

Net Positive



Buildings can go beyond avoiding negative impacts and actively create positive contributions.



Energy
Carbon
Water
Materials
Ecological Impact
Human Impact

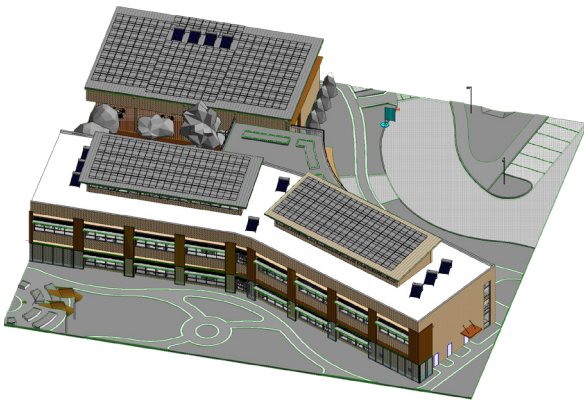
- ✓ **Energy:** How can we minimize energy consumption and maximize renewable energy generation to go beyond net-zero?
- ✓ **Carbon:** How can we reduce embodied carbon in materials and offset operational emissions to mitigate environmental impact and achieve carbon positivity over the building's lifecycle?
- ✓ **Water:** How can we harvest and recycle water within the building and onsite to minimize consumption and positively impact local ecosystems?
- ✓ **Materials:** How can we minimize waste, promote a circular economy and use sustainable materials in a resource-efficient manner in design and construction?
- ✓ **Ecological Impact:** How can we integrate natural systems like green roofs and wildlife habitats to actively contribute to ecosystem regeneration and enhance biodiversity?
- ✓ **Human Impact:** How can we create environments that optimize indoor air quality, provide access to natural light, promote physical activity, and utilize other strategies to prioritize occupant health and well-being?





Energy

How to minimize energy consumption and maximize renewable energy generation.



ARCHITECTURAL

- ◆ Optimize Building Orientation for solar, natural ventilation and daylighting.
- ◆ Building Configuration & Massing to maximize energy efficiency.
- ◆ Sun-Shading – overhangs, vertical and horizontal ‘fins’.
- ◆ Solar Façade incorporation.
- ◆ Design for natural daylighting, including clerestory windows and generous north-facing glazing, to reduce electric lighting.
- ◆ Avoid thermal bridging.

ELECTRICAL

- ◆ Solar Panels - at parking areas (as shade structures), on roofs, building façades, and site (as available).
- ◆ Electrical battery storage.
- ◆ High efficiency light fixtures with sensors and lighting controls.

STRUCTURAL

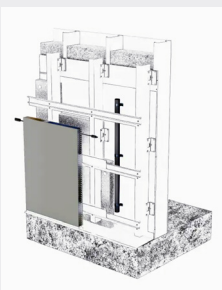
- ◆ Unlike steel, concrete or masonry, wood has the advantage of low thermal conductivity compared to steel and concrete. As a result, wood buildings are easy to insulate to high standards. Often, hybrid systems including wood provide the best outcomes. Mechanical

MECHANICAL

- ◆ Reduced OA (outdoor air) load by up to 80% using ASHRAE 62.1 Indoor Air Quality Procedure in combination with an air scrubber and implementing an ERV to precondition required OA.
- ◆ Utilize heat recovery technology to heat and cool zones on demand.
- ◆ Increased space temperature setpoints and added HVLS fans for comfort.
- ◆ Solar water heaters to heat or preheat water before entering water heater.



Solar Cladding Panels



Solar Water Heating



Sustainable Minds®
Transparency Catalog



EC3

Carbon

How to reduce embodied carbon and offset operational emissions to mitigate environmental impact and achieve carbon positivity over the building's lifecycle.

GENERAL

- ◆ Select materials that have reduced carbon by utilizing software that has sufficient data to make the selections, including life cycle assessments and Environmental Product Declaration (EPD) catalogs.
- ◆ Test alternates in systems and materials to make real time design updates to minimize negative environmental impacts.
- ◆ Partner with manufacturers actively decarbonizing their manufacturing process.

