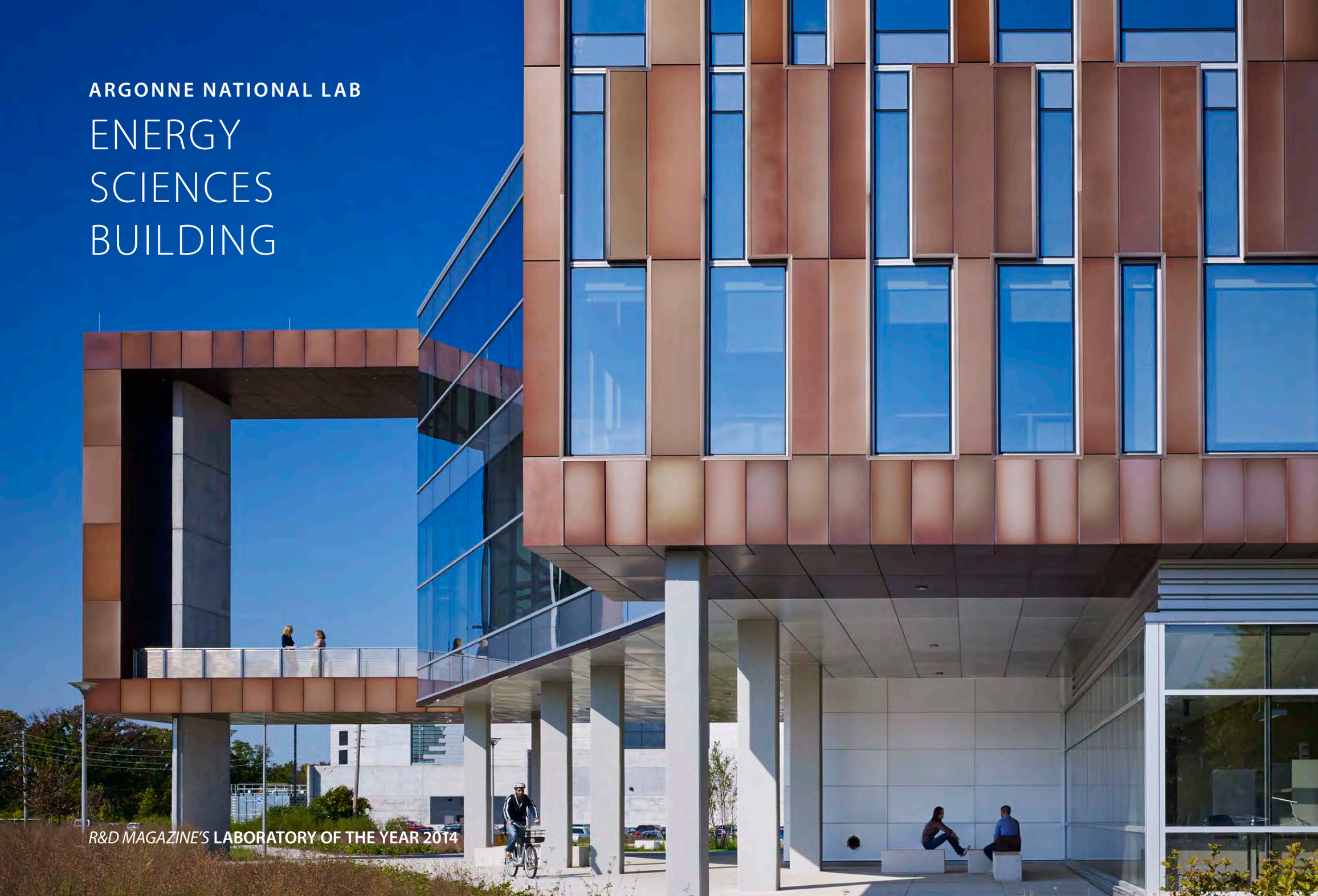

ARGONNE NATIONAL LAB

ENERGY SCIENCES BUILDING

R&D MAGAZINE'S **LABORATORY OF THE YEAR 2014**

ENERGY SCIENCES BUILDING

Argonne National Laboratory supports the Department of Energy (DOE) Office of Science's mission "to deliver the remarkable discoveries and scientific tools that transform our understanding of energy and matter and advance the national, economic, and energy security of the United States." The Energy Science Building (ESB) houses interdisciplinary scientists working at the outer boundaries of contemporary research to address complex issues associated with the transformation of global society through new sources of energy. Research at the ESB is expected to lead to significant advances in how the world consumes and conserves energy.

PROJECT STATISTICS

PROJECT NAME:
Energy Sciences Building

PROJECT LOCATION:
Lemont, Illinois

PROJECT OWNER:
Argonne National Laboratory

DATE OF COMPLETION:
June 2013

TOTAL GROSS SIZE (SF/M^2):
158,000 SF (14,700 M^2)

TOTAL CONSTRUCTION COST:
$65,000,000

TOTAL PROJECT COST:
Confidential

COST PER SF/M^2:
$411 per SF

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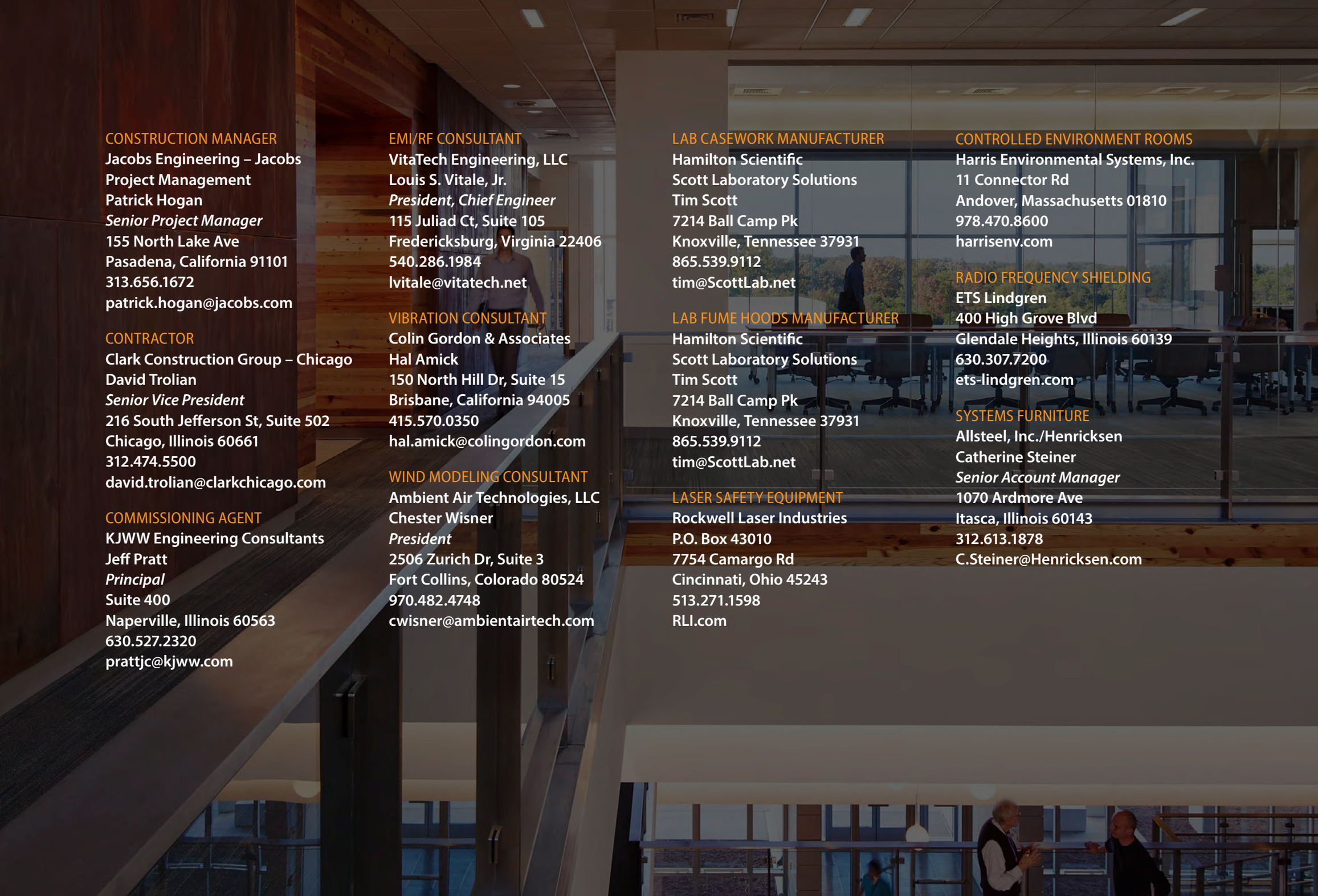

