



La Cámara de Comercio de Puerto Rico
y su Comité de Energía y Agua presentan el Foro:

Sistema Energético 3E: EFECTIVO, ECONÓMICO Y EFICIENTE

Panel III: Eficiencia Energética – Beneficios Económicos y Ambientales



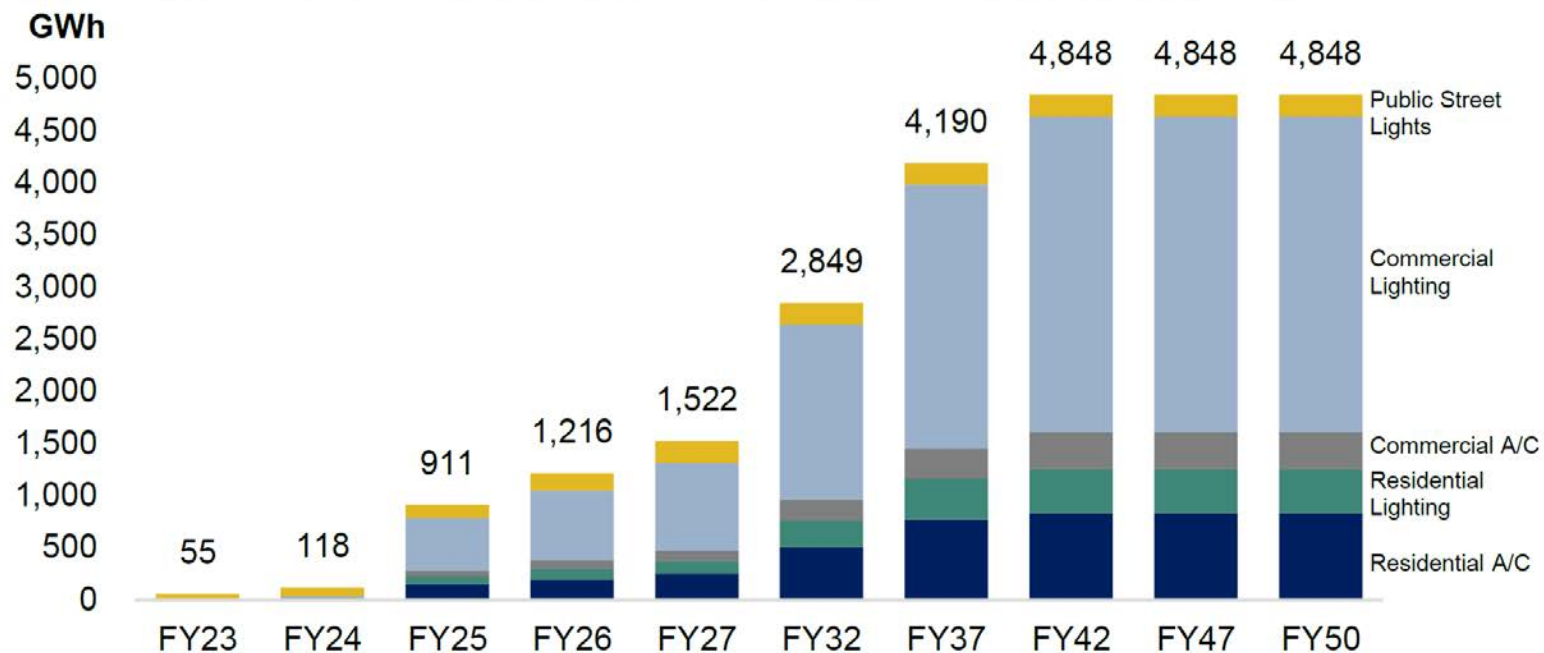
#CamaraEnAccion

Foro Sistema Energético 3E: Efectivo, Económico y Eficiente

Definición de Eficiencia Energética:

- ✓ Es el uso óptimo de la energía para obtener los mismos resultados en cuanto a la utilización de todo equipo que utilice energía eléctrica. Por ejemplo: Obtener más lumen/watt utilizando una bombilla LED o utilizando una unidad de aire acondicionado de mejor eficiencia (menos consumo energético) mientras se obtiene las mismas condiciones ambientales.

