

## One and Two Potomac Yard: Sustainability in the Federal Government

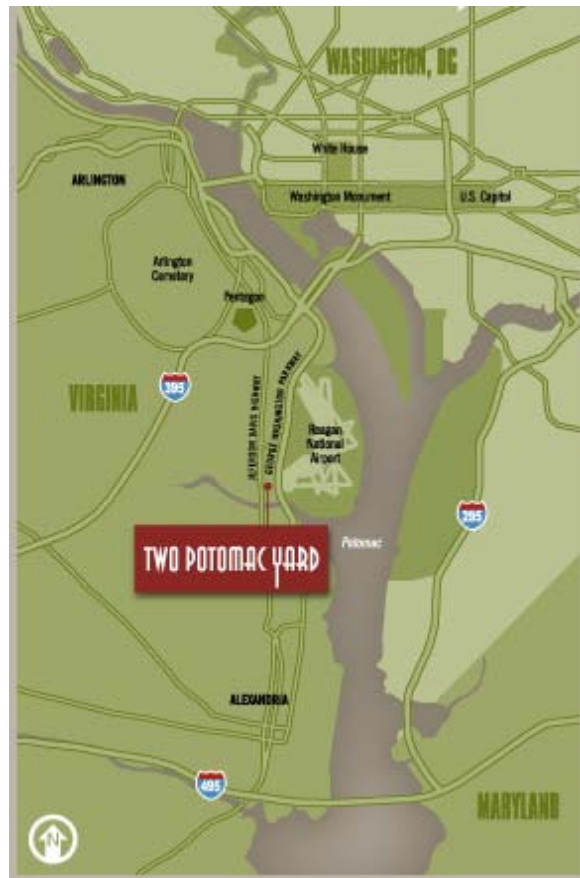
The desire for “green” buildings has ballooned over the past couple decades as concerns of environmental sustainability have become more mainstream in the United States. Because of its enormous size the Federal government can play a significant role in promoting environmentally friendly building practices and supporting certain “green” products. There are close to 500,000 buildings operated by the US Federal government, which cumulatively consume a huge amount of resources (White House). This past year I had the privilege of interning at the Office of the Federal Environmental Executive (OFEE), which is an office that implements environmental standards for operations in the Federal government. The newest Executive Order, E.O. 13514, sets environmental goals for government operations and was signed by President Obama on October 5<sup>th</sup>, 2009. Obama recognized the Federal government’s role in environmental leadership in his remarks during the signing ceremony:

*"As the largest consumer of energy in the U.S. economy, the Federal, Government can and should lead by example when it comes to creating innovative ways to reduce greenhouse gas emissions, increase energy efficiency, conserve water, reduce waste, and use environmentally responsible products and technologies." (White House)*

One example of this leadership can be found in One and Two Potomac Yard, which is actually made up of two twelve story buildings that are connected at the base with a walkway. The complex has an area of 654,000 SF, was finished in May of 2006 and is the first construction completed in an urban redevelopment effort. There are multiple tenants, but the EPA takes up most of the office space with 1,650 employees of the 2,350 people that work there. Both buildings earned a LEED- New Construction Gold rating and have also obtained Energy Star certification (National Institute of Building Sciences).

The site for the complex was chosen carefully. It is located in Potomac Yards, which is a mixed-use development in Arlington, VA, just outside of Washington, DC and next to the Potomac River. The entire Potomac Yards development has 2.5 million SF of office space, 1,600 residential units, and 188,000 SF of restaurants and shopping areas (OFEE). Potomac Yards is an abandoned railroad yard and was certified as a brownfield, mainly due to the cinder ballast in the soil from the coal-burning locomotives. Before construction could begin this contaminated soil was removed and shipped to Richmond, VA to be used as road building material in a landfill. Reconciling this land into usable space was much more desirable than taking agricultural land in a rural location and contributing to the sprawl that characterizes most of northern Virginia. In addition to its proximity to Washington, DC the site is also near Reagan National Airport, a Metro stop, a major bike trail, the Virginia Railway Express (VRE),

and several Metro bus and shuttle routes. The site is near the utility lines that an office building requires. The project earned ten out of a possible fourteen credits on the LEED scorecard for Sustainable Sites (FEMP).



