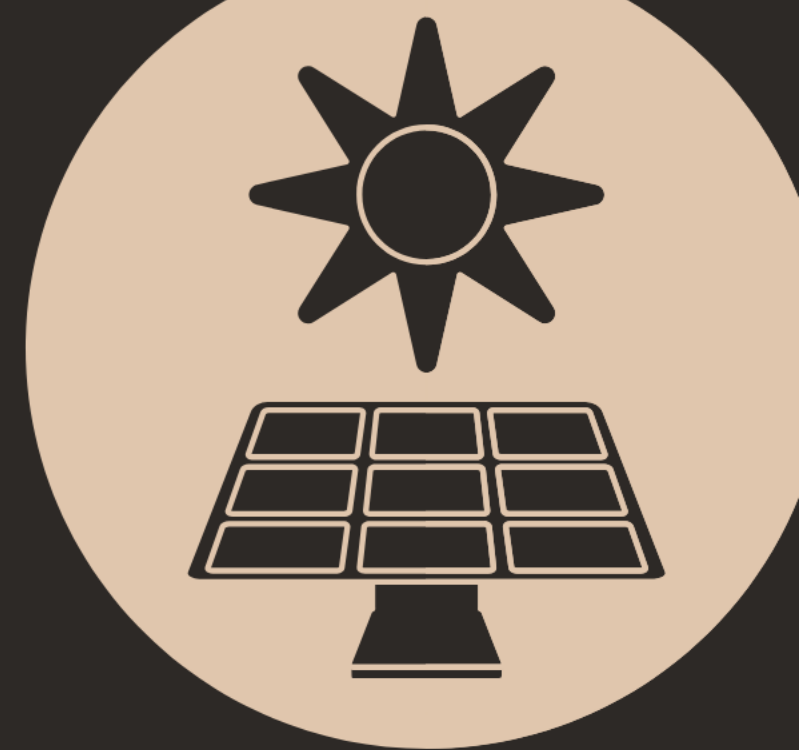
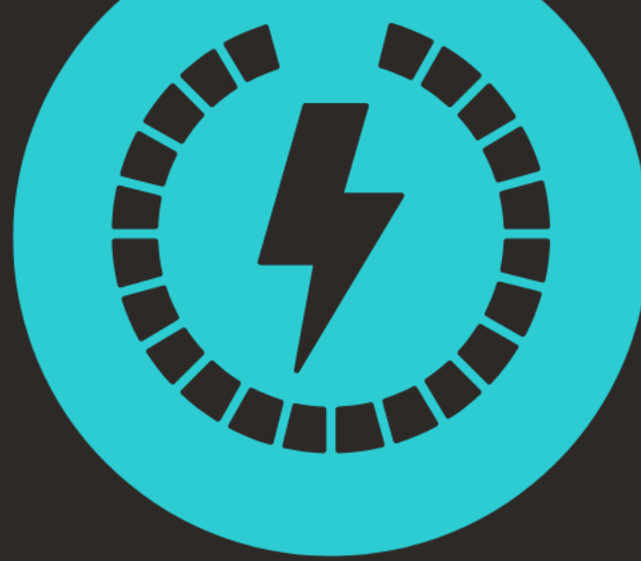


FEFPA SUMMER CONFERENCE 2019
MONDAY, JULY 15
1:45-2:45PM
ESTATE BALLROOM



A NET ZERO REALITY

LESSONS LEARNED FROM FLORIDA'S FIRST
ZERO ENERGY PUBLIC SCHOOL

SCHOOL DISTRICT OF OSCEOLA COUNTY | LITTLE | GILBANE BUILDING COMPANY



WHO WE ARE



MARC CLINCH
CHIEF FACILITIES OFFICER
School District of Osceola County



PHILIP DONOVAN
COMMUNITY PRINCIPAL
Little Diversified Architectural Consulting



GEOFF TUCKER
SENIOR PROJECT MANAGER
Gilbane Building Company

WHAT WE'LL TALK ABOUT

- 1) **Our New Reality**
- 2) **A New Vision for Schools** MARC CLINCH | PROJECT CHAMPION
- 3) **The High-Performance Design** PHILIP DONOVAN | PROJECT ARCHITECT
- 4) **Building for Success** GEOFF TUCKER | PROJECT MANAGER
- 5) **Q&A**

OUR NEW REALITY

**GLOBAL RESOURCE ATTRITION IS
CREATING A CATALYTIC SHIFT IN THE WAY
WE DESIGN & CONSTRUCT BUILDINGS**

#shifthappens



OUR NEW REALITY

TODAY'S ADMINISTRATORS,
EDUCATORS, & FACILITIES
PLANNERS HAVE MORE ON THEIR
PLATES THAN EVER BEFORE.

#shifthappens

OUR NEW REALITY

Energy &
construction
costs are on
the rise

Budgets
are tighter

Everyone's
worried about
climate change
& environmental
impacts

The public is
looking for more
environmentally
friendly energy
solutions than ever
before

WE ARE LIVING IN A DIFFERENT ERA

1970s
Energy
Conservation



1980s
Energy
Management



1990s
Energy
Procurement



2000s
Carbon
Reduction



2010s
Energy
Efficiency



TODAY
Efficiency as
a Resource

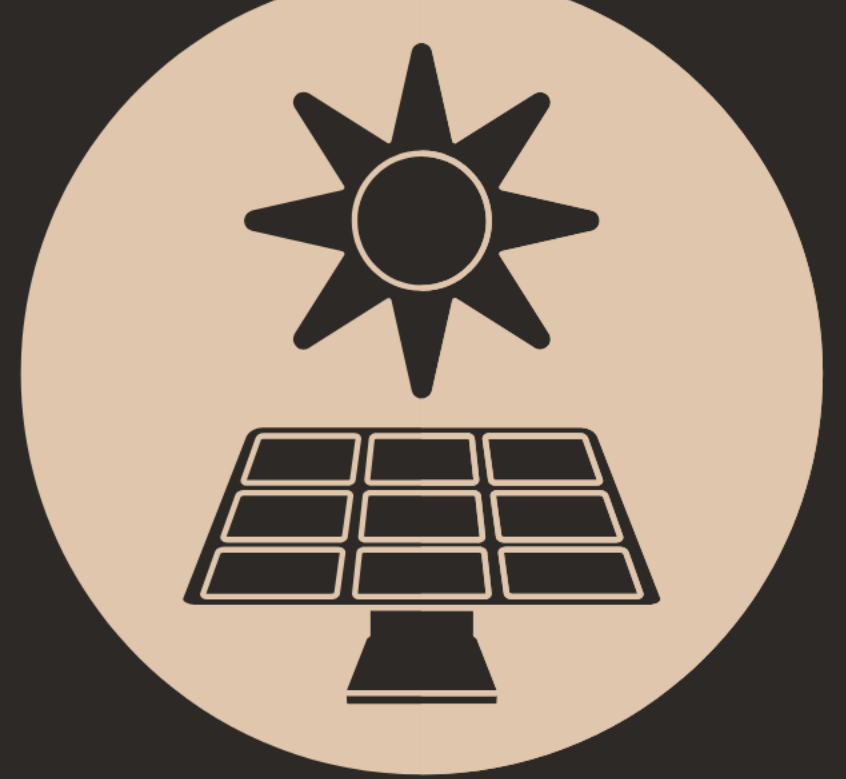
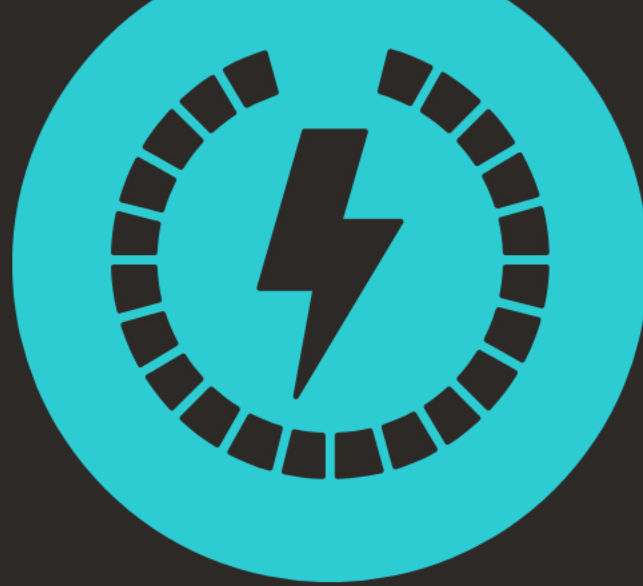
THIS IS NOT A PASSING TREND

89%

of Americans are very
concerned about the
environment

93%

agree that saving
energy helps the
environment



LESSON #1

**THERE IS A
DEVASTATING RISK
IF WE DO NOTHING**



07.08.19 | 11:00 AM

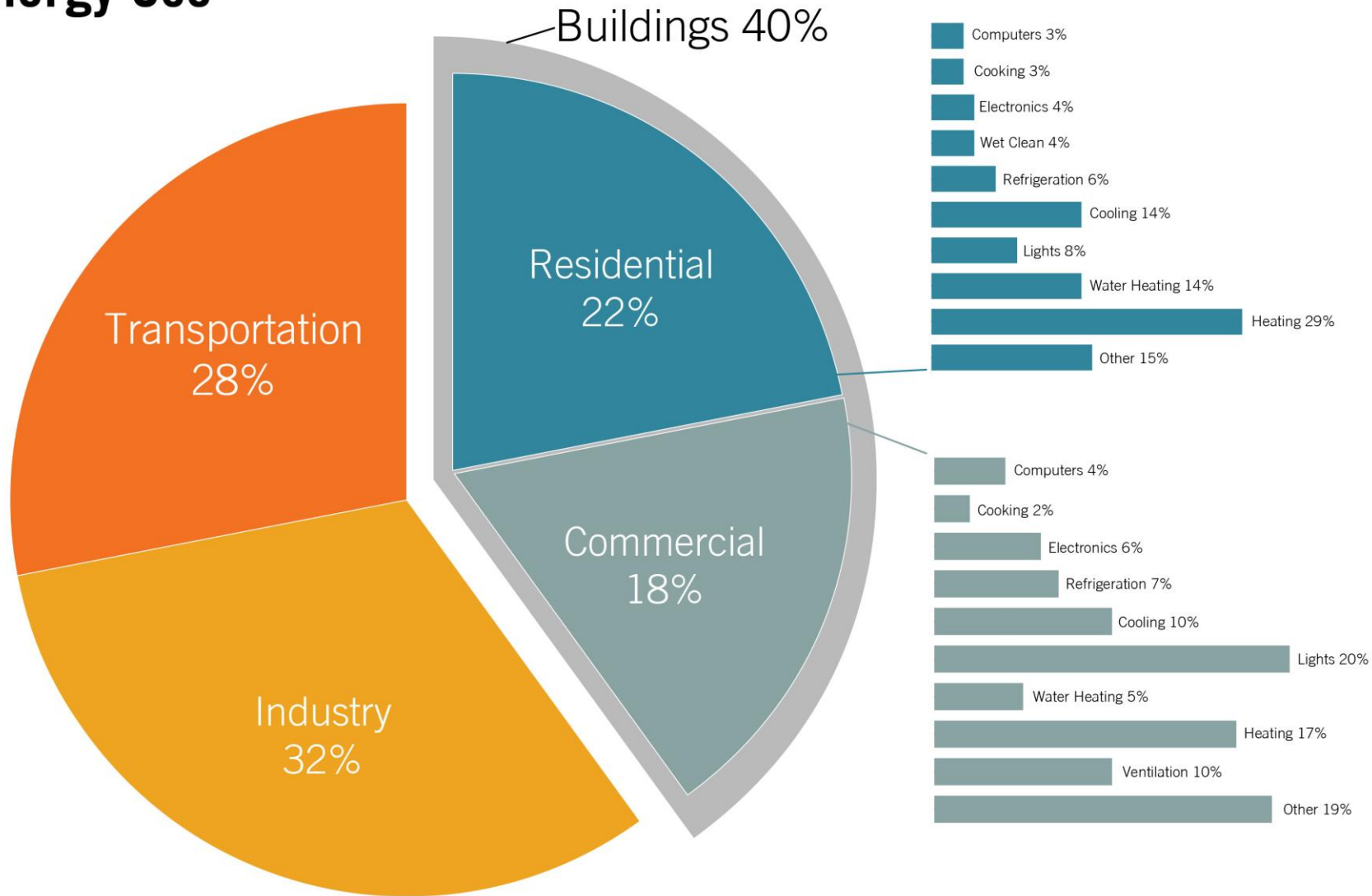
The world's aging architecture is a \$21 trillion risk

The cost of making buildings more energy efficient can seem staggering—until you look at the cost of not retrofitting them.

FAST COMPANY



U.S. Energy Use



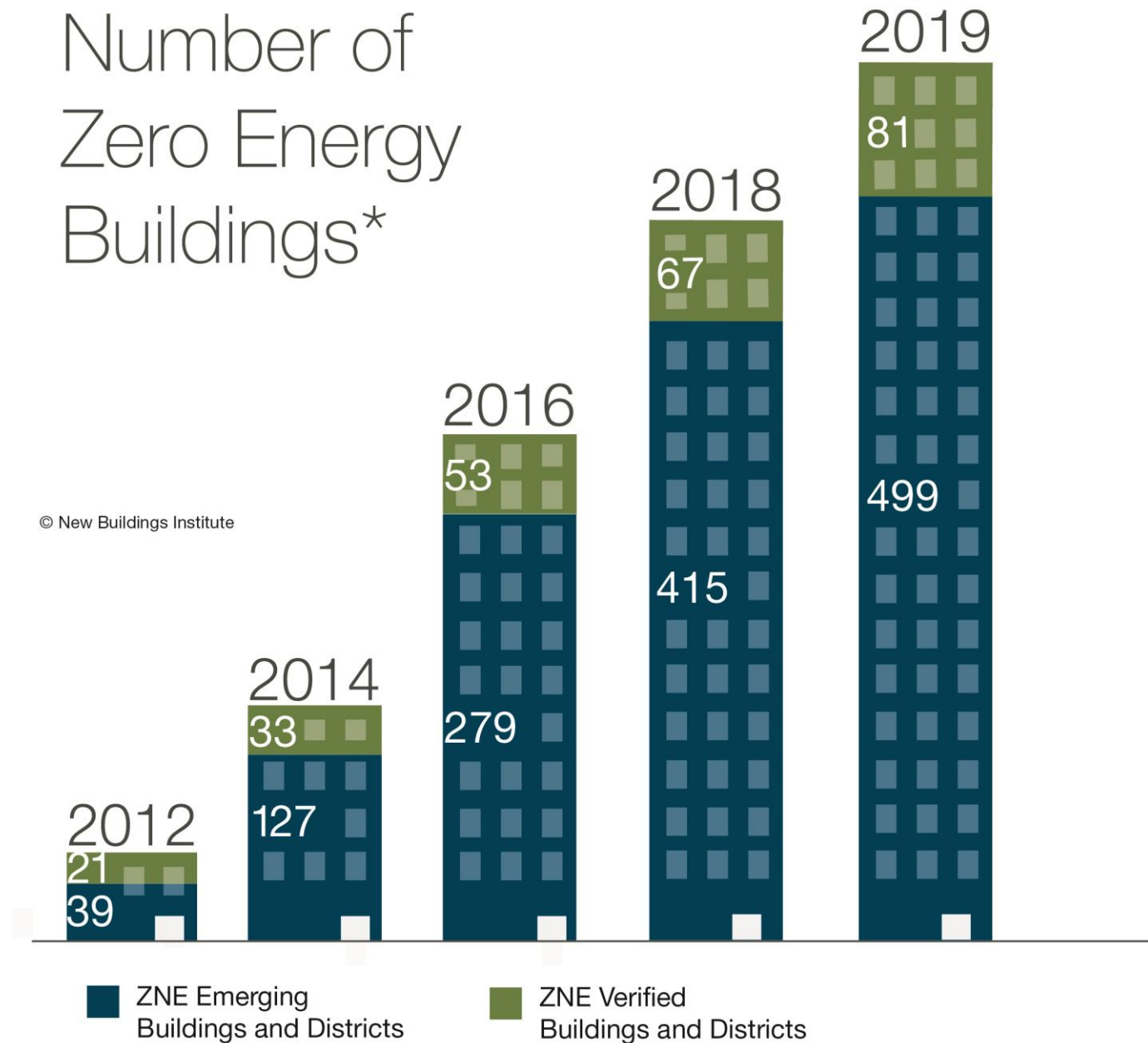
Policy makers understand that buildings sit at the nexus of energy policy

61%

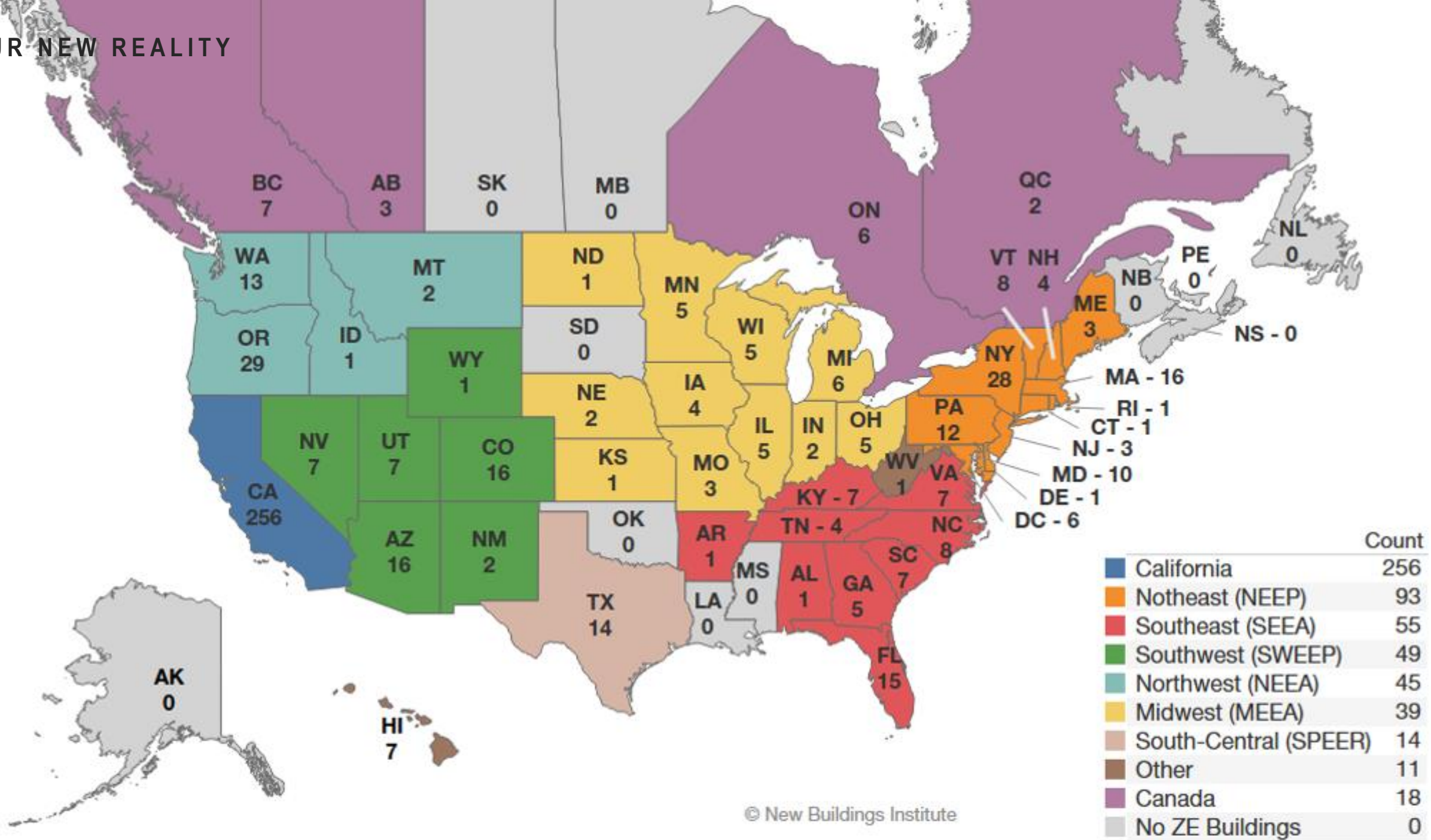
of U.S. respondents are very or extremely likely to have one or more facilities that are nearly zero, net-zero, or positive energy or carbon status within the next 10 years