EXHIBIT 58: CUMULATIVE ENERGY EFFICIENCY SAVINGS BY PROGRAM (GWH)



1. Ley 57-2014 de Transformación y Alivio Energético y Ley 17-2019 de Política Pública Energética, establecen una reducción en la carga neta de un 30% (utilizando como base el 2019) para el 2040.
2. IEA (International Energy Agency) en COP27: La eficiencia energética como un recurso valioso para impulsar el rendimiento energético de la economía y la renovación de los edificios.

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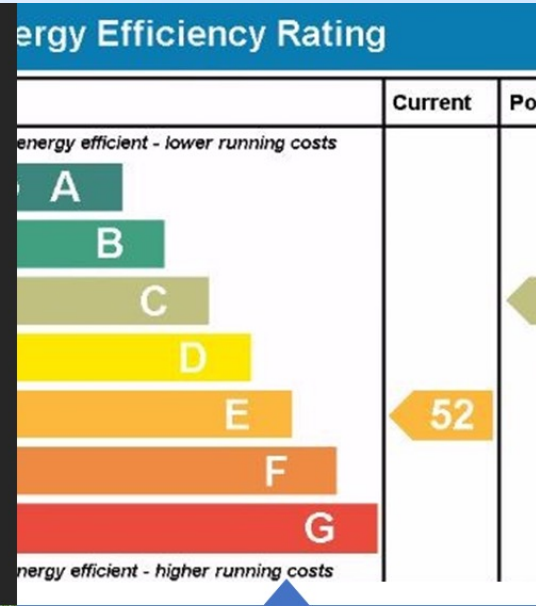


DURABILIDAD

Habilidad de
aguantar

RESILIENCIA

Habilidad de
rebotar

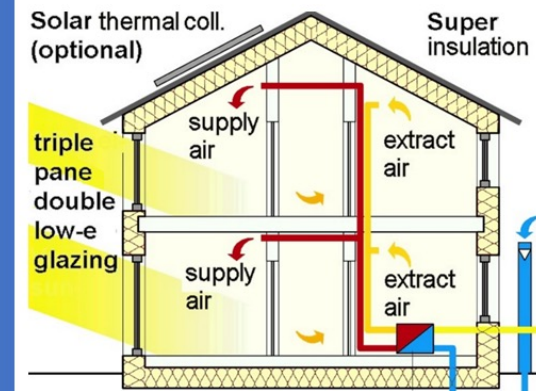


EFICIENCIA
ENERGÉTICA

Hacer más con
menos, eliminando
desperdicio

DESEMPEÑO DE
EDIFICIOS

Como un edificio
lleva acabo sus
funciones

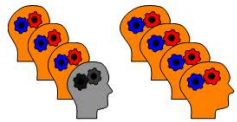


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“Energy Treasure Hunt”

- ✓ Identificar oportunidades para reducir el consumo de energía en el área de trabajo en horas de operación y fuera de horas de operación.
- ✓ Oportunidades deben ser sin inversión o inversión mínima.

Conceptos de “Treasure Hunt”



