Channeling the Power of 'And'

How DPR Construction built its new Washington, D.C. regional office to be a high-performance building—maximizing sustainability, employee wellbeing, AND creating a workplace for the 21st century.

When DPR outgrew its existing Washington, D.C. area office, it created an opportunity to think about the space differently. "We could do so much more than just build a cool-looking office. We wanted to incorporate sustainability and wellness while also creating a truly 21st-century workplace," said Chris Gorthy, project executive for DPR.

DPR set some lofty goals for its new office space, all linked together by the idea that the team really could achieve it all.

This is where AND kicked in: The team knew they wanted to achieve Net Zero Energy (NZE) certification and a bevy of other items that, if not handled creatively, could conflict with one another. Articulating DPR's culture and supporting productive, enjoyable work had to balance with cost effectiveness, functionality and other factors. Specific goals and objectives were developed and condensed into the owner's project requirements (OPR) document. This living, 10-page document summarized the vital information about project goals, expectations and performance criteria for owner, design team, construction team, operations and maintenance staff. It defined the four goals that were established for the new office:

Workplace of the future: Create a 21st-century workplace that invigorates and encourages the staff

Sustainability: Incorporate strategies that contribute to the health and well-being of the environment and the staff

Data-driven decisions: Make decisions based on cost-analysis, payback studies and team expertise

Living laboratory: Build a living lab where technologies, products and systems could be showcased for customers, designers and the community.

Serving as both owner and builder allowed DPR the opportunity see things from the customer perspective and take on the complexities involved in making hard decisions to achieve those goals.

Create a workplace of the 21st Century that invigorates and encourages staff

Using its own needs for substantial collaboration in tandem with guidelines from the International WELL Building Institute™ (IWBI), Leesman®+, U.S. Green Building Council LEED® and the International Living Future Institute (ILFI), DPR created a program that includes a variety of activity zones geared to facilitate interaction, collaboration and connection. Marc Schneiderman, principal with SmithGroupJJR, designers of the project, saw it first and foremost as a space-planning challenge. "We wanted the space to be warm and inviting, but also challenging and thought-provoking as it flows with the way DPR works. It was actually more about the negative space rather than the functional areas. Copious circulation allows the space to work for large-scale events while it still retains a lot of energy for daily use."

The office creates a sense of community. People have places to spend time together beyond meetings or daily desk activities. The large kitchen, community dining area, lounge and workout room create a plethora of organic opportunities for employees to interact and from which creative project problem solving is inevitable. The space is adaptable for a variety of uses and work styles and is perceived by employees as simply being an attractive, enjoyable space. Gorthy added, "One of the unintended consequences of the super flexible environment is that people can and do just act naturally."

An open office environment featuring Herman Miller's Living Office furniture system and smart technology such as Evoko conference room scheduling, Barco ClickShare wireless computer connection technology and Sonos® wireless audio-visual all add to the ability for maximum interaction and flexibility virtually anywhere in the office.

Together, these efforts enabled the project to achieve Leesman+ accreditation, placing it among the top 4% of workplaces surveyed by Leesman worldwide. In fact, DPR was able to increase its Leesman Index (Lmi) by 16 points, illustrating that it has created a workplace that consistently measures high levels of employee pride, productivity and sense of community.