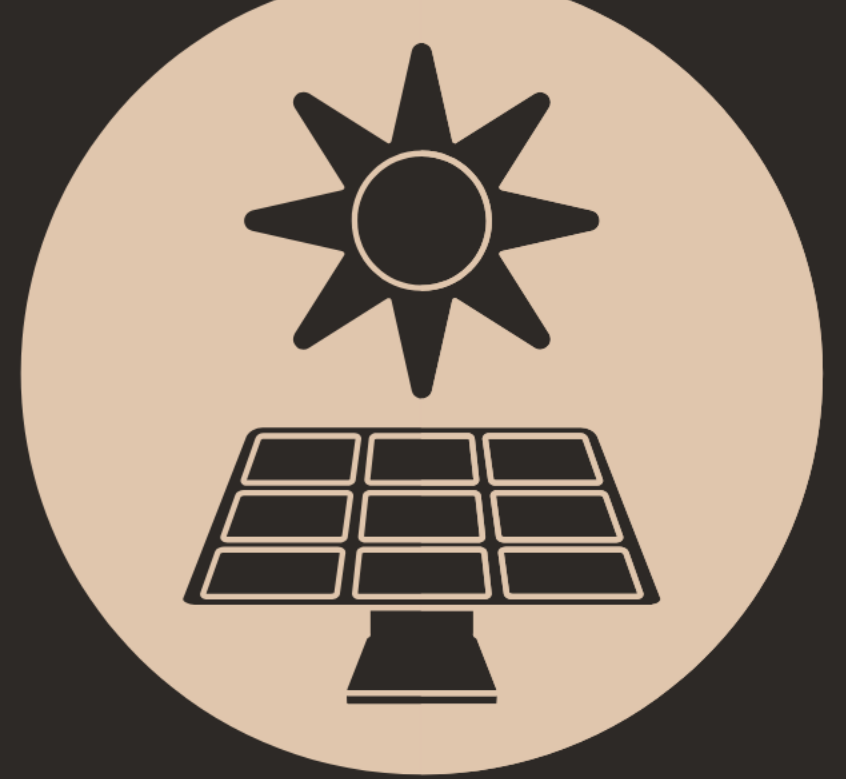
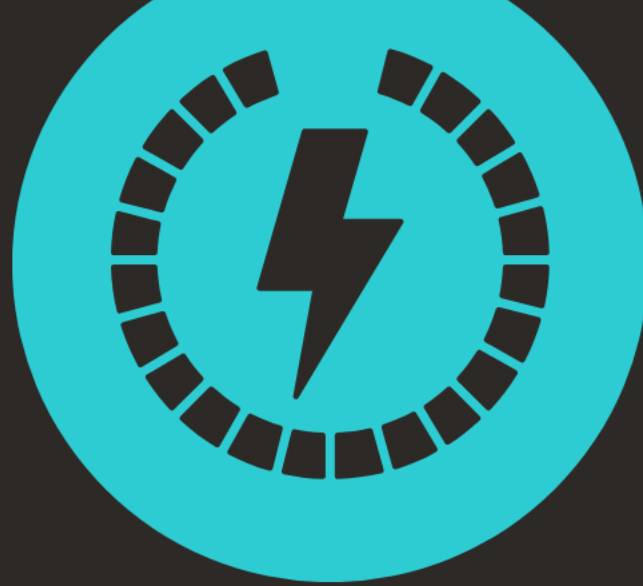
According to Johnson Controls' 2018 Energy Efficiency Indicator Study
<http://www.johnsoncontrols.com/staticfiles/xs/Marketing/Managing-Energy-Costs-Schools.pdf>

Number of Zero Energy Buildings*



OUR NEW REALITY





LESSON #2

**THE COSTS ARE
NOT PROHIBITIVE**



OUR NEW REALITY



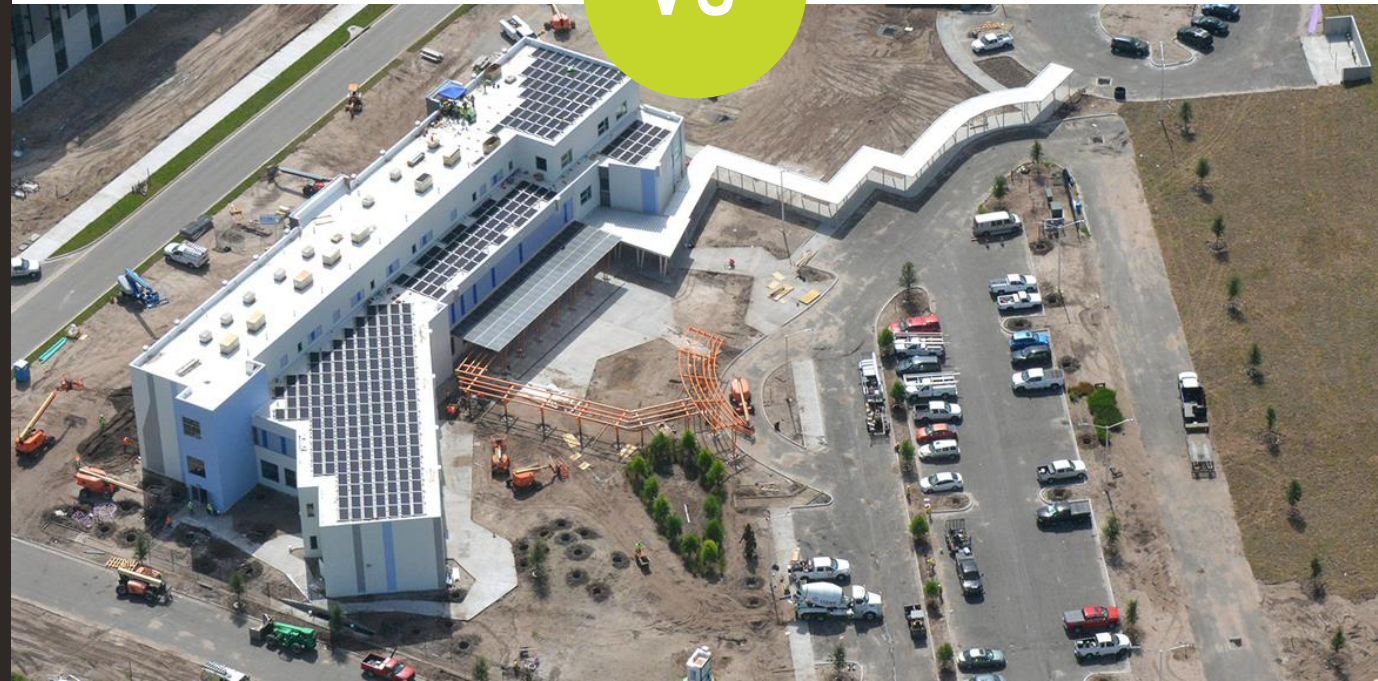
**U.S. school districts spend \$6B
each year on energy —
second only to
salaries.**



On average, high-performance schools can use between **65%–80% less energy** than conventionally constructed schools, and the remaining energy required is supplied by renewable energy.



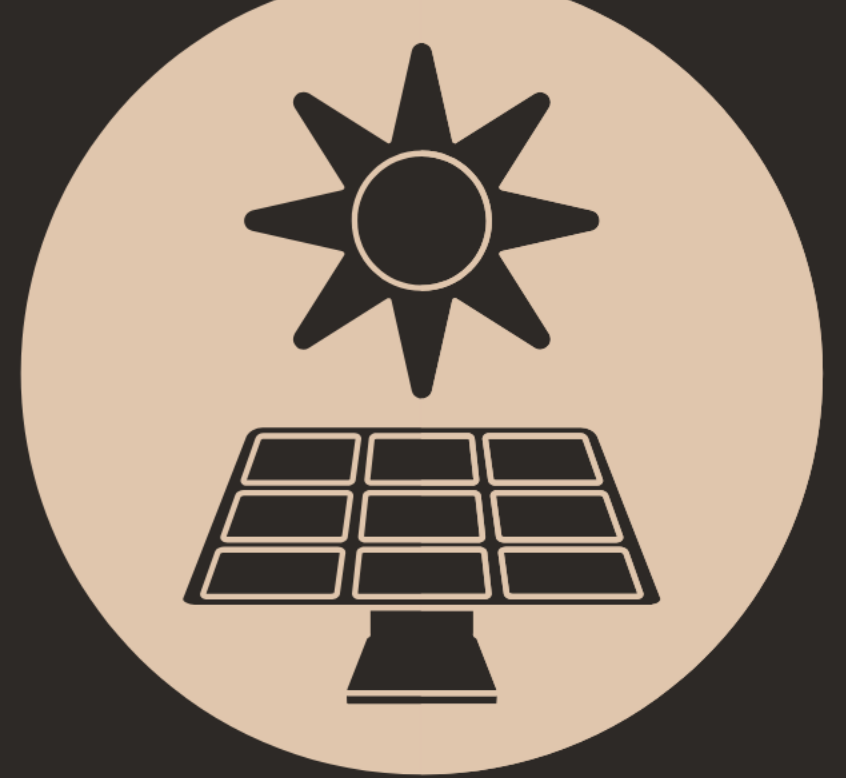
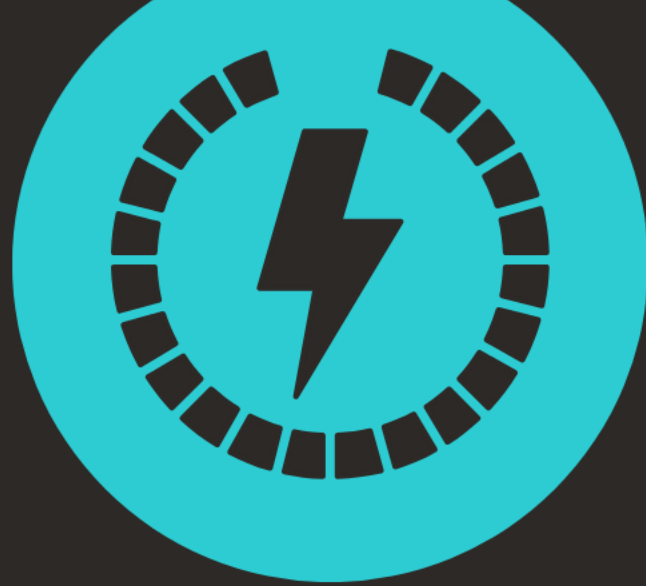
VS



DISCOVERY ELEMENTARY SCHOOL



PHOTO CREDIT: ALAN
KARCHMER
ARCHITECT: UMDO ARCHITECTS

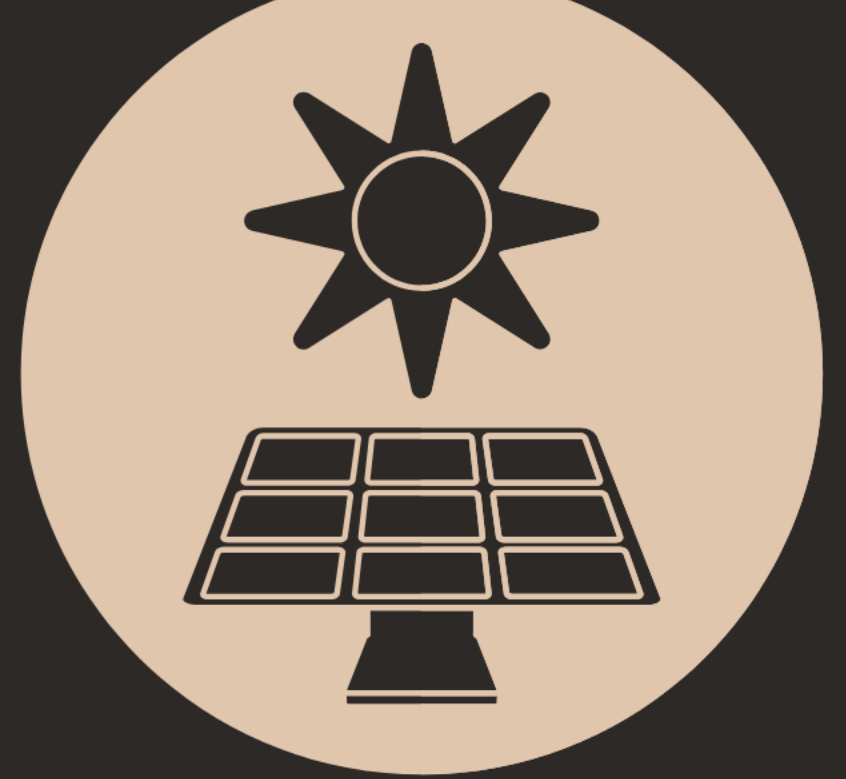
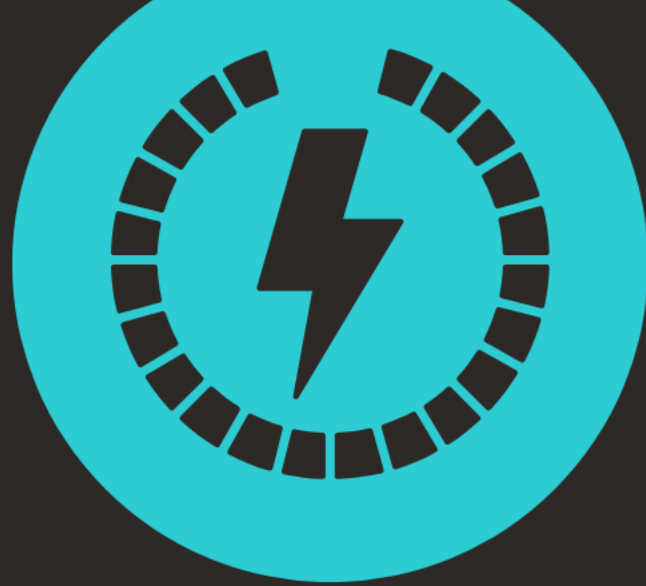


LESSON #3

**WE MUST PREPARE
STUDENTS FOR 21ST
CENTURY CAREERS**



65% of today's students will move into careers that haven't been created yet



LESSON #4

**HIGH-PERFORMANCE =
HEALTH & WELLNESS**





Solar Panels Power New Schools—and New Ways of

SHARE



CHRIS BERDIK SCIENCE 06.06.18 06:00 AM

SOLAR PANELS POWER NEW SCHOOLS—AND NEW WAYS OF LEARNING



A view of the 1,700 solar panels on the roof of Discovery Elementary School in Arlington, Virginia. Over the course of the year, these panels provide more than enough energy to power the school.

CHRIS BERDIK FOR THE HECHINGER REPORT

DRESSED IN PASTEL pink and green for an early spring day, second-grader Katherine Cribbs was learning about energy on a virtual field trip—to her own school.