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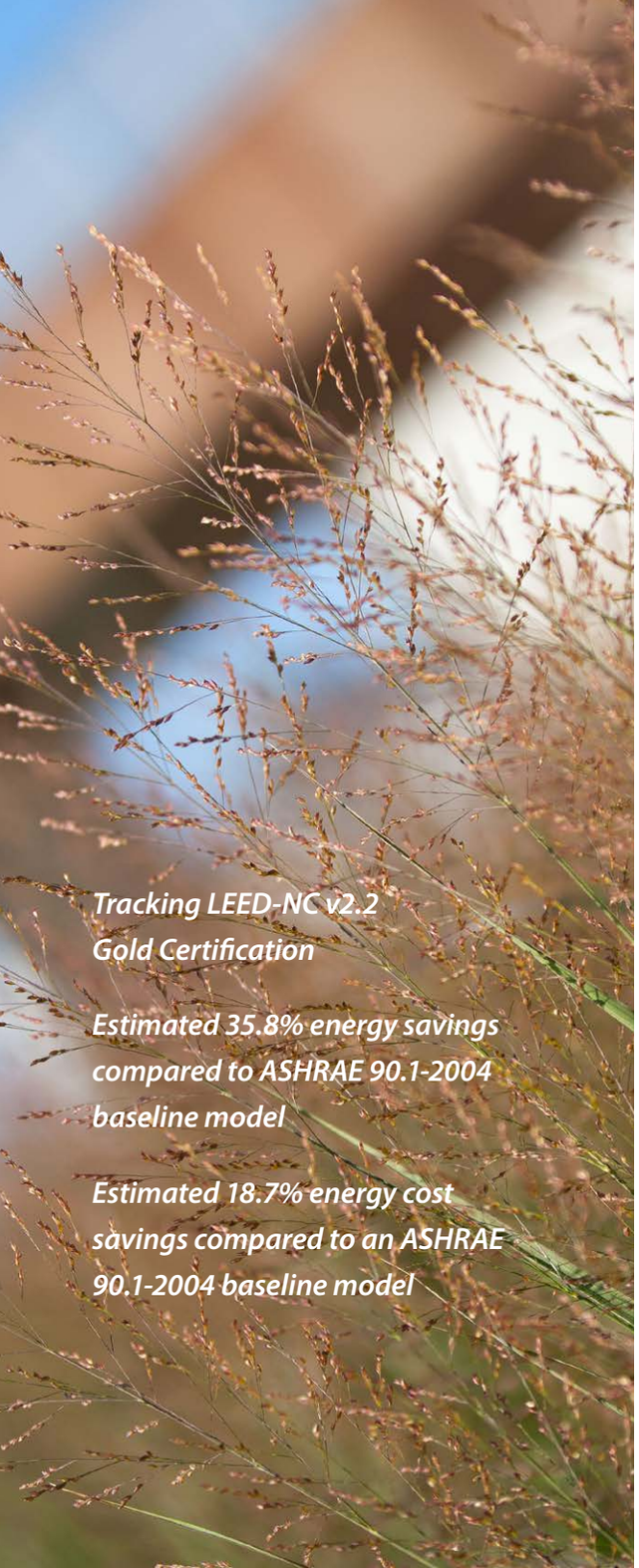
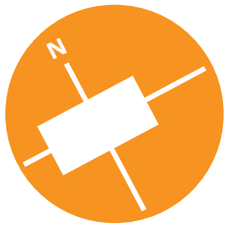


Tracking LEED-NC v2.2 Gold Certification

Estimated 35.8% energy savings compared to ASHRAE 90.1-2004 baseline model

Estimated 18.7% energy cost savings compared to an ASHRAE 90.1-2004 baseline model

SUMMARY OF SUSTAINABLE DESIGN STRATEGIES



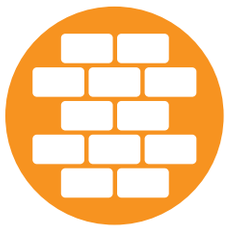
BUILDING ORIENTATION

Elongate north and south façades

Maximize diffuse north light

Utilize shaded south light

Minimize east and west low-angle sun



BUILDING MATERIALS

Building envelope commissioned by third-party

High insulation R value walls, roofs, below-grade walls, slab

Low U factor and solar heat gain coefficient (SHGC) windows and skylights

Use of recycled content, regional materials, and certified wood

Reclaimed wood wall paneling and furniture

DAYLIGHT AND VIEWS

Large skylight allows daylight to penetrate through three-story atrium

Canted ceilings allow sunlight from perimeter offices to penetrate through corridors into labs

Views to outdoors and restored prairie landscape

LIGHTING

High-efficiency lighting with daylighting controls

Occupancy sensors

Zoned lighting controls in labs for flexibility and energy savings

Use of task lighting to provide lighting as needed and improve occupant comfort

Green outlets

HEATING AND COOLING

Higher supply-air temperature reset

High efficiency fans with variable frequency drives (VFDs) lower system fan power

Exhaust air heat recovery units, run around loop

Premium efficiency pumps with VFDs

Less exhaust and makeup airflow during unoccupied periods for laboratory spaces

High-performance, low-velocity fume hoods

Chilled water and hot water loop pressure reset

Flash steam heat recovery

WATER

No site irrigation

Low-flow fixtures expected to reduce water use 31%

SITE

Approximately 133,000 SF of open space with native landscaping

Storm detention pond and rain gardens

Reduced stormwater runoff 28% from pre-developed condition


01
RESEARCH
02
SUSTAINABILITY
03
SITE
04
BUILDING
DESIGN
05
LAB DESIGN
06
RESULTS

01 RESEARCH

"Argonne's beautiful new Energy Sciences Building provides our world-class researchers with the flexible, state-of-the-art facilities they need to fulfill our laboratory's mission of discovery and innovation in the national interest. The building's innovative design both reflects and promotes the work of our interdisciplinary teams of engineers and scientists as they discover and innovate across a wide range of energy challenges. It is a great addition to our campus."

—Dr. Eric Isaacs
Director, Argonne National Laboratory

The Energy Sciences Building (ESB) at Argonne National Laboratory provides an environment designed to accelerate the pace of discovery, bringing together researchers in chemistry, materials science, and physics to enable clean-energy discoveries. In the ESB, interdisciplinary teams of researchers work in space that can be easily reconfigured to reflect collaborative approaches to a wide range of grand challenges in energy science.

The building houses the research infrastructure necessary to conduct breakthrough science in the discovery and synthesis of efficient, effective new catalysts and the design and creation of novel crystals, films, and polymers for solar photovoltaic, energy storage and efficient electronics platforms. Collectively, Argonne's superb capabilities in these research areas play a key role in addressing the nation's long-term energy goals.

To further promote collaboration, walkways connect the building to two nearby research buildings. When a fourth building is completed, the buildings will together create Argonne's new "Energy Quad."