CIVIL

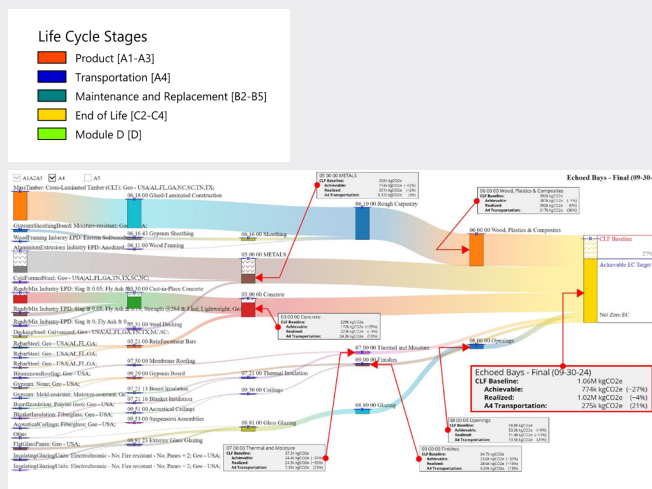
- ◆ Utilize pavement options with reduced embodied carbon, like permeable pavers.
- ◆ Use of Carbon Neutral Asphalt for roads and drives.

STRUCTURAL

- ◆ Sustainable concrete mixes in combination with either supplementary cementitious materials (SCM's) or carbon sequestration (e.g., carbon cure). Optimizing steel structures and planning for deconstruction may lead to successful projects. When possible, consider wood (including mass timber) as it has the lowest embodied carbon, and biogenic carbon may be considered.

MECHANICAL

- ◆ Reduce the amount of ductwork needed by utilizing ductless conditioning options while also considering textile duct alternatives.



Mass Timber



Cross Laminated Timber (CLT)



Glue-Laminated Timber (Glulam)



Water

How to harvest and recycle water to minimize consumption and positively impact local ecosystems.

MECHANICAL

- ◆ Harvest rainwater and RTU condensate for use in toilet flushing and landscape watering.
- ◆ Use low flow plumbing fixtures to greatly reduce annual water usage.

STRUCTURAL

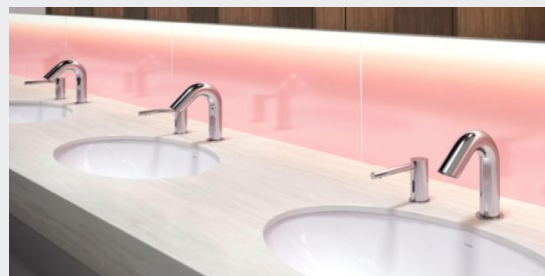
- ◆ Using Bio-based materials such as wood reduces the volume of water used for construction. For instance, 25% of the weight of concrete is water and substantial amounts of water are used to manufacture steel and cure concrete.

CIVIL

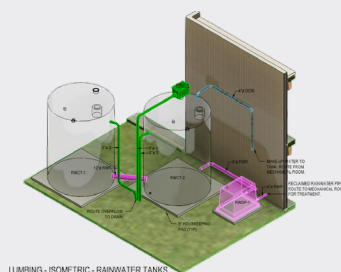
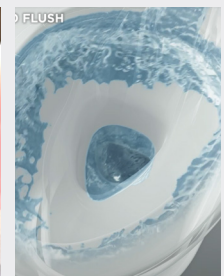
- ◆ Utilize bioswales and rainwater gardens for water retention and natural irrigation.
- ◆ Reduce irrigated area or use no permanent potable water irrigation.

LANDSCAPE

- ◆ Utilize harvested rainwater for irrigation.
- ◆ Run driplines through the planting beds to water plants.
- ◆ Utilize water efficient and drought-tolerant landscaping and native vegetation.



Low Flow Fixtures

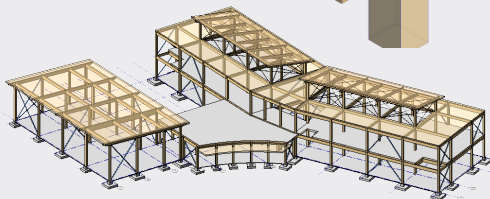
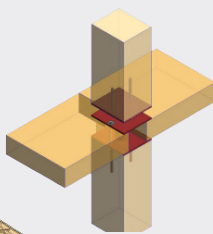


Rainwater Tanks



Materials

How to use sustainable materials in a resource-efficient manner, minimize waste and promote a circular economy.



GENERAL

- ◆ Design efficient yet resilient buildings to reduce materials.
- ◆ Explore reuse or repurposing of existing buildings and materials when feasible.
- ◆ Design for deconstruction and plan for reuse of materials.

- ◆ Understand your region, source locally and know the supply chain.
- ◆ Prioritize the use of building materials with EPDs (Environmental Product Declarations).
- ◆ Establish a carbon budget and quantify results.
- ◆ Use the structure as finish when possible, reducing overall material usage.

MECHANICAL

- ◆ Extend the life of unit filters by utilizing OA (Outside Air) regeneration.
- ◆ Reduce the need for sheet metal ductwork by selecting systems that distribute air directly to the space as well as utilizing textile ducts.