With a flurry of touch-screen taps, she explored the “energy dashboard” of Discovery Elementary

WIRED

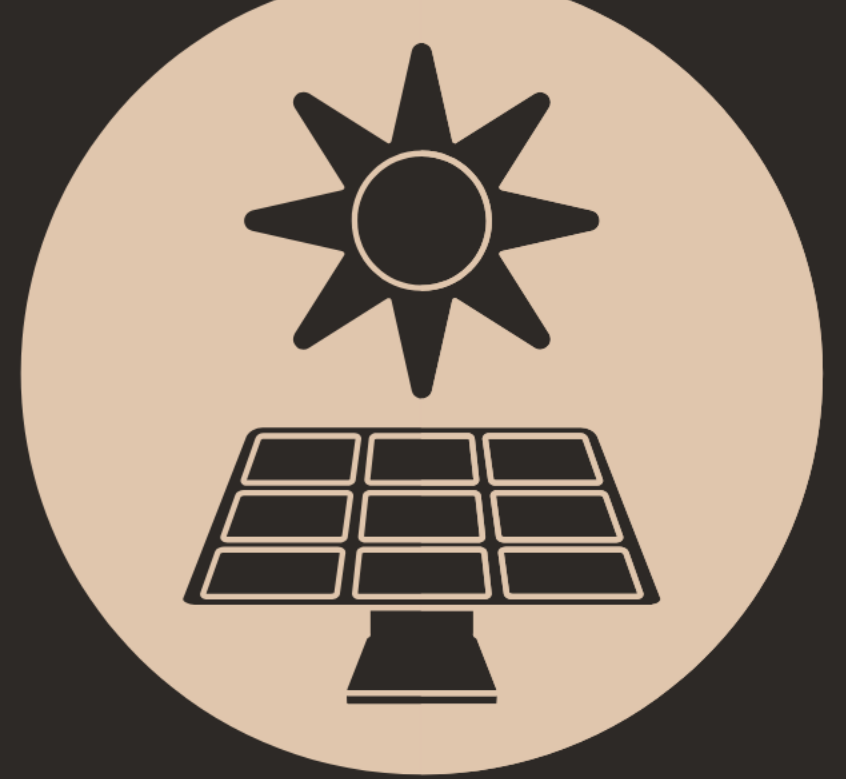
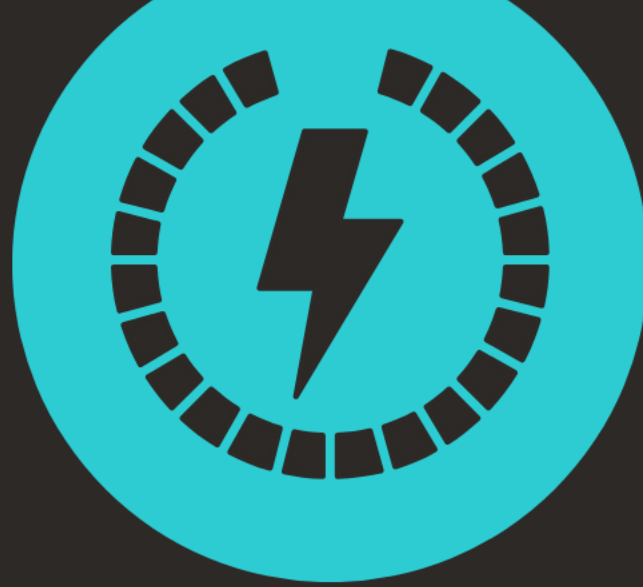


Future of Learning



How students learn from super green schools that use zero energy

Finding “vampires,” angling solar panels, tracking cafeteria waste – all become lessons



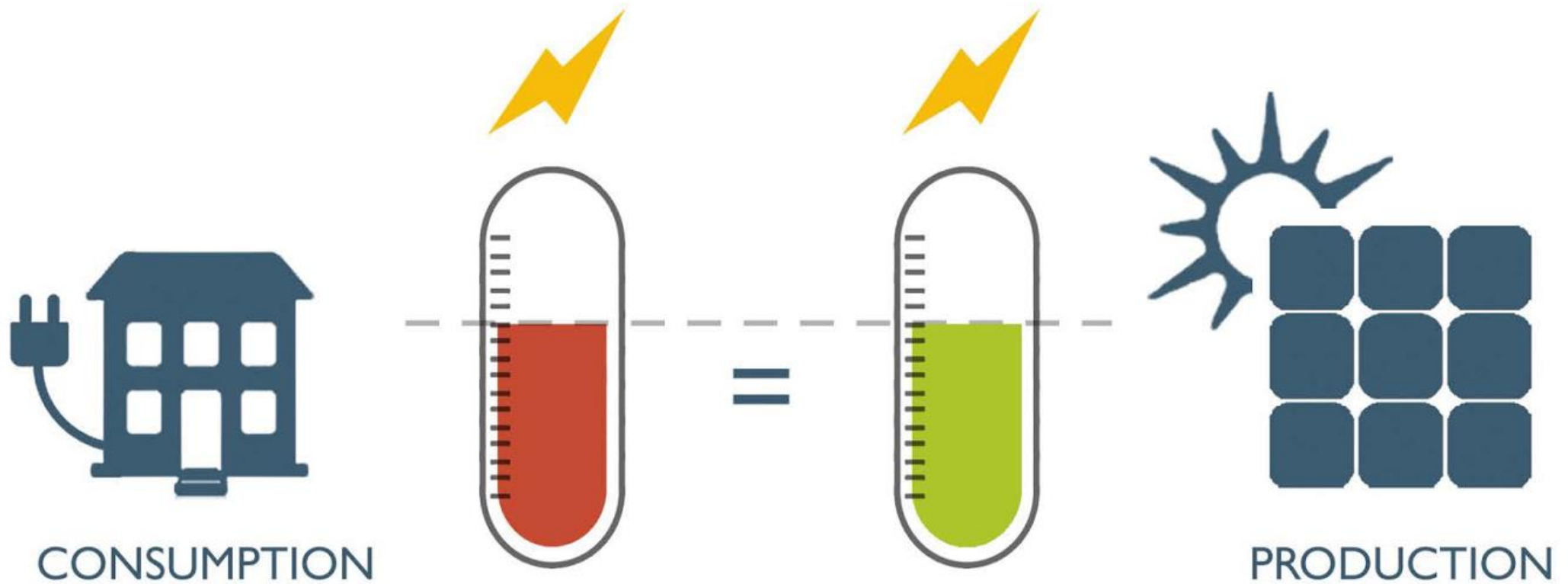
LESSON #5

**EUI: THE LOWER,
THE BETTER**



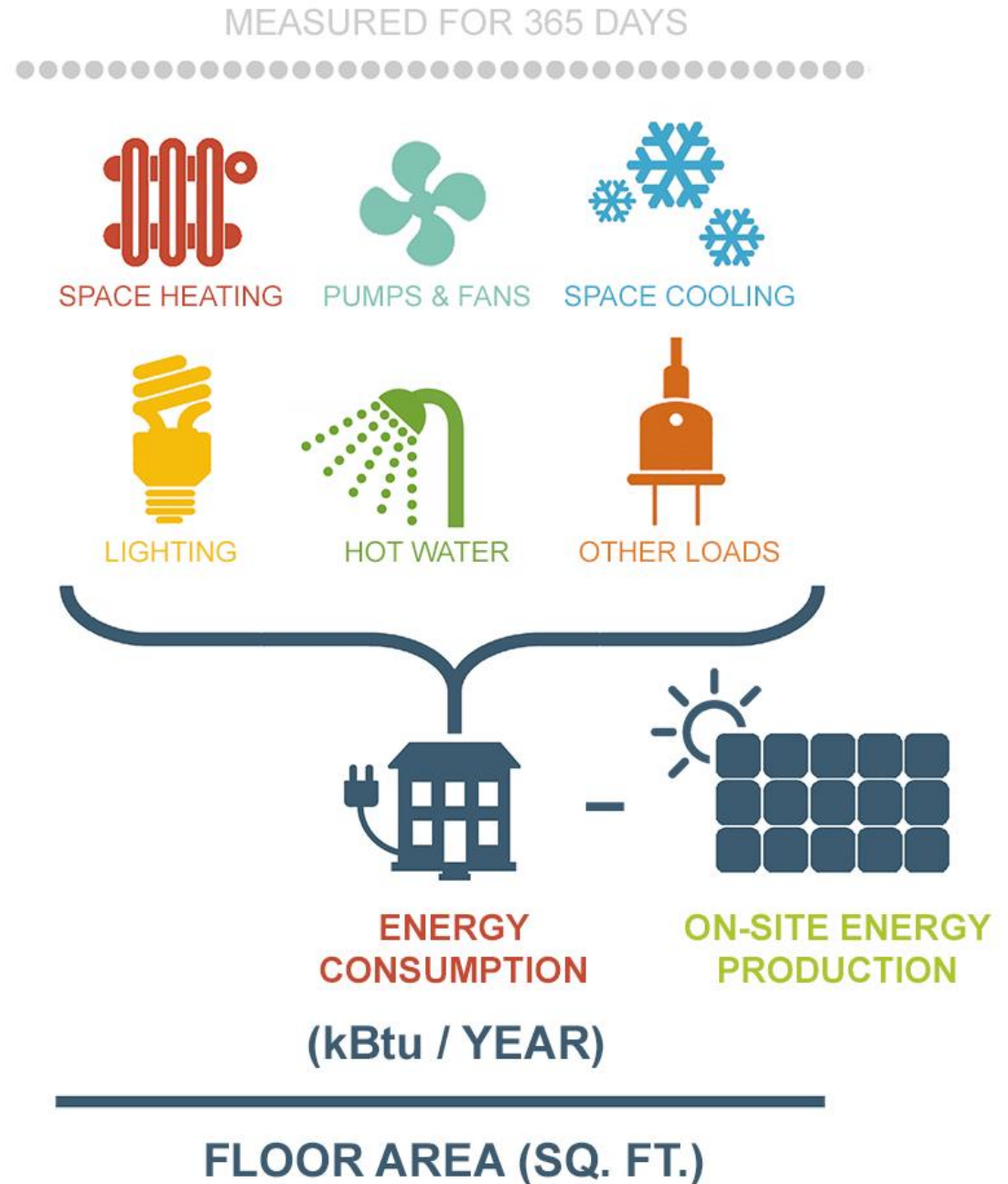
WHAT IS NET ZERO ENERGY?

A net-zero energy building returns as much energy to the power grid as it uses in a year

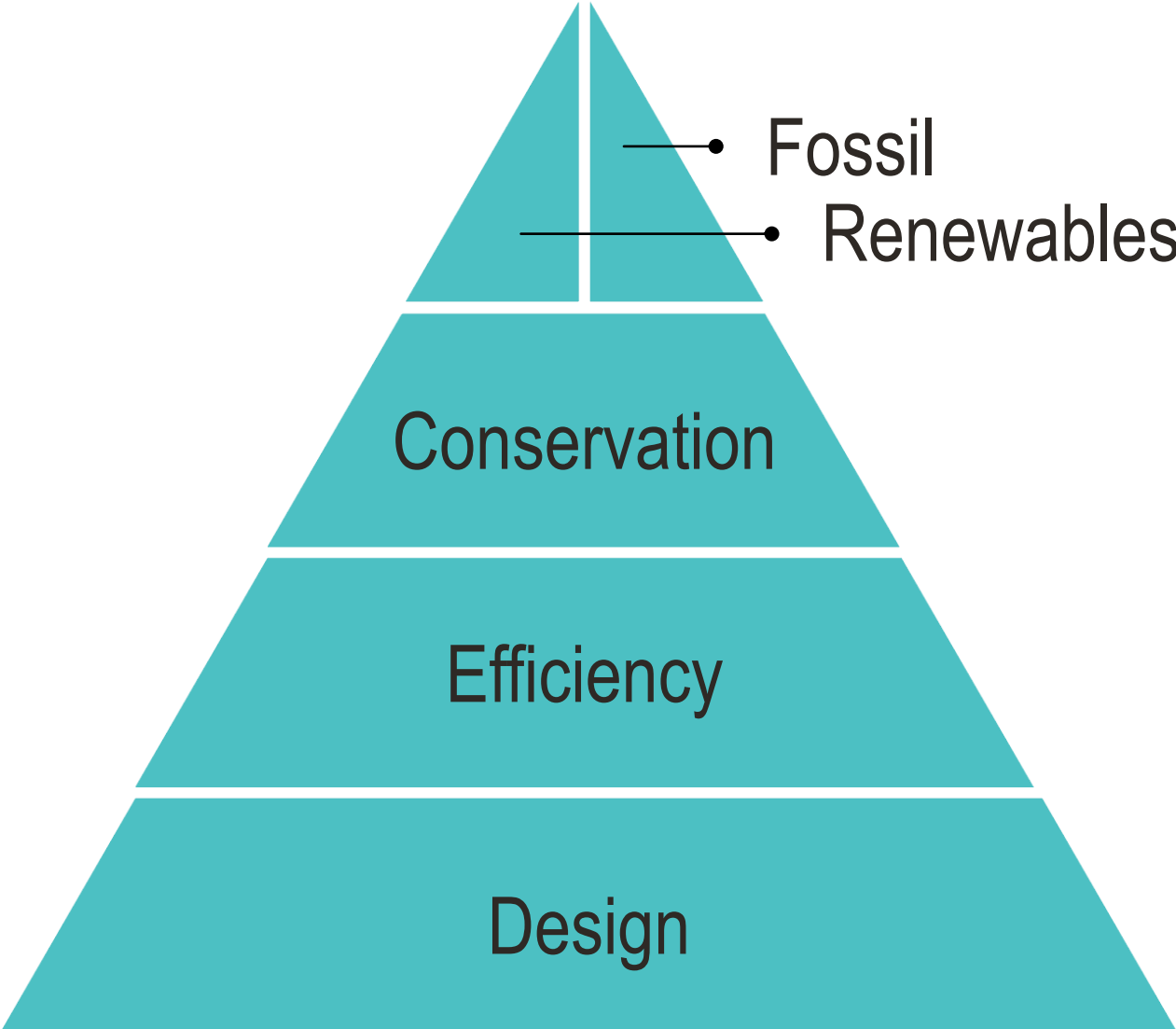


WHAT IS EUI?

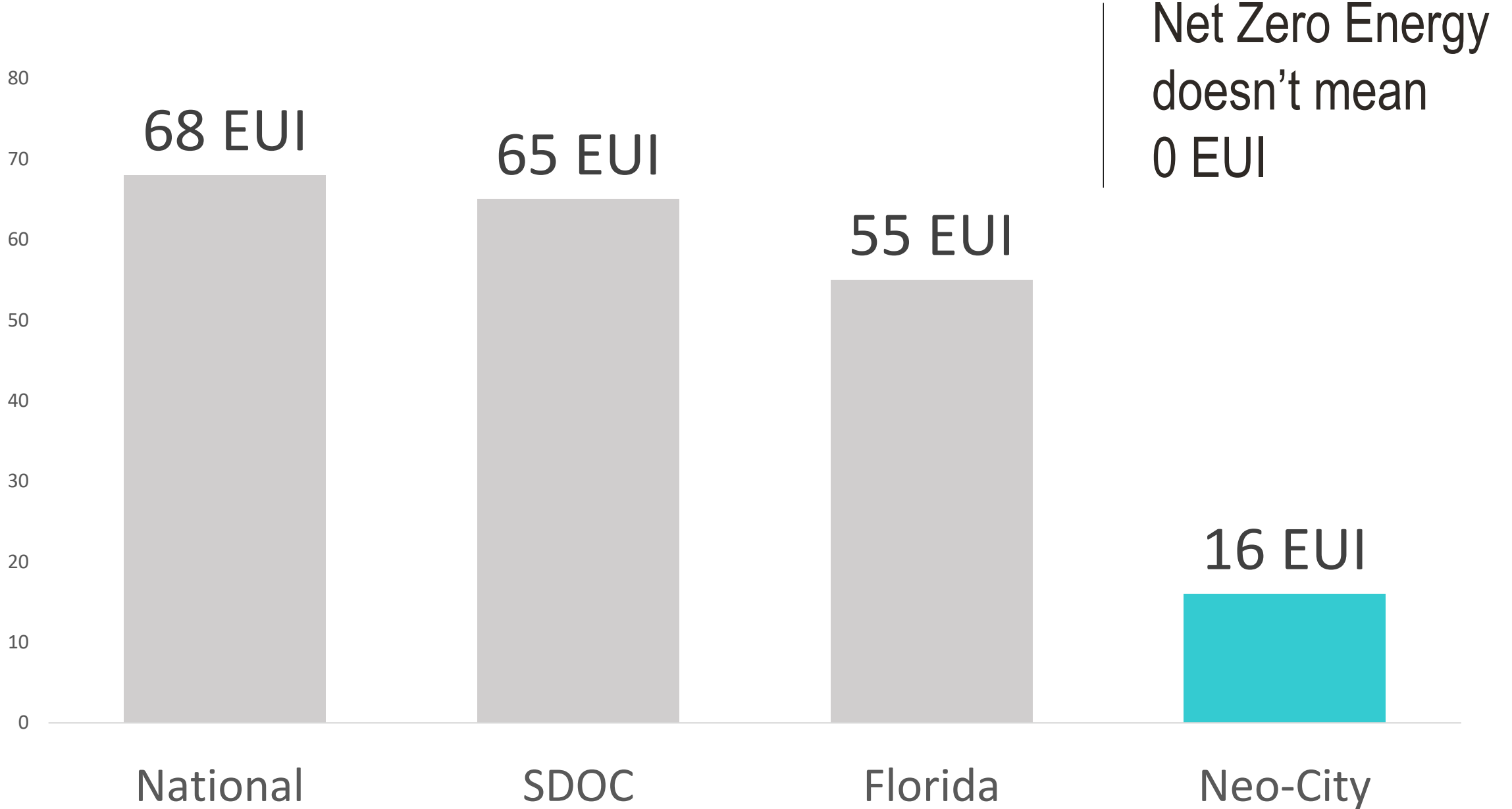
Energy Use Intensity (EUI)
...the lower the number
...the lower the energy use



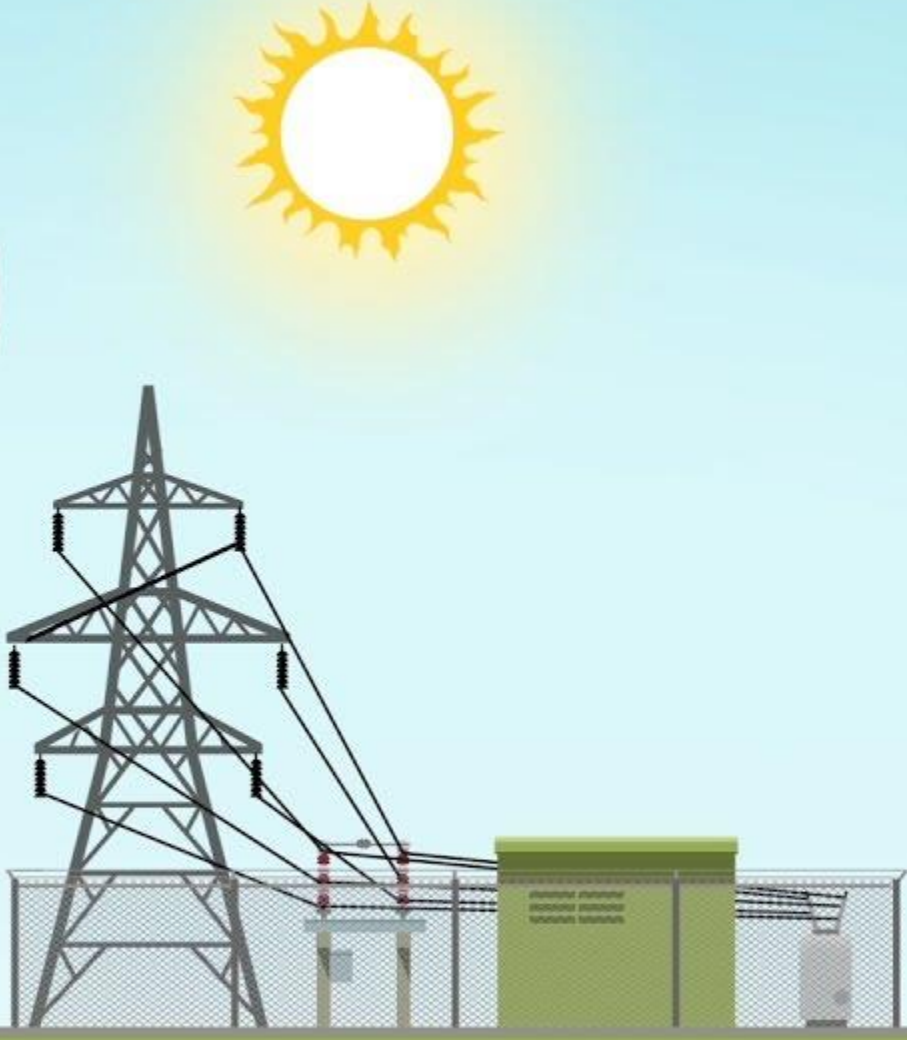
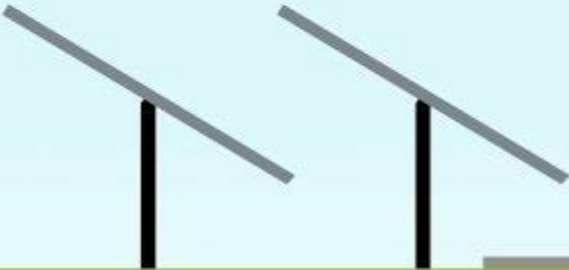
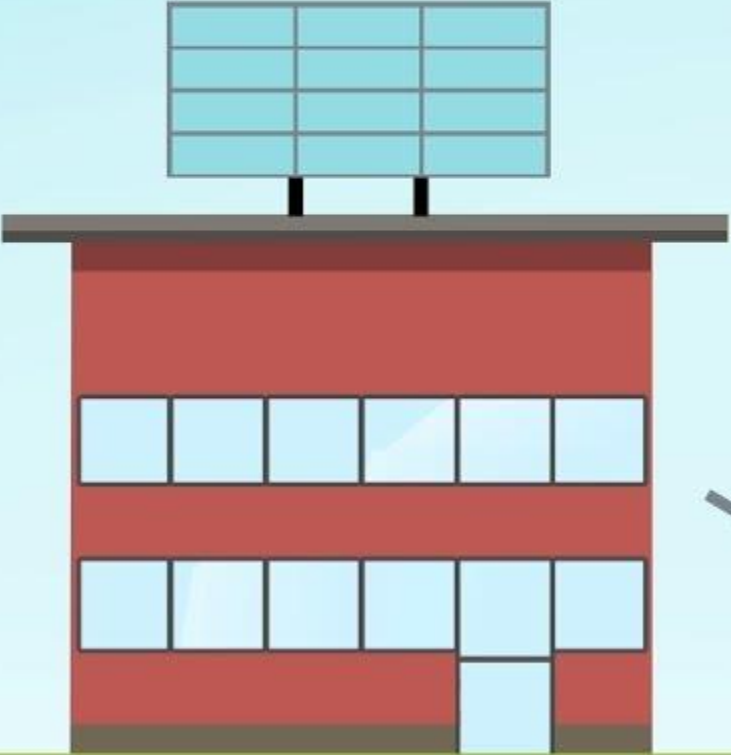
THE ENERGY PYRAMID