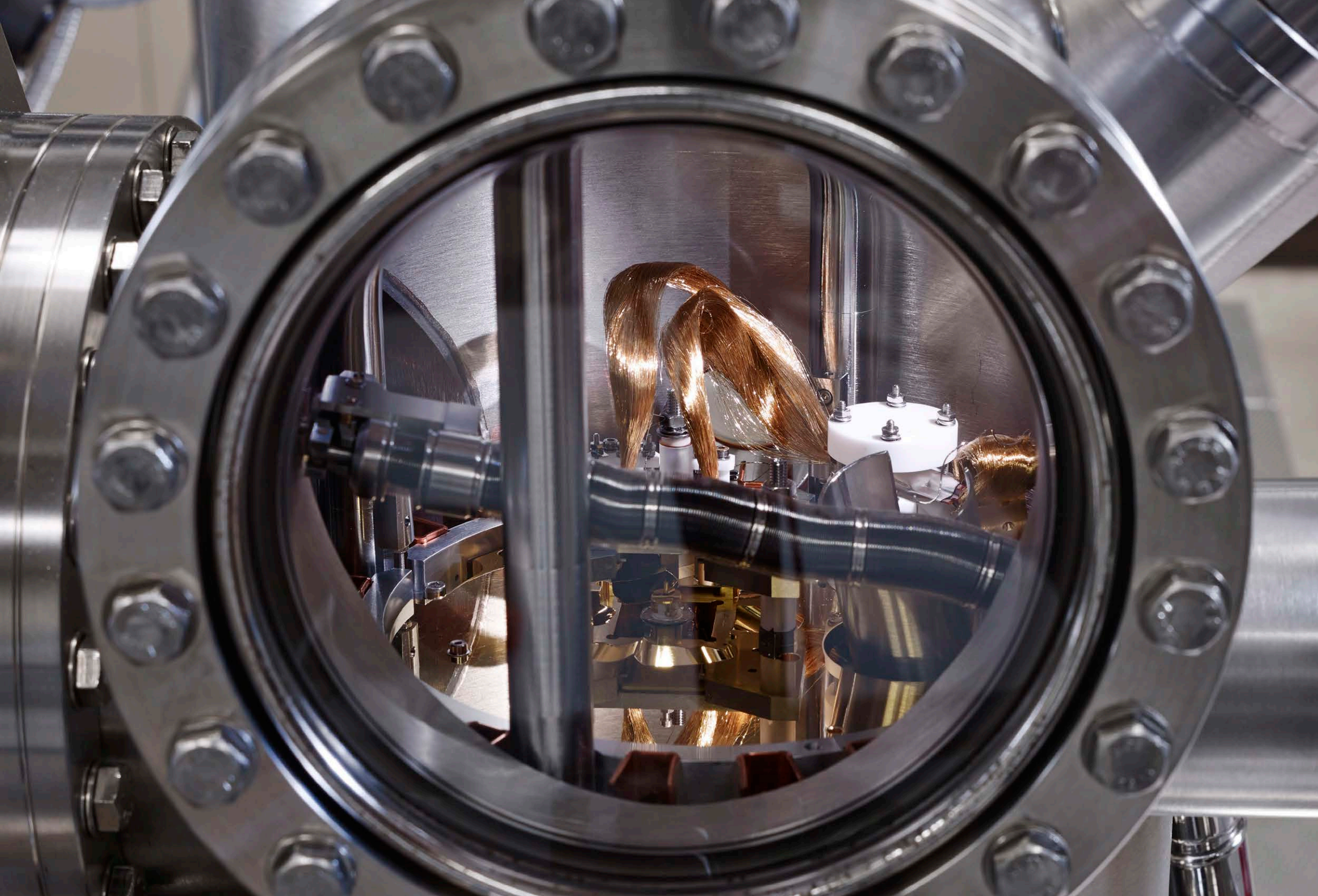
By virtue of its highly visible location, the ESB makes a strong statement about Argonne's commitment to an interdisciplinary approach to science, with labs from each of four energy-related programs on campus:

- Materials Science Division (MSD)
- Chemical Sciences and Engineering (CSE)
- Energy Systems Division (ES)
- Center for Nanoscale Materials (CNM)

The ESB brings these researchers together under a single roof, organizing them by program with a mix of groups on each floor—purposefully creating constant new opportunities for interaction and collaboration.

The five theme areas of the ESB:

1. Discovery Synthesis
2. Biomimetics and Solar Energy
3. Catalysis
4. Fuel Cells
5. Electrical Energy Storage



02 SUSTAINABILITY

"Given our mission, there was no question that the ESB had to be energy efficient. We wanted to achieve LEED Gold through good design—and we're right on track. For example, we had a third-party commission the building envelope—a first at Argonne—to assure that it wouldn't "leak," that the wall, window, and roof systems were properly detailed, and that it would achieve the R values we expected."

—Dejan Ristic
Pressure/Energy Systems Engineer Group Leader
Facilities Management and Services
Argonne National Laboratory

ENERGY

Energy is the single most important focus of the ESB: both in the design of the facility and in the research conducted here. It is a living-learning laboratory that uses effective design to reduce energy demand and consumption. Through energy modeling using ASHRAE as the baseline, the building was designed to consume 34.5% less energy and reduce energy costs by 22.8 percent. The ESB is tracking LEED Gold certification.

BUILDING ENVELOPE

Because consistent and controlled air pressure is critical to the function of laboratories, the exterior envelope of the building must operate as intended, without transfer spots inadvertently allowing air to flow in and out, while maintaining healthy air quality. In an unprecedented move for Argonne, the ESB was commissioned by a third-party commissioning agent, hired to evaluate the building envelope, including building materials, curtain wall and roofing systems, and design details.

SITE

The building is oriented along the east-west axis for optimal solar exposure. The site is being restored to its prairie landscape. The native habitat, wetlands, and groundwater sources are all recharged through the use of stormwater, roof drainage and overland site water flow. All plantings in the landscape are selected from native species, requiring little maintenance and no irrigation.

DAYLIGHTING

Daylight penetrates deep into the building through the sky-lighted atrium, and through transparent glass curtain-wall along the office-lined northern façade. The southern façade has less glass, and it is shaded to reduce unwanted heat gain in the summer months. Canted ceilings in the perimeter offices allow the sunlight to penetrate through the offices, corridor, and into the laboratories. Windows into the labs allow daylight in, and also provide views from the labs to the outdoors.

ELECTRICITY

In addition to maximizing daylight into the building, electric lighting uses photocells to reduce the use of electricity. Occupancy sensors switch lights off when spaces are not occupied, and "green" outlets for task lighting reduce plug loads.

WATER

Low-flow fixtures are expected to reduce water consumption by 31 percent compared to the LEED baseline energy model. Landscaping does not require irrigation.

HVAC

Mechanical air handling systems in ESB operate as variable air volume systems where the amount of air supplied to and exhausted from each lab is adjusted as required by the cooling load within the space or the exhaust requirements of the specific lab's program.

AIR HANDLING UNITS

The ESB uses an innovative application of a fan-wall for supply air, with a variable frequency drive controlling the speed of the fans as required. (A second VFD is provided for redundancy). The fan wall increases flexibility and reduces overall energy consumption. Also, the loss of one fan will have only a minimal effect, if any, on building operations. Other advantages of the fan wall are more uniform airflow through unit components, better acoustics due to less low-frequency noise, no belts to maintain, and the system requires far less floor space.

HEAT RECOVERY

The ESB, out of necessity, uses a lot of air. The goal is to try to recover as much heat from exhaust air and to preheat incoming air to save on winter heating and summer cooling. The ESB uses two heat recovery units located in the mechanical penthouse. Each unit contains filters and heat fans, allowing heat to be recovered in the coils. Glycol water is circulated between these coils and in the outside air paths of the primary air handling units to pre-treat the outside air and reduce the amount of heat required by the primary heating coils as well as the associated campus steam system. Limited to sensible energy only, the system avoids risks related to cross contamination of exhaust air into supply air.

Drinking fountains contain a bottle-filling feature and a running tally that counts the number of bottles filled—the number of plastic bottles not ending up in landfills.

03 SITE

"The ESB is the first step to transforming the campus to be walkable and sustainable. The site is now healthy—with open areas restored to its native prairie landscape. By creating a new Energy Quad, the design of the ESB encourages interaction among our scientists from different programs not only in the building but on campus. This aligns with our campus-wide push to develop a more interdisciplinary and collaborative work culture."

