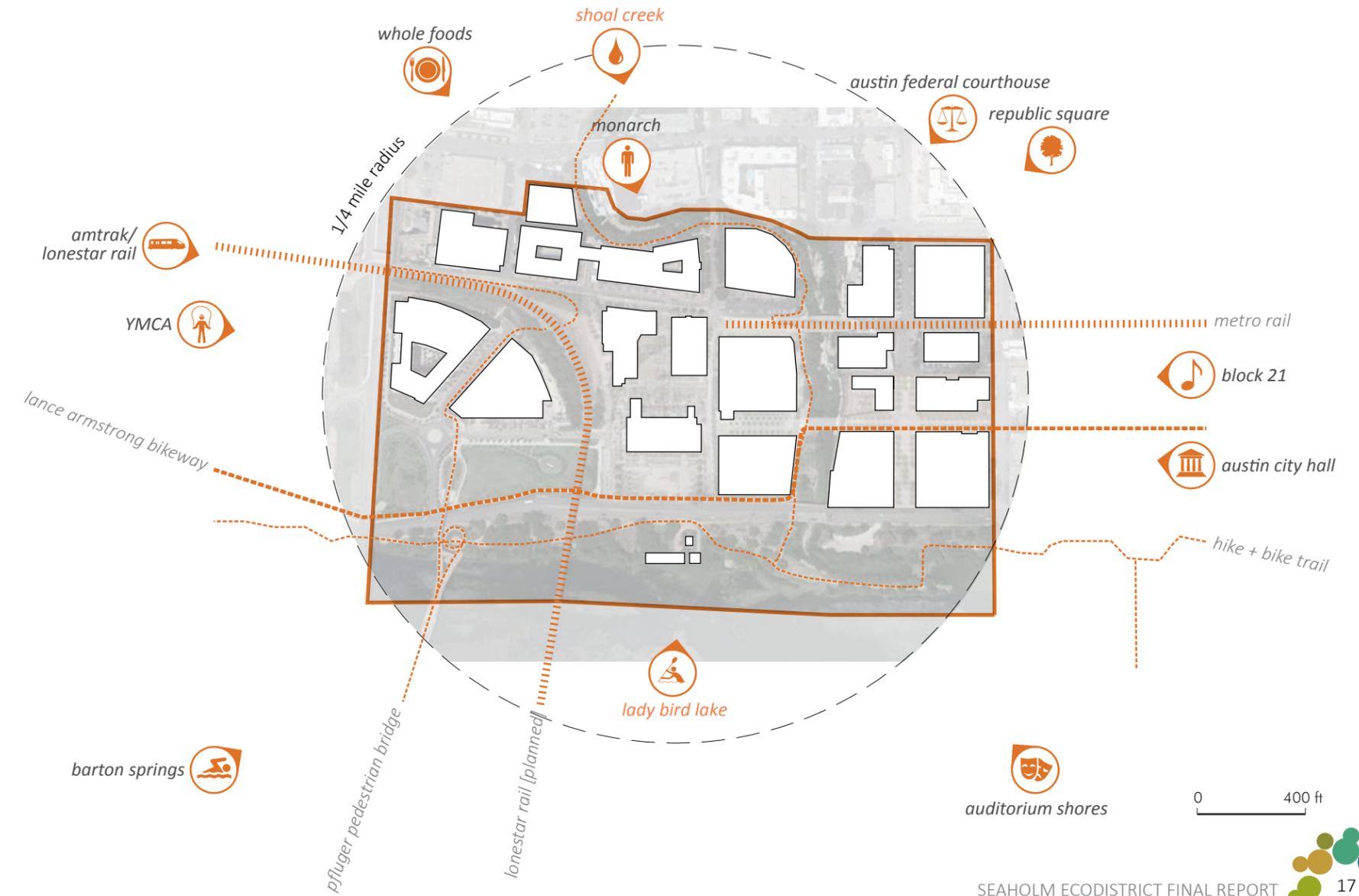
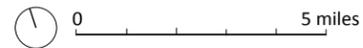


ECODISTRICT BOUNDARY

The “District-shed”, like a watershed ecology, recognizes the greater relationships around the District in its context within the City, hydrological impacts, and infrastructure loops.

The District-shed’s “soft” boundary addresses interests that may influence or be influenced by the District. Some immediate concerns that relate to the Seaholm EcoDistrict include:

- Neighbors & stakeholders
- Infrastructure routes
- The Shoal Creek watershed and its Conservancy
- Municipal, Civic and other governing agencies
- The Lady Bird Lake and Shoal Creek hike & bike trails
- Public transit modes servicing the District



ECODISTRICT RESOURCES

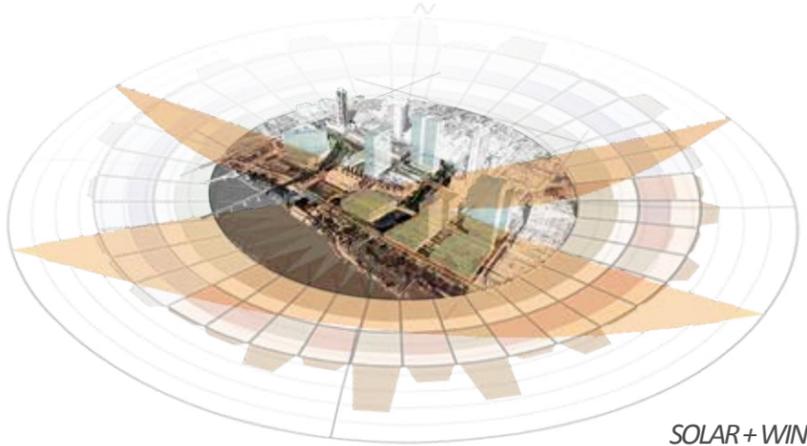
The space and geographic location of the Seaholm EcoDistrict make it a special venue for Austin’s most progressive environmental urban design initiative to date.

Located directly north of Lady Bird Lake, the site enjoys **protected southern exposure** and **access to prevailing summer breezes**. Encompassing the mouth of the Shoal Creek watershed and abutting Lady Bird Lake, the site is **rich in habitat and water resources**.

The site area also has tremendous potential for connectivity, from the Pflugger Pedestrian Bridge across the Lake to the planned Lone Star Rail and Capital Metro Rail terminal.

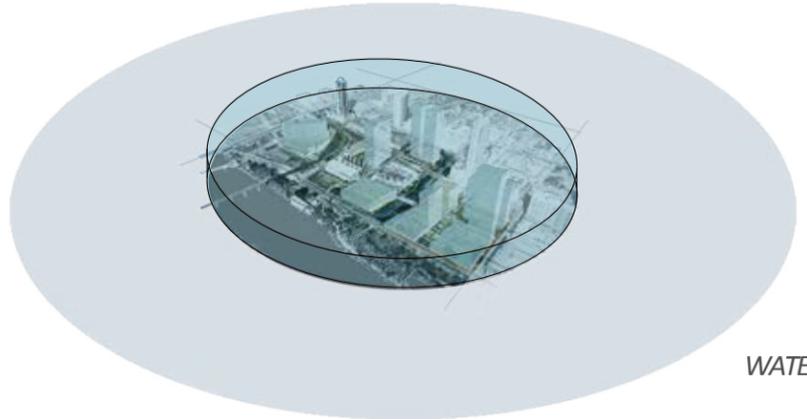


DISTRICT DAILY VERTICAL SOLAR INSOLATION : 740-1290 BTU/sf/day¹
DISTRICT HAS PROTECTED SOLAR ACCESS
DISTRICT HAS PROTECTED PREVAILING WIND ACCESS
¹ source: Sustainable Sources



SOLAR + WIND RESOURCES

DISTRICT YEARLY RAINFALL: 52,950,000 gallons²
DISTRICT RECEIVES ENTIRE SHOAL CREEK WATERSHED
DISTRICT INCLUDES LADY BIRD LAKE
² assumes 30" of rain annually; source: US Geological Survey



WATER RESOURCES

ECODISTRICT RESOURCES

The District's site and land area provide access to a wealth of resources; these resources, if properly managed and engaged, have the potential to significantly reduce operational costs and negative environmental burdens of the EcoDistrict development.

Based off initial estimates of usable surface areas, the District is positioned to produce significant electricity through photovoltaics and water heating through efficient solar-thermal installation--electricity uses that would otherwise be drawn at long-term cost from the City grid.

