Conceptual Modeling of the Revitalization Scenario

The revitalization scenario has been defined with conceptual modeling of potential alternatives for development program, urban design and sustainability strategies. The conceptual modeling measured potential resource use of energy, water, and waste on an annualized basis within the SW Ecodistrict study area. The modeling of potential improvements was done at the building, block and district scale.

Current federal and city policies for government and private sector facilities will shape the design of district improvements, adding more efficient buildings to the district by 2030. EO 13514 will influence government procurement processes, including how government buildings are remodeled or built new. Through an iterative process, the team refined the conceptual designs as modeling results were identified. The modeling results were compared against national baselines for energy, water, and waste use to measure success. The modeling also included the potential cost of improvements based on a conservative estimate of near term construction costs.

Resource use was measured on a square foot basis. For example, gallons per square foot for water and energy use per square foot were used to illustrate building system outcomes. As the team developed the design for the district, we assessed the value of an improvement at each scale of the district. For example, as the population in the district increases through redevelopment, the relative use of resources is reduced. The cost trade-off for these potential outcomes informed refinement of the revitalization scenario.

The baseline for the SW Ecodistrict included an assessment of existing improvements for water, waste, and energy at the building scale. This was the starting point to measure compliance with the Executive Order as new building strategies were employed. Year over year reductions in energy and water use would be required from the existing condition to meet the Executive Order. In the future, reductions in resource use would be achieved by exceeding the baseline indices as building occupancy changed. The baseline establishes the point beyond which the likely cost and benefits of higher levels of resource use efficiency are reasonable. For example, energy use for new buildings in the district can be measured against other buildings nationally in the Commercial Buildings Energy Consumption Survey (CBECS) of 2003. This is a national index of energy use in commercial buildings. In early phases, it is feasible to achieve a 30 percent reduction below the CBECS survey indices. In later phases, we could achieve an 80 percent reduction. To put this in perspective, LEED Platinum certified buildings in DC have achieved a 30 percent to 40 percent reduction in energy use from the CBECS survey. Modeling of water and waste would similarly measure success against the baseline.

At the block scale, the project quantified how streets, open space and buildings would share resources. A key strategy in reducing stormwater run-off is to collect it for reuse. Here, a block or group of blocks share a stormwater system to clean and then convey stormwater to a storage tank for reuse. The measurement of this block strategy included the likely loss of stormwater to evaporation as well as the loss of water through the transpiration of water through plants. The team quantified the area of roof, streets, and open space. In the block scale modeling, the amount of pervious or impervious area was measured to quantify the amount of potential rainwater harvesting.

At the district scale, the team measured development scenarios that quantified the resource use and cost of all building, street, and open spaces improvements. Where blocks were redeveloped the model accounted for changes in land use and the intensity of activity. Across the district, modeled building systems included rehabilitated and redeveloped buildings, and building s with new uses.

The existing Central Utility Plant would supply buildings across the district with power, cooling, and heat. In early years, natural gas will be use for create power, heating, and cooling in the central plant. The carbon emissions from gas fuel use could be offset with carbon credits. In the future the fuel source for the central utility plant can be changed from natural gas to another fuel that does not release carbon into the atmosphere. The advantage of connecting buildings together affords a simple way to overcome the barriers present if a building were to source its power, cooling, and heating efficiently with zero carbon emissions.