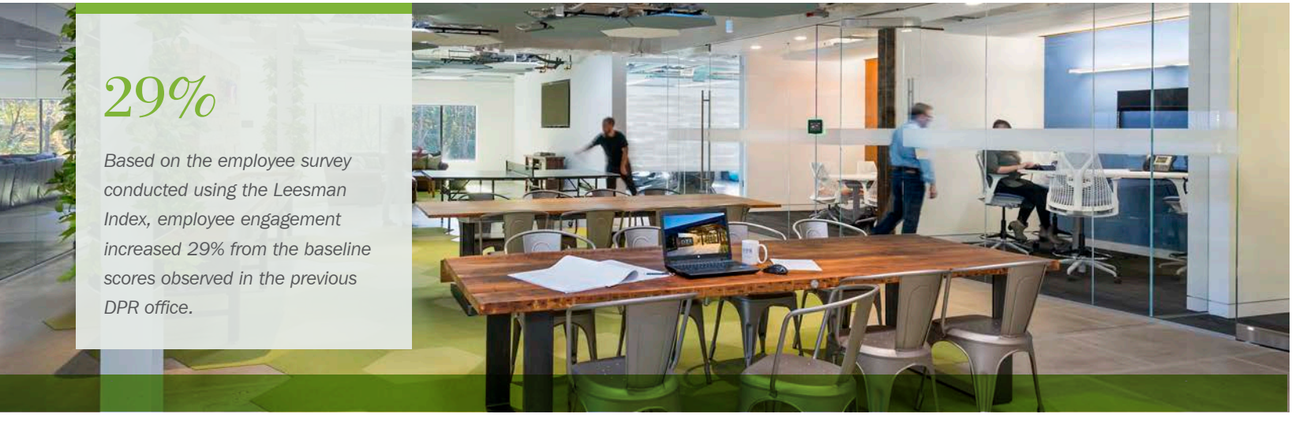
RESULTS

Leesman+

The Leesman Index is the largest independent database of workplace effectiveness data. Certified Leesman+, the new DPR office is among the top 4% of workplaces surveyed by Leesman worldwide.

Herman Miller prepared a report which compares the post-occupancy score with that of the previous space.

Access the full report to learn more https://www.hermanmiller.com/research/categories/case-studies/dpr-construction/



29%

Based on the employee survey conducted using the Leesman Index, employee engagement increased 29% from the baseline scores observed in the previous DPR office.

Incorporate sustainable strategies that contribute to the health and well-being of the environment and the staff

Rather than building new, DPR intentionally chose the more sustainable route of reuse. By renovating a 20,000-sq.-ft. space which had been vacant for more than seven years, literally tons of embodied carbon were conserved when compared to a new build.


A look at the space prior to renovation: DPR chose a space which had been vacant for more than seven years.

Embracing the societal shift that is emphasizing health and well-being in the workplace, DPR utilized materials that minimize volatile organic compounds (VOCs) in indoor air and provided a garage door that opens to a patio for outside air when weather permits. Natural daylight from perimeter windows is augmented by 24 Solatubes® (a natural daylighting fixture which brings daylight to the core of the building). A wellness room, workout room, kitchen featuring healthy snacks and bicycles made available for nearby errands are some of the features that offer workers a "nudge" to make healthier decisions without the need for formal policies or programs that are high on some metrics, but low on long-term health results. Additionally, these aspects have helped the building meet the WELL Certified™ Gold standards. Gorthy noted, "We thought there would be some serious roadblocks to getting the WELL certification, but our team just kept attacking it little by little. There are fewer than 100 certified WELL buildings in the world and fewer than 50 in the U.S. That's how significant the certification is. We just kept pushing forward on our project goals and gradually dove deeper into the details."

141 kW

The 141kW PV system is anticipated to produce 180MW hours per year, covering the predicted energy consumption plus 10%.

With a goal of achieving NZE as a crucial element of the project, installation of an appropriate energy generation system was essential. "Photovoltaics (PV) couldn't be the first strategy to achieve NZE. We started with passive and active strategies, then offset with PV panels," said DPR's Chris Hoffman. After employing those strategies, DPR made the decision to install a 141 kW rooftop PV system, which was the best choice for the individual building. Schneiderman remembered, "When we peeked onto the roof and saw this serene and unperturbed ballast surface, we


One reason for the building selection was the flat roof which would allow for PV panels

CERTIFICATIONS

Achieved WELL Gold Certification within the WELL Building New and Existing Building standard

Achieved LEED v4.0 Platinum certification by the USGBC

NET-ZERO ENERGY PENDING

NZE certification (by the ILFI) 12-month window, targeted for fall of 2019

knew it would be perfect." But it was also the cause of a lot of apprehension in ensuring that it worked both mechanically and, more so, financially. Initial costs from the steel fabricator for roof reinforcements for the PV system came in at $950,000 for a $500,000 PV system, which was untenable. "It almost destroyed our NZE goals, before we even got started. Instead of giving up, the team collaborated and worked hard to find a way. We were relentless and just kept asking questions," Hoffman recalled. It turned out initial calculations for the dead load of the panels were higher than necessary. Laser scanning the existing building provided the engineer and fabricator with exact dimensions and armed with that information, the need to design to worst case scenario was avoided.

"PV couldn't be the first strategy to achieve NZE. We started with passive and active strategies, then offset with PV panels."