Similarly, the rainwater catchment potential--along with the existing water storage cisterns left by the Seaholm Power Plant--is anticipated to outweigh, in some cases, the total outdoor water use of District developments. This--along with tested water reduction sources such as condensate capture and "purple pipe" effluent irrigation--represents a huge financial savings along with considerable environmental benefits specific to stormwater runoff issues and water quality in Shoal Creek and Lady Bird Lake.

Water access and solar potential also mean opportunities for localized food production--a proven economic and value generator, and a planning step that could further the unique visible identity of the Seaholm EcoDistrict.



DISTRICT BUILDING-INTEGRATED PHOTOVOLTAIC POTENTIAL = 3.67 MW

BASED ON CURRENT DESIGNS FOR SOUTH-FACING VERTICAL SURFACES¹

DISTRICT SOLAR THERMAL POTENTIAL = 35.1 million kWh

BASED ON CURRENT DESIGNS FOR ROOF SURFACE AREA²

DISTRICT RAINWATER CATCHMENT POTENTIAL = 8.98 million gallons/year

BASED ON CURRENT DESIGNS FOR ROOF SURFACE AREA³

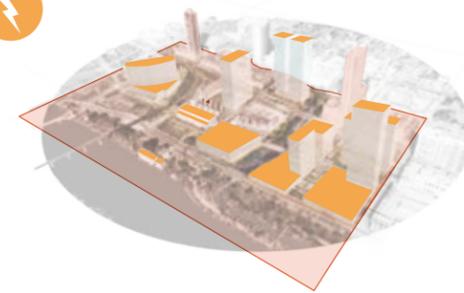
DISTRICT STORMWATER CAPTURE+TREATMENT = 36.6 million gallons/year POTENTIAL

BASED ON CURRENT DESIGNS FOR OPEN SPACE⁴

DISTRICT FOOD PRODUCTION POTENTIAL = 1,049,300 pounds/year

BASED ON CURRENT DESIGNS FOR ROOF + VERTICAL SURFACE AREA AND OPEN SPACE⁵

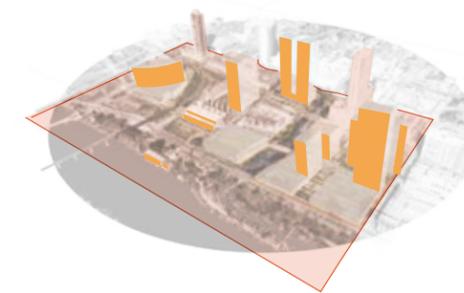
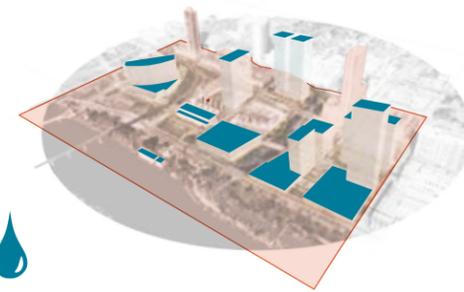
¹ assumes 10' floor height and 10W/sf photovoltaic production
² solar thermal standard of 75 kwh/sf
³ rainwater catchment standard of 600 gallons/inch rain/1000 sf
⁴ using rainwater catchment standard
⁵ using conservative estimate of 1 lb food per sf & 1/2 lb food per sf vertical surface



High Albedo Roof Surface
Roof-mount Photovoltaics

DISTRICT ROOF AREA: 468,000sf¹

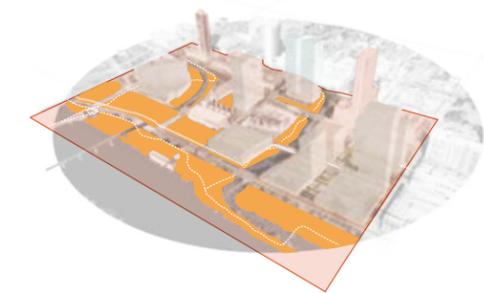
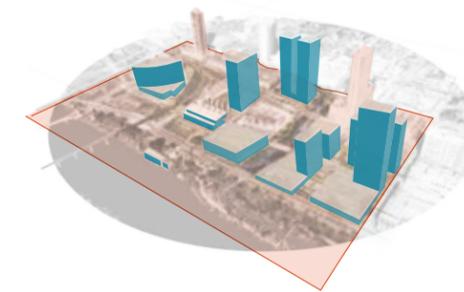
Green Roofs



Building-Integrated Photovoltaics

DISTRICT VERTICAL SOUTHERN EXPOSURE: 368,600sf²

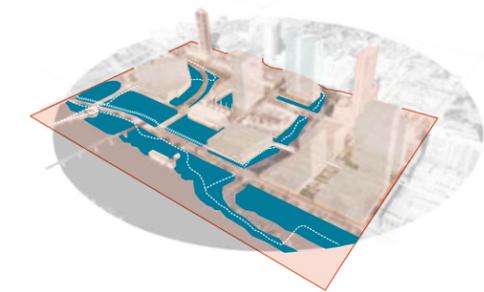
Rainscreens
Living Walls



Street-Level Thermal Comfort Shading

DISTRICT OPEN SPACE AREA: 1,943,000sf

Stormwater Capture + Treatment
Habitat Development



¹ based on current district designs for building footprints
² based on current district designs for number of building stories (assumes 10' floors)

IMAGINE AUSTIN VISION PLAN

- 
PROSPEROUS
 - Diverse Business Opportunities
 - Technological Innovation
 - Education/Skills Development
- 
EDUCATED
 - Learning Opportunities for All Ages
 - Community Partnerships with Schools
 - Relationships with Higher learning
- 
CREATIVE
 - Vibrant Cultural Events/Programs
 - Support for Arts/Cultural Activities
- 
NATURAL AND SUSTAINABLE
 - Sustainable, Compact, and Walkable Development
 - Resource Conservation/Efficiency
 - Extensive Green Infrastructure
- 
LIVABLE
 - Healthy & Safe Communities
 - Housing Diversity and Affordability
 - Access to Community Amenities
 - Quality Design/Distinctive Character
 - Preservation of Crucial Resources
- 
MOBILE AND INTERCONNECTED
 - Range of Transportation Options
 - Multimodal Connectivity
 - Accessible Community Centers
- 
VALUES AND RESPECTS PEOPLE
 - Access to Community Services
 - Employment, Food, and Housing Options
 - Community/Civic Engagement
 - Responsive/Accountable Government

image credit: *Imagine Austin/CMPBS*

PERFORMANCE AREAS FRAMEWORK

The EcoDistrict framework comprises **eight key performance areas** (far right, inner circle). The City of Austin Office of Sustainability's ten action areas align well with these EcoDistrict goals, as seen here (outer circle).

These performance areas integrate the priorities of the triple bottom line, and provide organization and feedback through the planning, design, construction, and operations phases of the Seaholm EcoDistrict.

The Imagine Austin vision plan for complete communities (near right) presents a comprehensive planning ethic for the City, supported by the specific EcoDistrict performance areas.



GOAL SUMMARY¹

The Goal Summary is a process tool of assessing District progress. It consists of several operative categories:

- **CITY OF AUSTIN GOALS**
City of Austin goals provide the strategic backdrop for neighborhood-scale development. Goals are pulled from City strategic plans and documents
- **DISTRICT BENCHMARK**
District Benchmark represents the sustainability performance levels and design features that have been committed to as a part of Master Developer Agreements and AEGB, LEED, and City of Austin requirements
- **DISTRICT METRIC**
District Metrics will provide the ability to measure results achieved in the District and provide direction for ongoing improvement
- **DISTRICT OBJECTIVE**
District Objectives provide specific goals that have been established as part of applying the EcoDistrict concept to the neighborhood
- **DISTRICT STRATEGY**
District Strategies are specific steps that may be taken to achieve the desired Objectives and Metrics results

¹ These are current goals anticipated to evolve as the planning process develops

GOAL SUMMARY KEY

CITY OF AUSTIN GOALS	DISTRICT BENCHMARK	DISTRICT METRIC	DISTRICT OBJECTIVE	DISTRICT STRATEGY
EQUITABLE DEVELOPMENT				
HEALTH + WELL BEING				
COMMUNITY IDENTITY	see page 26		see page 28	
ACCESS + MOBILITY				
WATER				
ENERGY		see page 27	see page 29	
HABITAT + ECOSYSTEM				
MATERIALS MANAGEMENT				