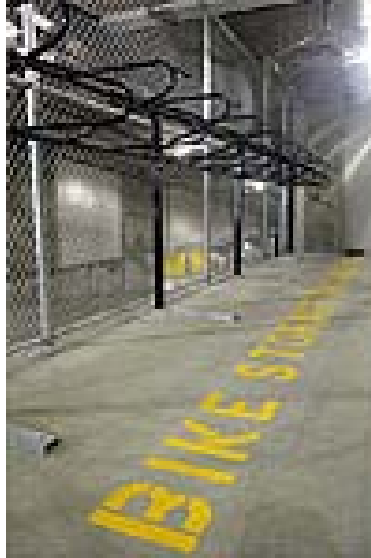
The project obtained approval for development in August of 2001, but had to make major changes in the design to accommodate new security concerns after the attacks on September 11<sup>th</sup>. The design team had to meet the Federal Protective Service requirements, which brought interesting conflicts between environmentally friendly design principles and security design principles. Originally there was major New Urbanist influence on the design of the project, such as an active streetscape with no set backs from the sidewalk, multiple access points to the building, and street-level retail. The new security measures required the complex to have setbacks of at least fifty feet and very limited access points to the buildings. The challenge was then to maximize the environmentally friendly features of the project that did not conflict with security concerns, while trying to appease the EPA and Arlington County and keeping costs low (National Institute of Building Sciences).

During construction the builders made efforts to earn as many LEED credits as possible. The builders were able to recycle 71% of their construction waste, diverting over two thousand tons of

material from entering the landfill. 27% of the building materials used had some level of recycled content (National Institute of Building Sciences). 35% of the below grade poured-in-place concrete structure was made of recycled ground granulated blast-furnace slag. Also, 63% of materials used were manufactured regionally (within a 500 mile radius) and 61% of the regionally manufactured materials were also extracted regionally. More impressively, 83% of the wood-based materials were certified by the Forest Stewardship Council. However, the project only scored six out of a possible thirteen credits in the Materials and Resources category on the LEED scorecard (EPA). One reason is that the waste diversion levels were not quite high enough to earn more credits. The construction crew also made efforts to influence the future indoor air quality by raising the finish materials (drywall, ceiling tiles, duct work etc.) off the ground with wooden pallets and covering them with plastic sheeting. This effort prevented contamination from dust, odors and liquids on the construction site while the finishing materials were being stored (EPA).

The EPA's Comprehensive Procurement Guidelines, which specify recycled content or biobased products, were used when purchasing indoor equipment such as office furniture, exit signs, walls panels etc. For example, the workstation furniture contains 35-40% recycled material. The carpeting was chosen because it was able to be recycled afterwards and also emitted low levels of volatile organic compounds (VOCs). VOC standards were also taken into consideration when procuring adhesives, paints, wood products, and caulking. Limiting VOCs is an important part of creating a space with acceptable indoor air quality (National Institute of Building Sciences).

The developers of the project did not add anymore parking spots than were required by code. In addition the parking lot is located underneath the building, which minimizes the amount of space that is impermeable to water or that contributes to the heat island effect. Though the DC-Metropolitan area is known for its dependence on cars, One and Two Potomac Yard makes some efforts to encourage alternative modes of transportation. In order to encourage ride-sharing, thirty of the best parking spots are reserved for carpoolers. The Crystal City Metro stop is less than half a mile away and the EPA gives employees subsidies if they commute via mass transit or bike (Interview with Cathy Berlow). The VRE has a stop nearby and there are a couple bus lines within a quarter mile of the building. The Mt. Vernon bike trail goes right by the building. This trail connects up with the W&OD trail, which runs through the main suburbs of northern Virginia out to the countryside in Purcellville, making it possible to commute from the suburbs by bike if one is very committed and in great shape. Biking is accommodated by having an indoor area designated for bike lockers and twenty eight showers. Anticipating a new mix of cars the EPA also installed thirty electric car charging stations in the underground parking lots (OFEE).



Though energy efficiency is one of the places where this project scored the lowest on the LEED evaluation, seven out of seventeen credits, there were still numerous efforts made to minimize energy use. The idea in this project was to maximize utilization of natural lighting while minimizing the amount of artificial lighting required. Large double-glazed windows that stretch from the floor to ceiling were used around the whole perimeter of the building to let as much sunlight in as possible while preventing heat loss in the winter or excessive heat gain in the summer. The office furniture was arranged in such a way to allow natural light to penetrate deeply into the office and barriers for conference rooms were made of glass paneling for the same reason. Dimming ballasts were used on the ceilings which were able to sense the brightness in a room and adjust accordingly. Occupancy light sensors were also installed so that lights would not be on in rooms when no one was in them.