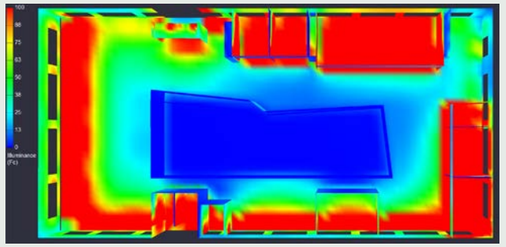
DPR used that same mentality with all the building systems—asking questions, determining what the worst-case scenario was and realizing that would never happen. And as they overcame each of these obstacles, they got even more buy-in to the goals and mission of the project. "Everyone started saying, 'now, how can we figure this one out? How can we have this AND this effectively?'" said Gorthy.

Another newly-introduced sustainable practice which necessitated a major behavioral change for the staff is the waste diversion and recycling program. Instead of trash cans at everyone's desk, DPR centralized trash locations throughout the office where employees can recycle and throw out their trash including separating compostable and recyclable items. DPR's Dianna Tarallo said, "We really thought about this great opportunity we had to change people's behavior, and this is a perfect example. People didn't like it at first, but they adjusted." Now, with the ability to separate compostables from trash and recycling, trash has been reduced by at least 50% from previous efforts.

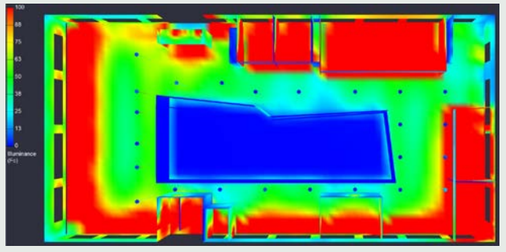
CASE STUDY

Passive Strategies: Daylighting

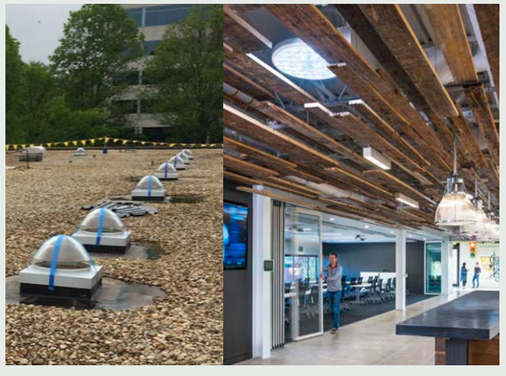
DPR placed 24 Solatube fixtures in the roof to bring natural lighting into the space. The team did several studies before determining the most efficient location for each Solatube to maximize the amount of daylight in the core of the space. The team then implemented a robust lighting system, complete with motion sensors, photocells and automated dimming to ensure constant lighting levels throughout the course of a day.



Initial daylighting study prior to the renovation



Current daylighting strategy with the location of the Solatubes



Strategically installed Solatubes bring natural light into the space

CASE STUDY

Active Strategies: Selecting the Right Systems

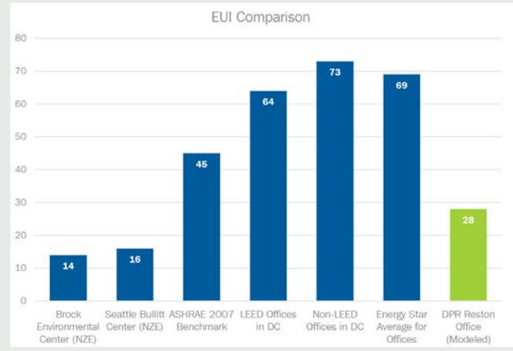
The team utilized an energy model to evaluate multiple mechanical and electrical systems before selection.

For the mechanical system, the team selected a dedicated outdoor air system (DOAS) system with heat recovery chiller. The electrical strategies focused on lighting, to compliment the Solatubes, as well as receptacle controls to reduce the amount of phantom load generated by equipment.