	CITY OF AUSTIN GOALS	DISTRICT BENCHMARK	DISTRICT METRIC ¹
EQUITABLE DEVELOPMENT	<p>AFFORDABLE housing, workspace, services</p> <p>LOCAL ECONOMY: jobs, opportunity</p> <p>DIVERSE communities, choices</p>	<ul style="list-style-type: none"> • GWTP development to include affordable housing, minimum living wage agreement • Services and amenities to serve diverse populations 	<ul style="list-style-type: none"> • TBD% affordable housing • TBD% local businesses • Diverse housing/use types • Access to services + nature
HEALTH + WELL BEING	<p>HEALTHY behaviors + environments</p> <p>ACTIVE lifestyles, amenities, population</p> <p>NUTRITION: education, access, local food</p>	<ul style="list-style-type: none"> • Low-VOC interior paints + coatings [AEGB BR 6] • Ventilate per ASHRAE 62.1-2007 [LEED 2009 NC EQp1] • Smoking restrictions [LEED 2009 NC EQp2] 	<ul style="list-style-type: none"> • TBD% District restaurants feature local + healthy foods • TBD% District residents/tenants pursue active + healthy lifestyles
COMMUNITY IDENTITY	<p>CREATIVE economy + opportunity</p> <p>PUBLIC ART: visibility + accessibility</p> <p>HISTORIC PRESERVATION: interpretation, identity</p>	<ul style="list-style-type: none"> • Preserve historic structures + reuse salvaged elements • Public art • District branding + storytelling 	<ul style="list-style-type: none"> • TBD% Historic structure preservation • TBD% Salvage reuse • Visible metering displays • Comprehensive wayfinding + branding
ACCESS + MOBILITY	<p>COMPLETE STREETS: accessible, safe, connected</p> <p>MULTIMODAL transportation + transit options</p> <p>BIKE LANES SIDEWALK: 35 5 new miles per year</p>	<ul style="list-style-type: none"> • District-wide car share + electric vehicles • Urban rail stop • Bus Rapid Transit service • Bike share stations 	<ul style="list-style-type: none"> • TBD% Vehicle emissions reduction • TBD% Non-vehicle transit • TBD% Commute trip reduction • TBD% Parking integrated management + wayfinding • TBD% Bike storage/shower access

¹ This assessment establishes metrics of concern; most numerical targets are yet to be defined



	CITY OF AUSTIN GOALS	DISTRICT BENCHMARK	DISTRICT METRIC ¹
WATER	<p>CONSERVATION: 140 gal/cap/day citywide by 2020</p> <p>GENERATION: 1.3 B gal/year reuse</p> <p>RESILIENCE: increased drought + flood planning</p>	<ul style="list-style-type: none"> • 20% reduction [LEED 2009 NC WEp1] • Compliance with code per flow rates [AEGB BR 5] 	<ul style="list-style-type: none"> • TBD% Potable water use reduction • 100% Non-potable irrigation • TBD% Stormwater quantity/quality control • TBD% On-site wastewater treatment
ENERGY	<p>NET ZERO: 800MW citywide reduction by 2020</p> <p>RENEWABLES: 200MW citywide mix by 2020</p> <p>70% citywide GHG reduction by 2030</p>	<ul style="list-style-type: none"> • 10% improvement relative to ASHRAE 90.1-2007 [LEED 2009 NC EAp2] • 7.5% improvement in energy performance [AEGB BR 4] 	<ul style="list-style-type: none"> • TBD% Energy use reduction • TBD% On-site renewables • TBD% Greenhouse gas reduction • TBD% Heat island mitigation
HABITAT + ECOSYSTEM	<p>GREEN streets, infrastructure, access</p> <p>SHOAL CREEK restoration, stewardship</p> <p>35% CANOPY: heat island reduction, shade</p>	<ul style="list-style-type: none"> • Central Library + Seaholm to use existing infrastructure to store runoff for reuse • Second Street rain gardens to capture runoff from bridge to meet water quality code • Riparian restoration project on Shoal Creek peninsula • Central Library riparian restoration/stabilization 	<ul style="list-style-type: none"> • TBD% Riparian restoration • 100% Cool roofs • TBD% Canopy coverage
MATERIALS MANAGEMENT	<p>ZERO WASTE: 90% citywide reduction by 2040</p> <p>RECYCLING: universal ordinance for resid./comm.</p> <p>BEST USE life cycle analysis, reduced toxicity</p>	<ul style="list-style-type: none"> • Storage/collection of recyclables [LEED 2009 NC MRp1] • Storage/collection areas for four primary recyclable waste streams [AEGB BR 7] • Construction debris recycling [AEGB BR 8] 	<ul style="list-style-type: none"> • TBD% Storage/collection for recyclables • TBD% Waste reduction • TBD% Construction emissions reduction



	DISTRICT OBJECTIVES	DISTRICT STRATEGIES
EQUITABLE DEVELOPMENT	<ul style="list-style-type: none"> Address governance and process improvements at a policy level^{† † †} 	<ul style="list-style-type: none"> Develop District governance mechanism for affordable housing planning, funding, and management Identify policy barriers and opportunities to address them Pursue external funding sources (including Federal incentives, sponsorship, and underwriting) Provide mixed uses and residence types (including “microhousing”, live-work, and affordable models), public spaces and events, and seek local businesses as tenants Provide range of amenities to support racial, socioeconomic, and age diversity Provide equitable access to nature <i>[see: Habitat + Ecosystem]</i>
	<ul style="list-style-type: none"> Evaluate affordable housing and microhousing solutions^{† † †} 	
	<ul style="list-style-type: none"> Promote diversity by providing amenities for all ages and levels of income^{† †} 	
HEALTH + WELL BEING	<ul style="list-style-type: none"> Establish District-wide Healthy Environments Plan^{† †} 	<ul style="list-style-type: none"> Demonstrate sustainable techniques, materials and methods Improve environmental conditions to enhance neighborhood vitality and health <i>[see: Habitat + Ecosystem]</i> Develop and implement District-wide integrated pest management, green housekeeping, and landscaping policies Establish healthy materials guidebook to inform design, construction, tenant fit-out, and operational decisions Follow COA Construction Equipment Emissions Plan Monitor and publicly display District air and water quality improvements and ongoing performance via interactive dashboard <i>[see: Community Identity]</i> Promote District as a proving ground for health-related policies and programs Maximize on-site food production and establish community garden <i>[see: Habitat + Ecosystem]</i> Encourage District businesses to offer healthy choices Provide children’s play areas and venues that promote physical activity for all ages <i>[see: Equitable Development]</i> Solicit user feedback to evolve and expand active living and health-promoting educational opportunities
	<ul style="list-style-type: none"> Promote local and healthy food production and access 	
	<ul style="list-style-type: none"> Empower healthy lifestyles, activities, education, and universal access^{† †} 	
COMMUNITY IDENTITY	<ul style="list-style-type: none"> Establish District-scale branding^{† † † † †} 	<ul style="list-style-type: none"> Develop District design and performance criteria to guide development Develop EcoDistrict branding, including identity and signage Investigate governance models such as a Sustainability Management Association, Public Improvement District (PID), and/or relationship with Downtown Austin Alliance Strengthen connections between District development, Cesar Chavez, Lady Bird Lake, and Shoal Creek <i>[see: Access + Mobility]</i> Provide interpretive, educational programs and facilities (including interactive dashboard, innovative technology incubators, public art opportunities, and eco-concierge service) Explore Business Improvement District (BID) model Articulate and publicly display building, infrastructure, and District performance via interactive dashboard Consider ways to use existing smokestacks as dynamic performance data displays Create District arts and cultural plan integrating physical artwork, artist tenants, and art programming Maximize preservation of historic structures and reuse of salvaged building elements and items
	<ul style="list-style-type: none"> Establish District-wide Sustainability Management Association[†] 	
	<ul style="list-style-type: none"> Engage creative adaptive reuses that preserve historical identity of the site^{† † † † †} 	
ACCESS + MOBILITY	<ul style="list-style-type: none"> Establish District-wide Parking & Transportation Plan^{† † † † †} 	<ul style="list-style-type: none"> Provide dedicated routes, charging stations, showers and amenities, and preferred parking for pedestrians, bicycles, car-sharing and alternative and fuel efficient vehicles Establish District approach to parking and freight management, connection to trails, dynamic metering, connectivity, and future use of vehicle parking areas Use mobile apps to facilitate parking and public transit use Promote District as a multi-modal local and regional transit hub Consider ways to improve connectivity along and across Cesar Chavez Street Articulate utilities and infrastructure to enhance wayfinding, District identity, and resource awareness <i>[see: Community Identity]</i> Enhance environmental and social performance of streets, trails, and other mobility infrastructure <i>[see: Water]</i> Showcase advances in grey and green infrastructure technologies (including integrated utility trenches, dynamic lighting, stormwater management, etc.)
	<ul style="list-style-type: none"> Maximize design of diverse-use Complete Streets^{† † †} 	

