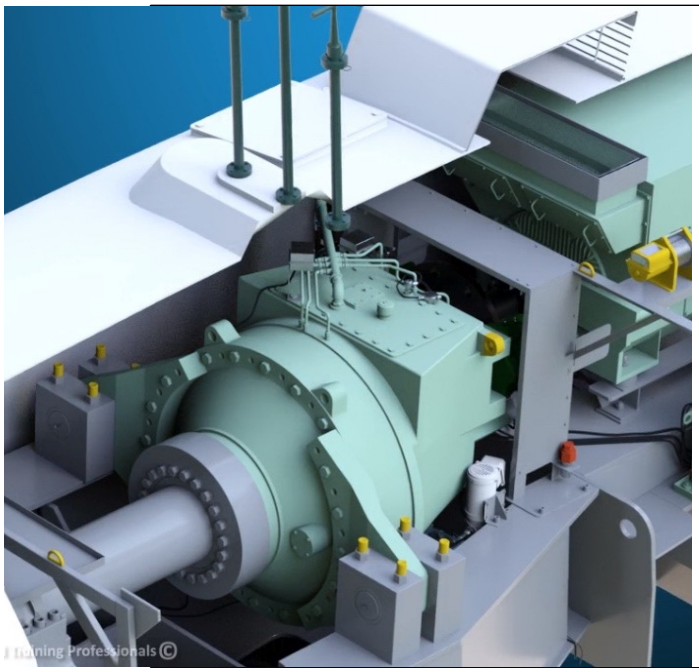

De-Carbonizing the Campus: Planning, Tools & Technologies
CampusEnergy2023
February 27 – March 2, 2023
Gaylord Texan Resort & Convention Center | Grapevine, Texas
INTERNATIONAL
DISTRICT ENERGY
ASSOCIATION



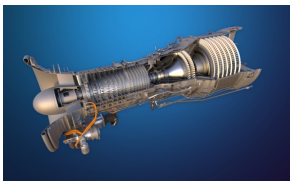
Preparing Today's Workforce for Tomorrow's Net Zero Energy Systems

Kelsey Gamble, CEO

Ken Daycock, VP

CHALLENGE: TECHNOLOGY

RETIRING EXISTING CRITICAL ASSETS



50 MW – Typical Gas Turbine

- Less than 1 acre
- Available 24x7
- Reliable

WHILE DEPLOYING NEW RENEWABLE TECHNOLOGIES

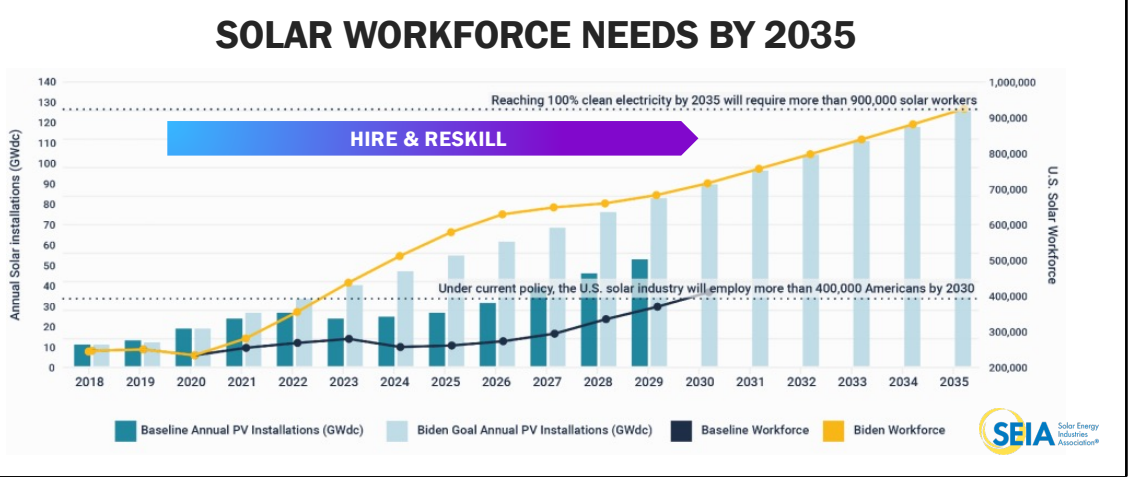
50 MW – Wind Turbine

- ~60 acres per tower
- Requires 10 to 50 towers, plus energy storage.
- Wind required, but restricted.