—Karen Hellmann
Associate Division Director
Argonne National Laboratory

NEW FACE FOR SCIENCE

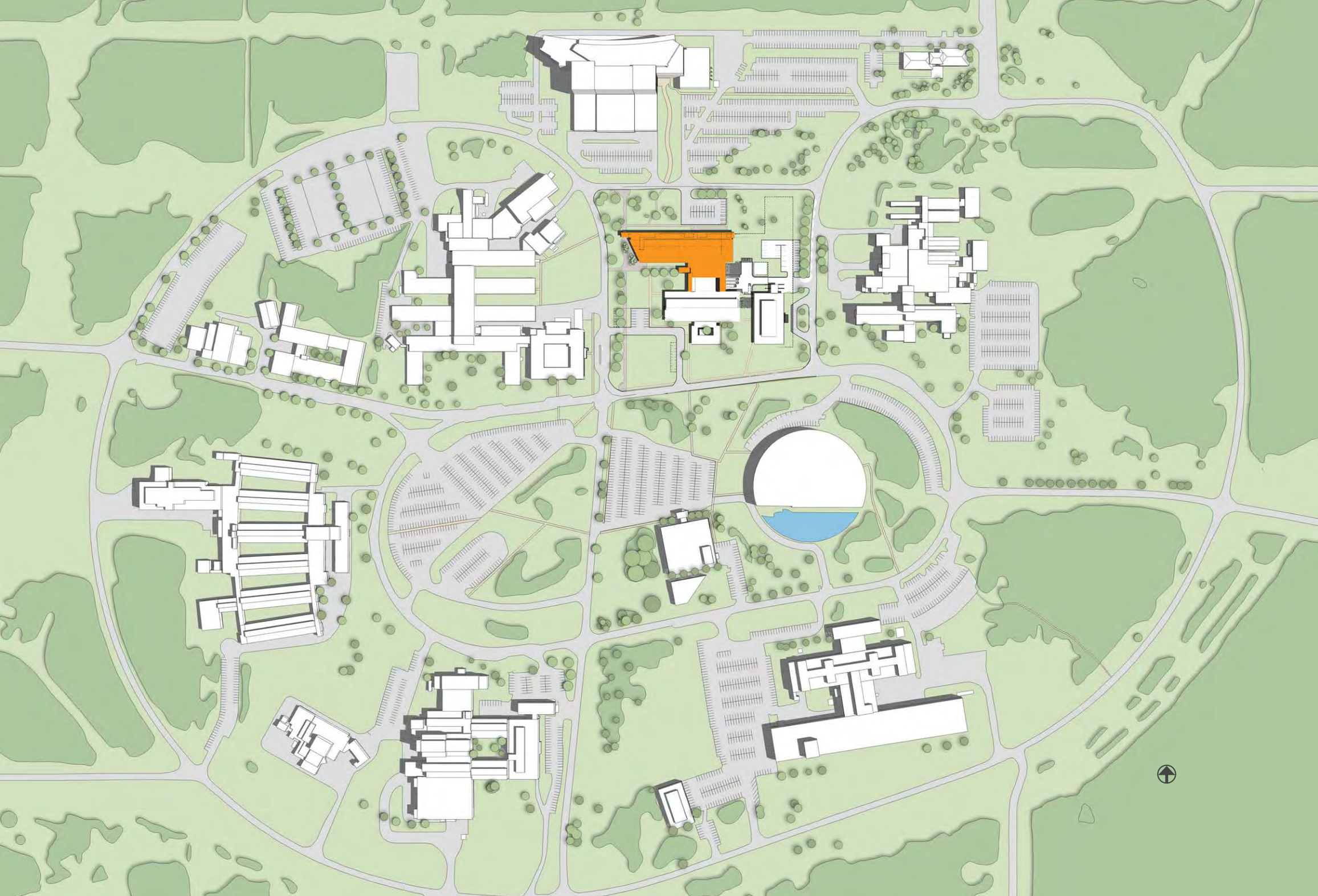
The new Energy Sciences Building ushers in the transformation of Argonne's campus to an interdisciplinary and sustainable campus. The building's prominent location provided the opportunity to create a new entrance to the north campus and a new image for Argonne.

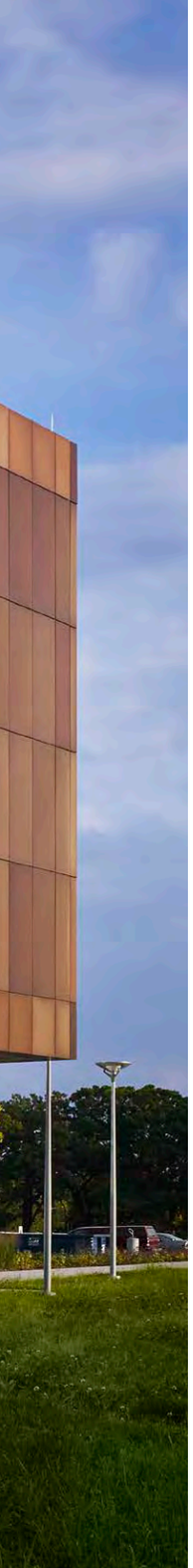
INTERDISCIPLINARY

The transformation will change the character of Argonne from a traditional, departmentally organized research campus to an interdisciplinary campus, based on an academic model. Rather than disparate buildings organized departmentally with surface parking for each, the campus will be more walkable, with buildings defining quadrangles, and offer both indoor and outdoor gathering areas.

PEDESTRIAN FRIENDLY

The change to a pedestrian-focused campus includes plans to close some roads to vehicles, and to create new links to connect stand-alone buildings. A "sky-gate" at the west end of the building anchors the pedestrian path linking existing north and south campuses, and also provides a sheltered area with benches. Bicycles are available just for the riding, with bike racks conveniently located at various buildings and quads.