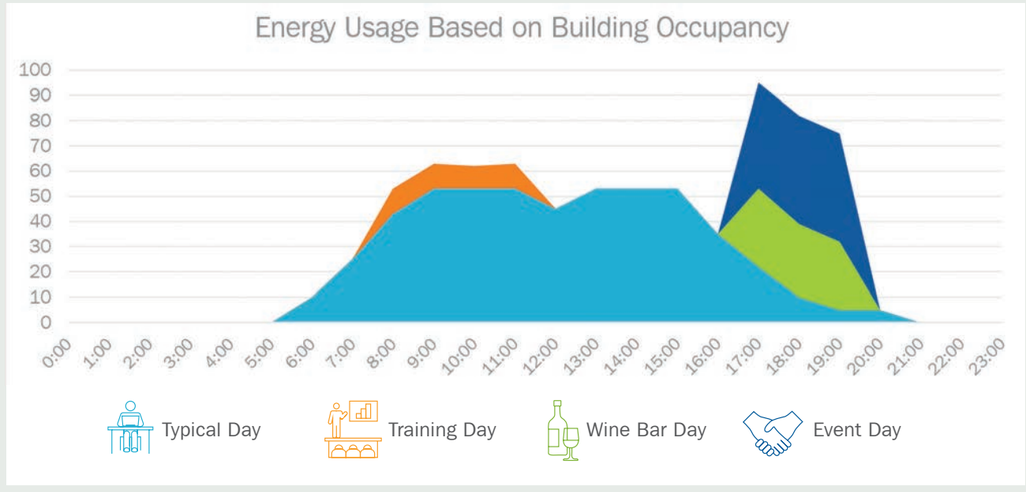
While reducing the Energy Usage Intensity (EUI) was a primary driver in the system selection, and critical for achieving net zero energy, the systems also had to provide a comfortable working environment for occupants (maintaining a small temperature band between 70-75 degrees Fahrenheit) and be cost effective and allow for flexibility given the multitude of different spaces and levels of usage throughout the space.

To accomplish these goals, it was imperative that DPR accurately predict the energy usage over the course of a year. The team was able to utilize plug load data from the three other DPR net zero energy offices to gain an understanding of the typical EUI. They also analyzed the various building uses (i.e. typical work days, event days, training days, etc.) to make realistic assumptions on energy use.

By modeling all this data, the team was able to determine which system could balance the competing priorities of energy reduction and occupant comfort.



Using plug load data from three other NZE offices helped predict EUI.



DPR analyzed the different types of days, activities and number of occupants that would be in the space to make realistic assumptions about energy usage.

Make data-driven decisions based on cost analysis, payback studies and team expertise

DPR wanted to tie design and construction decisions to actual data. With three recent DPR office examples, they had a tremendous benchmarking database at their fingertips. The team did a total cost analysis of rent, construction costs, energy savings, systems, components, finishes and even people's commutes.

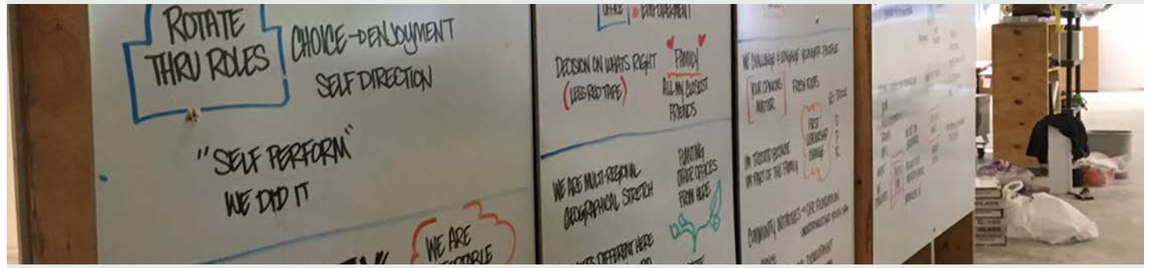
One item for which data analysis caused a different outcome than expected concerned the installation of insulation. It's easy to assume that an early 1980s building would need additional insulation. The first estimate of the cost was $130,000. However, deeper examination and a subsequent comparison of energy models with and without insulation demonstrated only a $460 per year savings with insulation. "The payback was *never*!" according to Gorthy. Instead of a costly upgrade for a negligible return, DPR made a better investment by buying another solar panel for that cost and more than offset the minimal insulation loss.

Another heavily data-driven decision was the selection of the mechanical system. The team wanted a system that was able to maintain thermal comfort consistently throughout the office as well as be efficient.

Four different systems were selected as possibilities and further analyzed for energy use intensity, cost, temperature and humidity control and flexibility. The selected four-pipe system features a high-efficiency Heat Recovery Chiller, Cooling Tower and a dedicated outdoor air system (DOAS). Though meant for a larger space, and slightly more expensive, Hoffman said, "the system is an example of what DPR thinks the future of mechanical systems will be, more efficient AND yielding healthier air." Data is generated and monitored through a Honeywell controls system and Senseware sensors that measure energy usage from each of the components individually, as well as other energy users in the office such as lighting and receptacles and provides real-time analysis and monitoring.

The Lucid Dashboard display shows real-time information on water usage and energy usage/generation.