Combinación de
Conocimientos



Ir y ver,
3 días de evento



Identificar el uso
de energía



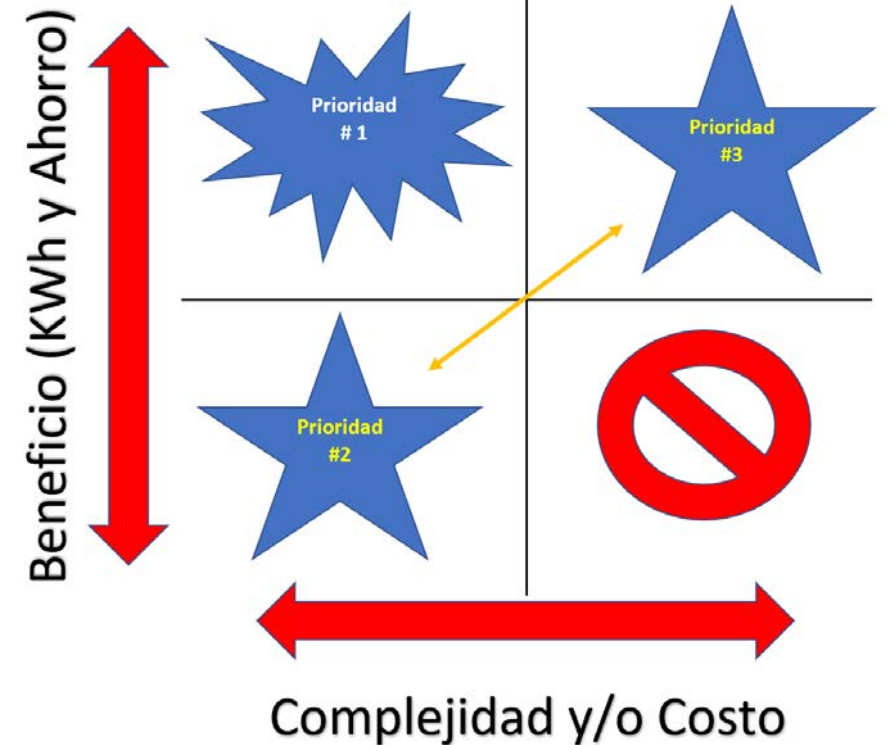
Traer nuevas ideas
y compartir mejores
prácticas



Identificar manera de
ahorrar en los proyectos
y
Establecer una cultura
de ahorro energético