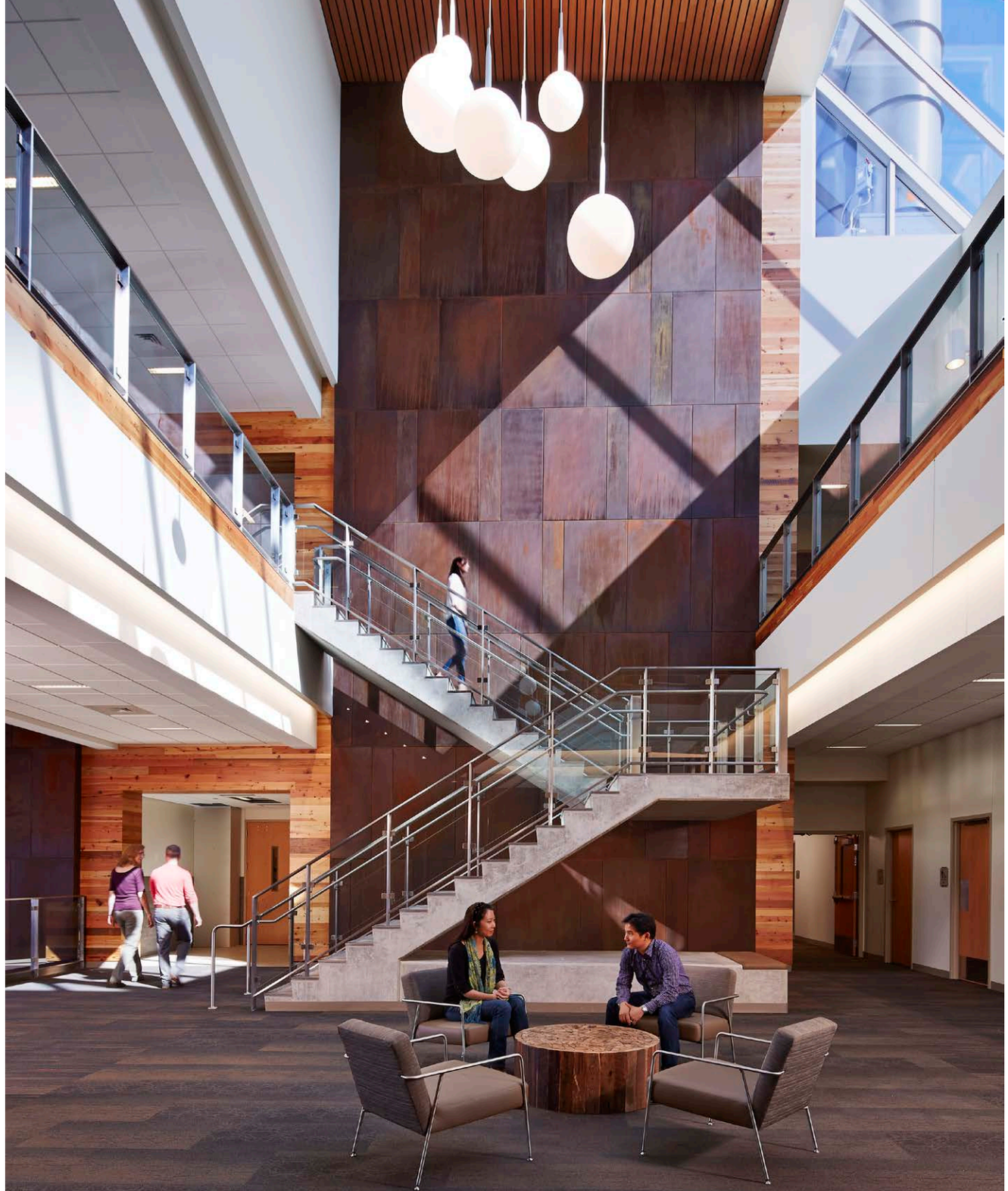


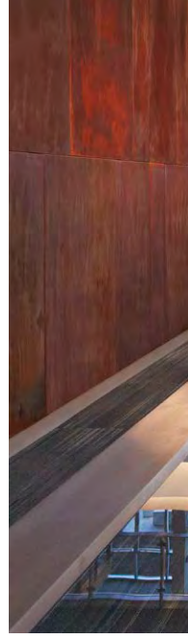


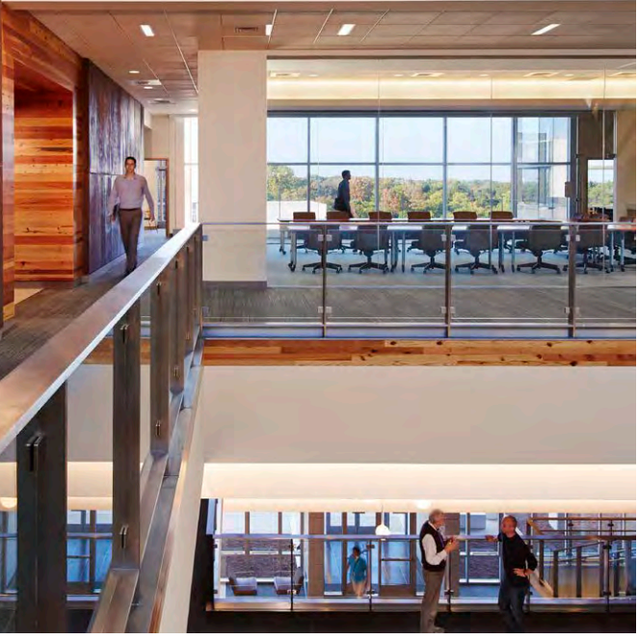
04 BUILDING DESIGN

"The more I stay, the more I like it. Walking into this building, I feel excited. The light is just right, and the lab works beautifully. It's the best design I've seen for a lab. I love the building. I brought my husband through on the weekend, and he felt the same way!"

—Hong Zheng
Principal Materials Engineer
Materials Science Division







NEW WAYS OF WORKING

In addition to transforming the campus, the building is designed to change the way people work; moving from a departmental structure to a system that is project- and tool-based. Throughout the design process, the design team held open meetings and workshops for any scientists and staff members interested in attending; fostering connection—even before the building was completed—among groups who formerly had their own "fiefdoms." The participatory, transparent approach helped to change the direction of a slow-moving hierarchical government work culture, thought to be set in stone, to a more open, industry-competitive way of working: a tool in itself for attracting and retaining the best and the brightest. Furthermore, special care was given to the selection of finishes and furniture; a departure from typical utilitarian government facilities.

COLLABORATION

This building is the first on campus to bring groups together in one building, organized by science rather than department. There is a mix of departments on all floors to create opportunities for sharing and collaboration. Everyone working here passes through the atrium at least a couple of times a day. The generous open corridors around the atrium, conference rooms, team rooms and break areas provide informal and formal gathering areas. There are also outdoor spaces for congregating, including a second floor terrace, and "sky-gate" terrace.

TRANSPARENCY

All visitors enter through the atrium lobby offering views to all three floors of the ESB as well as to the energy quad beyond. Circulation to and through the labs also requires people to move through the atrium. With connecting stairs and skylights, daylight is able to illuminate all three floors. Views through the atrium to the outdoors further orient visitors and employees to the rest of the north campus. Transparency also extends to the laboratory and office spaces where interior and exterior windows not only provide light and views, but also allow researchers to see and to be seen, celebrating creativity and fostering safety.

Typical existing low-slung, red-brick buildings on campus.

ATTRACT AND RETAIN

Unlike peer government research facilities, the ESB offers modern, flexible laboratories similar to those found in private industry and on academic campuses. With specialized state-of-the-art equipment and instrumentation, the facility also includes light-filled collaborative spaces—formal and informal—day-lit open and closed offices, and technology-rich areas to showcase the groundbreaking science. The ESB is serving as a recruiting tool to aid in attracting and retaining the best and the brightest, competing with private-sector organizations and academic institutions.

ARCHITECTURAL VOCABULARY

The design of the ESB, included creating a new modern architectural vocabulary for Argonne, celebrates trans-disciplinary science and complements the existing, low-slung, long red-brick buildings on campus. The use of the copper-anodized aluminum panels and curtain-wall system relates to the existing campus brick, while the contemporary articulation of the façade begins the transition to a more modern campus. The variegation in the metal panels also breathes life into the façade as it changes with the sun and seasons. The building is designed to be transparent, revealing activity in the labs inside. It is designed with “science in sight.”

"The ESB is a great place to work! I have met so many scientists I didn't know before, just by walking through the lobby. Everybody who works here, and people from other buildings, want to see what's going on here—and they often stay a while. There are so many comfortable, open and bright places to meet."

—Stephen Streiffer
Deputy Associate Laboratory Director
Argonne National Laboratory

Ground Level

Vibration sensitive labs including characterization, laser, and microscopy labs are located here, with laboratories with EMI sensitivities located farthest from electrical and magnetic interferences.

- LABORATORIES
- OFFICES
- VERTICAL CIRCULATION
- SERVICE CORE
- MECHANICAL

First Level

The lab blocks on the first level contain the majority of the synthesis labs, which function as a shared resource for all groups in the building, with adjacent labs containing instrumentation that supports the research.

- LABORATORIES
- OFFICES
- VERTICAL CIRCULATION
- SERVICE CORE
- MECHANICAL

Second and Third Levels
The lab blocks on the third level contain the remaining wet chemistry laboratories in the program including associated instrumentation laboratories. The labs are clustered based on science and lab function to increase collaboration and maximize shared affinities between the groups.

- LABORATORIES
- OFFICES
- VERTICAL CIRCULATION
- SERVICE CORE
- MECHANICAL

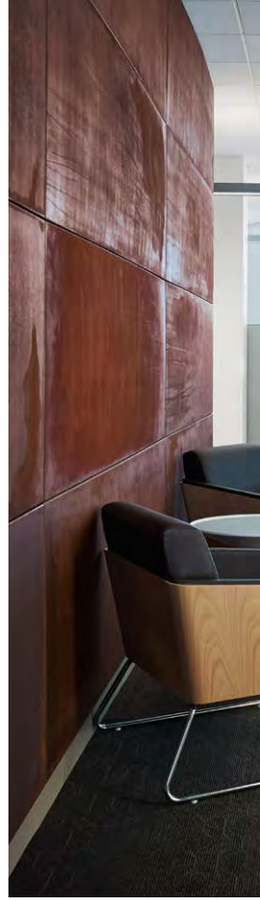
FLOOR PLANS

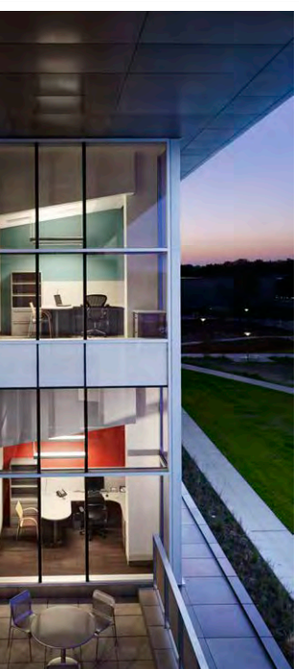
Each floor is intentionally organized similarly, to simplify building systems, for intuitive wayfinding, and to enhance safety by segregating public from private areas and back-of-house from front-of-house functions. The straightforward plan also contributed to the facility being built significantly under budget, allowing an expansion originally planned for the future to begin immediately. In plan, the building is relatively simple, with a large, modular lab block on each floor bisected by the entrance and collaboration atrium. Elevators flank the atrium—one serving the lab blocks to the east, and the other serving the lab block to the west. Fire stairs are located at the east and west ends of the lab blocks.