Hard decisions lead to great outcomes



The challenging decisions faced at the DPR Reston office are not uncommon, but the way they were handled—without compromising energy and healthy building goals—is unique. "There were many tough decisions we made that flew in the face of traditional approaches. In the end, they not only allowed us to achieve all our goals, but also provide a model for customers about how a similar approach can work for their goals," said Gorthy.

Through whiteboarding, conversations and detailed analysis of anticipated return on investment, alignment was reached around what was truly important. According to Gorthy, "Clearly understood owner requirements, a willingness to tackle conflicts together, and an open mind were key to our success."

Among the tough calls were:

- **Balancing indoor air quality (IAQ) with energy efficiency needs.** The team opted to preserve the use of 100% outside air even though it meant increasing energy generation needs to achieve NZE. This was the result of the full design and construction team collaborating from project conception. They created a basis of design that aligned with owner project requirements (OPR). As part of that, systems were analyzed on a variety of cost and outcome measures and the best option for IAQ informed how to approach energy offsets.
- **Preserving employee comfort without compromising NZE goals.** "We went all in on productivity and employee comfort," Gorthy said. "Having a comfortable temperature range in the office is worth a small extra expenditure on energy generation." This was first outlined in the OPR: "Thermal comfort conditions should be consistent, and highly adjustable per space use, and create an environment that supports occupant comfort." This served as a guidepost for all partner planning throughout the process.
- **Breaking free of traditional commercial real estate metrics.** Open spaces and non-traditional work areas offer flexibility for future staffing needs while also doubling as program spaces and informal meeting areas. "People could look at our circulation space as wasted space and that we're paying too much for space that isn't occupied by workstations," Gorthy said. "We believe it's what makes the space successful." Research trips to see other spaces, including to Herman Miller's Michigan facilities helped inform this approach.
- **Relying on data, not assumptions.** While there are trends in workplace design, the team opted to focus on feedback from employees on what they wanted in their new space as well as what sorts of features they wouldn't use. The team surveyed employees directly and analyzed the results to fit the program to employee feedback, instead of assuming that workplace design trends automatically applied.

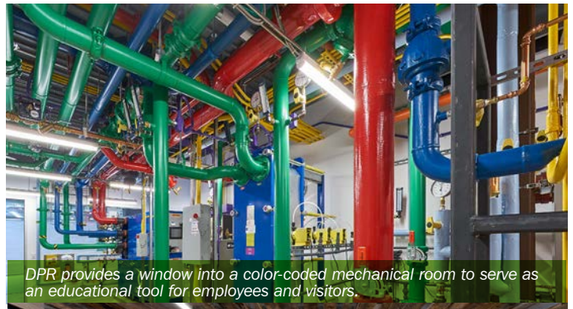
Build a living laboratory where technologies, products and systems could be showcased for customers, designers and the community

Knowing the mechanical system would generate a lot of interest as a showcase, DPR installed it behind a glass window wall. Color-coded piping helps visitors more easily understand the functionality of the four-pipe system. DPR went ahead with another concept to further the idea of the mechanical system as a laboratory with the introduction of radiant sails in a few of the meeting rooms. The ceiling-hung system transforms the centuries-old technology of radiant heating and cooling into a modern architectural element, providing alternative thermal comfort to occupants.

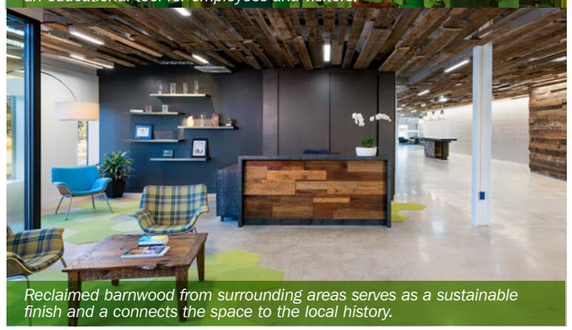
From ceiling to floor, learning opportunities were leveraged. At floor level, four different concrete finish options were installed throughout the common areas to showcase and educate owners on the different options available and how they wear over time.

DPR wanted to utilize a multitude of finish types to show customers how they look and work and all meet LEED material credit requirements. Many are Cradle to Cradle Certified™ including carpet, wall covering, tile and window shades. The most notable architectural element throughout the space is reclaimed wood taken from barns in Connecticut and the eastern shore of Maryland, all installed by DPR's self-perform carpenters. This sustainable finish, used in the entryway of the space and above the wine bar, connects the office with the history of the Mid-Atlantic region.

