

GREEN FEATURES OF MELINK HEADQUARTERS

BUILDING ORIENTATION AND LAYOUT:

1. Building orientation facing south and 2:1 length to width dimensions to maximize day-lighting, maximize solar heating in winter, and minimize cooling load in summer.
2. Two-story design to minimize land usage and also minimize roof surface area to in turn minimize the building cooling load.
3. Restrooms, stairwells, and storage rooms are on east and west ends of building to minimize sun glare and hot spots in early morning and late afternoon due to sun position.
4. Plant roof height was reduced to minimize HVAC operating costs. Ceiling fans to be used during summer for convection cooling and during winter for reducing stratification.

BUILDING ENVELOPE:

5. Pre-cast concrete walls with R-19 insulation to provide a large thermal barrier. Smooth surfaces and light colors to maximize solar reflection and minimize convection losses.
6. High performance roof membrane with R30 insulation to maximize solar reflection and minimize convection losses.
7. High performance exterior windows to maximize solar reflection, minimize convection losses, and maximize visible light transmittance.
8. Interior storm windows with low E added to further reduce heat losses during winter, resulting in a triple pane combination with original windows.
9. Emergency stairwell on west side is enclosed in pre-cast concrete to provide additional insulation to the main office building against prevailing cold weather fronts.
10. Metal doors and hatches are covered with foil-backed bubble insulation.
11. Bay doors are sealed and insulated to minimize infiltration when opened for shipping and receiving purposes.

12. Resealed existing windows and insulated with back-rod to address infiltration and conduction/convection heat losses during the winter. Original subcontractor did bad job.
13. Glass partitions installed in main and plant lobbies as well as stairwell and plant kitchen to create better zoning and thermal barriers against heat loss in the winter.
14. New thermally-insulated and isolated doors, frames, and thresholds installed for main lobby to test performance compared to conventional 'weak link' exterior doors.

NATURAL LIGHTING:

15. Extensive use of exterior windows – especially on the south side - to maximize natural day-light and minimize need for electrical light.
16. Exterior windows located next to desk in each office to provide both ambient and task lighting so that electrical lights can be turned off for most of the day/year.
17. Extensive use of interior windows in perimeter offices to allow natural day-light to penetrate the center of the building and minimize need for electric lighting.
18. Use of low-profile workstations in the center of the building to allow natural day-light to permeate the office environment and provide wide-open panoramic views.
19. Mini-blinds installed on south windows to serve as sun screens and light-shelves by setting angle such that light reflects up toward ceiling during winter afternoons when sun is low.
20. Exterior sun shades also installed on south windows to minimize solar gain during the cooling season and maximize solar gain during the heating season.
21. Skylights installed in second floor office space to further minimize need for electric lighting during the day.

ELECTRIC LIGHTING:

22. Electric lighting includes newer generation florescent T-8 lamps and ballasts.
23. Automatic control in perimeter offices, conference rooms, and restrooms with occupancy sensors to turn lights off when a person leaves after a programmed time.



24. Manual control in all areas with switches to reduce light levels whenever possible based on occupancy, natural light available and individual preferences. Maximum zones possible.
25. Indirect lighting fixtures in the main office and learning center to minimize glare and provide an architecturally more pleasing environment.
26. Direct lighting fixtures in perimeter offices have parabolic cells to minimize glare.
27. Task-lighting made available for individuals who request it. A 13 watt lamp provides adequate task lighting without adding a significant heat load to the office space.
28. Exterior building lights to be controlled by time of day, photocell, and motion sensor so that they only turn on when necessary for employees and intruders.
29. Exterior parking lights to be controlled by intelligent timer that only comes on an hour before dawn and an hour after dusk.
30. Sidewalk lights are solar powered.
31. Most florescent fixtures de-lamped during commissioning based on fact employees do not need 75-100 foot-candles to work, and in fact prefer less artificial light.
32. LED lights installed to replace florescent tubes where lights have to be on 24/7 for emergency regress purposes.

GEOTHERMAL HEATNG & COOLING SYSTEM:

33. Geothermal heat pumps to utilize the earth as a stable heat exchanger rather than the fluctuating ambient air temperature. Also no fossil fuels burned for heating.
34. Geo-thermal wells include (28) 450 feet deep bore holes to minimize land space requirements and number of u-bends in exchanger field.
35. Heat pumps utilize new environmentally friendly R410A refrigerant.
36. Heat pump air distribution system includes high-efficiency take-offs and radius or 45 degree bends to minimize static pressure losses.
37. Heat pumps to be physically located over aisles in office building and on mezzanine in plant for easy filter replacement.