† Incorporates priorities from EcoDistrict workshop, January 2013; †† Incorporates COA goal; ††† Incorporates additional CMPBS recommendation



	DISTRICT OBJECTIVES	DISTRICT STRATEGIES
WATER	<ul style="list-style-type: none"> Promote District-wide net zero or net positive water use^{† † † † †} 	<ul style="list-style-type: none"> Target ambitious percent improvement over code in District water use Optimize use of reclaimed water sources (including rainwater, effluent, and condensate) Target keeping 100% of stormwater on site, capture a portion for reuse, and address COA code barriers to reclaimed water re-use Monitor, meter, and publicly display District water collection and use via interactive dashboard <i>[see: Community Identity]</i> Reduce burden on centralized water and stormwater infrastructure through small-loop reclaim/treatment infrastructure Showcase District-wide stormwater management plan and and comprehensive green infrastructure <i>[see: Access + Mobility]</i> Partner to enrich stewardship of creek and lake, including water quality, erosion control, and wildlife protection <i>[see: Habitat + Ecosystem]</i>
	<ul style="list-style-type: none"> Establish District-wide Stormwater Management Plan^{† † †} 	
	<ul style="list-style-type: none"> Improve Shoal Creek and Lady Bird Lake water quality^{† † † †} 	
ENERGY	<ul style="list-style-type: none"> Promote District-wide net zero or net positive energy use^{† † † † †} 	<ul style="list-style-type: none"> Target ambitious percent improvement over code in District energy performance Encourage District cooling utilization paired with chilled beams Articulate and publicly display energy performance of buildings and infrastructure via interactive dashboard <i>[see: Community Identity]</i> Encourage and showcase market-ready and innovative renewable energy production sources and local providers Integrate District-scale energy systems to manage peak loads and energy use intensity (including combined heat + power) Practice best use and protection of District’s unique solar access (including vertical photovoltaics and financial incentives) Showcase local, regional, and other exemplary energy-conserving techniques and materials <i>[see: Materials Management]</i>
	<ul style="list-style-type: none"> Establish District-wide Energy Management Plan^{† † †} 	
HABITAT + ECOSYSTEM	<ul style="list-style-type: none"> Establish District-wide Ecosystem Stewardship Plan^{† † †} 	<ul style="list-style-type: none"> Encourage all developments to embrace and promote lake and creek access, use, and beautification Protect dark skies Identify code barriers to open space uses and opportunities to address them <i>[see: Equitable Development]</i> Establish District-wide landscape management and integrated pest management plan <i>[see: Health + Well Being]</i> Enrich District public and private open space by introducing food-producing landscapes, gardens, and beekeeping Match businesses with District productive spaces (such as gardens) to promote micro-economies and enhance District branding <i>[see: Community Identity]</i> Encourage implementation of green vertical surfaces (including State parking garage building) Encourage implementation of integrated agriculture
	<ul style="list-style-type: none"> Design beneficial, productive, and interactive landscapes^{† † † † †} 	
MATERIALS MANAGEMENT	<ul style="list-style-type: none"> Promote District-wide zero waste infrastructure and developments^{† † †} 	<ul style="list-style-type: none"> Enact District-wide programs for waste reduction, reuse, recycling, and composting consistent with COA Zero Waste goals and according to highest waste outputs of building type and use Establish guidelines for high-performance healthy building materials Articulate and publicly display waste reduction performance of buildings and infrastructure via interactive dashboard <i>[see: Community Identity]</i> Create “boneyard” of salvaged building elements and items for reuse <i>[see: Community Identity]</i>
	<ul style="list-style-type: none"> Promote responsible building materials and practices 	
	<ul style="list-style-type: none"> Establish District-wide Construction Waste Reduction Plan[†] 	



CONSERVE-INTEGRATE-CYCLE

The **Conserve-Integrate-Cycle** method describes scales of intervention, beginning with simple means of use reduction through conversation and concluding with District-scale cyclical thinking and full life-cycle understanding. The Conserve-Integrate-Cycle **toolkit** is a dynamic catalogue of green techniques and technologies, both tried-and-tested models and pilot project opportunities.

CONSERVE

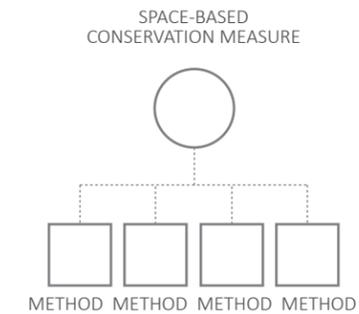
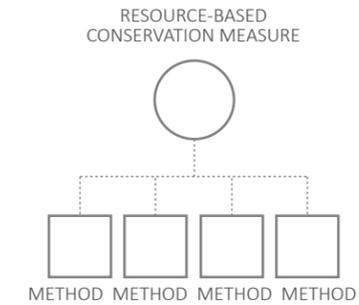
Conserve is universally accepted as the most immediate metric for green building. Rating systems such as LEED and Austin Energy Green Building measure performance based on improvements relative to a baseline, such as for energy and water.

INTEGRATE

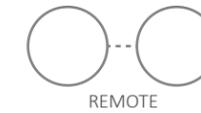
Integration establishes a relationship between systems, enabling a single intervention to fulfill multiple functions. Building systems integration commonly recognizes a scale of intervention: remote, touching, integrated, unified.

CYCLE

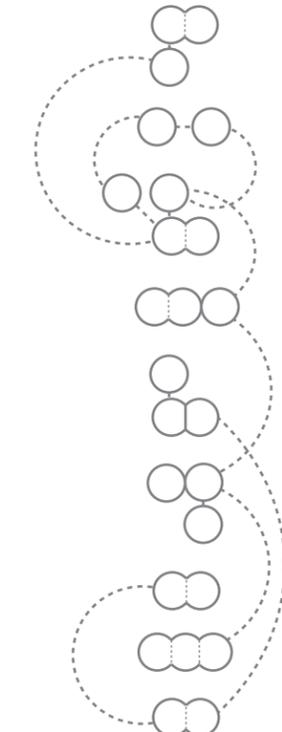
Cycle emphasizes the continuous flow of resources from source to use to re-source.



CONSERVE
RESOURCE | SPACE
MEASURE + METHOD TAXONOMY



INTEGRATE¹
LEVELS OF INTEGRATED
SYSTEMS



CYCLE
EXAMPLES OF PERFORMANCE SYNERGIES
BETWEEN INTEGRATED INTERVENTIONS

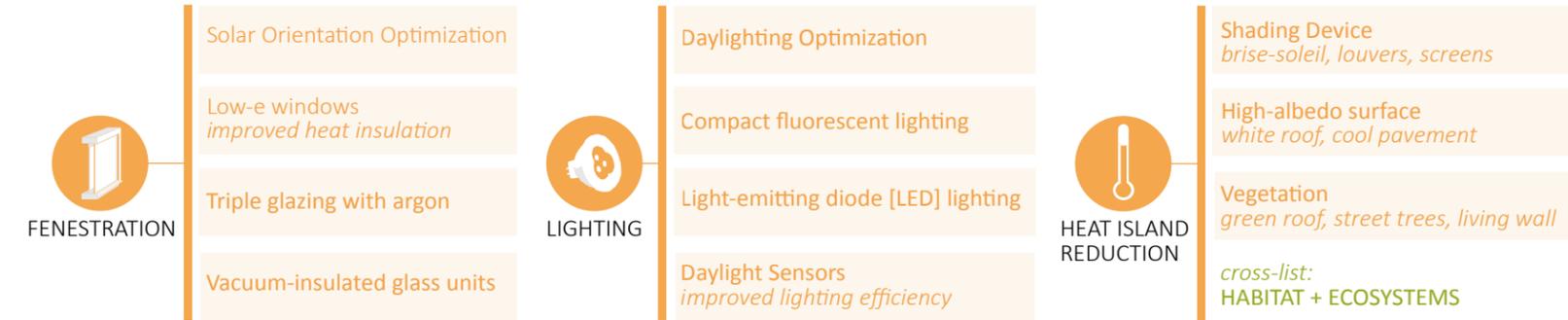
¹ from Richard Rush's *Building Systems Integration Handbook*