As in all of the newer DPR offices, the office utilizes a project dashboard display that provides real-time information related to energy and water consumption as well as energy produced by the photovoltaic array.



DPR provides a window into a color-coded mechanical room to serve as an educational tool for employees and visitors.



Reclaimed barnwood from surrounding areas serves as a sustainable finish and a connects the space to the local history.

READ MORE

Space that gives a healthy "nudge"

DPR's new Reston office is aligned with emerging thinking that promoting healthy office lifestyles is best achieved by subtle features that "nudge" employees toward healthy decisions. This idea is explored in depth in Rex Miller's *The Healthy Workplace Nudge*, a book that also includes examples of DPR's approach.

Those nudges take the form of things like the ease of finding healthy snack options, outdoor spaces that encourage walking, and a variety of workspaces that provide flexibility for individual work styles. Emphasizing these features over other options means healthy decisions are easier decisions.

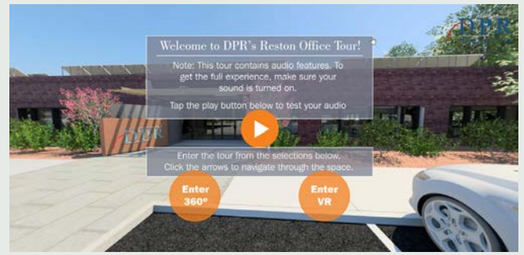
While all these features helped DPR achieve a variety of third-party certifications, the upshot is bringing a more human touch to the workplace that can organically foster healthy living alongside productivity.

Learn more at www.rexmiller.com

MULTIMEDIA

Walk through the space!

The team utilized a virtual model and Sphere photography to take 360 degree photos of the space. The virtual model allowed employees to visualize the space prior to move-in as well as serving as a tool for virtual visitors to understand the sustainable features of the living lab. The Sphere photography showcases the final product.



Check out the photography following the link below to either be viewed by computer or on a standard VR headset.

BIM Tour: http://360tour.dpr.com/dprdc
360 Virtual Tour: http://bit.ly/2AEQSb1

2003

DPR's LEED Silver Sacramento office was the first privately owned LEED certified building in California's Central Valley.

2010

DPR's San Diego office opens, and later becomes the first commercial building to achieve both LEED-NC Platinum and NZE status in San Diego.

2013

DPR's LEED-NC Platinum Phoenix office became the largest building (and one of only four) in the world to achieve NZE building certification from the ILFI.

2014

DPR's San Francisco office followed and became the first commercial office in San Francisco to achieve NZE building certification to date.

2016

DPR's Washington, D.C. area office opens, to date it has achieved LEED-CI v4 Platinum and WELL Building Gold certifications and is targeting and NZE building certification.

Next Up?

Over the next two years, DPR plans to open two additional NZE buildings located in Sacramento, CA and Austin, TX.

How was the team able to successfully achieve such remarkable results?

Not surprisingly, it takes commitment, passion, planning and collaboration, all facets of the DPR Point of View, which focuses on Respect for the Individual and Changing the World. Gorthy shared, “A key difference on this project from our other offices and something we could replicate for projects we build for customers, is that we set up a dedicated ownership team to make decisions and keep attacking and driving things forward. That’s another example of the power of AND on this project; we had a project team who was dedicated AND passionate.”

These leaders learned to balance the different elements of the project. For example, providing a demand-controlled ventilation system pushed against the goal for NZE. Natural daylight didn’t always work with the varied schedules of our staff, so task-adjustable lighting was provided to individuals. Gorthy continued, “I think the biggest lesson was that you don’t have to choose between cost, wellness, sustainability and creating an incredible workplace. With the right team, engaged early, you can maximize the benefits.”