In order to control heating and cooling costs high efficiency HVAC systems were installed. The roof was also constructed of a white, reflective, curved material to limit the amount of heat absorbed during the summer. A portion of the roof is a green roof and acts to regulate the interior temperature. Another way energy is used efficiently is by only purchasing Energy Star certified appliances, such as microwaves and refrigerators (EPA).



The EPA uses 100% Green Power, which means that the purchase Renewable Energy Certificates (RECs) for all of the electricity they consume. Purchasing RECs does not mean that the electricity physically entering the building is produced from a renewable source. One REC represents one megawatt-hour produced by a renewable electricity plant in another location. This is a good option when there are limited opportunities to purchase electricity from a local utility company that produces electricity with renewable resources. The funds that are used to purchase the RECs go to support wind farms in Minnesota, Nebraska, Wyoming and Oklahoma (Green Power Partnerships).

During the design phase the complex was projected to use 7,110,000 kWh annually to heat, cool, illuminate and run office equipment for the 650,000 SF of space, which translates to 37.1 kBtu/SF. In 2003 the Energy Information Administration estimated that the average office building will use 93 kBtu/SF each year, so the Potomac Yards project is well below those numbers (FEMP). With the way that the Federal government operates it is hard to tell exactly how close to the projected energy use values the complex actually comes. I contacted Cathy Berlow, the Tenant Representative for the EPA, and asked her how the energy use has compared with projected costs. This is her response:

*“The utility bills we receive from our lessor through the General Service Administration do not compare apples to apples. ...Using the Energy Star rating system for energy consumption metrics, PY is within 2 points of the Energy Star score between design completion and now.” (interview)*

The complex earned four of five credits on the LEED scorecard in the water efficiency category. The bathrooms are equipped with low flow urinals and dual flush toilets, which typically account for the majority of water use in an office building. The sinks are also equipped with low flow faucets with an electric shut off to prevent water waste. One of the more interesting water saving methods used was in the landscaping around the building. The plants that were used for landscaping were native, drought-resistant plants, such as the American Holly, making an irrigation system unnecessary. These plants are able to survive simply by the rain that naturally falls in the area, which greatly reduces water use. With these water saving measures the complex consumes 2,920,000 gal/year of water, which translates to

about 4.5 gal/SF each year (FEMP). According to Cathy Berlow this is also very close to the projected consumption level at the end of the design period.

The Potomac River is not known for being pristine near Washington, DC, so it is very important for developments to make efforts to minimize further damage from storm water runoff. There are a few ways that One and Two Potomac Yard attempts to accomplish this. I have already mentioned the effort to put the parking underground to minimize impermeable surfaces, which allows water to be absorbed more efficiently into the ground and prevents more chemicals from being washed into the river. The roof over the connection between the two buildings is a green roof.



Though it is only a portion of the roof the green roof still covers a substantial area of 1,711 SF. In addition to being a nice place to eat lunch or a way to insulate the building, the green roof also serves to reduce runoff. The roof consists of a series of trays that are four inches deep and planted with sedum. This helps to absorb water that would have been pushed off the roof into the drainage system. In the rear of the building, nearest the Potomac River there is a large sand filtration system in the ground that filters runoff before it enters the river. Water is collected and directed to the filter before entering the storm drain, which leads to the Potomac. This filter has been shown to decrease total suspended solids by over 80% and total Phosphorus by over 40% (EPA).

Now that the building is in use it is important to maintain “green” operation and management practices. Efforts to educate the tenants of the building have been made by strategically placing signs to explain the “green” features of the building. This includes having plenty of recycling bins and explanations of how to sort refuse. In addition to being able to recycle paper, plastic, glass and aluminum, there are places to recycle batteries and used inkjet cartridges. A Green Housekeeping Plan was developed in order to use environmentally low impact cleaning supplies and to isolate volatile chemicals from occupied areas in the buildings. The maintenance team also benefits from a monitoring system that allows them to track the humidity, carbon dioxide levels, temperature etc. in order to use

energy for the HVAC system efficiently and create the most livable atmosphere possible (National Institute of Building Science). With these efforts the project earned a solid eleven of fifteen possible credits for indoor environmental quality.

These efforts to build and maintain a sustainable building are impressive, especially for a government agency renting from a speculative building. Speculative buildings are normally planned and built without a specific tenant in mind. For this reason the goals of the building are typically to create a setup that works for a variety of customers at a low cost, meaning that environmental concerns are often not at the top of the priority list. The EPA was able to get involved in the design and construction process very early on, which helped drive the environmentally conscious aspects of this project. Despite these efforts at “green” building there are still some problems in the process that need to be addressed further and ways that the project could still lower its environmental impact.