50 MW – Solar PV

- Requires 750 acres
- Huge infrastructure, plus energy storage.
- Requires consistent sunlight

CHALLENGE: PEOPLE



Wind

- 11,100 direct jobs in 2021 (US DOL)
- 1,900 jobs increase per year
- 44% increase by 2031

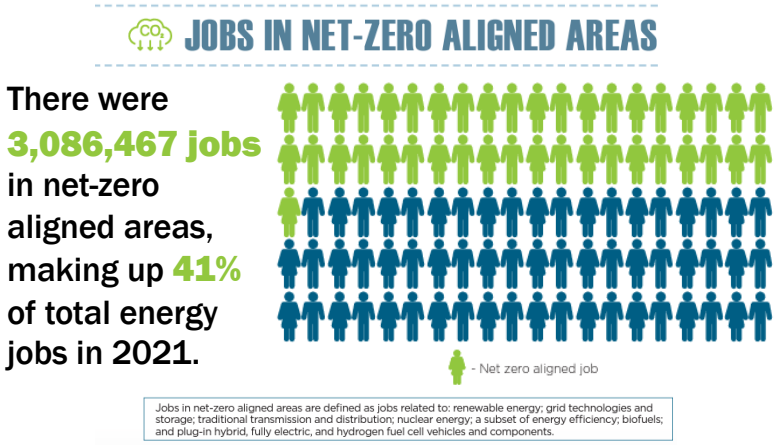
Solar PV Installer

- 17,100 direct jobs in 2021 (US DOL)
- 27% increase by 2031

The workforce needs graph is about the growing need for employees in this area, which references the actions "reskill and hire." While the Employment Report is about the alignment to net-zero focus areas, which showcases the need to "train and retain."

CHALLENGE: PEOPLE

TRAIN & RETAIN

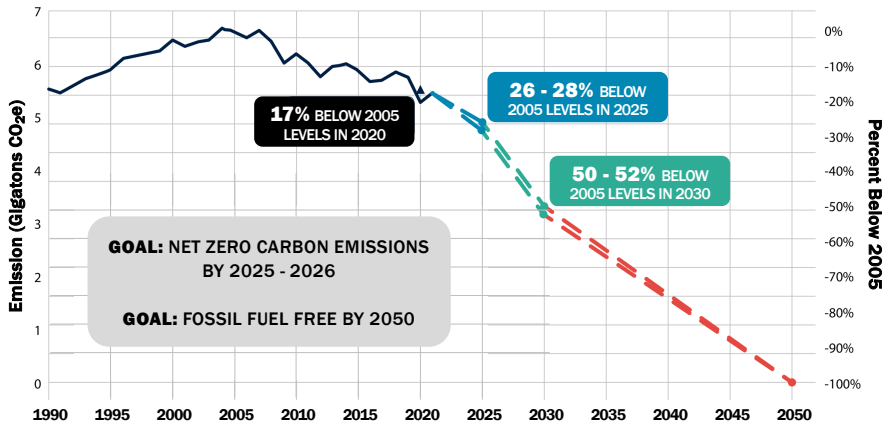


Bloomberg NEF (BNEF) reports that the global energy storage installations are projected to reach a cumulative 411 gigawatts (or 1,194 gigawatt-hours) by the end of 2030, 15 times the 27GW/56GWh of storage that was online at the end of 2021.

Hydrogen, Solar Thermal, Nuclear (including SMR), Geothermal all projecting job growth and/or training needs.

CHALLENGE: TIME

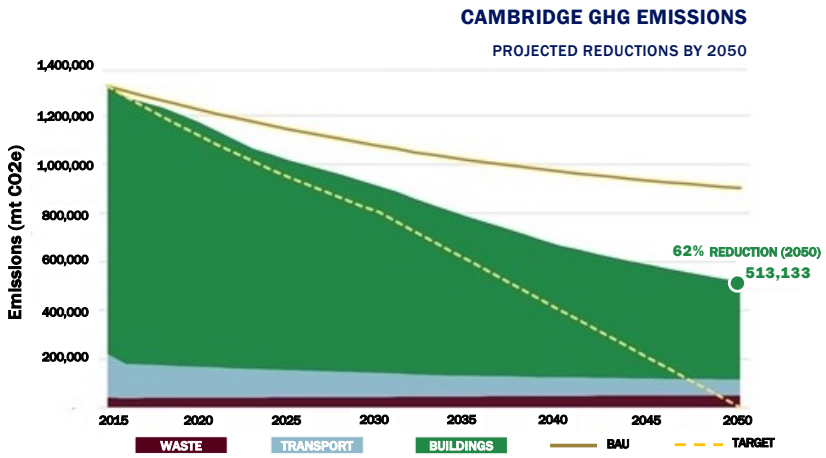
AGGRESSIVE CARBON REDUCTION & ELIMINATION TARGETS



Many IDEA CampusEnergy members have committed to achieving net zero Carbon emissions as soon as 2025 or 2026 and to be Fossil Fuel Free or NZGHG by 2050.