SCORECARD

WELL Building Standard™ v1

AIR	16/27
WATER	7/8
NOURISH	12/15
LIGHT	7/11
FITNESS	5/8
COMFORT	7/12
MIND	12/19

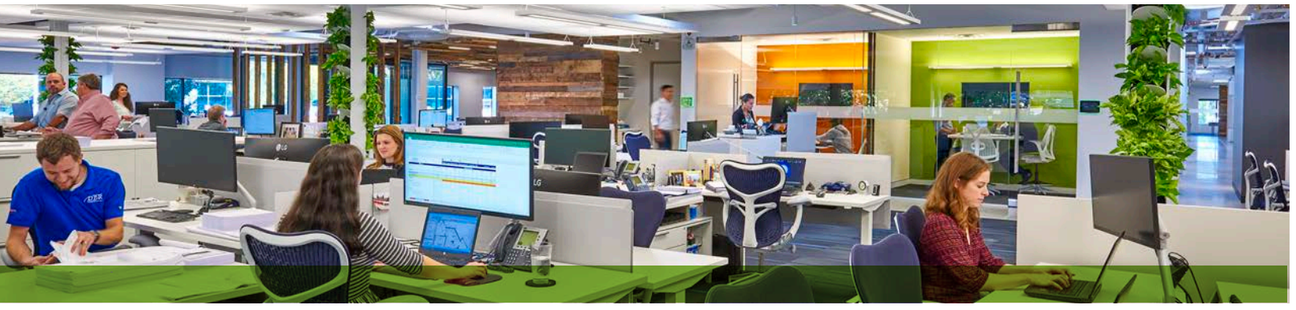
66 GOLD CERTIFICATION
36 prerequisite + 30 optimization points

SCORECARD

LEED® v4 for ID+C

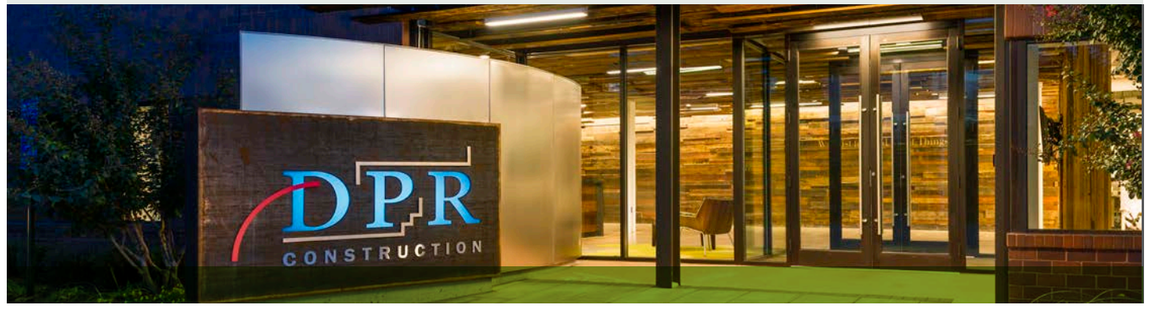
INTEGRATIVE PROCESS	2/2
LOCATION & TRANSPORT	11/18
WATER EFFICIENCY	6/12
ENERGY & ATMOSPHERE	37/38
MATERIALS & RESOURCES	6/13
INDOOR QUALITY	9/17
INNOVATION	6/6
REGION PRIORITY	3/4