38. Variable-speed water-circulating pumps and differential pressure sensor to save pump energy during part-load conditions with 25% minimum speed setting.
39. An automatic ground-loop bypass system was installed to save on pump energy, building heat, and solar thermal during unoccupied periods. Algorithm controls on/off of geo-loop.
40. Humidifiers installed in return ducts of main heat pumps serving first and second floor offices and controlled to 40% minimum during the winter.

PASSIVE & ACTIVE VENTILATION AND IAQ CONTROL:

41. Operable vents in the office, conference room, and kitchen windows to provide natural ventilation when outside conditions are right and minimize mechanical cooling.
42. Differential enthalpy sensors to communicate when it makes sense to open operable vents for free cooling via computer screens in office and plant.
43. Dedicated outside air unit to include energy recovery wheel connected to restroom exhaust.
44. CO2 sensors to control dedicated outside air unit and call for high speed when levels exceed a programmed level, ie. 900 ppm.
45. Algorithm developed to turn ERV to high speed when outside air temperature drops below 35F (during occupied hours only) so that electric heater does not turn on.

BUILDING AUTOMATION SYSTEM:

46. BAS to allow remote control of occupied and unoccupied temperatures and times, as well as exterior building light schedules.
47. Electrical distribution system to include sub-meters for each building to allow separate monitoring of HVAC, lighting, and plug loads.
48. Monitoring and verification to also include trending of key building health parameters, ie. Temperature, RH, CO2, lighting levels, geothermal water temps and flow-rates, etc.
49. Individual building load circuits monitored with CT sensors along with renewable energy circuits, to verify when building is importing and exporting power to/from the grid.

PLUMBING:

50. Sink faucets to have infrared sensors for automatic on/off operation to reduce use of water.
51. Sink faucets to have aerators to reduce use of water when they are turned on.
52. Waterless urinals in men's restrooms use zero water verses 1 gallon per flush for conventional urinals.
53. Toilets with dual-flush capability to be installed in women's restrooms to reduce the flushing of urine which is already 99% water.
54. Number of restrooms and toilets exceeds code requirements in order to focus on human comfort instead.
55. Hot water heater to be set to 110F to minimize electric heating costs.
56. Heat pump water heater installed for plant shower to minimize need for electric water heating since this building has no gas service.
57. Solar thermal system installed for second floor office showers to minimize need for electric water heating. It was sized to handle 100% of load during the summer.
58. Solar thermal system also inter-connected with geothermal loop to dump waste heat to the heat pumps during the winter and thereby improve efficiency.
59. Turned off breakers to smaller water heaters serving restrooms since it was discovered that no one waits for the hot water to reach the faucets.
60. Installed 1-gallon water heaters in main conference restrooms to provide a comfortable hand-washing experience for those who prefer hot water – with minimal electricity.
61. Septic system with leech fields to promote a self-sustaining mentality and eliminate need for a sewer line that adds load to the sewage treatment infrastructure.

SOLAR ENERGY:

62. Concrete walls to serve as massive solar collector and heat sink on sunny days, allowing heat to be slowly released into the building at night when it is cooler/colder outside.

63. Photo-voltaic (PV) system rated at 30KW installed on plant roof to harvest solar power and reduce electric bills.
64. Pre-engineered ground-mounted 2kW solar PV system installed near the plant for both production and testing/education purposes.
65. Solar thermal system installed for hot water heating in the second floor restrooms where showers are located. Also connected to the geothermal loop for boosting temps in winter.
66. Auxiliary electric meter to have capability of 'spinning' backwards so that on weekends when there is little or no electric load, power can be fed back to the grid.
67. Five additional solar PV technologies rated at 22kW installed on the roof to test performance, ease of installation and maintenance, and provide a basis for future recommendations.
68. A 25kW thin film ground-mounted array installed to showcase Abound panels and Rough Brother racking, as well as augment net zero energy efforts.
69. Six 2kW silicon ground-mounted arrays installed to showcase a light-commercial / residential solar PV system that makes solar cool and sexy, as well as low cost.
70. A 10 kW solar canopy/carport installed to showcase alternative racking solutions for idle, heat island parking lots. Charging stations and electric vehicles (EV's) to be included.

WIND ENERGY:

71. A low-wind turbine rated at 6.5KW was installed to complement the solar PV system by generating electricity at night and during the winter when the sun does not shine.