STRUCTURAL

- ◆ Be material efficient and use high strength materials where needed.
- ◆ Optimize designs and consider carbon content of sections (e.g., steel shapes W vs HSS).
- ◆ Use performance-based specs, specify max Global Warming Potential for concrete mixes, and consider longer curing times.
- ◆ Be open to explore new materials and systems that may be more sustainable, use bio-based

materials such as wood to reduce water usage. Hybrid systems are often a great solution.

- ◆ Use of lighter materials like wood reduces transportation & building erection related CO2 emissions and decreases foundation sizes.

ARCHITECTURAL

- ◆ Smaller footprints lead to CO2 savings by reducing overall material usage.
- ◆ Exterior façades with sustainable wood and solar façades.
- ◆ Low-E glazing with bird friendly fritting, to prevent bird strikes.

INTERIORS

- ◆ Selection of finishes and furnishings with low carbon and environmental impacts, good indoor air quality, material health, and circular economy.
- ◆ Materials with low volatile organic compounds (VOCs) or harmful emissions.
- ◆ Materials that have durability/longevity to lengthen product use.
- ◆ Run driplines through the planting beds to water plants.
- ◆ Utilize water efficient and drought-tolerant landscaping and native vegetation.



Ecological Impact

How to integrate natural systems to actively contribute to ecosystem regeneration and enhance biodiversity.



Maximize natural areas

GENERAL

- ◆ Understand the site conditions, context, and local habitat and adapt design solutions to integrate with the native environment.

LANDSCAPE

- ◆ Replace lawn areas that are difficult to mow with shrubs and tall grasses.
- ◆ Provide the site with meadow wildflowers supporting local pollinator species.
- ◆ Adopt best practices in landscape maintenance to improve plant health and eliminate the need for pesticides.
- ◆ Conserve Habitats for Threatened and Endangered Species.

MECHANICAL

- ◆ Hybrid VRF system requires less refrigerant charge than a typical system.
- ◆ Refrigerant used is to be low GWP (<700).
- ◆ Replacing natural gas burners with electric resistance heating.

STRUCTURAL

- ◆ Wood is a natural, renewable, and sustainable material. Maximizing wood use for structures could remove millions of tons of CO2 from the atmosphere annually. If other systems are used, understand the lifecycle, plan for deconstruction and reuse.

ARCHITECTURAL

- ◆ Microalgae Façades.
- ◆ Integration of roof terraces and gardens.
- ◆ Use of fritted glass reduces bird strikes.



Plantings can provide cover for ground nesting birds.



Native plantings can attract species of bees, wasps and butterflies.



Micro Algae Panels





Human Impact

How to create environments that optimize indoor air quality, provide access to natural light, promote physical activity, and prioritize occupant health and well-being.



SMART TECHNOLOGY INTEGRATION

- ◆ Implement smart building technologies (smart thermostats, lighting controls, and occupancy sensors) to monitor air quality, temperature, and lighting levels, allowing for real-time adjustments to optimize occupant comfort and well-being.

NATURAL LIGHT OPTIMIZATION

- ◆ Maximize access to natural light and use light-reflective surfaces. Exposure to natural light has been shown to improve mood and enhance productivity. Manual and programmable window shades offer more light control. Minimize glare.

ACTIVE DESIGN ELEMENTS

- ◆ Encourage physical activity by incorporating features like centrally located staircases, walking paths, or fitness areas. Provide bike racks and shower rooms.

COMMUNITY SPACES

- ◆ Design communal areas such as lounges, cafeterias, or outdoor gathering spaces to foster social interaction and a sense of community. Community gardens create the opportunity for healthy living including onsite food production.

ERGONOMIC WORKSPACES

- ◆ Ergonomic furniture, adjustable desks, and supportive seating encourage proper posture and reduce the risk of musculoskeletal issues. Balance boards or stability balls promote movement and alleviate discomfort from prolonged sitting.

NOISE REDUCTION STRATEGIES

- ◆ Sound-absorbing materials, acoustic panels, ceiling clouds and noise-cancelling measures minimize distractions, create a quieter environment which improves concentration, communication, and overall well-being.

BIOPHILIC DESIGN

- ◆ Provide views of nature and introduce natural elements (living walls, indoor greenery and gardens, water features and natural materials) to improve air quality, reduce stress, and create a rejuvenating atmosphere.

EXPOSED WOOD

- ◆ Exposed wood, including wood structures, have a stress-reducing effect, boosting occupant well-being.

BIOPHILIC ART

- ◆ Art installations inspired by natural elements or showing nature can also enhance visual interest and stimulate creativity.

ENHANCED WAYFINDING

- ◆ Wayfinding through plan organization, carpeting, accent walls and furnishings.