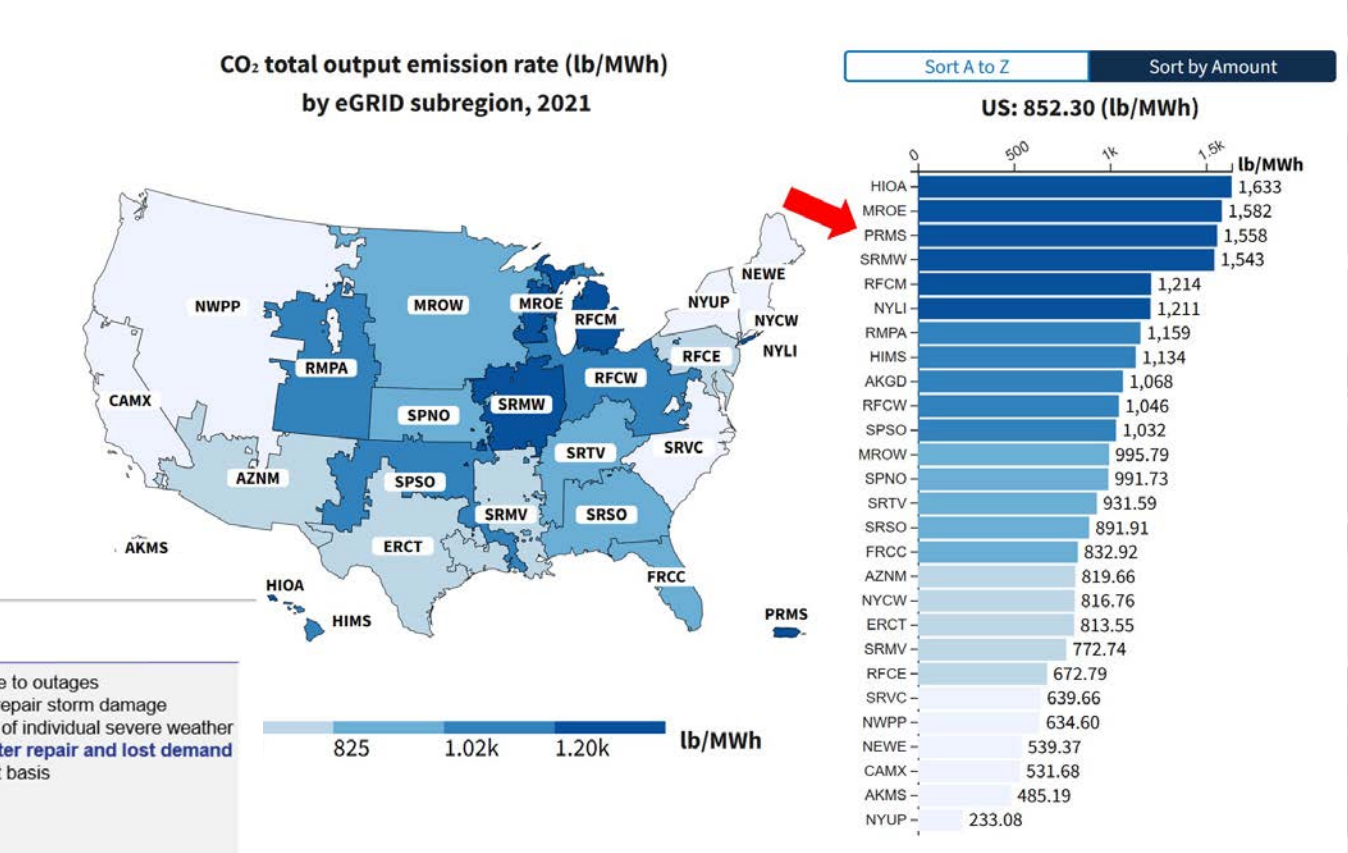
Mejoramiento
Continuo



Impacto Ambiental:

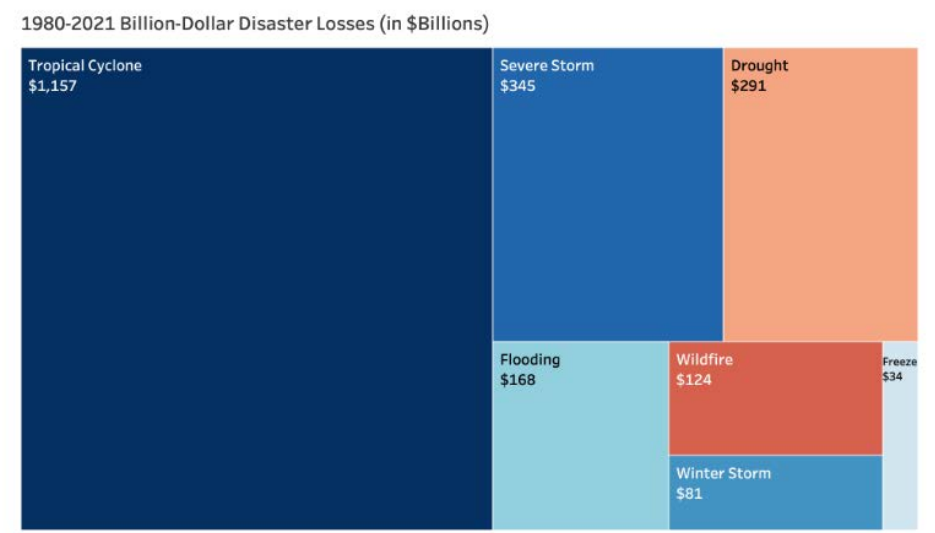
EXHIBIT 26: IMPACT OF CLIMATE EFFECTS ON PREPA

Impact Level	Climate Effects	Description	Impact on PREPA
	Damage from extreme wind	- Frequency of extreme wind days have increased 28% since 1980 - While average intensity has remained stable since 1980, maximum wind speeds have increased	- Loss of revenue due to outages - Increased costs to repair storm damage - Increased intensity of individual severe weather events suggest greater repair and lost demand costs on a per-event basis
	Damage from extreme precipitation	- Projections suggest a 15% to 25% decrease in extreme precipitation days - Projected increase in intensity of extreme precipitation days suggest a shift toward less frequent, more severe events (i.e. hurricanes)	
	Damage from coastal flooding	- Projected 1 to 2 ft sea level rise by 2050 expected to increase risk of coastal inundation and flooding - Greatest risk posed to Northeast regions (i.e. San Juan)	
	Wildfire risk	- Natural forests cover significant share of PR land mass - Rising temperatures can increase wildfire potential and subsequent risk of fire hazard and powerline damage	
	Heat stress	- Higher average temperatures could increase surges in demand for A/C (currently 27% of total energy demand for hot-humid climates) - Heat waves and droughts, however pose risks to infrastructure	- Increased demand for electricity - Potential increase in revenue due to increased demand
	Decreased transmission efficiency	Energy loss in transmission and distribution is positively correlated with temperature	- Increased generation required to meet equivalent demand due to increase energy loss - Increased costs to increase generated load & generation capacity



Foro Sistema Energético 3E: Efectivo, Económico y Eficiente

Figure 2 // Billion-dollar climate- and weather-related disasters accounted for 80 percent of disaster-related losses, totaling \$2.2 trillion from 1980-2021 (shown in \$billions below).

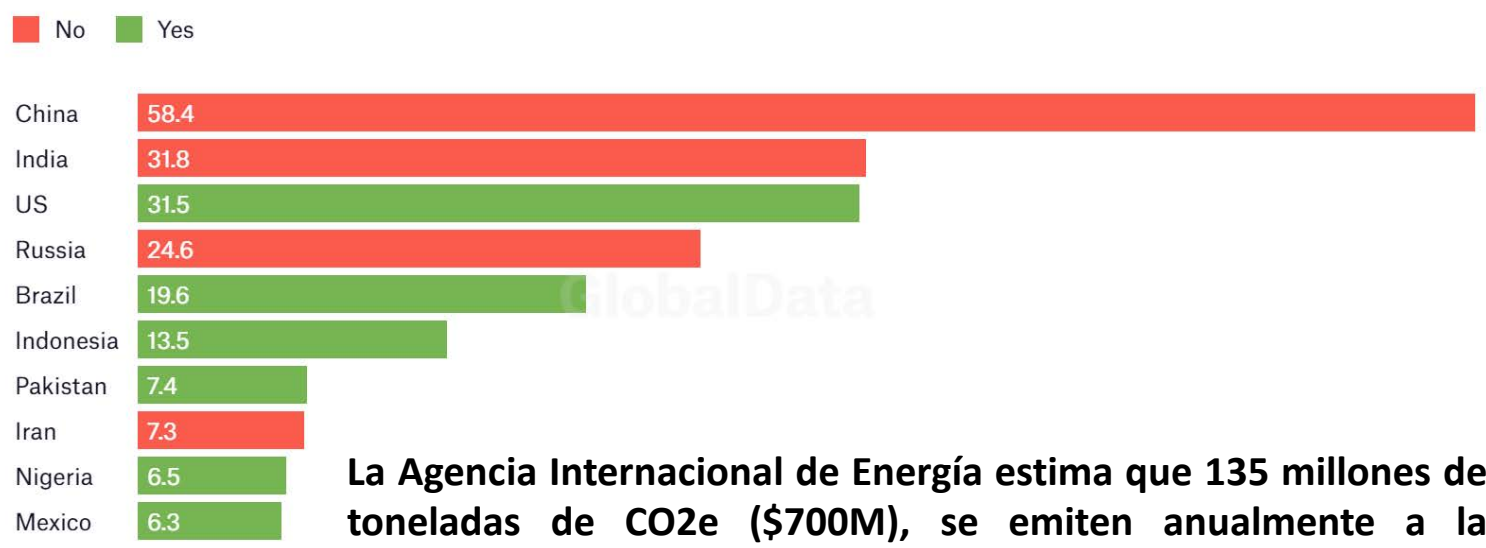


(data source: NOAA, 2022).