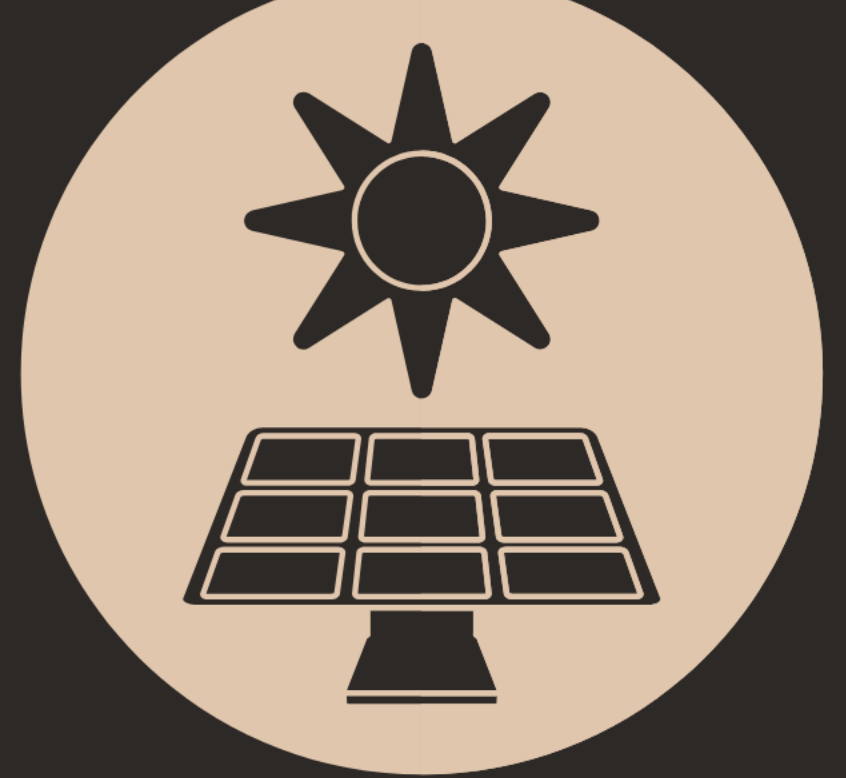
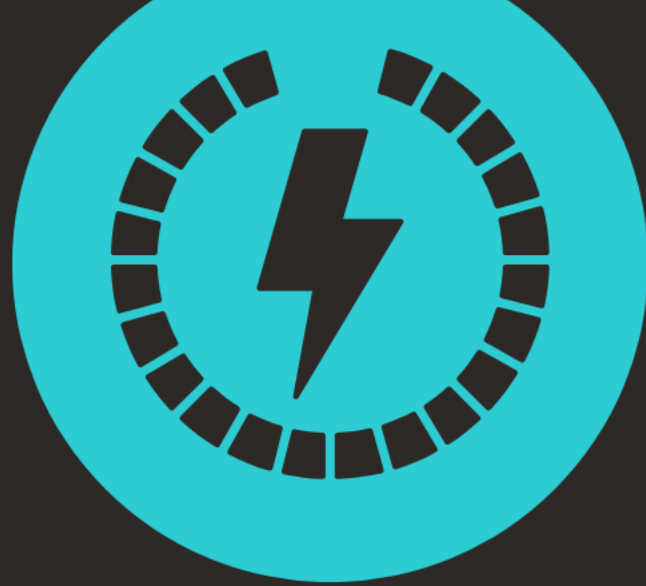


WHAT IS EUI?



Net Zero Energy doesn't mean "off the grid"





LESSON #6

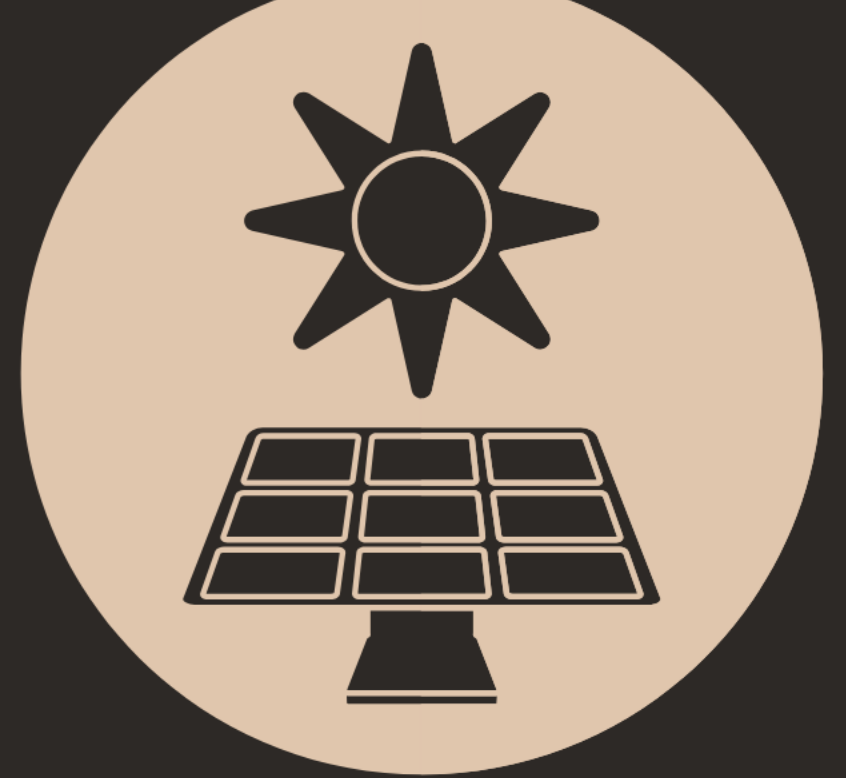
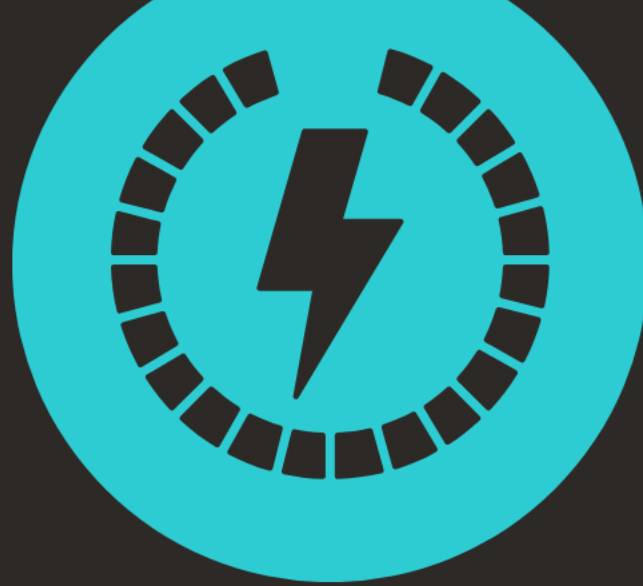
FLORIDA SCHOOLS ARE IDEAL FOR ZERO ENERGY





WHY ZERO ENERGY IS A NO-BRAINER FOR FLORIDA SCHOOLS...

- ✓ Predictable occupancy levels
- ✓ Most demand comes during the day
- ✓ School schedules are optimized for large windows of PV generation
- ✓ There is long-term interest in reducing utility expenses
- ✓ Roof provides an adequate foot-print for solar
- ✓ Redundancy during power outages, hurricanes, etc.
- ✓ School as an integrated STEM teaching tool
- ✓ Schools influence how multiple generations of students view the world
- ✓ Schools are often the center of a community and set an example



LESSON #7

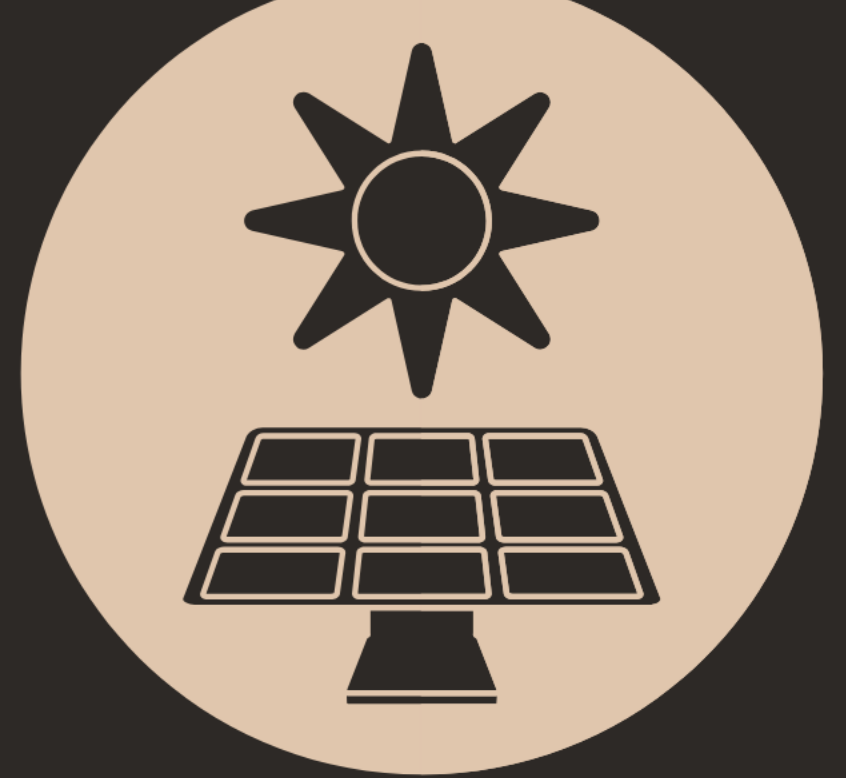
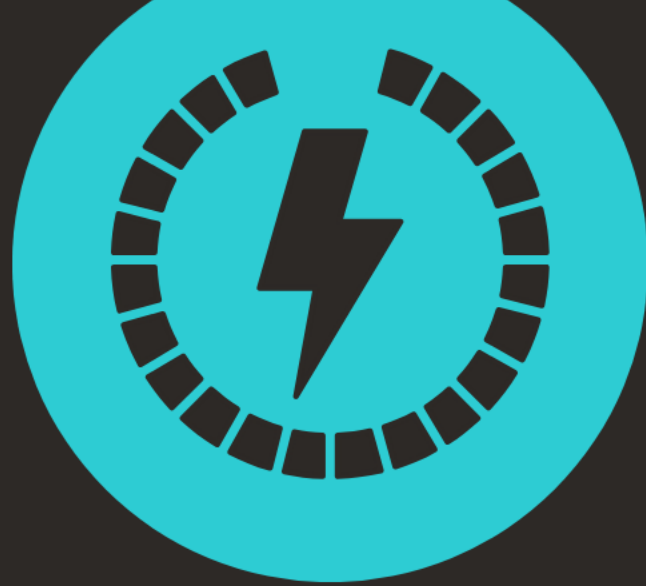
**THE KEY TO
SUCCESS IS AN
INTERNAL CHAMPION**



NEOCITY

FRAMING THE OPPORTUNITY



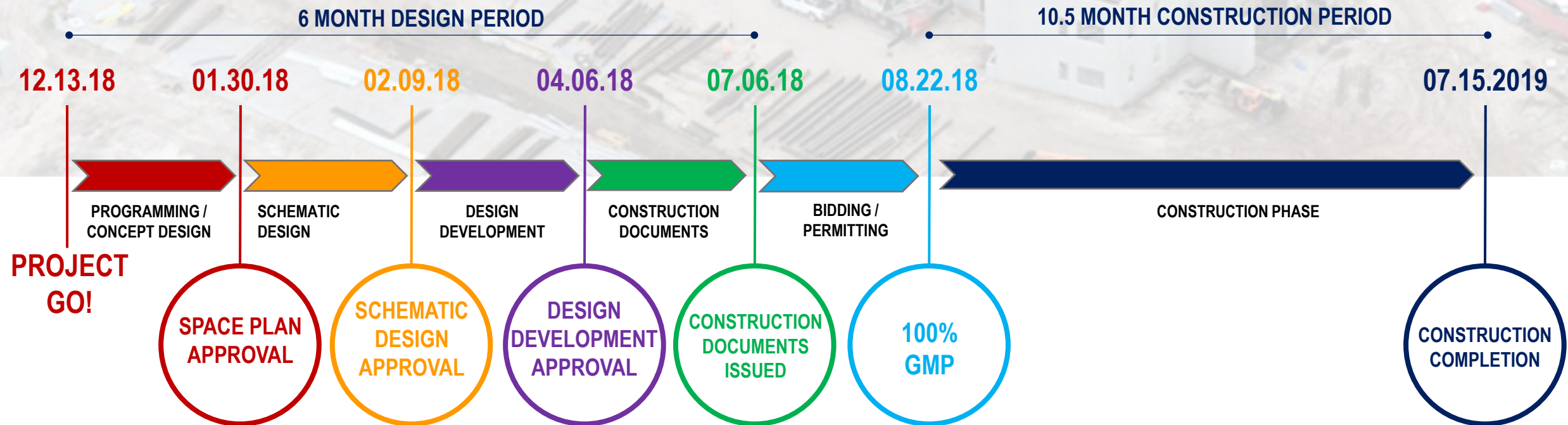


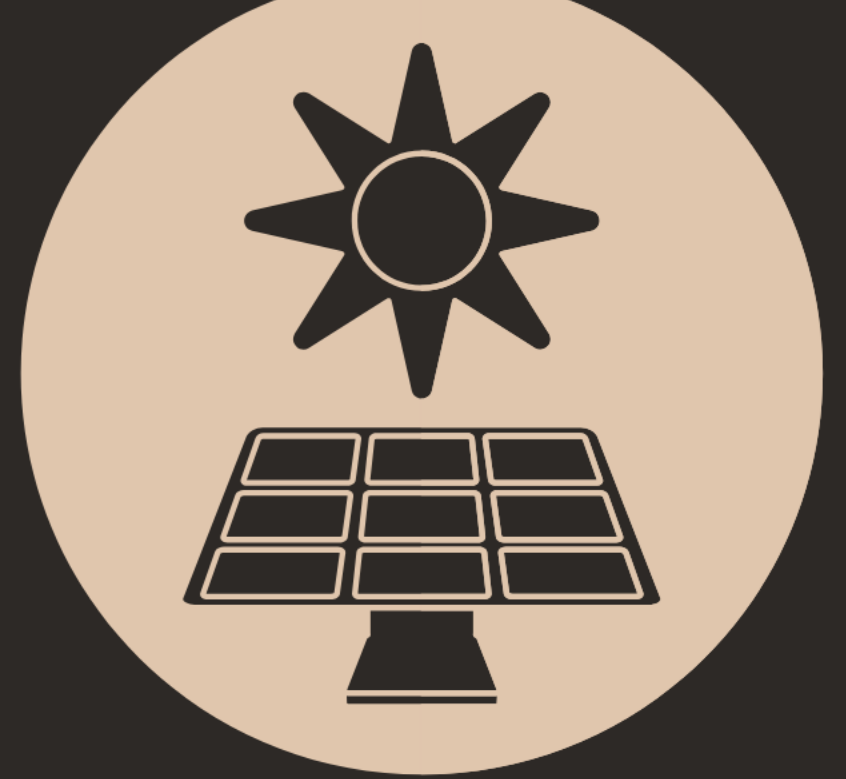
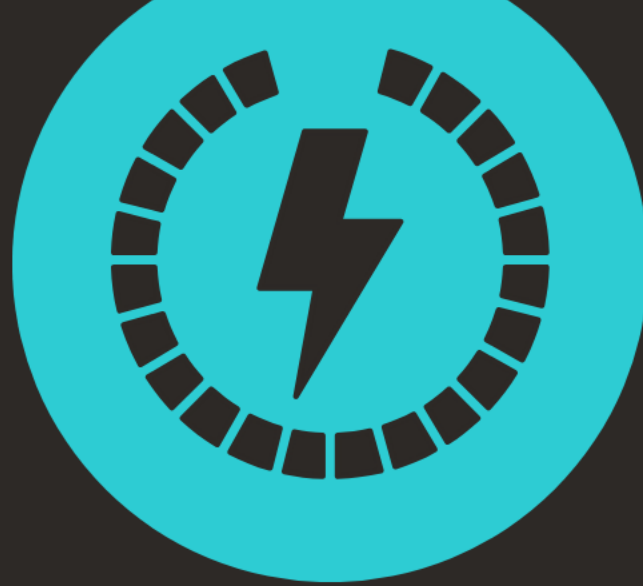
LESSON #8