The loading dock and service entrance are located at the southeast corner of the building, to serve as a single point of service access for the new energy quad upon the quad's completion. The building is designed to meet the requirements of the latest edition of codes, orders, standards, and guides in accordance with DOE Order 413.3A, "Program and Project Management for the Acquisition of Capital Assets."

INTERIORS

The interior design concept aligns with the architectural design to create flexible and comfortable workplaces and gathering areas, with sustainability in mind. Finishes and furniture were chosen for function, durability and low environmental impact. Nearly all finishes and furniture contain a high percentage of recycled content and most are also recyclable.





FURNITURE

Within the atrium, seating areas feature paper-topped tables and magnetic metal wall paneling to encourage impromptu note-taking and posting. Striking reclaimed-wood tables center comfortable and welcoming casual seating areas. Break rooms and formal conference rooms feature magnetic dry-erase glass walls to enhance conversation. All office furniture was selected for its low environmental impact, durability, and function. It includes options for easy reconfiguration and optional add-ons to suit personal preferences.

MATERIALS

Reclaimed wood and recycled metal panels clad the atrium walls creating a striking design. A media wall at the entrance displays work conducted at the ESB, enhancing the welcoming ambience with science on display. Recycled glass terrazzo floors were selected for highly trafficked areas in the atrium, for the material's durability and its low environmental impact, as well as for its elegant quality. High recycled content carpet tiles line personnel corridors along the perimeter offices. Environmentally friendly linoleum tile floors and low-VOC paint were selected for the laboratories with the linoleum tile carrying through to the service corridors.

WAYFINDING

The way-finding strategy began with an intuitively-understood cohesive plan, repeated on each floor. The atrium serves as the main orientating component, with interior wall finishes of reclaimed wood and recycled metal panels. Walls of the office-laboratory personnel corridors flanking the atrium are painted a different accent color on each floor to enhance intuitive wayfinding. Furthermore, lighting and signage was designed as a single unit (including room identification, safety and protocol information) demarcating each lab entry, color-coded by floor, and located consistently to the left of room and lab entrance doors.

05 LAB DESIGN

"The new labs are bright and open, and so well planned that there seems to be a place for everything! I'm thrilled that the labs easily accommodate so many different types of equipment, and have the infrastructure to support such a wide range of experiments. Our scientists practically live here, and now, that's not a bad thing. I expect we'll see some great work come out of this new building."

—Peter Littlewood
Associate Laboratory Director
Physical Sciences and Engineering
Argonne National Laboratory

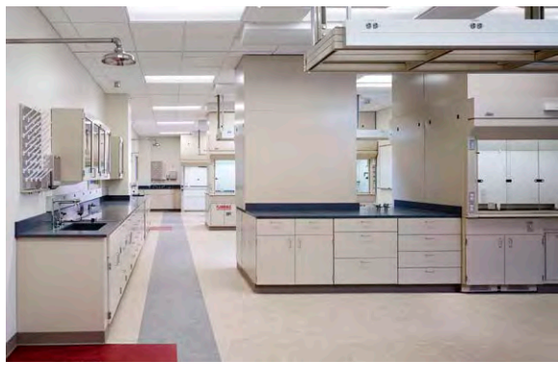
LAB BLOCKS

Each of the lab blocks consists of back-to-back laboratory modules bisected by a shared service corridor. Functions are grouped together to enhance research synergies and to achieve infrastructure economies of scale. Personnel corridors, with views into the labs, run along the outside of the lab block. Offices and collaboration spaces are located along the perimeter walls across from the labs.

VIBRATION CRITERIA

As with many laboratory buildings, vibration from outside sources is a primary concern to the integrity of experiments. The ESB required spaces in its lowest level to meet requirements as strict as Vibration Criteria E (VCE) while the upper levels were built to meet Vibration Criteria A (VCA). The upper levels of the ESB are performing better than ground level spaces in other buildings on campus.

Basic Module



Fume Hood Intensive Module

MODULAR APPROACH

In the ESB, each lab is different. A module to accommodate all of them—including fume-hood intensive labs—was essential. There are five basic lab types: synthesis, instrumentation, characterization, wet-chemistry and laser labs, as well as specialty shielded labs. Labs are fit-out with minimal fixed items, and casework a combination of fixed and mobile units. This creates the flexibility to accommodate a wide variety of equipment. Utilities and services are fed from above on overhead service carriers. Many of the labs host research projects that utilize highly customized equipment set-ups.

THE MODULE

A planning module of 11'-0" by 28'-0" was established to organize laboratory space and locate equipment and furnishings, while providing circulation patterns and clearances for ADA and life safety. The laboratories vary by research group and function, but each consists of one half module, or one or more full modules. Designed specifically for Argonne's dynamic energy research programs, it was critical that labs be able to accommodate changes in research methodologies, technologies, equipment and instrumentation. So, mechanical, electrical, plumbing and structural systems were integrated into the module for quick and relatively inexpensive reconfiguration. Inside the lab, services are provided along the perimeter walls, as well as from overhead service carriers.

SERVICE CORRIDOR

A double-loaded service corridor bisects the laboratory block. The 12'-0" wide service corridor serves a critical support function by segregating heat-generating, noisy and dirty equipment—such as chillers, vacuum pumps,—from the sensitive research environment within the main laboratories. The lab module also includes a zone within the service corridor for gas cylinders and ventilated gas cabinets —there are 37 different specialty gases available—and storage. Oversized doorways into the labs facilitate moving and reconfiguring large equipment and delivering supplies.

"Initial testing of our UHV system has indicated that vibrational sensitive measurements such as STM/AFM are performing better in the ESB than in our (former location), even though we are positioned on the third floor."

—Vojislav Stamenkovic
Technical Lead
Material Science Division

Circular polarized UHF Radio Frequency Identification (RFID) antennae, basically hi-tech bar code readers are installed at entrances to the services corridors and laboratories in order to track the movement of chemicals and better monitor quantities stored and used within the building. This new system far exceeds the antiquated manually-kept spreadsheet that was used in the past to track upward of 10,000 individual chemicals and helps ensure greater safety and code compliance in the new building.

SEGREGATION OF SERVICE AND PERSONNEL

Service elevators accessible from the loading dock provide vertical access to the service corridors on each floor and make it easy to move equipment and supplies in and out of the labs, as well as changing gas cylinders in the service corridor—all separated from public access. Personnel corridors are located between the office and the main lab entrances and are connected to the central atrium and stairs.

SEPARATION OF LABS AND SUPPORT

The service corridor support zone allows utilities to be disconnected and re-configured outside the labs, so labs can be modified without disturbing on-going research in adjacent labs. A service elevator at the end of each service corridor minimizes crossover traffic between lab and non-lab areas.

SPECIALTY LABS

Three radio-frequency (RF) shielded laboratories are designed to provide at least 100dB of RF isolation up to 2.5 GHz. These labs are essentially six-sided shielded boxes with fully annealed monolithic pure copper lining. All penetrations into these labs are detailed with wave-guides and RF filters.

SPECIALTY GASES

There are 37 types of specialty gases available. Gases are piped into the labs from cylinders located in the service corridor. Modularly distributed ports—high and low along the wall—provide flexibility for utility connections; between equipment and services in the service corridor, and instrumentation in the labs.