BIOMASS:

72. Wood-pellet stoves installed in the main conference room and library to supplement the heating system and further reduce our reliance on electrical power from the grid.

BATTERY STORAGE SYSTEM:

73. A 25kW lead-acid and lithium-ion battery storage system will be installed to reduce peak-demand charges in the summer and winter. Emergency back-up power to be added.



RECYCLING:

- 74. Recycling system for paper, glass, plastic, and metal during construction.
- 75. Recycling system for paper, glass, plastic, and metal during operation.
- 76. Much of the building was constructed of recycled materials.
- 77. Carpet squares will allow for easy replacement if/when they are stained or damaged, plus they are padded for extra comfort.
- 78. New recycling efforts result in 90% being diverted from landfill.

LANDSCAPING:

- 79. The 9 acre pastoral setting surrounded by fields, woods, and water provide a relaxing setting for employees.
- 80. Landscaping to be relatively self-sustaining and not require irrigation or maintenance other than minor lawn cutting and tree pruning.
- 81. Deciduous trees to provide shade for building and parking lot during the summer and allow sunlight into the building for free heating during the winter.
- 82. The pond is stocked with fish caught from the Little Miami River and now serves as a local favorite fishing spot for employees.

HEALTH & WELL-BEING:

- 83. A kitchen with faucet sink, refrigerator, microwave, water cooler, and coffee pot in each of the 3 buildings to focus on human comfort rather than minimum code requirements.
- 84. A shower is available in the plant for employee use if/when they use their lunch period for jogging or other form of exercise.
- 85. Outside views available to most everyone from their offices.
- 86. Perimeter offices and interior workstations to be approximately the same size and utilize the same type/size furniture to ensure everyone feels equally valued as a team member.



87. Courtyard with paver sidewalks, gardens, and wood benches to provide a relaxing setting for employees during breaks.
88. Patio areas with lawn furniture provided near pond and river to facilitate outdoor lunches and meetings on nice days.
89. Fitness room and green library built on second floor to promote healthy living and education on the green movement.

MISCELLANEOUS:

90. All computer monitors are the flat screen LCD type. CRT type monitors are not used. Also screen savers will be set to go 'dark' after a 3-minute period of on-use.
91. All personal computers being switched to Energy-Star laptops over time to further reduce IT related energy consumption.
92. IT servers are being switched to Energy Star servers over time and set up for virtual hard drives to minimize low-capacity inefficiencies of multiple servers.
93. Perimeter offices and interior workstations are the same size and utilize the same type/size furniture to ensure everyone feels equally valued as a team member.
94. Dock door seals to minimize infiltration of outside air into plant when trucks back-up for pickups and deliveries during hot/cold weather.
95. Entrance mats in both lobbies to have flush-mounted grates so that any dirt on shoes falls down and becomes trapped - preventing it from being tracked into the building.
96. Thermos-type coffee pots allow coffee makers to be turned off after brewing and still keep the coffee hot for several hours.
97. Dishwasher installed to minimize use of paper products for cups, plates, and ware. Also washable dishes provided to employees.
98. Purchased wool sweaters for employees to gain support for pushing the envelope on winter heating set points. Went from 70F to 67F and no golf shirts in January any more.
100. Installed timers in all offices and workstations to turn off computers, printers, and other phantom loads at night.



101. Installing a building monitoring system with kiosk for both employees and visitors to learn how energy is being used and generated in real-time and on a historical basis.

GREEN AWARENESS & INCENTIVE PROGRAMS:

102. Car pool program

103. Bicycle program

104. Leased hybrid cars for regional supervisors, technicians, and leadership team. Incentives also available for employees to purchase their own hybrid – up to 5 per year.

105. Steve Melink has the company's first electric car, the Chevy Volt, and uses our parking lot's charging station to add electricity to the car.

106. Incentives also available for employees to purchase solar PV, solar thermal, hybrids/EV's or other renewable energy systems for their homes.

107. Customer showcase in plant to demonstrate state-of-the-art designs and equipment for green restaurant and retail chains.

108. Melink to fly a U.S.G.B.C. flag (with member logo) ... beneath the U.S. flag to show all visitors our commitment to the success of the green building movement.

109. Energy bills for building publicly displayed every month to show progress toward net-zero energy performance.

110. Kiosk installed in main lobby to all show visitors our commitment to green building leadership and excellence, ie. net zero energy.