**IT DOESN'T TAKE
LONGER TO BUILD A
NET ZERO SCHOOL**



SCHEDULE WAS THE CRITICAL PATH





LESSON #9

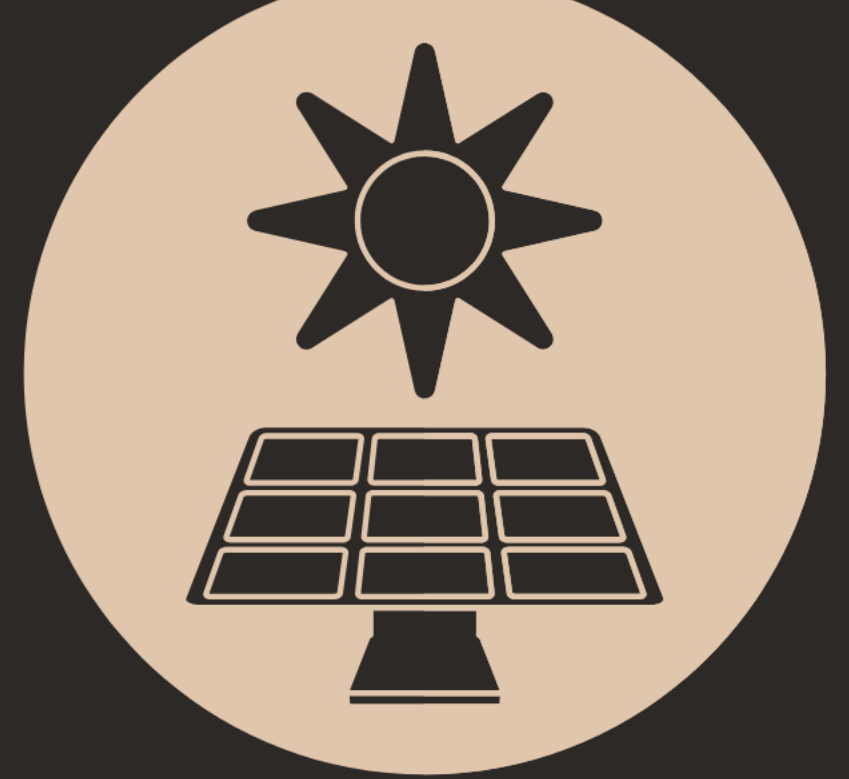
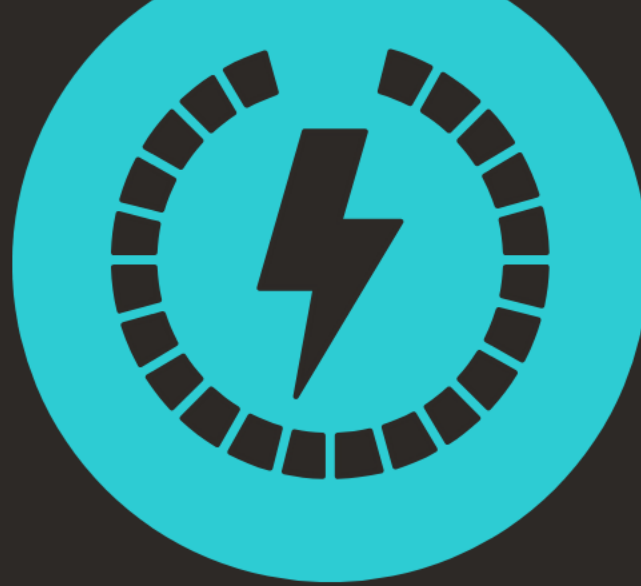
EXPERIENCE IS A REQUIREMENT





Experience is a hard teacher
because she gives the test first,
the lesson afterward.

-VERN LAW



LESSON #10


IT'S NOT JUST ABOUT SOLAR PANELS





Any building
can be zero-
energy...



An aerial photograph of a vast solar farm. The solar panels are arranged in neat, parallel rows that stretch across a large area of land. The panels are tilted at an angle, and their shadows are cast onto the ground. The surrounding landscape includes green fields, a road, and some industrial buildings in the distance. A large black circle is overlaid on the left side of the image, containing white text.

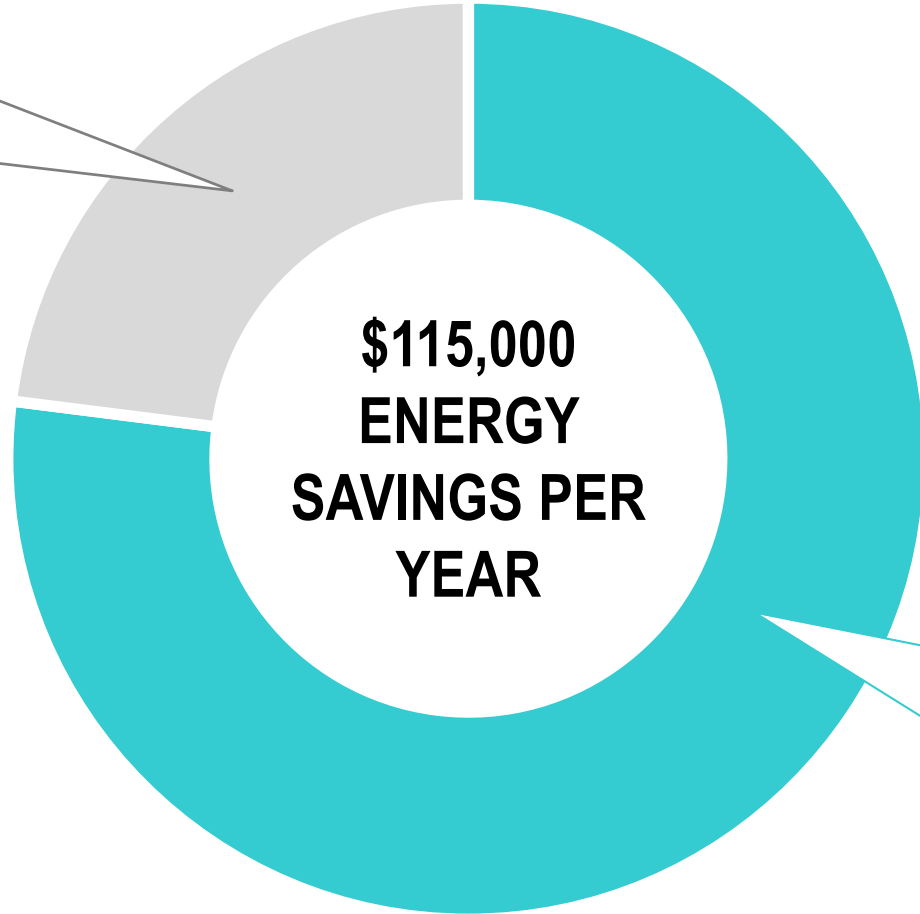
If you have
a solar array
big enough

A close-up photograph of Tom Cruise, looking intensely at the camera while holding a mobile phone to his ear. His mouth is wide open in a shout, and his expression is one of urgency or anger. The background is blurred, showing what appears to be an airport or travel setting with other people and structures.

**NEOCITY ACADEMY WILL SAVE
SDOC OVER \$115,000 A YEAR**

#showmethemoney

23%
Solar Panel
Production



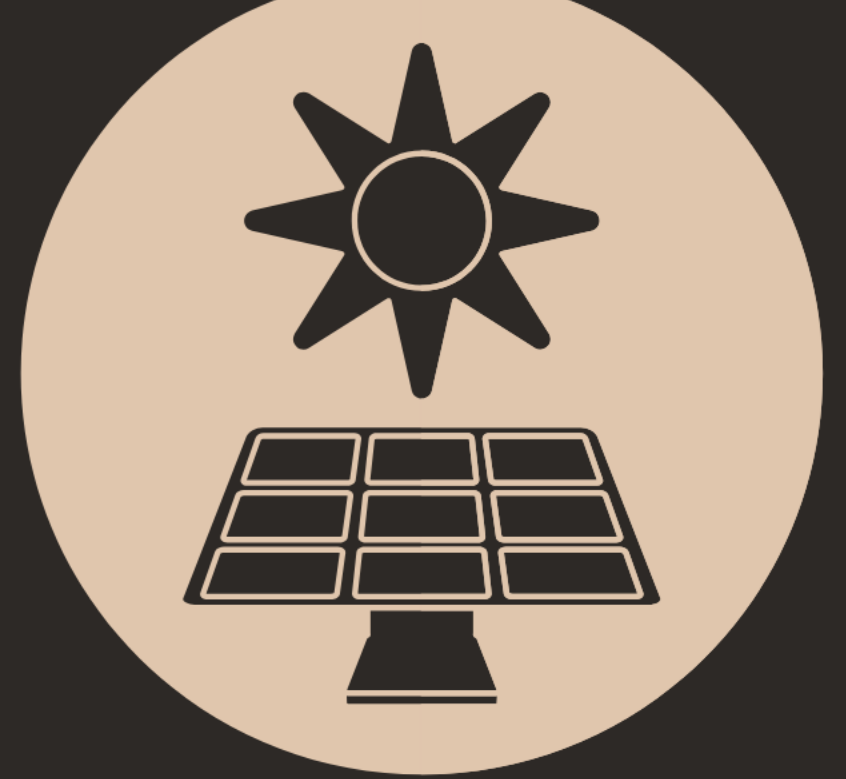
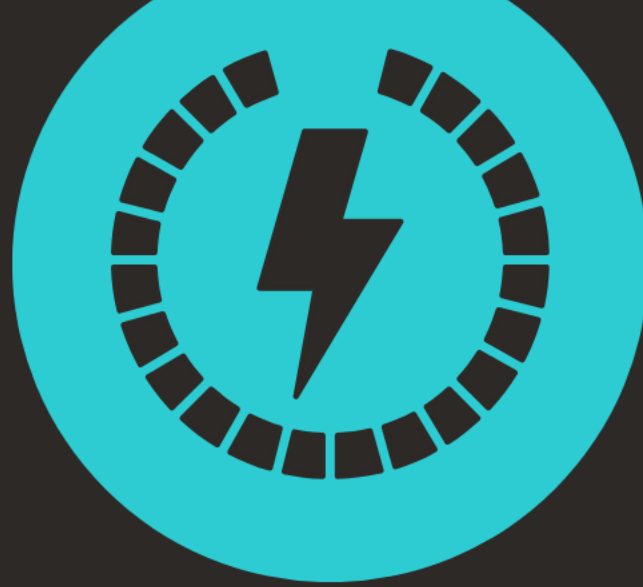
**\$115,000
ENERGY
SAVINGS PER
YEAR**

**Less than $\frac{1}{4}$ of
those savings are
from solar panel
production**

77%
High-performance
Building Design

One rule remains constant for new construction and retrofits:


**REDUCE DEMAND FIRST,
SUPPLY SECOND**




LESSON #11

**EVERY PROJECT IS
UNIQUE**

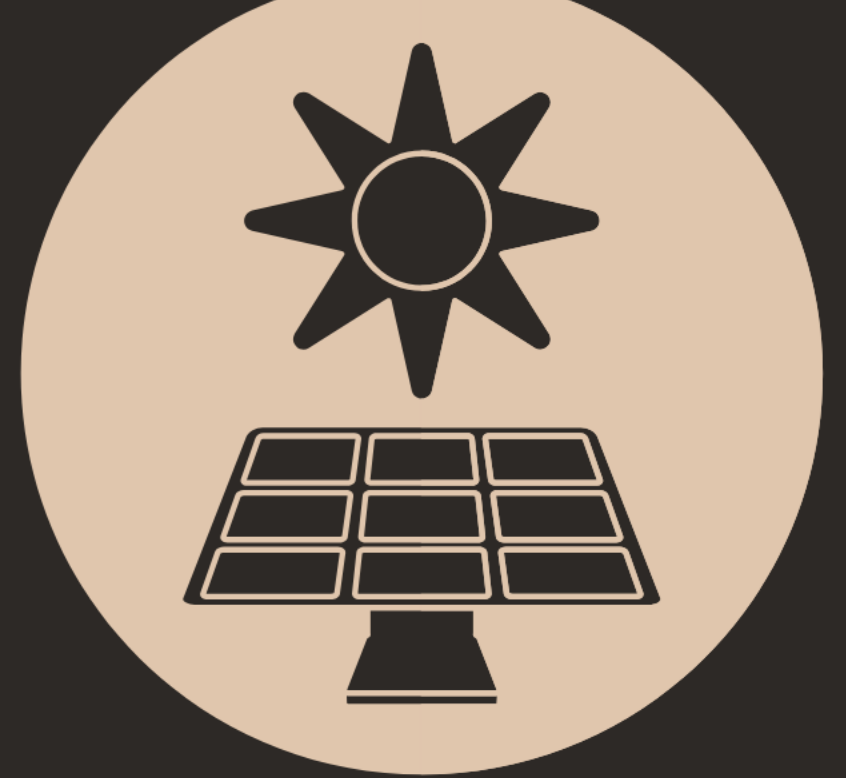
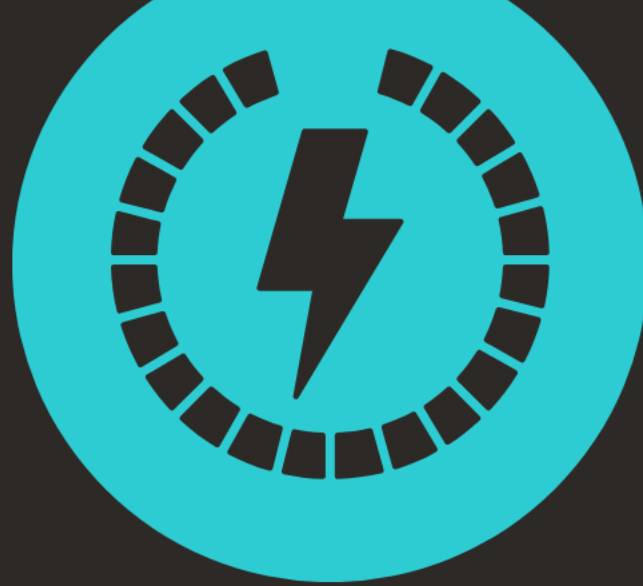




No two sites,
buildings or
renovations are
the same

A photograph of a railway station at night. The tracks are illuminated with a warm, golden light, creating a complex pattern of lines that recede into the distance. A train is visible in the center, with its headlights glowing brightly. The background shows the silhouettes of railway infrastructure, including masts and overhead lines, against a dark sky. The overall atmosphere is industrial and dramatic.

There are many
different paths to
achieve high-
performance



LESSON #12

**DETERMINE PROJECT
GOALS EARLY ON &
LIVE BY THEM**

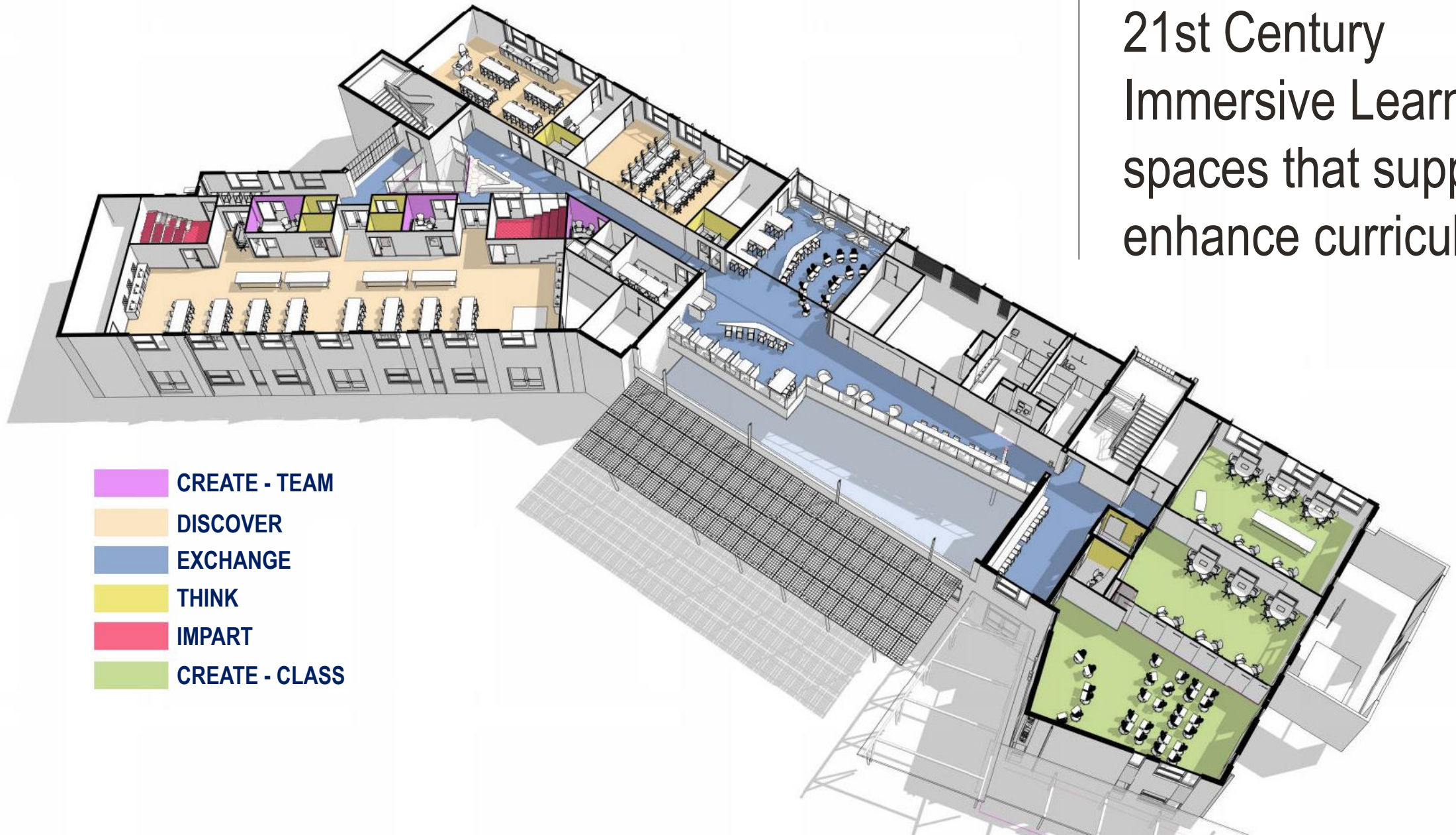


DESIGN DRIVERS

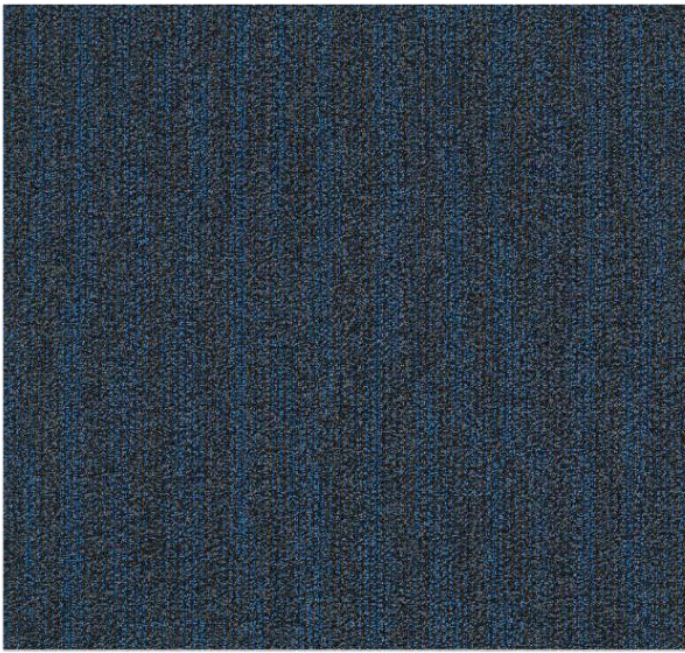
1. Immersive Learning Environment (Collaboration + 21st C Skills + Active Learning)
2. High Performance Building Facility
3. Flexible
4. Adaptable
5. Efficient & Effective
6. Microcosm of the BRIDG (Ideas + Industry) – “Simulate the Experience”
7. Strong Connection to NEOCITY Partners + UCF
8. Transparency: “See Learning Happening”
9. Colorful & Energetic Environment
10. EUI 20
11. FIRST Net Zero Energy School in Florida
12. Inspire Learning at a Higher Level
13. Create a Culture of Innovation, Creativity + Problem Solving
14. WELL Inspired Learning Environment
15. Use Building as a Teaching Tool