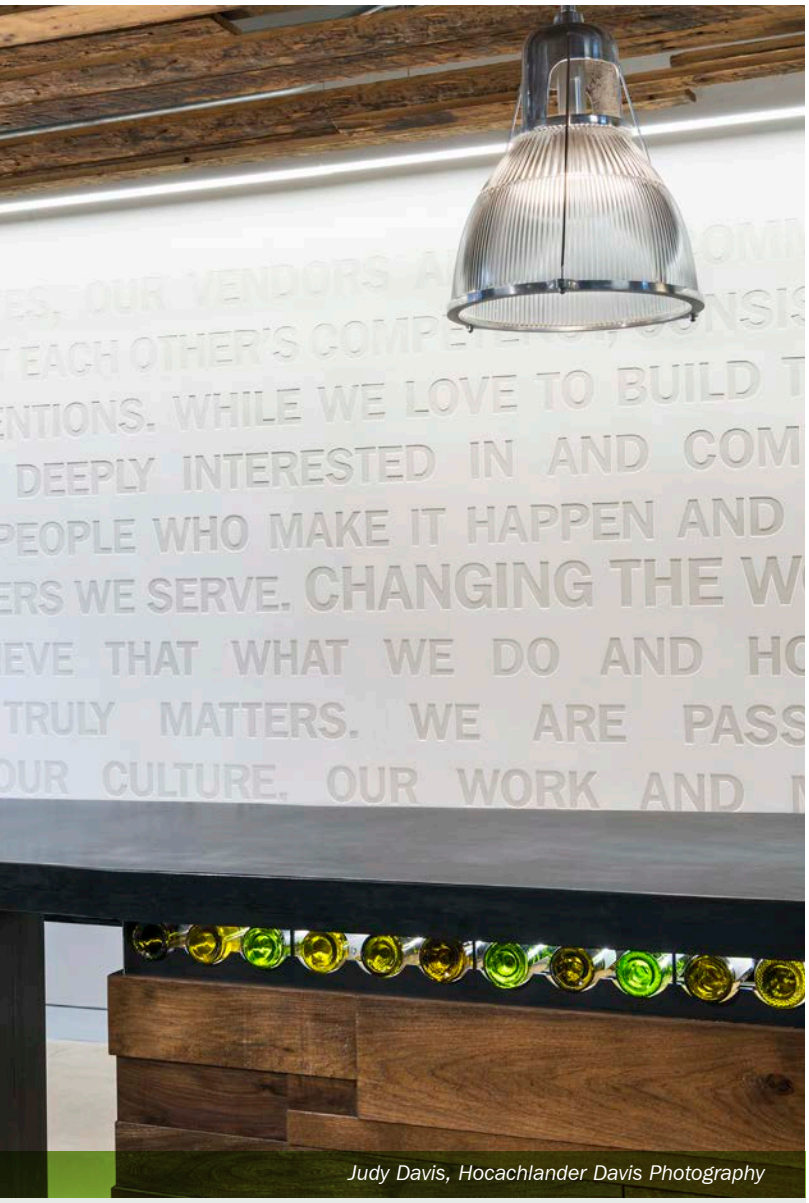
80 PLATINUM CERTIFICATION



A CLOSER LOOK

Office Feature	Office of the Future	Sustainability	Living Laboratory
LEED Platinum certified through the USGBC and targeting NZE certification through ILFI	•	•	•
24 Solatubes, installed by DPR Self-Perform crews, bringing daylight to interior spaces	•	•	•
Use of Clear-Vu temporary lighting during construction, a reusable system that uses less energy		•	•
White reflective finishes and RavenWindow® to lessen daylighting requirements and limit glare	•	•	•
Energy usage reduced 58.5% from a typical office (19.72 kWh/sf/yr to 8.18 kWh/sf/yr)	•	•	•
100% LED light fixtures		•	
Blue power outlets to identify “switched” outlet locations	•	•	•
3-D as-built model for ease of maintenance post-construction	•		•
Incorporating many WELL Building Certification requirements	•	•	•
432 SunPower’s® Helix™ photovoltaic panels, producing 179.9 MWh per year	•	•	•
Solar hot water panels to assist in hot water production		•	•
Sloan prefab AER-DEC® lavatory in restrooms where occupants soap, wash and dry hands in one spot	•	•	•
Enmetric plug load monitoring at all workstations to reduce plug loads, even during working hours	•	•	•
All finishes/textiles used in the space are Cradle-to-Cradle certified		•	
Four different concrete finishes throughout to showcase exposed concrete options for customers		•	•
Reclaimed wood from factories in surrounding areas, installed by DPR Self-Perform crews		•	
Ten different conference room configurations and furniture options for more productive meetings	•		•
Diverse open office furniture options including sit-to-stand desks and trapezoidal stations	•		•
Reduction of equipment noise through noise dissipating acoustics	•		
Stop light for overhead door, determines when opening will impact HVAC system energy usage		•	•
Communal areas with sofas, ping-pong table and shuffleboard table foster “creative thought”	•		
0.8 miles from Wiehle-Reston East Metro station and 200 yards from the W&OD Trail		•	
Quiet rooms including a library, wellness room and phone booth to promote “deep thought”	•		





Judy Davis, Hocachlander Davis Photography

DPR CONSTRUCTION

"You don't have to choose between cost, wellness, sustainability and creating an incredible workplace. With the right team, engaged early, you can maximize the benefits."

CUSTOMER: DPR Construction

TEAM:

- SmithGroupJJR
- Herman Miller
- Sustainable Building Partners
- Southland Industries
- M.C. Dean
- Gutierrez Studios
- Old Wood DE, LLC
- Sloan
- Healthy Buildings
- WattStopper by Legrand
- Penzance

THREE TAKEAWAYS FOR SUCCESS

- Establish a dedicated ownership team that does more than provide support—be accountable for the results as well.
- Ask questions. And then confirm the answers. The additional effort can save time, money and re-work.
- Decisions may be difficult, but know that clarity will be gained by using data to inform and guide you in making decisions.

LEARN MORE ABOUT DPR'S OTHER NZE LIVING LABS:
https://www.dpr.com/view/path-to-net-zero-energy

www.dpr.com