Pérdidas anuales por desastres de miles de millones de dólares durante los últimos cinco años: un total de \$765 mil millones en pérdidas y más de 4,500 muertes entre 2017 y 2021, fueron casi ocho veces más altas que en la década de 1980. (NOAA, 2022)

Four of the top ten methane emitters didn't pledge to cut emissions

Top ten emitters of methane in 2021 (Mt), and Global Methane Pledge participants



Mt stands for megatonnes.
Source: IEA

La Agencia Internacional de Energía estima que 135 millones de toneladas de CO₂e (\$700M), se emiten anualmente a la atmosfera debido a escapes durante la extracción y transporte de gas natural.

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“No tienes que creer en el cambio climático para resolverlo. Todo lo que hagamos para aumentar la eficiencia energética generará dinero, mejorará la seguridad y la salud, y estabilizará el clima.”

Amory Lovins, Rocky Mountain Institute

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The urban built environment is responsible for 75% of annual global GHG emissions: buildings alone account for 39%. Eliminating these emissions is a key element in addressing climate change.

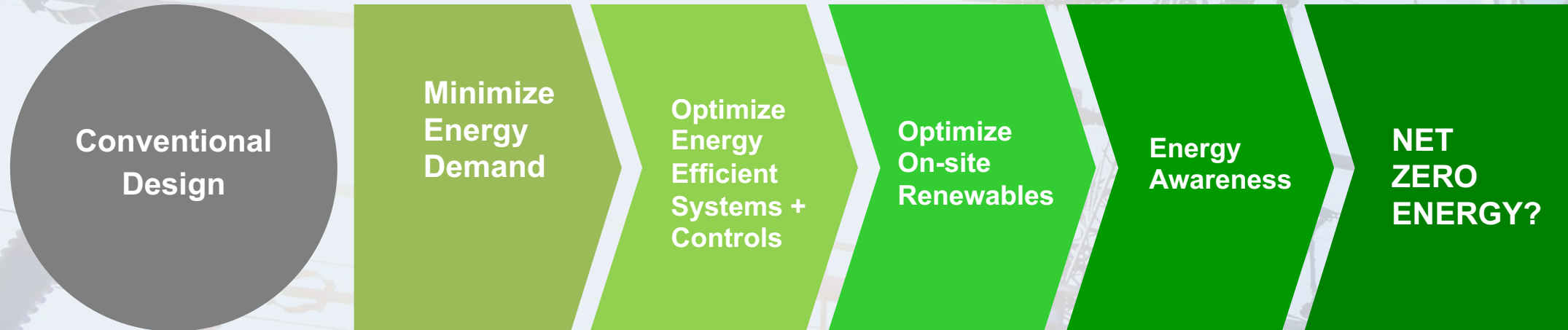
The design and construction industry is a 1.9 Trillion-dollar piece of the U.S. Economy, and Architects and Engineers are its Thought Leaders.

A GSA study found that high performance buildings deliver substantial savings over conventional buildings:

- 23% less energy consumption
- 28% less water consumption
- 25% decrease in Operational Expenses
- 9% less Waste to Landfills
- 2% Increase in Tenant Satisfaction
- 8% -15% Rental Rate Premium
- 2-5% Higher Occupancy Rates
- 8-12% Resale Premium
- Higher Net Operating Income

- *GSA June 2018 report: The impact of high-performance buildings*
- *Appraisal Institute White Paper Green Building and Property Value A Primer for Building Owners and Developers*

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Appropriate Renewable Technologies