Every Child, Every Chance

21st Century
Immersive Learning
spaces that support &
enhance curriculum



- CREATE - TEAM
- DISCOVER
- EXCHANGE
- THINK
- IMPART
- CREATE - CLASS



WALK-OFF MAT



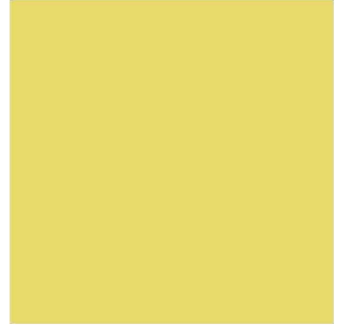
VINYL FLOOR TILE



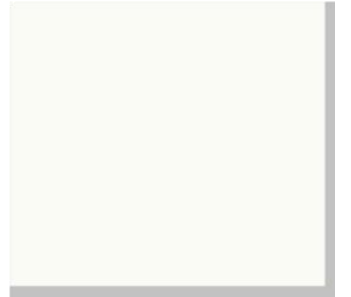
VINYL FLOOR TILE



ACCENT PAINT



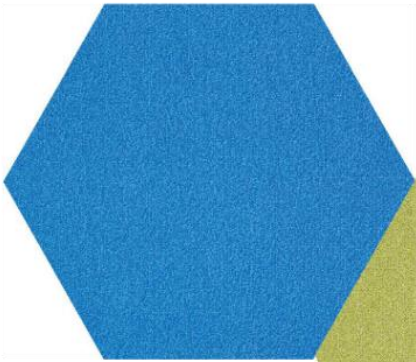
ACCENT PAINT



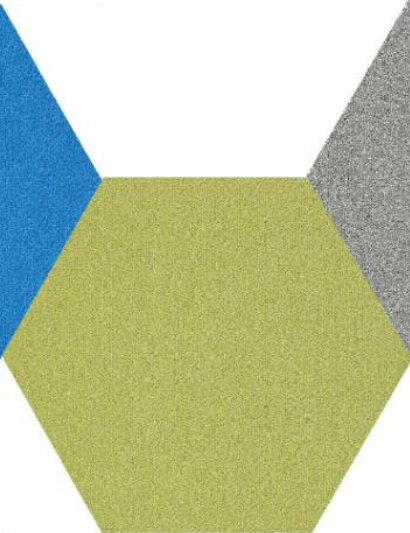
GENERAL PAINT



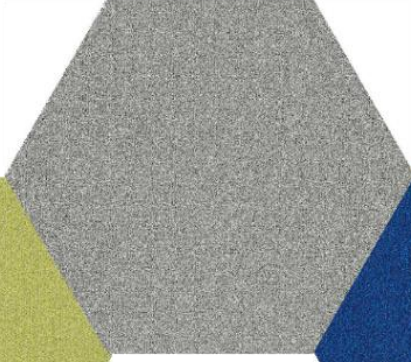
ACCENT PAINT



ACCENT CARPET



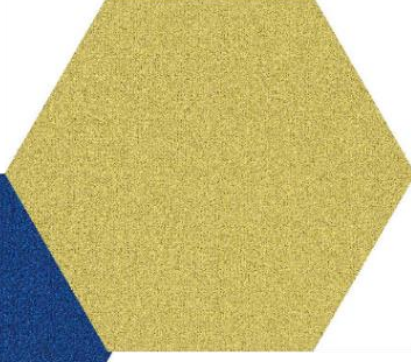
ACCENT CARPET



ACCENT CARPET



ACCENT CARPET



ACCENT CARPET

MATERIAL PALETTE: PUBLIC SPACES



ADVANCED
ENGINEERING

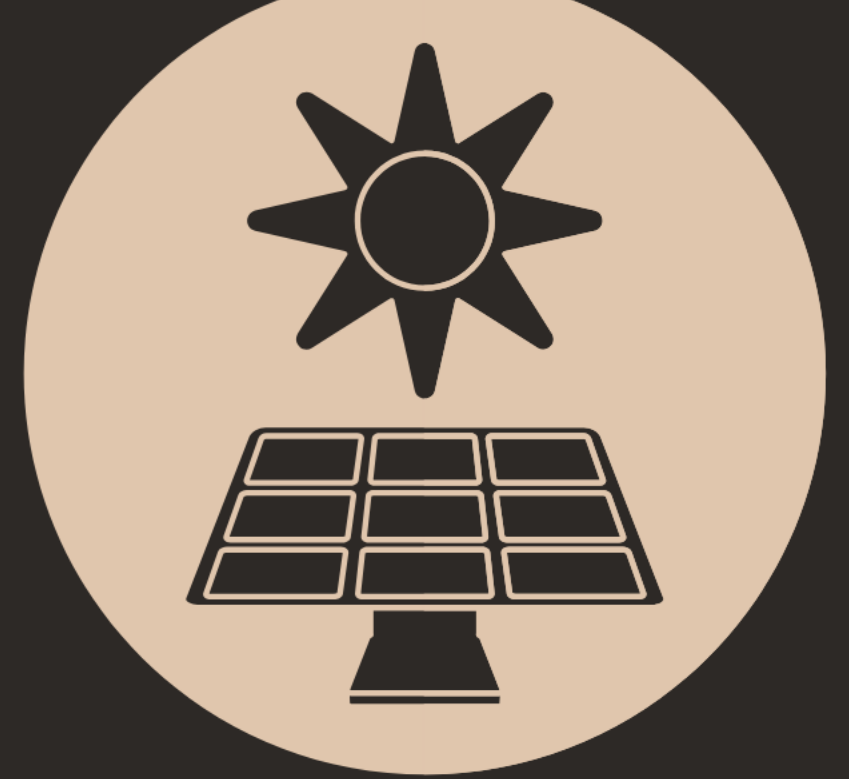
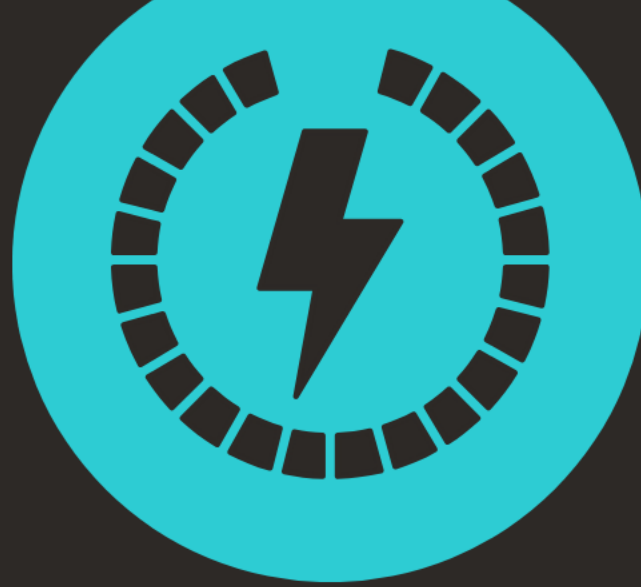
#CREATEJOYFULSPACES

#FLEXIBLEANDFUN





#IMMERSIVELEARNING



LESSON #13

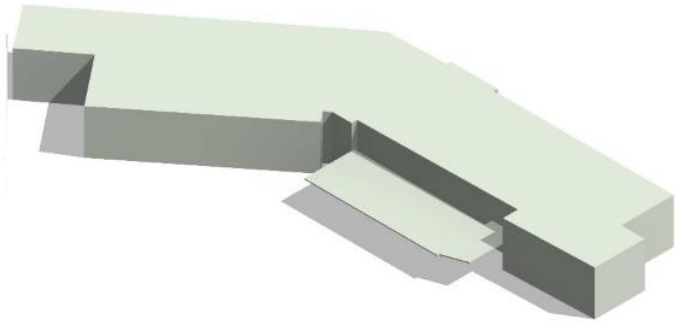
**DATA MUST
GUIDE YOUR
DECISIONS**



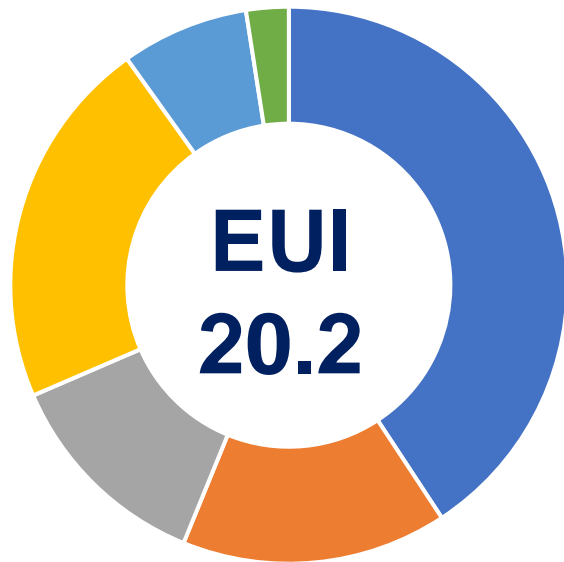
Due to finite project resources, it's imperative to utilize energy model data to make the best trade-off decisions



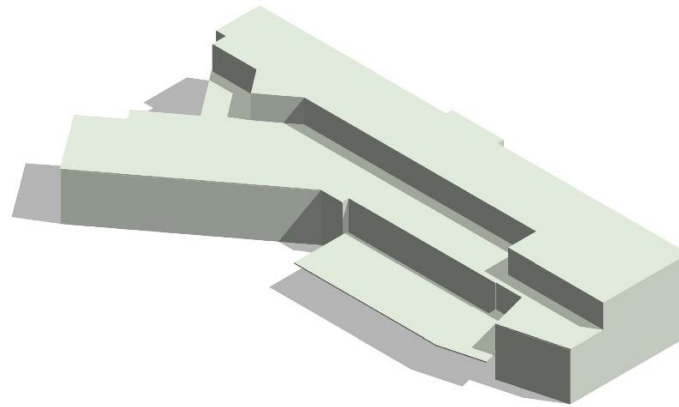
#DATAISGOLD



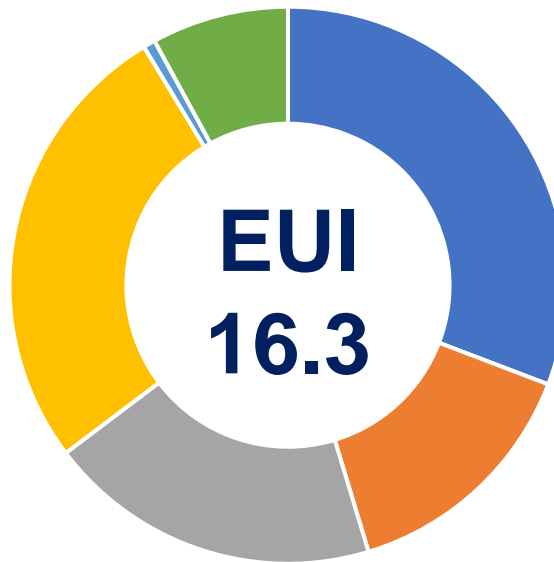
STUDY 01



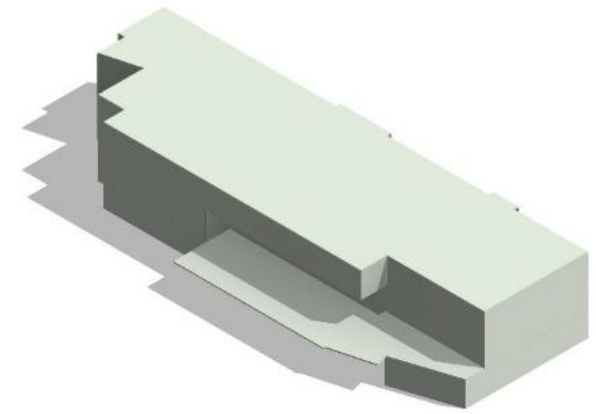
- HVAC
- PLUG LOADS
- PUMPS
- LIGHTING
- ENVELOPE
- FANS



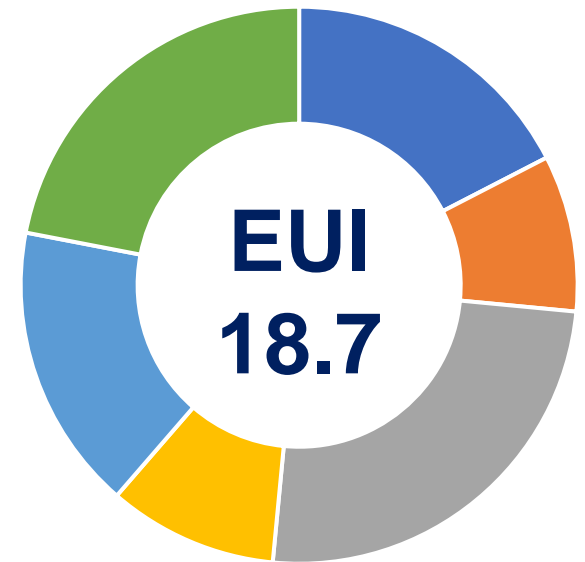
STUDY 02



- HVAC
- PLUG LOADS
- PUMPS
- LIGHTING
- ENVELOPE
- FANS



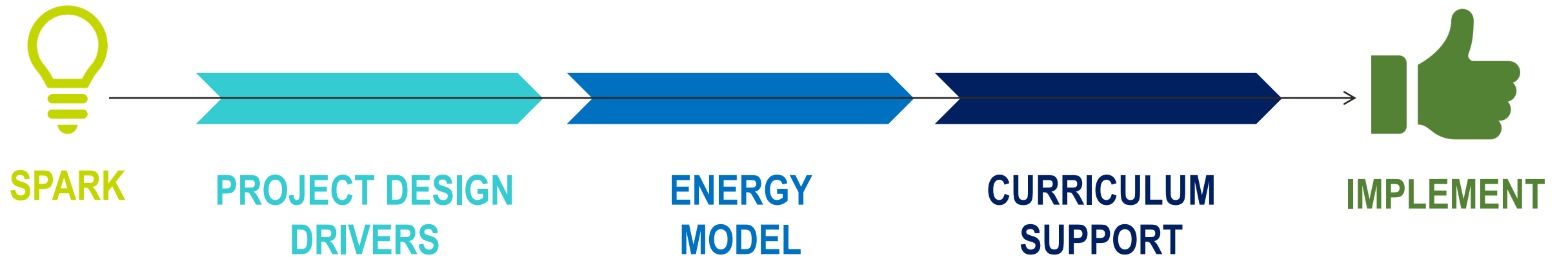
STUDY 03



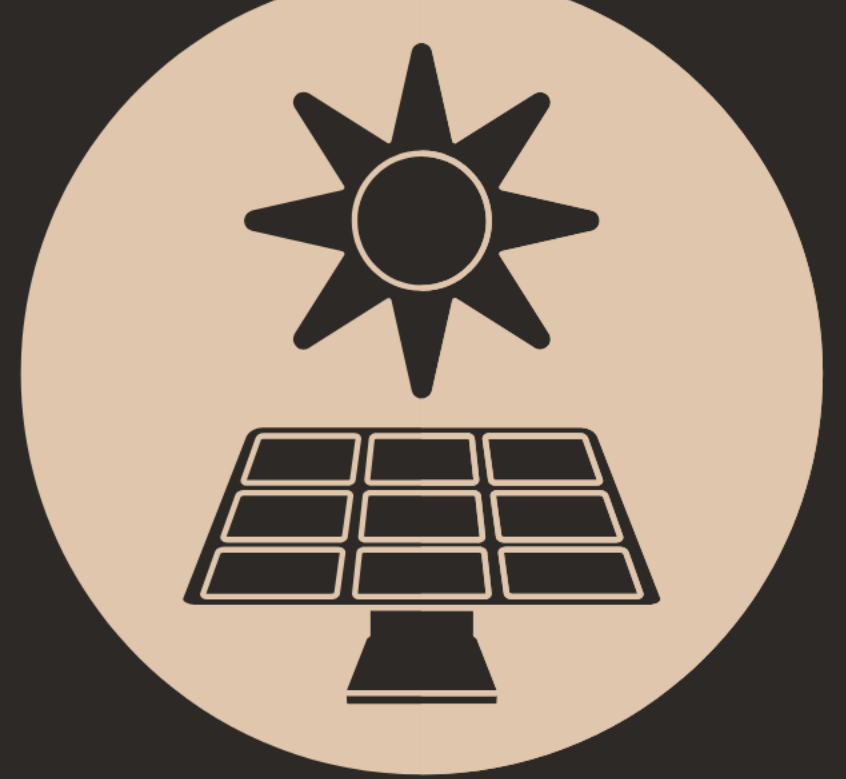
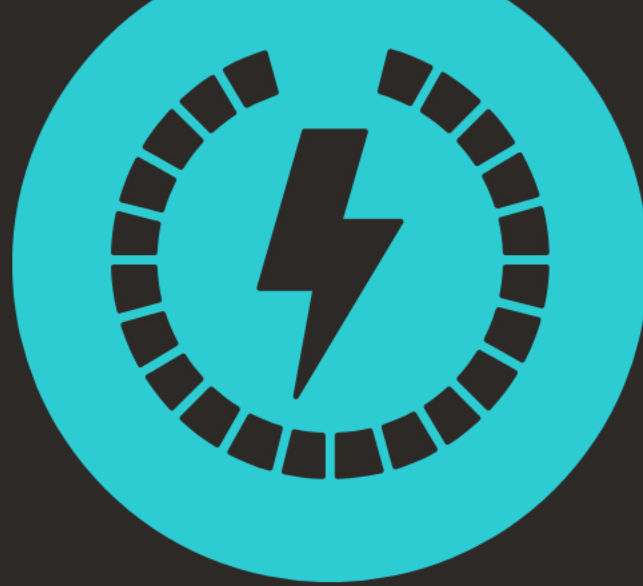
- HVAC
- PLUG LOADS
- PUMPS
- LIGHTING
- ENVELOPE
- FANS