HOUSE SERVICES

Basic lab services include hot and cold water, reverse osmosis water, process cooling water, compressed dry air, nitrogen, standard and special power, phone and data. Local exhaust vents are provided at each module. Some are stubbed for future use, while others are provided with articulated exhaust arms or capped for direct connection to instrumentation.

FIVE BASIC LAB TYPES

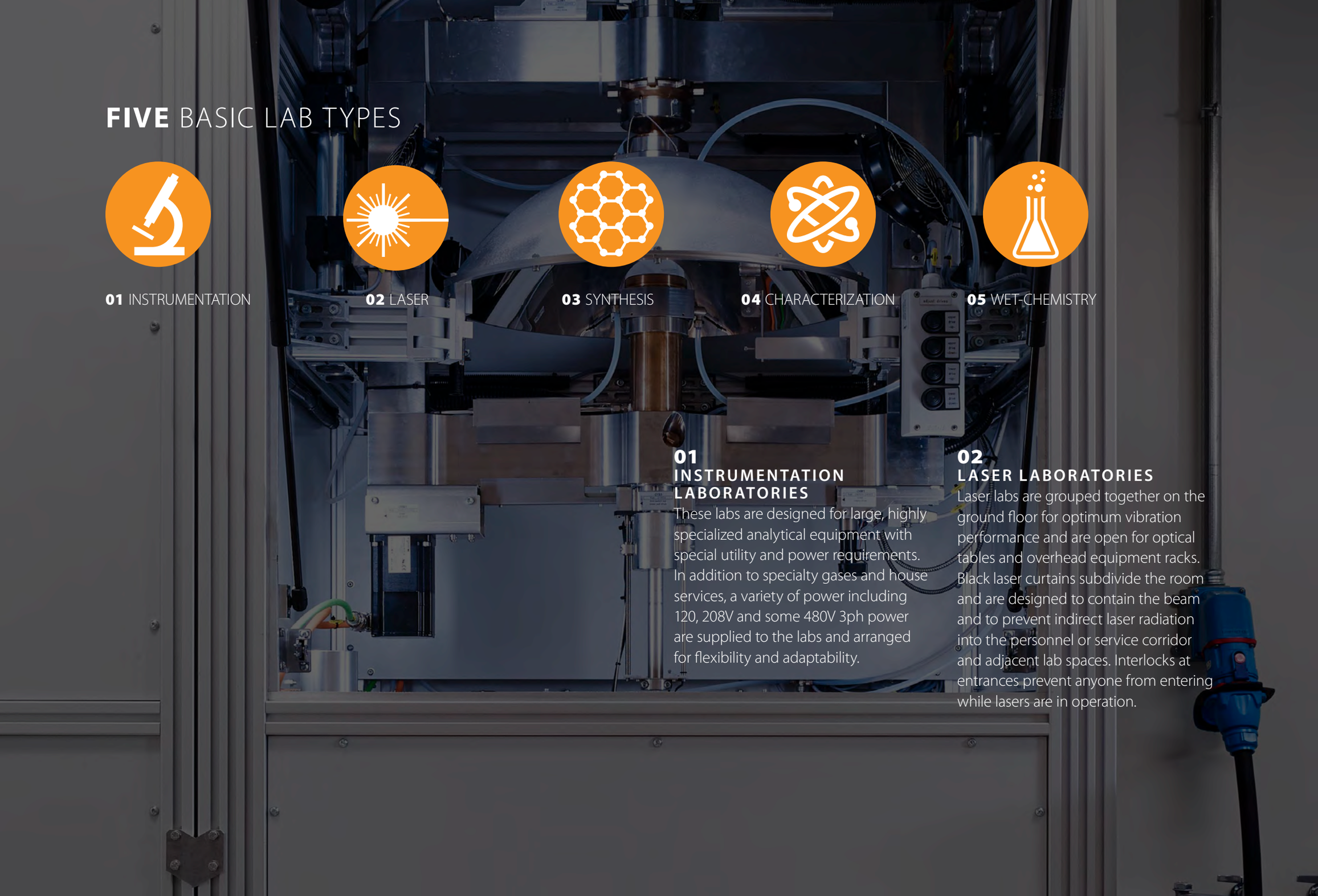
01 INSTRUMENTATION

02 LASER

03 SYNTHESIS

04 CHARACTERIZATION

05 WET-CHEMISTRY



01
INSTRUMENTATION LABORATORIES

These labs are designed for large, highly specialized analytical equipment with special utility and power requirements. In addition to specialty gases and house services, a variety of power including 120, 208V and some 480V 3ph power are supplied to the labs and arranged for flexibility and adaptability.

02
LASER LABORATORIES

Laser labs are grouped together on the ground floor for optimum vibration performance and are open for optical tables and overhead equipment racks. Black laser curtains subdivide the room and are designed to contain the beam and to prevent indirect laser radiation into the personnel or service corridor and adjacent lab spaces. Interlocks at entrances prevent anyone from entering while lasers are in operation.

03
SYNTHESIS LABORATORIES

Synthesis labs are co-located to facilitate interaction. Windows into the personnel corridor provide natural lighting and views to the exterior. These labs are designed for nanoparticle synthesis which requires high-temperature instrumentation and additional exhaust requirements.

Basic module type before fit-out for synthesis lab.

High-temperature furnaces allow precision synthesis and crystal growth of new materials under controlled atmospheres and up to 1700 degrees Centigrade. Customized furnace enclosures were designed to contain and exhaust the heat and fumes from multiple collocated furnaces and ovens.

The SciDre GmbH Smart Floating Zone optical image furnace permits growth of large, impurity-free crystals at pressures ranging up to 150 bar. Control of chemical reactivity in this way leads to discovery of compounds not found under ordinary atmospheric conditions. It was brought into the lab through the oversized doors from the wide service corridor into the lab, an example of how the labs are designed to receive all sorts of equipment, no matter how large and ungainly.

"New materials are a gateway to higher performance in energy technologies ranging from electrical energy storage to solar energy conversion to high efficiency electrical transmission. A focus of the Energy Sciences Building mission is the discovery of new materials and their growth into high-quality research specimens for evaluation and deployment. The solid-state materials synthesis laboratories pictured here advance this mission by exploring the frontiers of how to create new materials. A key capability is high-pressure crystal growth, in which the chemical stability and reactivity of materials can be dramatically changed from what is found under atmospheric conditions. By using high pressures of reactive process gases during crystal growth, entirely new materials can be discovered, and existing compounds can be modified to exhibit improved electronic properties."

—John Mitchell
Senior Scientist and Associate Director
Materials Science Division
Argonne National Laboratory