- Photovoltaic array
- Solar domestic hot water heater
- Wind energy capture systems
- Waste heat capture

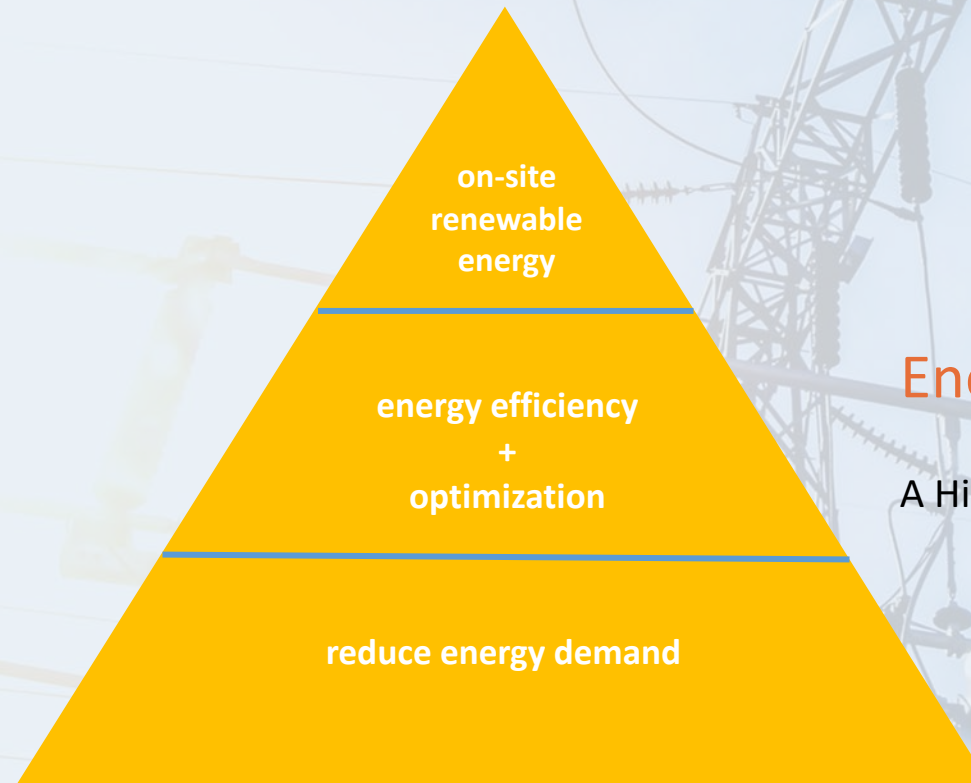
Efficient Systems + Integrated Controls

- Right-Size High efficiency HVAC system LED Simplified Hydronic Distribution
- Variable speed water pumps
- Lighting and lighting controls
- Energy star rated appliances and electronic equipment

Passive Architectural Design

- Exploit existing solar and wind orientation
- Properly Insulated Building Enclosure
- High performance glazing + Shading Devices
- Light Harvesting optimized window openings