RESOURCE CONSERVATION

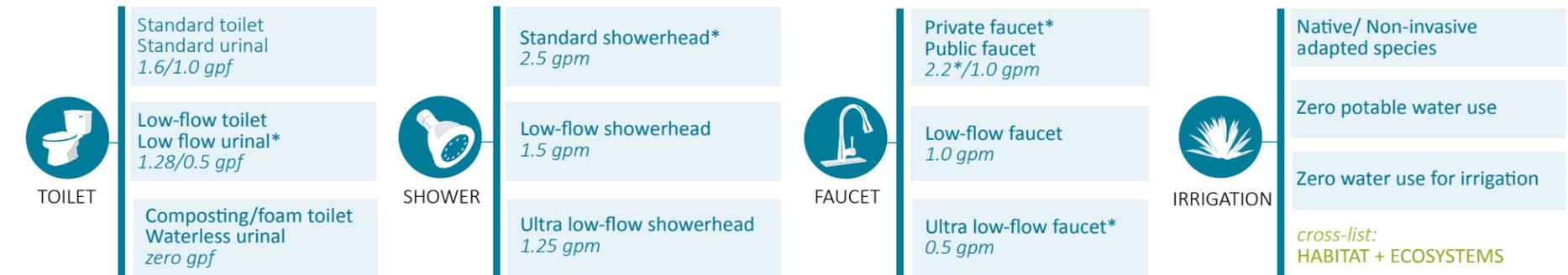
Resource conservation generally deals with quantifiable metrics of resources available to a project. These include needs such as water and electricity as well as output streams such as construction and operational building debris, and wastewater.

The toolkit approaches each Performance Area with a series of conservation categories which include uses and input-output sources. For example, the Water toolkit includes water uses (including toilets, showers, faucets, appliances, HVAC, fire suppression, and irrigation) and sources (City water, rainwater, effluent, condensate reclaim, and others).

Each of these conservation categories can be indexed, as shown here, to include tested and experimental strategies by which conservation can be effected through increased production of sources or reduction of use intensity.



EXAMPLES OF ENERGY CONSERVATION METHODS



EXAMPLES OF WATER CONSERVATION METHODS

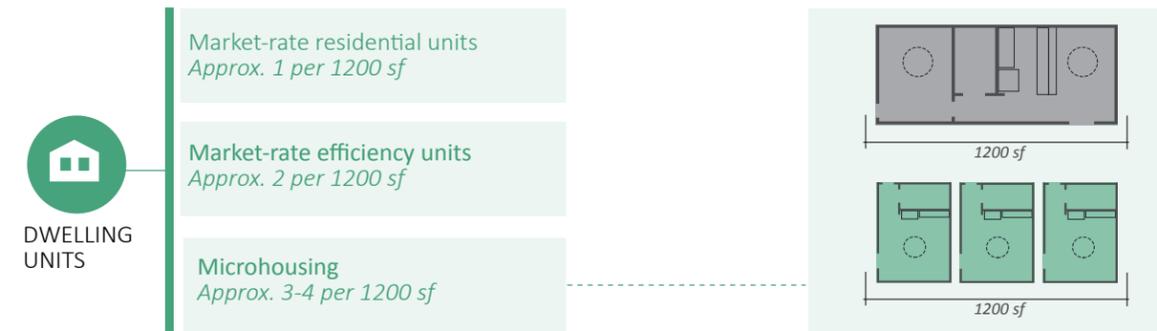
* indicates current City of Austin code requirement

SPACE CONSERVATION

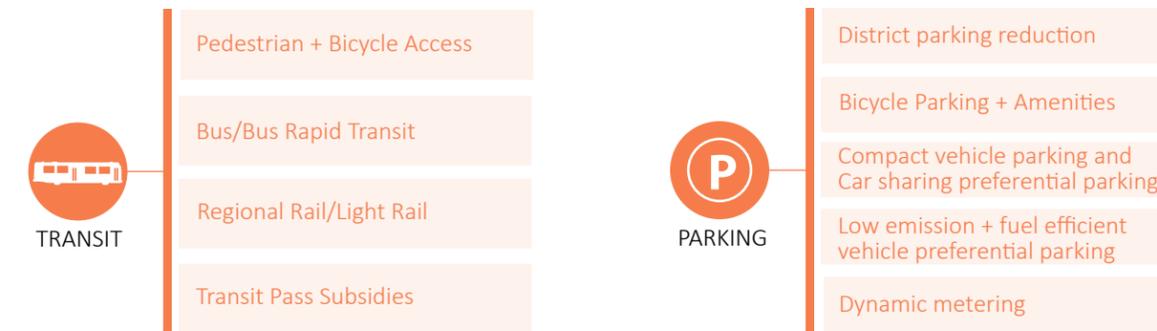
Space conservation is generally a more qualified metric than resource conservation, but adheres to similar principles of increasing production (incentivized spatial interventions) and reducing load (discouraged spatial conditions).

The toolkit similarly functions as an organizational system of conservation categories under the Performance Areas which address concerns relative to the District Strategies laid out in the Goal Summary (see page 24).

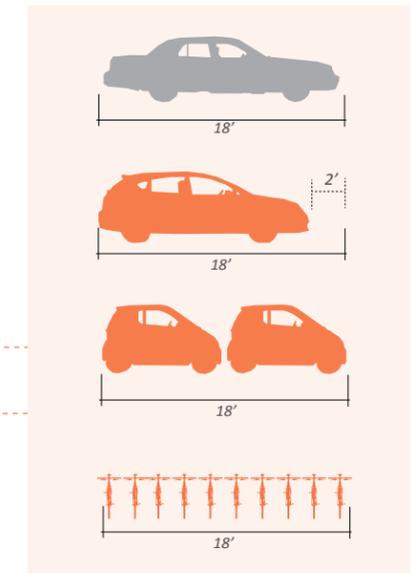
Examples of space conservation include considering dwelling unit diversity as a form of affordable housing that is empathetic to market concerns. The Space Conservation Toolkit outlines several housing types--from market-rate residential units to pilot microhousing--which facilitate the goals of the Equitable Development Performance Area. Likewise, the spatial implications of parking interventions illustrate both the myriad design options available and the space conservation they maintain.



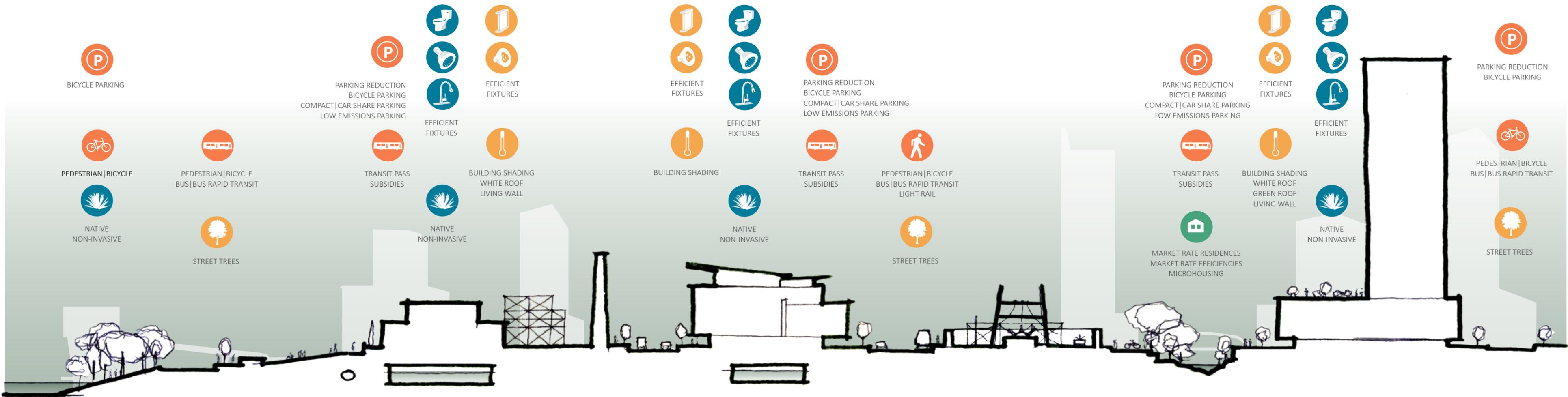
EXAMPLES OF EQUITABLE DEVELOPMENT CONSERVATION METHODS



EXAMPLES OF ACCESS+MOBILITY CONSERVATION METHODS



SPATIAL CONSERVATION



EXAMPLES OF CONSERVATION IN ENERGY, WATER, ACCESS+MOBILITY, AND EQUITABLE DEVELOPMENT WITHIN DISTRICT

INTEGRATED SYSTEMS

Integrated systems represent an additional tier of intervention toward efficiency. They can operate at all scales of the District but do not represent full cycles.