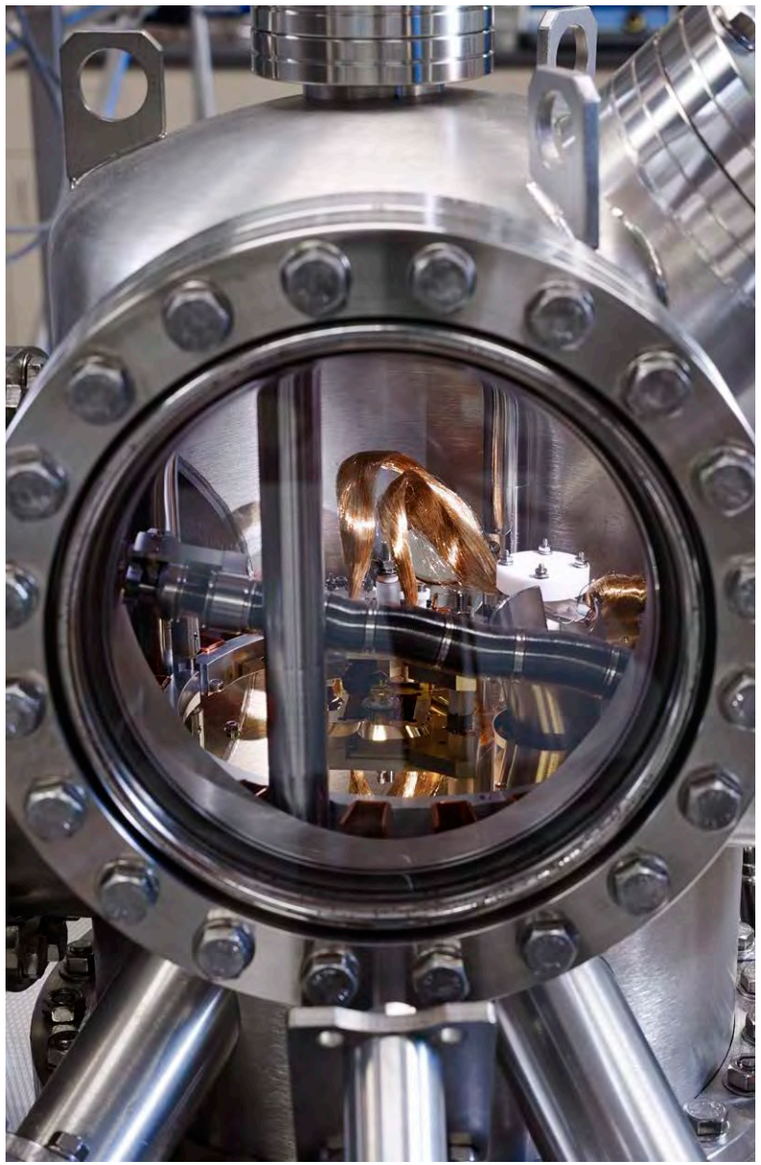
04
CHARACTERIZATION LABORATORIES

The characterization labs are grouped together on the ground level for ease of cryogen dewar transport and optimum vibration performance. Pumps are located in the service corridor in mobile ventilated pump cabinets. Isolated areas have 12-foot high ceilings for servicing cryostats. Characterization labs require flexibility for reconfiguration. They are open plan with instruments located on work tables.

- LEED—Low energy electron diffraction
- XPS—X-ray photoelectron spectroscopy
- LEISS—Low energy ion scattering spectroscopy
- UPS—Ultraviolet electron spectroscopy
- AES—Auger electron spectroscopy
- STM—Scanning tunneling microscopy

Basic module type before fit-out for characterization lab.

Looking through Lab A316 Electric-Chemistry Testing Lab to Lab A313 Atomic Level Characterization Lab UHV Chamber.



Looking into UHV
Characterization Chamber

"We of the Energy Conversion and Storage group are custodians of these labs. Our task is to understand the basic science underlying the conversion, back and forth, of chemical energy and electrical energy.

The two labs that were photographed contain most of the tools that we have been using in our studies. The striking metal structure—may we call it sculpture?—is an Omicron Ultra-High Vacuum system whose primary function is the preparation and characterization of model specimens for controlled electrochemical measurements…carried out in the lab visible through the door.

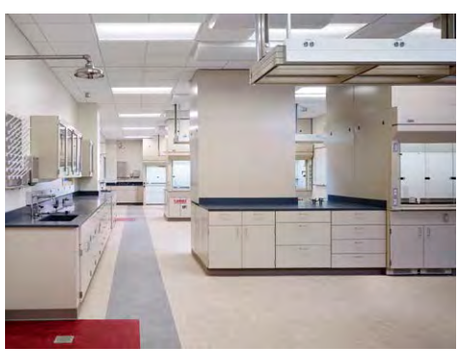
Next door, the skills and intuition of our electrochemists are applied to the task of probing the quite poorly understood fundamentals that underlie the interchange of chemical and electrical energy. What promotes favorable processes, ones that rapidly covert energy and not waste it? What hinders unfavorable reactions, the ones that generate chemical dead ends or heat? Control of the environment… is critical to avoid being misled…and (to understand) how to achieve and maintain these tolerable levels…There is room for as many as twelve simultaneous experiments…

We expect good things to come from this lab."

—Arvydas P. Paulikas
Physicist and Senior Scientific Associate
Material Science Division
Argonne National Laboratory

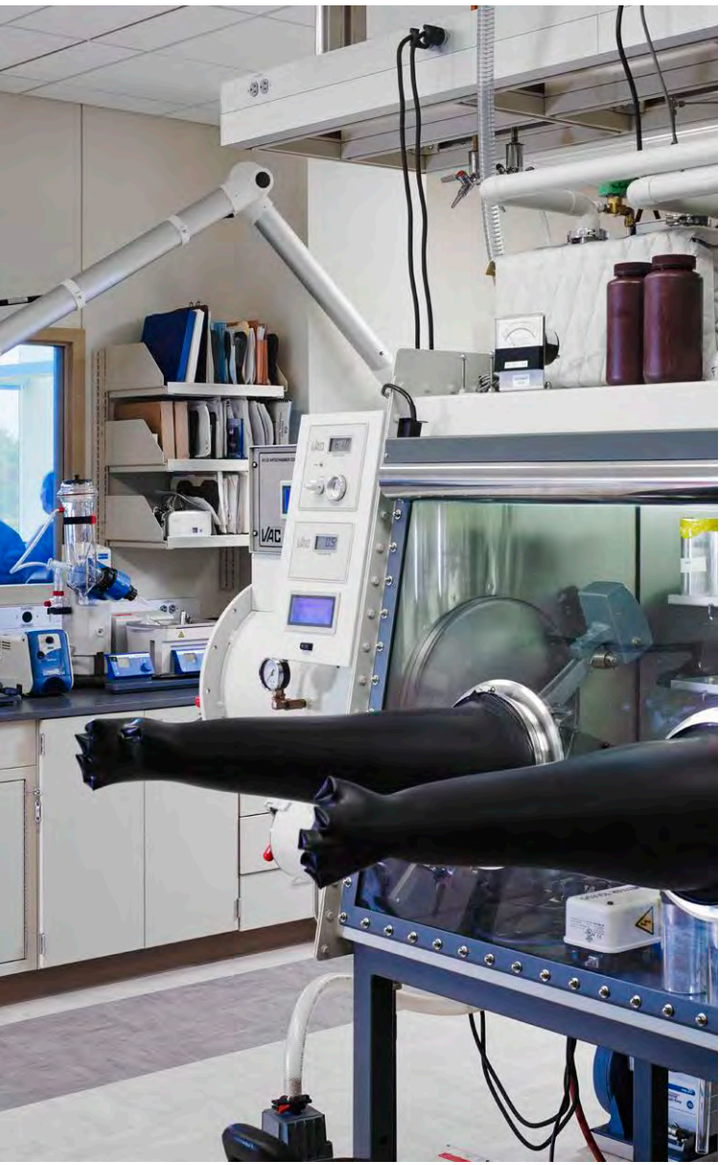
05
WET CHEMISTRY LABORATORIES

Wet chemistry labs are co-located where possible to facilitate interaction, and include windows to the personnel corridor for views to the outdoors and for natural light. Because of the heavy use of chemicals and increased requirements for fume hoods, these labs were located on the upper floors of the building to minimize the length of duct runs to the penthouse.



Fume hood module type before fit-out for wet-chemistry lab

Looking through Lab A316 Electric-Chemistry Testing Lab to Lab A313 Atomic Level Characterization Lab UHV Chamber



Looking through Lab A316 Electric-Chemistry Testing Lab to Lab A313 Atomic Level Characterization Lab UHV Chamber

06 RESULTS

"The principle objective of the Energy Sciences Building was to create a high performance facility that enables energy research towards practical and significant achievements that will change the world's production and consumption of energy. In alignment with Argonne's research mission, as well as the projects conducted in the ESB, it was important that it be energy-efficient and environmentally-sustainable: It is tracking LEED Gold.

The new ESB is a sorely needed, adaptable, high-performance modern facility focused on energy research. It changes the departmental organization and "fiefdom" culture to a problem-based interdisciplinary culture, encouraging shared functions to promote interaction and collaboration. It is a showcase facility that we will use to help recruit the best and the brightest scientists in the country.

Aesthetically, the design establishes a new architectural vocabulary which relates to the existing campus but is modern and expressive of contemporary science. Its form helps to create a new Energy Quad, ushering in the transformation of a vehicular-campus to a pedestrian-friendly "academic" campus. Prominently located near the entrance to the north campus, the ESB will be seen by almost everyone visiting Argonne, giving us a new, modern image expressive of Argonne's contributions to some of the great advances in science today."

—Gail Stine
Director of Facilities Management and Services
Argonne National Laboratory