The first big issue is that northern Virginia is extremely dependent upon cars. Having lived in a suburb near DC I know that a large proportion of the people who work in the city or near it drive long distances to work by themselves. There is nothing that this one building could do to change that, except offer to facilitate alternate commuting methods, which they have done. Cathy Berlow did not have any statistics on how many people bike to work, but I suspect it is not a very high percentage. On the other hand there is heavy use of the Metro to Crystal City. Another challenge faced by this project was to reconcile differences in requirements placed on the builders by different authorities. The building needed to meet certain environmental and security standards from the Federal government, while also building to the codes set by Arlington County and meeting a certain number of credits to become LEED-NC Gold. The design team successfully navigated these waters, which is reflected in their earning five out of a possible five credits for the Innovation and Design Process category on the LEED scorecard. There could be more collaboration between the municipalities, Federal government and US Green Building Council to systematically reconcile some of these inherent conflicts. There have also been concerns recently about the validity and effectiveness of the LEED system. It is necessary to hold builders accountable in some way if they are to claim “green” status for a building, but are there ways to do it that are not so slow, expensive and paper work intensive? \$3,956,100 in construction costs can directly be attributed to the LEED process. This includes modeling projects, hiring consultants and paying LEED-accredited architects (FEMP). In building a new structure it is possible to build to the scorecard in such a way that earns a lot of credits, but does not lower the building’s impact on the environment as much as possible. There is a large emphasis on the LEED scorecard for indoor environmental quality with a possible fifteen credits, but only a possible five credits for water efficiency.

The indoor air quality category actually has more influence over the LEED score than the siting of the building, which can have a far greater impact on consumption of fossil fuels and emission of green house gases. Energy efficiency is only slightly more influential on the LEED scorecard (Schendler).

In conclusion the Federal government can play a large role in supporting the “green” building industry and can make a huge impact on our consumption of resources by setting high energy and water efficiency standards for its buildings. The LEED system may not be perfect, but it is the best system we currently have to objectively gauge the green attributes of buildings. One and Two Potomac Yard certainly some degree of negative impact on the environment, but it is a good example of a collaborative partnership between the Federal government and the private sector to meet stringent environmental standards at a reasonable cost.

## Works Cited

- "Arlington, VA - Potomac Yard." *Greening EPA*. EPA, 25 Sept. 2009. Web. <[http://www.epa.gov/oaintrnt/facilities/hq\\_nova.htm](http://www.epa.gov/oaintrnt/facilities/hq_nova.htm)>.
- "Carbon Emissions from Building Energy Use." *Buildings and Plants*. Energy Star. Web. <[http://www.energystar.gov/index.cfm?c=evaluate\\_performance.bus\\_portfoliomanager\\_carbon](http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager_carbon)>.
- "High Performance Federal Buildings." *Federal Energy Management Program*. US Department of Energy, 4 Sept. 2006. Web. <<http://femp.buildinggreen.com/finance.cfm?ProjectID=654>>.
- "Interview with Cathy Berlow." E-mail interview. 12 Oct. 2009.
- Office of the Federal Environmental Executive. "One and Two Potomac Yard." *Closing the Circle News* (Summer 2007). Print.
- "One and Two Potomac Yard." *Whole Building Design Guide*. National Institute of Building Sciences. Web. <[http://www.wbdg.org/references/cs\\_potomac.php](http://www.wbdg.org/references/cs_potomac.php)>.
- "Potomac Yards 1 and 2/EPA." *U.S. General Services Administration*. U.S. GSA, 16 July 2009. Web. <[http://www.gsa.gov/Portal/gsa/ep/contentView.do?contentType=GSA\\_BASIC&contentId=21865](http://www.gsa.gov/Portal/gsa/ep/contentView.do?contentType=GSA_BASIC&contentId=21865)>.
- Schendler, Auden. "LEEDing us Astray? Top green-building system is in desperate need of repair." *Grist Beta*. Grist Magazine, Inc., 26 Oct. 2005. Web. <<http://www.grist.org/article/leed/>>.
- United States. Environmental Protection Agency. Green Power Partnership. *Renewable Energy Certificates*. EPA, July 2008. Web. <[http://www.epa.gov/grnpower/documents/gpp\\_basics-recs.pdf](http://www.epa.gov/grnpower/documents/gpp_basics-recs.pdf)>.
- White House. Office of the Press Secretary. *President Obama signs an Executive Order Focused on Leadership in Environmental, Energy and Economic Performance*. [www.whitehouse.gov](http://www.whitehouse.gov). White House, 5 Oct. 2009. Web.