The taxonomy used here to draw and define integrated systems (near right) is borrowed from Richard Rush's *Building Systems Integration Handbook*. The levels of integration are as follows:

REMOTE
Systems do not touch

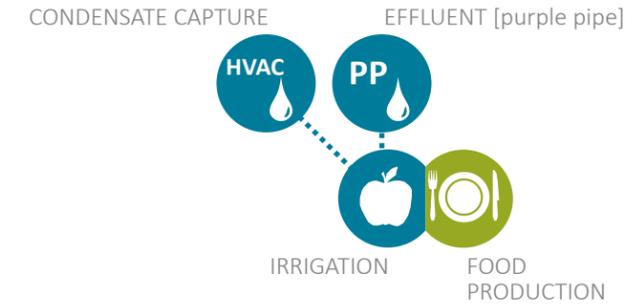
TOUCHING
There is contact between systems, but they are not permanently connected

CONNECTED
Systems are permanently connected, but do not otherwise perform integrated function

MESHED/UNIFIED
Systems occupy the same space; this implies full integration between paired systems



Sink-in-toilet fixture
Point-of-use greywater recycling



Condensate | Effluent Irrigation



Productive Green Roofs + Walls

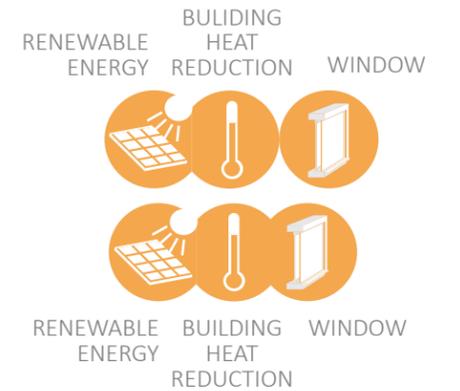
Bike Showers with Wetland Treatment



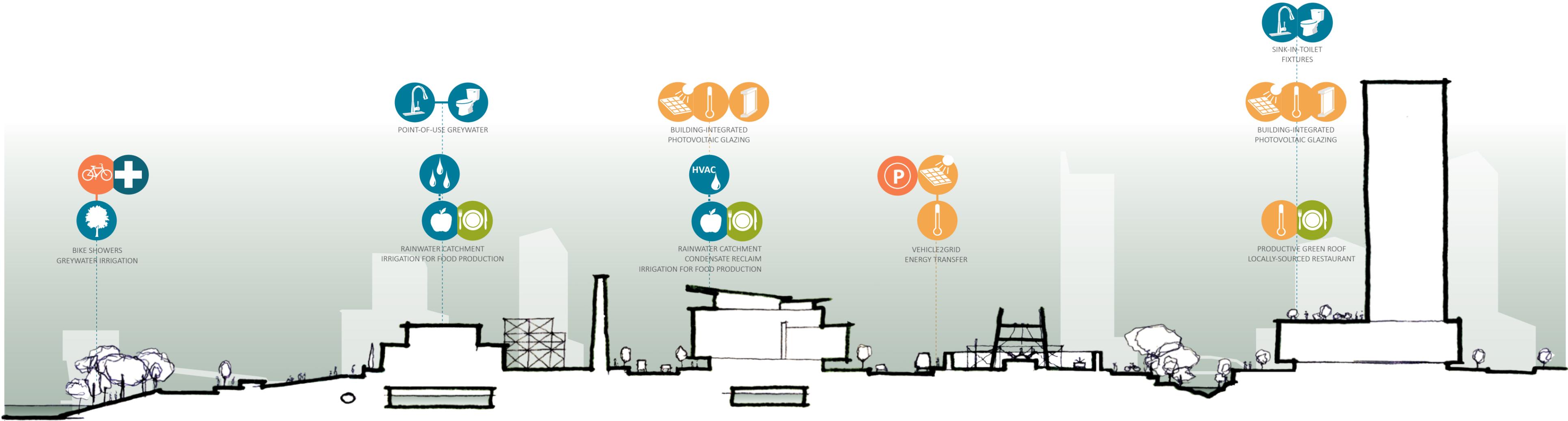
Photovoltaic Electric Vehicle Charging Stations
Vehicle to Grid Energy (V2G/"Carbitrage")