#DATAISGOLD

DECISION MAKING STEPS



#DATAISGOLD



LESSON #14

**IT'S COMPLEX, IT'S
NOT COMPLICATED**





DISTRIBUTED HEAT PUMPS WITH A DEDICATED OUTDOOR AIR SYSTEM



A major portion of a building's energy loss is by air leakage through the building's skin

MINIMIZE AIR LEAKAGE >>

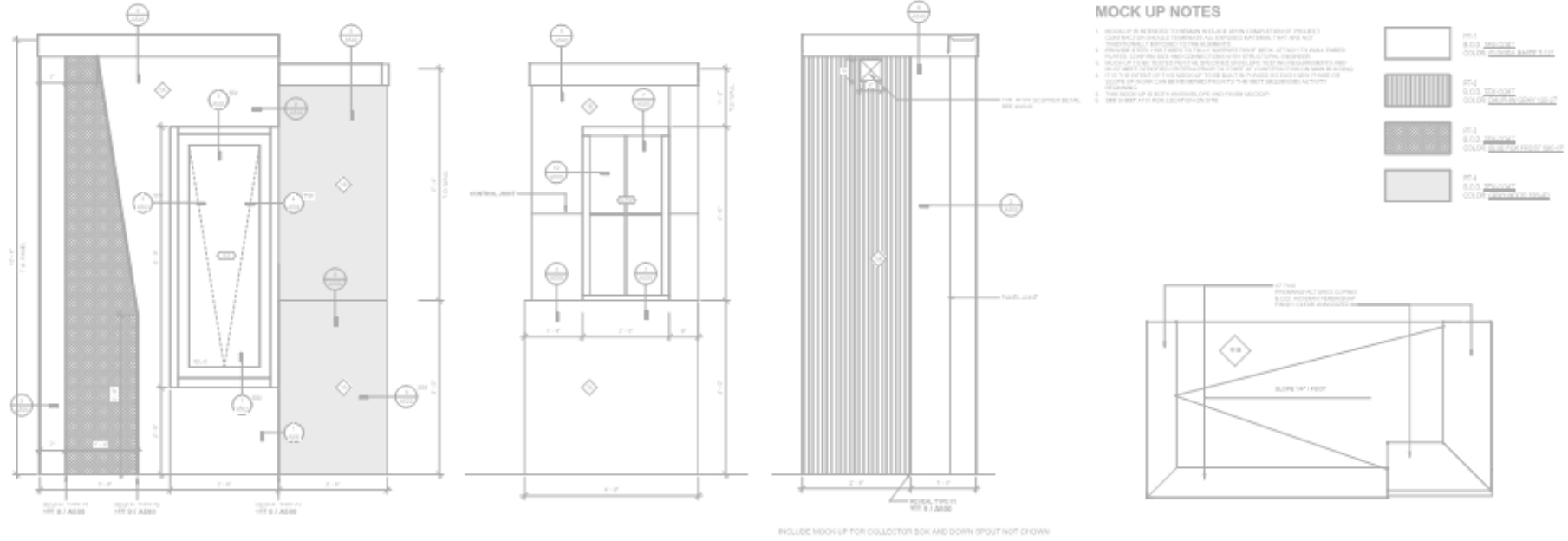
RIGHT SIZE MECH. SYSTEM >>

REDUCE ENERGY FOOTPRINT

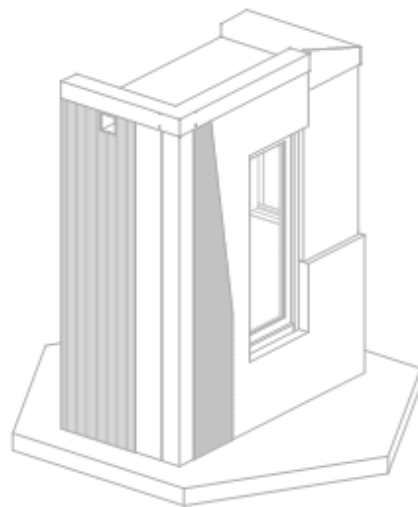
“I felt exactly how you would feel if you were getting ready to launch and knew you were sitting on top of 2 million parts — all built by the lowest bidder on a government contract.”

- John Glenn

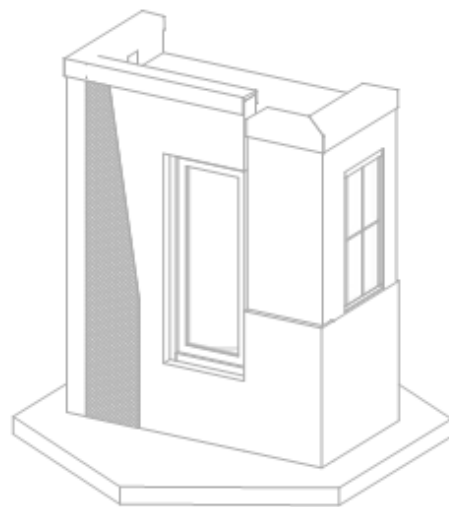




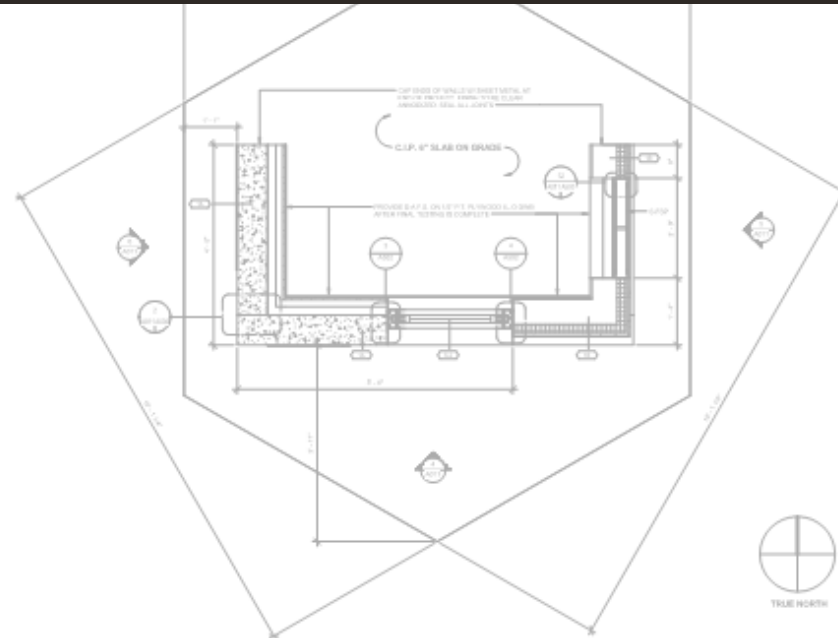
MOCK-UPS ARE NON-NEGOTIABLE



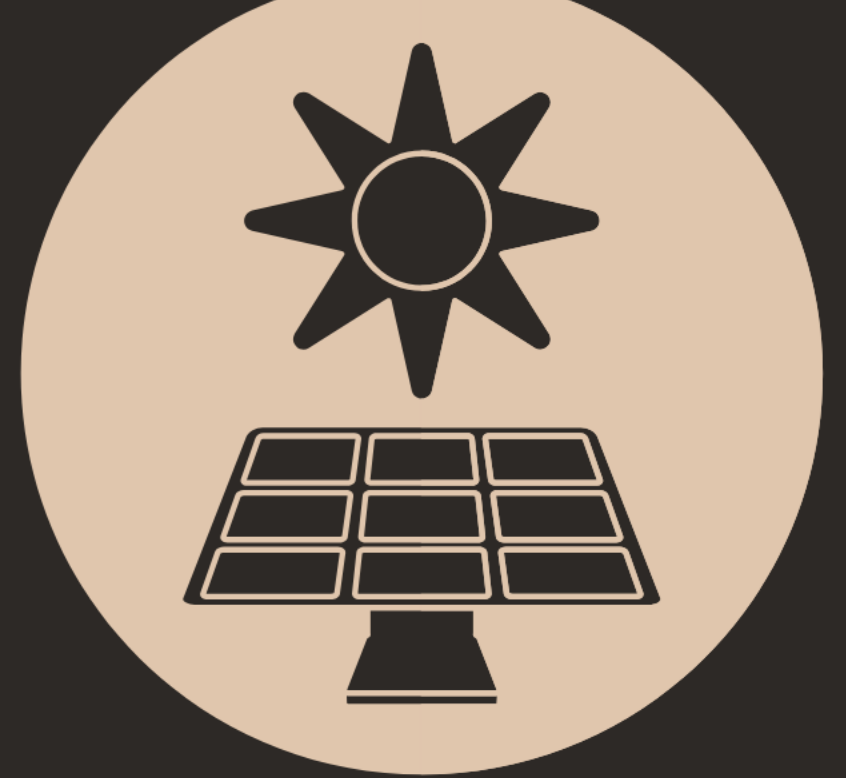
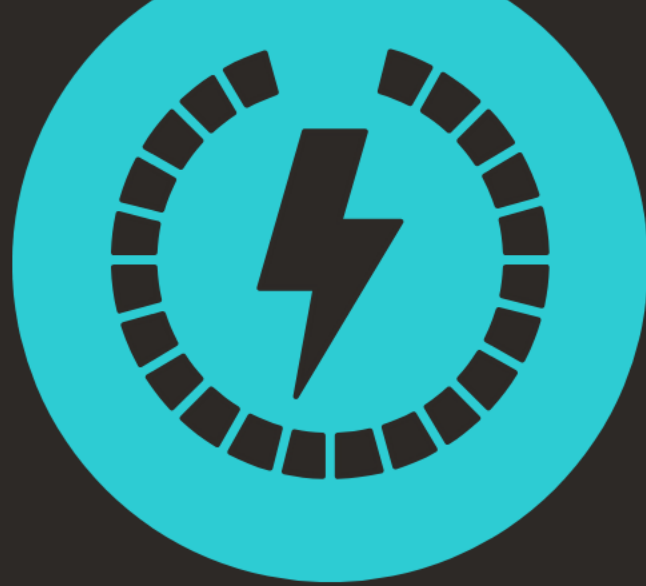
MOCK-UP AXONOMETRIC VIEW 02



MOCK-UP AXONOMETRIC VIEW 01



MOCK-UP PLAN



LESSON #15

**DESIGN IS ONLY
50% OF THE
PROCESS**



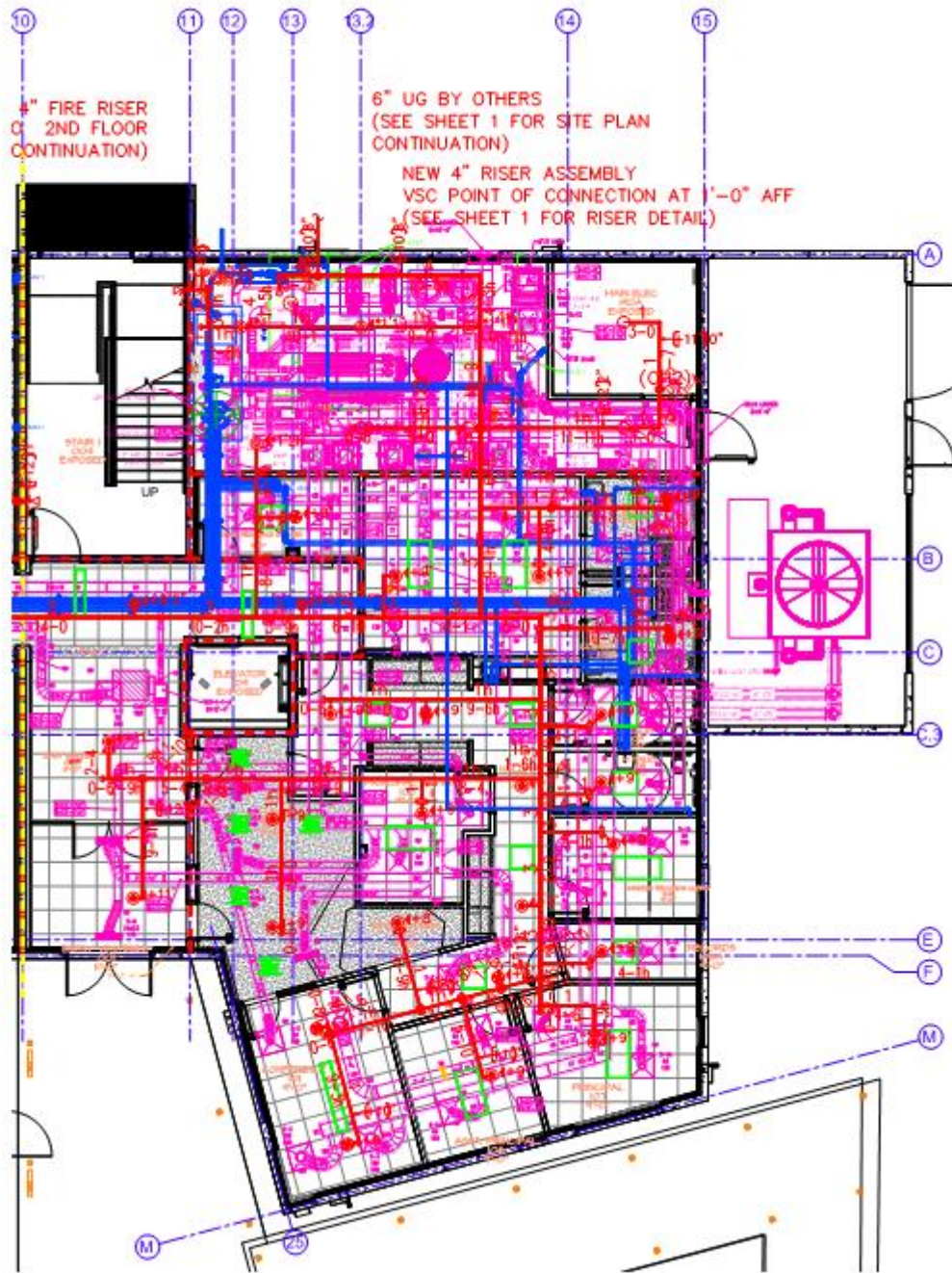
An illustration showing four hands in dark blue suits reaching towards a central red puzzle piece. The puzzle piece is a 2x2 grid of four red pieces. The hands are positioned at the top, bottom, left, and right, with their fingers pointing towards the center. The background is a light blue gradient. A yellow circle is overlaid on the right side of the image, containing text.