CHALLENGE: TIME

AGGRESSIVE CARBON REDUCTION & ELIMINATION TARGETS



The city of Cambridge, Mass is home to multiple universities, including Harvard, MIT, Cambridge, Lesley, and others.
Harvard – Fossil Fuel Neutral by 2026 & NZGHG by 2050
MIT - “Fast Forward” climate action plan, which was announced in May 2021, MIT has set a goal of eliminating direct emissions from its campus by 2050. An important near-term milestone will be achieving net-zero emissions by 2026.

The near term may be achievable with offsets and efficiencies, but 2050 will be a major paradigm change in how energy is generated, stored, and used. Obviously, there will be changes from our current technologies and an associated shift in workforce training.

Case Study – AES is an example of the process used in workforce transformation from obsolete to newer technology. This case study has documented results over the past 3-years, and the process is already being deployed on multiple renewable technologies.

CHALLENGE: TECHNOLOGY

OLD: BOILER

- 1960s technology
- Outdated and generic training

NEW: CC TURBINE

- Technology of today
- Customized training to match

The AES Corporation needed to transition its Southern California critical power generation resources from outdated and inefficient conventional steam power generation to state-of-the-art, highly efficient, and more automated combined cycle combustion turbine generation.

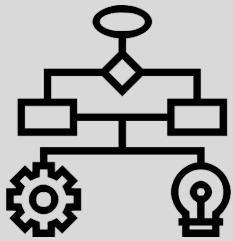
- Inefficient Conventional Steam Generation
- 1960s technology
- Facility utilized outdated training materials
- There were no visual custom training products created or used at this facility
- Training content consisted of standard PowerPoint presentations for generic processes and equipment

Transition to new

- 40% more efficient Combined Cycle
- Elimination of ocean water cooling
- A fully customized training package was developed for this site
- This consisted of a blended learning program including 3D equipment-specific animations, guides, Dashboard, on-site training package

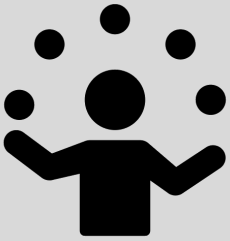
CHALLENGE: PEOPLE

DIFFERENT EXPERTISE



- 25 years avg. workforce experience.
- Little-to-no expertise with new equipment.

MAINTAIN BOTH SYSTEMS



- Team had to learn 'new' while operating 'old.'
- Cross-training in multiple roles necessary.

With a workforce averaging 25 years of experience on the old conventional power plant, it was critical for the training program to be customized not only to the AES site and new equipment but to the needs of the AES team. While making this transition, the team had to continue to operate in an existing power plant, while training on how to operate the new one.

Previously, the team operated with expertise in one-specific area. AES had a goal to cross-train their expertise to allow for more complex problem-solving and increased efficiencies.

CHALLENGE: TIME

AGGRESSIVE GOALS

- Equivalent Availability Factor (EAF)
- Concurrent Plant Operations
- Budget

AGGRESSIVE SOLUTIONS

- 6 Week Classroom
- Staggered Staff Sessions
- Animated CBT
- High Fidelity Simulation

AES had an aggressive EAF goal. The average is 87-90% for most power plants, while AES was trying to exceed these expectations by at least 3%.

On top of that, their current training program was 6 months. They challenged us to reduce it by half.

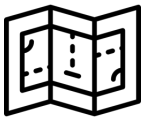
RESULTS

TIME & MONEY SAVED

- Training time reduced **(6 *months* to 6 *weeks*)**
- **$1.6 million reduction** in training costs
- **EAF 98%** (avg 87-90%) – each % point valued at **~$1.5 million**

FORMAT MATTERS

- eLearning before ILT - key to **engagement**
- Programs support efficient/cost-effective operation



BLUEPRINT

- Model serves as the **blueprint** for the AES / TTP training partnership
- Supports AES' **vision**: **(1)** world's leading power company **(2)** commitment to improving lives by delivering greener, more innovative energy solutions

APPLICATION TO NET ZERO ENERGY

	Solar Technician	Wind Technician	Battery Technician
Level 1	• Electrical Fundamentals • PV Fundamentals • Inverter Fundamentals • Transformer Fundamentals • SCADA Fundamentals • Maintenance Testing	• Electrical Fundamentals • Wind Turbine Fundamentals • Generator • Up tower Safety • Controls Fundamentals • Medium Voltage Transformers	• Electrical Fundamentals • Batteries • Maintenance
Level 2	• Substation Safety • Substation Fundamentals • Control Building • Testing Applications • Maintenance Basic	• Substation Safety • Substation Fundamentals • Tower Prep for Maintenance	• Substation Safety • Substation Fundamentals
Level 3	• Advanced Maintenance: *NERC Maintenance, Hi-Pot, Electrical Splicing & Termination, PD Testing*	• Advanced Maintenance: *Borescope, Alignment, Vibration. other*	• Advanced Maintenance: *Battery Capacity Testing*

Renewables Technician Portfolio = 100+ Modules and Growing

The blueprint for preparing the future workforce to operate and maintain emerging renewable energy assets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