Building-Integrated Photovoltaics



EXAMPLES OF INTEGRATION METHODS AT VARIOUS SCALES



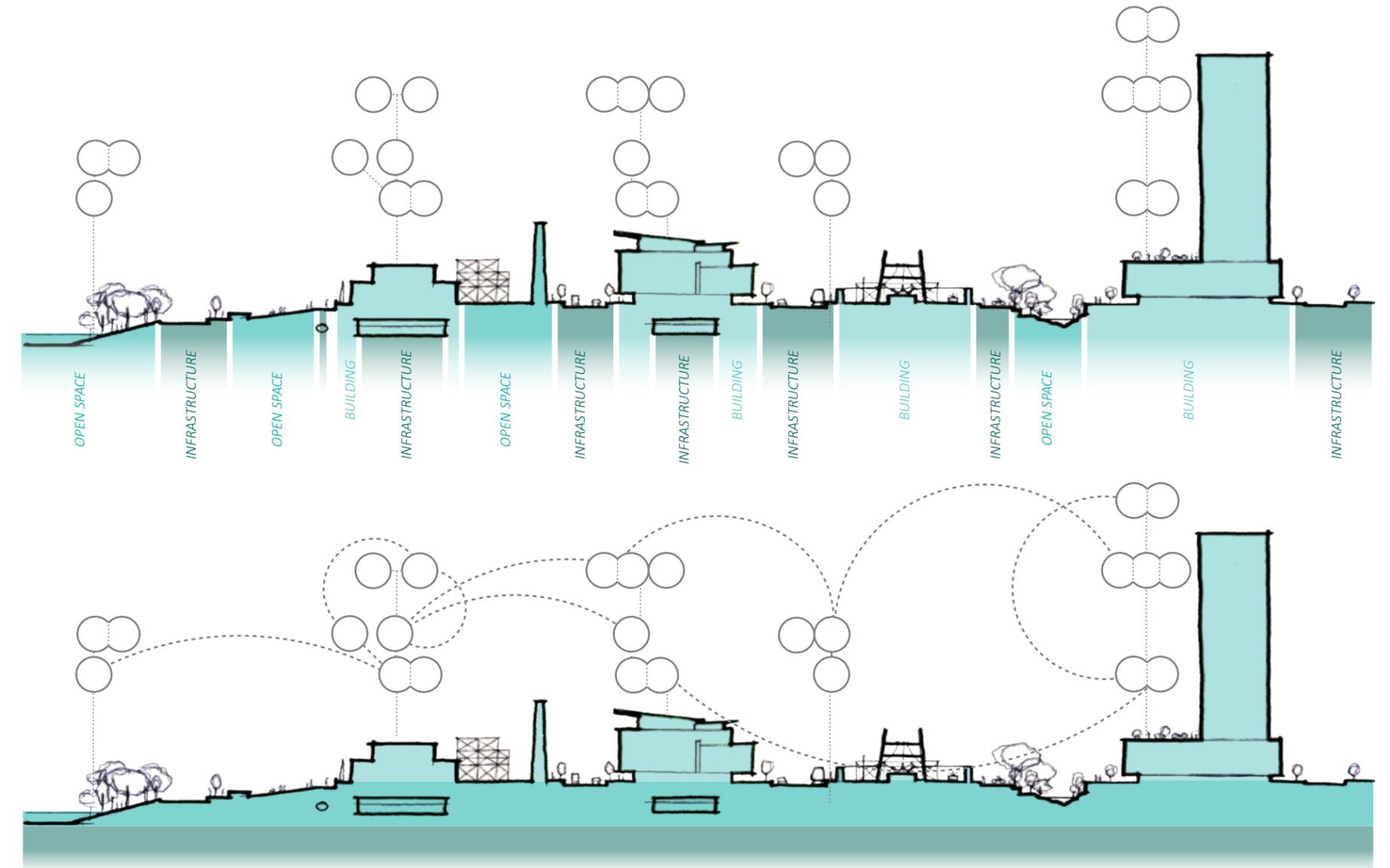
EXAMPLES OF INTEGRATED SYSTEMS WITHIN DISTRICT

CYCLE THINKING

Cycle thinking advances the concepts behind integrated systems, understanding independent integrated interventions as a series of parts which can combine to create a larger scale, more complex “ecosystem” of design—with the ultimate goal of achieving complete life cycle balancing and dynamic flow.

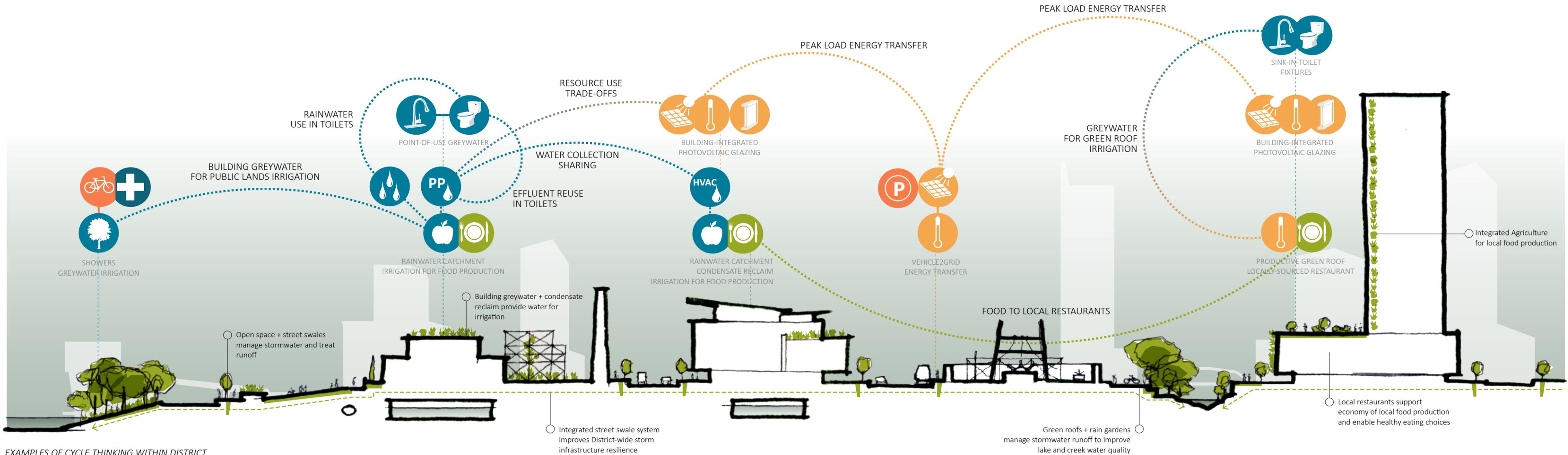
The unique set of stakeholders that the Seaholm EcoDistrict has engaged allows it to seek cycles at a District scale, invoking multiple buildings, ownerships, and Performance Areas. Cycle thinking has the potential to produce a wide range of benefits to the District:

- Reduce operational costs by engaging productive waste reuse and closing end-use loops
- Identify synergies between Performance Areas to achieve multiple District Strategies
- Illustrate viability of full life cycle planning in urban settings
- Increase market value for retail, commercial, and residential uses
- Relieve burden on citywide infrastructure systems



CYCLE THINKING UNIFYING DISTRICT PARTS

BUILDING + OPEN SPACE+ INFRASTRUCTURE



ACTION AREAS

This assessment supports several Action Areas for the first phases of the Seaholm EcoDistrict development. These Action Areas acknowledge efforts in green building, the potential for urban design, ecological mindfulness, and the specific potential and influence of the site:

- **AIM FOR NET POSITIVE**
Net Positive envisions a project which produces benefits that **exceed its consumption**. Envision a Seaholm EcoDistrict that is resource self-sufficient, zero waste, and yields a net positive value for the City
- **CREATE INTEGRATED CENTRAL INFRASTRUCTURE + MANAGEMENT PLANS**
Adopt plans to administer **best practices** for mobility, parking, affordable housing, and water, energy, waste, and material systems
- **BRAND THE DISTRICT**
Embrace the **historical character** of the Seaholm and Green sites in branding the EcoDistrict character and promoting arts and environmental technologies

- **MONITOR + DISPLAY PERFORMANCE METRICS**
Adopt rigorous metering and sub-metering of District-scale performance metrics to instill a sense of healthy competition between the EcoDistrict's developers and promote **innovative, visible, and interactive public "Dashboard" displays** of these metrics
- **PROMOTE SEAHOLM BETA TO ADVANCE BASELINE**
Take advantage of District-level planning to find innovative ways to **push beyond standard conventions** of green building, community design, and infrastructure, including advanced metrics, integration of systems, and empowerment of multiple scales of action

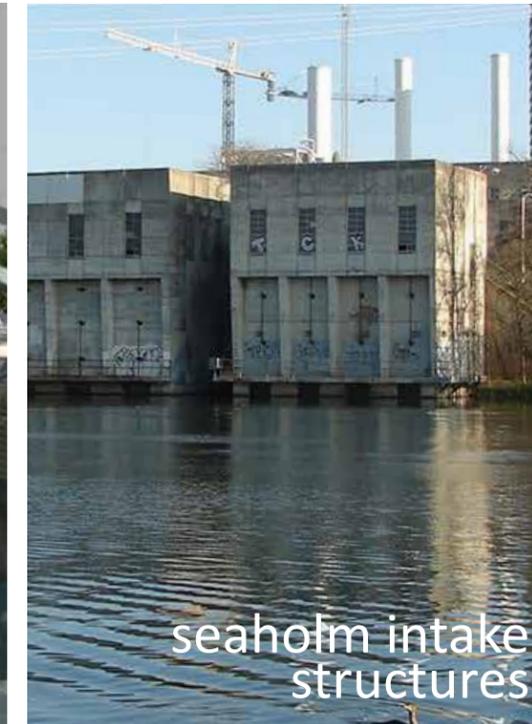


image credits: City of Austin/Touchstone Architecture; City of Austin/Speak Up Austin; City of Austin

APPENDIX: CASE STUDIES

District thinking benefits from understanding a wide variety of precedents and examples.

These pages illustrate a cross-section of efforts that have gone into sustainable planning, green building, and local development in Austin.