Setting the
GMP begins at the
concept design
phase



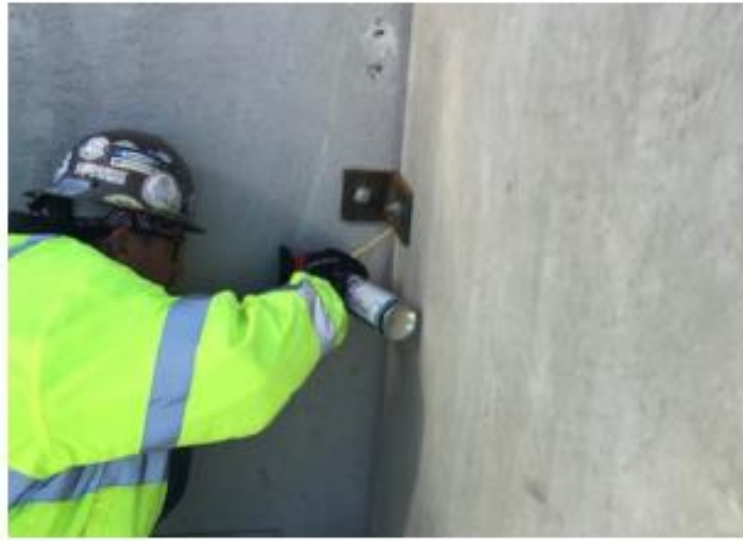
IT'S COMPLEX, IT'S NOT COMPLICATED

WILL IT HIT : WILL IT FIT





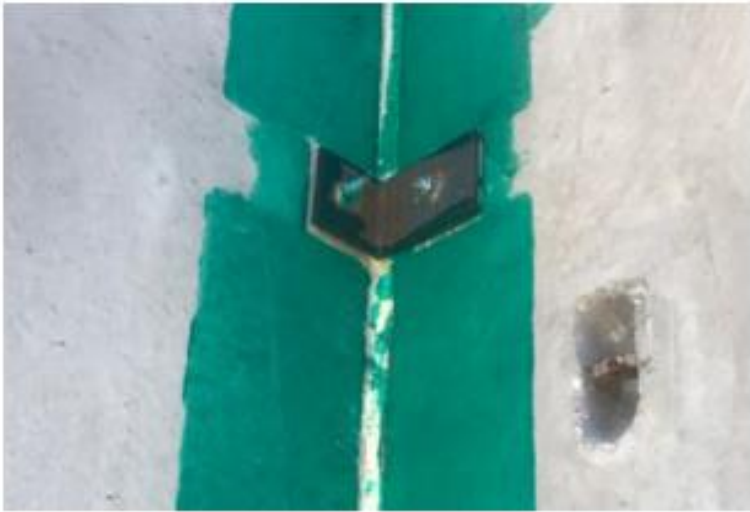
STEP 1: INSTALL BACKER ROD IN JOINT



STEP 2: INSTALL SPRAY FOAM INSULATION IN JOINT



STEP 3: TRIM SPRAY FOAM FLUSH WITH WALL



STEP 4: APPLY TRANSITION PRIMER TO BOTH SIDES OF JOINT



STEP 5: APPLY TRANSITION MEMBRANE AND ADHERE WITH WEIGHTED ROLLER



STEP 6: SEAL EDGES OF MEMBRANE WITH BUTYL SEALANT

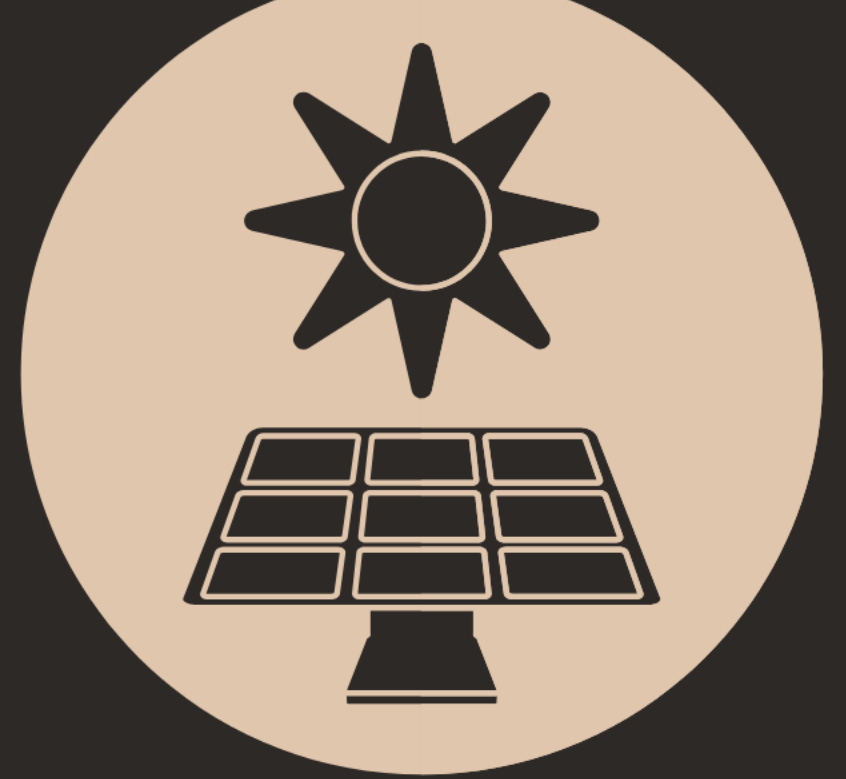
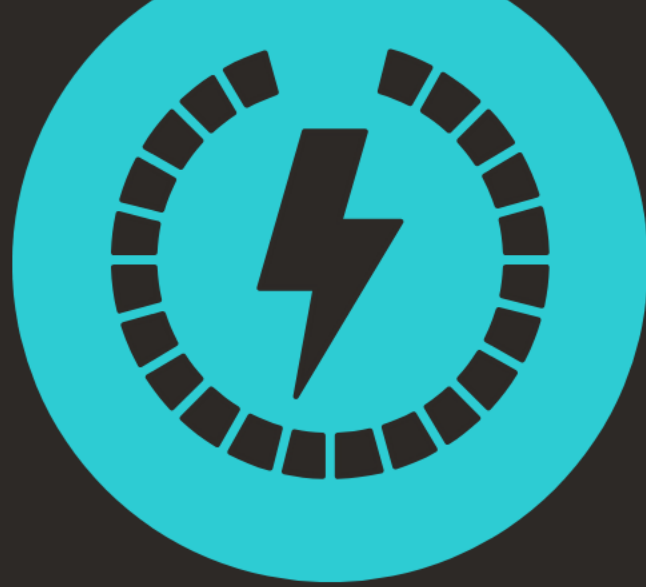
***Have no fear
of perfection
- you'll never
reach it.***

Salvador Dali



TRAINING & CONSISTENCY





LESSON #16

TRUST BUT VERIFY



QA/QC is everyone's job but it starts at the sub contractor level

Summary of Envelope Assembly

		<u>TC</u>	<u>GC</u>
<u>Step #</u>	<u>Tilt Panel Joint Assembly</u>	<u>SIGN OFF</u>	
	BEGINNING AT EXTERIOR SIDE OF THE JOINT		
1	Scrape Joint Clean.		
2	Install backer rod from the exterior 3" deep into the joint.		
3	Install the SikaFlex following the backer rod 3/4" depth in the joint.		
4	Install the LDF with a 2" depth in the joint.		
5	Install another back rod on the exterior.		
6	Install the Sikaflex.		
	ON THE INTERIOR SIDE OF THE JOINT		
7	Install LDF along the backer rod.		
8	Let LDF cure and expand.		
9	Trim the LDF flush with the face of the tilt panel.		
10	Prime tilt panel and LDF at the joint.		
11	Apply Blueskin at the joint covering LDF and primer.		
12	Roll and compress Blueskin with weighted roller		
13	Seal edges of the tape on the tilt panel with Butyl Sealant.		

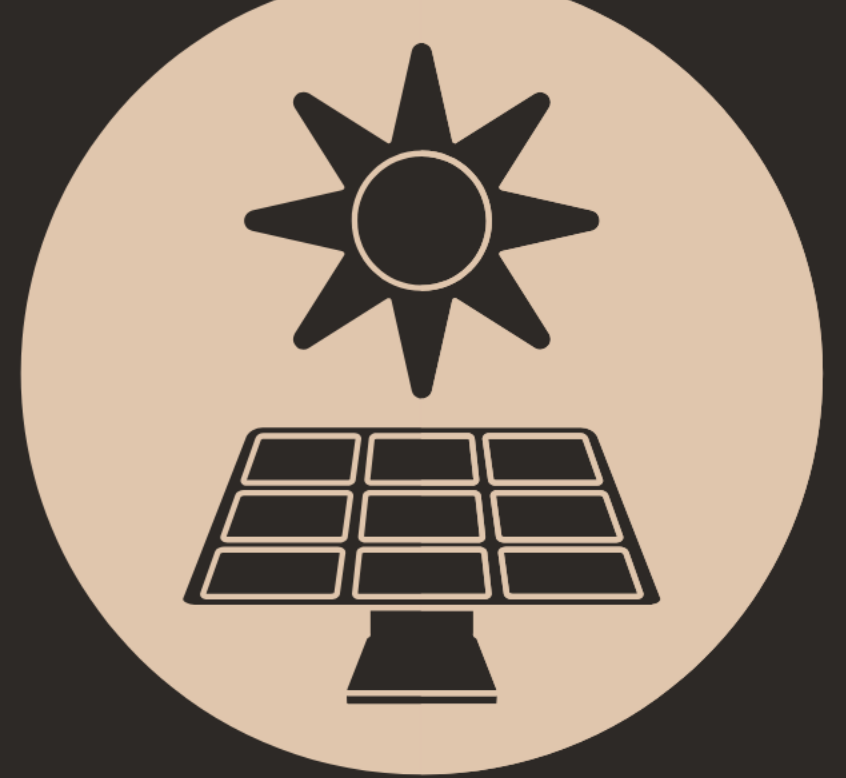
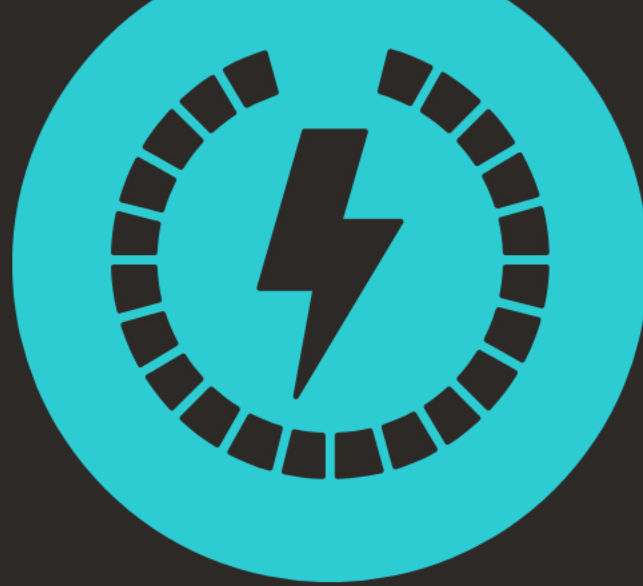


TESTING



AND MORE TESTING





LESSON #17

SO, WHERE'S THE MONEY?



LIFECYCLE COSTS
(VS TYPICAL SCHOOL BUILDING)



\$115K

**SAVED PER YEAR
ON ENERGY COSTS**

\$3.2M

**SAVED OVER 20 YRS ON ENERGY
& MAINTENANCE COSTS**



44,560 SF

500

STUDENTS
(CAPACITY IS 625)



**WITHIN COST
PER STUDENT
STATION &
SREF**

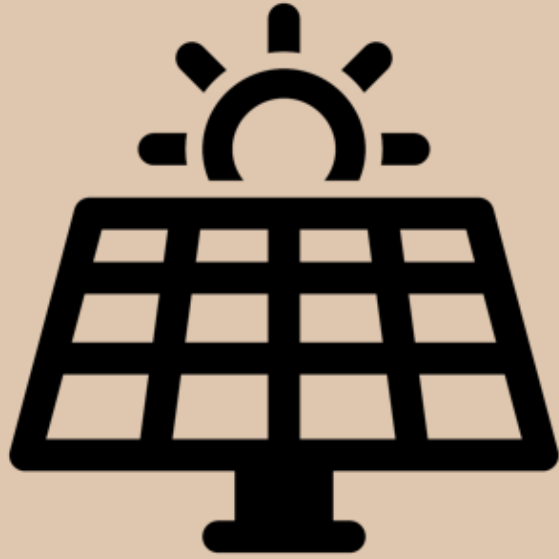


SOLAR PANELS

TOTAL: 650

470 SELF-BALLASTED ROOF MOUNTED

180 CANOPY MOUNTED

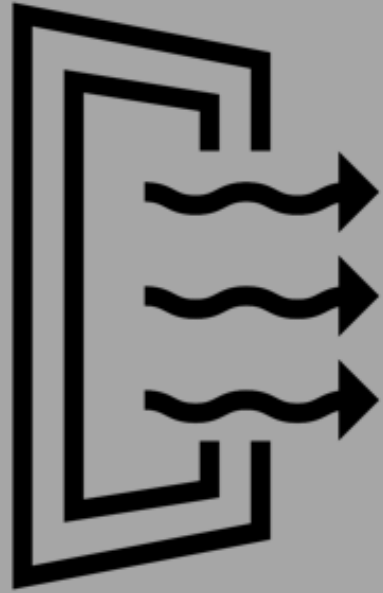


228kW

OF ENERGY
PRODUCTION



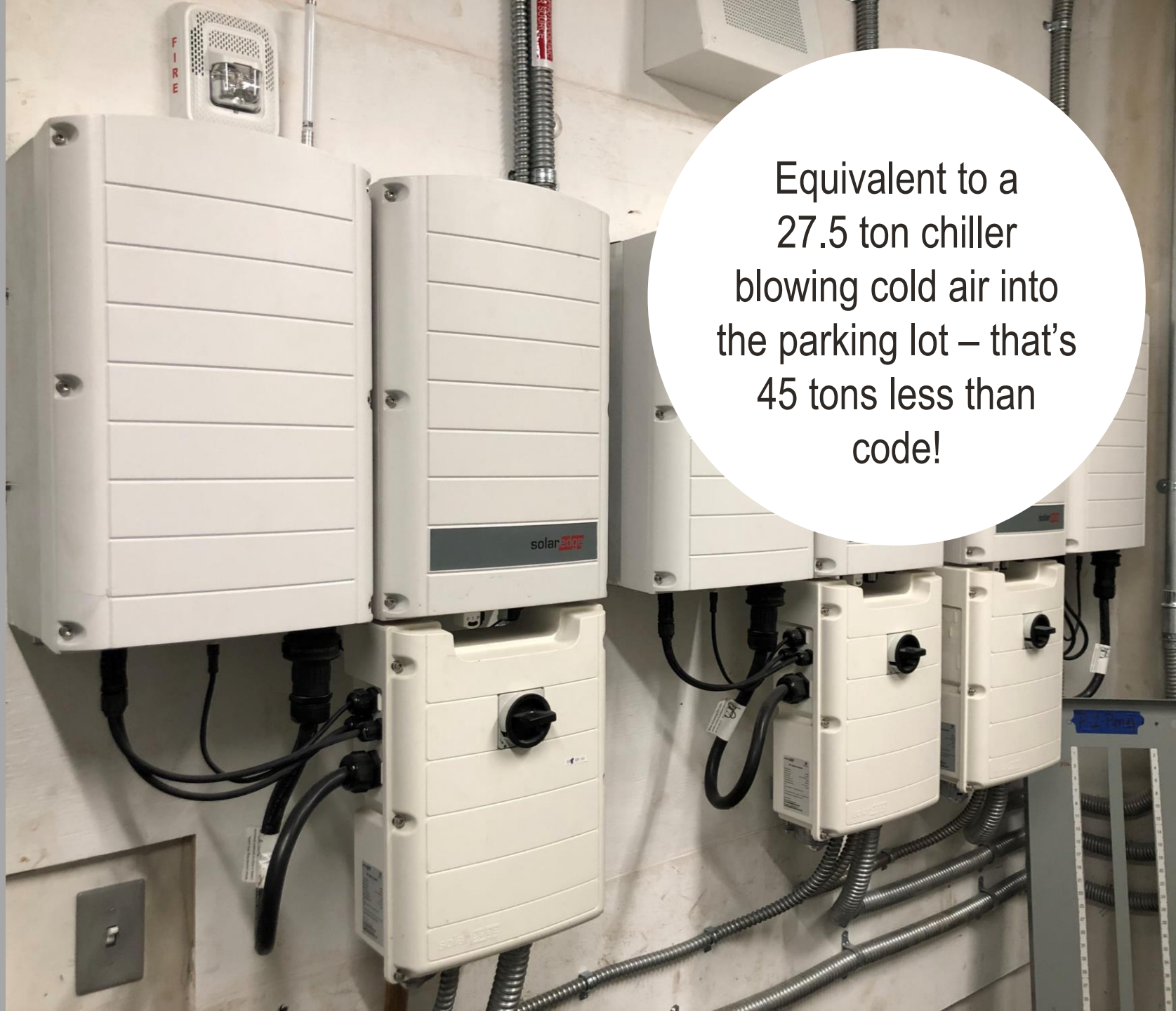
WHOLE BUILDING AIR LEAKAGE
AREA OF ENVELOPE: 73,286 SF



10,993 CFM

.15 cfm (at 75 Pascals)

REQUIRED RATE



Equivalent to a
27.5 ton chiller
blowing cold air into
the parking lot – that's
45 tons less than
code!

WHOLE BUILDING AIR LEAKAGE
AREA OF ENVELOPE: 73,286 SF



1,970 CFM

.027 cfm (at 75 Pascals)

TESTED RATE

82% better
than required!
That's 68 tons of
cold air loss less
than code!



HIGH PERFORMANCE
BUILDING PREMIUM



+ 5.5%

ROI = 6 YEARS



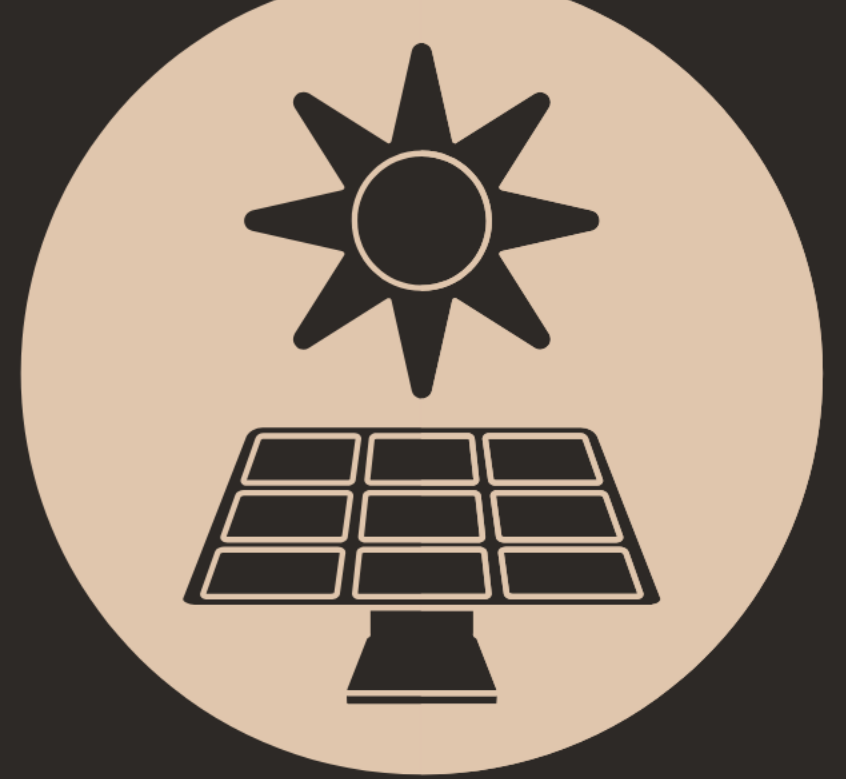
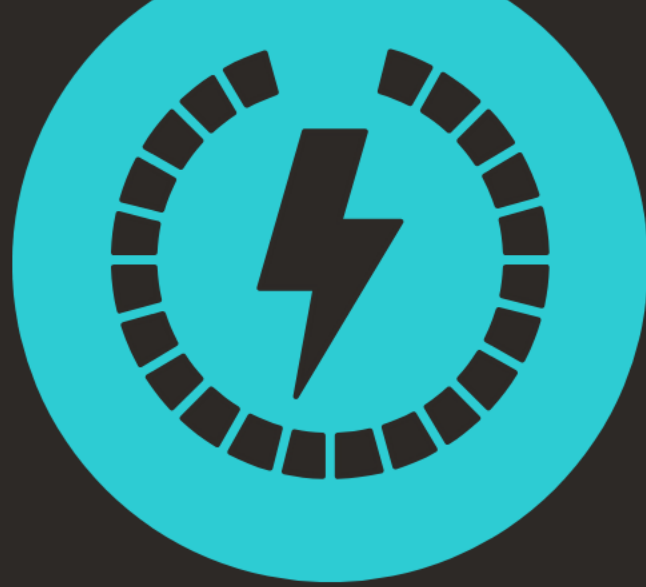
FULL ZERO-ENERGY
BUILDING PREMIUM



+ 9.3%

ROI = 9.5 YEARS





Q&A