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↑
INTEGRATED DESIGN PROCESS



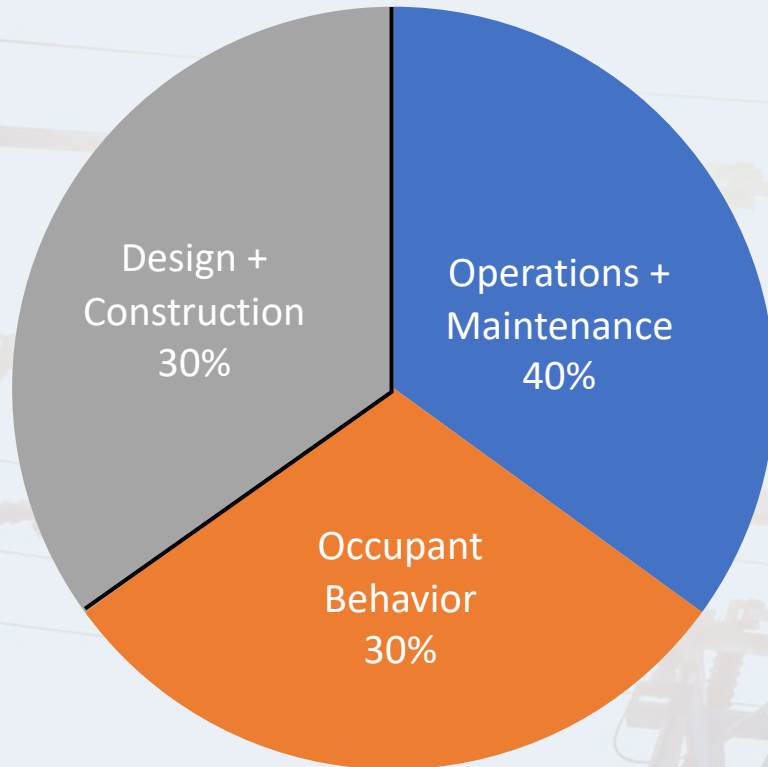
Energy Aware Design

A Hierarchy of Design Strategies

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Energy Awareness

The Vision



The Reality

Operational

- **Culture: Continuous Improvement**
- Preventive Maintenance
- Track Energy + Water Consumption
- Benchmarking
- Energy Audits

Institutional

- **Culture: Energy-Awareness**
- Occupant Awareness + Participation
- Company Energy Efficiency Policy

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Metrics Achieved

38 % Energy savings (\$175,000 / yr)

10% Renewable Energy (\$26,000 / yr)

75 % Potable Water Savings (\$75,000 / yr)

Low-Impact Site Design

- Rainwater Harvesting Matrix
- Permeable Concrete
- High-albedo paving + roof
- Xeriscape and N+A Landscape

80% C+D Waste Diverted

- Modular Construction

M+V Plan for Energy and Water

LEED Platinum 2012

80 Points



SARTORIUS

ECO I Clean Room Manufacturing Facility 2012



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SARTORIUS

Yauco Manufacturing Campus Expansion 2016-2019

LEED Goals + Metrics:

Scale Project Proven Design Strategies and Construction Best Practices to a much larger site and a larger, more complex building design...

Energy Savings **35%**

Renewable Energy **+ 25%**

Potable Water Use Savings **65%**

Low-Impact Site Design Strategies

C+D Waste Diversion **80%**

Energy and Water Dashboard



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Campus-Wide Metrics Achieved



Energy Savings

\$850,000 / 2,656 Tons CO₂ / yr



Potable Water Savings

By harvesting rainwater, AC condensate, and RO reject water. \$260,000



LID Stormwater Design

Mimics and maintains pre-development watershed conditions



CD Waste Diverted

Recycled and Re-Used Construction and Demolition Waste



New Trees Planted

500 more trees were planted than required for remediation 1,910 Tons CO₂ over 20 yrs.

Yauco Manufacturing Campus Expansion 2016 - 2019



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Benchmarking / Auditing / and Energy Dashboard Resources

Benchmarking

- **ENERGYSTAR Target Finder:** www.energystar.gov/buildings/service-providers/design
- **AIA 2030 Challenge Zero Tool:** Use to establish energy baselines and reduction targets for new and existing buildings.
<https://zerotool.org/>

Audit and Dashboard

- **Rocky Mountain Institute (RMI)** is an independent, non-partisan nonprofit that drives the efficient and restorative use of resources. www.rmi.org
- **ANSI/ASHRAE/ACCA Standard 211-2018 Standard for Commercial Building Energy Audits**
- **ENERGYSTAR Portfolio Manager Tool** (Free Energy and Environmental Dashboard)
www.energystar.gov/buildings/tools-and-resources/portfolio-manager-quick-start-guide

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***Building Certifications &
Green Building Standards***





¡GRACIAS!

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