Within these case studies are examples of successes and challenges, all of which will inform the planning and design processes of the Seaholm EcoDistrict.



image credit: EcoDistricts

Lloyd EcoDistrict; Portland, OR

300 ac

First EcoDistrict development pilot program

Uses a five-phase, comprehensive approach for accelerating sustainable neighborhood development:

District Organization

District Assessment

Project Feasibility

Project Development

District Monitoring



image credit: EcoDistricts

Pilot project for EcoDistricts (formerly Portland Sustainability Institute) continues to advance the EcoDistricts framework and inform future district-scale developments

Dockside Green; Victoria, BC, CANADA

30 ac

Attained Stage 2 LEED-ND Platinum certification

Will pay municipal penalty of \$1/sf (up to \$1M/building) for every building that fails to receive LEED-NC Platinum certification

100% Fresh air system utilizes heat recovery from the exhaust system and preheats incoming air

Energy Star appliances average **47%** energy savings over the Canadian Model National Energy Code base energy rating

Residential metering measures domestic hot and cold water use, heating bills, and electricity usage

100% sewage treated on site and used for flushing toilets, landscape irrigation and water features

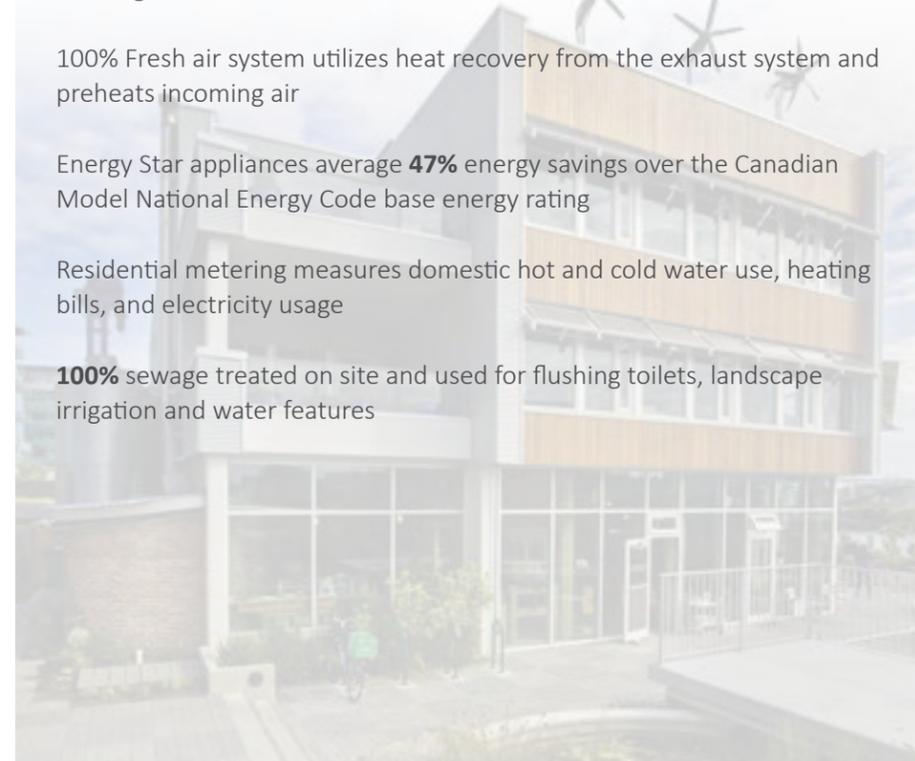


image credit: Dockside Green

New Urbanist-principled development project takes aim at LEED for buildings and neighborhood development Platinum certification

*SFPUC Headquarters
San Francisco, CA*

277,500 sf
100% of wastewater treated on-site
55% energy use reduction
45% daylight harvesting
7% PV and wind energy production offset
40% reduced indoor potable water use
30% building occupants within 15' of operable window
Harvested rainwater used for landscape irrigation
Integrated Project Delivery



photo credit: SFPUC

High-visibility headquarters for public utility shows commitment to integrated environmental design

*Bullitt Center
Seattle, WA*

50,000 sf
82% indoor lighting is supplied by daylight
100% wastewater treated onsite and used offsite as fertilizer
Building constructed with **fly ash concrete** and 95% post-consumer recycled rebar
56,000 gallon rainwater collection system services 100% non-potable water needs
Uses twenty six 400-ft **geothermal wells** to reduce heating costs



photo credit: Groundwork Strategies

Downtown commercial building seeks certification by Living Building Challenge

*BIPV Pilot, Willis Tower
Chicago, IL*

--
Pythagoras Solar BIPV glass panels shade, reduce cooling costs, and generate electricity
Project may grow to **2MW** energy production
Testing for market viability



photo credit: Andrew Michler

High-profile mid-century building undertakes an energy-saving BIPV-shaded window pilot test program

*BP Helios Plaza
Houston, TX*

400,000 sf
400,000 gallon rainwater storage capacity offsets **all water use** excluding washing, cooking, and human consumption
Natural gas combined heat and power generator
First LEED Platinum certified building in Houston



photo credit: BP

Houston area corporate campus invests in resilient environmental features for energy and water

*Plantagon Greenhouse
Linköping, Sweden*

67,000+ sf
Hybrid office tower with south-facing integrated agriculture façade
190 ft vertical growing space and 60 ft deep double-skin curtain wall
Heat exchange between office and growing area minimizes energy costs
District heating from trash-burning plant and CO₂ harvest from biogas plant
Project broke ground in 2013



photo credit: Plantagon International

Hybrid office and food production model attracts investors for pilot building construction

*Mueller Redevelopment
Austin, TX*

700 ac
Development governed by series of environmental guidelines:
fiscal responsibility
economic development
east Austin revitalization
compatibility with surrounding neighborhoods
diversity
sustainability
Pursuing LEED-ND Pilot Certification; Currently Stage 2 Plan Silver Certified

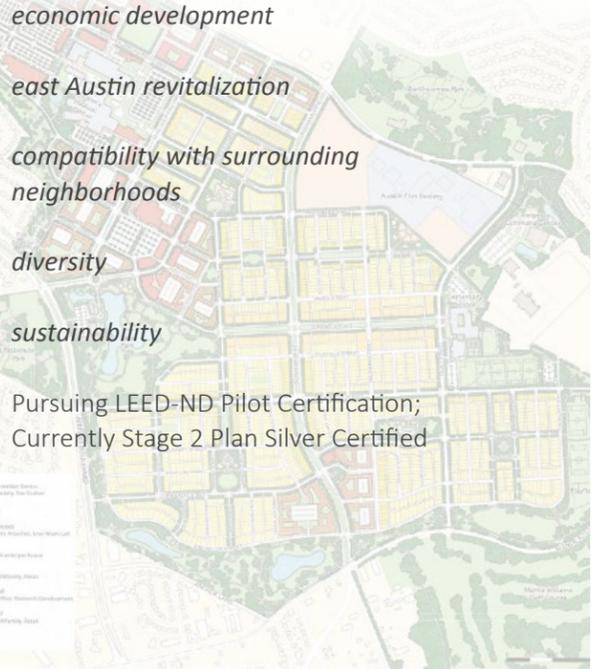


image credit: ROMA

The redevelopment of Austin's former airport was guided by New Urbanist principles and enhanced environmental standards
**CMPBS served as sustainability and LEED consultant for masterplan and buildings*

*Block 21
Austin, TX*

1,082,000 sf
30% reduction in potable water use + annual water savings of **2.4 m** gallons
37% lighting energy use reduction
16% insulating + efficient windows energy use reduction
22% recycled content materials + **23%** locally-sourced materials
residents receive free memberships to Car2Go car-sharing program



photo credit: Richardo B. Brazziell

Downtown Austin hotel and residential tower raises the bar for street life, energy + water efficiency, and design
**CMPBS served as LEED consultant for project*

*Livestrong Foundation
Austin, TX*

30,000 sf
LEED Gold adaptive reuse of existing building
30% indoor water use reduction [*low-flow toilets + faucets*]
50% outdoor water use reduction [*native plants, water treatment*]
95% remodeling building waste reused
90% stormwater captured for use

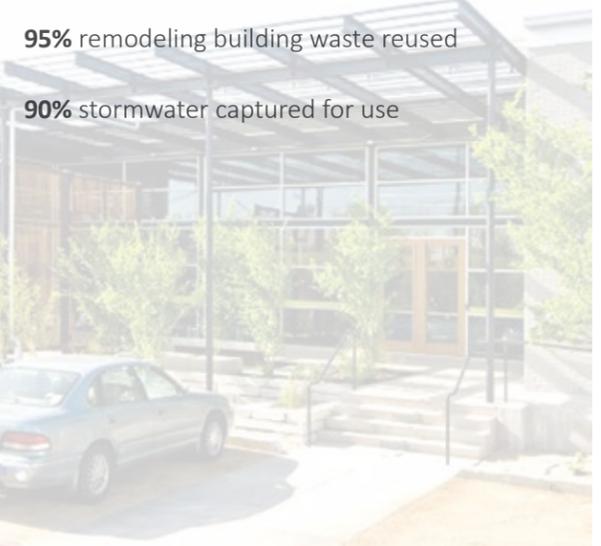


photo credit: Hester+Hardaway

Adaptive reuse of Austin warehouse makes exemplary use of daylight and material efficiency and promotes quality design
**CMPBS served as LEED consultant for project*



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